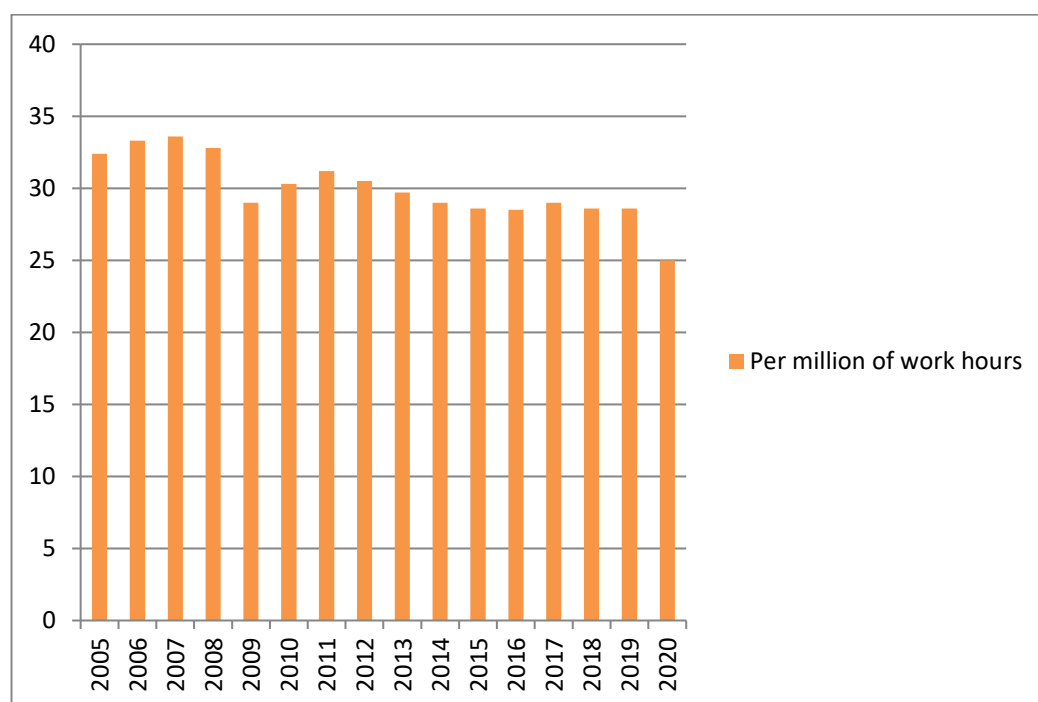


## Work today and in the future: Part Three: Work-related deaths, diseases and costs in the Nordic countries – Adapted summary

### Background

The impact of OSH preventive work and labour inspection is generally measured by the reported and recorded occupational accidents and diseases in absolute numbers and rates per work hours or workers. The decreases of these figures have stagnated in the last decades. For example, in Finland fatal workplace accidents decreased rapidly from over 150 in the 70ies, but remains persistently between 20-30 fatalities in the last decade. Equally, the frequency of non-fatal workplace accidents have stagnated to between 25-30 accidents per one million work hours.

