

# Estimation of the costs of work-related injuries and diseases

In Finland, Germany, the Netherlands, Italy and Poland

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European Agency  
for Safety and Health  
at Work



Safety and health at work is everyone's concern. It's good for you. It's good for business.

## Overview

- Cost estimation project for work-related diseases and injuries
  - Bottom-up model
  - Top-down model
- OSH overview of MSDs and Healthy Workplaces Campaign 2020-22
  - Timeline
  - Projects & planned outputs
- Healthy Workplaces Campaign 2020-22
  - Communication and promotion packs
  - Campaign website
  - Time table and milestones



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## Objective of the study

### *To estimate the costs of work-related injuries and diseases for five countries*

- Including the valuation of life and health impacts
- Distinction between different cost bearers (employers, workers, society)
- Differentiation between causes of injuries and diseases
- Transparent and reproducible methodology

## Selected countries

Countries	Geographical location	Insurance system <sup>[1]</sup>	% employed in services <sup>[2]</sup> (EU average = 73.1%)
Finland	North	Mixed	73.1%
Germany	West	Bismarckian	73.9%
The Netherlands	West	Bismarckian	82.9%
Italy	South	Beveridgean	72.4%
Poland	Central	Bismarckian	58.3%

Sources:

[1] EU-OSHA, 2017b

[2] Labour Force Survey 2015 (Eurostat)

## Two approaches

### Bottom-up model

- Building up from costs per case to total costs
- Direct costs (i.e. healthcare), indirect costs (i.e. productivity loss), intangible costs (monetized life and health impacts)

### Top-down model

- Based on work-related fraction of total burden of disease expressed in DALYs
- Monetary value of a DALY
- Monetization approaches based on loss of productivity and life and health impacts

# Bottom-up model

## Bottom-up model

Estimation of cases

Definition of cost categories

Price weights

Total (sub) category costs  
for a strata =

# of cases in the strata  
x  
per case costs for the  
strata

## Bottom-up model – estimation of cases

- **Non-fatal work-related injuries<sup>1</sup>**
- **Fatal work-related injuries<sup>1</sup>**
- **Non-fatal work-related diseases<sup>2,3</sup>**
  - Different data sources, different scenarios of the case count. Baseline scenario:
    - Count of compensated (accepted, recognized) and non-compensated non-fatal cases for most types of diseases<sup>2</sup>; with the following exceptions:
    - for cancers, circulatory diseases, respiratory diseases, and musculoskeletal diseases we estimated case counts and used attributable fractions to estimate the work-related cases<sup>3</sup>
- **Fatal work-related diseases<sup>3</sup>**

Sources:

[1] ESAW 2015 (non-fatal cases of Poland and Italy are adjusted based on the fatal to non-fatal ratio). To estimate the number of non-fatal cases with 1-3 workdays lost, the severity distribution in the LFS 2013 was applied

[2] National sources: Finland - Finnish Institute of Occupational Health (2012); Germany - DGUV Statistics (2013); The Netherlands - NCvB statistiek, Nationale Registratie Beroepsziekten (2015); Italy - Banche dati static, occupational injury and disease (2015); Poland: Choroby Zawodowe W Polsce W (2014)

[3] IHME 2015

## Bottom-up model – estimation of cases

Countries	work-related injuries		work-related diseases	
	Non-fatal (> 1 workday lost)	Fatal	Non-fatal	Fatal
Finland	63,407	35	67,795	628
Germany	1,158,865	450	1,088,793	13,924
The Netherlands	99,880	35	220,368	3,262
Italy	1,257,987	543	638,448	10,524
Poland	697,337	301	454,090	4,663

## Cost estimation 2019- definition of cost categories

### Direct costs

- Healthcare costs (public sector/insurer)
- Overhead costs (public sector/insurer)
- Informal care giving (worker/family)
- Out of pocket costs healthcare products (worker/family)

