

A Decade of Transformation, Epidemiological Trends, and Implications of Work-Related Injuries in Saudi Arabia, 2016–2026: A Retrospective Ecological Time-Trend Analysis

Review began 09/27/2026

Review ended 10/09/2026

Published 10/19/2026

© Copyright 2026

Alhaqqas. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.118187

Norah H. Alhaqqas ¹

1. Family Medicine, Ministry of Health, Qassim, SAU

Corresponding author: Norah H. Alhaqqas, l7en.algrob@gmail.com

Abstract

Background: Work-related injuries (WRIs) represent a significant public health and economic burden globally and within the Kingdom of Saudi Arabia in particular. The period from 2016 to 2026 constitutes a highly consequential decade in Saudi Arabia's history, encompassing the launch of Saudi Vision 2030, sweeping labor market reforms, the disruption of the COVID-19 pandemic, and a period of accelerated post-pandemic economic recovery and mega-project execution. This study describes national trends in registered WRI counts and rates among General Organization for Social Insurance (GOSI)-insured workers from 2016 to 2025, with Q1 2026 reported descriptively, and examines changes in injury characteristics where data are available.

Methods: A retrospective ecological time-trend analysis was conducted using secondary open data from 86 quarterly and annual reports published by the GOSI. Data were extracted, translated, and harmonized. Descriptive statistics, linear regression, Mann-Kendall trend tests, Spearman correlation, and chi-square tests were employed to identify trends and statistically significant differences across four phases: pre-COVID (2016-2019), COVID-19 lockdown (2020-2021), post-COVID recovery (2022-2023), and the Vision 2030 growth (2024-2026).

Results: A total of 345,792 WRIs were recorded among GOSI insured workers from 2016 through the first quarter of 2026. Annual injuries declined from 50,602 in 2016 to 28,813 in 2020, representing a 43.1% decrease, before reaching a COVID period low of 27,560 in 2021 and subsequently rebounding to 36,981 in 2025, a 34.2% increase from the 2021 low. The injury rate per 1,000 insured workers showed an overall statistically significant declining trend. Linear regression estimated a reduction of 0.281 injuries per 1,000 workers per year, explaining 76.1% of the variance in the annual injury rate ($R^2 = 0.761$; $F(1,8) = 25.54$; $p = 0.001$). This downward trend was also supported by Spearman rank correlation ($\rho = -0.927$, $p < 0.001$) and the Mann-Kendall trend test ($Z = -3.041$, $p = 0.002$). The nationality distribution of injuries shifted significantly between 2016 and the 2024-Q1 2026 period ($\chi^2 = 673.69$, $p < 0.001$), with the Saudi share increasing from 5.1% to 8.9%. The distribution of injury causes also changed significantly between Q1 2024 and Q1 2026 ($\chi^2 = 44.24$, $p < 0.001$).

Conclusion: While Saudi Arabia has achieved a substantial long-term reduction in occupational injury rates, the absolute number of injuries has increased significantly during the current economic acceleration. Continuous monitoring and targeted interventions, particularly for non-Saudi male workers in high-risk sectors, are necessary to sustain the safety improvements achieved before the pandemic.

Categories: Occupational Health, Family/General Practice

Keywords: industrial safety, occupational injuries, occupational safety and health, saudi arabia, vision 2030

Introduction

Occupational health and safety (OHS) is a cornerstone of sustainable economic development and worker well-being. The International Labour Organization (ILO) defines a work-related injury (WRI) as "any personal injury, disease or death resulting from a work-related accident" [1]. Globally, approximately 2.9 million deaths were attributed to work in 2019, comprising 2.58 million deaths due to work-related diseases and 0.32 million related to occupational injuries, a 26% increase from the 2.3 million annual deaths recorded in 2014 [2]. This trajectory reveals the worsening global burden despite advances in workplace safety in developed nations. The ILO further estimates that work-related diseases and injuries are associated with an economic loss equivalent to 5.8% of global gross domestic product (GDP), or approximately \$5.8 trillion annually in direct and indirect costs, including lost workdays, medical expenses, and production delays [2]. Earlier estimates from the ILO placed this figure at approximately 4% of global GDP [3], with subsequent analyses revising it upward as the scope of occupational disease recognition expanded [4]. Hence, OHS should be a national public-health and economic priority.

As demonstrated by the preceding statistics and facts, OHS is a critical concern that extends far beyond the responsibilities of individual workers or single companies. Although employees and employers play an essential role in preventing workplace accidents, injuries, and illnesses, occupational safety must also be addressed at a broader level involving entire industries and governments. Different sectors, particularly construction, logistics, manufacturing, healthcare, and large-scale infrastructure development, face complex safety challenges due to the use of heavy equipment, transport operations, demanding work

How to cite this article

Alhaqqas N H (October 19, 2026) A Decade of Transformation, Epidemiological Trends, and Implications of Work-Related Injuries in Saudi Arabia, 2016–2026: A Retrospective Ecological Time-Trend Analysis. Cureus 18(10): e118187. DOI 10.7759/cureus.118187

schedules, and exposure to hazardous working conditions. Therefore, governments and industry leaders must establish and enforce clear regulations, safety standards, training requirements, and inspection systems to protect workers effectively. By treating OHS as a national and industry-wide priority, rather than only an organizational responsibility, stakeholders can reduce workplace injuries, improve employee well-being, increase productivity, and support sustainable economic development.

The epidemiology of occupational injuries in the Gulf Cooperation Council (GCC) countries, Saudi Arabia in particular, has been the subject of growing academic interest. Prior to the launch of Vision 2030, Abbas et al. [5] conducted a comprehensive review of occupational injuries in Saudi Arabia covering the period from 2004 to 2016. Their analysis revealed a concerning upward trajectory, noting a 300% growth in reported injuries over that 12-year span, peaking at over 50,000 injuries in 2016. They attributed this rise to rapid, under-regulated industrial expansion and a massive influx of migrant labor.

Saudi Arabia has a large migrant workforce, particularly in private sector employment and high-risk industries. At the end of the first quarter of 2022, the General Organization for Social Insurance (GOSI) had registered over nine million insured workers [6]. These workers are concentrated in high-risk industries such as construction, manufacturing, and transportation, sectors that consistently account for the majority of reported occupational injuries [5,7]. GOSI serves as the primary institutional mechanism for recording and compensating WRIs in the Kingdom, publishing annual statistical reports that constitute the most comprehensive national dataset on occupational injuries available.

