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# Organisational factors and under-reporting of occupational injuries in Sweden: a population-based study using capture–recapture methodology

Cecilia Orellana <sup>1</sup>, Bertina Kreshpaj,<sup>1</sup> Bo Burstrom,<sup>2</sup> Letitia Davis,<sup>3</sup> Paolo Frumento,<sup>4</sup> Tomas Hemmingsson,<sup>1,5</sup> Gun Johansson,<sup>1,6</sup> Katarina Kjellberg,<sup>1,6</sup> David H Wegman,<sup>7</sup> Theo Bodin<sup>1,6</sup>

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<sup>1</sup>Unit of Occupational Medicine, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden

<sup>2</sup>Department of Global Public Health, Equity and Health Policy Research Group, Karolinska Institutet, Stockholm, Sweden

<sup>3</sup>Researcher, Cambridge, Massachusetts, USA

<sup>4</sup>Department of Political Sciences, Università di Pisa, Pisa, Italy

<sup>5</sup>Department of Public Health Sciences, Stockholm University, Stockholm, Sweden

<sup>6</sup>Center for Occupational and Environmental Medicine, Stockholm Region, Stockholm, Sweden

<sup>7</sup>University of Massachusetts Lowell, Lowell, Massachusetts, USA

## Correspondence to

Dr Cecilia Orellana, Unit of Occupational Medicine, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Stockholm, Sweden; [cecilia.orellana@ki.se](mailto:cecilia.orellana@ki.se)

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## ABSTRACT

**Objective** To estimate the magnitude of under-reporting of non-fatal occupational injuries (OIs) by different organisational factors in Sweden for the year 2013.

**Methods** Capture–recapture methods were applied using two data sources: (1) the national OI register and (2) records from a labour market insurance company. To assure comparability of data sources, the analysis was restricted to the public sector and private companies with at least 50 employees. OIs were matched using personal identification number and reported injury dates ( $\pm 7$  days). Organisational factors were obtained from the national labour market register and injury severity (no healthcare/only outpatient/hospitalised) from the National Patient Register. Total number of OIs and ascertainment by data sources were estimated assuming data source independence.

**Results** There were an estimated 98 493 OIs in 2013. Completeness of reporting OIs to the national register and to the insurance company was estimated at 73% and 43%, respectively. No report to either source was estimated at 15 000 OIs (~15%). Under-reporting to the national register differed by selected organisational factors, being higher among organisations in the public sector, those with more females, with a younger workforce and with a higher proportion of immigrants. Overall under-reporting was more common in agriculture (19.7%), other services (19.3%), commerce and hospitality (19.1%), health (18.4%) and education (18.4%). Under-reporting decreased as injury severity increased, with little variations across sectors of economic activity.

**Conclusions** Results suggest considerable under-reporting of OIs in Sweden and differential under-reporting by organisational factors. Results are relevant for official estimates of burden and for setting priorities for workplace safety and prevention.

## INTRODUCTION

Accurate recording of occupational injuries (OIs) serves several national objectives. Measuring the true burden of OIs provide appropriate estimates of the burden for workers and for the economy. Complete recording also appraises authorities of any hidden differential injury risks, providing

## Key messages

### What is already known about this subject?

► Studies conducted in other countries have shown substantial under-reporting of occupational injuries (OIs). The magnitude of under-reporting of OIs and factors associated with under-reporting in Sweden have not been systematically investigated.

### What are the new findings?

- An estimated one in four OIs (27%) were not reported in official statistics in Sweden in 2013, despite reporting being legally mandated.
- The estimated magnitude of under-reporting was influenced by several factors at the organisational level, being highest among organisations with more female employment, with a younger workforce, with a high proportion of immigrants and among employers belonging to the public sector.
- Overall, sectors of economic activity with the highest estimated under-reporting were agriculture, other services, commerce and hospitality, health and education.
- Also, as OI severity increased under-reporting decreased, with little variations across economic sectors.

### How might this impact on policy or clinical practice in the foreseeable future?

► Results suggest notable under-reporting of OIs in Sweden and differential under-reporting by factors at the organisational level. Results are relevant for official estimates of burden and for determining priorities for workplace safety and prevention efforts.

information essential to target properly limited inspectional resources as well as to guide effective implementation of prevention and educational programmes. Finally, this information allows individual employers to benchmark their OI experience within their industry sector, facilitating the identification and correction of injury prevention deficiencies. In the 1990s, actual OI reporting for Sweden was estimated to be approximately 50% of the true

level, for all branches of economic activity.<sup>1</sup> No investigation was prompted by this finding.

The number of OIs in Sweden that are officially reported to the Information System on Occupational Injuries (ISA), a national register held by the Swedish Work Environment Authority, has been in decline for decades. In the early 1990s, there was a sharp decline in serious OIs, especially among men, attributed to structural changes in the labour market. Employment opportunities moved from hazardous environments in large-scale manufacturing industries to service sector jobs in small and medium-sized enterprises.<sup>2</sup> During the following decade, OIs continued to decrease, although at a slower pace and not in all sectors of economic activity, such as the healthcare sector.<sup>3</sup> Research outside Sweden suggests that under-reporting may contribute to the apparent decline in OIs.<sup>4–5</sup> Studies conducted in neighbouring countries, Norway and Denmark, have shown substantial under-reporting.<sup>6–8</sup>

Previous studies suggest that several organisational factors are associated with the under-reporting of OIs. However, apart from employer size,<sup>9–11</sup> few factors have been investigated. A limited number of studies have suggested that ownership sector (private/public)<sup>11–12</sup> and economic activity<sup>10–12</sup> could be associated with under-reporting of OIs, although for the latter, results are not consistent across studies, possibly due to differences within the study populations. The reasons for under-reporting injuries are only partially known and could vary across countries, but perceptions with regard to eligibility for compensation,<sup>9</sup> organisational safety climate<sup>13</sup> and system barriers<sup>14</sup> have been suggested to play a role.

Setting priorities for workplace safety, research and prevention of OIs depends on accurate and reliable data. One way to estimate under-reporting is by means of capture–recapture, a method used to estimate the size of an unknown population, using overlapping sets of data.<sup>15</sup> Capture–recapture has been widely used in epidemiology and specifically to assess under-reporting of OI.<sup>6–10–12–16–19</sup> To the best of our knowledge, no previous study has used this specific method to investigate under-reporting in Sweden. Furthermore, exploring differential under-reporting could result in new understanding of methods useful to guide OI research as well as prevention and public policy.

The aim of this study is to estimate the magnitude of under-reporting of OI in Sweden overall and by different factors at the organisational level, using the best available information from two separate national sources of OI data.

## METHODS

### Data sources

This study includes all reports of non-fatal OIs in Sweden during 2013, among residents aged 18–65 who had at least one registered employer during that year. We used information from two data sources: the ISA register and the AFA Insurance company (AFA, from the Swedish acronym ‘the labour market insurance company’).