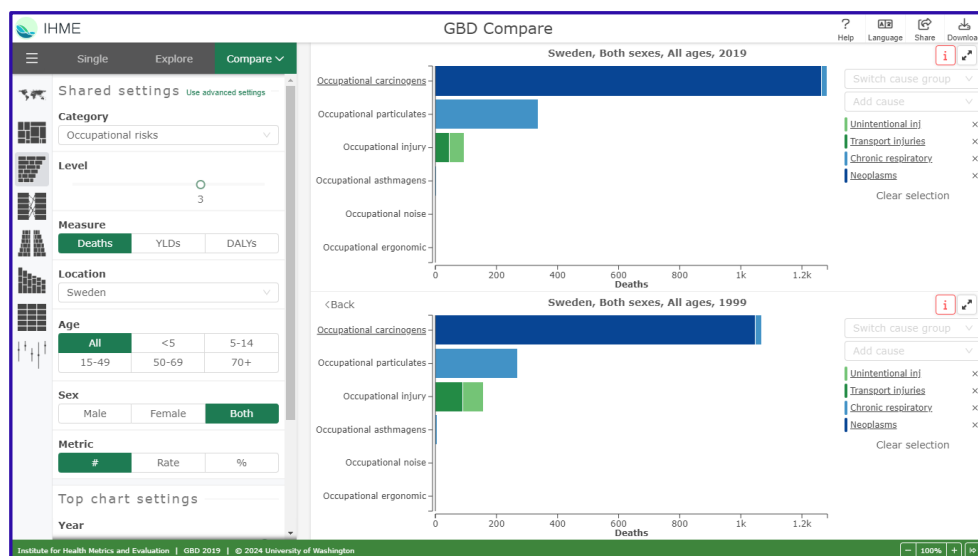


Frequency of occupational accidents at work per million work hours

The numbers of compensated occupational diseases are decreasing, which is a good sign. However, the national legal compensation criteria defines these numbers. For example, whereas cancer is a disease; occupational cancer is an administrative decision, and this applies to a large number of other diseases. The non-compensated other work-related illnesses and fatalities are increasing. Whereas compensated occupational diseases are well recorded, other work-related illnesses and fatalities are causing a high level of absence from work, work disability and deaths not covered by compensation records. They are poorly understood and thus receive less focus of prevention and need to be taken better into account.

<sup>1</sup> Nordic Council of Minister's project: Work-related fatalities in the Nordic countries

For example, the table below for Sweden from the Global Burden of Disease and Injury Study Results (published by *The Lancet* and available online) shows that deaths from work-related carcinogens has increased substantially from year 1999 to years 2019.



Note: The word “occupational” means work-related. These results are covering a lower number of work-related issues as compared to the study originating in Sweden by Järholm and others.

The work-related deaths are not recorded as thoroughly as occupational deaths. Research show that there is an increase in work-related diseases and injuries, see for example Järholm, Global Burden of Disease and Injury Studies and other<sup>2</sup>.

The causes of common diseases can be related to individual characteristics, living environment related or work related. Several researches have been done to assess to which amount diseases can be related to work (attributable fractions), in cases where the diseases is not legally defined as an occupational diseases. A number of report are summarised below.

### Attributable fractions (due to workplace exposure) of diseases not classified as occupational diseases.

| Causes                  | Attributable fraction           |       |                       |       |                         |         |                                   |       |                                  |       |
|-------------------------|---------------------------------|-------|-----------------------|-------|-------------------------|---------|-----------------------------------|-------|----------------------------------|-------|
|                         | Nurminen and Karjalainen (2001) |       | Rushton et al. (2008) |       | Steenland et al. (2003) |         | Morrel et al. (1998) <sup>a</sup> |       | Leigh et al. (1997) <sup>b</sup> |       |
|                         | Men                             | Women | Men                   | Women | Men                     | Women   | Men                               | Women | Men                              | Women |
| Communicable diseases   | 4.8                             | 32.5  |                       |       |                         |         |                                   |       |                                  |       |
| Cancers                 | 13.8                            | 2.2   | 8.0                   | 1.5   | 3.3-7.3                 | 0.8-1.0 |                                   |       | 6-10                             |       |
| Respiratory diseases    | 6.8                             | 1.1   |                       |       |                         |         |                                   |       | 10 <sup>c</sup>                  |       |
| Circulatory diseases    | 14.4                            | 6.7   |                       |       | 6.3                     |         | 1.0                               | 1.0   | 5-10                             |       |
| Mental health disorders | 6.6                             | 1.8   |                       |       |                         |         | 1.0                               | 1.0   | 1-3                              |       |
| Digestive diseases      | 2.3                             | 1.5   |                       |       |                         |         |                                   |       |                                  |       |
| Genitourinary system    | 3.0                             | 0.4   |                       |       |                         |         | 1.0                               | 1.0   | 1-3                              |       |

<sup>a</sup> Covers only deaths due to occupational exposure to hazardous substances

<sup>b</sup> Pneumoconiosis are not included in the figure of Leigh et al.

<sup>2</sup> Global-, regional- and country-level estimates of the work-related burden of diseases and accidents in 2019, <https://doi.org/10.5271/sjweh.4132>

The Director-Generals of the Nordic Labour Inspectorates requested a research team to collect the information on all work-related fatalities to get a picture on the overall situation.

