



The Economic Burden of Lung Cancer & Mesothelioma in Canada Due to Occupational Asbestos Exposure

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Summary of Findings

- **Total cost of mesothelioma and lung cancer from asbestos related occupational exposure for new cases in 2011 was \$1.7 billion**
- The per case average lifetime cost was \$818K
- Health-related quality of life costs were the highest proportion of the costs at 80%
- The next highest proportion was direct costs, including health care, out of pocket, family care giving and WCB administration at 11%
- Indirect costs, including friction and output & productivity costs, were 9% of total costs
- Substantial economic burden from 2,099 newly diagnosed cases in 2011



Overview

Type of economic burden study undertaken

- Incidence costing study
- Considers only newly diagnosed cases in a particular year
- Includes lifetime costs associated with each new case incurred by all stakeholders

Key question addressed by this analysis

- What would be the saving to society if we did not have any cases of cancer attributable to occupational asbestos exposures in a particular year?
- Economic burden = counterfactual scenario – current scenario



Overview (cont'd)

Key cost components considered

1. Direct costs (health care products & services)
2. Indirect costs (output & productivity in paid work)
3. Quality of life costs (social role engagement & intrinsic value of health)

Study Framing

- Newly diagnosed cases in 2011
- Estimate total lifetime costs of these cases incurred by all stakeholders (societal level economic burden)
- Discounted all (future) costs to 2011 calendar year



Impacts & Related Costs by Stakeholder

	Individual	Family & Community	Employer	System, public sector & society
1. Direct	<ul style="list-style-type: none"> • out-of-pocket expenses for health care products & services 	<ul style="list-style-type: none"> • care giving of family & community members 	<ul style="list-style-type: none"> • insurance programs costs for health care products & services • insurance admin 	<ul style="list-style-type: none"> • health care products & services • insurance admin
2. Indirect	<ul style="list-style-type: none"> • labour-market earnings • payroll benefits associated with labour-market earnings • wage replacement benefits 	<ul style="list-style-type: none"> • family income and savings • <i>quality of life of family and community members</i> • <i>adult outcomes of children</i> 	<ul style="list-style-type: none"> • productivity & output • replacement worker recruitment & training costs (friction costs) • insurance program costs for wage replacement benefit • <i>labour relations</i> • <i>reputation</i> 	<ul style="list-style-type: none"> • productivity & output • friction costs • <i>capital accumulation, investment, and related productivity implications</i>
3. Quality of life	<ul style="list-style-type: none"> • engagement in social roles • intrinsic value of health 			<ul style="list-style-type: none"> • population health-related and quality of life



Direct Costs of Health Care

- Starting point was health care costs of lung cancer by type and stage identified by **Canadian Cancer Risk Management Model (CRMM)**
- CRMM also provided data on survival probabilities
- For mesothelioma survival used **US Surveillance, Epidemiology, and End Results (SEER) Registry**
- Added health care administration costs of 16.7% (Woolhandler 2003)
- Fraction of cases appearing in WCB system– 54% for mesothelioma and 10% for lung cancer (Del Bianco 2013)
- Higher health care costs for WCB accepted claims (WSIB 2007, CRMM)



Other Direct Costs

Family & Community Time in Care Giving

- Assumed 16 hours of care giving time per week (Van Houtven 2010)
- Care giving time valued at weighted average provincial minimum wage
- Weighted average increased by 2% per year after 2015

Out of Pocket Costs

- Assumed to be \$548/month—includes travel, parking, drugs, home health care, vitamins, accommodation (Longo 2011)
- Assumed to increase by 2% per year
- Cost assumed to be incurred for 10 years and were adjusted for survival rates over this period

Administration

- Added WCB administrative costs of 27% of incurred expenses & transfer payments (AWCBC 2011)



Indirect Costs of Output & Productivity

Human Capital Approach (HCA)

- **Used to estimate lost labour-market productivity & output**
- Considered the wage of individual & the amount of work time lost due to poor health or premature death (CRMM, Earle 2010, SEER Registry)
- For counterfactual used average labour-market earnings in Canada adjusted for age & sex (LFS 2011, SLID 2010)
- Included payroll costs (14%) and productivity growth (1%) in estimates (Canadian National Accounts)

Friction Cost Approach (FCA)

- **Used to reflect cost to employer to replace absent worker if sickness absence endured for a period of time**
- Losses assumed to be 6 months of annual wage in year of diagnosis



Quality of Life Costs

- Captured through Quality Adjusted Life Years (QALYs)
- Preference-based measure of health-related quality of life
- **Morbidity & time are combined using a weight that is between 0 (death) & 1 (one year in perfect health)**
- QALY does not include productivity & output from market activity
- Future QALYs were discounted using a 3% rate



Quality of Life Costs (cont'd)

- QALY weights and conditional life expectancies associated with each cancer (CRMM, SEER, Arnold 2015)
- For counterfactual used population average QALY adjusted for age & sex (CCHS 2010)
- For counterfactual used population conditional life-expectancy (Canada Life Tables 2009-2011)
- Literature offers range of values for a QALY from \$US20K to US\$161K
- **We use CAN\$100K for value of a QALY**



Economic Burden of Mesothelioma

Based on 391 cases in 2011

Health care costs:

All cases

\$ 18,111,628

Per case

\$ 46,351

Informal care giving:

\$ 5,211,858

\$ 13,338

Out of pocket:

\$ 4,859,052

\$ 12,435

Workers' comp administration:

\$ 32,784,603

\$ 83,902

Productivity and output:

\$ 26,485,332

\$ 67,781

Friction:

\$ 2,123,380

\$ 5,434

Health-related quality of life:

\$269,720,081

\$690,263

Total:

\$359,295,934

\$919,503

* 2011 Canadian dollars



Economic Burden of Asbestos-related Lung Cancer

Based on 1,708 cases in 2011

Health care costs:

All cases

\$ 48,631,695

Per case

\$ 28,480

Informal care giving:

\$ 29,464,431

\$ 17,255

Out of pocket:

\$ 28,253,406

\$ 16,546

Workers' Comp administration:

\$ 23,538,935

\$ 13,785

Productivity and output:

\$ 109,797,788

\$ 64,300

Friction:

\$ 9,279,172

\$ 5,434

Health-related quality of life:

\$1,108,198,035

\$648,988

Total:

\$1,357,163,463

\$794,789

* 2011 Canadian dollars



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