The decade from 2016 to 2026 is uniquely significant. The launch of Saudi Vision 2030 in 2016 set in motion an ambitious agenda of economic diversification, Saudization of the workforce, and large-scale infrastructural development [8]. Simultaneously, the Kingdom undertook major reforms to its labor laws and OHS regulatory framework, including the introduction of the expatriate levy in July 2017 (a monthly fee of SAR 400 per foreign employee), which significantly reduced the number of foreign workers in the private sector and contributed to a measurable decline in reported injuries [7,9]. The COVID-19 pandemic in 2020 then imposed an unprecedented shock on the labor market, temporarily altering injury patterns through national lockdowns and the suspension of non-essential work [10]. Asiri documented that 2020 recorded the lowest number of work-related deaths in the 2016–2021 period, with a 96% decrease relative to 2016 [7]. The subsequent post-pandemic recovery has been characterized by the rapid resumption of delayed projects and the emergence of entirely new economic sectors, all of which carry their own distinct occupational hazard profiles [11].

The literature currently contains fragmentation and critical gaps. The study by Asiri, which is considered the most comprehensive recent study to date, concluded its analysis in 2021, explicitly noting that their study period ended before the full post-pandemic economic recovery [7]. They called for extended research to determine if the downward trend would continue as economic activity resumed. Furthermore, recent studies on specific sectors, such as the construction industry, suggest that the acceleration of “giga projects” (e.g., NEOM, the Red Sea Project) may be introducing new safety challenges that have not yet been captured in national epidemiological profiles [12].

Understanding the full epidemiological picture of this decade is therefore essential for evaluating the effectiveness of current OHS interventions and informing future policy. Therefore, this study directly addresses these gaps by extending the longitudinal analysis up until the first quarter of 2026, encompassing the post-COVID recovery (2022–2023) and the current period of accelerated economic growth (2024–2026), utilizing the primary source files published by the national registry to eventually help relevant authorities to make informed, data-driven decisions about workforce protection.

The study describes national trends in registered WRI counts and rates among GOSI-insured workers from 2016 to 2025, with Q1 2026 reported descriptively, and examines changes in injury characteristics where data are available.

Materials And Methods

Study design

A retrospective ecological time-trend analytical study design was employed. The study utilized secondary open data extracted directly from 86 original quarterly and annual reports published by the GOSI in Saudi Arabia between 2016 and 2026. GOSI is the mandatory national insurance provider covering all private sector employees and a subset of public sector workers. The dataset represents all formally registered WRIs that resulted in medical treatment, disability, or death among the insured population.

Data extraction and harmonization

Data were extracted for the period from January 1, 2016, to March 31, 2026. The data collection process involved programmatic extraction from multiple Excel (Microsoft Corp., Redmond, WA) file formats across different reporting eras. For the 2016–2023 period, data were extracted from bilingual (English/Arabic) and Arabic-only tabular reports using a custom Python script. For the 2024–2026 Q1 period, GOSI published detailed microdata files containing individual injury records with categorical variables (nationality, gender, age, region, and injury cause), which were processed to aggregate counts across all dimensions.

Data harmonization involved translating Arabic categorical variables into English and standardizing classification schemes across different reporting years. During data validation, some files originally labeled as injury reports were identified as establishment/contributor reports and were excluded.

Statistical analysis

The primary outcome variable was the number of registered WRIs. Index values were calculated using 2016 as the base year (Index = 100). All data were entered and managed in Microsoft Excel (Microsoft Corporation, Redmond, WA) before being imported into SPSS version 29 (IBM Corp., Armonk, NY) for statistical analysis.

The following inferential statistical tests were applied: Ordinary least-squares regression was used to estimate the linear association between calendar year and annual injury rate for 2016–2025; annual injury-count regression was not prespecified. Spearman rank correlation was used to assess the monotonic relationship between year and injury rate, as this method is appropriate given the non-normal distribution of the data. The Mann-Kendall trend test, a non-parametric test, was used to detect statistically significant monotonic trends in the annual injury rate time series (done using Microsoft Excel with XLSTAT add-in features). The chi-square test of independence was used to assess whether the proportional distribution of injuries by nationality and injury cause changed significantly between time periods. The injury-to-worker ratio was calculated by dividing the total number of injuries by the total number of insured workers for a given year and was then computed annually for each demographic group, sector, and occupation. A p-value of less than 0.05 was considered statistically significant for all tests.

Target population

The study population comprised all GOSI-insured workers; the case population comprised registered WRIs among those workers, both Saudi and non-Saudi, who sustained a WRI between January 1, 2016, and March 31, 2026, and whose cases were recorded in the GOSI annual statistical reports.

Inclusion Criteria

All WRI records reported to GOSI between January 1, 2016, and March 31, 2026, pertaining to workers aged 15 years and above, consistent with the ILO definition of working age [1].

Injuries classified under GOSI's occupational injury definition include accidents sustained during work, accidents sustained during commuting to/from the workplace or to a place of prayer or meals, accidents during movements to perform employer-assigned tasks, and occupational diseases specified in the GOSI table of occupational diseases [6].

Exclusion Criteria

Non-insured workers of any kind, injuries that happen outside our time frame (2016–2026), and records with missing key variables were excluded from subgroup analyses (missing sector classification, injury mechanism, or outcome status); no imputation was performed. Injuries not classified as occupational under GOSI's legal definition (injuries occurring entirely outside the scope of employment) were excluded.

Ethical considerations

As this study relied exclusively on secondary, aggregated, and anonymized data from publicly available GOSI statistical reports and government open data portals, it does not involve direct human subjects research. Nevertheless, the following ethical principles were strictly followed throughout the study.

Data Confidentiality

No individual-level identifiable data were sought or used. All analyses were conducted on aggregated, de-identified datasets as published by GOSI and the General Authority for Statistics [13].

Data Integrity

Data were extracted, recorded, and reported accurately and transparently. Any limitations in the source data (including the classification changes and data quality issues) were acknowledged and addressed in the study.

Conflict of Interest

The research did not have any conflicts of interest, and the study was conducted independently of GOSI or any government body whose performance may be evaluated by the findings.

Results

Overall trends in annual injuries and injury rate

Over the study period (2016–2026 Q1), a total of 345,792 WRIs were recorded among GOSI-insured workers. Table 1 presents the complete annual summary of injuries, insured workers, and the derived injury rate per 1,000 workers across the full study period.

