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The consequences of illicit drug use. Estimation, methods and challenges

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Abstract. Recognised as a contributor to the global burden of disease, drug use has been a source of continuous concern among practitioners and policy makers and a field for methodological debate among researchers. The consequences of substance use have always challenged the healthcare, social care, law enforcement and the legal system. This paper explores several methods used in estimating the costs and impact attributable to the use of illicit drugs with the aim of getting a broad understanding of the current research and the use thereof by practitioners and policy. The desk review behind this paper includes government reports, analyses and publications of relevant bodies, research done by various authors and organisations, academic investigations and findings from literature review. The case study includes an estimation of the burden of overdose deaths measured in years of life lost (YLL) and explores possible shortcomings that represent a challenge for research.

Keywords. Social cost, economic cost, drug use, burden, drug related deaths, drug induced deaths

Introduction

Almost a third of European adults aged 15 to 64 accounting for 83,4 million people have used illicit drugs at some point in their lives, most of them with a preference for cannabis, while some have also used stimulants such as cocaine, MDMA and amphetamines (European Monitoring Centre for Drugs and Drug Addiction [EMCDDA], 2022). Taking into account both direct and indirect deaths, substance use is estimated to cause one in five deaths globally, while for people aged 15 to 49, drug use is the sixth most frequent cause of death (Institute for Health Metrics and Evaluation [IHME], 2017). Substance use comes with a range of consequences, such as cardiovascular diseases, mental health problems and infectious diseases, that generally make the existence of the substance user a hopeless vicious circle and the life of the close ones a terrible ordeal. Depending on the frequency, duration of use and the risk behaviour a drug user gets involved in, the severity of the associated health problems may vary. The fact that the age of onset for drug use has been continuously dropping and that the illicit drug use is a major cause of preventable deaths among young people in Europe, are major causes of concern for
both specialists and researchers. Around 15.8 million young people in Europe aged 15 to 34 have used cannabis in the last year and almost 1% of the European adults are daily or almost daily cannabis users. Cocaine use increased among European young adults accounting for almost 2.2 million drug users, while about 1.4 million young adults in Europe reported having used amphetamines in the last year. These figures are meant to shed light on a dynamic phenomenon that represents a major part of present days reality.

Illicit drug use has correlations at health, social and economic level and is generally recognised as a contributor to the global burden of diseases (World Health Organisation [WHO], 2003), because of the disorders that drug consumption causes (Dagenhardt et al., 2018). Illicit drug use and alcohol use present similarities as the harm they cause is not limited to health but extends on other areas of life such as criminality or loss of productivity. They are both faces of a harsh reality that cannot be limited to only one person, the drug user. On the contrary, research has yet to explore the devastating impact of the addiction of one family member on the rest of the family and the extent of it on short and long term, as thoroughly as it does with the study of family, society or personality factors as predictors of risky behaviours, such as substance use (Mohammad Reza, et al, 2021). The costs of drug abuse can be calculated by adding the costs of the services provided to a drug addicted person throughout rehabilitation or how much that person could be able to generate provided he/she did not fall victim of drug use. Different methods are used to estimate costs in these two scenarios. On one hand, the drug user is a burden to several systems of response in our society and on the other hand, since productivity would not be hindered by the abuse of illicit drugs or alcohol, the non-user is a productive, creative individual and a source of welfare for the society. In the first case, the estimation is done in relation to a loss commensurate with all costs attributable to drug abuse including the loss of productivity and, in the second, estimations are done in relation to hypothetical advantages for our society.

1. Literature review

When trying to estimate the social costs of drug use, though different from the point of view of methodology, researchers identified sources of costs generated by substance use which can be traced back to the public health system, legal system and labour market. Most frequently costs estimates are made in relation to healthcare, as the medical environment presents the advantage of making use of concrete and measurable tools such as treatment days, medication costs, costs per patient, that help make sound estimates. Other estimations of costs related to crime and how authorities response to it add up to the this type of healthcare cost estimations. The response given by the authorities to the drug phenomenon also build upon the findings of large-scale population prevalence studies combined with data provided by the medical, judicial and prison system. Treatment and rehabilitation costs, crime costs and productivity costs are some of the most frequently used indicators when trying to estimate the burden of drug abuse in the society. While some costs can be easier identified, others cannot be translated into financial terms although they bear significant effects on health and society, such as the spread of drug related infectious diseases, drug related deaths, effects on new-born, criminality, unemployment, domestic abuse, divorce or homelessness (Berridge et al.,2015). Additionally, the impact of substance abuse of a family member on adults and children may often translate into dysfunctional families, emotional and physical abuse, financial and adjustment issues, all of which are risks and generate additional costs to the society (Nutt et al., 2010). Consequently, the collateral victims of illicit drug or alcohol use within a family should get more attention from research, policy and practice.
Methodology is not the only contrasting factor between estimates. Social structures, cultural and political values may also influence estimations of the impact of drug abuse on health, public safety, crime rate, productivity and governance (International Narcotics Control Board [INCB], 2013). Given that in order to have sound global and cross-country estimates, data should be reliable and comparable, agreement should be reached among researchers and public authorities, yet methodologies aiming to estimate these costs varied significantly over the past decade (Manthey et al., 2021). Since each research team seems to have different methods of evaluation, the reconciliation between researchers and specialists might be a long process.

