



ESTIMATING THE COST OF ACCIDENTS AND ILL-HEALTH AT WORK: A REVIEW OF METHODOLOGIES

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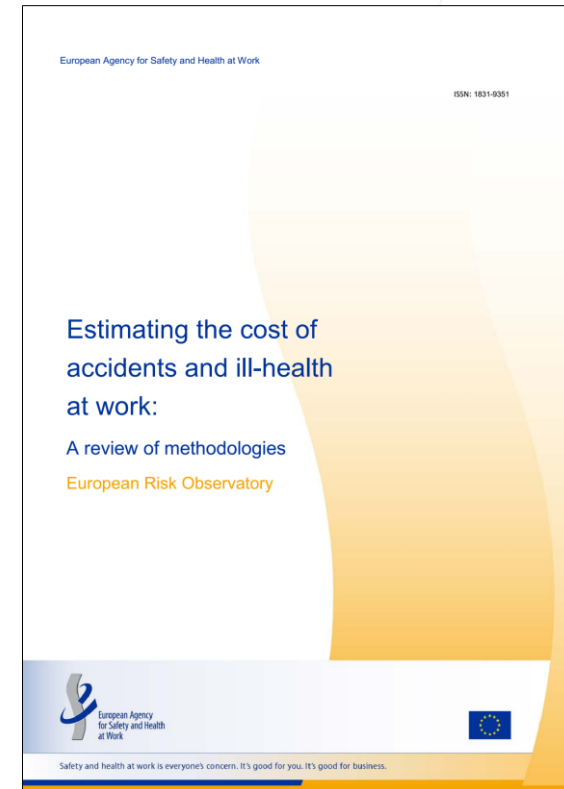
Structure

- **Introduction**
- **Overview about different models**
 - Germany
 - ILO/EU-OSHA/Finland/Singapore/ICOH
 - UK
 - Australia
- **Conclusions**

Estimating the cost of accidents and ill-health at work: A review of methodologies (2014)

Two key steps required to provide a quantitative estimate of the cost of occupational injuries and illnesses:

1. the identification of the number of cases
2. the application of monetary values to the identified cases.



National estimates: Germany

- 567.7 million workdays lost per year due to sick leave = 1.6 million working years (2013)
- 1.6 million x 37,700 € average salary = 59 billion €, 2.0 % GDP
- 1.6 million x 66,400 € GDP/employee = 103 billion €, 3.6 % GDP

Tab. D 1: Schätzung der volkswirtschaftlichen Produktionsausfallkosten und der ausgefallenen Bruttowertschöpfung durch Arbeitsunfähigkeit 2013

37.824 Tsd. Arbeitnehmer x 15,0 Arbeitsunfähigkeitstage	
⇒ 567,7 Mio. Arbeitsunfähigkeitstage, beziehungsweise	1,6 Mio. ausgefallene Erwerbsjahre
Schätzung der Produktionsausfallkosten anhand der Lohnkosten (Produktionsausfall)	
1,6 Mio. ausgefallene Erwerbsjahre x 37.700 € durchschnittliches Arbeitnehmerentgelt ¹	
⇒ ausgefallene Produktion durch Arbeitsunfähigkeit	59 Mrd. €
⇒ Produktionsausfall je Arbeitnehmer	1.550 €
⇒ Produktionsausfall je Arbeitsunfähigkeitstag	103 €
⇒ Anteil am Bruttonationaleinkommen	2,0 %
Schätzung des Verlustes an Arbeitsproduktivität (Ausfall an Bruttowertschöpfung)	
1,6 Mio. ausgefallene Erwerbsjahre x 66.400 € durchschnittliche Bruttowertschöpfung ¹	
⇒ ausgefallene Bruttowertschöpfung	103 Mrd. €
⇒ Ausfall an Bruttowertschöpfung je Arbeitnehmer	2.731 €
⇒ Ausfall an Bruttowertschöpfung je Arbeitsunfähigkeitstag	182 €
⇒ Anteil am Bruttonationaleinkommen	3,6 %

