Safety and health in the steel industry **Data report 2025**

A holistic approach towards safety and health is required to improve performance

worldsteel ASSOCIATION

Contents

For terminology definitions and calculations, please refer to the worldsteel publication 'Safety and health principles and definitions' available at worldsteel.org.

The data in this document is provisional and may be updated or supplemented with additional information.

The World Steel Association (worldsteel) is one of the largest and most dynamic industry associations in the world, with members in every major steel-producing country. worldsteel represents steel producers, national and regional steel industry associations, and steel research institutes. Members represent around 85% of global steel production. | Design: MakeAlias.com

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Foreword

Welcome to the World Steel Association's 2025 safety and health in the steel industry data report. This report is based on data provided by our members and offers crucial insights into our industry's ongoing commitment to the safety and wellbeing of our workforce.

In 2024, worldsteel's members reported 67 fatalities globally, representing a global fatal frequency rate (FFR) of 0.016, the lowest on record. Additionally, our global lost time injury frequency rate (LTIFR) is at 0.70, which is also the lowest on record.

The steel industry is clearly making improvements in safety and health through learning exchanges and technology use. We are committed to achieving the goal of zero harm for employees and contractors.

Although lagging metrics are important, worldsteel consistently advises against using only these metrics as benchmarks. To support this, worldsteel endorses the adoption of evolving approaches in safety and health management used by our leading members. One of our challenges this year will be to revisit our metrics, focusing on the prevention of high-potential incidents and illness.

Our emphasis remains on process safety management (PSM) while addressing contractor vulnerabilities and fall from height incidents, the leading cause of fatalities in recent years.

Promoting holistic wellbeing in the global steel industry is crucial. We must continue striving for excellence in safety and health to ensure a safer, healthier future for everyone.

Andrew Purvis
Director, Sustainable Manufacturing

It is important that we promote a culture of holistic wellbeing for everyone in the global steel industry. Together, let us continue to strive for excellence in safety and health, ensuring a safer, healthier future for all.

worldsteel's position on lagging indicators

The most popular lagging indicators, such as LTIFR or total recordable injury frequency rate (TRIFR), will be kept within the worldsteel reporting framework and as a reference of the industry's general performance.

However, comparisons between organisations or local sites should not be made using LTIFR or TRIFR.

Below are the main reasons:

- These indicators correlate poorly with the severity of accidents and injuries and do not provide a valid or reliable measure of safety and health controls and initiatives.
- A smaller organisation's LTIFR or TRIFR is more significantly affected by a single incident but this doesn't necessarily indicate a more dangerous working environment.
- Although worldsteel has a definition for lost time injury (LTI) and total recordable injury (TRI), companies vary in their definition of what constitutes an LTI and TRI.

These two indicators should not be part of individual, team or organisation objectives, bonuses, or incentives as they can foster a negative attitude towards reporting, limiting the organisational ability to learn and improve.

Potential serious injuries and fatalities (PSIF)

A serious injury is a permanent impairment or life-altering state, or an injury that, if not immediately addressed, will lead to death or permanent or long-term impairment.

A potential serious injury or fatality is a near miss incident that could have resulted in a serious injury or fatality if not for specific barriers or countermeasures or if one factor around the event had been changed.

A precursor of PSIF is a high-risk situation in which control methods are absent, ineffective, or not complied with, and if allowed to continue, would potentially result in a fatality or serious injury.

In 2024, 94% of sites made use of a PSIF framework.

The number of individual sites reporting to worldsteel using the PSIF framework has increased in recent years. The figures below only represent the sites reporting PSIFs and combining contractors and employees.

Figure 1: PSIF triangle 2024 for employees and contractors

Fatalities*	Total 56	PSIF	
Lost time injuries	2,289	539	23.55%
All other injuries**	21,446	326	1.52%
Near misses	183,224	3,253	1.78%
Precursors	3,302,039	182,073	5.51%

* In 2024, there were 67 fatalities reported to worldsteel. In order to preserve the ratios within the PSIF section of this report, fatalities reported by organisations that were not able to provide PSIF information have been excluded from this analysis.

** All other injuries includes restricted work cases (RWC), medically treated injuries (MTI) and minor injuries (MI).

Stated injury statistics in this graphic are derived from companies that report PSIF information to worldsteel.

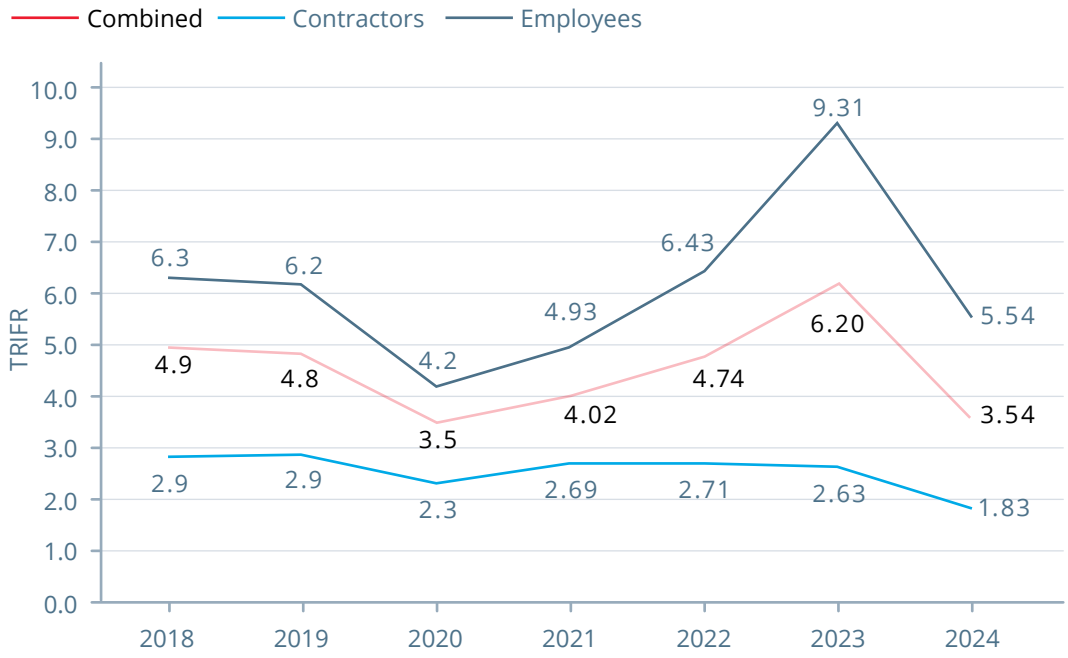
Typically around 20% of incidents have the potential to become serious injuries or fatalities.