Official ISA statistics are based on OI reports to the Social Insurance Agency, which covers all employees and self-employed persons in Sweden. The employee is responsible for notifying the employer of a work injury, who in turn is legally obligated to report it.

The second data source, AFA, is a mutual insurance company owned by employers’ organisations and trade unions. AFA primarily covers workplaces that have collective bargaining agreements—100% of public sector employees and 93%–95% of the total Swedish Labour market, with lower coverage among

smaller private sector companies.<sup>20</sup> Employees report directly to AFA through an online form. AFA provides a broader compensation than ISA including lost income, and sometimes compensation for pain and suffering. Additional details on the data sources can be found in our published study protocol.<sup>21</sup>

Both ISA and AFA use the Swedish legal definition of OI: ‘an occupational injury is an injury due to accident(s), which occurred at the workplace or other place where the injured person had been for work. For an event to be counted as an accident, it is required that the course was relatively short and arose in connection with a particular event.’<sup>3</sup>

We included reported OIs (not necessarily approved claims). We excluded OIs that occurred during transit to/from work because these are difficult to disentangle from regular traffic insurance. We excluded injuries due to accumulated exposure (many musculoskeletal disorders) and near injuries, as these are not included in the definition of OI required to be reported.

To characterise OI severity, we used data from the National Patient Register (NPR), which includes all visits to inpatient or specialised outpatient care (excluding primary care).<sup>22</sup> We selected diagnoses included in chapter XIX of the International Statistical Classification of Diseases and Related Health Problems ICD-10: injury, poisoning and certain other consequences of external causes (S00–T99).

Information on organisational factors was available for all Swedish organisations in the Longitudinal Integration Database for Health Insurance and Labour Market Studies.<sup>23</sup> These included ownership sector (public/private), number of employees, sector of economic activity (full description in online supplemental table S1) and organisational level characteristics of the workforce: proportion of women, proportion of young employees (<30 years old), proportion of immigrants and proportion of highly educated workers.

### Data management

ISA and AFA cover slightly different populations. To make our two sources comparable, we restricted the analysis to the public sector where all employers have collective agreements and therefore insurance,<sup>24</sup> and to private companies with  $\geq 50$  employees. This size restriction was based on the fact that nearly all (>98%) private employers with  $\geq 50$  employees pay occupational pensions, a proxy for also being covered by AFA insurance.<sup>25</sup>

The Swedish unique personal identity number allowed information to be linked from all databases.<sup>26</sup> Statistics Sweden de-identified the original identification numbers ensuring confidentiality. We linked ISA and AFA based on a  $\pm 7$  days’ range, assuming that OIs reported within a week in either of them was considered the same injury. Then we added data from the NPR linking date of admission with injury date, on a  $\pm 7$  days’ range. Finally, we defined three levels of increasing OI severity: no healthcare (ie, no admission in NPR), outpatient care and hospitalisation.

### Statistical analysis

We employed a two-source capture–recapture method, estimating the total number of OIs, including those not reported to either source, using the Lincoln-Peterson estimator<sup>15</sup> that assumes source independence. Ascertainment for each data source was calculated as the actual number of OIs divided by the capture–recapture estimate. We computed estimates by OI severity and by all organisational factors, then stratified organisational factors by OI severity.

To adjust for predictors and make the independence assumption more plausible, we estimated log-linear regression models.<sup>27</sup> Covariate-adjusted models included proportion of women, proportion of young employees and proportion of migrants, at

the organisation level. We present crude results, as they were in close agreement with adjusted results and are more relevant for policy-makers.

Data management was conducted using the Statistical Analysis Software (SAS) V.9.4. Capture–recapture estimates were obtained in R (R Foundation for Statistical Computing), including bootstrap to obtain 95% CI.

## RESULTS

The final sample for analysis included 71 921 and 42 278 OIs reported to ISA and AFA, respectively. Merging on  $\pm 7$  days, resulted in a dataset with 83 327 unique OIs. The distribution of OIs by demographic, organisational factors and severity is shown in table 1.

This distribution was similar for the data sources, but the numbers from AFA are smaller. In general, OIs were higher in organisations

**Table 1** Distribution of non-fatal occupational injuries by organisational factors and injury severity, sorted by data source, Sweden, 2013\*

	ISA		AFA	
	N	(%)	N	(%)
Total	71 921	100	42 278	100
Proportion of women at the organisation				
Male-dominated (female<40%)	25 661	35.7	17 839	42.2
Gender-integrated (female $\geq$ 40-<60%)	9 515	13.2	6 402	15.1
Female-dominated (female $\geq$ 60%)	36 745	51.1	18 037	42.7
Proportion of young workers at the organisation (mean age <30years old)				
$\leq$ 10%	8 393	11.7	4 880	11.5
>10 to <30%	54 303	75.5	30 945	73.2
$\geq$ 30%	9 225	12.8	6 453	15.3
Proportion of immigrant workers at the organisation				
<10%	28 862	40.1	19 352	45.8
$\geq$ 10 to $\leq$ 20	26 948	37.5	14 433	34.1
>20%	16 111	22.4	8 493	20.1
Proportion with higher level education (>13 years) at the organisation				
<20%	14 871	20.7	11 005	26.0
$\geq$ 20%–40%	18 858	26.2	11 703	27.7
$\geq$ 40%–60%	25 741	35.8	13 548	32.1
$\geq$ 60%	12 451	17.3	6 022	14.2
Ownership Sector				
Public †	40 309	56.0	21 270	50.3
Private	31 612	43.9	21 008	49.7
Employer size ‡				
Medium to small (50–99)	4 115	13.0	3 187	15.2
Medium to large (100–249)	5 523	17.5	4 014	19.1
Large ( $\geq$ 250)	14 324	69.5	13 807	65.7
Sector of Economic Activity§				
Agriculture	84	0.1	75	0.2
Industry	14 512	20.2	9 283	22.0
Construction	3 302	4.6	2 802	6.6
Commerce and hospitality	4 585	6.4	3 608	8.5
Transport	4 913	6.8	3 572	8.5
Financial services	949	1.3	720	1.7
Public administration	6 285	8.7	4 065	9.6
Education	7 198	10.0	4 634	11.0
Health	23 258	32.3	9 387	22.2
Other services	6 318	8.8	3 885	9.2
Missing	517	0.7	247	0.6
Injury Severity ¶				
No hospital contact	60 824	84.6	32 045	75.8
Only outpatient	9 967	13.9	9 069	21.4
Hospitalised	1 130	1.6	1 164	2.7

\*Includes OIs among all public sector and medium and large companies in the private sector ( $\geq$ 50employees). Injuries missing information on sector were excluded (3.8% for the total OIs).