## Available data

The numbers of reported occupational accidents and occupational diseases are available in the national statistics.

However, the recorded and approved numbers of “**occupational deaths**” and diseases depend on the legal definition of “occupational deaths/occupational diseases” in each country, whereas “**work-related deaths**” and work-related diseases is a much broader concept<sup>3</sup>.

Furthermore, some of the “common” diseases (cancers, respiratory and circulatory diseases, etc.) are partly be caused by exposures at work. These are not generally approved as “occupational diseases” – the project has used scientific research to estimate how big a part is caused by work exposure (work-related diseases).

Work-related deaths is only a part of the work-related burden of disease. The number of fatal cases do not consider illnesses and diseases due to for example. musculoskeletal disorders, repetitive movements, and psychosocial issues, which seldom lead to death. Equally, various stages of disability and loss of life quality are not included.

The WHO has developed a measure which gives a more detailed picture of the work-related burden of disease, the loss of life quality and thus the negative financial consequences due to work exposure - **Disability Adjusted Life Years (DALYs)**. One DALY represents the loss of the equivalent of one year of full health. Using DALYs both the burden of diseases that cause premature death, and less serious disability can be calculated and made visible with a single indicator. A three days’ disability is less important than a loss of limb, blindness or mental incapacity to work permanently; the DALY will make a distinction in such cases.

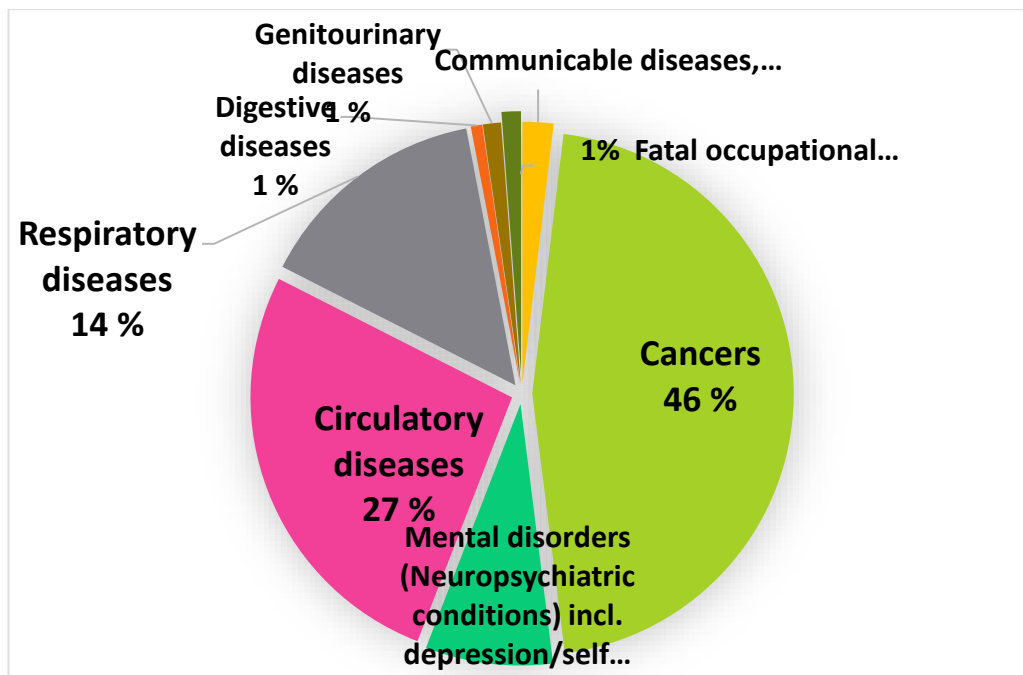
The cost factor of poor working conditions has been included to give an impression of the amount of funds that can be saved by improving working conditions, not to mention the human suffering.

## Causes of work-related deaths

In 2019, the ILO estimates indicate a total of 11 730 work-related fatalities are estimated to have occurred in the Nordic countries, of which **only 143 (1 %) are caused by accidents at work**. Cancers and circulatory diseases (cardiovascular diseases caused by stress, long working hours, etc.) are the major causes of work-related deaths as visualised in the figure below. Notably, these exposures cause many cases of cancer deaths (46 %), followed by circulatory and respiratory diseases (27 resp. 14 %). For each Nordic country separately, see Annex I.