To reduce serious harm, steelmakers should focus on better identifying, managing and reporting near misses and injuries with the potential to cause fatalities and serious injuries.

Total recordable injury frequency rate (TRIFR)

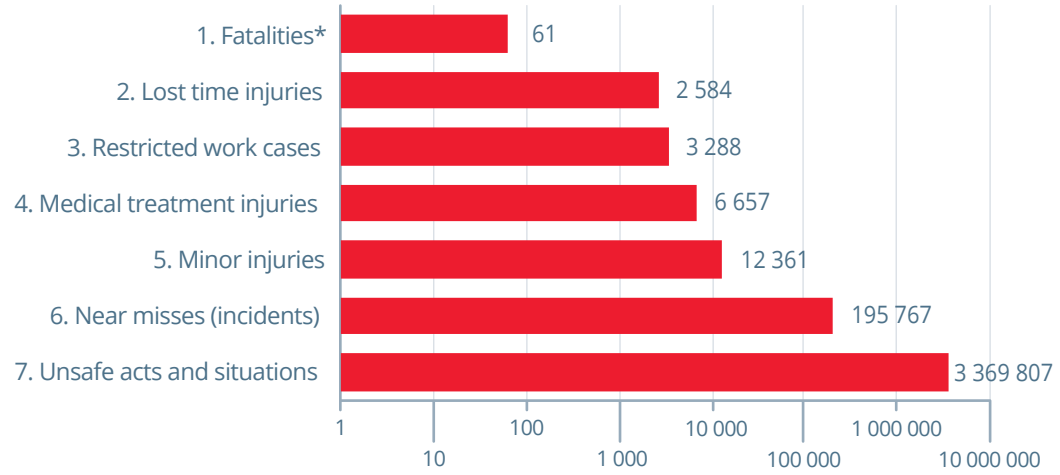
Total recordable incidents comprise fatalities, LTIs, RWCs and MTIs. In the data survey, restricted work cases and MTIs are reported separately. Working hours are counted only on-sites that have reported at least one RWC or MTI.

Figure 2: TRIFR 2018-2024



TRIFR decreased from 6.20 in 2023 to 3.54 in 2024.

Figure 3: Safety pyramid 2024

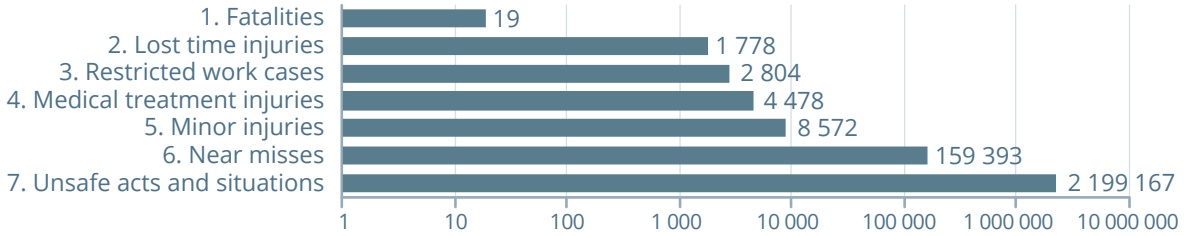


* In 2024, there were 67 fatalities reported to worldsteel. In order to preserve the ratios within the TRIFR section of this report, fatalities reported by organisations that were not able to provide TRIFR information have been excluded from this analysis.

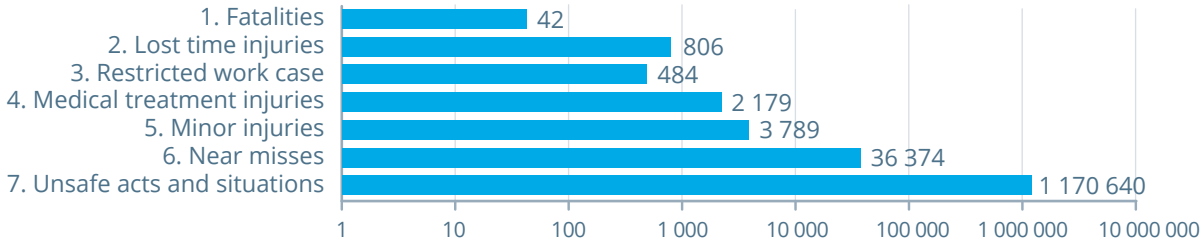
Safety pyramids can be used to compare the shape of a company's incident triangle. In case the company triangle is narrower, it could mean that not all incidents are reported, or that fatality prevention requires more attention. It should be noted that the average incident triangle is not necessarily optimal; it should probably be wider. Reducing the number of more minor incidents does not directly reduce the probability of severe incidents, but having those reported allows action to be taken to mitigate risks that might otherwise cause severe incidents.

Figure 4: Safety pyramids 2024 for employees and contractors

Employees:



Contractors:



More must be done to improve contractor management systems, to improve reporting, and to better manage and reduce the risks contractors face. This is especially true of PSIF events (see page 4).

Table 1: Ratio LTIs vs fatalities 2005-2024

Cause	LTIs	Fatalities	Ratio LTIs per 1 fatality
Gassing and asphyxiation	283	144	1.97
Explosion	255	98	2.60
Rail	229	78	2.94
Fire	382	83	4.60
Electrical	502	88	5.70
Structural failure	356	58	6.14
Fall from height	2 162	330	6.55
On-site road vehicle	1005	136	7.39
Overhead crane	1 053	107	9.84
Forklift	356	35	10.17
Moving machinery	3 349	316	10.60
Hot metal	833	69	12.07
Falling object	2 252	178	12.65
Other mobile equipment	885	56	15.80
Hot substances	670	28	23.93
Off-site road vehicle	350	14	25.00
Product loading	693	18	38.50
Product handling storage	2210	38	58.16
Exposure to chemicals	219	3	73.00
Manual tasks tools	3 655	10	365.50
Slip, trip and fall	4 495	6	749.17

The ratio between LTIs and fatalities provides important insight into workplace safety. A small ratio suggests fewer LTIs per fatality, and while less common these type of incidents represent a higher risk of fatalities.