†Public sector is composed of municipal and government administration; municipal-owned and government-owned companies and organisations; and other public institutions.

‡Number of employees is available only for companies in the private sector.

§Sectors of Economic Activity according to the Sixth European working conditions survey. Industry is composed of Mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; and, water supply, sewerage, waste management and remediation activities.

¶Severity of injuries using data from inpatient and specialised outpatient care, available from the National Patient Register.

AFA, AFA Insurance; ISA, the Information System on occupational injuries; OI, occupational injuries.

that tend to be gender-segregated, with more than 10% of workers being young (<30 years old), and with less than 10% being immigrant workers. The public sector was slightly overrepresented, as well as large companies in the private sector ( $\geq 250$  employees). Most injuries did not require healthcare contact, and the highest numbers of OIs were observed in the health, industry and education sectors.

Capture–recapture estimates for this final sample, overall and by injury severity are presented in [table 2](#).

Overall, we estimated 98 493 OIs in 2013. Completeness of reporting OIs to ISA and to AFA was estimated at 73% and 43%, respectively, and 15 000 OIs (15.4%; 95% CI 15.1% to 15.7%) were estimated to be not reported to either data source. Under-reporting of OIs decreased as the injury severity increased, particularly for AFA. The capture proportions for hospitalised OIs were similar in ISA and AFA (~80%), while those associated to OIs with no healthcare contact were much smaller in AFA (38%) than ISA (72%).

Capture–recapture estimates by organisational factors are presented in [table 3](#).

Non-overlapping CIs were present for several factors in the different groupings calling attention to significant differences. Under-reporting was highest among female-dominated organisations (13.2%; 95% CI 12.8% to 13.5%), those with more than 10% immigrant workers (17.6%; 95% CI 17.1% to 18.1%), with a younger workforce (>30% of workers below 30 years old, 18.2%; 95% CI 17.4% to 18.9%) and those belonging to the public sector (14.4%; 95% CI 14.1% to 14.8%). Among private companies, under-reporting decreased as employer's size increased. However, with increasing size of the organisation, capture by ISA increased while capture by AFA decreased. Estimates for sector of economic activity ranged from 6.5% in public administration (95% CI 5.9% to 7.1%), to 19.7% in agriculture (95% CI 12.0% to 27.4%). Under-reporting was most notable among other services (19.3%; 95% CI 18.3% to 20.3%), commerce and hospitality (19.1%; 95% CI 18.0% to 20.1%), health (18.4%; 95% CI 17.8% to 18.9%) and education (18.4%; 95% CI 17.5% to 19.3%).

[Table 4](#) presents the magnitude of under-reporting for organisational factors stratified by OI severity.

In general, we observed a common gradient across organisational factors, with a decrease in the estimated under-reporting with increased injury severity. In those cases where the decrease in under-reporting was less evident across different organisational factors (eg, economic sector), small numbers may explain this difference. Complete count details for [tables 3 and 4](#) are presented as supplementary material (online supplemental tables S2 and S3).

Additional analysis showed that estimates for economic sectors by levels of severity remained even after adjustments for proportion of women, proportion of younger workers and proportion

of immigrants at the organisation level (online supplemental table S4). We also calculated the distribution of OIs and proportion of reported injuries by each source for the entire population, without the restriction of company size in the private sector and without capture–recapture estimates (online supplemental table S5). Findings from this side-by-side comparison of the two data sources including all employers were consistent with our main capture–recapture results.

## DISCUSSION

In this study, we used capture–recapture methodology to estimate the extent of under-reporting of OIs in Sweden in 2013. While 85% of the estimated total number of injuries were reported in at least one of the two data sources, the estimated overall capture proportion in the official injury register (ISA) was only 73%. This estimation means that in the public sector and among medium and large private sector employers, one in four OIs—approximately 26 000 in 2013—were not in the official count of OI burden. The insurance company AFA only captured 43% of the total estimated OIs. Since these data sources are not routinely combined in practice, the under-reporting in ISA is most relevant to stakeholders who rely on official statistics to inform policy and to prevent OI in Sweden. Moreover, this national register forms the basis of the information reported at the European level.<sup>28</sup>

In line with our findings, others have also found higher reporting of OIs to the national system among public employers<sup>11 12</sup> and larger workplaces.<sup>10 11</sup> Previous studies have investigated sectors of economic activity, either in stratified analysis<sup>10–12</sup> or as part of a list of explanatory variables,<sup>17 29</sup> with inconclusive results. The present study considers additional unexplored factors at the organisation level (eg, proportion of immigrants), includes data on both the public and private sectors, and adds a broader coverage of sectors of economic activity compared with previous studies.

Differential under-reporting across economic sectors could have several underlying explanations including reporting protocols, strong unions, workplace or industry awareness and professional cultures. Low under-reporting in the industrial production sector should not be surprising, as these are male-dominated sectors with high levels of unionisation.<sup>20</sup> The opposite situation could explain our results for agriculture, where less unionisation and less skilled workers may affect OI reporting.

Our results of decreased under-reporting with increasing injury severity are consistent with previous studies, which have identified lesser severity as a predictor of not reporting OIs, usually measured either as type of injury or part of the body<sup>8 29</sup> or as time off from work.<sup>29 30</sup> Severity, however, has not been

**Table 2** Capture–recapture estimates of under-reporting non-fatal occupational injuries by injury severity in Sweden, 2013\*

	Overlap	ISA only	AFA only	Total observed †	Total estimated‡ (95% CI)	% under-reported (95% CI)	% captured by ISA	% captured by AFA
<b>Total</b>	30 872	41 049	11 406	83 327	98 493 (98 115 to 98871)	15.4 (15.1 to 15.7)	73.0	42.9
No healthcare contact§	23 206	37 618	8839	69 663	83 991 (83 607 to 84376)	17.1 (16.7 to 17.4)	72.4	38.2
Only outpatient	6741	3226	2328	12 295	13 409 (13 344 to 13475)	8.3 (7.9 to 8.7)	74.3	67.6
Hospitalised	925	205	239	1369	1422 (1412 to 1432)	3.7 (3.0 to 4.4)	79.5	81.9

\*Severity is defined using data from the National Patient Register (NPR), which includes all visits to inpatient or specialised outpatient care (ie, excluding primary care).

†Total observed corresponds to the sum of occupational injuries captured by ISA only, AFA only and the overlap. The final sample for analysis of 83 327 occupational injuries corresponds to 78 743 individuals.

‡Total estimated is the sum of the injuries observed plus those not captured by any of the sources.

§Without any date of admission in the NPR.

AFA, AFA Insurance; ISA, the Information System on occupational injuries.