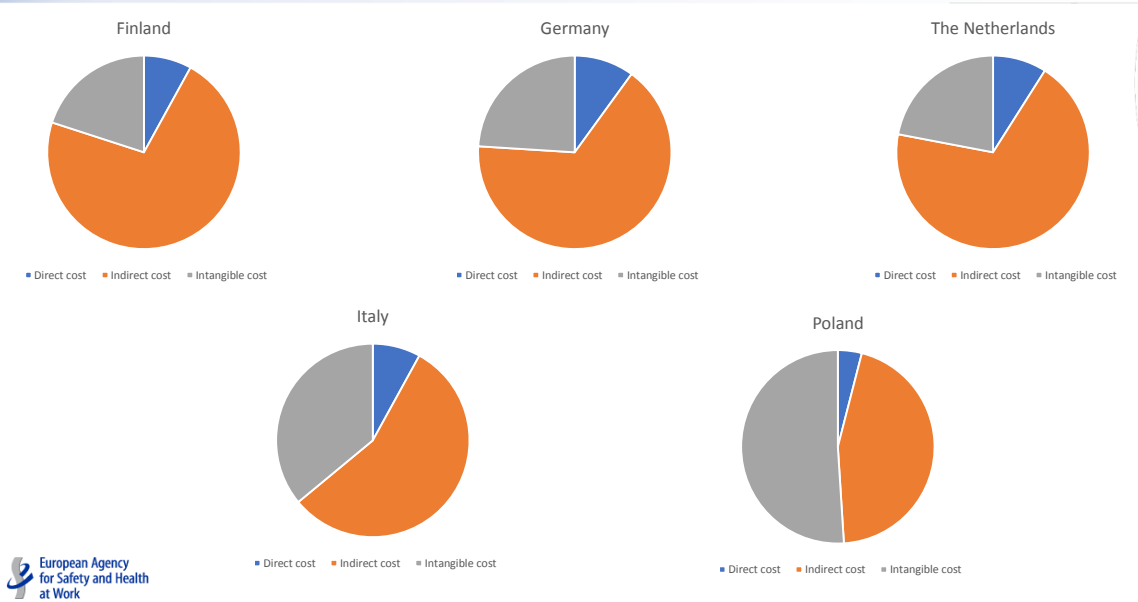
### Indirect costs

- Wages and Salaries (worker, society)
- Payroll/fringe benefits (worker/family)
- Employer adjustment costs (employer)
- Insurance administration costs (public sector/insurer)
- Home production losses (worker/family)
- Presenteeism (employer)