Many process safety issues fall into this category. It is therefore particularly important to conduct thorough incident investigations and implement preventive measures for incidents with low ratios.

The table shows the ratio between lost time injuries and fatalities by causes. Low ratios mean that per fatality, there are, on average, only a small amount of lost time injuries; a high ratio indicates there are many lost time injuries per fatality. If these were drawn as an incident triangle for each cause, the triangles for the low ratios would be very narrow.

These ratios show that to prevent fatalities, it is more important to undertake comprehensive and robust incident investigations and instigate preventive measures for those incidents with a low ratio. It is precisely these incidents that are most likely to lead to fatalities without effective prevention. These ratios also emphasise the usefulness of categorising potential serious injuries and fatalities among other incidents.

Lost time injury (LTI) analysis

Any work-related injury resulting in the employee or contractor being unable to return to work for their next scheduled work period. Returning to work with work restrictions does not constitute an LTI, no matter how minimal or severe the restrictions, provided it is at the employee's next scheduled shift. However, if an injury deteriorates and time is later lost, a LTI should be recorded. The LTIFR is calculated by combining fatalities and LTIs.

Figure 5: Number of LTIs 2015-2024

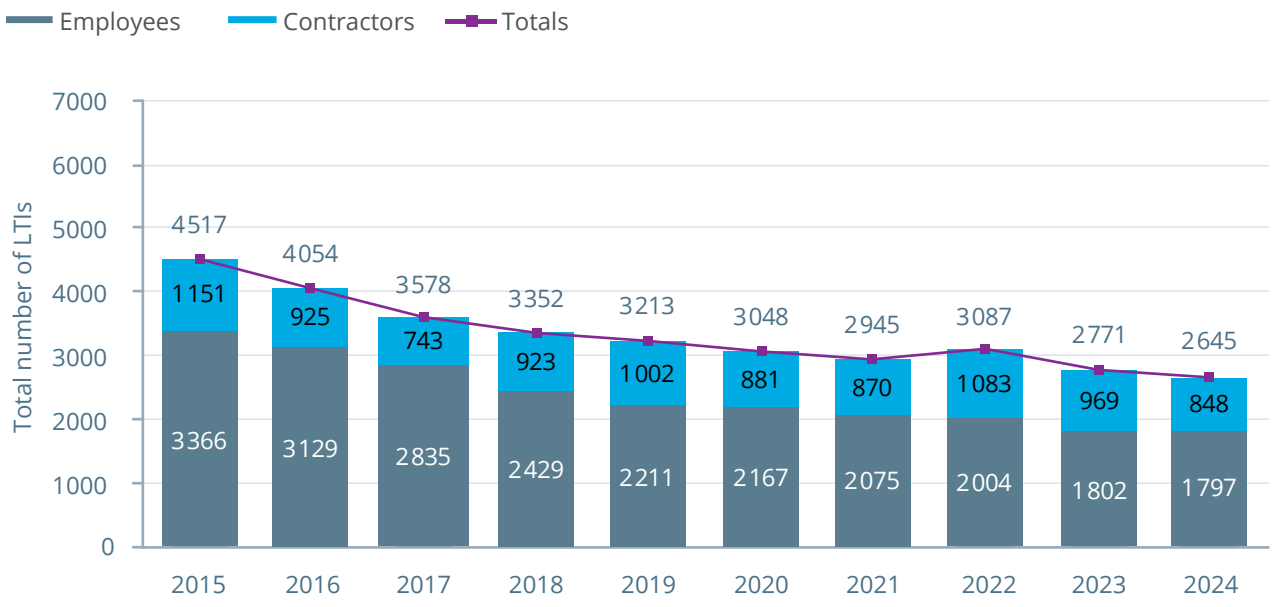
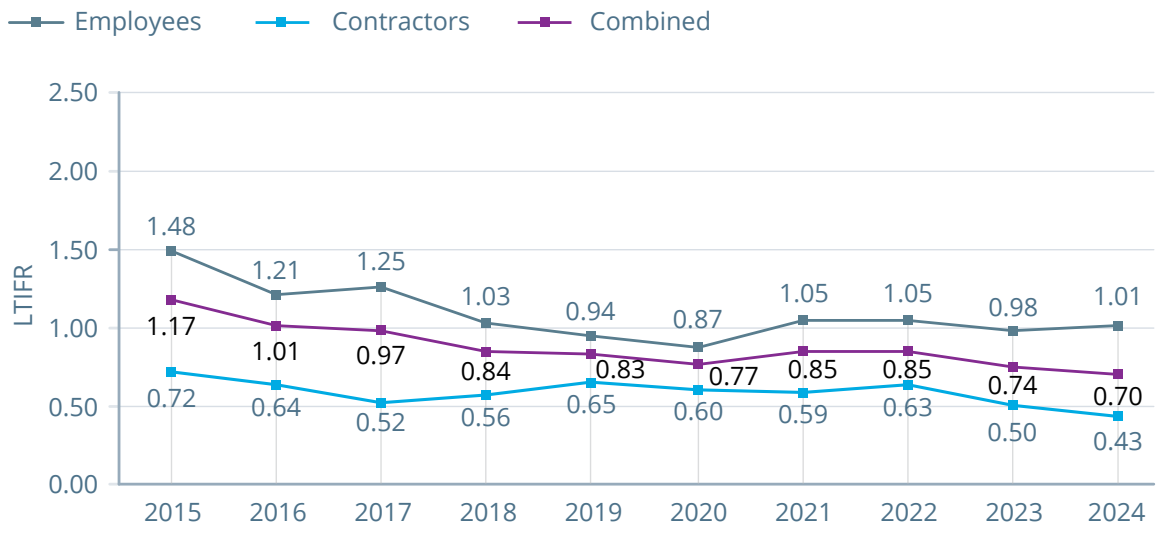