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<sup>3</sup> ILO criteria for including diseases as an occupational disease are listed in the ILO List on Occupational Diseases: [https://www.ilo.org/wcmsp5/groups/public/---ed\\_protect/---protrav/---safework/documents/publication/wcms\\_125137.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_125137.pdf)



Fatal work-related diseases and injuries in all Nordic countries (2019). Source ICOH Global Estimates 2019.

The majority of work-related deaths today are caused by past exposures (past 1 – 40 years). Typical exposure times are risk-related and the latency time before diagnosing an illness can be relatively long. Asbestos is a special exception, where the latency time can be up to 50 years. However, the number of those exposed to asbestos, even though at a lower level of exposure, is *increasing* for example in building demolition and repair and by asbestos in outside atmosphere while the massive asbestos exposure by installing asbestos containing materials some 50 years ago will cause gradually year by year decreasing negative outcomes.

While many exposures in general are gradually decreasing, the impact of such changes depends on the risk concerned and this is a slow and selective process. There is no overall evidence that general exposures are going quickly down. Meanwhile some exposures are going up:

- Exposures to chemicals and pesticides has gone up due to more intensive and continuously growing use.
- Circulatory diseases caused by demand-control and effort-reward imbalances, long working hours, shift and night work, job insecurity are exposing a growing number of the working population. Psychosocial risk exposures at work are increasing.
- Exposures to dusts, fumes, vapours and smokes cause a growing number of chronic lung diseases and asthma,
- Communicable diseases and risks caused by biological factors are increasing, see <https://doi.org/10.1016/j.shaw.2023.10.005> and ILO International Labour Conference Agenda in June 2024

The pattern of problems are largely similar in the Western European countries, EU and other High Income areas. Globally and, in particular, in the low-income countries the number of deaths caused by occupational accidents and work-related communicable diseases have a much higher share of the total as compared to long latency diseases, such as work-related cancer, which is prevalent in the Nordic countries.

In contrast to the large percentage of work-related (non-accident) deaths, the targeting of OSH prevention at workplaces, labour inspections and especially the media attention is focusing on occupational accidents and deaths. Attention to occupational injuries is valid and necessary; they are actual and can fairly quickly be prevented, whereas exposures with a long latency period requires long-term efforts and strategies. Based on experiences from inspection practices in Finland most inspections are related to occupational accidents (57 % focus on prevention of accidents, 24 % on chemical agents, 12 % on biological agents and 7 % on physical workload.

**Asbestos exposure** has been and remains still the highest single factor causing work-related deaths. Asbestos causes 1148 fatalities annually (of a total of 4407 deaths)<sup>4</sup>.

Asbestos causes the biggest individual risk and the import and new use has gone radically down and stopped in Nordic countries since the 1970's. Exposures in installing new asbestos has gone down. Today, 50 years after the peak of use of asbestos, the main exposure comes from the high amount of asbestos in infrastructure, and higher numbers of exposed people due to inhaled asbestos, such as continuously growing number of asbestos-related deaths in cities such as Stockholm today.

**Psychosocial risks**<sup>5</sup> arise from poor work design, organisation and management, as well as a poor social context of work and result in negative psychological, physical and social outcomes such as work-related stress, burnout or depression. Excessive stress may adversely affect the cardiovascular system by accelerating adverse cardiovascular processes, including atherosclerosis, and by contributing to triggering a cardiovascular event.

The primary negative outcome of psychosocial risks is long term disability, including lost workability that may extend throughout one's life. Fatal cases caused by self-harm and suicides have been reported. In addition to ischemic heart disease and stroke, psychosocial factors contribute to an average population attributable fraction of 16.6 % for depression. The range of attributable fraction is 9 – 25 %, with the Nordic countries situated at the lower end.

Further sources:

Nurminen M, Karjalainen A. Epidemiologic estimate of the proportion of fatalities related to occupational factors in Finland. *Scand J Work Environ Health* 2001;27(3):161—213.

