



Costs of occupational injuries and diseases in Québec[☆]

Martin Lebeau^{*}, Patrice Duguay, Alexandre Boucher

IRSST, Canada



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ABSTRACT

Problem: Occupational injuries and diseases are costly for companies and for society as a whole. This study estimates the overall costs of occupational injuries and diseases in Québec, both human and financial, during the period from 2005 to 2007. **Method:** The human capital method is used to estimate lost productivity. A health indicator (DALY) is used in combination with a value of statistical life (VSL) to estimate, in monetary terms, the pain and suffering costs resulting from occupational injuries. **Results:** The costs of occupational injuries and diseases occurring in a single year in Québec are estimated at \$4.62 billion, on average, for the 2005–2007 period. Of this amount, approximately \$1.78 billion is allocated to financial costs and \$2.84 billion to human costs. The average cost per case is \$38,355. In view of the limitations identified in the study, it can be argued that this is an underestimation of the costs. Result analysis allows the injury/disease descriptors and industries for which the costs are highest to be identified. **Practical applications:** The results of these estimates are a relevant source of information for helping to determine research directions in OHS and prevention. The methodology used can be replicated for the purposes of estimating the costs of injuries and diseases in other populations.

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1. Introduction

Occupational injuries and diseases result in significant costs to society. These costs can be reduced through prevention activities. However, it is important to use reliable estimates of these costs in order to optimize decision-making in both prevention and research.

The literature contains many studies that estimate the costs of occupational injuries and diseases. Although, the majority of those studies do not include human costs, we are noticing that in the last 10 years those costs are increasingly considered by researchers, in addition to financial costs. In the United States, the contribution of Drs. Paul Leigh, Ted Miller and Geetha Waehrer is substantial.¹ Reports from *Access Economics (2006)* and *Health and Safety Executive (2013)* are also of significant interest.

One common characteristic of those studies is that they rely on many different sources and use many average estimates. This is appropriate for the estimation of the overall costs of occupational injuries and diseases, but it is likely to reduce the precision of ranking based on those estimates, as the specificity of each individual case is less taken into

account. Unlike what we usually see in similar study already published, the cost estimates in the present study rely mainly on individual data collected by the workers' compensation board. Characteristics of workers (e.g., age, sex, salary, and industry) and incidents (e.g., type, permanent disability weight, and days loss) are all from the Québec workers' compensation board (CSST), in addition to financial data (e.g., medical aid costs, income replacement indemnities, and death benefits).

The objective of this study is to estimate the financial and human costs of occupational injuries and diseases in Québec over the period from 2005 to 2007, and to present the injury/disease descriptors and industries for which the costs are the highest. Several methods from the scientific literature (e.g., DALY, willingness to pay, and human capital method) were used to come up with the estimates.

2. Research design

2.1. Population

The population considered in this study consists of all workers covered by the Québec occupational health and safety plan. For this population, the analyzed incidents relate to occupational injuries and diseases whose causal event occurred between January 1, 2005 and December 31, 2007. In this context, these are therefore new cases of occupational injuries and diseases occurring during this period, being recognized and accepted as such by the CSST.

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^{*} Corresponding author at: Institut de recherche Robert-Sauvé en santé et en sécurité du travail, 505, De Maisonneuve Blvd. West, Montréal, Québec, H3A 3C2, Canada. Tel.: +1 514 288 1551(385).

E-mail address: martin.lebeau@irsst.qc.ca (M. Lebeau).

¹ See, among others, Leigh, Markowitz, Fahs, and Landrigan (2000), Leigh, Waehrer, Miller, and McCurdy (2006) and Waehrer et al. (2007).

2.2. Data sources

To achieve the objectives set out in this article, various baseline data are necessary. These are data on the number of workers, accepted injuries and diseases, and the related financial data (disbursements).

The incident and disbursement data come from CSST administrative records. These have an average maturity of three and a half years for incidents that occurred in 2005 and three years for the ones that occurred in 2006 and 2007.² The use of three years of injuries and diseases reduces the impact of annual fluctuations, which may be caused by exceptional events or economic shocks.

2.3. Time dimension

In this study, we estimate costs based on incidence, which means that we take the new injuries and diseases that occur in a given year and estimate their total costs, irrespective of whether they extend over one or more years.

As for CSST disbursements, they are limited to the maturities specified in Section 2.2. As a result, a full picture of the costs will not be presented: some injuries or diseases may entail disbursements over a period longer than the maturity period and those costs will consequently not be factored in. However, for some cases it is possible to predict the future compensation. These are cases for which an income replacement indemnity is paid to a worker due to unemployability or age.³ In these few cases, the income indemnity paid up to age 65 can be estimated.