Year	Phase	Total Injuries	Insured Workers	Injury Rate (per 1,000)	Index Value (Injuries)	Index Value (Rate)
2016	Pre-COVID	50,602	8,200,000	6.17	100.0	100.0
2017	Pre-COVID	37,109	7,800,000	4.76	73.3	77.1
2018	Pre-COVID	32,557	7,500,000	4.34	64.3	70.3
2019	Pre-COVID	34,406	7,300,000	4.71	68.0	76.3
2020	COVID	28,813	7,100,000	4.06	56.9	65.8
2021	COVID	27,560	7,400,000	3.72	54.5	60.3
2022	Recovery	31,200	8,100,000	3.85	61.7	62.4
2023	Recovery	24,506	9,200,000	2.66	48.4	43.1
2024	Boom	33,170	10,100,000	3.28	65.5	53.2
2025	Boom	36,981	10,800,000	3.42	73.1	55.4

TABLE 1: Annual work-related injuries, insured workers, and injury rate per 1,000 workers in Saudi Arabia (2016-2025)

Index values are relative to 2016 = 100.

2026 Q1 recorded an additional 8,888 injuries.

The annual series shows a marked early decline followed by a recent rebound. Injuries fell by 26.7% between 2016 and 2017, decreased further to 32,557 in 2018, and then increased modestly to 34,406 in 2019. The injury count observed in 2020 was 28,813 injuries, after which the annual total slightly decreased in 2021 (27,560 injuries), increased to 31,200 in 2022, fell to 24,506 in 2023, and then increased sharply to 33,170 in 2024 and 36,981 in 2025. Thus, the 2025 total was 34.2% higher than the 2021 level, although it remained below the 2016 baseline.

In contrast, the insured workforce increased from 8.2 million in 2016 to 10.8 million in 2025, an expansion of 31.7%. The injury rate therefore fell from 6.17 to 3.42 per 1,000 insured workers over the same period. The rate did not decrease in every individual year (for example, it increased modestly between 2023 and 2025), but its overall level in 2025 was substantially lower than in 2016. The index values in Table 1 and Figure 1 illustrate this divergence clearly: by 2025, the injury count index was 73.1, whereas the injury rate index was 55.4. In other words, the recent growth in injury counts occurred in the context of a considerably larger insured workforce.

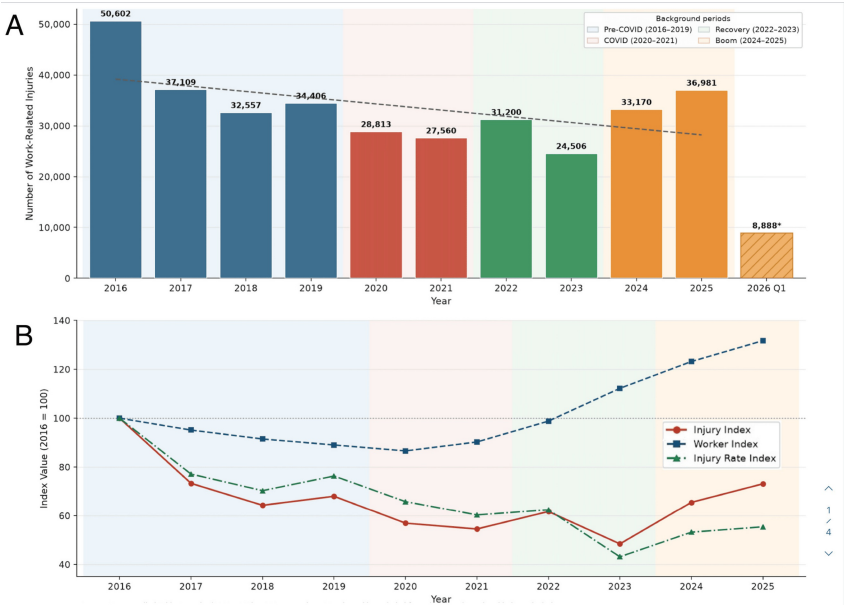


FIGURE 1: Annual work-related injuries with linear trend line and index value analysis

Base year 2016 = 100; 2026 first quarter only.

A: Annual work-related injuries in Saudi Arabia, 2016-2026. B: Index values for injuries, workers, and injury rate (2016 = 100).

The pre-COVID decline period is shown in a light blue background; the COVID-19 lockdown period is shown in a light red background; the post-COVID recovery period is shown in a light green background; and the Vision 2030 boom period is shown in a light yellow background.

Decline in the injury rate (2016-2025)

Although the absolute number of WRIs rebounded during the later years of the study, the injury rate per 1,000 insured workers demonstrated an overall statistically significant downward trend from 2016 to 2025. The decline was not uniform across every consecutive year, as temporary increases occurred during 2018-2019, 2021-2022, and 2023-2025. Nevertheless, the overall pattern indicated a substantial reduction in injury incidence relative to the 2016 baseline. This trend was supported by three complementary statistical tests, each yielding a statistically significant result at $p < 0.0$ (Table 2).

Statistical Test	Test Statistic	Effect Size/Model Statistic	p-value	Significance
Linear regression (slope per year)	$S = -0.281$ per year	$R^2 = 0.761$; $F(1, 8) = 25.54$	$p = 0.001$	***
Mann-Kendall trend test	$Z = -3.041$	Kendall's $\tau = -0.778$	$p = 0.002$	***
Spearman rank correlation (rate vs. year)	$\rho = -0.927$	—	$p < 0.001$	***

TABLE 2: Statistical tests for trend in injury rate per 1,000 workers (2016-2025)

*** denotes a highly statistically significant result, conventionally $p < 0.001$.

The linear regression model estimated a decrease of 0.281 injuries per 1,000 insured workers per year and explained 76.1% of the variation in the annual injury rate ($R^2 = 0.761$). The overall model was statistically significant, $F(1,8) = 25.54$, $p = 0.001$. The Mann-Kendall trend test independently confirmed a significant downward trend ($Z = -3.041$, Kendall's $\tau = -0.778$, $p = 0.002$). Similarly, the Spearman rank correlation demonstrated a very strong inverse monotonic association between calendar year and injury rate ($\rho = -0.927$, $p < 0.001$). Collectively, these findings indicate that the injury rate declined substantially over the 2016-2025 period, despite short-term fluctuations in individual years.

