Estimating the financial return on employers' investments in the prevention of work injuries in Ontario

In August 2018, the Institute for Work & Health (IWH) published an Issue Briefing titled "What do employers spend to protect the health and safety of workers?" The briefing described a 2017 study to estimate occupational health and safety (OHS) expenditures by employers with 20 or more employees in Ontario, Canada. This Issue Briefing shares findings from a follow-up study to estimate the financial return on those OHS expenditures.

A 2017 study led by Dr. Cameron Mustard obtained estimated OHS expenditures for 334 organizations, based on interviews with a person in each organization knowledgeable about OHS practices. This person provided information on the organization's number of employees, economic sector, proportion of employees covered by collective agreements, and OHS expenditures in five dimensions: organizational management and supervision; staff training in health and safety; personal protective equipment; professional services provided by external organizations; and share of new capital investment attributed to improved OHS performance.

Average expenditures were calculated for 17 economic sectors, for goods-producing versus service sectors, and for the overall sample. The study estimated that the average OHS expenditure per employee per year in Ontario was $2,417 among goods-producing sectors, $847 in the service sectors, and $1,303 overall.

Recently, Mustard and IWH colleagues, Dr. Emile Tompa and Dr. Basak Yanar, extended this research to estimate the net financial return to employers from investments in OHS. They compared expenditures on OHS to the financial benefits (both tangible and intangible) for a sample of employers with strong OHS performance in three sectors in Ontario: manufacturing, construction and transportation.

KEY MESSAGES

- Building on earlier IWH research, an IWH study estimated the net financial return on investments in occupational health and safety among employers with at least 100 full-time equivalent employees in three large economic sectors: manufacturing, construction and transportation.
- In each of the three sectors, the average financial return on investment in OHS was positive. The average financial return was 24 per cent among 289 manufacturing employers, 114 per cent among 56 transportation employers, and 34 per cent among 88 construction employers.

Other research on the financial return on OHS investments

A range of research methods has been used to estimate the financial costs and benefits of employer expenditures on OHS. A study led by the International Social Security Association (ISSA) and German Social Accident Insurance (DGUV) reported that the average OHS expenditures per employee per year was more than €1,200 ($1,800 CAD) in a convenience sample of approximately 330 employers in Europe (Braunig and Kohstall, 2013). Employer representatives were also asked a single question about their assessment of the ratio of the financial benefits to OHS expenditures. The average estimated financial return on these investments was about $2.20 for each $1.00 invested in prevention. Using similar methods as the ISSA study, a U.S. survey of more than 400 senior financial officers reported a median of $2.00 of financial benefits for each $1.00 invested in prevention (Huang et al, 2011).

A study for the European Commission used a different approach (De Greef et al, 2011). The research team estimated the costs of work-related injury and illness in approximately 400 case studies, then worked with employer representatives to estimate the potential financial benefits arising from 56 specific prevention measures. Under conservative assumptions, the study estimated the ratio of financial benefits to OHS expenditures to be 1.29. Under a less conservative set of assumptions, the estimate was 2.18.

In 1999, the Ohio Bureau of Workers' Compensation established a Safety Incentive Grants Program to provide matching funds to employers who were investing in engineering controls to improve OHS. An assessment of the economic benefits of this program concluded that the financial benefits of the program's incentive expenditures in 2015 ($14.3 million) were in the range of $22 million to $39 million

(Miller et al, 2017). These financial benefits, comprised of avoided workers' compensation costs and employer productivity gains arising from avoided work-related injury and illness, represented a return on the program investments in the range of 1.6 to 2.9.

A study focused on the construction industry in the United Kingdom collected information from approximately 80 construction contractors on OHS expenditures and measures of financial benefits that included estimates of both tangible and intangible benefits (Ikpe et al, 2012). The ratio of financial benefits to OHS expenditures was about 2.6.

How the IWH return-on-investment study was conducted

The IWH return-on-investment (ROI) study included three phases. First, the project team established an estimate of the average cost of a lost-time workers' compensation claim, using a methodology by which employers can estimate both the direct and indirect costs of work-related injury and illness (Ontario Workplace Safety and Insurance Board, 2011).

Direct costs included wage replacement benefits and health-care services paid or reimbursed by the work disability insurance authority, as well as any expenditures contributed by employers related to wage supplements or the continuation of non-wage benefits. Indirect costs to employers included the costs to repair or replace damaged property, material or equipment; administrative costs associated with injury event investigations and the hiring and supervision of replacement staff; productivity costs associated with work interruptions; and costs associated with legal services or complying with labour inspection enforcement orders.

The estimate of direct costs of a lost-time claim was based on an actuarial estimate by Ontario's Workplace Safety and Insurance Board (WSIB) of the current year expenditures and future year liabilities for new lost-time claims in a current year. The actuarial estimate for current year expenditures and future year liabilities for the approximately 45,000 lost-time claims in 2018 was $1.35 billion. Claim administration costs added $400 million. Using these data, the average direct cost of a lost-time compensation claim was estimated to be $39,000 in the manufacturing and transportation sectors and $78,000 in the construction sector. (The cost to an individual employer may vary from the average sector cost, but this does not affect the estimates of average ROI for the sector.)

