

European Statistics on Accidents at Work (ESAW)

Method for calculating incidence and standardised incidence rates

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European Statistics on Accidents at Work (ESAW) data are collected and disseminated on Eurostat's website on an annual basis. In addition to absolute numbers of accidents and percentages, incidence rates and standardized incidence rates are calculated by Eurostat.

Incidence rates

Incidence rates are calculated as the ratio between (i) the number of accidents (non-fatal or fatal for a given year, country, sector, sex, age group or other breakdowns) and (ii) the corresponding number of employed persons (reference population) multiplied by 100,000.

For example, an incidence rate of 1,500 accidents per 100,000 persons for a certain country, sector k and year means that 1,500 accidents were reported for this country, sector and year, for each 100,000 persons employed in the sector. Beside employees, employed persons (also called 'workers') may include self-employed, family workers and other categories of employed persons.

Example from table 1 below:

1. 380 accidents were reported by country X in 2016 for sector 'A - Agriculture, forestry and fishing' and 25,000 workers were working during this year in the same sector.
2. Then the (non-standardised) incidence rate is calculated as follows:

$$r_{X,k} = \frac{acc_{X,k}}{refpop_{X,k}} = \frac{380}{25,000} * 100,000 \frac{accidents}{100,000 workers} = 1,520.0 \frac{accidents}{100,000 workers}$$

where $acc_{X,k}$ is the number of accidents and $refpop_{X,k}$ is the number of workers in country X and in sector k .

Standardised incidence rates

Incidence rates vary between economic sectors as there are some economic activities which expose some workers to higher risks of accidents. Examples of high risk sectors include agriculture, construction and transport. Countries with a higher share of more risky economic activities are more likely to have higher incidence rates, even if measures of preventing accidents are equal. In order to support comparison between countries, a standardisation method was developed in order to eliminate the influence of different sizes of economic sectors between countries. This method produces the so-called 'standardised incidence rates'.

The method for calculating standardised incidence rates for countries is the following:

1. The first step is to calculate for each year a fixed set of EU weights w_k for each economic sector k of the common branches A, C – N. The EU weights w_k differ only for sectors and thus are based on EU sector totals only (the same for each country). They correspond simply to the ratio between the EU reference population of a sector (number of all workers in this sector in the EU) and the total EU reference population for all NACE common branches (A, C-N):

$$w_{k,EU} = \frac{refpop_{k,EU}}{refpop_{EU}}$$

where $refpop_{k,EU}$ is the EU reference population for sector k and $refpop_{EU}$ is the entire reference population of the EU common branches A, C – N;

2. Then, for each country X and sector k the weights w_k are multiplied with the (non-standardised) incidence rates r in order to produce weighted incidence rates r' specific for each sector in country X :

$$r'_{X,k} = r_{X,k} * w_k$$

3. Finally, the standardised incidence rate sr of the country X is calculated as the sum of the weighted incidence rates r' of the country X :

$$sr_X = \sum_{k=A,C-N} r'_{X,k},$$

with k representing sectors A, C, D, E, ... until N. Standardised incidence rates have the same unit as the non-standardised ones (number of accidents per 100,000 workers).

Example from table 1 below:

1. In the 2nd column you find the EU sector weights in the column w_k 'EU sector weights ($\frac{refpop_{k,EU}}{refpop_{EU}}$):'

- For sector A: $w_A = \frac{refpop_{A,EU}}{refpop_{EU}} = \frac{11056}{147045} = 0.0752=7.52\%$
- For sector C: $w_C = \frac{refpop_{C,EU}}{refpop_{EU}} = \frac{32142}{147045} = 0.2186=21.86\%$
- ...
- For sector N: $w_N = \frac{refpop_{N,EU}}{refpop_{EU}} = \frac{11637}{147045} = 0.0791=7.91\%$

2. The weighted incidence rates r' are displayed in the column 'Weighted incidence rate ($r * w_k$)'

- For sector A: $r'_{X,A} = r_{X,A} * w_A = 1,520.0 * 7.52\% = 114.3$
- For sector C: $r'_{X,C} = r_{X,C} * w_C = 2,613.3 * 21.86\% = 571.2$
- ...
- For sector N, : $r'_{X,N} = r_{X,N} * w_N = 2,781.4 * 7.91\% = 220.1$

3. The standardised incidence rate is the sum of the weighted incidence rates and its unit of

measure is accidents per 100,000 workers

$$\begin{aligned} \blacksquare \quad sr_X &= \sum_{k=A,C-N} r'_{X,k} = 114.3 + 571.2 + \dots + 220.1 = 2,238.7 \text{ accidents per 100,000} \\ &\text{workers} \end{aligned}$$

Standardised incidence rates for different breakdowns of ESAW data

The same EU sector weights are used for all breakdowns such as gender groups, age groups etc. For example, the standardised incidence rate for age group 35 – 45 is calculated as the sum of the weighted incidence rates for the sectors A, C, ..., N of the corresponding incidence rates for this age group:

$$sr_{X,age\ 35-45} = \sum_{k=A,C-N} r'_{X,age\ 35-45,k} = \sum_{k=A,C-N} r_{X,age\ 35-45,k} * w_k$$

However, there are by definition no standardised incidence rates for individual NACE sectors or divisions.

Table 1: Example of calculating standardised incidence rate for country X (2016)

	EU		Country X			
	EU reference populations per sector (1,000)	EU sector weights (refpop _{k,EU} / refpop _{EU})	Reference population (workers) (1,000)	Number of accidents (number)	Incidence rate (acc / refpop _k) (accidents per 100,000 workers)	Weighted incidence rate (r * w _k) (accidents per 100,000 workers)
NACE	refpop _{k,EU}	w _k	refpop _k	acc _{X,k}	r _{X,k}	r' _{X,k}
A - Agriculture, forestry and fishing	11,056	7.52%	25	380	1,520.0	114.3
C - Manufacturing	32,142	21.86%	466	12,178	2,613.3	571.2
D - Electricity, gas, steam and air conditioning supply	1,295	0.88%	23	92	400.0	3.5
E - Water supply; sewerage, waste management and remediation activities	1,692	1.15%	10	432	4,320.0	49.7
F - Construction	13,683	9.31%	244	9,855	4,038.9	375.8
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	30,374	20.66%	431	8,489	1,969.6	406.8
H - Transportation and storage	10,407	7.08%	145	6,676	4,604.1	325.9
I - Accommodation and food service activities	9,278	6.31%	117	1,655	1,414.5	89.3
J - Information and communication	5,979	4.07%	81	366	451.9	18.4
K - Financial and insurance activities	6,330	4.30%	109	224	205.5	8.8
L - Real estate activities	1,999	1.36%	15	261	1,740.0	23.7
M - Professional, scientific and technical activities	11,173	7.60%	139	571	410.8	31.2
N - Administrative and support service activities	11,637	7.91%	307	8,539	2,781.4	220.1
Total for sectors A, C-N (refpop _{EU})	147,045	100.00%	2,112	49,718	2,354.1	
Standardised incidence rate sr _X (sum of weighted incidence rates r' for all sectors A, C-N)						2238.7