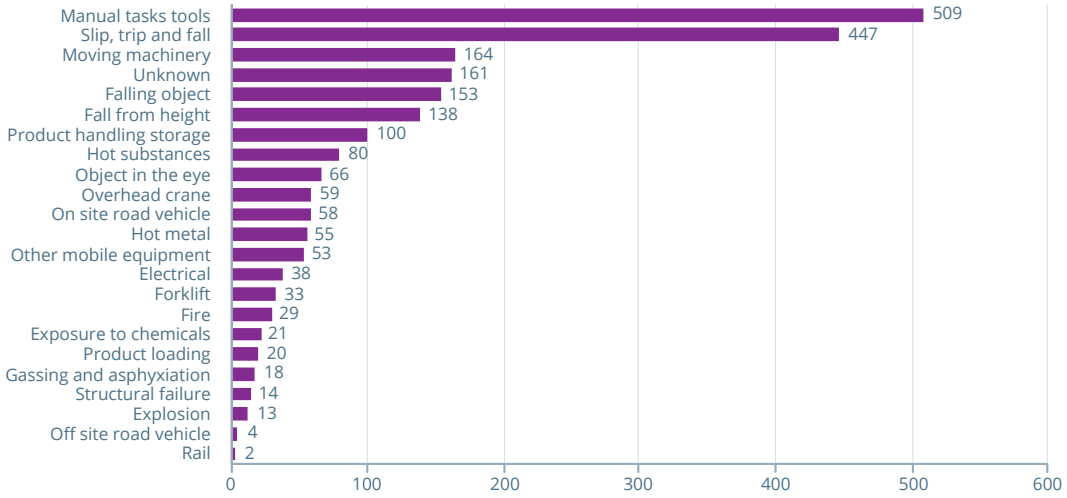
Figure 6: LTIFR 2015-2024



The LTIFR decreased from 0.74 in 2023 to 0.70 in 2024.

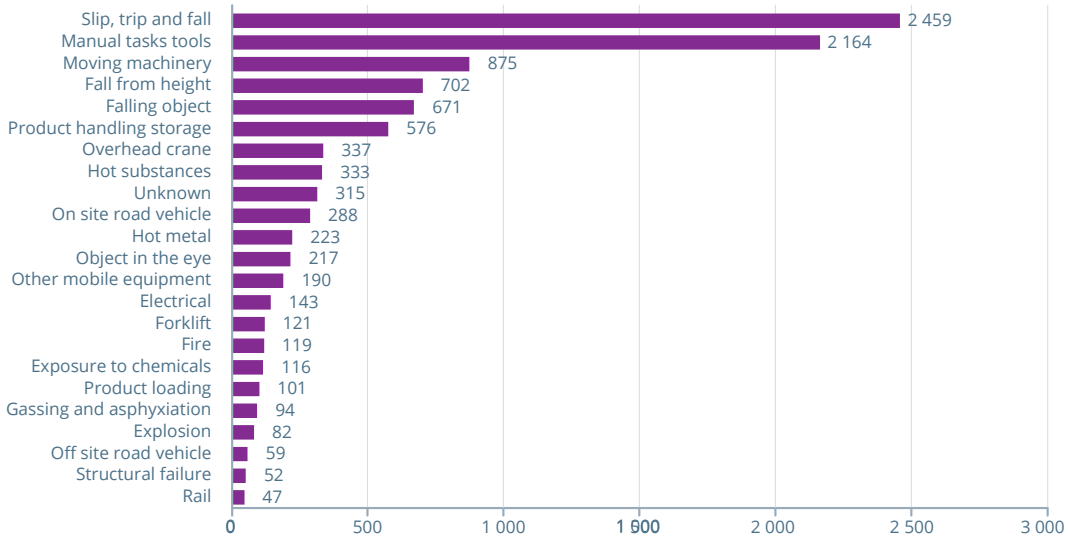
Figure 7: Causes of LTIs 2015-2024 for employees and contractors combined

Causes of LTIs 2024

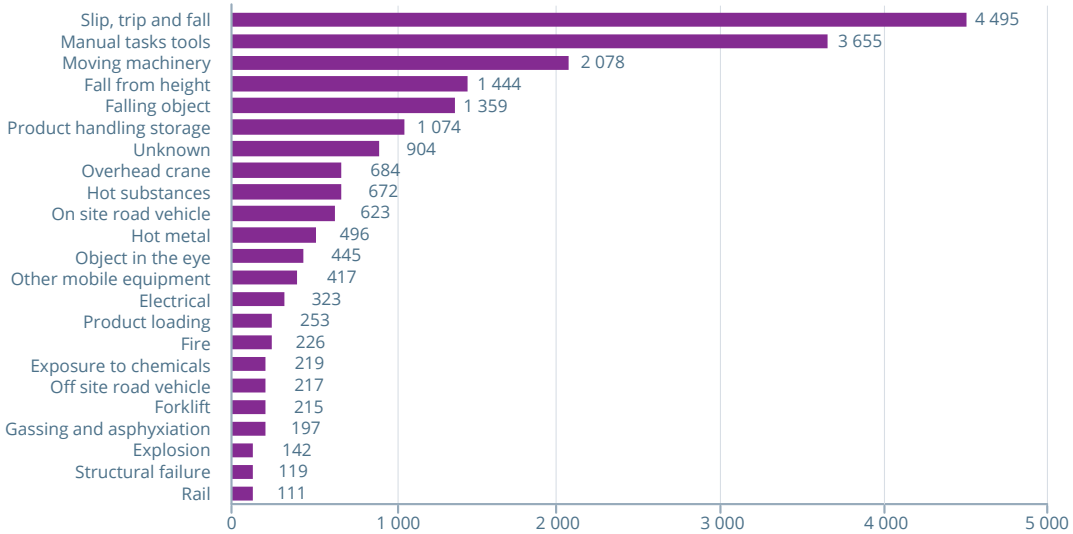


The top five causes of LTIs in 2024 for employees and contractors combined were: use of manual tools, slipping, moving machinery, falling objects and falling from height.

