eurogip

May 2017

Ref. EUROGIP - 179/E
ISBN 979-10-97358-54-9

Estimating the level of under-reporting of accidents at work in Europe with three statistical methods: comparative, fatality matching and survey data

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Summary and main conclusions of the survey

This survey aims to reconcile administrative statistics on accidents at work in European countries with the Labour Force Survey (LFS) in order to estimate the levels of under-reporting of accidents at work and to assess the main sociological and economic causes of these accidents.

- In 2013, more than one in 10 accidents at work were not reported to the authorities in EU countries.
- The exact level of reporting of accidents at work is difficult to estimate but is probably between 65% and 87%.
- The differences are notable between, on one hand, the countries of the so-called "Bismarckian" tradition, which have a historical compulsory insurance system against accidents at work, and, on the other hand, the EU countries, which have only recently established such an insurance system (often after their integration into the EU). Countries with different systems (systems of mixed management with health insurance, state systems, systems based on a legal obligation to report accidents at work, etc.) have different levels of reporting.
- Under-reporting of accidents at work in Europe mainly affects the agricultural sector and older workers. In contrast to the results of other studies, we do not find significant underreporting among young workers. There is also no significant difference between men and women.

I. Introduction

This survey aims to investigate statistical evaluations of underreporting using two methods developed by a study carried out in 2015 by the Nordic institute *BSN* (*Baltic Sea Network on Occupational Health and Safety*) based on a European statistical comparison.[1] This study, conducted by Dr. Kari Kurppa, assessed the under-reporting of non-fatal accidents at work on the basis of data published by the International Labour Organisation (ILO) between 2003 and 2007.

Based on the Nordic study, this survey aims to assess the levels of reporting of accidents at work for the year of 2013,[2] using the statistics of the ESAW (European Statistics of Accidents at Work) methodology. First, we establish a benchmarking approach, which is based on a group of countries, whose good performance in occupational health and safety is recognized by observers, chosen as a control group. In order to evaluate the possible biases of these methods, EUROGIP proposes a new statistical evaluation method that is based on microdata from the European employment survey and its ad-hoc module ("EU Labour Force Survey 2020 module on accidents at work and other work-related health problems"; 2013).

1. European statistics on accidents at work

Compiled by the European Commission's Directorate General Statistics, Eurostat, as part of the European Statistics of Accidents at Work (ESAW) methodology, national statistics on accidents at work are a main source of data on safety and health at work in the Member States. They record **recognized** accidents at work that result in at least four days' absence from work, as recorded by the competent administrative authorities in the Member States. They are provided in absolute values or, for comparative purposes, in incidence rates (i.e., the number of accidents per 100,000 workers).

This data shows very significant differences in incidence rates between countries, as reflected in **Table 1**. Per 100,000 employed persons, these rates range from 72 non-fatal accidents at work (Romania) to 3,042 (France). Accidents at work are strongly related to the level of exposure to occupational risks in specific economic branches (such as the construction sector). One of the main causes of statistical differences would therefore be the different structure of economic activity in the various countries. In order to correct this bias, it is possible to alter the incidence rate by taking into account these structural differences. Eurostat performs this correction, for comparative purposes, by computing a standardized incidence rate that gives each economic branch the same weight at the national level as in the European Union total.[3]

1 Kari Kurppa (2015), Severe under-reporting of Work Injuries in Many Countries of the Baltic Sea Region: An exploratory semi-quantitative study, Finnish Institute of Occupational Health, Helsinki.

2 The year 2013 was chosen because it is the most recent year in which the ad-hoc module of the Labour Force Survey on accidents at work was carried out.

3 In practice, this method increases the accident frequencies observed in countries where sectors particularly exposed to occupational risks (such as construction) are less important and decreases the accident frequencies in countries where these sectors are more important. This trend is, for example, evident in Portugal or the Netherlands (**Table 1**).

Table 1: Number of non-fatal accidents at work per 100,000 workers

The *incidence rate (without standardization)* is the number of accidents at work in a country or sector per 100,000 workers.

The *standardized incidence rate is* the average of the national sectoral incidence rates weighted by the share of each sector in the European economy (with the sector corresponding to a section of NACE Rev. 2, the statistical classification of economic activities in the European community).

Country	Without standardization	Standardized
France	3,042	3,164
Portugal	2,780	3,619
Spain	2,581	2,909
Belgium	2,099	2,147
Denmark	2,081	2,094
Finland	1,931	2,230
Switzerland	1,929	2,877
Germany	1,900	2,178
Luxembourg	1,886	2,466
Netherlands	1,819	2,278
EU-15	**1,781**	**2,023**
Austria	1,548	1,840
EU-28	**1,533**	**1,696**
Slovenia	1,491	1,595
Malta	1,479	1,888
Italy	1,469	1,712
Iceland	1,039	1,179
Estonia	994	1,095
Ireland	959	1,036
Czech Republic	893	971
Norway	877	821
Croatia	843	868
United Kingdom	832	990
Sweden	793	875
Poland	512	541
Hungary	480	487
Cyprus	419	572
Slovakia	375	427
Greece	275	447
Lithuania	235	260
Latvia	198	225
Bulgaria	83	80
Romania	72	77

Source: Eurostat (European Statistics of Accidents at Work Database, 2013).

In 2001, in one of the first reports of the ESAW program, Eurostat considered that the disparities in incidence rates between countries were partly explained by different "reporting levels". While reporting systems based on insurance schemes would have an optimal coverage of accidents at work in their statistics, other types of systems could encourage reporting levels below 100%. The European Commission then recommended Member States to assess their actual reporting levels in order to

- be able to correct European statistics on accidents at work using appropriate corrective factors, where necessary;
- ensure the comparability of statistics between the different Member States; and
- aim to achieve, in the medium run, reporting levels close to 100%.

Based on the information provided by the EU-15 Member States, Eurostat estimated the actual reporting levels for 1999 to be between 25% and 100% (**Table 5**). In 2014, the last year of the ESAW program evaluation, these levels were estimated for most of the EU-28 countries. However, each country carried out its own assessment, which leads to low comparability of results.

The European Commission also recommended using the ad-hoc module "Accidents at work and occupational diseases" of the European Labour Force Surveys, which provided an "important correction factor" for the administrative data collected under the ESAW program. The manipulation of this module is the core of this survey.

2. Comparability of statistics on accidents at work

Harmonized European statistics remain very difficult to interpret due to discrepancies between the different member countries. Although the primary objective of these publications is not to compare the occupational health and safety performance of European countries, there are multiple sources of bias in the statistics, which Eurostat pointed out in its 2001 report.

- The coverage of the population

In 1998, the ESAW data covered 90% of European workers. However, depending on the countries' coverage systems and the way in which statistics were reported to Eurostat, there were large reporting differences in some groups of workers (e.g., self-employed and student workers, **Table 1**) and in some economic sectors (e.g., public administration and private employers, **Table 2**). In addition, there were differences in the Member States' methods of counting their reference population, which is ideally the "number of persons employed (persons exposed to occupational risks)"[4]. States sometimes apply different calculation methods, which may exclude non-resident workers or information on employment in full-time equivalents worked.[5]

4 European Statistics on Accidents at Work, Summary of methodology, Eurostat, 2012 Edition.

5 For example, Germany reports the number of insured workers, while France reports the number of insured full time–equivalent workers.

Table 2: Coverage of occupational status in ESAW (2014)

Status	Germany	Spain	Finland	France	Italy	Poland	Sweden	Norway
Self-employed	Partially	Partially	Yes	No	Yes	Yes	Yes	No
Family workers	Partially	Partially	Yes	No	Yes	Yes	Yes	No
Students	Yes	No	*Not known*	Yes	Yes	Partially	Partially	No

Source: Eurostat (2014), Metadata, European Statistics of Accidents at Work (ESAW).

Table 3: Coverage of economic sectors in ESAW (2014)

NACE Section[6]	Germany	Spain	Finland	France	Italy	Poland	Sweden	Norway
Public administration	Partially	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Employing households	Yes	Yes	Yes	Part.	Yes	Yes	Yes	Yes

Source: Eurostat (2014), Metadata, European Statistics of Accidents at Work (ESAW).

- The definition of an accident at work

Each country records accidents at work according to specific legal standards. Although Eurostat requires a reprocessing of the data by the competent national authorities according to a common reference system (see **Annex**), there are still significant differences in the harmonized data due to differing definitions of an accident at work.

- Specific accidents at work

Depending on their own systems of recording and accounting for accidents at work, Member States may or may not include in their statistics certain categories of accidents at work—commuting accidents in particular (**Table 3**). Commuting accidents are generally accidents that occur during the journey from home to work or from work to a usual lunch break. There may, therefore, be a significant bias in some countries' numbers due to the inclusion of fatal commuting accidents (which make up a large proportion of accidents, as they are road accidents). In addition, some countries exclude accidents whose cause is solely medical and not occupational.

6 NACE Rev. 2, Statistical classification of economic activities in the European Community.

Table 4: Coverage of specific accidents at work in ESAW (2014)

	Germany	Spain	Finland	France	Italy	Poland	Sweden	Norway
Commuting accidents	No	Yes	Yes	No	Yes	No	Yes	Yes
Accidents (medical)	No	Yes	*Not known*	Yes	Yes	No	No	No

Source: Eurostat, European Statistics of Accidents at Work (ESAW) Methodology, 2001 Edition.

- Accounting for fatal accidents at work

The ESAW statistics are not supposed to count accidents that result from strictly natural causes. As a result, the statistics are to exclude accidents relating exclusively to a medical problem, incidents of the heart or brain, or any other sudden medical problem occurring during work but having no obvious link with the victim's occupation.

This methodology does not, theoretically, induce a significant bias between countries concerning non-fatal accidents at work. However, there may be a significant bias between countries depending on the way fatal accidents at work are recorded. Most European countries exclude from their statistics fatal accidents at work linked to a cause unrelated to the work, such as suicides, fainting spells, or other attacks occurring at work.

For example, in Germany, deaths whose occupational origin is not proven are not counted by the competent authority, even when they occur at the workplace or during the employee's working activity. This difference creates a significant disparity compared to the databases transmitted by the French authorities, which include all deaths in the workplace because of the principle of presumed imputability.[7]

- Statistical changes over time

Each year, in order to approximate the scope of the data to be transmitted to Eurostat, adjustments, inclusions, and changes by the member States: in the number of accidents at work or in the number of workers insured against occupational risks for instance. These alterations sometimes make it difficult to monitor the evolution of the claims experience.[8]

After taking these differences into account through a preliminary processing of microdata and metadata, we assume that the result is a common frame of reference regarding the definition of the accident at work and the insured population in the various countries.

3. An overview of under-reporting

Statisticians can define the level of reporting of accidents at work as the ratio (%) of the number of accidents at work, for a given year or period, recorded by the administrative databases of the competent authorities to the number of accidents at work actually occurring in that year. It is generally recognized that, in most European countries, there is a share of accidents that are

7 One could refer to the EUROGIP survey: Florian Jacquetin (2016), OSH Indicators - France Germany / 2010-2014: Accidents at work statistics and financial highlights, Ref EUROGIP-118/F.

8 For example, France used to transmit the consolidated data of the General and Agricultural Schemes via the DARES (Directorate for the Animation of Research, Studies and Statistic of the Ministry of Labour). In 2014, the extension of the scope to the civil service sector led to a change in the source of the insured population, which caused a break in the trend of the statistics.

not recorded in national statistics. The level of reporting can theoretically vary from 0% (zero reporting level) to 100% (optimal reporting level).

Below are statistics from Eurostat's assessment of actual reporting levels in the Member States.

Table 5: Estimated level of reporting by EU-28 countries

	1998	2014
Germany	100%	100%
Austria	100%	100%
Belgium	100%	100%
Bulgaria		100%
Croatia		100%
Denmark	46%	47%
Spain	100%	99%
Estonia		47%
Finland	100%	
France	100%	
Greece	39%	
Hungary		90%
Ireland	38%	38%
Italy	Close to 100%	
Luxembourg	100%	100%
Malta		100%
Norway	25 to 100%	100%
Portugal	100%	100%
Romania		~100%
United Kingdom	43%	47%
Slovenia		~100%
Sweden	52%	59%
Switzerland		~100 %

Source: Eurostat, European Statistics of Accidents at Work (ESAW) Methodology, 2001 Edition.

Eurostat, METADATA, European Statistics of Accidents at Work (ESAW), 2014 Reference Year.