Figure 2 shows that the largest reduction occurred in the early years of the series, when the rate fell from 6.17 in 2016 to 4.34 in 2018. It subsequently remained below 4.0 per 1,000 workers from 2020 onward, reaching its lowest observed full-year value of 2.66 in 2023. Although the rate increased to 3.28 in 2024 and 3.42 in 2025, these values remained markedly lower than those recorded before the pandemic. The agreement among the regression, Mann-Kendall, and Spearman tests indicates that the overall reduction is

statistically reliable despite these short-term fluctuations.

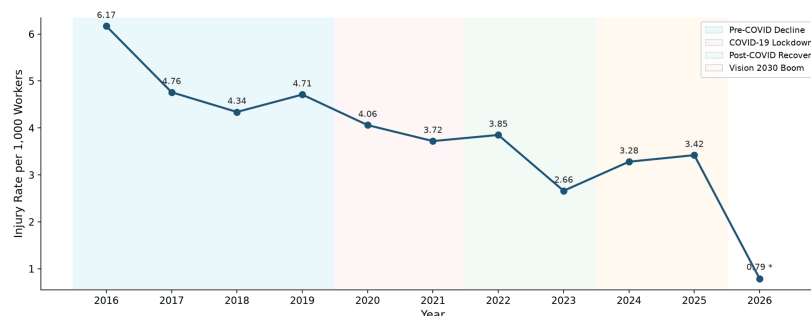


FIGURE 2: Work related injury rate per 1,000 GOSI-insured workers, 2016-2026 Q1

* 2026 first quarter only.

The pre-COVID decline period is shown in a light blue background; the COVID-19 lockdown period is shown in a light red background; the post-COVID recovery period is shown in a light green background; and the Vision 2030 boom period is shown in a light yellow background.

GOSI: General Organization for Social Insurance.

Quarterly variations and the COVID-19 impact

The quarterly time series provides a more detailed view of the annual patterns. Before the pandemic, quarterly injury counts generally declined from the higher values recorded in 2016 toward lower levels in 2018 and 2019. The series then showed pronounced disruption during 2020. The lowest available quarterly values occurred during the lockdown period, with the marked reduction in Q2 2020 visually separating this period from the preceding years.

From 2022 onward, the quarterly pattern became more variable but moved upward overall. Several quarters in 2024 and 2025 exceeded the levels observed during the recovery period; the first quarter of 2026 recorded 8,888 injuries. This Q1 2026 count was 30.4% higher than Q1 2024 (6,817 injuries). The quarterly series therefore complements the annual analysis by showing that the recent rise is not limited to a single annual observation. Because some earlier quarterly injury files were unavailable or mislabeled in the archive, Figure 3 should be interpreted as a descriptive temporal pattern rather than a complete uninterrupted quarterly series.

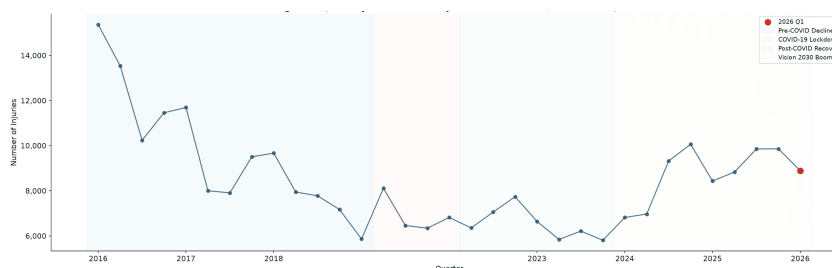


FIGURE 3: Quarterly time series of work-related injuries (2016-2026 Q1)

The pre-COVID decline period is shown in a light blue background; the COVID-19 lockdown period is shown in a light red background; the post-COVID recovery period is shown in a light green background; and the Vision 2030 boom period is shown in a light yellow background.

Nationality distribution (2016 versus 2024-2026 Q1)

The nationality distribution of WRIs changed significantly over the study period. Table 3 presents the observed injury counts by nationality for the 2016 baseline (supported by Asiri et al.'s study [7]) and the 2024-2026 Q1 microdata period, along with the results of the chi-square test of independence.

Nationality Distribution					
Nationality	2016 (n)	2016 (%)	2024–2026 Q1 (n)	2024–2026 Q1 (%)	Change in Share
Saudi	2,573	5.1%	7,086	9.0%	+3.9 pp
Non-Saudi	48,029	94.9%	71,953	91.0%	–3.9 pp
Total	50,602	100.0%	79,039	100.0%	—
Chi-Square Test					
Test	χ^2 Statistic	df	p-value	Significance	
Nationality distribution shift	673.69	1	p < 0.001	***	

TABLE 3: Nationality distribution of work-related injuries: 2016 baseline vs. 2024-2026 Q1

*** denotes a highly statistically significant result, conventionally p < 0.001.

df: Degree of freedom.

The chi-square test of independence confirmed that the nationality distribution differed significantly between the 2016 baseline and the 2024-2026 Q1 period ($\chi^2 = 673.69$, df = 1, p < 0.001). The Saudi share increased by 3.9 percentage points, from 5.1% to 9.0%, while the non-Saudi share declined by the same amount, from 94.9% to 91.0%. In absolute terms, the recent microdata period included 71,953 injured non-Saudi workers and 7,086 injured Saudi workers.

This result describes a significant change in the composition of registered injuries, but it should not be interpreted as a comparison of nationality-specific injury risk because workforce denominators stratified by nationality were not available for the same period. Nevertheless, the data show that non-Saudi workers continued to account for more than nine out of every ten registered injuries. Figure 4 also shows that males accounted for 75,674 injuries (95.7%), compared with 3,365 injuries among females (4.3%).

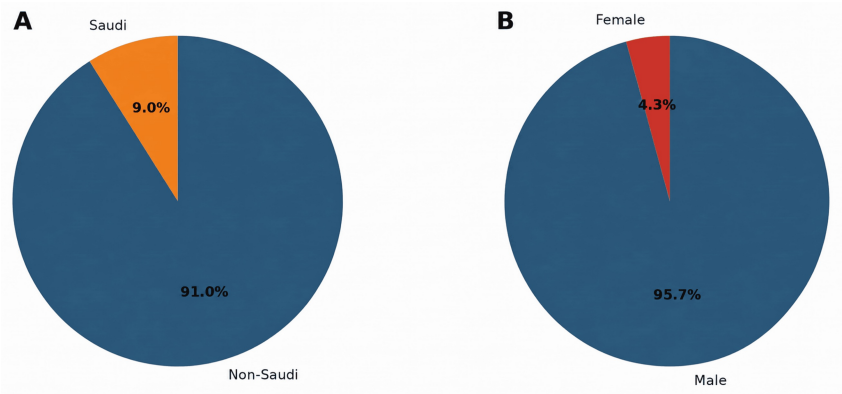


FIGURE 4: Distribution of work-related injuries by nationality and gender (2024–2026 Q1)

A: Injuries by nationality (2024–2026 Q1; n = 79,039). B: Injuries by gender (2024–2026 Q1; n = 79,039).

