

# "Switzerland's statistics on occupational accidents by international comparison"

## Management – Summary

### The main results

This research was carried out by University of Applied Sciences and Arts Northwestern Switzerland (FHNW) in collaboration with the Federal Coordination Commission for Occupational Safety.

The study was prompted by the fact that Switzerland often has significantly higher risk rates than the EU-28 average in comparative statistics according to EUROSTAT. According to the standardised, non-fatal occupational accident figures reported by EUROSTAT for 2016 and 2017, the Swiss figure of 2,674 accidents per 100,000 employees are exceeded only by Portugal, France, and Spain. The EU-28 average in 2016 was 1,647 accidents (per 100,000 employees).

Against the background of active prevention measures and the large number of people involved in the field of occupational accident prevention, this poor ranking for Switzerland raises questions about the validity and interpretability of the data. The study aims to identify possible explanations for the discrepancies in the data for European occupational accident statistics through an in-depth analysis of the definitions and methodologies used to collect and report occupational accident statistics in Europe (EU, Switzerland, Norway). This should enable the occupational accident statistics of the different countries to be put into context.

The study was able to achieve the stated objective. The main findings are as follows:

- A direct comparison of the data on fatal and non-fatal occupational accidents in the wider EU area is not conclusive, due to the variety of reporting and recording procedures used in the individual states.
- The relatively high accident rates in Switzerland are largely due to the extensive and closely interlinked insurance-based system for reporting and recording accidents, and to needs-oriented incentives. The Swiss figures correspond to the average for insurance-based systems over the period under consideration – a comparison with countries using the same reporting system thus rates the non-fatal incidence in Switzerland as being merely average and not excessive.
- In a counterfactual simulation, which postulates the reporting system used in Switzerland for all countries and assumes a shadow economy of the same magnitude, Switzerland moves from the fourth-highest non-fatal incidence ranking (out of 29 countries) to 16th place for 2018. The model thus supports the result from the descriptive evaluations indicating that, after adjusting for these formal and informal differences, Switzerland shows "only" average values and not excessive values.
- Aside from the main objective of the study, in terms of incidence, it was established that a growing GDP per capita in the primary sector causes incidence rates to rise disproportionately, while in the other sectors it also has a significantly positive but disproportionately low influence on incidence. A growing GDP also represents a driving magnitude of incidence, all other things being equal. Similarly, a higher proportion of 18- to 24-year-old employees in the sectors drive the incidence rate up, and micro enterprises in the 0-9 employee size category have a significantly higher incidence rate than other size categories.

## The study in brief

The analysis is divided into three modules. In **Module 1**, basic literature is evaluated, with presentation and discussion of the statistics, concepts, and terms relevant in the research area. The literature review serves to identify the basic categories of analysis and definitions of terms for the study of fatal and non-fatal occupational accidents in the EU and Switzerland. In addition, initial conclusions were to be drawn from the findings regarding the validity and comparability of the statistical material on occupational accidents in the EU-28 and illustrated by means of exemplary observations from various EU states.

The most significant finding from this module is the fact that a direct comparison of the data material on the occurrence of fatal as well as non-fatal occupational accidents in the enlarged EU area is not conclusive. The data from ESAW (European Statistics on Accidents at Work) are case-related and based on administrative sources in the member states. The following backgrounds for the inconsistencies in the data material were identified:

- divergent legal and formal frameworks for reporting of accidents and transmission of accident reports (definitions of terms, recording of ESAW variables, reporting procedures, performance incentives, insurance obligations, acknowledgement/non-acknowledgement of accidents, etc.).
- Country-specific variations in methods and practices for data collection and statistical recording (determination of employment figures as a reference variable, occupational accidents in relation to demographic and socioeconomic variables, under-reporting, etc.)

Portugal, France, and Spain are among the EU-28 countries whose reported incidence rates, together with Switzerland, are above the EU average. They all have an insurance-based reporting system that offers significant financial compensation to victims in the event of reported and acknowledged accidents. The lower rates in Bulgaria, Romania, and other Eastern European states that joined the EU after 2003 reflect the existence of gaps in coverage due to inadequate incentive systems: statutory systems in which injured parties are covered by the general social insurance system are common in Eastern EU countries. Below-average incidences predominate in the Eastern European member states. The phenomenon clearly indicates that many accidents go unreported.