Rundungsfehler

¹ Volkswirtschaftliche Gesamtberechnung (Statistisches Bundesamt)

Concept of DALYs = Disability Adjusted Life Years (ILO/EU-OSHA/Finland/Singapore/ICOH, J. Takala, 2016)

$$YLL = N \times L$$

+

$$YLD = I \times DW \times L$$

=

$$DALY = YLL + YLD \quad \text{Disability Adjusted Life Years}$$

- We can easily count the lost years from GBD/IHME from the two numbers per country/region: all deaths and YLLs
- Number of fatal cases either from statistics and registers, such as mesothelioma deaths, or
- Using Attributable Fraction, AF_{work} for each disease/disorder and apply that to best all deaths number to the disorder concerned

- Take all YLD's from GB/IHME
- Apply AF_{work} to these YLD's

GBD/IHME: <http://www.healthdata.org/data-visualization/gbd-cause-patterns>

Example of EU costs of death calculation, preliminary results (ILO/EU-OSHA/Finland/Singapore/ICOH, J. Takala, 2016)

	Number of cases, DALYs, costs	EU 28		Singapore		Finland		Germany		China	
1	All fatal occupational accidents 1)		4,692		55		37		567		99,197
2	All fatal work-related diseases 2)		187,492		2,400		2,075		32,379		410,175
3	Non-fatal occupational accidents		3,331,380		10,264		48,263		930,447		87,750,997
4	YLL per case, injuries, years 3)		45.90		44.69		45.57		44.76		47.18
5	YLL per case, diseases, years		15.80		13.53		25.99		15.30		21.58
6	Years of Lost Life, YLL from fatal cases, injuries 4)		215,382		2,458		961		25,379		4,680,333
7	Years of Lost Life, YLL from fatal cases, diseases 5)		2,962,235		32,459		53,929		495,560		8,851,577
8	Years Lived with Disability , YLD caused by non-fatal accidents and diseases 6)		5,069,888		63,191		103,172		1,222,270		23,420,070
9	DALY caused by those above, YLLs and YLDs 7)		8,247,505		98,108		158,062		1,743,209		36,951,980
10	All costs in terms of monetary values, in USD 8)		698.2*10 ⁹		7.51*10 ⁹		17.58*10 ⁹		151.01*10 ⁹		527,608*10 ⁹
11	Cost of YLL, (fatal cases) in USD, illnesses and injuries 9)	1.46 %	269.0*10 ⁹	1.13%	2.67*10 ⁹	2.24%	6.1*10 ⁹	1.34%	45.1*10 ⁹	1.78%	193.2*10 ⁹
12	Cost of YLD (non-fatal cases) in USD, illnesses and injuries 9)	2.33%	429.3*10 ⁹	2.05%	4.83*10 ⁹	4.22%	11.5*10 ⁹	3.16%	105.9*10 ⁹	3.08%	334.4*10 ⁹
13	· Cost of Occupational Cancer in USD	0.73 %	137.4*10 ⁹	0.56%	1.32*10 ⁹	0.74%	2.01*10 ⁹	0.70%	23.4*10 ⁹	1.11%	124.3*10 ⁹
14	· Cost of MSD in USD, from GBD occupational ergonomic factors	0.62 %	115.4*10 ⁹	0.08%	0.19*10 ⁹	0.60%	1.63*10 ⁹	0.76%	25.5*10 ⁹	0.80%	87.3*10 ⁹
	· Cost of disease group C, D...										
15	Percentage of GDP based on numbers of cases, 10)										
	YLL of GDP (Deaths)		1.457 %		1.13 %		2.24 %		1.34 %		1.78 %
	YLD of GDP (Disability)		2.325 %		2.05%		4.22%		3.16 %		3.08 %
	DALY _{loss} % = TOTAL of GDP		3.8 %		3.18 %		6.46 %		4.50 %		4.86 %

Costs to Britain of workplace fatalities and self-reported injuries and ill health, 2013/14 (HSE, 2015)