**Table 3** Capture–recapture estimates of under-reporting non-fatal occupational injuries by organisational factors in Sweden, 2013\*

Variables	% Under-reported (95% CI)	%captured by ISA	%captured by AFA
Proportion of women at the organisation			
Male-dominated (female <40%)	13.2 (12.8 to 13.5)	73.2	50.9
Gender-integrated (female 40%–60%)	9.6 (9.1 to 10.1)	79.4	53.4
Female-dominated (female >60%)	19.2 (18.8 to 19.7)	70.6	34.6
Proportion of young workers at the organisation (<30 years old)			
≤10%	14.4 (13.7 to 15.2)	74.5	43.3
>10 to <30%	14.9 (14.6 to 15.2)	74.2	42.3
≥30%	18.2 (17.4 to 18.9)	66.2	46.3
Proportion of immigrant workers at the organisation			
<10%	12.5 (12.1 to 12.8)	75.0	50.3
10–20	17.6 (17.1 to 18.1)	71.5	38.3
>20%	18.0 (17.4 to 18.7)	71.1	37.5
Proportion of highly educated workers at the organisation (higher level education (>13 years)			
<20%	15.1 (14.5 to 15.6)	69.2	51.2
≥20%–40%	13.6 (13.1 to 14.1)	74.6	46.3
≥40%–60%	16.7 (16.2 to 17.2)	72.9	38.4
≥60%	14.2 (13.5 to 15.0)	77.3	37.4
Ownership sector			
Public	14.4 (14.1 to 14.8)	75.9	40.1
Private	16.0 (15.6 to 16.4)	70.1	46.6
Employer size †			
Medium to small (50–99)	18.0 (16.9 to 19.1)	64.2	49.7
Medium to large (100–249)	16.9 (15.9 to 17.8)	67.1	48.8
Large (≥250)	15.1 (14.6 to 15.6)	72.3	45.4
Sector of economic activity			
Agriculture	19.7 (12.0 to 27.4)	58.7	52.4
Other services	19.3 (18.3 to 20.3)	67.1	41.3
Commerce and hospitality	19.1 (18.0 to 20.1)	62.5	49.2
Education	18.4 (17.5 to 19.3)	67.4	43.3
Health	18.4 (17.8 to 18.9)	73.8	29.8
Construction	14.3 (13.3 to 15.3)	66.9	56.8
Financial services	13.1 (11.2 to 15.1)	71.4	54.2
Transport	12.3 (11.4 to 13.1)	73.6	53.5
Industry	11.1 (10.6 to 11.6)	77.9	49.8
Public administration	6.5 (5.9 to 7.0)	85.6	55.3
Missing	–	–	–

\*Including working population in the entire public sector and medium and large companies in the private sector (≥50 employees).

†Employer size available only for private companies.

AFA, AFA Insurance; ISA, the Information System on occupational injuries.

investigated in combination with organisational factors as presented here. Our nuanced findings of under-reporting across economic sectors by levels of severity could be used to inform future research and provide better guidance for appropriate targeting of inspections and prevention programmes.

Our study also adds to understanding the importance of workforce gender structure and injury reporting by showing the lowest under-reporting among gender-integrated organisations and the highest among female-dominated organisations. This finding appears to align with the recent Swedish report on the overall importance of gender segregation across economic sectors.<sup>31</sup> It also suggests that assumptions of male-dominated occupations being ‘high-risk’ occupations may actually be due in part to under-reporting of OIs in female-dominated occupations. Authorities should consider these findings when targeting injury prevention.

Finally, we found higher under-reporting among organisations with a high proportion of immigrants. Dong *et al* found that

under-reporting of OIs was higher among Hispanic workers compared with white workers in the USA.<sup>32</sup> Their findings were limited to small establishments (1–10 employees) in the construction sector. While Hispanic workers are not all immigrants, this study finds specific evidence of under-reporting among organisations with a higher proportion of immigrants across all sectors of economic activity.

Studies conducted in neighbouring countries have shown that under-reporting of OIs may be higher than that reported for ISA in the present study. A Norwegian study using capture–recapture methods indicated an undercount of reported amputations, ranging from 16% to 58% during a 10-year study period.<sup>6</sup> Capture–recapture methodology has been used in other jurisdictions, such as in the USA<sup>12 17–19</sup> and The Netherlands,<sup>10</sup> with a wide range of estimates for under-reporting of OIs. Other methods were used in Denmark, where only 24%–44% of the OIs in hospital records were found in the Danish equivalent of ISA<sup>7</sup> and in Norway, where only 9%–13% of OIs registered by

**Table 4** Capture–recapture estimates of under-reporting non-fatal occupational injuries in Sweden, stratified by severity levels, 2013\*

	No healthcare contact	Only outpatient	Hospitalised
	% under-reported (95% CI)	% under-reported (95% CI)	% under-reported (95% CI)
Total	17.1 (16.7 to 17.4)	8.3 (7.9 to 8.7)	3.7 (3.0 to 4.4)
Proportion of women at the organisation			
Male-dominated (female <40%)	15.4 (15.0 to 15.9)	7.6 (7.1 to 8.1)	2.3 (1.9 to 3.3)
Gender-integrated (female 40%–60%)	10.3 (9.7 to 10.9)	6.0 (5.2 to 6.9)	6.5 (3.6 to 9.4)
Female-dominated (female >60%)	20.3 (19.8 to 20.8)	10.5 (9.8 to 11.3)	5.3 (3.7 to 6.9)
Proportion of young workers at the organisation (<30 years old)			
≤10%	16.2 (15.2 to 17.2)	7.9 (6.8 to 9.0)	3.7 (2.0 to 5.5)
>10 to <30%	16.4 (16.0 to 16.7)	7.8 (7.4 to 8.3)	3.1 (2.3 to 3.8)
≥30%	20.8 (19.8 to 21.7)	10.6 (9.5 to 11.7)	7.5 (4.6 to 10.4)
Proportion of immigrant workers at the organisation			
<10%	13.7 (13.2 to 14.1)	7.6 (7.0 to 8.1)	3.1 (2.3 to 4.0)
10–20	19.5 (18.9 to 20.1)	8.7 (8.0 to 9.5)	4.2 (2.9 to 5.5)
>20%	20.1 (19.3 to 20.9)	9.3 (8.4 to 10.2)	4.5 (2.8 to 6.2)
Proportion of highly educated workers at the organisation (higher level education >13 years)			
<20%	18.5 (17.8 to 19.2)	8.1 (7.4 to 8.8)	2.3 (1.5 to 3.1)
≥20%–40%	15.0 (14.5 to 15.6)	7.6 (6.8 to 8.3)	3.3 (2.1 to 4.5)
≥40%–60%	17.8 (17.3 to 18.4)	9.0 (8.2 to 9.8)	4.7 (3.2 to 6.1)
≥60%	15.1 (14.3 to 15.9)	8.4 (7.2 to 9.5)	10.1 (5.7 to 14.5)
Ownership sector			
Public	15.3 (14.9 to 15.8)	7.9 (7.3 to 8.6)	4.8 (3.5 to 6.0)
Private	18.8 (18.3 to 19.3)	8.5 (8.0 to 9.0)	3.1 (2.4 to 3.9)
Employer size †			
Medium to small (50–99)	23.2 (21.8 to 24.5)	9.5 (8.2 to 10.9)	4.8 (2.2 to 7.4)
Medium to large (100–249)	20.5 (19.3 to 21.7)	9.9 (8.6 to 11.2)	2.6 (1.3 to 4.0)
Large (≥250)	17.4 (16.8 to 18.0)	7.8 (7.2 to 8.4)	2.9 (2.0 to 3.8)
Economic activity			
Agriculture	22.1 (12.6 to 31.7)	NE	NE
Other services	22.6 (21.3 to 23.9)	10.0 (8.7 to 11.4)	5.7
Commerce and hospitality	21.6 (20.3 to 22.9)	12.3 (10.7 to 14.0)	7.1 (3.4 to 10.9)
Education	20.4 (19.3 to 21.4)	9.3 (7.9 to 10.8)	5.0 (2.4 to 7.7)
Health	18.9 (18.2 to 19.6)	10.8 (9.5 to 12.0)	6.0 (3.1 to 8.8)
Construction	18.7 (17.2 to 20.2)	8.4 (7.2 to 9.7)	2.5 (0.9 to 4.1)
Financial services	14.2 (11.8 to 16.6)	10.7 (7.2 to 14.1)	NE
Transport	13.5 (12.5 to 14.4)	8.1 (6.8 to 9.5)	4.3 (1.8 to 6.8)
Industry	13.0 (12.4 to 13.7)	5.5 (4.9 to 6.1)	1.2 (0.6 to 1.8)
Public administration	6.8 (6.1 to 7.5)	4.3 (3.3 to 5.2)	6.8 (3.3 to 10.4)
Missing	–	–	–