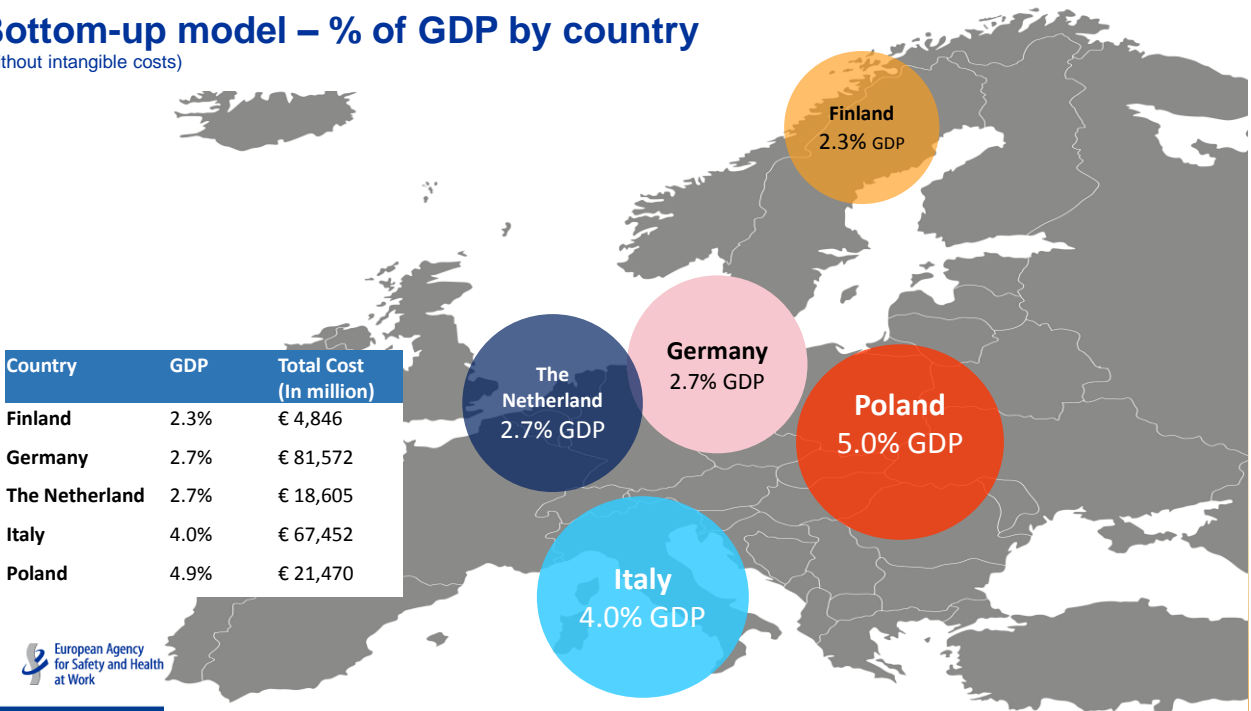
### Intangible costs

- Monetary value of Quality Adjusted Life Years (worker/family)

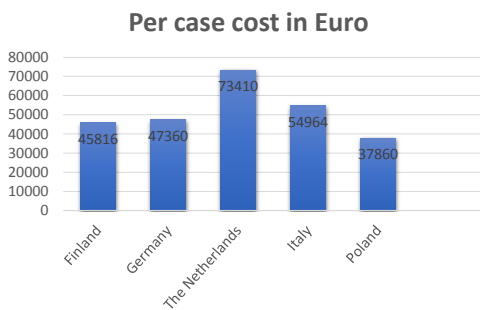
## Bottom-up model – type of costs by country



## Bottom-up model – % of GDP by country (without intangible costs)



## Bottom-up model – per case and per employed person



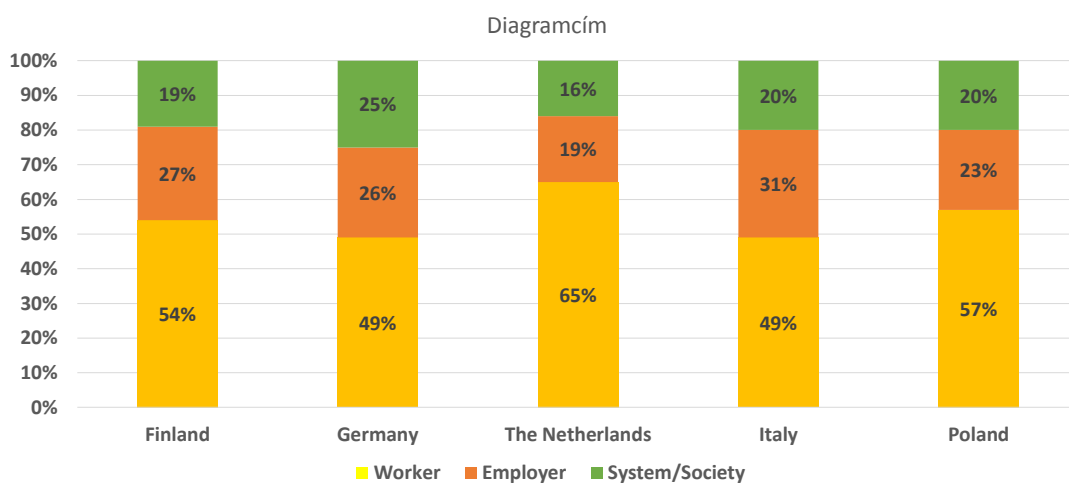
## Bottom-up model – costs by stakeholder

Country	Employer		Worker		System/Society	
	In million €	%	In million €	%	In million €	%
Finland	€ 1,325	22%	€ 3,800	63%	€ 916	15%
Germany	€ 21,534	20%	€ 64,813	61%	€ 20,782	19%
The Netherlands	€ 3,484	15%	€ 17,235	73%	€ 3,032	13%
Italy	€ 20,632	20%	€ 70,391	67%	€ 13,821	13%
Poland	€ 5,007	11%	€ 34,421	79%	€ 4,353	10%