Table 1: Summary of cost components by cost bearer




Cost Category	Cost bearer		
	Individuals 	Employers 	Government / taxpayer 
Productivity Costs	✓	✓	✓
Health and rehabilitation costs	✓	✓	✓
Admin and legal costs	✓	✓	✓
Employers' Liability Compulsory Insurance	✓	✓	
Non-financial human costs	✓		

Table 2: Cost to Britain per case 2013/14 - average appraisal value estimates (2013 prices)

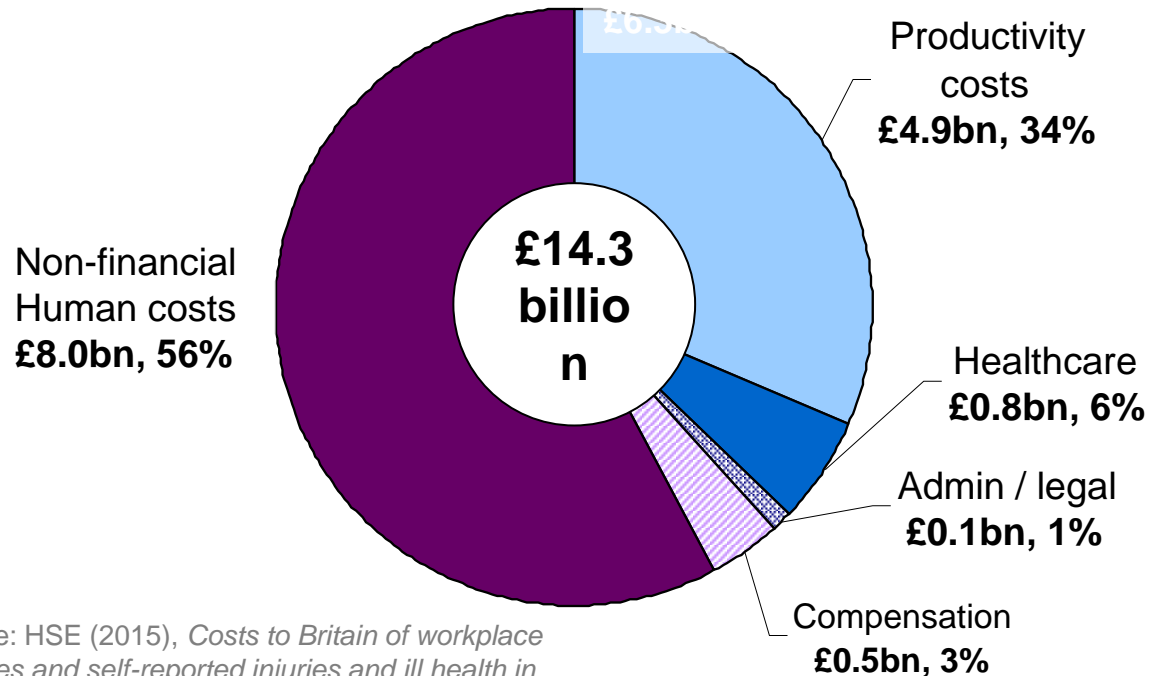
	Non financial human cost (rounded)	Financial cost (rounded)	Total cost (rounded)
Fatal injuries	1,153,000	421,600	1,575,000
Non-fatal injuries	4,600	2,900	7,500
<i>7 or more days absence</i>	17,600	10,100	27,700
<i>Up to 6 days absence</i>	330	550	880
Ill health	9,900	8,700	18,700
<i>7 or more days absence</i>	20,100	17,300	37,400
<i>Up to 6 days absence</i>	290	560	850

Source: HSE Cost to Britain model

Cost = Quantity x Unit price

These costs are very important...