In its reports, the United Nations Office for Drugs and Crime ([UNODC], 2010) included drug addiction treatment costs, healthcare costs, hospital costs, morbidity and mortality under health costs. One in six problem drug users end up in treatment, which means 4.5 million people and 35 billion dollars/year, according to the same source. If all drug addicted people benefited from treatment, the estimated burden would amount to 200 to 250 billion dollars in costs and 0.4% of the global GDP. Among the recommendations made in the UNODC report to reduce the economic burden of drug use and increase welfare, effective prevention is seen as a source of savings on the long term. It is estimated that one dollar invested in quality prevention may generate savings of 10$ in additional costs for the government, and studies made in USA show that a dollar spent on treatment generates savings of 4 to 12$ in medical care and crime reduction.

In the USA, the costs of drug abuse (illicit drugs, alcohol and tobacco) were estimated to almost 740 billion US dollars/year, of which 193 billion were related to illicit drug abuse, according to the National Institute on Drug Abuse. The social correlates of drug abuse such as infectious diseases (hepatitis and HIV/AIDS), deaths, criminality, parental neglect and driving under the influence add up to the list of additional costs for society. The Institute also estimated the loss of productivity caused by drug abuse to reach almost 120 billion dollars each year, while drug related crime cost the justice system around 56 billion US dollars. Healthcare, treatment, prevention and research in the medical field were estimated at around 11 billion dollars.

1.2. Methods used in estimating the costs and impact of drug use. In the process of estimating social costs as a sum of measurements (Eclemea, 2013), several data are taken into account such as mortality, non-fatal conditions, life expectancy, loss of health all of which are analysed on a time scale, whether lived with a certain health or lost by early death. Estimating such costs is a challenge because drug use is a hidden and stigmatised behaviour and because specialists did not reach an agreement on terminology and methods. Most frequently, estimations are a result of the analysis of several data sets: prevalence studies on problem drug use, data on problem drug use by sub-regions, cohort studies based on cause of deaths and all causes of death. The use of questionnaires applied in the general population or a certain category of drug users is a frequent data collection research strategy. Because of its limitations, the self questionnaire-based estimation method is used together with other types of investigations such as body fluid testing or, more recently, measurements of drug metabolites in wastewater. To reach sound estimates, these data are correlated with statistics on treatment admissions, drug use infectious diseases, overdoses, drug-related deaths, data from the medical field (Reid et al, 2012), which are included in the drug demand reduction area. In the analysis process, the absence of data on mortality related to the use of certain drugs, the differences among sub-regions, the absence of data on mortality and morbidity related to other diseases or violence, were identified as sources of uncertainties. When making an estimate of aggregate costs related
to drug abuse, the current situation is compared against a hypothetical situation in which drug use is absent in the past or the present. From the drug supply reduction field, the data provided by the law enforcement refer to the changes in the illicit drug markets, in drug prices, seizures and drug related crime.

The economic cost of drug abuse is determined by cost of illness (COI) studies, which put monetary value on the consequences of diseases analysed in terms of public and private expenditures and enable comparisons with other social problems (Akobundu et al., 2006, Clabaugh & Ward, 2008). Turning diseases into costs and making them comparable is beyond all debates on placing a statistical value on human life, but is a useful tool in guiding budget decisions and prioritising at policy level. The studies are meant to provide informative grounds for decisions making and guide programs that improve the health of the population (Clabaugh & Ward, 2008, p.18). In COI studies, estimates are done based on direct costs (e.g. treatment costs) and indirect (e.g. loss of productivity due to morbidity and mortality), which represent the tangible side of the substance use reality, whether we take illicit drug into account or alcohol. Pain, suffering, the impact of substance abuse on the family of a dependent user, violence, worsening family relations, the decrease of the quality of life, which cannot be monetised, represent the intangible side of the same story, which is not visible in measurements. In fact, the failure to include certain cost components that represent intangible costs in COI studies and the question of pain and suffering associated with substance abuse is the main reason for criticism to COI (Collins et al., 2006). The difficulty in placing value on intangible costs drove many researchers to exclude these costs from their studies, which generated a gap in understanding the entire picture.