Takala J, etc. Global-, regional- and country-level estimates of the work-related burden of diseases and accidents in 2019, *Scand J Work Environ Health*, 2023. <https://doi.org/10.5271/sjweh.4132> , Supplementary pdf-files and excel-files have the latest death and disability data on all work-related diseases and injuries of all Nordic countries – including also EU Member States, and 181 countries and regions.

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<sup>4</sup> Global Burden of Disease and Injury Studies. See also <https://doi.org/10.5271/sjweh.4132>

<sup>5</sup> Psychosocial and neuropsychiatric disorders are included as they have been by-passed earlier and disability causes 8 % of fatalities (mostly Parkinson's diseases and depression. They also cause a high level of absence from work and thus a major decrease of GDP.

## Work-related deaths: Case Sweden<sup>6</sup>

The Swedish authorities released a report in 2019 of the number of work-related deaths due to selected exposures, see table. It also includes noise and long term heavy physical work, where the relation to work and the risks are less reliable. Some persons may have been exposed to more than one factor meaning that the numbers cannot be added to estimate the total number of work-related cases in Sweden. Although the numbers in the Swedish case cannot be directly added the order of magnitude is roughly the same as in the ICOH estimates.

The Swedish study lists work exposures that cause premature deaths. The estimated numbers of deaths due to work exposures are of a higher order of magnitude compared to fatal occupational accidents.

Stress and shift work cause the highest number of cases of work-related deaths, while frequently occurring diesel exhaust exposure is also a high-ranking cause of death. The fatal outcomes are largely concentrating on occupational cancer, cardiovascular and respiratory problems.

ILO estimated that in 2017 there were 4,250 work-related deaths in Sweden. The latest data now being peer-reviewed for scientific publishing ended to some 4.407 deaths based on data of 2019. The rising numbers of deaths are largely caused by long-latency diseases at work, that continue to go up, when life expectancy increases.

See latest data for Sweden and other Nordic countries at EU-OSHA Barometer (ICOH Estimates): <https://visualisation.osha.europa.eu/osh-barometer/accidents-diseases-well-being/work-related-diseases/icoh/disease-groups-per-country>

and the printed document <https://osha.europa.eu/en/publications/occupational-safety-and-health-europe-state-and-trends-2023>

| Factor                | Number of work-related deaths per year |         |         |
|-----------------------|--|---------|---------|
|                       | Women                                  | Men     | Total   |
| Accidents             | 4,0                                    | 33,0    | 37,0    |
| Stress                | 360,3                                  | 412,2   | 772,4   |
| Shift work            | 280,9                                  | 446,8   | 727,7   |
| Dust (COPD)           | 246,6                                  | 174,8   | 421,4   |
| Asbestos              | 45,0                                   | 222,5   | 267,5   |
| Quartz                | 9,0                                    | 116,2   | 125,2   |
| Engine exhaust        | 222,7                                  | 324,7   | 547,4   |
| Passive smoking       | 75,2                                   | 119,6   | 194,8   |
| Welding fumes         | 32,0                                   | 39,0    | 71,0    |
| Ionizing radiation    | 1,0                                    | 3,8     | 4,8     |
| Uncertain connections |  |         |         |
| Noise                 | 338,4                                  | 439,0   | 777,4   |
| Physical heavy work   | 0,0                                    | 1 548,8 | 1 548,8 |