\*Including working population in the entire public sector and medium and large companies in the private sector (≥50 employees).

†Employer size available only for private companies.

NE, no estimation due to low numbers.

one hospital were reported to their equivalent of ISA within 1 year.<sup>8</sup> A 2015 Finnish report, including several countries in the Baltic region, concluded that for Sweden the reporting level was considered to be approximately 30%–50% of true levels,<sup>33</sup> slightly below the estimated 50% in the 1990s.<sup>1</sup> The more recent study, however, provided only rough estimates and was based on extrapolations from experience in ‘benchmark’ countries.

Based on this review, we conclude that our results suggest lower under-reporting to ISA than might be expected from the experience in other countries. The reasons for this are unclear, but differences in severity and nature of injuries covered in these studies, populations under study, healthcare and compensation systems, along with different methods used to estimate under-reporting, preclude precise comparisons across countries. The restriction to private companies having at least 50 employees could be another explanation. Larger workplaces are known to

have better reporting of OIs than smaller companies where there is widespread unawareness that reporting of OIs is mandatory.<sup>9</sup> This is consistent with our analysis of capture rates by employer’s size presented in online supplemental table S5. Interestingly, ISA and AFA have the same percentage captured for microemployers, the group likely to be least well informed about official reporting requirements. Overall, we believe that our study presents a conservative estimate of total under-reporting.

The reasons for under-reporting are not well understood in the Swedish context, but factors such as precarious employment<sup>30–34</sup> or disincentives to reporting that are enhanced in precarious work<sup>14</sup> have been suggested to affect OI reports in other contexts. A Swedish report found that many employees consider it unnecessary to report injuries, as they may assume they are not eligible for financial compensation.<sup>9</sup> Strategies that have been identified to encourage reporting in Sweden include

clear information and clear procedures at the workplace; the work environment management; knowledgeable and well-informed staff and management involvement.<sup>35</sup> The success of such strategies has not been assessed. In a study from the USA, under-reporting was higher in working environments with poorer organisational safety climate or where supervisor safety enforcement was inconsistent.<sup>13</sup>

### Strengths and limitations

Strengths of this study include the use of nationwide register data with thorough coverage of the working population; the ability to link all registers thanks to the unique personal identity number; the existence of two separate reporting systems for OIs and the availability of covariates for adjusted models. Another strength is that ISA and AFA use the exact same case definition for OI, which made combination of data sources feasible.

However, some limitations should be mentioned. Our definition for the overlap of data sources on a  $\pm 7$  days' range might be considered arbitrary. Like previous reports,<sup>11 36</sup> we chose to apply this range to avoid missing OIs due to administrative issues, or differences between date of report and actual date of the event. Even using this definition, OIs not having the exact same date in both sources was less than 5%. Also, reported injuries are not the same as injuries accepted for compensation. However, in our discussions with register holders, the issue of reporting injuries unrelated to work is perceived as negligible. Additionally, differential coverage of AFA insurance across economic sectors is known.<sup>37</sup> It is especially low in hotels and restaurants, which requires the results for economic sectors such as commerce and hospitality to be interpreted with caution. In the agricultural sector, we were unable to compute estimates for all severity levels due to small numbers. However, our overall estimate for this sector is in line with previous studies showing that the magnitude of under-reporting is of importance both in agricultural activities<sup>38</sup> as well as in forestry.<sup>39</sup>

AFA does not include workers who are not covered by collective bargaining agreements, and workers covered by such agreements are more likely to report their injuries. To make sure that our two data sources were comparable (ie, individuals have the same likelihood to be 'captured'), we restricted the analyses to injuries within the public sector (with 100% coverage of collective bargaining), and private companies with  $\geq 50$  employees, which are highly likely to be covered by collective bargaining.<sup>20 37</sup> This means that our analysis did not include self-employed workers.

Methodological issues from the capture–recapture methodology approach may arise from the lack of true independence between data sources.<sup>15</sup> In case of a positive dependence (ie, if an OI is present in one data source it is more likely to be present in the other), then our results would be an underestimation of the true proportion of under-reporting. Source independency is a strong assumption, yet necessary for the employment of this method. Nonetheless, to make the assumption of independence more plausible, we took measures such as the restriction within the private companies as well as examining covariate-adjusted models which confirmed the unadjusted results.

We could not use clinical data as a third source of OI reports, because healthcare providers are not mandated to report known or suspected work-related injuries. We were able to use the NPR to characterise severity for injuries already reported to ISA/AFA.

Our results show the need for further quantitative studies exploring issues such as precarious employment conditions, business performance and sociodemographic characteristics of the workforce. Qualitative studies are also needed in order to

understand economic, social, and cultural barriers to reporting as has been done in other countries.<sup>14 40</sup> Studies in areas of economic activity with low under-reporting (eg, industry) could inform interventions on how to improve reporting in those with high under-reporting such as healthcare where the downward trend of OIs in recent decades is less evident.<sup>3</sup>

### CONCLUSIONS

To conclude, we observed differential under-reporting across several organisational factors, as well as by severity levels. It is important to explore these issues in further detail as they affect surveillance, inspection targeting and research of OIs, and at a minimum, may lead to biased official injury statistics.