All these facts taken together justify the hypothesis that, instead of accident statistics being directly comparable, it is possible at best to contrast the data from countries that use the same reporting procedures.

**Module 2** focuses on the discussion and evaluation of interviews with international experts. The interviews were conducted based on a specially designed, semi-structured guide. The interviews were intended to provide insights into the basic requirements and practices for recording occupational accidents in selected EU-28 countries. They therefore served to evaluate, deepen, and extend the findings from Module 1. High-ranking officers in national institutions who document, research, and statistically record occupational accidents in their respective countries or are responsible for the transfer of data to the European level were asked to act as experts.

None of the experts interviewed considered the ESAW data material to be sufficiently informative about occupational accidents in Europe, beyond the observation that the data was non-comparable. The respondents had little or no familiarity with the statistical procedures of Eurostat in the treatment of national data sets. It is therefore hardly surprising that the interviewees stated that the ESAW data material is used only under very limited circumstances within their own national institutions.

All interviewees expressly welcomed the present analysis as a necessary, basic study to explain the barely explored inconsistencies in the ESAW data material and showed great interest in the results.

The expert interviews provide impressive confirmation of the key findings from the literature analysis:

1. The relatively high accident rates in Switzerland are largely due to the extensive and closely interlinked insurance-based system for reporting and recording accidents, and to needs-oriented incentives. The veracity of this conclusion is underlined by the statements of the German expert Thomann and the Austrian expert Mayer on the importance, as in Switzerland, of the high density of regulation and detection, the high coverage rates, and the needs-oriented incentive systems in their respective countries, combined with very high recognition rates for

occupational accidents. Both Germany and Austria have significant non-fatal occupational accident figures when compared internationally.

2. The inconsistencies in the ESAW data material are an expression of a complex interplay between legal, methodological, and process-related characteristics of the collection and processing of data material, which differs between states and European regions. Within each of the three identified variable complexes or levels – the legal and formal, the methodological and process-related, and the socio-economic level – there is an overlap in each case of the country-specific characteristics of regulatory density, regulatory content, and standardisation, on the one hand, and of country-specific, informal practices – *the informalisation of the formal* – on the other. It is therefore necessary to ask the following question when interpreting the ESAW statistics: *how many shades of grey are there?* It is only with knowledge and awareness of the country-specific characteristics that the differences in level between the individual countries as well as the country-specific developments of the ESAW data can be interpreted. As absolute numerical material, they cannot be handled with any insight.

**Module 3** models the non-fatal incidence rates in the EU countries as well as Switzerland and Norway using a panel data regression. The objective is -+- to develop a basic, needs-oriented model that allows the influence of the variables, which were classified by the experts as being fundamental for the limited comparability of the incidence rates, to be quantified. These variables are primarily the reporting system, a tendency in various states to under-report, and other peculiarities and mechanisms of the national systems, which are more difficult to grasp analytically. The model attempts to approximate these peculiarities with variables such as a (perceived) corruption index, the population's trust in an independent judiciary or the magnitude of the black and grey market as a percentage of GDP.

In the descriptive analyses preceding the modelling, fatal and especially non-fatal incidences are stratified according to different demographic and economic aspects. Bivariate analyses show that practically all variables examined have significant influences on the incidence rates; with regard to the economic aspects, these include gross domestic product (GDP), the relative magnitude of the sectors (as a percentage of GDP and percentage of employees) and the relative magnitude of the different sectors within the economy. Demographic aspects are clearly influenced by the gender distribution within the workforce and its age structure. The distribution of age groups and genders within the industries and sectors is also relevant. Demographic and economic influences would appear to overlap each other. However, a multivariate model as the main objective of Module 3 cannot take all driving factors into account, as the panel of 30 countries over 9-10 years is not large enough for this. One of the main results of these descriptive evaluations is the **contrasting** of non-fatal incidence rates between the insurance-based reporting system and that of the social security system. In the years from 2010 to 2019, incidence rates in the social security system were always lower than the average across insurance-based systems by a factor of 2 to 3. Secondly, it is shown that the Swiss figures correspond to the average for insurance-based systems over the period under consideration – a comparison with countries that use the same reporting system thus rates the non-fatal incidence rates in Switzerland as being merely average and not excessive.