Causes of LTIs last 5 years (2020-2024)



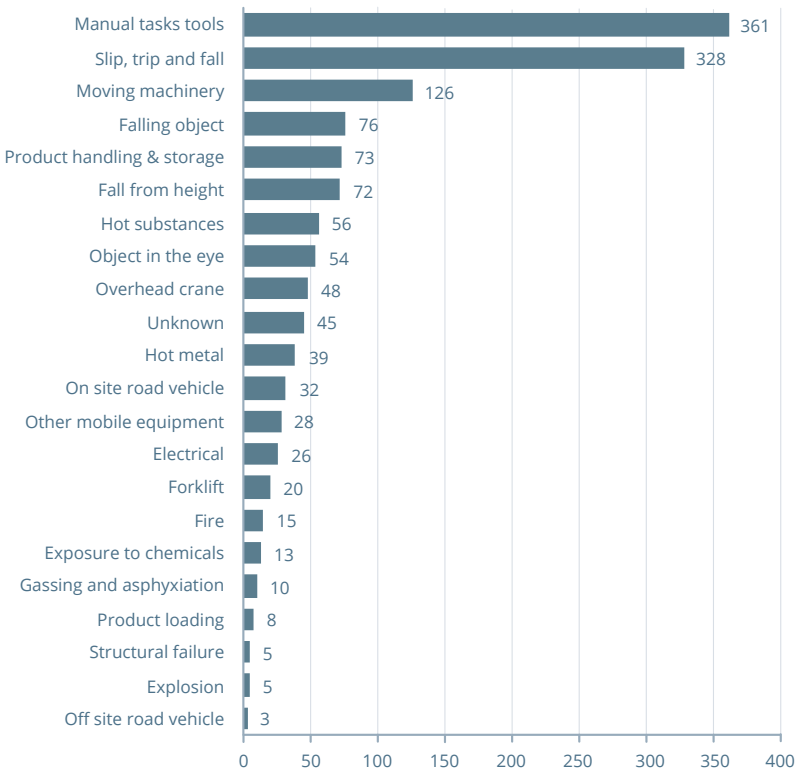
Causes of LTIs last 10 years (2015-2024)



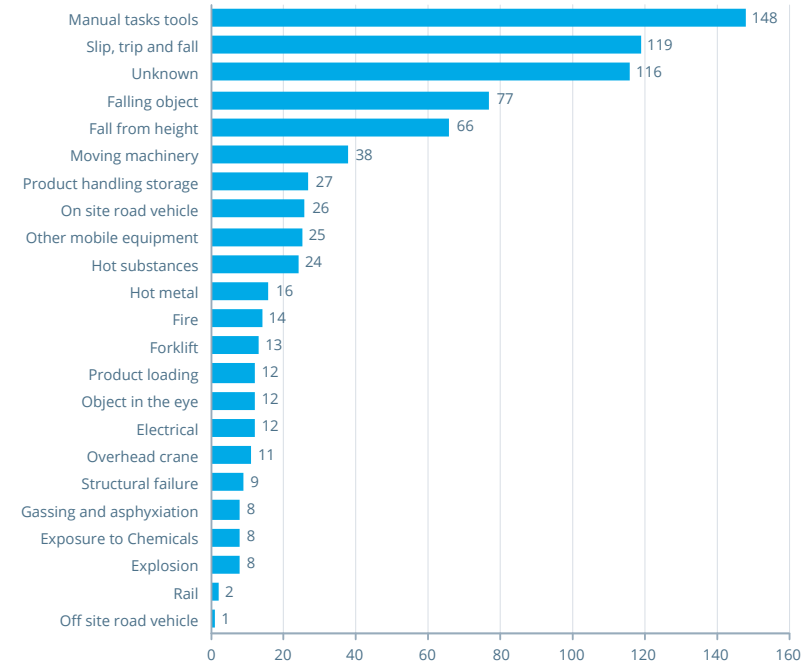
The following graphs show the distribution of causes separated by employees and contractors.

Figure 8: Causes of LTIs in 2024 for employees and contractors

Causes of LTIs - employees 2024



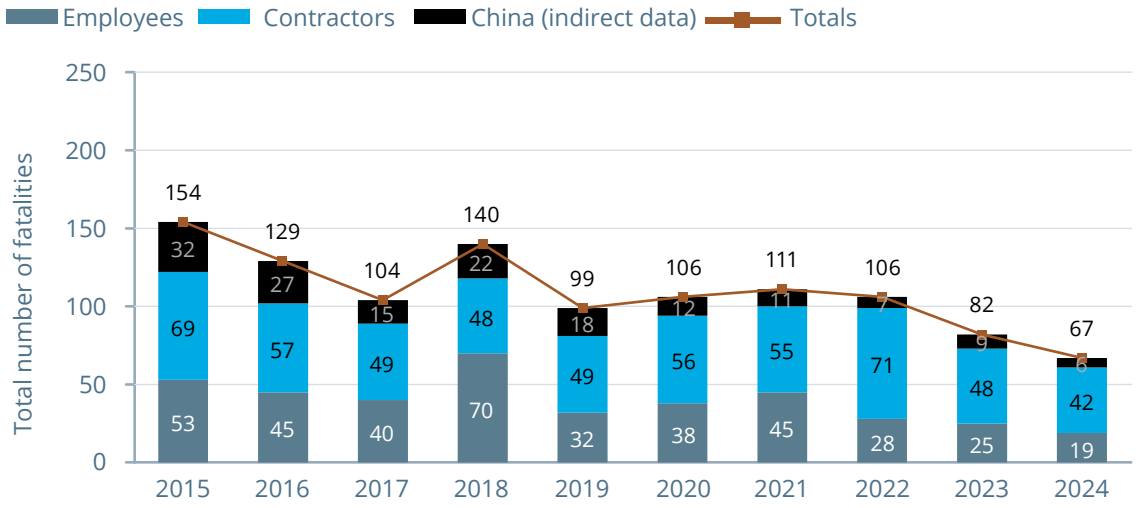
Causes of LTIs - contractors 2024



Fatality analysis

Death from a work-related injury, certified by a medical professional. The fatality frequency rate (FFR) is calculated as the number of fatalities per million hours worked.