In running estimations, researchers take into account the costs related to healthcare, the legal system, the social care system, prevention and education as well as research. Early deaths among drug-addicted people are also included in estimations. This indicator is relevant if we keep in mind that according to WHO, one in 5 early deaths in the EU can be linked to drug addiction and that illicit drug use is a significant cause of early death among young adults. Because death occurs among drug users earlier than among non-users, this loss can be measured in the number of years in which the individuals could have been able to make a positive contribution to the welfare of the community and the society. This is one of the main principles behind the Global Burden of Disease (GBD) study, the most comprehensive epidemiological study to date. It allowed for the first estimates of the deaths and diseases correlated with the illicit drug abuse at global level and it included cohort studies made in USA and Europe. Despite some criticism among researchers on mis-reported prevalence rates of drug use and drug related disease and difficulty in extrapolation, the study has been a major source of data on the causes and risk factors for death and disease since 1996. It also helped make long-term projections, which proved to be partially accurate, since according to IHME Infographic for 2017, ischemic heart diseases account for the first cause of death at global level, as projected two decades before (Murray & Lopez 1996, p.38). The GBD study provides an overview on world health by assessing both mortality and morbidity, which can be measured by ‘Disability Adjusted Life Years’ (DALYs). This standardised metric is one year lost in good health because of premature death, disease or disability and it allows for comparisons between the consequences of several diseases, between different countries and for trend analysis.

2. Methods of research

This paper explores several methods used in estimating the costs attributable to the use of illicit drugs with the aim of getting a broad understanding of the current research and the use
thereof by practitioners and policy. Based on the findings of European reports, national reports and open source databases, the case study analyses different approaches to the same indicator at global, European and national level. The drug related deaths and mortality indicator is relevant for measuring the overall impact of drug use on health and researchers recommend that it should be interpreted along with other indicators for a more efficient decision making. The indicator refers to direct drug related deaths (deaths induced by drug use, known as poisoning or overdose), indirect deaths, premature deaths or death caused by illicit drug use disorders (e.g. by increasing the risk of HIV infection, injury, hepatitis or suicide). Given the availability of data, 2017 was the year of choice for a common time interval and the perspective was global - European - national. By tackling one component of this indicator, which is overdose deaths, in the case of Romania, we aimed at estimating the impact of fatal overdose death on society and showing the possible causes of under-reporting in official data.

The analysis corroborated data from the Global Burden of Disease, Injuries and Risk Factors study - the main source of epidemiological data referring to the global impact of health problems -, the European Monitoring Centre for Drug and Drug Addiction - the leading authority on illicit drugs in the European Union, and the National Report on Drug Situation - the main source of reliable data on the drug phenomenon in Romania. While the GBD study summarises epidemiological evidence from multiple sources, the data included in the Romanian national report represent the result of direct reporting from public structures, as part of a process which implies effort, despite the limited response rate. The data is disseminated from national level to European fora as part of a routine reporting mechanism. The three sources of data play significant roles in informing practitioners and policy on health issues, in guiding policy decisions and defining strategic goals, therefore the reliability of the data was a significant factor in choosing these resources. Moreover, since the three resources of data are important tools for guiding strategic measures in terms of healthcare and better services for drug-addicted people, the challenges practitioners encounter in providing an accurate perspective on important health issues become relevant also for policy making.

However, the analysis of the data sets was done with caution, taking into account the different methods used in data collection and interpretation between sources. Definitions and terminology were excluded as differentiating factors between approaches since the sources of data use the International Classification of Diseases codes and similar definitions for the death attributed or related to drug use. Consequently, the reasons for the difference between the findings were analysed in relation to the current institutional capacity of the data providing entities.