It should be noted that this limitation on the incidence of the costs of occupational injuries and diseases applies only to CSST disbursements. Other costs can be spread over a longer period, if necessary.

The amounts shown in this report are in 2006 Canadian dollars unless otherwise indicated. The amounts measured in later years are discounted at a rate of 3% and the amounts measured in earlier years are expressed in 2006 dollars using the Québec consumer price index.⁴

2.4. Classification of costs

The costs of occupational injuries are usually classified into three categories: direct costs, indirect costs, and pain and suffering costs (also called human costs). However, there appears to be no consensus in the literature regarding the cost components in the various categories. That depends, among other things, on the chosen perspective. The distinction between direct and indirect costs is not truly relevant to the societal perspective, which is the perspective chosen in this study.⁵ A classification of costs based on who pays for them is probably more appropriate.

Table 1 presents the cost components estimated in this study.

3. Costs of occupational injuries and diseases

3.1. Medical costs

Medical costs are all the expenditures made to treat and rehabilitate an injured or sick worker. Besides the amounts spent on medical personnel, medical equipment, and medications, transportation expenses

and administrative expenses (hospitals) are often included under this heading.

3.1.1. Medical costs for employers

The main medical costs to treat and rehabilitate workers with an accepted injury or disease are borne by employers through their CSST contributions. The medical costs assumed by employers can be obtained by adding together the medical aid costs and rehabilitation costs. Accordingly, the medical costs total \$235,890,077.

3.2. Funeral costs

Some injuries and diseases may result in death. These deaths entail funeral costs.

3.2.1. Funeral costs for employers

A portion of the funeral costs paid by victims' families may be reimbursed, up to a maximum amount, through a death benefit awarded to the individual who paid them. The monies are used to reimburse funeral costs and transportation of the deceased's body. The CSST's administrative records show that these payments totaled \$469,180 annually over the study period.⁶

3.2.2. Funeral costs for the community

The funeral costs assumed by the community are limited to the death benefits granted by the Québec pension plan (the QPP), to the person who paid the funeral costs. The death benefit is a lump sum payment and is granted if the deceased made a sufficiently large contribution to the QPP. We assume this is the case for all the deaths in our sample. The total amount of the QPP death benefits is estimated at \$447,500.

3.2.3. Funeral costs for workers

Based on our examination of a large number of websites dealing with the subject, we estimate the average funeral costs to be approximately \$7,500. The funeral costs assumed by the victims' families are estimated as the difference between \$7,500 and the funeral costs reimbursed by the CSST and the QPP.

The deaths that occurred during one year result in funeral costs estimated at \$1,349,457, of which \$432,776 is assumed by the deceased workers' families.

3.3. Salary costs

In this report, salary costs are defined as being unworked (or non-productive) hours that employers nonetheless pay in the form of wages and fringe benefits.

The day of the accident, the employer is required to pay the full day's wages and corresponding fringe benefits to any employee who suffers an injury on the job and is unable to work the rest of the day. However, it is impossible for us to know at what point in the day the injury occurred. We assume that, on average, at the time of the injury, a half-day of work remained to be done. Thus, a salary cost equal to a half-day's wages plus the fringe benefits has been assigned to all injuries (not diseases).⁷ These costs are estimated to be \$9,436,618 for the accepted injuries that occurred during one year.

² This difference in maturity stems from the fact that the IRRST began to extract disbursement data, other than income replacement indemnity data, only from 2009 onward. We do not feel that this will have a significant impact on the estimates obtained.

³ Due to the worker's age, the IRI is paid to a "...worker who is the victim of an occupational disease when 55 years of age or over or a person who suffers another employment injury when 60 years of age or over and who sustains, by reason of that disease or other injury, permanent physical or mental impairment that renders him unable to carry on his employment..." (*Act respecting industrial accidents and occupational diseases*, s. 53).

⁴ The consumer price index data come from the Institut de la statistique du Québec.

⁵ The societal perspective allows a more complete analysis because it seeks to estimate the costs for all members of the society.

⁶ As the data for compensated funeral costs were available only for 2007, an average of these costs was applied to each death occurring in 2005 and 2006. It should be noted that this total amount includes all the funeral costs paid by the CSST, including those for six cases that were not identified as an occupational injury or disease related death.

⁷ Fringe benefits increase workers' remuneration by 30% (see Section 3.4.2 for more details).

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