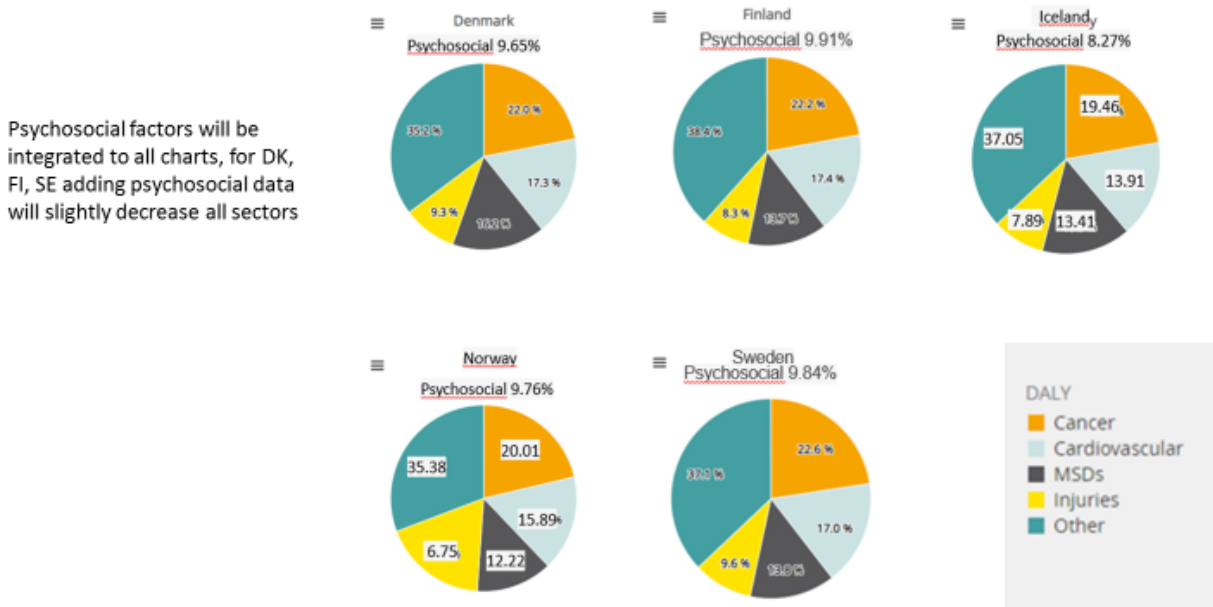
<sup>6</sup> Arbetsmiljöverket, Arbetsrelaterad dödlighet – delrapport 1, Beräkning av antalet dödsfall 2016 uppdelat på olika exponeringar i arbetet, <https://www.av.se/globalassets/filer/publikationer/kunskapsmanstallningar/arbetsrelaterad-dodlighet-rap-2019-3-del-1.pdf?hl=arbetsrelaterad%20d%C3%B6dlighet>

## Causes of DALYs in the Nordic Countries

DALY's or Disability Adjusted Life Years is an important indicator of the level and length of disability. While death cases are concrete and easily understandable for preventive purposes, the disability level and length are wider key indicators due to permanent or temporary disability suffered by workers. The "adjustment" process is an internationally agreed procedure taking into account the seriousness of the diseases or injury outcomes. A three days' disability is less important than a loss of limb, blindness or mental incapacity to work permanently; the DALY will make a distinction in such cases.

The estimation methodology "Disability Adjusted Life Years" (DALYs) has been developed by WHO to give a better picture of the disease burden. One DALY represents the loss of the equivalent of one year of full health. Using DALYs both the burden of diseases that cause premature death, and less serious disability can be calculated and made visible with a single indicator.

### Disability Adjusted Life Years, DALYs at work



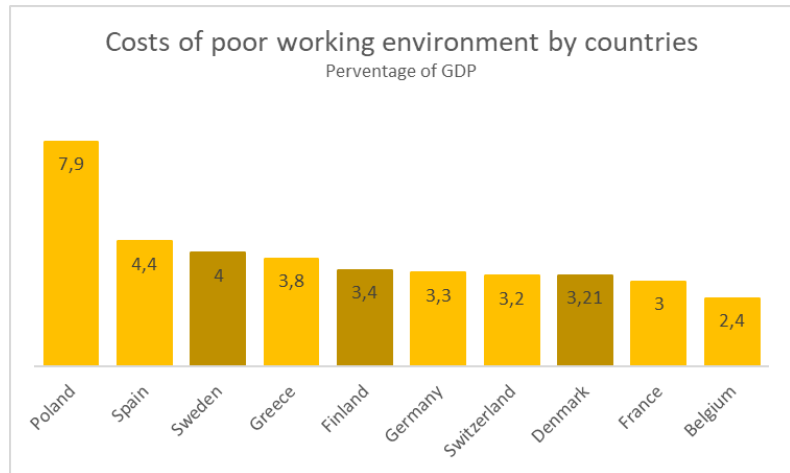
Note: To be updated by EU-OSHA to avoid overlapping estimates

Source: original data from EU-OSHA, new data by Nordic project, integrated already to Iceland and Norway charts