Regarding age distribution, as shown in Figure 5, injuries were concentrated among younger and middle-aged workers, with the highest frequencies observed in the 25-29, 35-39, and 30-34 age brackets, consistent with the findings of a previous study [7]. The analysis of cases indicates that the registered injury burden was concentrated among workers in the early and middle stages of working life.

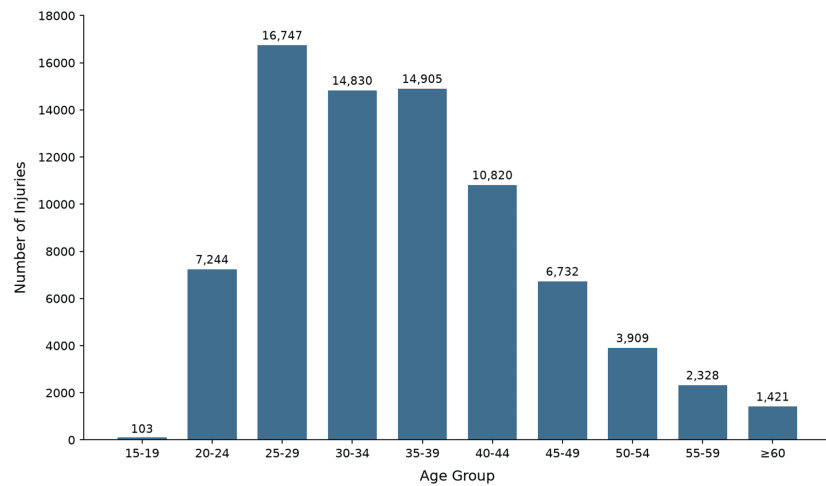


FIGURE 5: Work-related injuries by age group (2024-2026 Q1)

Shift in injury cause distribution (Q1 2024 versus Q1 2026)

The distribution of injury causes changed significantly within the recent economic boom phase itself. Table 4 presents the observed injury counts by cause for Q1 2024 and Q1 2026, along with the chi-square test results.

Injury Cause Distribution					
Injury cause	Q1 2024 (n)	Q1 2024 (%)	Q1 2026 (n)	Q1 2026 (%)	Change in Share
Struck by/against objects	3,620	53.2%	4,408	49.6%	−3.6 pp
Falls	1,920	28.2%	2,730	30.7%	+2.5 pp
Road traffic accidents	820	12.0%	1,272	14.3%	+2.3 pp
Other causes	457	6.7%	478	5.4%	−1.3 pp
Total	6,817	100.0%	8,888	100.0%	—
Chi-Square Test					
Test	χ^2 Statistic	df	p-value	Significance	
Injury cause distribution shift	44.24	3	p < 0.001	***	

TABLE 4: Injury cause distribution: Q1 2024 vs. Q1 2026

*** denotes a highly statistically significant result, conventionally p < 0.001.

The chi-square test confirmed a highly statistically significant change in the distribution of injury mechanisms between Q1 2024 and Q1 2026 ($\chi^2 = 44.24$, df = 3, p < 0.001). The result reflects changes in both the absolute number and relative share of the major injury categories. Struck by/against object injuries increased from 3,620 to 4,408 cases, but their proportional share decreased from 53.2% to 49.6%. Falls increased by 42.2%, from 1,920 to 2,730 cases, and their share increased by 2.5 percentage points. Road traffic accidents showed the largest relative increase in count, rising by 55.1% from 820 to 1,272 cases, with their share increasing from 12.0% to 14.3%.

Accordingly, the significant chi-square result should be understood as a redistribution of injury mechanisms rather than the replacement of one leading cause by another. Struck by/against object events remained the most frequent recorded cause in both quarters, while falls and road traffic injuries became proportionally more prominent. The aggregate 2024-2026 Q1 data in Figure 6 show the same overall hierarchy, with struck by/against events dominating the injury profile, followed by falls and road traffic accidents.

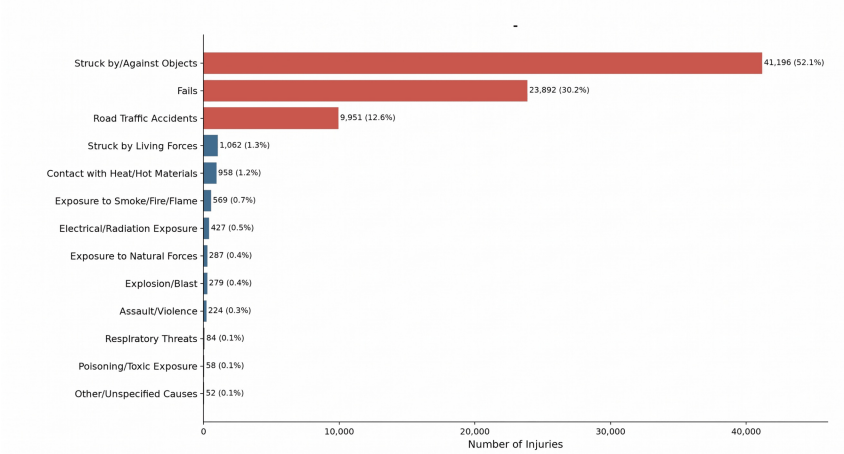


FIGURE 6: Primary causes of work-related injuries (2024-2026 Q1 injury data; n = 79,039)

Treatment outcomes and fatalities

Treatment outcomes in the recent microdata period were dominated by cases classified as “Under Treatment” at the time of reporting, shown in Figure 7. Among cases with a recorded final outcome, recovery without disability was more frequent than recovery with disability or death. This outcome profile should be interpreted as a reporting status snapshot rather than a final measure of injury severity because a large number of cases had not yet reached a documented final outcome. The pattern is consistent with the data completeness issue noted in earlier GOSI analyses, particularly for injury status categories.