The benchmarking method is based on the principle that at least one country (or group of countries) achieves exemplary performance in the level of reporting of occupational accidents. In order to select this benchmark group, Dr. Kurppa required a candidate country with

- An optimal level of reporting of accidents at work and
- An excellent overall occupational health and safety performance, combined with a relatively low incidence rate of occupational accidents.

In order to identify appropriate candidates for the control group, Kurppa first classified the occupational injury systems of the European countries based on the reporting system (see Box 1) and, in particular, on whether the occupational injury reporting system is based on an **insurance scheme** (as is the case in France or Germany). In particular, Kurppa, whose research focused on the countries around the Baltic Sea, compared, on the basis of ILO[9] data, the occupational injury statistics of several countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russia, and Sweden.

Kurppa then defined three main groups of countries, based on an a priori estimate of the level of reporting:

- **Reporting systems based on social insurance schemes**

These reporting systems are based on a monopolistic and compulsory public insurance scheme, which is binding at least on all employed persons and financed by social contributions levied on the wage bill, and which pays a replacement income to victims of accidents at work. By extension, mixed systems, which operate on the above principle but include private insurance (as is the case in Belgium, for example), can be included.

The expected level of reporting under these systems would be close to 100%.

In Kurppa's study, the countries belonging to this framework are Finland and Germany.

- **Reporting systems based on other regimes**

The other regimes are broadly defined as all systems that do not fit into the above criteria.

They may include, for example, countries where accidents at work and their consequences are compensated for by universal social security, such as Sweden, where daily benefits for accidents at work are paid by the health insurance system. Dr. Kurppa estimates the level of reporting in Sweden to be between 30% and 50%. This system is mainly used in the Scandinavian and Northern European countries.

In this study, the countries belonging to this framework are Denmark, Norway, and Sweden.

There are also countries whose occupational injury systems were, at the time of the cited study, simply constrained by a legal obligation for employers to report accidents at work to the authorities in charge of occupational risks (Estonia, Latvia, Lithuania, Poland, and Russia). The level of reporting in these countries is then assumed to be relatively low.

It should be noted that since the enlargement of the European Union to 28 countries, a large majority of the new member countries have adopted an insurance system. There are now only six countries that do not have a specific social system dedicated to the coverage of occupational risks (Croatia, Estonia, Greece, Hungary, the Netherlands, and Slovenia).

9 International Labour Organization (ILO).

Box 1: Insurance against accidents at work in Europe: a Bismarckian predominance, but with different actors, systems, and management

According to a political science typology, there are two inspirational models for the functioning of a social security system:

- The Bismarckian model, named after the German Chancellor Otto von Bismarck (1815–1898), founder of the first social insurance against accidents at work in Europe in 1884. This model imposes insurance against a social risk, through the payment of a contributory contribution, in exchange for the payment of a replacement income proportional to the last salary in the event of incapacity for work. In the case of accidents at work, it is the employer who contributes.

- The Beveridge model, named after the economist and politician William Beveridge (1879–1963), redistributes income to the poorest citizens through a progressive tax.

By definition of the insured risk, an occupational injury insurance model must have a Bismarckian basis. In most countries with a system of occupational risk coverage, there is indeed insurance financed by compulsory social contributions from workers (employees and, in some countries, the self-employed). Employers are subject to a legal obligation to report accidents to the competent authorities.

However, there are marked differences in the management of benefits, particularly in countries with a Beveridge system:

- In Ireland and the United Kingdom, countries with a liberal tradition, there is insurance, but it only modestly compensates victims of accidents at work.
- In Sweden, low-severity accidents are not compensated by accident insurance, but by the universal health insurance scheme, with a small contribution.

The choice of a control group: Finland and the European Union-15.

Dr. Kurppa based his comparative study on the statistics of the group of insurance-based countries (Finland and Germany), assuming that a compensatory insurance system is a sufficient incentive for economic actors (employees and employers) to report accidents at work consistently. It also includes the aggregated statistics of the EU-15, which include a majority of countries with occupational injury reporting systems based on insurance schemes and which represent a stable average of observed claim frequencies.

II. Estimating the under-reporting of accidents at work

In the following text, non-fatal accidents at work will refer, in a shortened form, to all non-fatal accidents at work which cause the victim to be away from work for at least four days.[10]

1. A European comparison with the Spanish model

Dr. Kari Kurppa proposed a first approach to estimate the level of under-reporting of occupational injuries causing more than three days' absence from work. This approach estimates the hypothetical number of occupational injuries that would have been reported if the labor force of the country under study had been employed in a control-group country, forming the comparative basis.

Kurppa chosed Finland[11] as a control country because it has an insurance-based reporting system, and its reporting level was already assessed as close to 100% in 2001 by the ESAW program. Moreover, with an incidence rate of 1,931 accidents at work per 100,000 workers (the sixth in Europe, see **Table 1**), it offers an interesting basis for comparison that does not discriminate against its European partners, many of which have a much higher incidence rate.

We introduce two alterations to the method proposed by Dr. Kurppa:

- First, we choose Spain as a control country. Indeed, it is, like Finland, a country where compensation for accidents at work is based on an insurance scheme, and its reporting level estimated by ESAW is systematically equal to 100%. Moreover, the indicators used in the study as a whole (non-fatal/fatal ratio and microdata) confirm a posteriori that the level of reporting in Spain is among the highest.
- Second, we introduce the standardized incidence rate, in order to take into account sectoral differences and the important influence that certain exposed sectors can have on the overall incidence (agriculture and construction in particular). This parameter does not significantly influence the results obtained.

It is therefore important to be able to determine precisely the size of the employed population covered against occupational risks. This number is reported by the competent authorities of the Member States together with the statistics on accidents at work and is then used to calculate the incidence rates. From the incidence rates and the number of accidents at work published by Eurostat, it is then possible to reconstruct a number that is fairly close to this value. It should be noted, however, that these reference populations do not always represent the same reality depending on the countries considered, either in terms of accounting (number of workers, full-time equivalents worked) or in terms of sectors. While the private sector is generally well accounted for, there are significant differences in reporting on certain categories of workers: civil servants, farmers, and self-employed people.

A first overview of the assessment of underreporting by this method is given in **Table 6**. According to this method, the reporting levels directly follow the results displayed by the ESAW program.

- Continental European countries with a Bismarckian tradition have reporting levels close to 100%.

10 The terms "more than three days" or "at least four days" are used interchangeably in publications.
11 Dr. Kurppa also proposed to carry out this exercise based on the average incidence rate in the EU-15.

- Countries with Beveridge systems, either liberal (UK) or social democratic (Sweden), have reporting levels between 30% and 50%.
- Eastern European countries show low levels of reporting.

It is very easy to criticize this first assessment. It is based on the recognition of an appropriate level of a priori reporting in a country and on the principle that most countries should have the same incidence rate. This latter principle is obviously biased, as there are fundamental differences between the work realities of each country, present as much in the economic structure of the countries as in the daily relationship with work or the occupational health and safety culture present in companies.

Definitions and results

The *covered population* in a country is the reference population transmitted to Eurostat in the framework of the ESAW program. This data is not available in the European Directorate's public database, but it can be recalculated from the incidence rate (see **Annex**).

The *estimated number of accidents* of a country corresponds to the estimated number of accidents if the labor force of this country evolved in the control country (in Spain, then in the whole EU-15) and if the sectoral structure of the country was similar to that of the whole European Union.

The *number of reported accidents* corresponds to the number of accidents transmitted to Eurostat over all NACE Rev. 2 Sections A, C–N, including workers in agriculture, industry, construction, trade, and services, and excluding the public sector (whose treatment differs in many countries) and ancillary service activities (whose reporting levels are lower).

The *estimated reporting level* is a confidence interval calculated

- as a lower bound, the number of reported accidents over the number of accidents estimated from the Spanish incidence rate; and
- as an upper bound, the number of reported accidents over the number of accidents estimated from the EU-15 incidence rate.

The countries are ranked in descending order of estimated reporting levels.

Table 6: Estimation of under-reporting in 2013 (Method 1: "comparative")

Country	Labor force (million)	Estimated non-fatal accidents (ref: Spain)	Estimated non-fatal accidents (ref: EU-15)	Reported number of non-fatal accidents	Reporting level (estimation in %)
Spain	9.5	276,507	192,265	276,507	100 – 100
France	14.0	407,995	283,694	443,690	100 – 100
Portugal	3.1	90,622	63,013	112,734	100 – 100
Finland	1.6	46,614	32,413	35,731	77 – 100
Denmark	1.6	47,444	32,989	34,155	72 – 100
Belgium	2.1	62,049	43,145	45,802	74 – 100
Switzerland	2.9	84,594	58,822	83,673	99 – 100
Germany	33.7	979,662	681,195	733,619	75 – 100
Luxembourg	0.3	7,942	5,522	6,732	85 – 100
Netherlands	5.0	144,413	100,416	113,096	78 – 100
EU-15	**115.4**	**3,357,227**	**2,334,401**	**2,334,401**	**70 – 100**
Malta	0.1	3,493	2,429	2,267	65 – 93
Austria	3.0	87,662	60,954	55,455	63 – 91
Italy	161	468,464	325,740	275,662	59 – 85
EU-28	**145.1**	**4,220,325**	**2,934,545**	**2,460,489**	**58 – 84**
Slovenia	0.6	18,093	12,581	9,919	55 – 79
Iceland	0.1	3,253	2,262	1,318	41 – 58
Estonia	0.5	13,135	9,133	4,946	38 – 54
Ireland	1.3	37,381	25,993	13,314	36 – 51
United Kingdom	18.7	543,923	378,209	185,025	34 – 49
Czech Republic	3.7	108,123	75,182	36,102	33 – 48
Sweden	2.9	83,044	57,743	24,979	30 – 43
Croatia	1.0	29,141	20,263	8,695	30 – 43
Norway	1.5	43,722	30,401	12,346	28 – 41
Cyprus	0.3	7,378	5,130	1,449	20 – 28
Poland	11.7	340,660	236,873	63,327	19 – 27
Hungary	2.9	82,908	57,649	13,885	17 – 24
Greece	2.5	73,498	51,105	11,292	15 – 22
Slovakia	1.7	49,963	34,741	7,332	15 – 21
Lithuania	0.9	27,423	19,068	2,448	9 – 13
Latvia	0.6	17,599	12,237	1,358	8 – 11
Bulgaria	2.0	57,270	39,822	1,569	2.7 – 3.9
Romania	3.7	107,918	75,039	2,846	2.6 – 3.8

Source: EUROGIP, based on Kari Kurppa and Eurostat (ESAW, 2013).

2. A comparison based on fatal accident rates

This method, proposed by Dr. Kurppa, is based on the assumption that countries have a similar distribution in the severity levels of accidents at work. In particular, although there would be, under this method, a potential level of underreporting of non-fatal accidents at work in each country, the level of reporting of fatal accidents would be optimal, regardless of the country's reporting system. This assumption is also supported by Eurostat: "In general, fatal accidents at work are assumed to be of higher accuracy than non-fatal accidents at work as fatal accidents are usually investigated by relevant state authorities."[12] Indeed, the latter would necessarily be investigated more deeply than non-fatal accidents and would therefore be recorded much more frequently. Kurppa calculated the ratios of fatal and non-fatal occupational accidents reported by each country of the BSN (Baltic Sea Network) and recorded significant differences between them. According to him, a low ratio appears to be an indicator of a significant under-reporting level of low-severity accidents at work. On the contrary, a high ratio would indicate an optimal level of reporting.

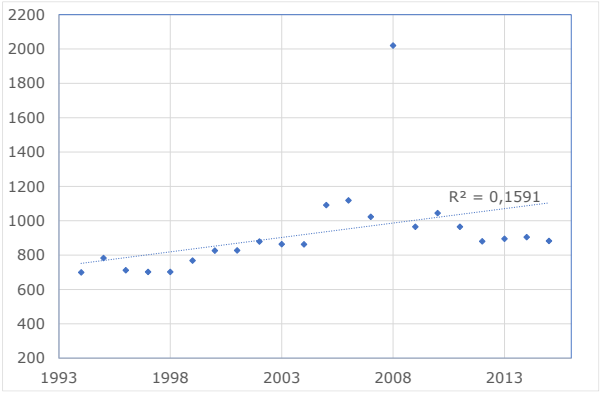
This hypothesis is supported by the incidence rate of fatal accidents at work, the dispersion of which is much less important than that of the incidence rate of non-fatal accidents at work. The dispersion of incidence of non-fatal accidents at work is, in theory, a more stable indicator than the incidence rate of non-fatal accidents at work, as shown in **Figure 1** and **Table 7**.