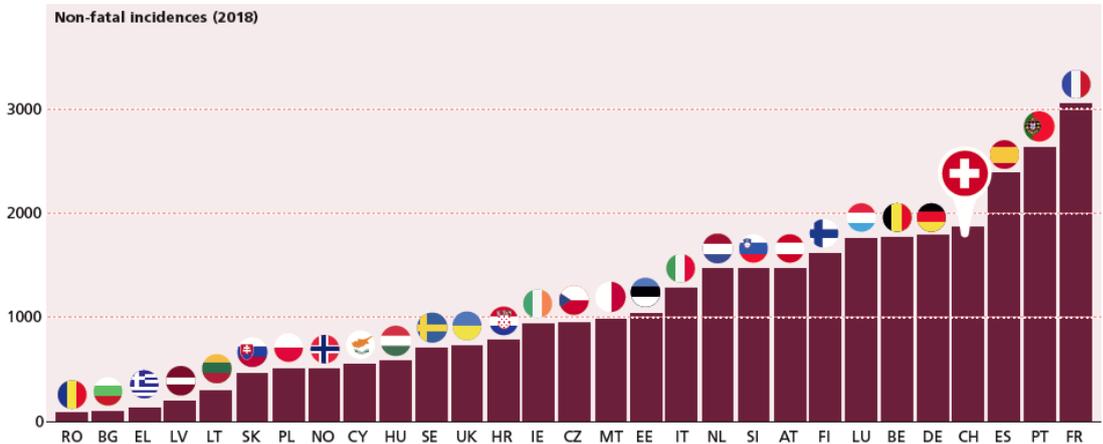
Module 3 explicitly examines only the non-fatal incidence rates, since it is mainly with regard to these figures that the aforementioned discrepancies exist; in the case of fatal incidence rates, according to the experts, the accuracy of the data material is generally higher (and the ratio of non-fatal to fatal incidences can even give an indication of the validity of the non-fatal incidences. The fatal incidence rate for Switzerland in 2018 was 1.24 cases per 100,000 workers, compared to an EU-28 average of 1.63 cases). The following explanatory variables with a significant influence on incidence were included in the model: the relative magnitude of the economic sectors measured by GDP per capita, the economic activity or annual change in GDP, the percentage distribution of the workforce in terms of age structure by economic sector, and the percentage distribution of companies by size category weighted by the number of employees in the respective size categories. This basic model, which contains the economic and demographic characteristics of the countries, is supplemented in the next step by the addition of the type of reporting system (social security reporting system or insurance-based reporting system). In addition, an indicator is included which, according to ESAW methodology, classifies the incidence rates of a country as being under-reported. Another included variable, which also approximates legal and formal characteristics, is the magnitude of the informal economy (grey and black market as percentage

of GDP). This simultaneously approximates the trust in a functioning state and can also serve as a proxy for under-reporting – accidents that occur in the shadow economy are certainly not reported, or are reported far less frequently than in the regular sectors.

The results show that a growing GDP per capita in the primary sector increases the incidence rate disproportionately, while in the other sectors it also has a significant positive but disproportionately low impact on incidence. A growing GDP also represents a driving magnitude of incidence, all other things being equal. Similarly, a higher proportion of 18- to 24-year-old employees in the sectors drive the incidence rate up, and micro enterprises in the 0-9 employee size category have a significantly higher incidence rate than other size categories.

By means of a counterfactual simulation, the reporting systems, the magnitudes of the shadow economy, and the tendency to under-report are then set to Switzerland's values for all states, i.e. incidence rates with an insurance-based reporting system are simulated for all states, with a low shadow economy share (Switzerland's value: 6.4%, 2018) and no tendency to under-report. This causes the incidence rate to rise in all countries (except Switzerland). The figure below shows the 2018 ranking of non-fatal incidence rates for the model. Switzerland ranks fourth in this, just behind France, Portugal, and Spain.