In this methodology, indirect costs of a lost-time claim would, on average, be two to four times the value of direct costs. The research team adopted a conservative estimate that indirect costs were twice the value of direct costs.

In the second phase, the team drew on administrative records of work-related injury and illness reported to the WSIB to identify employers with at least 100 full-time equivalent (FTE) employees that had the lowest incidence of work-related injury and illness in the three sectors, based on employers' claims records for the period 2013-2018.

In the construction sector, 465 employers had an insured workforce of greater than 100 FTEs. Among these, 165 had a lost-time claim incidence rate that was 60 per cent lower than the average for their assigned Rate Group. In the manufacturing sector, 1,805 employers had an insured workforce of greater than 100 FTEs, and approximately 400 had a lost-time claim incidence rate 60 per cent lower than the average for their assigned Rate Group. In the transportation sector, 371 employers had an insured workforce of greater than 100 FTEs, and approximately 110 had a lost-time claim incidence rate 60 per cent lower than the average for their assigned Rate Group. The number of employers retained for further analysis was 88 in construction, 289 in manufacturing and 56 in transportation. The project team excluded employers with inconsistent lost-time claim incidence rates over the six-year observation period, as well as employers registered in multiple Rate Groups.

In the third phase, the project team applied a set of plausible assumptions to estimate the financial benefits of OHS expenditures. This phase of work involved four steps.

Step 1: Estimating occupational health and safety expenditures

Estimates of OHS expenditures were obtained from the results of the earlier IWH study described above (Mustard et al, 2019; see also the 2018 IWH Issue Briefing). The estimated sector-level average OHS expenditures per worker per year were imputed to each of the individual employers in the construction, manufacturing and transportation employers in the sample for the current study.

Step 2: Estimating tangible financial benefits

For each of the 88 firms in the construction sector, the 289 firms in the manufacturing sector and the 56 firms in the transportation sector, the project team estimated the tangible financial benefits (direct and indirect costs of claims averted) arising from the employer's strong OHS performance.

The project team calculated the expected number of claims the employer would have experienced if the firm had the average lost-time claim incidence of its assigned Rate Group. The difference between the expected number of lost-time compensation claims and the observed number of lost-time compensation claims represented the number of lost-time claims averted by the employer's strong OHS performance. As described above, the direct cost of each averted claim over the six-year period was based on estimates provided by the WSIB. The indirect cost of the total averted claims was estimated by multiplying the direct cost by two. The sum of the direct and indirect averted costs was divided by six (years) and by the average number of full-time equivalent staff, resulting in an estimate of a tangible financial benefit per worker per year.

Step 3: Estimating intangible financial benefits

Employers with strong OHS performance may generate intangible financial benefits arising from improved employee retention and morale, improved production quality and strengthened corporate reputation. There is little consensus on the most appropriate method for valuing these financial benefits. However, all employers with whom the study team consulted over the course of this project agreed that these intangible benefits were real and that they represented important organizational outcomes of strong OHS performance.

While confident that these intangible benefits were real, employer representatives were not confident they could define the financial value of these benefits precisely. There was a general consensus that intangible financial benefits were, at a minimum, equal to the tangible financial benefits of the prevention of work-related injury and illness. The research team then applied the assumption that intangible benefits equalled tangible benefits in its calculation of the overall financial return.

Step 4: Calculating the financial return on employers' OHS expenditures

The project team calculated the ratio of financial benefits to expenditures on OHS to estimate the financial return on OHS expenditures for the individual employers in the three sectors. The numerator of this ratio was the sum of tangible financial benefits per worker per year (Step 2) and intangible financial benefits per worker per year (Step 3). The denominator of the ratio was the estimated OHS expenditure per worker per year (Step 1).

Study findings on return on OHS investments

For all three sectors studied, the average return on employers' investment in OHS was positive and substantial. There was variation around the average, but most employers experienced a positive return. Details for the three sectors are as follows.

From the earlier IWH study, the average expenditure per employee per year on OHS investments in the **manufacturing sector** was $1,515. The estimated average financial benefit to employers was $1,884, yielding a benefit/cost ratio of 1.24 or an estimated return of 24 per cent. There was variation around this average, with approximately 118 employers (41 per cent of the sample) with an estimated benefit/cost ratio less than 1.0, and 171 employers (59 per cent) having an estimated benefit/cost ratio greater than 1.0.

The average expenditure per employee per year on OHS investments in the **transportation sector** was $1,326. The estimated average financial benefit to employers was $2,980, yielding a benefit/cost ratio of 2.14 or an estimated return of 114 per cent. Four employers (seven per cent of the sample) had an estimated benefit/cost ratio less than 1.0; for 52 employers (93 per cent), it was greater than 1.0.

The average expenditure per employee per year on OHS investments in the **construction sector** was $3,625. The estimated average financial benefit to employers was $4,851, yielding a benefit/cost ratio of 1.34 or an estimated return of 34 per cent. Sixteen employers (18 per cent of the sample) had an estimated benefit/cost ratio less than 1.0; for 72 employers (82 per cent), it was greater than 1.0.