It should be noted that fatal accidents at work are statistically rare events, which implies that their incidence rate may be very volatile from one year to the next, since it is subject to specific events or miscellaneous facts. In order to smooth this ratio and to soften the cyclical effects, the ratio is recomputed based on the average of fatal and non-fatal accidents at work occurring between 2011 and 2015, or over a five-year period. This choice allows for the attenuation of the effect of the economic situation and gives access to less dispersed European statistics (**Table 7**).

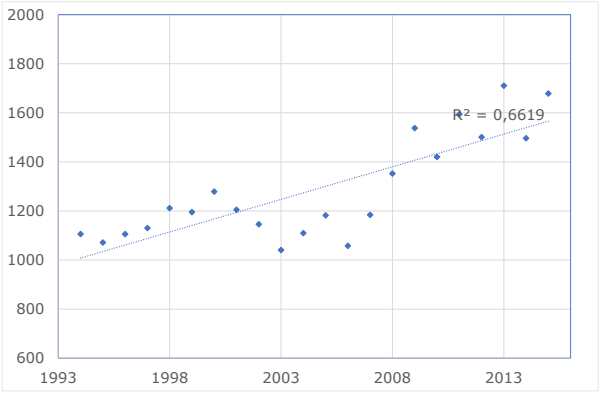
12 See Section *13, Accuracy* of Accidents at Work metadata at http://ec.europa.eu/eurostat/cache/metadata/fr/hsw_acc_work_esms.htm.

Figure 1: Ratios of non-fatal accidents at work to fatal accidents

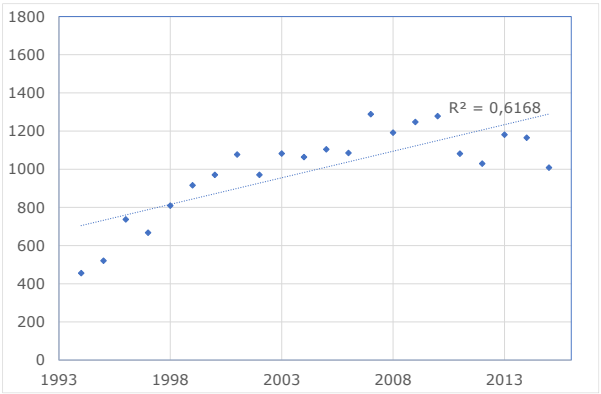
France (1994–2015)



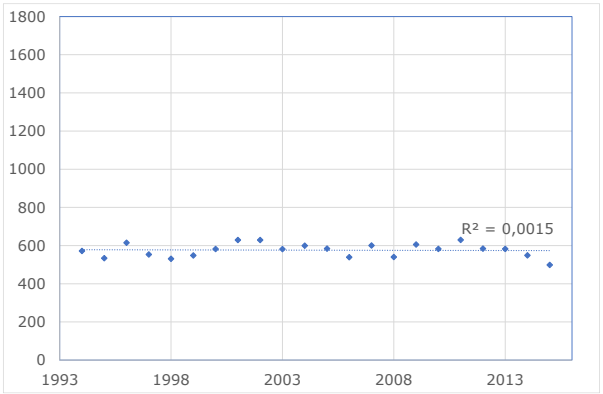
Germany (1994–2015)



Spain (1994–2015)



Italy (1994–2015)



The ratios plotted over the period from 1993–2015 show the relative stability of the indicator over time. In Italy, the indicator has remained almost constant. Its constant increase in Germany, Spain, and France reflects a gradual relative decrease in mortality in occupational accidents, linked to the expansion of services in European countries. In France, the year 2008 is an outlier. Eurostat records 289 fatal accidents at work for France in this year, while the French General Scheme counts 569 in its management report. This low figure therefore overestimates the French ratio beyond its observed average value.

Annual shocks, linked to particular events or changes in accounting, can impact this ratio. As proposed by Dr. Kurppa, we filter this data by smoothing it with a five-year moving average.

Table 7: Dispersion of European statistics of accidents at work

	Fatal accidents at work		Non-fatal accidents at work
Country	Incidence rate 2009–2013	Incidence rate 2013	Incidence rate 2013
Austria	3.79	3.43	1,548
Belgium	2.27	2.46	2,099
Bulgaria	3.53	3.35	83
Croatia	2.24	2.09	843
Cyprus	2.84	2.47	419
Czech Republic	2.55	2.63	893
Denmark	1.55	1.45	2,081
Estonia	3.04	3.22	994
Finland	1.30	0.9	1,931
France	2.73	2.96	3,042
Germany	1.12	0.99	1,900
Greece	0.73	0.63	275
Hungary	2.13	1.4	480
Ireland	2.27	2.13	959
Italy	2.75	2.31	1,469
Latvia	3.56	3.59	198
Lithuania	4.36	4.49	235
Luxembourg	2.62	1.6	1,886
Malta	2.80	2.27	1,479
Netherlands	0.70	0.5	1,819
Poland	2.79	1.83	512
Portugal	4.31	3.61	2,780
Romania	5.23	5.6	72
Slovakia	2.00	2.36	375
Slovenia	2.56	2.38	1,491
Spain	2.27	1.88	2,581
Sweden	1.04	0.77	793
United Kingdom	0.65	0.92	832
Norway	1.75	1.85	877
Switzerland	1.65	1.73	1,929
Dispersion coefficient	**0.46**	**0.52**	**0.68**

The calculation of the different ratios is shown in **Table 8**. It shows very heterogeneous values between countries, ranging from 1:12 (Romania) to 1:2,640 (Netherlands).

However, it is necessary to again define a control group of countries in order to make this comparison. Spain and the average of the former EU-15 countries are chosen in order to establish theoretical reporting levels. Empirically, we find

- For Spain, a ratio of 1 fatal accident per 1,096 non-fatal accidents at work. As Spain is assumed to have one of the most accurate reporting systems, its ratio can be chosen as a high range for assessing reporting levels.

- For the EU-15, a ratio of 1 fatal accident at work to 959 non-fatal accidents at work. As this ratio includes some countries whose systems are not based on insurance systems, this ratio can be chosen as a low range for assessing reporting levels.

Applying these two ratios to the number of fatal accidents at work in each country then allows us to define a confidence interval for the estimate of the actual number of non-fatal accidents at work that occurred in 2013.

This method again reveals differences between the different forms of reporting systems.

Definitions and results

In Table 8

The *averages* correspond to the annual number of accidents (non-fatal or fatal) observed over the period 2011–2015.

The *average incidence rate* is the ratio of this average to the average reference population in the same period.

The *ratio* is the ratio of the average of non-fatal accidents to the average of fatal accidents over the period 2011–2015.

The countries are ranked in order of descending ratios.

In Table 9

The *expected number of non-fatal accidents* is the number of non-fatal accidents calculated from the ratio of the reference country (Spain and EU-15).

The *estimated reporting level* is a confidence interval calculated

- as a lower bound, the number of reported accidents over the number of expected non-fatal accidents calculated from the Spanish ratio; and
- as an upper bound, the number of reported accidents over the number of expected non-fatal accidents calculated from the EU-15 ratio.

The countries are ranked in descending order of estimated reporting levels.

Table 8: Calculation of the ratio of fatal to non-fatal accidents at work (2011–2015)

	Fatal accidents		Non-fatal accidents		
Country	Average number	Average incidence rate	Average	Average incidence rate	Ratio
Netherlands	34.4	0.7	90,825	1,858	2, 640
Germany	451.0	1.3	717,853	2,148	1,592
Switzerland	57.2	1.9	72,429	2,410	1,266
Finland	27.8	1.7	35,945	2,227	1,295
Spain	279.6	2.8	303,778	3,095	1,086
Denmark	32.8	2.0	32,492	1,959	991
EU-15	**2,449.8**	**2.1**	**2,348,978**	**2,035**	**959**
France	512.4	3.7	463,806	3,314	905
Belgium	55.0	2.3	49,577	2,118	901
United Kingdom	197.8	1.1	155,319	826	785
EU-28	**3,454.5**	**2.4**	**2,510,724**	**1,732**	**727**
Portugal	158.8	4.9	112,365	3,464	708
Sweden	36.6	1.3	23,299	812	637
Luxembourg	10.2	3.6	6,233	2,186	611
Italy	476.2	2.9	271,181	1,672	569
Slovenia	20.0	3.3	10,862	1,794	543
Malta	4.0	3.4	2,150	1,813	537
Austria	123.4	4.2	54,638	1,847	443
Estonia	14.2	3.2	5,233	1,180	369
Norway	38.2	2.3	12,548	744	328
Czech Republic	113.6	3.2	36,948	1,053	325
Croatia	32.2	3.2	9,523	953	296
Greece	26.4	1.1	7,587	311	287
Ireland	42.2	3.3	11,792	917	279
Cyprus	5.6	2.5	1,459	660	261
Poland	273.0	2.3	63,707	534	233
Hungary	68.0	2.5	15,865	591	233
Slovakia	46.4	2.8	7,597	452	164
Lithuania	50.2	5.9	2,462	287	49
Latvia	30.6	5.2	1,285	217	42
Bulgaria	88.2	4.4	1,750	87	20
Romania	259.2	6.9	0.98	83	12

Source: EUROGIP, based on Kari Kurppa and Eurostat (ESAW, 2013).

Table 9: Estimated under-reporting in 2013 (Method 2: "fatal cases reconciliation")

	Average 2011–2015	2013	Estimated non-fatal accidents		
Country	Fatal accidents at work	Non-fatal accidents at work	Spanish coefficient 1:1 086	EU-15 coefficient 1:959	Estimated reporting level (%)
Netherlands	34	108,097	37,375	32,981	100 – 100
Germany	451	721,866	489,999	432,397	100 – 100
Switzerland	57	72,995	62,146	54,841	100 – 100
Finland	28	35,532	30,150	26,605	100 – 100
Denmark	33	32,868	35,636	31,447	92 – 100
Spain	280	273,983	303,778	268,067	90 – 100
Eu-15	**2,450**	**2,303,149**	**2,661,587**	**2,348,704**	**87 – 98**
France	512	440,424	556,709	491,265	79 – 90
Belgium	55	46,744	59,756	52,731	78 – 89
United Kingdom	198	159,893	214,904	189,641	74 – 84
EU-28	**3,455**	**2,460,489**	**3,753,220**	**3,312,010**	**66 – 74**
Sweden	37	24,313	39,765	35,090	61 – 69
Portugal	159	107,086	172,478	152,202	62 – 70
Luxembourg	10	6,117	11,082	9,779	55 – 63
Italy	476	269,629	517,378	456,558	52 – 59
Malta	4	2,225	4,346	3,835	51 – 58
Slovenia	20	10,136	21,729	19,175	47 – 53
Austria	123	54,445	134,071	118,310	41 – 46
Estonia	14	5,363	15,428	13,614	35 – 39
Czech Republic	114	38,015	123,423	108,914	31 – 35
Greece	26	8,708	28,683	25,311	30 – 34
Ireland	42	13,444	45,849	40,459	29 – 33
Norway	38	11,715	41,503	36,624	28 – 32
Croatia	32	8,925	34,984	30,872	26 – 29
Cyprus	6	1,301	6,084	5,369	21 – 24
Hungary	68	15,401	73,880	65,195	21 – 24
Poland	273	59,877	296,607	261,739	20 – 23
Slovakia	46	7,471	50,412	44,486	15 – 17
Lithuania	50	2,497	54,541	48,129	4.6 – 5.2
Latvia	31	1,376	33,246	29,338	4.1 – 4.7
Bulgaria	88	1,662	95,827	84,562	1.7 – 2.0
Romania	259	3,091	281,614	248,509	1.1 – 1.2

Source: EUROGIP, based on Kari Kurppa and Eurostat (ESAW, 2013).

3. An estimate based on survey microdata

The two Scandinavian methods (comparative and fatal cases reconciliation) are based on a significant bias and on assumptions that some might consider too strong. These methods assume indeed that among all European countries there is an occupational injury insurance system that optimally reports the number of non-fatal accidents at work. Although the control country chosen as the upper bracket (Spain) has long been recognized as one of the best performers in terms of occupational health and safety, it cannot be ignored that this country is also subject to the phenomenon of the under-reporting of accidents at work.