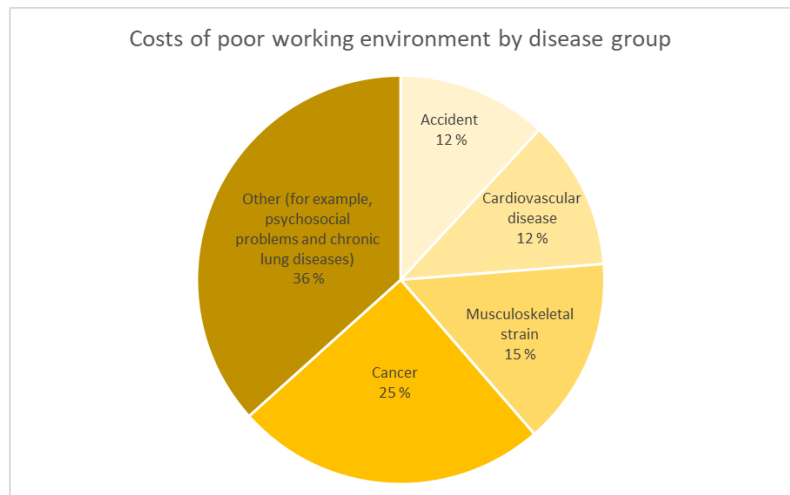
The DALY estimate for the individual Nordic countries indicates a higher value for occupational injuries compared to the absolute numbers of occupational accident deaths presented earlier. This is the case as workplace injuries occur to younger workers (and gives a higher DALY value), whereas work-related diseases tend to occur to workers that have had a long-term exposure, that is, at an older age (causing less years with disability). The differences between the Nordic countries are small.

## Costs of work-related deaths

On average, research estimates<sup>7</sup> that the cost of poor working conditions is approx. 4 % of a country's GDP. Finland<sup>8</sup> has estimated the cost of lost labour input to be 2 billion euro per month, that is 24 billion euro in a year.



Studying the sources of these overall costs due to work-related injuries and diseases, the research notes that occupational accidents costs 12 % of the total, whereas cancer causes a cost of 25 %<sup>9</sup>. Heart and coronary diseases causes also 12 %, musculoskeletal injuries causes 15 %. Psychosocial issues and chronic lung diseases are included in the “others” group.



<sup>7</sup> ILO 2023: Work hazards kill millions, cost billions, [https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS\\_075615/lang--en/index.htm](https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_075615/lang--en/index.htm)

<sup>8</sup> Ministry of Social Affairs and Health: Cost of lost labour input, 2014, [https://stm.fi/documents/1271139/1332445/Cost+of+lost+labour+input\\_en.pdf/d5790088-8e3e-4d13-a5cd-56c23b67de0c/Cost+of+lost+labour+input\\_en.pdf?t=1442323144000](https://stm.fi/documents/1271139/1332445/Cost+of+lost+labour+input_en.pdf/d5790088-8e3e-4d13-a5cd-56c23b67de0c/Cost+of+lost+labour+input_en.pdf?t=1442323144000)

<sup>9</sup> Source: Arbetarskydd 11/2017, data from European Agency for Safety and Health at Work, International Commission on Occupational Health, ICOH, and ILO.



## Conclusions

The report was made for the Director General of the Labour Inspectorates. Thus, the conclusion were formulated as discussion points and the conclusions/actions were to be made by the DGs.

For the Nordic event 26 April 2024 in Stockholm it can be discussed:

- Remains the focus in the Nordic countries (as well as in most countries) on prevention of occupational accidents in promotion, training, risk assessment and control and inspection?
- Is the main indicators used to evaluate the state of working environment records on occupational accidents and diseases? The measurement method supports the focus on what is measured. The statistics on occupational diseases concerns only legally approved occupational diseases, which leaves the (vast majority of) work-related diseases unrecorded.
- The huge decrease in occupational hygiene measurements further lessen the knowledge of exposures leading to work-related diseases.
- Occupational fatalities accounts for only 1 % of work-related deaths (injuries and invalidity 6-10 % measured as DALYs), whereas other work-related exposures cause the overwhelming part of fatalities, invalidity and diseases.
- The labour inspection and improvement of working conditions as well as media, however, still has the main focus on prevention of accidents.
- The cost for society of poor working conditions is huge 3-4 % of GDP. Occupational accidents cost 12 % of the total, whereas cancer, musculoskeletal strain, cardiovascular disease and psychosocial issues make up the majority of the costs.