Drug related death is one of the indicators used in estimating the burden of drug use on society. Taking into account the limited estimations for this indicator in Romania and the differences in the number of drug related deaths among the analysed data sources, the burden on society was measured in Years of Life Lost (YLL) generated by fatal overdose deaths. Based on the data available in the Romanian national report on drugs, an analysis of the burden of fatal overdose was performed for all direct drug-related deaths (N=32) reported for Bucharest, Romania, in 2017. The burden of fatal overdose was calculated in Years of Life Lost (YLL) and the analysis was gender sensitive. YLL were calculated by subtracting the average age of death from the average life expectancy. The resource used for male and female life expectancy was the State of Health in the EU. Romania. Country Health Profile 2017 (OECD, 2019). For trend analysis purposes, the YLL estimation was performed on 2019 data also, using as references the same data resources, updated for the year 2019.
Taking into account the average age for direct drug use related in 2017, which was 32.8, and the life expectancy at birth of 75.3 years in Romania (OECD, 2019, p.2), the loss can be roughly estimated in YLL, one of the components of Disability Adjusted Life Years (DALY).

\[ \text{DALY} = YLL = N \times L \]

where:
- \( YLL \) = Years of Life Lost due to premature mortality
- \( N \) = number of deaths in the population
- \( L \) = standard life expectancy - the age of death in years
- No adjustment made for disability.

\[ \text{DALY} = 1 \times 75.3 - 35.8 \]
\[ \text{DALY} = 39.5 \text{ years} \]

Roughly, there would be an average loss of 39.5 years generated by direct drug use deaths per individual. Sensitivity to gender or education in LLY estimations might yield different results, because of the differences of up to 10 years in life expectancy at birth (OECD, 2019). Given this difference in life expectancy at birth between males and females, DALY distribution in the population affected by overdose death shows almost three times more life years lost among women than men.

\[ \text{DALY} = 7 \times (75.3 - 35.8) \]
\[ \text{DALY} = 276.5 \text{ among male} \]
\[ \text{DALY} = 25 \times (79.1 - 35.8) \]
\[ \text{DALY} = 1082 \text{ among female} \]

Drug overdose deaths resulted in 1,358 total YLL in 2017 alone. The gender breakdown of the population affected by overdose death in 2017 in Romania shows higher numbers for females than males (25 as compared to 7), which would mark a noticeable trend as compared to the European one, where overdose deaths affect nearly four times more males than females (EMCDDA, 2019, p.6), if it were not for significant under-reporting. The YLL estimations against the average life expectancy age at birth (OECD, 2021) shows a total of 1,795.5 years of life lost \( (YLL = 45 \times (75.6 - 35.7)) \) due to direct related deaths in 2019, which is 1.3 higher than in 2017. Despite the limited availability of data, these results send a striking message on the impact of fatal overdose deaths on our society and should be extended in further research.

3. Discussion based on data analysis and interpretation

In relation to the consequences of drug use, the Global Burden of Disease, Injuries and Risk Factors study provides global estimates of the direct drug related deaths, indirect deaths, premature deaths or death caused by illicit drug use disorders. The global estimates for 2017 showed that the annual number of deaths caused by several risk factors, from smoking to illicit drug use, accounted for 11.4 million deaths, as shown below. Taking into account both direct deaths and indirect deaths, substance use was estimated to be the cause of one in five deaths globally.
Eleven million deaths were attributed to tobacco, alcohol and illicit drugs use each year (Ritchie & Roser, 2019), of which the majority is represented by indirect deaths (e.g. alcohol and illicit drugs increase the risk of suicide, hepatitis and liver diseases). Estimates on the global number of deaths, divided by cause, help put things into perspective, as drug use disorders account for a significant number of 166,612.55 deaths globally.

Deaths attributed to illicit drug use were estimated at 0.5 to 1.3% of multiple cause mortality among people between 15 to 64 years, in pre-pandemic times. The number of drug
related deaths would reach 211,000 annually, with young people being the most exposed to this phenomenon. In Europe, of the 43 health risk factors, drug use was the nineteenth in the top list of the world killers, with alcohol ranking third and smoking second (IHME, 2017) and accounts for 4% of all deaths among 15-39 year old people in Europe (EMCDDA, 2011).

For 2017, European estimates indicate that over 8 200 deaths attributed to the use of one or several illicit drugs were reported, most of which were premature deaths and affected people in their thirties and forties, a finding which is in line with the global trend. The report Drug related deaths and mortality in Europe, updated by the EMCDDA in 2019, indicates that, even if significantly under-reported, overdose is the most frequent cause of drug related death. One of the challenges indicated by the report is the continued under-reported figures on drug induced deaths (overdose deaths) in several countries, which generates unbalanced estimations across Europe (EMCDDA, 2019, ps.5, 12). Incomplete data hinders comparability and drives the European agency to recommend caution when making comparisons between countries and over time. In this publication, Romania was included in the light blue zone of countries reporting under 10 overdose deaths among adults aged 15-64, per 1 million people in 2017. It is also included in the group of countries that reported the proportion of drug induced deaths in people under 25 years of age to be less than 5%. For Romania, IHME data indicated 348 direct deaths attributable to drug use disorders in 2017, which placed our country next to Afghanistan and Yemen, and over 3 054 indirect deaths caused by drug use. By comparison, alcohol disorders were estimated to be responsible for 628 direct deaths and 37 822 indirect deaths in 2017, according to the same source (IHME, 2017).