To complement the ESAW databases, Eurostat accompanies its observations with the ad-hoc module of the European Labour Force Survey (EU-LFS) on accidents at work. This module, which accompanies the overall survey on a specific labor market theme each year, focuses on occupational health and safety issues at regular intervals (about every six or seven years). The latest module, "Accidents at work and other work-related health problems", was carried out in 2013 by the statistical offices of the member countries.

Table 10: List of ad-hoc modules of the European Labour Force Survey Health and safety at work

Year	Theme
1999	Accidents at work
2007	Occupational injuries, work-related health problems and exposure to health risk factors
2013	Occupational accidents and other work-related health problems
2020 (to come)	*Occupational accidents and other work-related health problems*

The 2013 ad-hoc module was produced in response to the European policies expressed in the European Commission's communication of 21 February 2007 on "Improving quality and productivity at work: Community strategy 2007–2012 on health and safety at work." This module marks the will to update occupational health and safety statistics with population-based surveys.

The main objective of the 2013 module was to measure trends since the 2007 module by facilitating comparability between European countries based on common survey variables. In 2013, all EU-28 countries (except Germany and the Netherlands), Switzerland, and Norway participated in this program.

By referring to the reference populations of the member countries, taken from the ESAW methodology databases, it is then possible to determine a lower and an upper bound for the levels of reporting of accidents at work in each country. For this purpose, any residual bias between the statistical fields covered by LFS and ESAW statistics (possibly related, for example, to economic sectors excluded from ESAW or to the coverage of self-employed workers in some countries) is neglected.

In this survey, respondents in each country were asked to indicate whether or not they had suffered an accident at work in the past calendar year, and, if so, how long they had been away from work as a result. It was therefore possible to estimate the proportion of respondents who

had suffered an accident at work resulting in at least four days absence by querying each country's database.

A mathematical formula based on probabilistic calculation allows this response rate to be projected onto the entire reference population (i.e., the population exposed to occupational risks) within a sufficiently precise confidence interval (for more details, see the calculation in the Annex. The estimation is based on the *law of large numbers*, which expresses that the statistical characteristics of a random representative sample approach the true characteristics of the population as the sample size increases.

Moreover, due to the low coverage of self-employed workers and family workers in the ESAW database, we assess the share of accidents at work within the employed population only, excluding the unemployed, inactive people, military personnel, and people under 15 years of age. For persons inactive at the time of the survey who gave information on their exposure to accidents at work, their status and economic sector were reconstituted from a proxy based on their professional situation one year earlier, if not on their last job held.

The estimated shares of the countries' populations who have experienced a non-fatal accident at work, together with the confidence intervals, are reported in **Table 11**. The data takes into account a weighting coefficient, associated with each respondent, in order to account for their representativeness within the population of their country, but also within the European population as a whole.

Table 12 shows reporting levels ranging from 11–20% (Romania) to 100% (Ireland).

Definitions and results

In Table 11

The columns *2 accidents* and *1 accident* indicate, per country, the respective share of the surveyed sample that reports having been a victim of either a minimum of two accidents or of only one accident at work during the year preceding the survey date.

The column *Share of accidents* indicates the number of accidents at work in relation to the sample population of the LFS.

The column *Confidence interval* is a 95% interval, in the statistical sense, based on the results of the inferential calculation (see **Annex**). It has a lower and an upper bound to estimate the actual share of occupational accidents in the population of each country.

Table 11: Estimated number of real accidents at work (2013)

	Share of the sample reporting being victim of at least one accident			
	2 accidents	*1 accident*	Incidence rate	Confidence interval
Austria	0.41%	2.53%	3.35%	2.86% – 3.84%
Belgium	0.22%	1.47%	1.91%	1.48% – 2.34%
Bulgaria	0.02%	0.22%	0.26%	0.14% – 0.38%
Croatia	0.22%	1.47%	1.91%	1.19% – 2.63%
Cyprus	0.13%	1.00%	1.26%	0.78% – 1.74%
Czech Republic	0.04%	1.58%	1.66%	1.41% – 1.91%
Denmark	0.08%	1.56%	1.72%	1.41% – 2.03%
Estonia	0.15%	0.85%	1.15%	0.76% – 1.54%
Finland	0.36%	2.38%	3.10%	2.63% – 3.57%
France	0.20%	2.97%	3.37%	2.94% – 3.80%
Greece	0.22%	0.70%	1.14%	0.82% – 1.46%
Hungary	0.10%	0.52%	0.72%	0.56% – 0.88%
Ireland	0.05%	0.75%	0.85%	0.66% – 1.04%
Italy	1.12%	1.99%	4.23%	3.91% – 4.55%
Latvia	0.48%	0.67%	1.63%	0.97% – 2.29%
Lithuania	0.05%	1.20%	1.30%	0.94% – 1.66%
Luxembourg	0.46%	2.46%	3.38%	2.68% – 4.08%
Malta	0.00%	1.33%	1.33%	0.76% – 1.90%
Norway	0.02%	0.89%	0.93%	0.68% – 1.18%
Poland	0.02%	0.72%	0.76%	0.63% – 0.89%
Portugal	0.30%	2.44%	3.04%	2.59% – 3.49%
Romania	0.17%	0.26%	0.60%	0.43% – 0.77%
Slovakia	0.26%	1.20%	1.72%	1.34% – 2.10%
Slovenia	0.04%	2.06%	2.14%	1.67% – 2.61%
Spain	0.08%	1.86%	2.02%	1.81% – 2.23%
Sweden	0.25%	1.02%	1.52%	1.28% – 1.76%
Switzerland	0.26%	2.75%	3.27%	2.69% – 3.85%
United Kingdom	0.13%	0.79%	1.05%	0.89% – 1.21%
EU-28	**0.15%**	**1.54%**	**1.84%**	**1.78% – 1.90%**

Source: EUROGIP, based on microdata from the ad-hoc module "Accidents at work and other work-related health problems" of the European Workforce Survey (2013).

In Table 12

The *estimated real accidents* represent a confidence interval calculated by projecting the confidence interval of **Table 11** on the whole employed population covered against occupational risks.

Reported accidents are accidents at work recorded in the ESAW database.

The *estimated reporting level* is a confidence interval computed as follows:

- the lower bound is the reported number of accidents divided by the upper bound of estimated actual accidents, and
- the upper bound is the reported number of accidents divided by the lower bound of the number of estimated actual accidents.

Table 12: Estimated under-reporting of accidents at work in 2013 (Method 3: "survey data")

Country	Estimated fatal accidents (confidence interval)	Reported accidents	Estimated reporting level (%)
Ireland	8,516 – 13,330	13,444	100 – 100
Denmark	22,975 – 33,129	32,868	99 – 100
Portugal	80,778 – 108,627	107,086	99 – 100
Malta	911 – 2,282	2,225	97 – 100
Belgium	31,648 – 49,833	46,744	94 – 100
France	411,875 – 533,425	440,424	83 – 100
Estonia	3,452 – 6,934	5,363	77 – 100
Norway	10,254 – 17,701	11,715	66 – 100
Slovenia	10,371 – 16,250	10,136	62 – 98
United Kingdom	165 919 – 226 736	159,893	71 – 96
Hungary	16,029 – 25,011	15,401	62 – 96
EU-15	**2,431,183 – 2,560,419**	**2,303,149**	**90 – 95**
Switzerland	78,184 – 112,000	72,995	65 – 93
EU-28	**2,825,923 – 2,957,529**	**2,460,489**	**83 – 87**
Finland	42,106 – 57,243	35,532	62 – 84
Luxembourg	7,321 – 11,134	6,117	55 – 84
Poland	73,673 – 104,326	59,877	57 – 81
Croatia	11,882 – 26,385	8,925	34 – 75
Czech Republic	52,581 – 70,818	38,015	54 – 72
Sweden	36,651 – 50,132	24,313	48 – 66
Cyprus	1,969 – 4,422	1,301	29 – 66
Austria	86,089 – 115,813	54,445	47 – 63
Bulgaria	2,755 – 7,482	1,662	22 – 60
Italy	630,156 – 732,233	269,629	37 – 43
Greece	20,805 – 36,800	8,708	24 – 42
Slovakia	23,040 – 36,043	7,471	21 – 32
Lithuania	8,823 – 15,687	2,497	16 – 28
Latvia	5,885 – 13,838	1,376	10 – 23
Romania	15,828 – 28,689	3,091	11 – 20

Source: EUROGIP, based on microdata from the ad-hoc module "Accidents at work and other work-related health problems" of the Labour Force Survey (2013).

III. Determinants of under-reporting

The three methods applied allow for the estimation of country reporting levels within confidence intervals. However, each of them is based on questionable assumptions, which could bias the results. For this reason, we compare and reconcile these three methods to see if they converge for each country. If not, they demonstrate that the differences in results are too great to conclude on a real level of reporting.

In general, our results allow us to place the level of reporting of accidents at work in the EU-28 in a range between 58% and 87%. It can be noted that the three methods allow us to compare the countries to each other, but that, overall, they assess the level of reporting of European accidents at work in quite different ranges: 58% – 84 % (Method 1: "comparative"), 62% – 75% (Method 2: "fatal cases reconciliation"), and 83% – 87 %[13] (Method 3: "survey data"). The most empirically accurate method (Method 3) is also the one that estimates the highest levels of reporting, which may reflect under-reporting in direct household surveys.

1. The comparison of the three methods

Method 1 ("comparative") is the simplest to implement and only requires aggregating the ESAW statistics. By construction, the estimated reporting level of the countries is directly proportional to the standardized incidence rates of accidents at work of the ESAW statistics (see Annex). This method thus allows a formal comparison of the number of reported accidents at work, because it integrates the differences in the sectoral structure of each economy, but it does not integrate other structural differences that impact the economic level: participation of young people in the labor market, level of education and awareness of workers, and accident prevention efforts. Furthermore, it assumes a priori that there is an optimal level of reporting (e.g., in Finland), which does not seem to be true in reality. It therefore appears to be a method that can be used very easily over time, but with a relatively low level of precision.

Method 2 ("fatal cases") appears more technical to implement. It is based on the following two principles:

- Fatal accidents at work are optimally recorded in all European countries, as they cannot be under-reported due to their social severity; and
- There is an optimal ratio of the number of non-fatal accidents at work in a country to its fatal accidents at work (e.g., Finland).

This method requires first the computation of the ratios of non-fatal to fatal accidents at work, followed by the selection of the one that seems to be closest to reality (in our case, we have chosen Spain) and an estimation of the actual number of non-fatal accidents at work in a country from the optimal ratio. Method 2 seems to be more accurate than Method 1, but it is still based on the assumption of the theoretical existence of an optimal occupational injury indicator in a country. Nevertheless, it is easily reproducible over time from the annual ESAW databases.

Finally, it appears that the second method provides the lowest estimate of the level of reporting. When analyzing the results in detail, it can be observed that this method is particularly unfavorable for small European countries, especially those that have recently joined the EU.

13 As the microdata does not allow us to estimate the reporting level of Germany and the Netherlands by Method 3, we assume from the results of Methods 1 and 2 that these two countries have a reporting level close to 100%. We can then estimate the level of reporting in the EU-28 by Method 3.

This finding might suggest that there is also a bias in the reporting levels of fatal accidents at work in these countries.

Moreover, it seems that this method globally overestimates the real level of reporting of accidents at work. This overestimation is present for Bulgaria and France, in particular, as these countries recognize all fatalities without differentiating between fatal occupational accidents directly caused by work and those caused by an external factor (suicides, malaise, aggression, etc.). This inclusion results in overestimation of the real number of accidents in both countries.

This difference reflects the French specificity of accounting, called "presumption of imputability,"[14] which leads to the recognition of a large number of work-related fatalities as fatal accidents at work, although the occupational origin of these fatalities has not been proven.[15] France has a ratio of non-fatal to fatal accidents at work (905 accidents per 100,000 insured workers) that is slightly below the EU-15 average (959 accidents per 100,000 insured workers).

Finally, Method 3 ("survey data"), based on the estimation of the empirical frequency and the application of the results of inferential statistics (see **Annex**), appears scientifically and sociologically to be the most robust method; it allows researchers to estimate a precise level of reporting, without any a priori assumption or any European comparison, and construct confidence intervals with the sample data of the European Labour Force Survey. However, it is based on microdata produced on an ad-hoc basis (about once every six years), which does not allow for frequent monitoring of occupational injury reporting levels. Moreover, access to microdata is constrained by specific regulations related to the confidentiality of survey data and the anonymization of respondents in surveys carried out by the national statistical institutes.