**Twitter** Theo Bodin @theobodin

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**Contributors** CO was involved in conducting data analysis, interpreting results, writing the manuscript and addressing editorial changes. TB is the principal investigator of the project and was involved in all aspects, including the conception and design of the study. PF created the statistical model to obtain capture–recapture estimations. All authors were involved in planning the study, interpreting results and reviewing the manuscript. All authors gave final approval of the final version and agreed to be accountable for all aspects of published work.

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**Data availability statement** Data can be obtained through acquisition from Swedish registers. The data collection process is described in the method section of this article. Details from analysis can be obtained from the corresponding author on request.

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### ORCID iD

Cecilia Orellana <http://orcid.org/0000-0002-5109-4698>

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## Supplementary material

<b>Table S1.</b> Sectors of economic activity used in the sixth EWCS*	
Economic Sector*	Corresponding NACE Rev.2 sectors
Agriculture	A. Agriculture, forestry and fishing
Industry	B. Mining and quarrying C. Manufacturing D. Electricity, gas, steam and air conditioning supply E. Water supply; sewerage, waste management and remediation activities
Construction	F. Construction
Commerce and hospitality	G. Wholesale and retail trade; repair of motor vehicles and motorcycles I. Accommodation and food service activities
Transport	H. Transportation and storage
Financial services	K. Financial and insurance activities L. Real estate activities
Public administration	O. Public administration and defence; compulsory social security
Education	P. Education
Health	Q. Human health and social work activities
Other services	J. Information and communication M. Professional, scientific and technical activities N. Administrative and support service activities R. Arts, entertainment and recreation S. Arts, entertainment and recreation T. Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use U. Activities of extraterritorial organizations and bodies.

\* Eurofund (European Foundation for the Improvement of Living and Working Conditions) (2017). Sixth European Working Conditions Survey – Overview report (2017 update). Luxembourg, Publications Office of the European Union.

**Table S2.** Capture-recapture estimates of underreporting non-fatal occupational injuries by injury organizational factors in Sweden, 2013 \*

Variables	Overlap	ISA only	AFA only	Total observed †	Total estimated ‡ (95%CI)	% Underreported (95%CI)	%captured by ISA	%captured by AFA
<i>Proportion of women in organization</i>								
Male dominated (female <40%)	13060	12601	4779	30440	35051 (34872-35230)	13,2 (12,8-13,5)	73,2	50,9
Gender integrated (female 40-60%)	5085	4430	1317	10832	11979 (11902-12057)	9,6 (9,1-10,1)	79,4	53,4
Female dominated (female >60%)	12727	24018	5310	42055	52076 (51703-52449)	19,2 (18,8-19,7)	70,6	34,6
<i>Proportion of young workers at the organization (&lt;30 years old)</i>								
≤10%	3636	4757	1244	9637	11265 (11147-11382)	14,4 (13,7-15,2)	74,5	43,3
>10-<30%	22966	31337	7979	62282	73169 (72850-73488)	14,9 (14,6-15,2)	74,2	42,3
≥30%	4270	4955	2183	11408	13941 (13780-14102)	18,2 (17,4-18,9)	66,2	46,3
<i>Proportion of immigrant workers in organization</i>								
<10%	14506	14356	4846	33708	38504 (38326-38681)	12,5 (12,1-12,8)	75,0	50,3
10-20	10324	16624	4109	31057	37673 (37390-37957)	17,6 (17,1-18,1)	71,5	38,3
>20%	6042	10069	2451	18562	22647 (22431-22862)	18,0 (17,4-18,7)	71,1	37,5
<i>Proportion of highly educated workers at the organization (Higher level education (&gt;13 years))</i>								
<20%	7611	7260	3394	18265	21502 (21344-21661)	15,1 (14,5-15,6)	69,2	51,2
≥20-40%	8730	10128	2973	21831	25280 (25109-25451)	13,6 (13,1-14,1)	74,6	46,3
≥40-60%	9876	15865	3672	29413	35312 (35,75-35549)	16,7 (16,2-17,2)	72,9	38,4
≥60%	4655	7796	1367	13818	16107 (15944-16271)	14,2 (13,5-15,0)	77,3	37,4
<i>Ownership Sector</i>								
Public	14726	16886	6282	45433	53101 (52827-53375)	14,4 (14,1-14,8)	75,9	40,1
Private	16146	24163	5124	37894	45097 (44842-45353)	16,0 (15,6-16,4)	70,1	46,6
<i>Employer size §</i>								
Medium-small (50-99)	2046	2069	1141	5256	6410 (6308-6511)	18,0 (16,9-19,1)	64,2	49,7
Medium-large (100-249)	2693	2830	1321	6844	8232 (8122-8342)	16,9 (15,9-17,8)	67,1	48,8
Large (≥250)	9987	11987	3820	25794	30379 (30185-30573)	15,1 (14,6-15,6)	72,3	45,4
<i>Economic activity</i>								
Agriculture	44	40	31	115	143 (126-161)	19,7 (12,0-27,4)	58,7	52,4
Other services	2608	3710	1277	7595	9412 (9274-9550)	19,3 (18,3-20,3)	67,1	41,3
Commerce and hospitality	2255	2330	1353	5938	7336 (7221-7451)	19,1 (18,0-20,1)	62,5	49,2
Education	3125	4073	1509	8707	10674 (10533-10815)	18,4 (17,5-19,3)	67,4	43,3
Health	6932	16326	2455	25713	31495 (31221-31769)	18,4 (17,8-18,9)	73,8	29,8
Construction	1875	1427	927	4229	4934 (4868-5001)	14,3 (13,3-15,3)	66,9	56,8

Financial services	514	435	206	1155	1329 (1295-1364)	13,1 (11,2-15,1)	71,4	54,2
Transport	2630	2283	942	5855	6673 (6600-6746)	12,3 (11,4-13,1)	73,6	53,5
Industry	7228	7284	2055	16567	18638 (18524-18752)	11,1 (10,6-11,6)	77,9	49,8
Public administration	3478	2807	587	6872	7346 (7299-7392)	6,5 (5,9-7,0)	85,6	55,3
Missing	183	334	64	581	-	-	-	-

\* Including working population in the entire public sector and medium and large companies in the private sector (≥50 employees).  
† Total observed corresponds to the sum of occupational injuries captured by ISA only, AFA only and the overlap.  
‡ Total estimated is the sum of the injuries observed plus those not captured by any of the sources.  
§ Employer size available only for private companies  
ISA= the Information System on occupational injuries. AFA= AFA Insurance.