The strengths and limitations of the study

This study applied a rigorous methodology to develop estimates of the financial return to employers on expenditures and investments in occupational health and safety. A novel component of this study was the inclusion of estimates of intangible financial benefits of strong OHS performance. These benefits arise from improved employee retention and morale, improved production quality and strengthened corporate reputation.

Measuring indirect costs and intangible benefits is inherently difficult, and there is no consensus in the literature as to how best to do this. As a result, there is inevitably some uncertainty underlying the estimates. The methods used in the study were based on plausible and conservative assumptions. For example, the value of indirect costs of averted work-related injury and illness (which translates into a financial benefit to the employer for each injury averted) is estimated as twice the value of the direct costs. This assumption is consistent with estimates reported from a study of more than 400 senior financial officers in the United States (Huang et al, 2011) and is on the conservative end of approaches to measuring these costs (which range as high as four times the direct costs).

Throughout the course of the project workplan, the project team consulted with representatives of leading employers to confirm the plausibility of assumptions applied in this study. The measure of intangible benefits from OHS investments relied on a conservative recommendation from these consultations that intangible financial benefits were, at a minimum, equal to the tangible financial benefits. More research on measuring intangible benefits would be helpful in reducing the uncertainty regarding this aspect of the estimates.

The estimation of the number of lost-time claims averted by employers with strong OHS performance also took a conservative approach. The study team compared the incidence of lost-time claims in the sample of employers with strong OHS

performance to the average incidence of lost-time claims among all firms in the employer's Rate Group. An alternate comparison to employers with the weakest OHS performance in their Rate Group would have increased the return-on-investment estimates. (Another way to think about this is that, if all employers in a sector were strong performers on OHS, the method used in the study would indicate no gain from the investment, since it relies on a comparison with the average. This would clearly understate the actual value of the investments.)

In addition to the uncertainty in the estimates of indirect costs and intangible benefits, there are some other limitations in this research. The benefit-to-expenditure ratios calculated for large Ontario employers with leading OHS may not be generalizable to all employers. It is also important to note that a summary measure of a return on investment, based on an average ratio of benefits and expenditures across a sample of employers, is not necessarily the benefit-to-expenditure ratio experienced by an individual employer. This is the case even within the sample, as some (but not all) elements of the calculation for individual employers were imputed from the overall sector average.

The estimates in this study indicated that the average financial return among large Ontario employers in three important economic sectors varied (by sector) from 24 to 114 per cent. These results are broadly consistent with the range of estimates available from other research in this field over the past decade, as summarized in an earlier section of this briefing.

The study discussed in this Issue Briefing was led by Dr. Cameron Mustard, now an adjunct scientist at the Institute for Work & Health after retiring as president and senior scientist earlier in 2022. His research colleagues included IWH Senior Scientist Dr. Emile Tompa and Associate Scientist Dr. Basak Yanar.

This briefing was prepared by Dr. Ron Saunders, an adjunct scientist at the Institute for Work & Health and its former director of Knowledge Transfer & Exchange.

References

Braunig D, Kohstall T. Calculating the international return on prevention for companies: costs and benefits of investments in occupational safety and health. International Social Security Association: Geneva, 2013; https://publikationen.dguv.de/widgets/pdf/download/article/2800

De Greef M, Van den Broek K, Van Der Heyden S, Kuhl K, Schmitz-Felten E. Socio-economic costs of accidents at work and work-related ill health. Directorate General for Employment, Social Affairs and Inclusion, European Commission: European Union, 2011; https://ec.europa.eu/social/BlobServlet?docId=7416&langId=en

Huang YH, Leamon TB, Courtney TK, Chen PY and DeArmond S. A comparison of workplace safety perceptions among financial decision-makers of medium vs. large-size companies. Accident Analysis and Prevention, 2011; 43(1), 1-10; doi: 10.1016/j.aap.2009.09.016

Ikpe EO, Hammon F, Oloke D. Cost-benefit analysis for accident prevention in construction projects. Journal of Construction Engineering and Management, July 2012; doi:10.1061/(ASCE)CO.1943-7862.0000496

Miller BM et al. Understanding the economic benefit associated with research and services at the National Institute for Occupational Safety and Health. RAND Corporation: Santa Monica, 2017; https://www.rand.org/pubs/research_reports/RR2256.html

Mustard C, Orchard C. What do employers spend to protect the health and safety of workers? Issue Briefing: Institute for Work & Health: Toronto, 2018; https://www.iwh.on.ca/summaries/issue-briefing/what-do-employers-spend-to-protect-health-and-safety-of-workers

Mustard C, Tompa E, Landsman V, Lay M. What do employers spend to protect the health of workers? Scand J Work Environ Health, May 2019; 45(3):308-311; doi:10.5271/sjweh.3778

Ontario Workplace Safety & Insurance Board. A financial business case for health and safety in Ontario workplaces. Workplace Safety and Insurance Board: Toronto, 2011; https://www.wsib.ca/sites/default/files/2019-03/5023a.pdf

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