Method 3 also depends on the quality of the surveys carried out by the national statistical institutes, the representativeness of the samples, and the respondents' interpretation of the legal concept of accidents at work. In many Eastern European countries, the surveyed population indicates a lower frequency of accidents, which may reflect less knowledge of occupational health and safety standards.

Table 13 summarizes the advantages and disadvantages of the three estimation methods.

14 According to Article L. 411-1 of the French Social Security Code, "an accident at work, whatever its cause, is considered to be an accident occurring as a result of or in the course of work to any person employed or working, in any capacity or in any place whatsoever, for one or more employers or company managers." There is, therefore, a presumption that any accident taking place in the workplace or during work is an accident at work. The victim does not have to prove a causal link between the work and the accident, but they must simply establish that the accident occurred at the place of work or during working hours. It is up to the employer or the insurer to prove the opposite.

15 These fatal accidents at work mainly include illnesses and suicides in the workplace. For more information, please refer to the EUROGIP study: Florian Jacquetin, OSH Indicators France Germany / 2010-2014 - Accidents at work Statistics and financial highlights, Ref EUROGIP-118/F, August 2016.

Table 13: Evaluation of the three methods for estimating reporting levels

	Method 1 "comparative"	Method 2 "fatal cases"	Method 3 "survey data"
Accuracy and relevance of the model	+	++	+++
Reproducibility of the model	+++	++	+
Accessibility of data	+++	+++	+
Possibility of regular evaluation	+++	+++	++
Estimated European level of reporting (%)	*58 – 84*	*66 – 74*	*83 – 87*

+: Low / ++: Medium / +++: High

Table 14: Assumptions underlying the statistical methods

Method 1 "comparative"	- The main determinant of the level of accidents at work is the sectoral structure of the economy. - All countries should have the same rate of accidents at work. - There is an optimal level of reporting of accidents at work. - This optimal level is achieved in at least one control country.
Method 2 "fatal cases"	- The countries do not have the same rate of accidents at work, but have the same distribution in severity (distribution between fatal and non-fatal accidents). - There is an optimal level of reporting of accidents at work. - This optimal level is achieved in at least one control country.
Method 3 "survey data"	- The sample produced by the European Labour Force Surveys is representative of the working population. - The respondents report the occurrence of an accident at work in a comprehensive and informed manner.

From the results in **Table 13** and the comparison of reporting levels, it is possible to classify the countries according to the level of reporting shown. As Method 3 (estimation by sampling) is considered to be the most accurate, its estimates are considered first and then compared successively to Method 2 (comparison of fatal injury ratios) and Method 1 (comparison of non-fatal injury incidence rates). In particular, when we could not apply one of the methods to a country's statistics, we consider first the most robust method that was applied.

Table 15: Comparison of the three statistical methods (in %)

	Confidence intervals (%)		
Country	Method 1 "comparative"	Method 2 "fatal cases"	Method 3 "survey data"
Austria	63 – 91	41 – 46	47 – 63
Belgium	74 – 100	78 – 89	94 – 100
Bulgaria	3 – 3,9	1,7 – 2,0	22 – 60
Croatia	30 – 43	*No data*	34 – 75
Cyprus	20 – 28	21 – 24	29 – 66
Czech Republic	33 – 48	31 – 35	54 – 72
Denmark	72 – 100	92 – 100	99 – 100
Estonia	38 – 54	35 – 39	77 – 100
Finland	77 – 100	100 – 100	62 – 84
France	100 – 100	79 – 90	83 – 100
Germany	75 – 100	100 – 100	*No data*
Greece	15 – 22	30 – 34	24 – 42
Hungary	17 – 24	21 – 24	62 – 96
Iceland	41 – 58	*No data*	*No data*
Ireland	36 – 51	29 – 33	100 – 100
Italy	59 – 85	52 – 59	37 – 43
Latvia	8 – 11	4,1 – 4,7	10 – 23
Lithuania	9 – 13	4,6 – 5,2	16 – 28
Luxembourg	85 – 100	55 – 63	55 – 84
Malta	65 – 93	51 – 58	97 – 100
Netherlands	78 – 100	100 – 100	*No data*
Norway	28 – 41	28 – 32	66 – 100
Poland	19 – 27	20 – 23	57 – 81
Portugal	100 – 100	62 – 70	99 – 100
Romania	3 – 3,8	1,1 – 1,2	10.8 – 19.5
Slovakia	15 – 21	15 – 17	21 – 32
Slovenia	55 – 79	47 – 53	62 – 98
Spain	100 – 100	90 – 100	100 – 100
Sweden	30 – 43	61 – 69	48 – 66
Switzerland	99 – 100	100 – 100	65 – 93
United Kingdom	34 – 49	74 – 84	71 – 96
EU-15	**70 – 100**	**87 – 98**	**90 – 95**
EU-28	**58 – 84**	**66 – 74**	**83 – 87**

Group A: countries with a reporting level between 90% and 100% according to all methods used for the study.

Group B: countries with a reporting level between 70% and 90%. By extension, this group includes those with a Method 3 assessment close to 100%, but with a much lower Method 2 or Method 1 reporting level.

Group C: countries with a declaration level between 40% and 70%.

Group D: countries with a declaration level below 40%.

This classification is quite close to the results of Dr. Kari Kurppa. It is presented below in **Table 16**.

- **Country group analysis**

Groups A and B are essentially comprised of countries historically affiliated with a Bismarckian social philosophy, based on an insurance system where the employer has a legal obligation to declare accidents at work to the insurance company and where the latter compensates the loss of the worker's salary with a replacement income. This group of countries includes the historical founders of the European Union,[16] as well as some countries with a liberal social tradition (the UK and Ireland).

Group C includes countries from Central Europe. It also includes Sweden, a country whose compensation for accidents at work is managed by the universal health insurance scheme. Sweden's estimated reporting level is consistent with the levels estimated by ESAW in 1999 (52%) and 2014 (59%). It is one of the few countries where the level of under-reporting can be quantified very precisely (see Box 2 below).

Group D includes Eastern European countries, mainly new members of the European Union.

When our results are compared to the recurrent assessments of country reporting levels, we find very similar and consistent findings overall. However, there are some exceptions:

- According to our study, Denmark appears to have a higher actual reporting level than that estimated by ESAW in 1999 (46%) or 2014 (47%).
- Our estimation of Romania's reporting level (below 50%) is below the estimated Eurostat coverage level in 2014 (100%).

2. Bismarckian and Beveridgian systems

Most of the studies investigating the underreporting of accidents at work (Baltic Sea Network, Eurostat) have highlighted the impact of a country's social system dedicated to the management of occupational risks on the phenomenon of under-reporting.

We have also observed that the countries with a Bismarckian tradition, the founders of the European Union that have compulsory insurance against accidents at work managed by social partners (France, Germany and Spain), show declaration rates close to 100% (**Figures 2** and **3**). In contrast, the countries that have recently joined the European Union and have only recently introduced compulsory insurance (Poland, Romania) show levels below the European average. Similarly, some insurance systems, which may delegate certain tasks—such as health insurance (for the compensation of daily allowances, for example)—to other bodies or to the State, have reporting rates below the European average (Ireland, Sweden). The United Kingdom and Ireland, where the level of reporting is between 70% and 90%, are the only countries where the recording and compensation of accidents at work are entirely managed by the State.

16 Except for Italy, which appears in Group C.

Table 16: Levels of reporting of accidents at work by country group

	Level of reporting	Country
Group A	100%	Belgium, Denmark, Finland, France, Germany, Portugal, Netherlands, Spain
Group B	70–100%	Estonia, Ireland, Luxembourg, Malta, Norway, Switzerland, United Kingdom
Group C	40–70%	Austria, Croatia, Hungary[17], Iceland, Italy, Poland[17], Czech Republic, Slovenia, Sweden
Group D	<40%	Bulgaria, Cyprus, Greece, Latvia, Lithuania, Romania, Slovakia

Box 2: The Swedish case

Sweden is one of the most interesting cases in the study. It has a lower level of reporting than the average EU-15 country, both in this study and in the different ESAW assessments.

Level of reporting	Sweden
Method 1 ("comparative")	30–43%
Method 2 ("fatal cases")	61–69%
Method 3 ("survey data")	48–66%
ESAW 2001	52%
ESAW 2014	59%

The Swedish accident insurance system can be described as a system with a Beveridge organization, especially since a significant redesign of the accident insurance system in 1983.

Although the National Social Security Agency (*Försäkringskassan*) covers all working residents, it only offers a common set of benefits to the insured and does not compensate for some accidents at work, particularly those of minor severity. Victims can, in these cases, turn to the mutual insurance company linked to their company's collective agreement, generally *AFA Försäkring*.

About 90% of Swedish employees have such coverage.

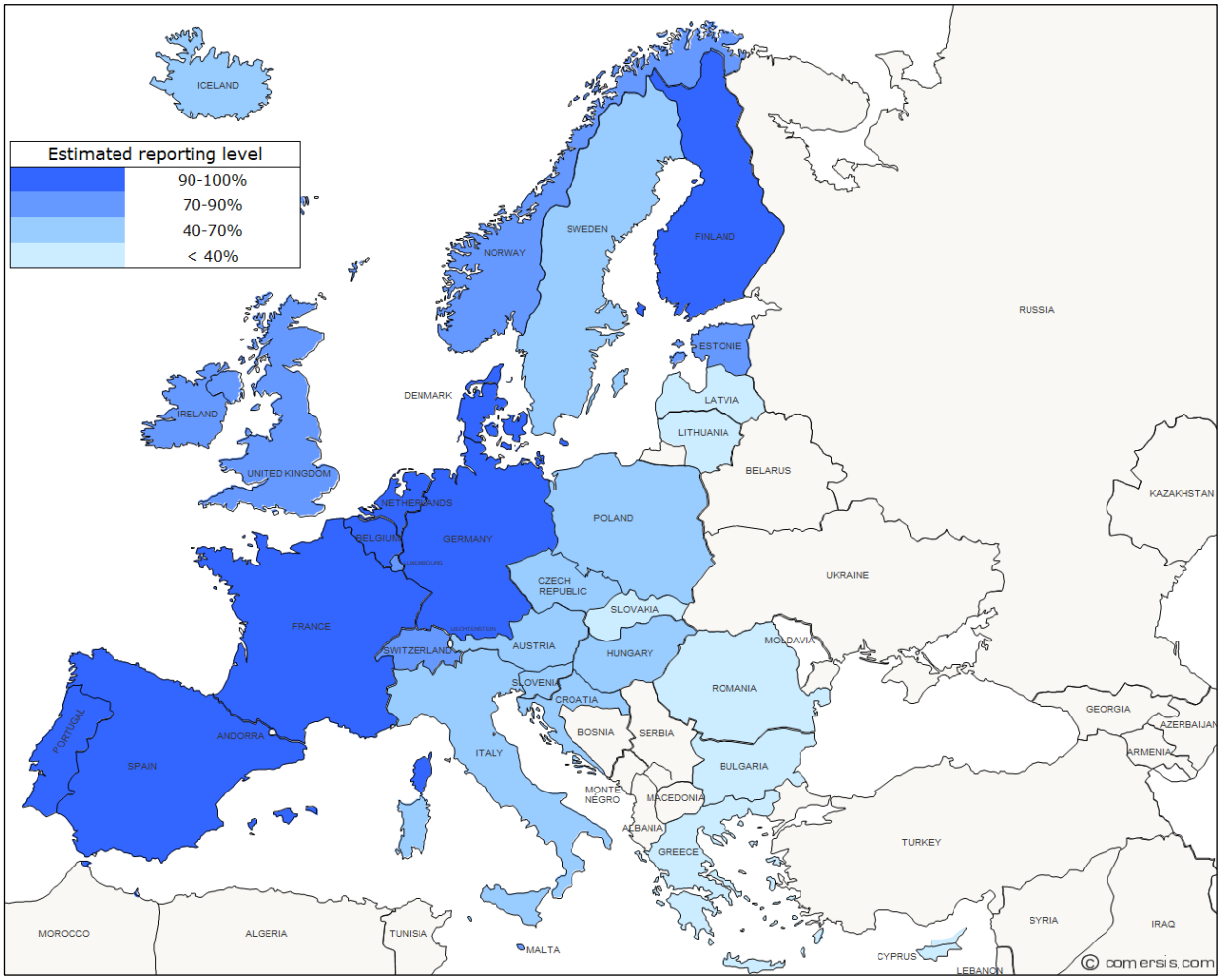
Finally, more specifically, workers can turn to the group insurance of the trade union to which they belong, or they can take out individual insurance.