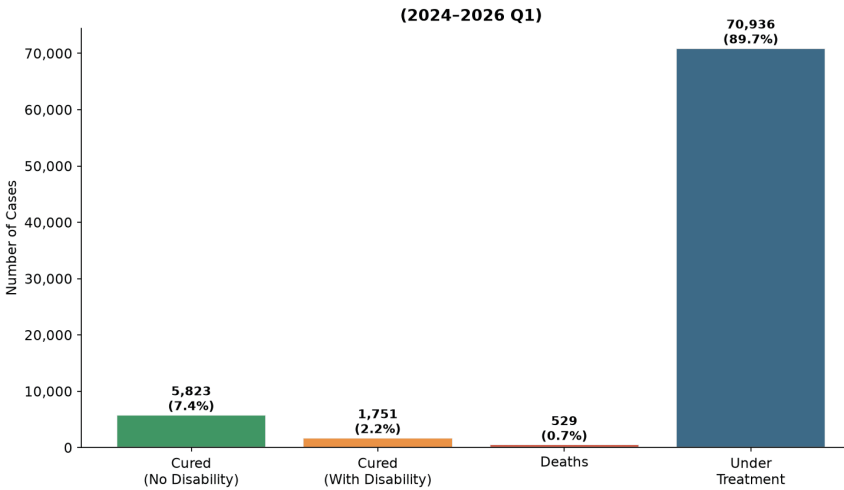


FIGURE 7: Distribution of treatment outcomes for 2024-2026 Q1

(n = 79,039).

Occupational fatalities showed substantial “year-to-year” variation as shown in Figure 8. Recorded deaths declined from 506 in 2016 to 9 in 2020, then increased during the later period to 228 in 2024 and 226 in 2025. The 75 deaths recorded in Q1 2026 should not be interpreted as a full-year total. Despite the visually apparent change across the decade, the linear regression of annual death counts was not statistically significant (slope = −12.54 deaths/year, R2 = 0.086, p = 0.382). This non-significant result indicates that the observed series was highly variable and does not support a simple linear conclusion of either sustained annual decline or sustained annual increase in occupational fatalities.

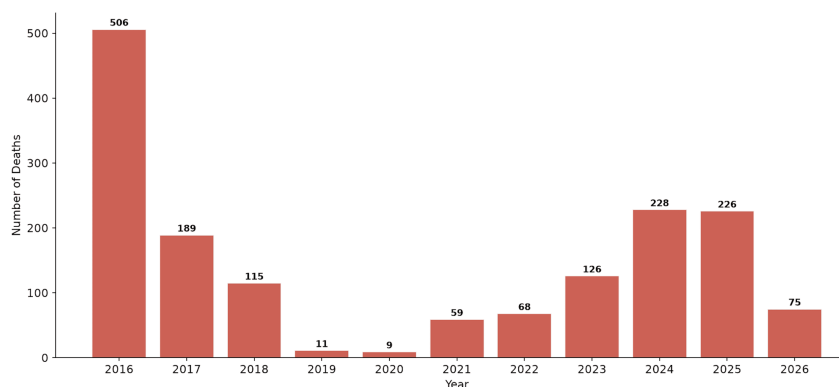


FIGURE 8: Annual occupational deaths from work-related injuries (2016-2026 Q1)

All years with complete quarterly reports from GOSI, except 2019: Q1, Q2 only; 2020: Q1, Q4 only; 2026: Q1 only.

GOSI: General Organization for Social Insurance.

Regional distribution

The geographic distribution of injuries was concentrated in the Kingdom's principal economic centers. Riyadh reported the largest number of injuries ($n = 23,417$), followed by the Eastern Province ($n = 13,301$) and the Makkah/Jeddah "western region" ($n = 11,394$). Together, these three regions accounted for 48,112 injuries or 60.8% of all injuries in the 2024-2026 Q1 microdata period.

Figure 9 shows that the remaining injuries were distributed across the other Saudi regions in smaller counts. The regional pattern is consistent with the concentration of insured employment, construction activity, industrial operations, and transport services in these areas. However, the findings represent injury counts rather than regional injury rates; without denominators for the number of insured workers in each region, the results cannot establish which region has the greatest individual worker risk.

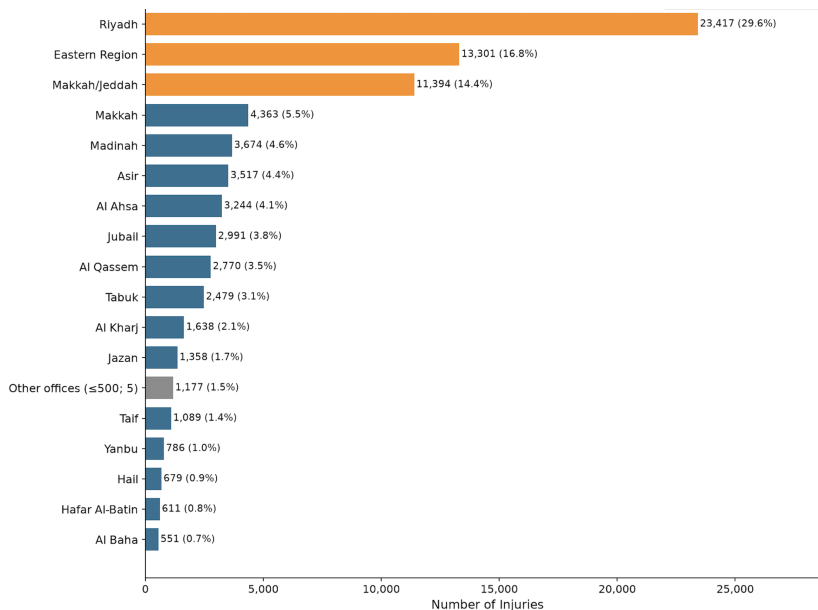


FIGURE 9: Regional distribution of work-related injuries (2024-2026 Q1, $n = 79,039$)

Other offices (≤500; 5) combine Najran, Northern Borders, Al Jouf, Dawadmi, and Bisha.

Discussion

This study provides a longitudinal national descriptive analysis of registered WRI trends using available GOSI data, bridging the critical gap between the pre-pandemic era and the current period of accelerated economic growth under Vision 2030. The analysis is grounded in the direct extraction and verification of 86

open primary source files published by the national registry, extending through the first quarter of 2026.