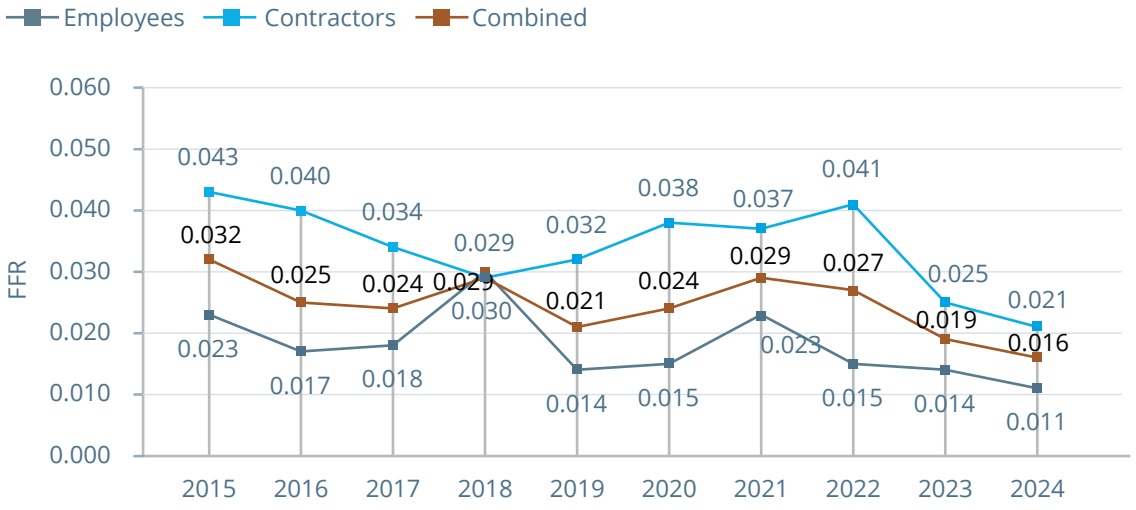
Figure 9: Number of fatalities 2015-2024



** Data received from China via Sinosteel Wuhan Safety & Environmental Protection Research Institute (SEPRI) does not distinguish between employees and contractors. Data received directly from Chinese worldsteel members does and is included in the analysis.*

The total number of fatalities reported to worldsteel during 2024 was 67, which represents a decrease of 18% compared to 82 in 2023.

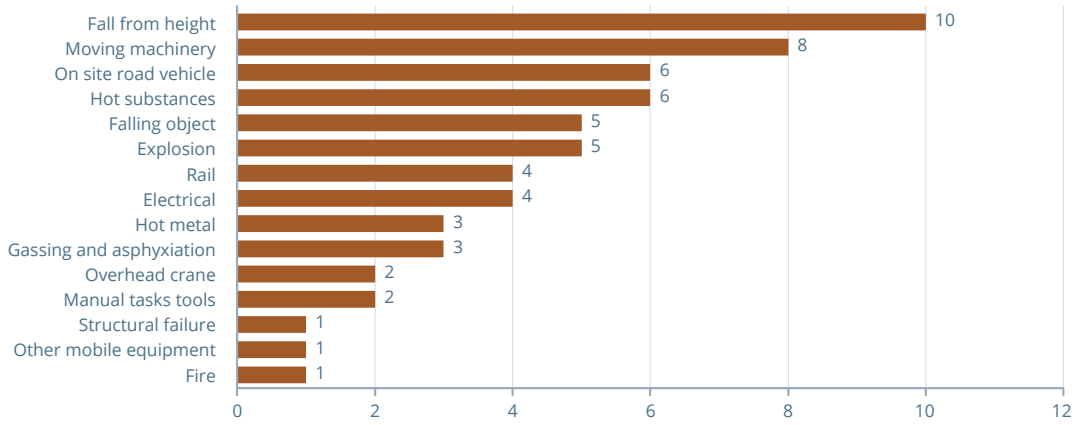
Figure 10: Fatality frequency rate 2015-2024



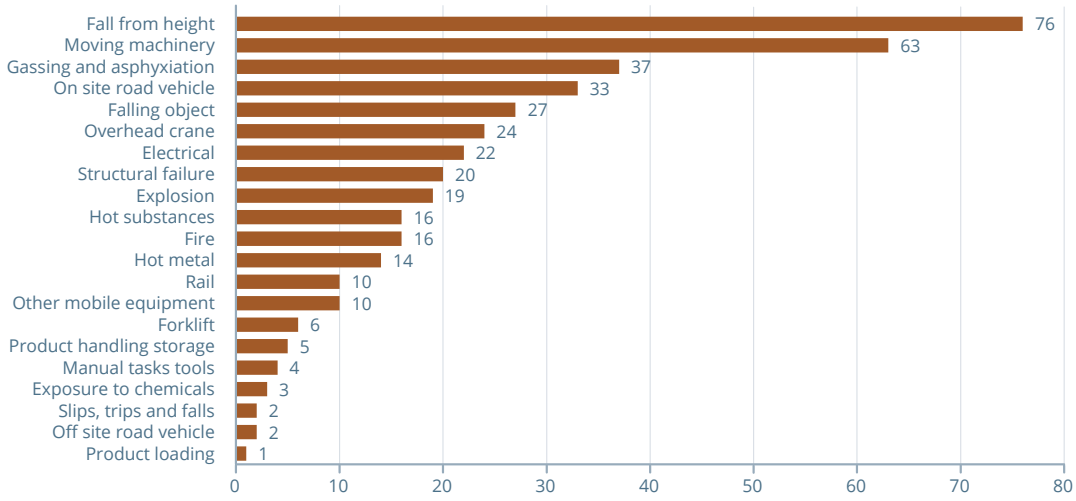
The fatality frequency rate decreased from 0.019 in 2023 to 0.016 in 2024.