Public insurance is only invoked if the worker has been recognized as having a temporary disability of at least 25% for a minimum of one week. During the first two weeks of absence, most workers are partially compensated by their employer.

Thus, the level of reporting of accidents at work could be directly related to the financial attractiveness of the insurance system. Such a comparison can be pursued with the United Kingdom and Ireland. Both countries have lower reporting levels than the EU-15 average and only marginally compensate victims of accidents at work, except for in the most serious cases.

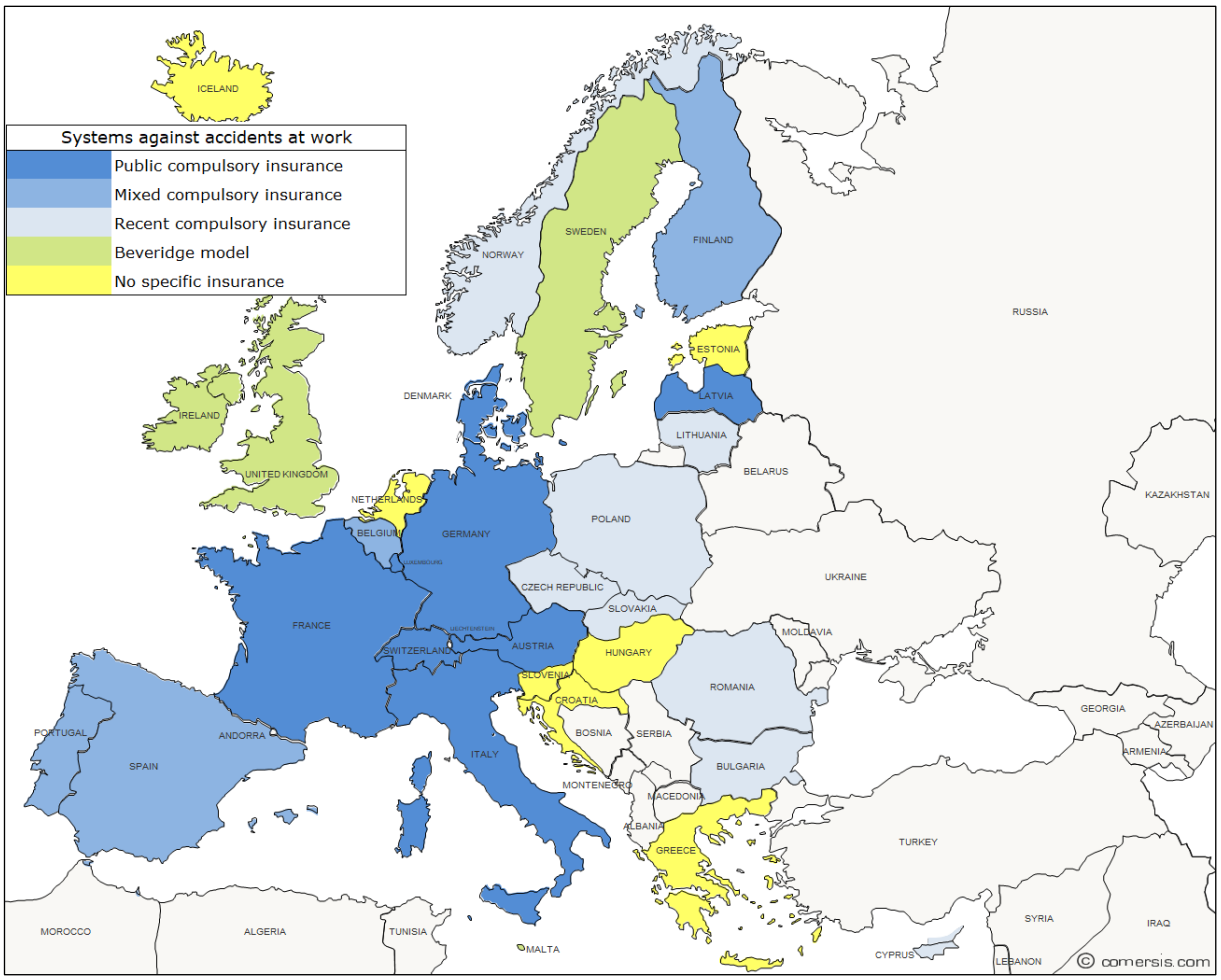
17 Hungary and Poland, however, show low levels of reporting by Methods 1 and 2, which may indicate a strong Method 3 bias for these two countries.

Figure 2: Estimated reporting levels of accidents at work by European country (2013)



Source: EUROGIP.

Figure 3: Occupational injury insurance systems in Europe



Source of classification: MISSOC (Mutual Information System on SOcial Protection) data.

Although each system has its own legal specifications in the management of accidents at work, it is possible to make a classification based on some objective criteria. It should be noted that some data may have been subject to legislative revisions since the publication of this document.

Compulsory public insurance systems (dark blue in **Figure 3**) are monopolistic schemes run by representatives of employees' unions and employers' federations. They are financed by employer contributions. They are actively involved in the payment of benefits-in-kind (reimbursement of care, hospitalization) or cash benefits (replacement income, disability pensions). Austria, France, Germany, Italy, Latvia, Luxembourg, and Switzerland are among these systems.

Mixed compulsory insurance systems (medium blue) combine public insurance or a central public entity with membership to private mutual organizations to insure accidents at work. Workers have the obligation to join. Belgium, Spain, Finland, and Portugal are among these countries.

The recent compulsory insurance systems (light blue) are, in essence, countries resulting from the successive enlargements of the European Union to 25 and then 27 members, which filed the statutes for compulsory insurance in the early 2000s. These systems include Lithuania, Norway, Poland, the Czech Republic, Romania, and Slovakia.

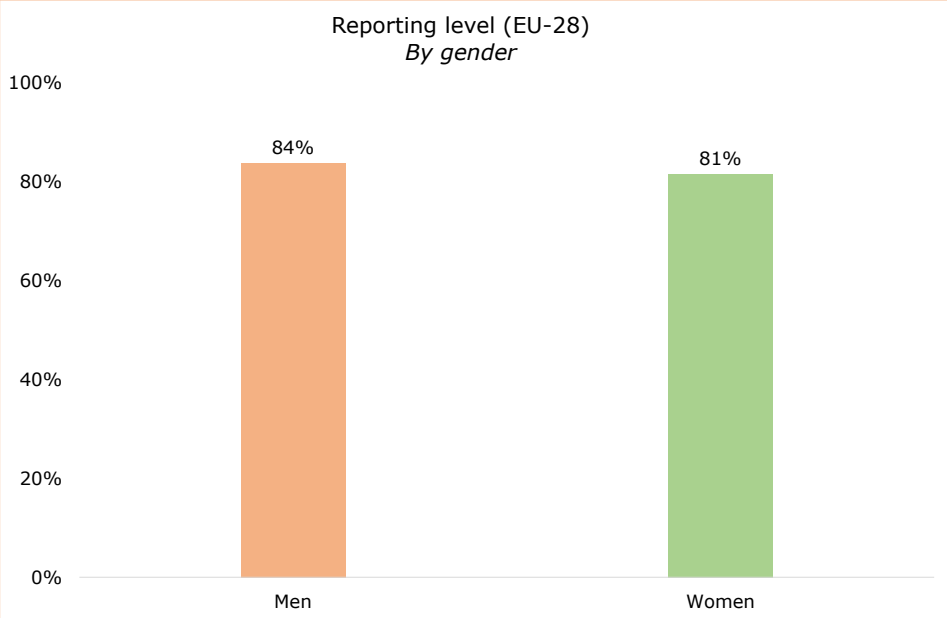
The non-insurance systems (green) are schemes that combine coverage of occupational risks with coverage from other public entities. They include Bulgaria, Ireland, Malta, Sweden, and the United Kingdom. They may involve the state (Ireland, United Kingdom) or universal health coverage for the payment of daily allowances (Sweden).

The last six countries (yellow) do not have a specific scheme related to occupational injury insurance. These countries are Cyprus, Croatia, Greece, Hungary, the Netherlands, and Slovenia.

3. Under-reporting by socio-economic category

When looking at the incidence rates of the Labour Force Surveys for the different categories of workers, underreporting seems to be specific to certain socio-economic categories. An assessment of this trend is given below, at the EU-28 level[18] (confidence intervals have not been specified). Underreporting is particularly prevalent among female employees (48%) and in the agricultural sector (49%). Contrary to expectations, underreporting seems to be increasing in the older age groups (73% for the over-55s) and sparing new entrants to the labor market.

Figure 4: Levels of reporting by gender of workers (2013)



18 Excluding Germany and the Netherlands, whose Labour Force Surveys were not studied.

Figure 5: Levels of reporting by age (2013)

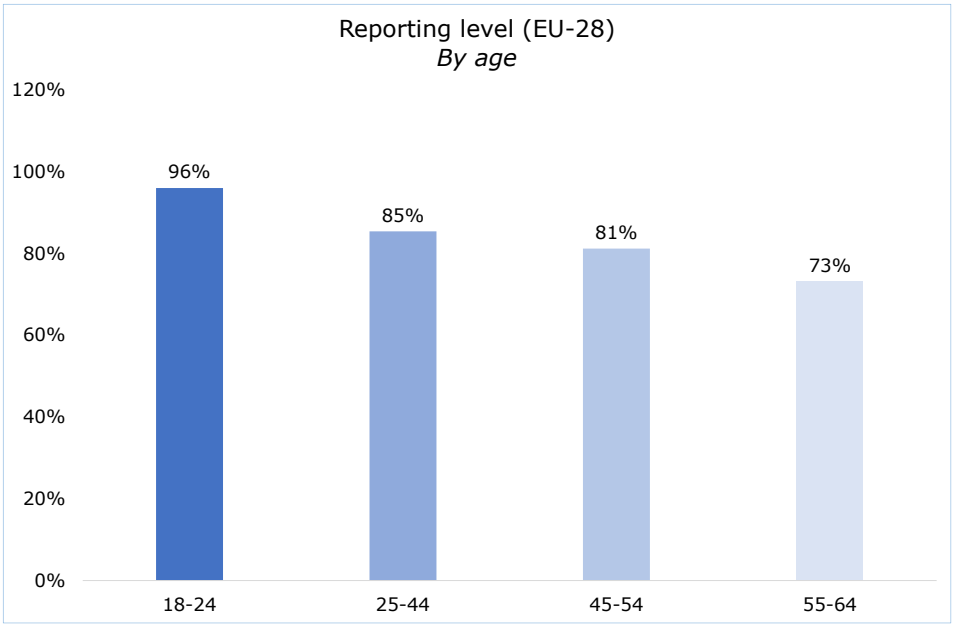
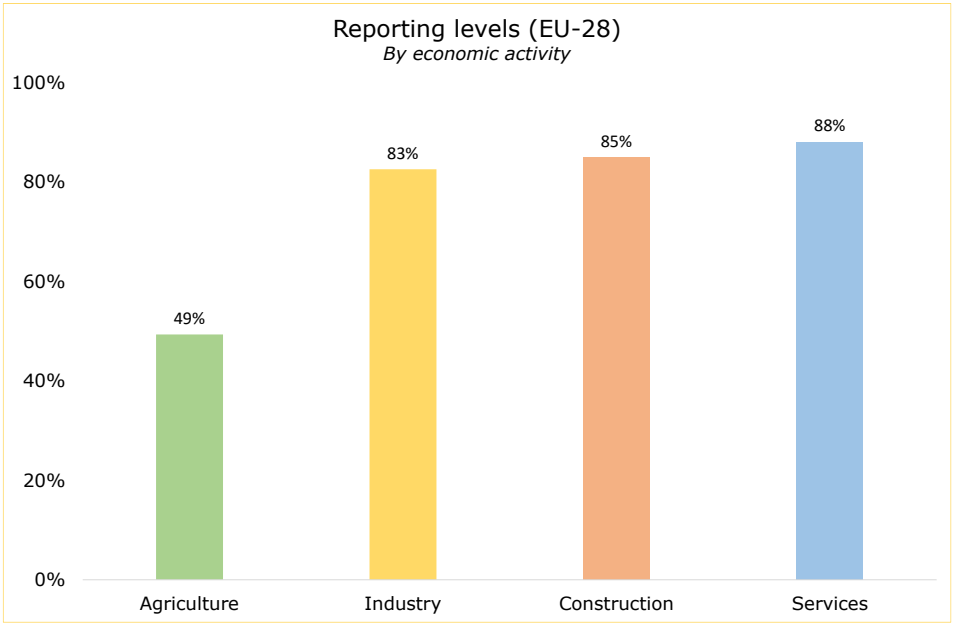