The findings confirm the significant downward trend in absolute injury numbers between 2016 and 2020 reported by the Asiri et al.'s study [7]. However, our extended analysis reveals a crucial inflection point: injury counts increased from 24,506 in 2023 to 33,170 in 2024 and 36,981 in 2025, following a variable post-pandemic recovery period, increasing by 28.3% between 2020 and 2025. The 8,888 injuries recorded in the first quarter of 2026 indicate that this upward trend is continuing. This rebound directly correlates with the post-pandemic resumption of economic activities and the rapid expansion of construction and infrastructure projects associated with Vision 2030.

The most robust and policy-relevant finding of this study is the statistically significant and sustained decline in the injury rate per 1,000 workers (Spearman $\rho = -0.927$, $p < 0.001$, Mann-Kendall $Z = -3.041$, $p = 0.002$). The linear regression model, which explains 76.1% of the variance in the injury rate, indicates a reduction of approximately 0.28 injuries per 1,000 workers per year. This finding may suggest that the overall occupational safety management framework in Saudi Arabia has genuinely improved over the decade, even as the absolute scale of industrial activity has expanded. However, alternative explanations including changes in reporting, classification, workforce composition, and coverage cannot be excluded. This divergence between rising absolute injuries and falling injury rates is a hallmark of rapidly growing economies where workforce expansion outpaces the growth in injury incidents.

The statistically significant shift in the nationality distribution ($\chi^2 = 673.69$, $p < 0.001$) is a nuanced finding. The increase in the Saudi share of injuries from 5.1% to 9% reflects the success of Saudization policies in integrating more Saudi nationals into the private sector workforce, although changes in occupation, reporting, or employment patterns cannot be excluded. However, non-Saudi workers constituted most registered injury cases, 91% of the injury burden, a disparity that far exceeds their workforce share and points to the continued concentration of migrant labor in the most hazardous occupations. This is consistent with findings across the GCC region [14]. Unfortunately, nationality-specific risk could not be assessed without comparable workforce denominators.

The statistically significant shift in injury causes ($\chi^2 = 44.24$, $p < 0.001$), with falls and road traffic accidents gaining a larger proportional share within the boom phase, has direct implications for prevention. However, longer comparable time series are preferred to assess sustained trends. The relative increase in falls suggests that as construction projects grow taller and more complex, height-related hazards may be intensifying; this warrants further sector-specific investigation, including construction work at height. The increase in road traffic accidents may be related to changing transport patterns and reflects the expansion of logistics, major projects, and delivery sectors under Vision 2030's economic diversification agenda, although this hypothesis also requires sector-specific exposure data. For instance, NEOM, the Red Sea Project, and Qiddiya City are major infrastructural developments that have placed and will continue to place substantial demands on construction and supply chain operations. NEOM is located on the Red Sea coast in northwest Saudi Arabia; the Red Sea destination is on the Kingdom's west coast; Qiddiya City is approximately 45 km from the city center of Riyadh [15-17]. As these geographically dispersed developments require large volumes of materials, equipment, transport vehicles and contractor movements, logistics-related work injury risks may increase during peak construction periods. These risks can be reduced through effective and comprehensive occupational or industrial hazard and safety policies to be implemented after conducting further major sector-specific studies.

Limitations of the study

Reliance on Reported Data

The GOSI registry captures work-related injuries reported among insured workers; therefore, injuries among noninsured workers are outside the scope of these registry-based estimates. A national Saudi analysis using GOSI data likewise noted that non-insured workers were not captured and called for research on injuries among this group [7]. Evidence from a survey of Nepalese migrants with work experience in Saudi Arabia, Qatar, and the United Arab Emirates found that only one third had employer-provided health insurance and that treatment cost, lack of sick leave and fear of job loss impeded access to health care [18]. The magnitude of any under ascertainment cannot be quantified from the available data.

Classification Discontinuity

GOSI changed its classification system for injury causes and economic sectors between 2016-2018 and 2019-2021. However, the study applied an ISIC Rev. 4 (International Standard Industrial Classification of All Economic Activities, Revision 4) crosswalk harmonization approach used by previous studies that covered these periods [7] and the General Authority for Statistics [13]; some residual incomparability across sub-periods and classifications may remain, particularly for the injury cause variable.

Ecological Fallacy

As the study uses aggregated "population-level" data, it is not possible to draw conclusions about "individual-level" causal relationships between specific risk factors and injury outcomes.

Exclusion of Informal Sector Workers

Workers in the informal economy and domestic workers (groups that are among the most vulnerable) are not

covered by GOSI and are therefore entirely absent from this dataset.

Absence of Primary Data

The exclusive reliance on secondary data means that contextual factors such as safety culture, worker awareness, and employer compliance cannot be directly measured. These factors would require primary data collection in future research.

Lack of Denominator Data

The unavailability of stratified data by specific economic sectors prevents the calculation of sector-specific injury rates and, therefore, targeted interventions tailored to specific sectors are unapproachable.

Recommendations

To sustain proper safety gains during the ambitious execution of Vision 2030 projects, the following recommendations are proposed: Maintain national occupational safety targeted surveillance. Sector regulators (Ministry of Human Resources and Social Development (MHRSD), National Council for Occupational Safety and Health (NCOSH), GOSI, etc.) should monitor using both injury counts and denominator-based injury rates, together with fatalities, disabling injuries, inspections, and near-miss reporting. National indicators should be supplemented with sector-specific targets.

Prioritize fall and struck by/against prevention. Because falls increased as a proportion of injuries and struck by/against events remained the leading mechanism, regulators and even employers should strengthen “work at height” controls, machine guarding, equipment maintenance, exclusion zones, and safe traffic separation around mobile plant and suspended loads.

Integrate road safety into occupational safety management. Transport, delivery, logistics, and construction employers should implement journey planning, fatigue management, vehicle maintenance, driver competency checks, and incident review procedures to address the growing share of work-related road traffic injuries.

Strengthen protection for targeted workers (high-risk migrants). Safety induction, task-specific training, and hazard reporting systems should be available in languages understood by the workforce and assessed for comprehension. High-risk jobs should have specific safety training as well.

Improve contractor accountability. Project owners and principal contractors should require subcontractor prequalification, competent supervision, documented risk assessments, incident investigation, and corrective action follow-up, particularly on major infrastructure projects.

Improve GOSI (and other regulators) surveillance data. They should maintain stable definitions and published classification crosswalks, update unresolved “Under Treatment” records, and publish insured worker denominators by sector, occupation, nationality, gender, region, and establishment size. These improvements would allow more accurate calculation of subgroup-specific injury rates.