## Annex 1: ILO Global Estimates of occupational injuries and fatal work-related diseases in the Nordic countries

The ILO Global Estimates are based on employment data from year 2019.

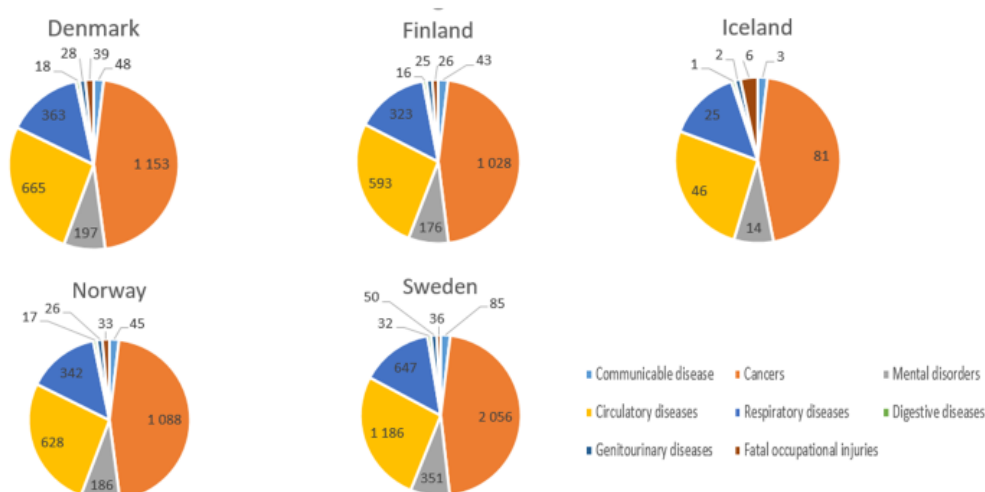
| Occupational injuries (2019) |                   |                           |                              |                           |  |  |
|------------------------------|-------------------|---------------------------|------------------------------|---------------------------|--|--|
|                              | Project estimates |                           | Reported by Nordic countries |                           | Fatal work-related diseases 2019 Project estimates | Occupational diseases (2020) reported to Eurostat* |
|                              | Fatal injuries    | Absence of 4 days or over | Fatal injuries               | Absence of 4 days or over |  |  |
| Denmark                      | 39                | 50 227                    | 39                           | 50 179                    | 2 472  | 2 410  |
| Finland                      | 33                | 42 500                    | 33                           | 43 126                    | 2 203  | 1 186  |
| Iceland                      | 2                 | 2 576                     | 2                            | 1 410                     | 173  |  |
| Norway                       | 33                | 42 500                    | 33                           | 40 000                    | 2 332  |  |
| Sweden                       | 36                | 46 364                    | 34                           | 36 795                    | 4 407  | 107  |
| <b>Total</b>                 | <b>143</b>        | <b>184 167</b>            | <b>141</b>                   | <b>171 510</b>            | <b>11 587</b>                                      |  |

The table indicates that the reported occupational accidents by Nordic country correspond to the estimates calculated by the project. The project estimates of absence of at least four days are based on the number of fatal injuries reported to Eurostat.

An Occupational disease database does not currently exist at the European level. The objective of a European Occupational Diseases Statistics (EODS) pilot project is to gather national data in a unique database and provide trends on the most recognized occupational diseases in the European Union. Information from Iceland and Norway is not available.

The data in the EU-OSHA visualisation database is based on the ICOH estimates<sup>10</sup>.

### Deaths related to work by causes per country



<sup>10</sup> EU-OSHA Barometer, <https://visualisation.osha.europa.eu/osh-barometer/accidents-diseases-well-being/work-related-diseases/icoh/prevalence-of-diseases/all-diseases>, based on ICOH estimates, <http://www.ichweb.org/site/images/news/pdf/Report%20Global%20Estimates%20of%20Occupational%20Accidents%20and%20Work-related%20Illnesses%202017%20rev1.PDF>