Figure 6: Levels of reporting by economic activity (2013)



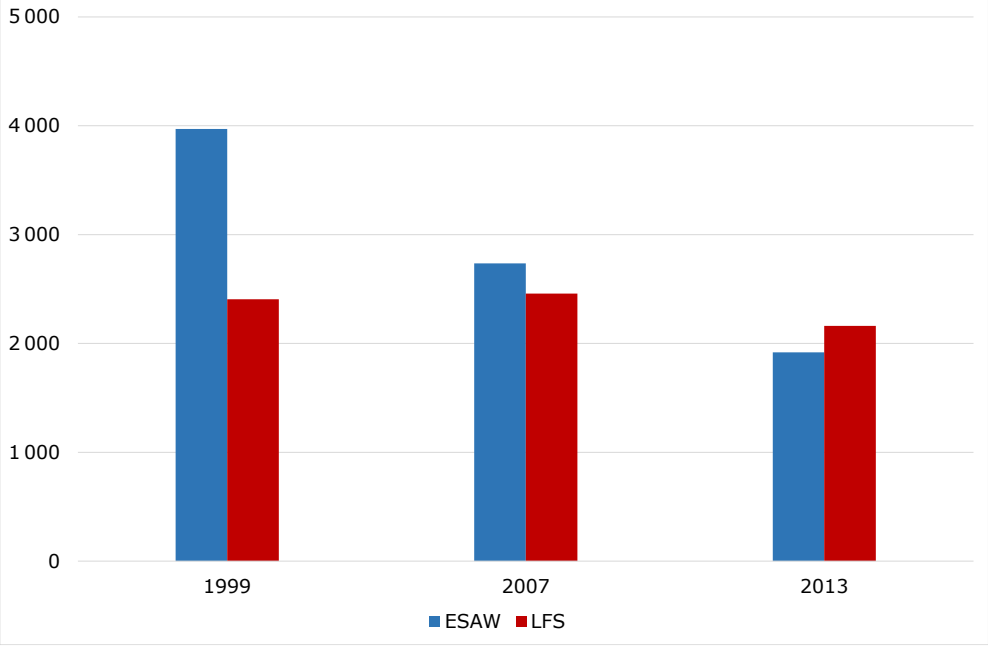
IV. Conclusion and reliability of the study

In line with previous studies carried out by the Baltic Sea Network and Eurostat, this statistical survey allows us to confirm the existence of a phenomenon of under-reporting of accidents at work in Europe. The actual level of this phenomenon is difficult to quantify very precisely; it is estimated that, at the European level, between 13% (low estimate) and 35% (high estimate) of accidents at work that occurred in 2013 were not reported to the competent authorities in the fields of the private sector and salaried employment.

These figures show important differences between countries with a historical compulsory insurance against accidents at work and countries with other systems (recent EU accession countries, insurance shared by health insurance schemes, state systems, and systems based on the legal obligation to report accidents). Furthermore, the results reflect that some sectors (agriculture) and some demographics (older workers) are more affected by the phenomenon of under-reporting than others. Young workers, subject to more frequent accidents and perhaps less able to immediately report their accidents (due to lack of knowledge of occupational risk insurance systems and pressure related to entering the labor market), are nevertheless those whose the estimated reporting level here is the highest.

However, these results, which are based on household surveys carried out by national statistical institutes, invite researchers to question the reality experienced by households in different countries. The computation of incidence rates in LFS, repeated in 1999 and 2007, shows that the frequency of accidents perceived by households was much higher than the frequency recorded by the administrative databases at the time (**Figure 7**). This discrepancy could reflect both an increase in underreporting over time and a statistical bias in the way that the 1999 and 2007 surveys were conducted in each country.

Figure 7: Comparison of incidence rates in the ad-hoc modules (1999, 2007, 2013)



The phenomenon of under-reporting, highlighted in 2013, does not appear in the years 1999 and 2007. In particular, the year 1999 shows a twofold difference between the administrative data and the household survey. This difference may reflect both over-reporting in the years in question and a bias in one or other of the statistical sources.

Moreover, if the reporting of an accident at work in a survey was directly linked to its legal recognition, an additional bias would be created; it is difficult for one to recognize that they have been the victim of an accident if they have never reported it before, or if their accidents have never been recognized. This conundrum highlights the reality of the survey and its interpretation, by the pollster and the respondent, which is impossible to assess at this stage.

An EUROGIP study on the under-reporting of occupational diseases

In 2015, EUROGIP published a study assessing the phenomenon of under-reporting of occupational diseases (OD) in five European countries: Germany, Denmark, Spain, France, and Italy. This is reported as a significant: "In terms of reporting, or claims for recognition of the work-related nature of the disease, a difference of 1 to 4 is noted between the country which has the fewest and that which has the most." These statistics varie, however, according to the types of pathologies and their coverage by occupational injury insurance.

Although there is much less data available on OD for studying the phenomenon at the European level, two main factors influencing the phenomenon of underreporting were noted:

- the knowledge that doctors and the general public have of the insurance system, and
- the attractiveness (particularly financial) of having the occupational nature of the pathology recognized.

For more information, consult the report *Reporting of occupational diseases: Issues and good practices in five European countries*, available at the following address: https://eurogip.fr/wp-content/uploads/2019/11/Report_DeclarationMP_EUROGIP_102EN.pdf

Annex

Below is clarification of the computational methods used to produce Tables 6, 8, 9, 11, 12, which estimate the level of reporting of non-fatal accidents at work in Europe.

For all of the developed methods, the following field is defined:

- The **non-fatal accidents at work** include only accidents at work that caused at least four full days of absence from work. They include traffic accidents but exclude commuting accidents.
- The **employees** generally refer to all persons in employment, except for the self-employed, family workers, and student workers. Depending on the country's system, they may refer to workers in the private sector or in civil service (except for the military).
- The **reference population** covers all employees and NACE Rev. 2 Sections A and C to N. It excludes Sections B (mining and quarrying) and O to U (certain services). Non-salaried workers (self-employed, family workers, students) are excluded.
- For the years 1999 and 2007, the reference population covers NACE Rev.1.1 Sections A and D to K. This scope sections is roughly equivalent to the scope studied in NACE Rev.2.

In the following, the estimate of the variable X is denoted by $X_{est.}$

We also note:

- X_{est}^{+} the upper bound of the estimate of the variable X.
- X_{est}^{-} the lower bound of the estimate of the variable X.

The reference population is not directly provided in the ESAW database. However, it can be recomputed from the number of accidents at work and the incidence rate for the corresponding country or economic sector.

To compute the insured population of a country, for example, the following formula is applied:

$$\text{Reference population of country } i = \frac{\text{Non–fatal accidents at work}}{\text{Incidence rate}} \times 100{,}000.$$

Table 17: Reference population insured against accidents at work (2013)

Country	*Eurostat data*		*Computation*
	Accidents at work	Incidence rate	Reference population
EU-28	2,460,489	1,696	145,077,713
EU-15	2,303,149	1,996	115,407,885
Austria	54,445	1,807	3,013,455
Belgium	46,744	2,191	2,132,997
Bulgaria	1,662	84	1,968,728
Croatia	8,925	891	1,001,762
Cyprus	1,301	513	253,611
Czech Republic	38,015	1,023	3,716,831
Denmark	32,868	2,015	1,630,923
Estonia	5,363	1,188	451,530
Finland	35,532	2,217	1,602,410
France	440,424	3,140	14,025,215
Germany	721,866	2,144	33,676,820
Greece	8,708	345	2,526,548
Hungary	15,401	540	2,850,031
Ireland	13,444	1,046	1,285,019
Italy	269,629	1,674	16,103,888
Latvia	1,376	227	604,995
Lithuania	2,497	265	942,691
Luxembourg	6,117	2,241	273,000
Malta	2,225	1,853	120,067
Netherlands	108,097	2,177	4,964,339
Poland	59,877	511	11,710,508
Portugal	107,086	3,438	3,115,220
Romania	3,091	83	3,709,794
Slovakia	7,471	435	1,717,511
Slovenia	10,136	1,630	621,974
Spain	273,983	2,882	9,505,180
Sweden	24,313	852	2,854,711
United Kingdom	159,893	855	18,697,874
Iceland	1,180	1,055	111,826
Norway	11,715	779	1,502,983
Switzerland	72,995	2,510	2,908,017

Method 1: "comparative"

For the year 2013, two reference incidence rates of non-fatal accidents at work (with at least four days' absence from work) are defined:

The Spanish standardized incidence rate:

$$\text{Rate}_{\text{Spain}} = \frac{\text{Standardized number of non–fatal accidents at work in Spain}}{\text{Reference population in Spain}} \times 100{,}000.$$

The EU-15 standardized incidence rate:

$$\text{Rate}_{\text{EU-15}} = \frac{\text{Standardized number of non–fatal accidents at work in EU–15}}{\text{Reference population in EU–15}} \times 100{,}000.$$

For a given country *i*, the estimated real number of non-fatal accidents at work is then defined as

$AW_{\text{country } i}{}^{-} = \text{Rate}_{\text{EU-15}} \times \text{Reference population}_{\text{country } i}$

$AW_{\text{country } i}{}^{+} = \text{Rate}_{\text{Spain}} \times \text{Reference population}_{\text{country } i}.$

The confidence interval of the estimate of the number of non-fatal accidents at work in country *i* is then defined as

$$[AW_{\text{country } i}{}^{-}\,;\, AW_{\text{country } i}{}^{+}].$$

The confidence interval for the reporting level of non-fatal accidents at work in country *i* is then defined as

$$\left[\frac{\text{Reported } AW}{AW\text{country } i +}\,;\, \frac{\text{Reported } AW}{AW\text{country } i -}\right].$$

Method 2: "fatal cases"

A country's severity ratio is defined as the ratio of the number of reported non-fatal accidents at work (with at least four days' absence from work) to the number of reported fatal accidents at work, in NACE Rev.2 Sections A, C–N.

For the period from 2011–2015, two benchmark severity ratios are defined:

The Spanish severity ratio:

$$\text{Ratio}_{\text{Spain}} = \frac{\text{Fatal accidents at work in Spain}}{\text{Non–fatal accidents at work in Spain}} = 1{,}086.$$

The EU-15 severity ratio:

$$\text{Ratio}_{\text{EU-15}} = \frac{\text{Fatal accidents at work in EU–15}}{\text{Non–fatal accidents at work in EU–15}} = 959.$$

Fatal accidents at work include all those designated as such by the ESAW methodology According to this classification, they include, for most countries, fatal accidents at work whose occupational cause is not proven.

For a given country *i*, the estimated real number of non-fatal accidents at work is then defined as

$AW_{\text{country } i}^{-}$ = $\text{Ratio}_{\text{EU-15}}$ × Number of reported fatal accidents at work $_{\text{country } i}$

$AW_{\text{country } i}^{+}$ = $\text{Ratio}_{\text{Spain}}$ × Number of reported fatal accidents at work $_{\text{country } i.}$

The confidence interval of the estimated number of non-fatal accidents at work in country *i* is then defined as

$$[AW_{\text{country } i}^{-}\,;\, AW_{\text{country } i}^{+}].$$

The confidence interval of the reporting level of non-fatal accidents at work in country *i* is then defined as

$$\left[\frac{\text{Reported } AW}{AW\text{country } i +}\,;\, \frac{\text{Reported } AW}{AW\text{country } i -}\right].$$

Method 3: "survey data"

In the Labour Force Survey (EU-LFS), respondents are asked whether or not they have suffered one or more accidents at work during the 12 months preceding the survey date. If they have suffered more than one, the exact number is not specified. They also indicate the work that was related to the accident, the duration of the associated absence from work, and whether or not the accident was a traffic accident.