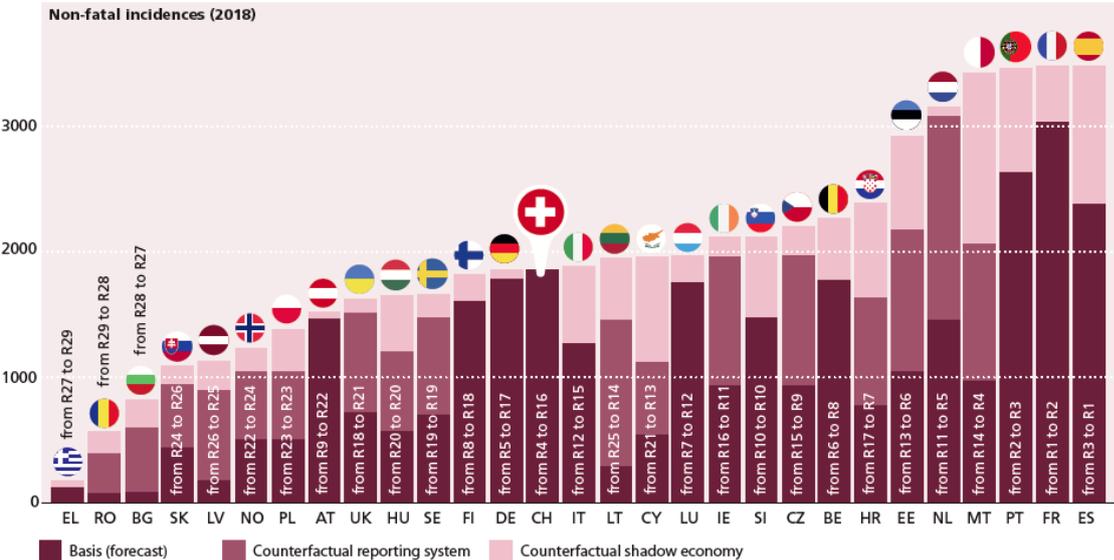
**Initial situation: Scores**



The counterfactual simulations now change these incidences predicted by the model, depending on the reporting system and the magnitude of the shadow economy.

**Scores according to the counterfactual simulation:**

All reporting systems insurance-based, no under-reporting and shadow economy on a level with Switzerland, 2018, no random effects:



Multipliers can be calculated from the ratio of this simulated incidence and the original incidence. These multipliers allow the incidence to be compared with the "Swiss incidence" after equalising the reporting systems and the shadow economy. The calculated factors are very high depending on the country – for example, a factor of 8.7 is calculated for Bulgaria or a factor of 6.8 for Romania (2018 data). This means that, in order to compare the Bulgarian incidence rate to the Swiss incidence rate, the Bulgarian rate must be multiplied by a factor of 8.7 to correct for differences in the reporting system and for other informal differences (shadow economy) between Switzerland and Bulgaria.

Country	BG	RO	LT	LV	CY	MT	HR	HU	EE	PL
Ratio	<b>8.68</b>	<b>6.82</b>	6.52	<b>6.11</b>	3.63	3.49	3.08	2.87	2.80	2.73
Country	NO	SK	CZ	SE	IE	UK	NL	IT	ES	EL
Ratio	2.44	2.38	2.34	2.34	2.26	2.24	2.15	1.47	1.46	1.45
Country	SI	PT	BE	FR	FI	LU	DE	AT	CH	
Ratio	1.44	1.31	1.28	1.14	1.12	1.12	1.04	1.03	<b>1.00</b>	

Even after these factors are included, the differences between Switzerland and countries with low case numbers such as Bulgaria or Romania remain relatively high, but this is actually a comparison at the extreme ends of the distribution; for countries such as Lithuania or Latvia (with multipliers of 6.5 and 6.1), after correction for the reporting system and under-reporting, the incidences reach a **magnitude** similar to that of Switzerland. When the reporting system used in Switzerland is postulated for all states and a shadow economy of the same magnitude is assumed, Switzerland moves from the **fourth-highest** ranking for non-fatal incidence (out of 29 countries) to **16th place** for 2018. The model thus supports the result from the descriptive evaluations, which indicates that, after adjusting for these formal and informal differences, Switzerland shows "only" average values and not excessive values.

The panel data regression presented here is an attempt to relate the incidence rates to economic and demographic variables, and thus to eliminate effects of a legal and formal nature. More meaningful modelling is certainly possible – for example, it would be necessary to clarify whether other variables of an economic and demographic nature play an important (or more important) role. The inclusion of the NUTS2 regions (cantons for Switzerland, federal states for Germany, etc.) should also be considered for future analyses. This would greatly increase the size of the panel, but would also complicate data preparation due to data being harder to obtain, and a cluster effect would have to be taken into account.