## Bottom-up model – costs by stakeholder



## Bottom-up model – costs by stakeholder without intangible costs





## Bottom-up model – estimation of costs

Country		Finland	Germany	The Netherlands	Italy	Poland
<b>Cases</b>		131,867	2,262,031	323,544	1,907,504	1,156,394
<b>Direct costs</b>	In million €	€ 484	€ 10,914	€ 2,137	€ 8,491	€ 1,882
<b>Direct cost % total</b>		8%	10%	9%	8%	4%
<b>Indirect costs</b>	In million €	€ 4,362	€ 70,658	€ 16,468	€ 58,961	€ 19,588
<b>Indirect cost % total</b>		72%	66%	69%	56%	45%
<b>Intangible costs</b>	In million €	€ 1,196	€ 25,557	€ 5,147	€ 37,392	€ 22,311
<b>Intangible cost % total</b>		20%	24%	22%	36%	51%
<b>Total economic burden</b>	In million €	€ 6,042	€ 107,129	€ 23,751	€ 104,844	€ 43,781
<b>Percentage of GDP total</b>		2.9%	3.5%	3.5%	6.3%	10.2%
<b>Percentage of GDP, direct and indirect costs only</b>		2.3%	2.7%	2.7%	4.0%	4.9%
<b>Per case cost</b>		€ 45,816	€ 47,360	€ 73,410	€ 54,964	€ 37,860
<b>Per employed person</b>		€ 2,479	€ 2,664	€ 2,855	€ 4,667	€ 2,722
<b>GDP per employed</b>		€ 86,016	€ 75,692	€ 82,159	€ 73,565	€ 26,738

## Top-down model

## Top-down model - elements

**DALY** = Disability Adjusted Life Year

The DALY is a measure of overall disease burden, expressed as the number of years lost or lived with disabilities due to ill-health, disability or early death, calculated by disease

DALY = sum of life years lost to premature mortality + healthy life years lost to disability

**Attributable fraction** = part of the disease that is caused by occupational exposure

**Monetary value of a DALY** according to several monetization approaches

Sources:

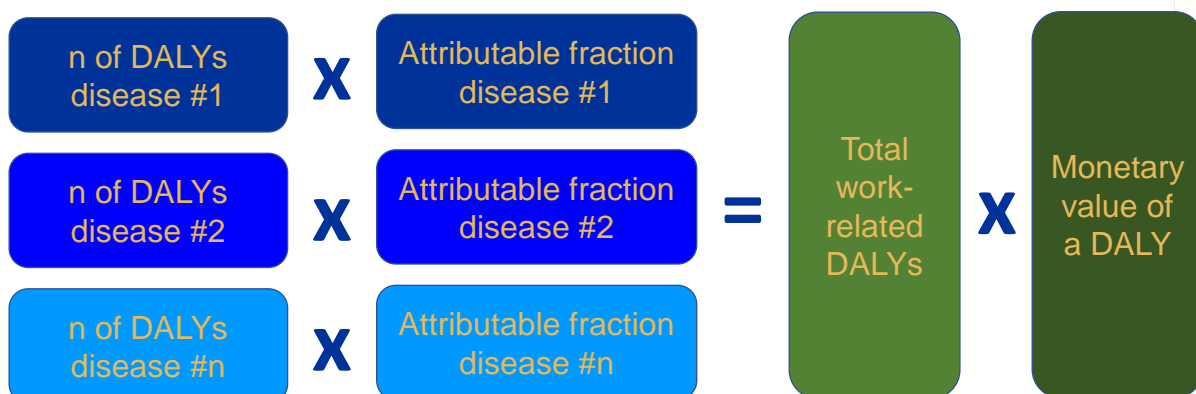
*DALYs by disease, sex, age and country from the World Health Organisation (WHO) Global Health Estimates.*

*Attributable fractions derived from the Global Burden of Disease study as registered by the Institute for Health Metrics and Evaluation (IHME), and from the literature.*

*Monetary values derived from the literature.*



## Top-down model – cost estimation



## Top-down model – monetization approaches

### Human capital approach

Based on the loss of economic productivity due to ill health, disability or premature mortality