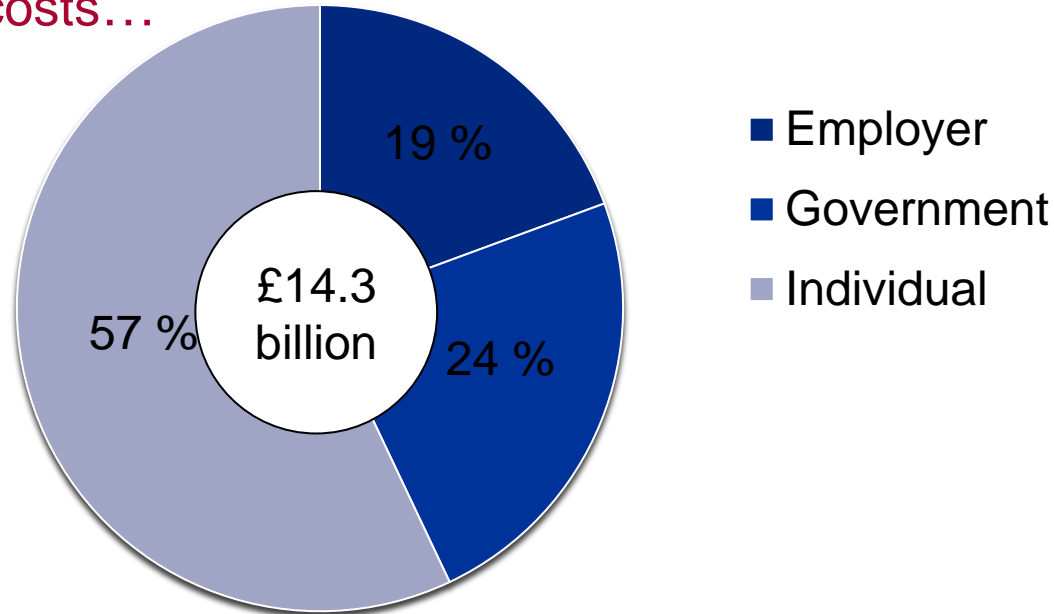
- **HSE estimates:** new cases of injuries and short latency illness in 2013/14



Source: HSE (2015), *Costs to Britain of workplace fatalities and self-reported injuries and ill health in 2013/14* [link](#)

These costs are very important...

- Provide **economic justification** to support, incentivise and regulate employers, since they do not bear full costs...



Cost of work-related injury and illness Australian 2012/13

Safe Work Australia (2015)

- **Define the key agents in the model (employees, employers, community)**
- **Define categories of costs, and which are borne by each agent**
- **Define the number of cases and characteristics such as compensated status, severity, nature, industry, occupation, jurisdiction**
- **Calculate the average cost of a typical incident, from the bottom up**

Key methodological points Australia

- **Human cost**
- **Incidence approach**
- **Lifetime cost approach**
- **Ex-post treatment of costs**
- **Similar to UK model, but including long-latency diseases, not including non-financial human costs**

Series of Australian estimates

Estimation period	Economic agent	Estimated cost (\$b)	GDP (\$b) a	Costs as % of GDP	Australian Workforce (millions) b
2000–01	Total	\$34.3	\$689.3	5.0%	9.09
	Employer	3%			
	Workers	44%			
	Community	53%			
2005–06	Total	\$57.5	\$967.5	5.9%	10.20
	Employer	4%			
	Workers	49%			
	Community	47%			
2008–09 ^c	Total	\$60.6	\$1 253.1	4.8%	10.93
	Employer	5%			
	Workers	74%			
	Community	21%			
2012–13	Total	\$61.8	\$1 521.1	4.1%	11.48
	Employer	5%			
	Workers	77%			
	Community	18%			

a ABS Catalogue 5204.0, Australian System of National Accounts, 2012–13.

b ABS Catalogue 6202.0, Labour Force Australia, September 2014.

c Due to significant revisions in the methodology, the 2008–09 and 2012–13 estimates should not be compared with the two previous estimates.

Conclusions

- All models have drawbacks and advantages
- Despite having a strong methodological differences, all models result in a similar magnitude in percentage of GDP
- “Cost = Quantity * Unite price“ approach is only feasible with good national data sources
- For the time being we have to focus on an approximate model for all EU countries and may elaborate a “Cost = Quantity * Unite price“ approach for selected countries, where sufficient data is available

**Thank you very much
for your attention!**

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