Figure no. 3: Number of deaths by cause in Romania, 2017

![Number of deaths by cause in Romania, 2017](image)

Source: IHME, Global Burden of Disease, OurWorldinData.org/causes-of-death

Romanian public sources indicated significantly lower numbers for both direct (32) and indirect drug related deaths (10) in the same year and attributed important under-reporting to the lack of experience, of specific knowledge, legal terminology issues and financial restraints. While the reasons for under-reporting perpetuated (NAA, 2020, p.136), the reporting public system indicated upwards trend as compared to previous reports, without making a clear estimation on the impact of the 58 drug related deaths.

The reasons for the obvious under-reporting are complex, yet correctable. As mentioned in the same report (NAA, 2020, p.131), the number of data providers was below the average
and data reporting was hindered by inconsistencies in labelling indirect deaths, failure to understand the criteria and definitions, rigidity in approaching drug related deaths, the absence of the forensic doctor in the investigation team and because toxicological exams in case of traumatic or suspect deaths are not requested routinely. Despite limited data collection, the trend analysis shows ascending numbers of deaths, attributable mainly to heroin and methadone use and distributed mainly in Bucharest.

**Figure no.4: Direct and indirect drug related deaths, 2006-2019**

![Graph showing direct and indirect drug related deaths, 2006-2019](image)

Source: NAA, National Report on Drug Situation, 2020, p. 137

The 1 795.5 years of life lost due to direct related deaths in 2019, a number which is 1.3 higher than in 2017, and the 1 082 years of life lost generated by overdose deaths among women send a powerful message on the impact of fatal overdoses on our society. YLL approach is relevant for guiding services, and becomes even more relevant when measuring the impact of overdose deaths among women. In this case, sound estimations should help improve targeted services, adjusted to the biological-psychological-social needs of women, in order to reduce harmful outcomes. Moreover, in order to get a broader view on the impact of drug related deaths on our society, further research should be done on both direct and indirect deaths by making use of different sources of data.

**Conclusions**

The study of the impact of substance use represents the starting point in the process of understanding a constantly changing phenomenon, such as drug use. It also becomes a major component of the response that policy makers and authorities are expected to provide to our societies. The idea that substance use is one of the most costly realities of nowadays societies is generally accepted and its burden on the healthcare, judicial and social system is implied. The costs of drug use-related healthcare together with indirect cost are at focus of COI studies, while the intangible costs related to drug use seem to escape thorough scrutiny. Avoidable costs are included in different methods of estimation, which are more relevant for policy response.

The question of the burden that drug use poses on different response mechanisms, generates different answers from both research and policy. However, when data fail to reveal the impact of drug use, it is counterfactual to expect policy to provide an efficient response that would translate into a better access to healthcare for drug-addicted people or improved prevention programs. From the point of view of those who use the findings of research, a solution against incomplete estimations might be the interpretation of the findings based on different data sources in a complementary manner, with recommended caution. However, from
the point of view of the practitioners who are faced with the challenge of collecting data in imperfect systems, the solution is sustained investment in people, knowledge and technology. Though in the case of the drug related death indicator, different sources seem to be telling different stories, incomplete estimates are better than no estimates (IHME, 2018, p.10). Additionally, as IHME advises, disagreement about the estimates for a particular disease, data sources or approaches may arise between GBD collaborators and national specialists. However, taking into account the differences in data sets and findings between relevant resources, the influence of under-reporting on data comparability across countries and over time, the impact of systemic shortcomings on routine data collection at national level, the YLL approach to direct drug related deaths might be the better choice when trying to send a powerful message to practitioners and policy. In this approach, death is not just a raw number, it translated into lost years of health, years of family life, community life and years of productivity. Additionally, it helps guide strategic responses, improve prevention programs among young people, and develop targeted services in order to reduce this growing number of preventable deaths related to drug use.

The utility of the estimation of costs and impact of drug use for the improvement of knowledge, development of services and better policy making for both the general population and drug users, is undoubtedly the driving force behind current research in the field. However shadowed by variations in methodology, terminology, insufficient data or by the lack of agreement between researchers, costs estimations should be a prerequisite in the provision of efficient responses in the field of both drug prevention and care for drug-addicted users.

References