### Willingness-to-pay

Based on the preference of survey respondents to pay for health gains

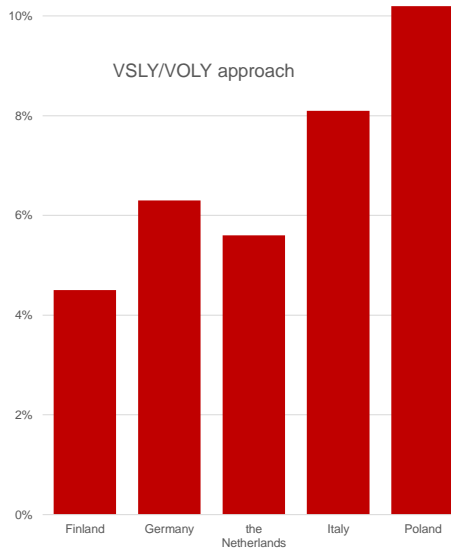
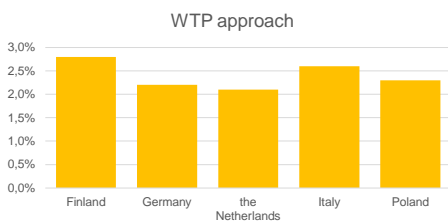
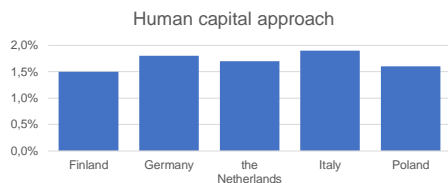
### Value of statistical life

Based on a value of the total remaining lifetime in case of no accident or illness

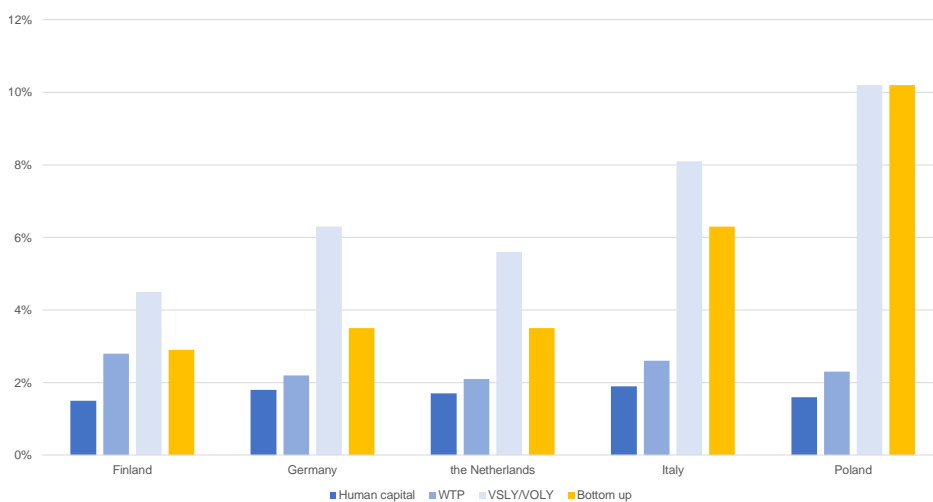
## Top-down model - estimation of costs

	Finland		Germany		The Netherlands		Italy		Poland	
<b>DALYs:</b>										
Total occupational DALYs	64,516		1,236,855		248,464		853,817		507,068	
Percentage of total DALYs	4.2%		4.9%		5.7%		5.1%		4.0%	
Occupational DALYs per 10,000 employed persons	265		308		299		380		315	
<b>Costs:</b>										
	million €	% of GDP	million €	% of GDP	million €	% of GDP	million €	% of GDP	million €	% of GDP
Human capital approach	3,106	1.5%	55,429	1.8%	11,879	1.7%	31,475	1.9%	6,929	1.6%
WTP approach	5,814	2.8%	66,251	2.2%	14,613	2.1%	42,895	2.6%	9,676	2.3%
VSLY/VOLY approach	9,345	4.5%	191,939	6.3%	38,016	5.6%	133,789	8.1%	43,836	10.2%

## Top-down model - estimation of costs % of GDP



## Comparison of the models (% of GDP)



## Conclusions

- **Top-down or bottom-up model?**  
A bottom-up model is more precise and gives more insight into different cost components. However, data availability and reliability can be a huge problem and it is a very time consuming activity
- **Life and health impacts**  
Important part of the cost estimation in both models. If they are not monetized they probably will be ignored. However, there is no consensus on the approach to estimate their value
- **Implications for future projects**  
The count of work-related cases should be improved. Also country specific data on healthcare costs should be easier to obtain. Finally, it would be helpful to come to a consensus on the way to value life and health impacts