Figure 11: Causes of fatalities 2015-2024

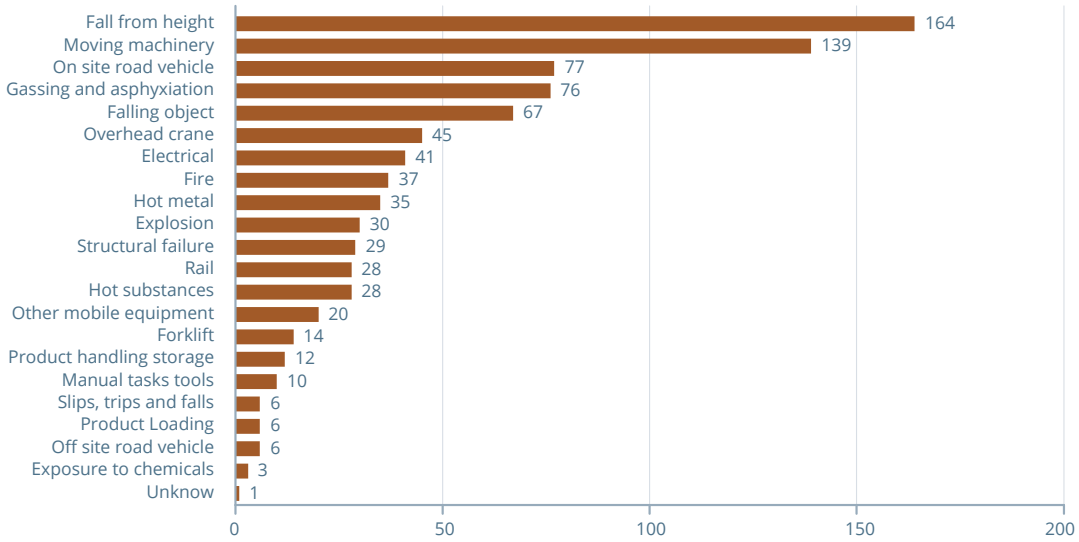
Causes of fatalities 2024



Causes of fatalities last 5 years (2020-2024)



Causes of fatalities last 10 years (2015-2024)



The top 5 causes of fatalities over the past decade were falling from height, moving machinery, on-site road vehicles, gassing and asphyxiation, and falling objects. These are consistent over time.

The following graphs show the distribution of causes split by employees and contractors.

Figure 12: Causes of employee fatalities 2024

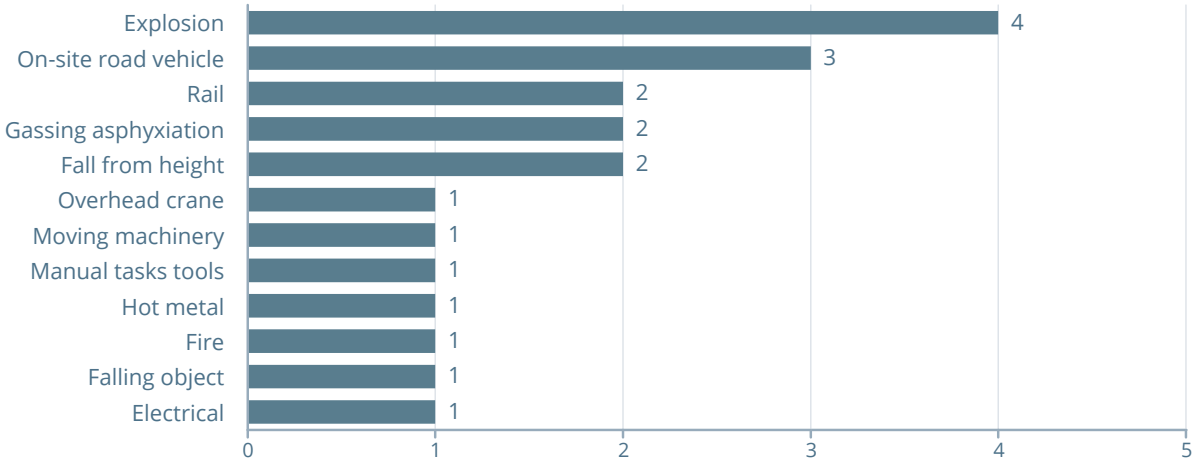
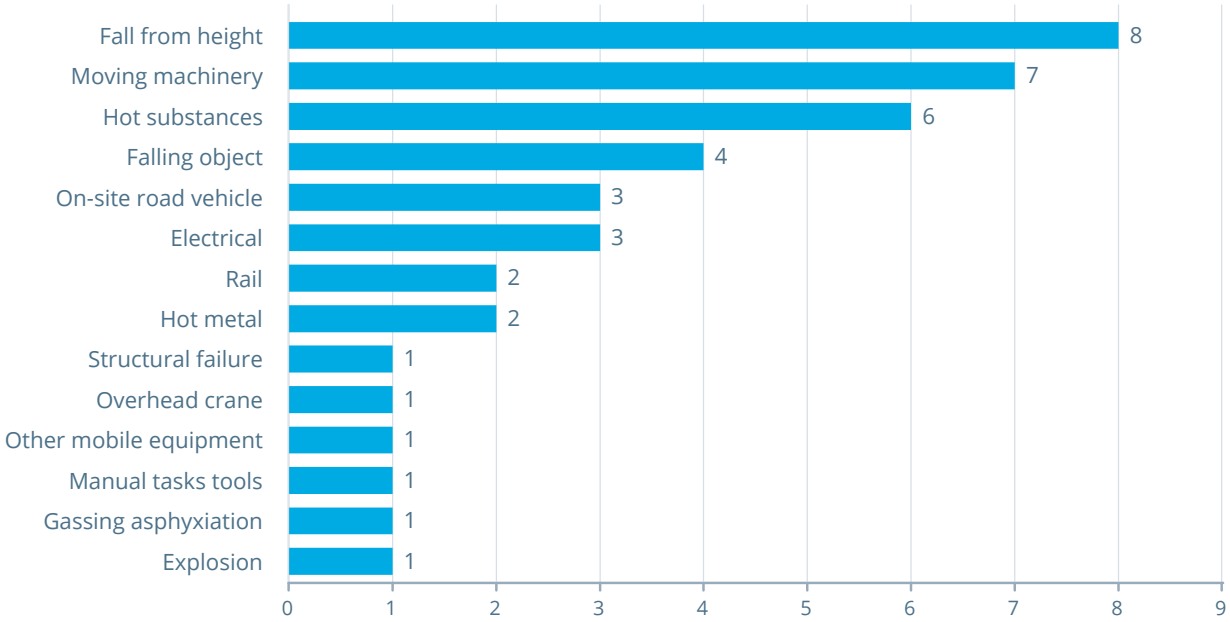


Figure 13: Causes of contractor fatalities 2024



Note: Events registered as 'other' or 'Unknown' are not included.

Contractors remain a vulnerable community within the global steel industry. Causes of fatalities for contractors and employees are different, reflecting the different activities and risks faced by each group.

Process safety management (PSM) analysis

Process safety management (PSM) is a blend of operational, engineering and management skills focused on preventing catastrophic accidents and near misses, particularly explosions, fires, structural collapse, and damaging releases associated with a loss of containment of energy or dangerous substances such as molten metals, fuels, and chemicals.