**Table S3.** Capture-recapture estimates of underreported non-fatal occupational injuries in Sweden, stratified by severity levels, 2013. \*

	No healthcare contact			Only out-patient			Hospitalized		
	Total observed †	Total estimated ‡ (95%CI)	% Underreported (95%CI)	Total observed †	Total estimated ‡ (95%CI)	% Underreported (95%CI)	Total observed †	Total estimated‡ (95%CI)	% Underreported (95%CI)
<b>Total</b>	69663	83991 (83607-84376)	17,1 (16,7-17,4)	12295	13409 (13344-13475)	8,3 (7,9-8,7)	1369	1422 (1412-1432)	3,7 (3,0-4,4)
<i>Proportion of women in organization</i>									
Male dominated (female <40%)	23403	27676 (27487-27864)	15,4 (15,0-15,9)	6264	6778 (6738-6818)	7,6 (7,1-8,1)	773	793 (788-799)	2,3 (1,9-3,3)
Gender integrated (female 40-60%)	8917	9942 (9865-10018)	10,3 (9,7-10,9)	1743	1855 (1837-1873)	6,0 (5,2-6,9)	172	184 (178-190)	6,5 (3,6-9,4)
Female dominated (female >60%)	37343	46866 (46491-47241)	20,3 (19,8-20,8)	4288	4794 (4747-4840)	10,5 (9,8-11,3)	424	448 (440-456)	5,3 (3,7-6,9)
<i>Proportion of young workers at the organization (&lt;30 years old)</i>									
≤10%	7868	9388 (9260-9517)	16,2 (15,2-17,2)	1549	1682 (1661-1704)	7,9 (6,8-9,0)	220	229 (224-233)	3,7 (2,0-5,5)
>10-<30%	52846	63192 (62859-63525)	16,4 (16,0-16,7)	8496	9217 (9167-9268)	7,8 (7,4-8,3)	940	970 (962-977)	3,1 (2,3-3,8)
≥30%	8949	11298 (11126-11470)	20,8 (19,8-21,7)	2250	2516 (2482-2550)	10,6 (9,5-11,7)	209	226 (218-234)	7,5 (4,6-10,4)
<i>Proportion of immigrant workers in organization</i>									
<10%	27538	31902 (31716-32088)	13,7 (13,2-14,1)	5510	5961 (5922-6000)	7,6 (7,0-8,1)	660	681 (675-688)	3,1 (2,3-4,0)
10-20	26481	32907 (32593-33220)	19,5 (18,9-20,1)	4139	4534 (4493-4575)	8,7 (8,0-9,5)	437	456 (450-463)	4,2 (2,9-5,5)
>20%	15644	19575 (19323-19827)	20,1 (19,3-20,9)	2646	2917 (2884-2950)	9,3 (8,4-10,2)	272	285 (279-290)	4,5 (2,8-6,2)
<i>Proportion of highly educated workers at the organization (Higher level education (&gt;13 years)</i>									
<20%	13650	16750 (16570-16931)	18,5 (17,8-19,2)	4113	4476 (4440-4511)	8,1 (7,4-8,8)	502	514 (510-518)	2,3 (1,5-3,1)
≥20-40%	18192	21409 (21242-21577)	15,0 (14,5-15,6)	3275	3543 (3513-3572)	7,6 (6,8-8,3)	364	376 (371-381)	3,3 (2,1-4,5)
≥40-60%	25882	31492 (31237-31748)	17,8 (17,3-18,4)	3177	3492 (3458-3527)	9,0 (8,2-9,8)	354	371 (365-377)	4,7 (3,2-6,1)

≥60%	11939	14061 (13910-14212)	15,1 (14,3-15,9)	1730	1888 (1862-1913)	8,4 (7,2-9,5)	149	166 (157-175)	10,1 (5,7-14,5)
<i>Ownership Sector</i>									
Public	39970	47200 (46893-47507)	15,3 (14,9-15,8)	4933	5359 (5318-5399)	7,9 (7,3-8,6)	530	557 (549-564)	4,8 (3,5-6,0)
Private	29693	36571 (36306-36836)	18,8 (18,3-19,3)	7362	8049 (8000-8098)	8,5 (8,0-9,0)	839	866 (859-873)	3,1 (2,4-3,9)
<i>Employer size §</i>									
Medium-small (50-99)	3725	4849 (4737-4961)	23,2 (21,8-24,5)	1365	1509 (1483-1534)	9,5 (8,2-10,9)	166	174 (169-179)	4,8 (2,2-7,4)
Medium-large (100-249)	5088	6401 (6277-6525)	20,5 (19,3-21,7)	1554	1724 (1697-1752)	9,9 (8,6-11,2)	202	207 (205-210)	2,6 (1,3-4,0)
Large (≥250)	20880	25274 (25062-25486)	17,4 (16,8-18,0)	4443	4819 (4783-4855)	7,8 (7,2-8,4)	471	485 (480-490)	2,9 (2,0-3,8)
<i>Economic activity</i>									
Agriculture	81	104 (87-121)	22,1 (12,6-31,7)	30	NE	NE	4	NE	NE
Other services	6000	7754 (7585-7922)	22,6 (21,3-23,9)	1433	1593 (1566-1620)	10,0 (8,7-11,4)	162	172 (167-177)	5,7
Commerce and hospitality	4552	5805 (681-5930)	21,6 (20,3-22,9)	1269	1448 (1417-1478)	12,3 (10,7-14,0)	117	126 (120-131)	7,1 (3,4-10,9)
Education	7318	9190 (9040-9341)	20,4 (19,3-21,4)	1245	1373 (1349-1397)	9,3 (7,9-10,8)	144	152 (147-156)	5,0 (2,4-7,7)
Health	23712	29243 (28929-29557)	18,9 (18,2-19,6)	1833	2054 (2022-2085)	10,8 (9,5-12,0)	168	179 (173-185)	6,0 (3,1-8,8)
Construction	2836	3489 (3410-3569)	18,7 (17,2-20,2)	1247	1362 (1342-1382)	8,4 (7,2-9,7)	146	150 (147-152)	2,5 (0,9-4,1)
Financial services	902	1051 (1017-1086)	14,2 (11,8-16,6)	222	249 (238-259)	10,7 (7,2-14,1)	31	NE	NE
Transport	4720	5455 (5386-5525)	13,5 (12,5-14,4)	1014	1104 (1086-1121)	8,1 (6,8-9,5)	121	126 (123-130)	4,3 (1,8-6,8)
Industry	13310	15304 (15173-15435)	13,0 (12,4-13,7)	2898	3067 (3046-3089)	5,5 (4,9-6,1)	359	363 (361-365)	1,2 (0,6-1,8)
Public administration	5737	6156 (6109-6203)	6,8 (6,1-7,5)	1028	1074 (1063-1084)	4,3 (3,3-5,2)	107	115 (110-120)	6,8 (3,3-10,4)
Missing	495	-	-	76	-	-	10	-	-
<p>* Including working population in the entire public sector and medium and large companies in the private sector (≥50 employees).  † Total observed corresponds to the sum of occupational injuries captured by ISA only, AFA only and the overlap.  ‡ Total estimated is the sum of the injuries observed plus those not captured by any of the sources.  § Employer size available only for private companies  NE= No estimation due to low numbers.</p>									