Support further evaluation and research. Future studies should use individual-level, qualitative, and mixed-method designs to examine underreporting, safety culture, contractor management, and the long-term outcomes of injured workers.

Conclusions

This longitudinal study examined registered WRIs among GOSI-insured workers in Saudi Arabia from 2016 through the first quarter of 2026, extending previous research into the post-pandemic period and the acceleration of Vision 2030 reforms. The findings indicate a clear overall improvement in injury risk per insured worker, although the absolute number of recorded injuries increased again in recent years as the insured workforce expanded and economic activity resumed. This rate count paradox demonstrates that declining injury risk does not eliminate the need for sustained prevention, surveillance, and enforcement.

The study also identified important changes in the composition and causes of injuries between the first quarter of 2024 and the first quarter of 2026, including the predominant contribution of non-Saudi workers and a larger share of injuries associated with falls and road traffic incidents. These findings support strengthened protection for migrant workers, fall prevention programs, machinery safety measures, and occupational road safety interventions. The results should be interpreted in light of the limitations of GOSI registry data, which represent formally reported injuries among insured workers and exclude informal, domestic, undocumented, and unreported cases; comparisons are also affected by classification changes and the partial availability of 2026 data, lack of sector- and nationality-specific denominators, and use of aggregate data. Nevertheless, the study provides a comprehensive account of registered occupational injury trends during a pivotal period of Saudi Arabia’s labor market transformation. In summary, registered injury rates among GOSI insured workers showed that Saudi Arabia has achieved a statistically significant overall decline from 2016 to 2025, but the post-pandemic increase in absolute injuries requires continued regulatory attention. Sustained progress toward Vision 2030 will depend on reducing both the risk of injury and the total burden of injuries, fatalities, and disability across the workforce.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Norah H. Alhaqqas

Acquisition, analysis, or interpretation of data: Norah H. Alhaqqas

Drafting of the manuscript: Norah H. Alhaqqas

Critical review of the manuscript for important intellectual content: Norah H. Alhaqqas

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

- Occupational safety and health statistics (OSH database) . (2026). Accessed: May 3, 2026: <https://ilostat.ilo.org/methods/concepts-and-definitions/description-occupational-safety-and-health-statistics/>.
- Takala J, Hämäläinen P, Sauni R, Nygård CH, Gagliardi D, Neupane S: Global-, regional- and country-level estimates of the work-related burden of diseases and accidents in 2019. *Scand J Work Environ Health*. 2024, 50:73-82. [10.5271/sjweh.4132](https://doi.org/10.5271/sjweh.4132)
- Safety in numbers: pointers for a global safety culture at work . (2003). Accessed: May 3, 2026: <https://www.ilo.org/publications/safety-numbers-pointers-global-safety-culture-work>.
- Takala J, Hämäläinen P, Saarela KL, et al.: Global estimates of the burden of injury and illness at work in 2012. *J Occup Environ Hyg*. 2014, 11:326-37. [10.1080/15459624.2013.863131](https://doi.org/10.1080/15459624.2013.863131)
- Abbas M, Saeed R, Asam ZU: Epidemiology of occupational injuries among insured workers in Saudi Arabia between 2004 and 2016. *Arh Hig Rada Toksikol*. 2021, 72:42-52. [10.2478/aiht-2021-72-3377](https://doi.org/10.2478/aiht-2021-72-3377)
- Statistics & data: annual report . (2022). Accessed: May 10, 2026: <https://www.gosi.gov.sa/en/StatisticsAndData/AnnualReport>.
- Asiri SM, Kamel S, Assiri AM, Almeshal AS: The epidemiology of work-related injuries in Saudi Arabia between 2016 and 2021. *Cureus*. 2023, 15:e35849. [10.7759/cureus.35849](https://doi.org/10.7759/cureus.35849)
- Saudi Vision 2030. (2016). Accessed: May 13, 2026: <https://www.vision2030.gov.sa/>.
- Saudi Arabia implements Expat levy . (2017). Accessed: May 13, 2026: https://web.archive.org/web/20241116115847id_/https://www.pwc.com/m1/en/tax/documents/2017/expat-levy-update-july.pdf.
- Hakeem FF, Alshahrani SM, Ghobain MA, Albabtain I, Aldibasi O, Alghnam S: The impact of COVID-19 lockdown on injuries in Saudi Arabia: results from a level-I trauma center. *Front Public Health*. 2021, 9:704294. [10.3389/fpubh.2021.704294](https://doi.org/10.3389/fpubh.2021.704294)
- Alkharaiji MA, Alsuliman MA: Patterns and implications of occupational injuries in Saudi Arabia during the first three quarters of 2024. *Univ J Public Health*. 2025, 13:1254-1260. [10.13189/ujph.2025.130517](https://doi.org/10.13189/ujph.2025.130517)
- Almuhaidib IA, Saleh M, Abdullah FM, Ramadan MZ: Occupational injuries in Saudi Arabia during the period from 2016 to 2018. *J Eng Res*. 2025, 14:1845-1857. [10.1016/j.jer.2025.11.003](https://doi.org/10.1016/j.jer.2025.11.003)
- Health and safety at workplace statistics 2024 . (2024). Accessed: May 15, 2026: <https://www.stats.gov.sa/documents/20117/2435273/Health%20and%20Safety%20at%20Workplace%20Statistics%202024%20EN>
- Masood MA, Khaled R, Bin-Ismail A, Semerjian L, Abass K: Occupational health in the Gulf Cooperation Council (GCC): a systematic review and call for comprehensive policy development. *PLoS One*. 2024, 19:e0312251. [10.1371/journal.pone.0312251](https://doi.org/10.1371/journal.pone.0312251)
- Qiddiya city: where play comes to life . (2026). Accessed: June 10, 2026: <https://qiddiya.com/qiddiya-city/>.
- The Red Sea: the world's most ambitious regenerative tourism destination . (2025). Accessed: June 10, 2026: <https://www.redseaglobal.com/en/portfolio/the-red-sea/>.
- Project NEOM. (2026). Accessed: June 10, 2026: <https://www.vision2030.gov.sa/en/explore/projects/neom>.
- Joshi S, Simkhada P, Prescott GJ: Health problems of Nepalese migrants working in three Gulf countries . *BMC Int Health Hum Rights*. 2011, 11:3. [10.1186/1472-698X-11-3](https://doi.org/10.1186/1472-698X-11-3)