The manufacturing of steel involves processes with intrinsic hazards that need careful management. The measures required to control these hazards are often complex. The focus of process safety management is not limited to protecting the people within the company but also includes the environment, assets, and the surrounding community.

Figure 13: Process safety management maturity assessment results 2024

The process safety management maturity analysis was derived from data provided by 36 organisations, representing 35.6% of worldsteel members.

Increasing maturity in process safety management can be observed. The industry has grown in experience and expertise in process safety management.

However, there are some important areas of improvement for elements 03 (stakeholders), 15 (measurement and metrics), and 16 (auditing). Process Safety KPIs are different from Occupational Safety KPIs. A specific set of indicators and guidance are being developed for process safety.

Table 2: Significant process safety events 2024

	Fires	Explosions	Molten metal and water reactions	Gas and liquid releases
Quantity	491	59	107	1 011

worldsteel's approach to process safety management is built on the American Petroleum Institute Recommended Practice 754, and identifies 17 key PSM elements.

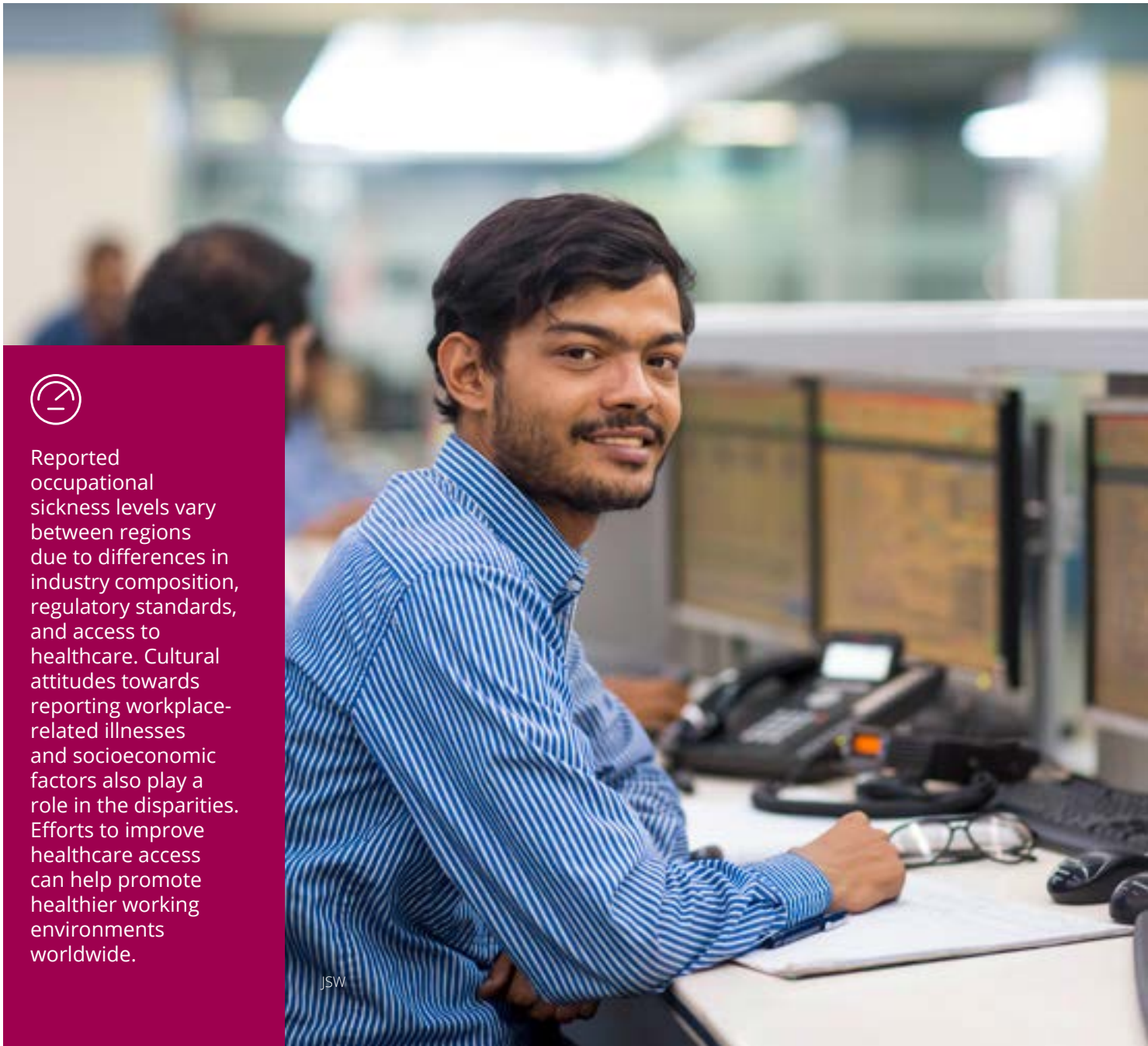
Sickness absence

Sickness absence [percentage] is calculated as the total number of hours of sickness absence per total work hours. This indicator is only calculated for employees.

The following table shows the sickness absence per region.

Table 3: Sickness absence per region 2015 – 2024

% Sickness absence	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa and Middle East (AME)	0.13	0.25	0.23	0.29	1.06	0.18	1.01	1.53	2.8	1.19
Asia/Pacific	0.12	0.08	0.08	0.19	0.15	0.05	0.11	0.69	0.58	0.06
Russia & other CIS + Ukraine	0.75	1.26	1.41	0.6	1.38	1.88	1.73	2.33	2.21	1.66
Europe	1.11	2.02	2.26	1.92	3.32	3.89	4.36	6.38	3.84	3.25
North America	0.14	0.14	0.14	0.23	0.22	0.42	0.14	1.31	1.27	3.5
South America	0.3	0.53	0.48	0.43	0.75	0.46	0.42	3.03	1.59	1.28



Reported occupational sickness levels vary between regions due to differences in industry composition, regulatory standards, and access to healthcare. Cultural attitudes towards reporting workplace-related illnesses and socioeconomic factors also play a role in the disparities. Efforts to improve healthcare access can help promote healthier working environments worldwide.

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