## OSH overview on MSDs 2018-2020 + HWC 2020-2022

Background:

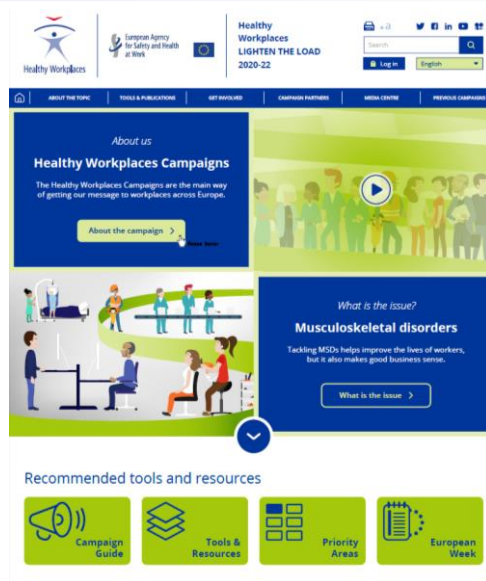
EU-OSHA OSH overview on MSDs: a three-year (2018-2020) cluster of projects

Followed by a Healthy Workplaces Campaign on MSDs

2017	2018	2019	2020	2021	2022
Planning and resource allocation	MSD research and analysis project content development			Follow up activities	
		Relevant outputs used/adapted for HWC resources			
	HWC MSDs planning and resource development		HWC MSDs		

Where are we now?

## CAMPAIGN WEBSITE



Wireframes:  
<https://projects.invisionapp.com/share/DPOY3MXXBK/AQ#/screens>



## OSH overview on MSDs – 2018-2020

12 projects and activities

Name of project	2018	2019	2020	2021	2022
MSDs: Prevalence, costs and demographics					
Psychosocial risk factors and MSDs					
MSDs among the future generation of workers (schoolchildren)					
Review of research, policy and practice on prevention of work related MSDs					
Working with chronic MSDs					
Compilation of online visual resources					
Prolonged static postures and lower limb disorders					
Hazard Mapping and Body Mapping Tool					
Participatory ergonomics to prevent MSDs					
Diversity in the workforce and MSDs					
Toolbox on MSDs (MSDs database)					
Final conference					

Healthy Workplaces Campaign



## Workshop- MSDs and Young

- First workshop organised in the framework of the MSDs OSH overview project
- To be held in Bilbao on 20-21 March 2019
- Between 60 – 70 participants (participants appointed by FoPs, social partners, ...)
- Workshops organised together with ENETOSH
- Objectives:
  - To increase knowledge (first state of the art when it comes to young and MSDs)
  - To share experiences and information
  - To try to mobilize different actors from different sectors / policy areas (OSH, education, public health, ..)
  - To facilitate liaison between actors and stakeholders engaged / interested in the topic “young and MSDs (and OSH in more general terms).
  - To assess if we can engage these different actors / stakeholders in a “mid-term collaboration” (to involve them as HWC 20-22 campaign partners)
  - To identify information, good practice to be integrated in the other projects / reports carried out in the framework of the MSDs Overview project.

## HWC 2020-22: MAIN MESSAGES

*Official title of the campaign:  
Healthy workplaces lighten the load*

1. **Umbrella message:** MSDs are preventable and manageable
2. Preventive measures can be simple and low cost
3. Early intervention and rehabilitation of workers with MSDs is possible, needed and desired
4. Staying physically active - even in periods of musculoskeletal pain - is important
5. MSDs can be influenced by psychosocial risks – that’s why it makes sense to tackle MSDs and psychosocial risks together
6. Promote good musculoskeletal health among the future generation of workers

## HWC 2020-22: COMMUNICATION AND PROMOTION PACKS (1)

In order to help keeping the momentum (throughout the whole campaign) the Agency will develop special communication and promotion packs on specific topics.

### TOPICS:

1. MSDs Facts and Figures (business case)
2. MSD prevention
3. MSD and future generation of workers
4. MSD and rehabilitation
5. MSD and diversity
6. MSD and sedentary work
7. MSD and psychosocial risks

Those topics will be promoted during 3 - 4 months, but not necessarily in the above mentioned order.