<b>Table S4. Adjusted capture-recapture estimates of underreporting non-fatal occupational injuries by economic activity in Sweden, 2013*</b>									
	<b>No healthcare contact</b>			<b>Outpatient</b>			<b>Hospitalized</b>		
	Total observed †	Total estimated ‡	% Underreported	Total observed †	Total estimated ‡	% Underreported	Total observed †	Total estimated ‡	% Underreported
<i>Economic activity</i>									
Agriculture	81	NE	NE	30	NE	NE	4	NE	NE
Other services	6000	7775 (7601-7949)	22,7 (21,4-24,0)	1433	1592 (1565-1619)	10,0 (8,6-11,4)	162	172 (166-178)	5,7 (2,9-8,5)
Commerce and hospitality	4552	5811 (5684-5939)	21,5 (20,2-22,8)	1269	1447 (1417-1478)	12,3 (10,7-13,9)	117	126 (112-140)	7,1 (3,2-11,0)
Education	7318	9185 (9027-9343)	20,3 (19,2-21,3)	1245	1373 (1348-1398)	9,3 (7,8-10,8)	144	152 (147-157)	5,1 (2,3-7,9)
Health	23712	29298 (28984-29613)	19,0 (18,3-19,7)	1833	2053 (2021-2085)	10,6 (9,3-11,9)	168	178 (172-184)	5,6 (2,8-8,4)
Construction	2836	3492 (3409-3575)	18,6 (17,1-20,1)	1247	1362 (1342-1382)	8,4 (7,2-9,7)	146	150 (147-152)	2,5 (0,8-4,0)
Financial services	902	1052 (1016-1089)	14,1 (11,7-16,6)	222	247 (236-257)	9,9 (6,4-13,4)	31	NE	NE
Transport	4720	5475 (5393-5556)	13,6 (12,6-14,6)	1014	1103 (1086-1121)	8,2 (6,8-9,4)	121	126 (122-130)	4,0 (1,5-6,5)
Industry	13310	15354 (15206-15503)	13,2 (12,5-13,9)	2898	3068 (3046-3089)	5,5 (4,9-6,1)	359	363 (361-366)	1,2 (0,6-1,8)
Public administration	5737	6439 (6332-6545)	9,9 (8,9-10,9)	1028	1081 (1065-1098)	4,7 (3,6-5,9)	107	116 (107-125)	7,3 (3,0-11,6)
Missing	495	-	-	76	-	-	10	-	-
<p>* Including all working population in the entire public sector and medium and large companies in the private sector (≥50 employees). Adjusted by proportion of women, proportion of young employees (&lt;30 years old) and proportion of immigrants at the organization level. Estimates for agriculture could not be obtained in adjusted models due to small numbers.</p> <p>† Total observed corresponds to the sum of occupational injuries captured by ISA only, AFA only and the overlap.</p> <p>‡ Total estimated is the sum of the injuries observed plus those not captured by any of the sources. Adjusted by proportion of women, proportion of young workers (&lt;30 years old) and proportion of immigrants in the organization.</p> <p>NE= No estimation due to low numbers.</p>									

<b>Table S5:</b> Distribution of non-fatal occupational injuries by company/organization factors sorted by data source, Sweden, 2013.*					
	<b>Total observed<sup>†</sup></b>	<b>ISA all</b>	<b>Present in ISA</b>	<b>AFA all</b>	<b>Present in AFA</b>
	<b>N (%)</b>	<b>N (%)</b>	<b>%</b>	<b>N (%)</b>	<b>%</b>
<b>TOTAL</b>	99614	83074	83,4	52814	53,0
<i>Proportion of women in organization</i>					
Male dominated (female <40%)	42344	33780	79,8	25813	61,0
Gender neutral (female 40-60%)	12397	10592	85,4	7333	59,2
Female dominated (female >60%)	44873	38702	86,3	19668	43,8
<i>Proportion of young workers at the organization (&lt;30 years old)</i>					
≤10%	13691	11198	81,8	7438	54,3
>10-<30%	68153	58447	85,8	34776	51,0
≥30%	17770	13429	75,6	10600	59,7
<i>Proportion of immigrant workers in organization</i>					
<10%	43623	35607	81,6	25820	59,2
10-20	34118	29134	85,4	16357	47,9
>20%	21873	18333	83,8	10637	48,6
<i>Proportion with higher level education (&gt;13 years) in organization</i>					
<20%	29292	22285	76,1	18452	63,0
≥20-40%	24839	20989	84,5	13556	54,6
≥40-60%	30580	26572	86,9	14217	46,5
≥60%	14903	13228	88,8	6589	44,2
<i>Ownership Sector</i>					
Public ‡	45433	40309	88,7	21270	46,8
Private	54181	42765	78,9	31544	58,2
<i>Employer size §</i>					
Micro (1-9)	5540	3545	64,0	3664	66,1
Small (10-49)	10 747	7608	70,8	6872	63,9
Medium-small (50-99)	5256	4115	78,3	3187	60,6
Medium-large (100-249)	6844	5523	80,7	4014	58,6
Large (≥250)	25794	21974	85,2	13807	43,8
<i>Economic Activity</i>					
Agriculture	735	531	72,2	428	58,2
Industry	19696	16807	85,3	11382	57,8
Construction	8434	6099	72,3	5753	68,2
Commerce and hospitality	8937	6457	72,3	5611	62,8
Transport	7212	5803	80,5	4476	62,1
Financial services	1438	1129	78,5	908	63,1
Public administration	6875	6288	91,5	4068	59,2
Education	9199	7553	82,1	4918	53,5
Health	26368	23780	90,2	9671	36,7
Other services	10061	8058	80,1	5307	52,8
Missing	659	569	86,3	292	44,3
*Includes OI among all public- and private-sector organizations in Sweden for the year 2013. Injuries missing information on ownership sector were early removed (3,8% for the total OI)					
† Total observed corresponds to the sum of occupational injuries captured by ISA only, AFA only and the overlap. A total of 83 074 and 52 814 non-fatal OI were identified in ISA and AFA, respectively. After the merge on +/- 7 days, a dataset with 99 614 distinct OI was created.					
‡ Public-sector is composed of municipal and government administration; municipal- and government-owned companies and organizations; and other public institutions.					
§ Number of employees is provided only for companies in the private sector.					
ISA= the Information System on occupational injuries. AFA= AFA Insurance.					