In order to be as consistent as possible with the scope of the ESAW statistics, the survey has been restated as follows:

- non-respondents are excluded;
- the non-employed population in the ILO sense[19] is excluded (compulsory military service, children, inactive, and unemployed);
- military members are excluded;
- non-salaried workers (self-employed, family workers) are excluded;
- only employees in NACE Sections A (agriculture), C-D-E (industry), F (construction), G-H-I (trade), and J-K-L-M-N (private services) are included, as the other sections are poorly covered in many countries; and
- accidents at work classified as road traffic accidents are included.

Using microdata from the ad-hoc module "Accidents at work and other work-related health problems" of the Labour Force Survey (2013), we define, for a country *i*,

- the share of the employed population in sectors A and C–N surveyed who were victim of one accident at work leading to at least four days' absence from work in the past year (2013) as

$$\widehat{p} = \text{Share\_1\_accident}_i = \frac{\text{Weighted number of victims of only one accident at work in the past year}}{\text{Weighted number of surveyed people}}.$$

- the share of the employed population in sectors A and C–N surveyed who were victim of at least two accidents at work leading to at least four days' absence from work in the past year (2013) as

$$\widehat{q} = \text{Share\_2\_accidents}_i = \frac{\text{Weighted number of victims of two accidents at work in the past year}}{\text{Weighted number of surveyed people}}.$$

It is assumed that the variable "number of accidents at work suffered" in the whole European population follows a probabilistic distribution with three possible outcomes: "0," "1," and "2." It is assumed that there is no worker who suffered three accidents at work in the same year; this assumption is compatible with the data in the French administrative database.

19 The ILO (International Labour Office) employed population includes persons aged 15 years or older who worked at least one hour during the reference week. It also includes persons who are presently employed but temporarily absent from work for reasons such as illness, leave, or training.

Table 18: Probabilistic law

X is the random variable "number of accidents at work suffered."

Variables *p* and *q* are the theoretical frequencies of each occurrence. By construction, they are real numbers between 0 and 1.

$X = x$	0	1	2
$P(X = x)$	1-*p*-*q*	*p*	*q*

The expectation of this distribution is equal to $E[X] = p + 2q$.

The variance of this distribution is equal to $V[X] = p + 4q - (p + 2q)^2$.

Since accidents at work are statistically rare events, it is assumed that p^2, q^2, and pq are negligible compared to *p* and *q*. By simplification, the variance of the law becomes

$V[X] = p + 4q$.

It is assumed that the annual rate of accidents at work in the whole population is represented by the probability of having one (or two) accidents during the year and can be estimated by the expectation of the law (i.e., $p + 2q$, multiplied by the size of the employed population).

Assuming that the observations are independent and identically distributed within the survey sample, the law of large numbers indicates that Share_1_accident $_i$ + 2 Share_2_accident $_i$ is a robust estimate of the incidence rate of non-fatal accidents in the country *i*.

A 95% confidence interval of this estimator, using classical probabilistic results (central limit theorem and Slutsky's theorem) is defined as

$$\widehat{\mu} = \widehat{E[X]} = \widehat{p} + 2\widehat{q}$$

$$\widehat{\sigma^2} = \widehat{V[X]} = \widehat{p} + 4\widehat{q} \ .$$

According to this result, for a given country *i*, the following confidence interval for the incidence rate is obtained:

$$\left[\widehat{\mu(i)} - 1.96 \times \frac{\widehat{\sigma(i)}}{\sqrt{N(i)}} \ ; \ \widehat{\mu(i)} + 1.96 \times \frac{\widehat{\sigma(i)}}{\sqrt{N(i)}} \right],$$

where 1.96 corresponds to the 97.5% quantile of the normal distribution, $\widehat{\mu(i)}$ and $\widehat{\sigma^2(i)}$ are the empirical mean and variance of the sample in country *i*, and *N*(*i*) is the number of observations in the survey sample in country *i*.

The data set used to produce these 95% confidence intervals is detailed in **Table 18**.

Table 19: Calculation of the confidence interval for Method 3 ("survey data")

*Excludes microdata from Germany and the Netherlands.

Country	2 accidents in the year *q*	1 accident in the year *p*	Share of accidents $E = p + 2q$	Obs. *N*	Variance $\sigma^2 = p + 4q$	Standard error $ET = \sigma / \sqrt{N}$	Lower bound $E - 1.96ET$	Upper bound $E + 1.96ET$
Austria	0.41%	2.53%	3.35%	6,586	4.2%	0.25%	2.86%	3.84%
Belgium	0.22%	1.47%	1.91%	4,968	2.4%	0.22%	1.48%	2.34%
Bulgaria	0.02%	0.22%	0.26%	7,995	0.3%	0.06%	0.14%	0.38%
Cyprus	0.13%	1.00%	1.26%	2,495	1.5%	0.25%	0.78%	1.74%
Croatia	0.22%	1.47%	1.91%	1,723	2.4%	0.37%	1.19%	2.63%
Denmark	0.08%	1.56%	1.72%	7,452	1.9%	0.16%	1.41%	2.03%
Spain	0.08%	1.86%	2.02%	18,242	2.2%	0.11%	1.81%	2.23%
Estonia	0.15%	0.85%	1.15%	3,747	1.5%	0.20%	0.76%	1.54%
Finland	0.36%	2.38%	3.10%	6,578	3.8%	0.24%	2.63%	3.57%
France	0.20%	2.97%	3.37%	7,713	3.8%	0.22%	2.94%	3.80%
Greece	0.22%	0.70%	1.14%	6,058	1.6%	0.16%	0.82%	1.46%
Hungary	0.10%	0.52%	0.72%	14,235	0.9%	0.08%	0.56%	0.88%
Ireland	0.05%	0.75%	0.85%	10,401	1.0%	0.10%	0.66%	1.04%
Italy	1.12%	1.99%	4.23%	24,745	6.5%	0.16%	3.91%	4.55%
Latvia	0.48%	0.67%	1.63%	2,303	2.6%	0.34%	0.97%	2.29%
Lithuania	0.05%	1.20%	1.30%	4,057	1.4%	0.19%	0.94%	1.66%
Luxembourg	0.46%	2.46%	3.38%	3,388	4.3%	0.36%	2.68%	4.08%
Malta	0.00%	1.33%	1.33%	1,567	1.3%	0.29%	0.76%	1.90%
Norway	0.02%	0.89%	0.93%	6,072	1.0%	0.13%	0.68%	1.18%
Poland	0.02%	0.72%	0.76%	17,942	0.8%	0.07%	0.63%	0.89%
Portugal	0.30%	2.44%	3.04%	6,999	3.6%	0.23%	2.59%	3.49%
Czech Republic	0.04%	1.58%	1.66%	11,107	1.7%	0.13%	1.41%	1.91%
Romania	0.17%	0.26%	0.60%	12,019	0.9%	0.09%	0.43%	0.77%
United Kingdom	0.13%	0.79%	1.05%	19,027	1.3%	0.08%	0.89%	1.21%
Slovakia	0.26%	1.20%	1.72%	6,005	2.2%	0.19%	1.34%	2.10%
Slovenia	0.04%	2.06%	2.14%	3,818	2.2%	0.24%	1.67%	2.61%
Sweden	0.25%	1.02%	1.52%	13,918	2.0%	0.12%	1.28%	1.76%
Switzerland	0.26%	2.75%	3.27%	4,307	3.8%	0.30%	2.69%	3.85%
EU-28 / G + N*	0.15%	1.54%	1.84%	225,088	2.14%	0.03%	1.78%	1.90%
EU-15 / G + N*	0.17%	1.83%	2.17%	136,088	2.51%	0.04%	2.09%	2.25%

Definition of an accident at work (ESAW/LFS)

An accident at work is defined as an event of short duration occurring in the course of an occupational activity and causing physical or psychological harm. The expression "in the course of a work activity" means "during the exercise of a work activity or during the period spent at the workplace."

A non-fatal accident at work is defined as an accident causing at least four full calendar days[20] of absence from work (sometimes also referred to as a serious accident at work). The concepts of these accidents are aligned between ESAW (European Statistics of Accidents at Work) and LFS (Labour Force Surveys), allowing for comparisons.[21]

Accidents at work recorded by ESAW refer to reports submitted to public insurance schemes (Social Security Administration), private insurance schemes, or other national authorities in charge (e.g., labor inspectorates). The accidents at work recorded by LFS are reported by households surveyed on a quarterly basis about accidents that occurred in the 12 months preceding the survey.

A fatal accident at work is an accident resulting in the death of the victim within one year of the accident. These accidents are included in ESAW, but by definition cannot be reported in LFS.

The transmission of data is compulsory for salaried victims and optional for self-employed persons, family workers, and students.

Among the accidents at work, the following categories are included:

- accidents at work that did not lead to medical treatment;
- accidents occurring during working hours, even if they did not occur during the person's usual occupation or at the workplace;
- accidents in public places or public transport during a journey to work (the following accidents are therefore included: traffic accidents during work, accidents on board any means of transport used during work [subways, trams, trains, boats, airplanes, etc.], slips, falls, or assaults in public places [pavement, stairs, etc.] or in arrival and departure points [stations, ports, airports, etc.] of any means of transport used during work);
- accidents occurring during lunch breaks, or any other break during the day, on the company's premises;
- acute poisoning cases; and
- intentional acts by others.

The following categories are excluded:

- commuting accidents (accidents that occurred during the normal journey between home and the workplace [i.e., road accidents occurring on the way from the worker's main or secondary residence to the workplace, or when picking up children from school], accidents that occurred between home and a place where the worker goes for work-related training,

20 Only full calendar days of absence from work should be taken into account, not including the day of the accident.

21 The only exception is accidents at work that lead to mental suffering. There is a difference between a discrete occurrence leading to mental distress and a mental health problem caused or aggravated by work; however, this difference is difficult to establish precisely and has led to the exclusion of accidents causing mental distress from LFS surveys.

or accidents that occurred between the workplace and a restaurant where the worker usually eats lunch, unless the restaurant is on the company premises);

- accidents in which the registrant was an observer or was involved without suffering injury (e.g., a lorry driver who was involved in a road accident but did not suffer any physical injury);
- accidents of a purely private nature, such as those occurring when the victim was not at work and was carrying out non work–related activities in various places (home, shop, bank, town hall, post office, hospital, railway station, port, airport, etc.);
- occupational diseases and other work-related health problems that develop over a long period of time;
- self-harm;
- accidents to members of the public, even if the accident was related to an occupational activity within the company (this includes members of the employee's or employer's families, if they are on company premises and are involved in an accident, such as children in a company crèche. Such accidents should not be reported as accidents at work, although a responsible employer will ensure that such incidents are normally covered by the company's insurance); and
- accidents related to strictly natural causes, such as accidents exclusively related to a medical problem (e.g., heart or brain incidents or any other sudden medical problem occurring during work, without any obvious link with the victim's occupational activity).

If the person has not suffered an accident at work during the 12 months of reference, the variable is coded 0. If the person has had only one accident, the variable is coded 1. If the person has had more than one accident, the variable is coded 2. Accidents resulting in multiple injuries are counted only once. The 12 reference months also include the reference week.

The inclusion of road accidents

The EU-LFS survey includes a specific question related to the characteristics of the victim's accident at work. In particular, it allows the identification of accidents at work that are classed as road accidents. In the sample, these accidents represent nearly 8% of all accidents at work declared by the respondents.

It is necessary to question whether these accidents should be included in our estimate. Indeed, road accidents should, as a general rule, be included in the ESAW methodology if they are considered traffic accidents during work, accidents on board any means of transport used during work, or other accidents in a public place or at the arrival and departure points of any means of transport used during work. However, the ESAW statistics exclude commuting accidents, which are accidents during the normal journey between home and work, i.e. road accidents occurring on the way from the worker's main or secondary residence to the workplace."

It cannot be ignored that the relatively high rate of road accidents may include a significant proportion of commuting accidents, which are theoretically excluded from the ESAW database but are still reported by the respondents; this data should therefore be reprocessed before being compared with national statistics. Nevertheless, several arguments lead us to disregard this difference at first sight:

- the method is based on the assumption that the respondents understand the legal concept of an accident at work;
- a posteriori, the comparison of the statistical methods used indicates that Method 3 most overestimates the countries' reporting levels (see **Table 15**). The exclusion of commuting accident statistics would tend to move the results of this method away from those of the first two.

EUROGIP, created in 1991 by the *Assurance Maladie-Risques professionnels* (Occupational injuries insurance within the National Health Insurance Fund), is an observatory and resource centre on occupational risk prevention and insurance in Europe.

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Paris 2017 - EUROGIP - 179/E

ISBN 979-10-97358-54-9

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