

Measuring the Burden of Work-Related Injuries in Iran Through Disability-Adjusted Life Years (DALYs)

Abstract

Statement of the Problem: According to the International Labour Organization (ILO), occupational accidents impose significant human suffering and economic losses worldwide. The economic burden extends beyond injured workers to employers and governments. This study aimed to estimate the burden of occupational accidents in Kashan City, Iran, in 2020 using the Disability-Adjusted Life Year (DALY) index.

Methodology: This cross-sectional study was conducted among the working population of Kashan City, Iran. Data were obtained from all registered occupational accidents recorded at the Department of Labor in 2020. The burden of occupational accidents was calculated according to the methodology recommended by the World Health Organization (WHO). Years of Life Lost (YLL) due to premature mortality and Years Lived with Disability (YLD) were estimated using standard formulas in Microsoft Excel.

Findings: A total of 407 occupational accidents were recorded during the study period. The total DALYs attributable to occupational accidents were 523.138 years. Of these, 308 years (58%) were due to YLL and 218.138 years (42%) were due to YLD.

Conclusion: The considerable burden of years of life lost and years lived with disability highlights the urgent need to strengthen occupational health services and preventive strategies to protect human resources from occupational injuries

Introduction

Occupational accidents remain a major public health challenge globally. The International Labour Organization estimates that millions of workers suffer from work-related injuries and diseases each year, resulting in substantial mortality, disability, and economic loss [1]. In developing

Research Article

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countries, rapid industrialization, inadequate safety standards, and limited regulatory enforcement exacerbate the risk of occupational accidents [2].

In Iran, occupational injuries are particularly prevalent in sectors such as construction, manufacturing, and mining [3]. These accidents not only affect workers and their families but also impose significant financial burdens on industries and national healthcare systems.

The Disability-Adjusted Life Year (DALY) is a composite health metric developed by the World Health Organization to quantify disease burden [4]. DALY combines:

- Years of Life Lost (YLL) due to premature mortality
- Years Lived with Disability (YLD) due to non-fatal injuries

DALY provides a comprehensive measure of both fatal and non-fatal outcomes, allowing policymakers to prioritize prevention strategies effectively [5].

Despite national-level estimates of injury burden in Iran [4], limited data are available at the city level. Therefore, this study aimed to estimate the burden of occupational accidents in Kashan City in 2020 using the DALY framework.

Methods

Study Design and Population

This cross-sectional study was conducted in Kashan City, Iran, among the working population in 2020. All occupational accidents registered in the Department of Labor during the study year were included.

Data Collection

- Data extracted included:
- Age and sex of injured workers
- Type of accident
- Severity of injury
- Mortality status
- Duration of disability

DALY Calculation

The DALY was calculated as:

$$DALY = YLL + YLD$$

Years of Life Lost (YLL)

$$YLL = N \times LYLL = N \times L$$

Where:

- N = number of deaths
- L = standard life expectancy at age of death

Years Lived with Disability (YLD)

$$YLD = I \times DW \times LYLD = I \times DW \times L$$

Where:

- I = number of incident cases
- DW = disability weight
- L = duration of disability

Standard life expectancy tables and disability weights were derived from WHO Global Burden of Disease methodology [4]. Calculations were performed using Microsoft Excel.

Results

Descriptive Findings

A total of 407 occupational accidents were recorded in Kashan during 2020. The majority occurred in industrial and construction sectors.

3.2 DALY Estimation

The total DALYs due to occupational accidents were estimated at 523.138 years.

- YLL: 308 years (58%)
- YLD: 218.138 years (42%)

The higher proportion of YLL indicates that premature mortality contributes substantially to the total burden. However, the YLD component also reflects significant long-term disability among survivors.

Discussion

This study demonstrates a considerable burden of occupational injuries in Kashan City. The predominance of YLL (58%) indicates that fatal occupational accidents significantly impact public health.

Our findings align with national-level studies in Iran reporting high injury-related DALYs [4]. Similar patterns have been observed internationally, particularly in high-risk occupational sectors [5].

Studies in Canada and Australia have shown that musculoskeletal disorders represent a significant share of compensated work-related disability [6]. In Iran, construction workers experience a high burden of injuries, consistent with our findings [3].

The economic and social impact of occupational accidents extends beyond direct medical costs. Productivity losses, compensation payments, and long-term disability impose additional burdens on industries and governments [1].

Strengthening occupational health and safety systems, improving regulatory enforcement, and enhancing worker training programs are essential to reduce preventable injuries.

Conclusion

The burden of occupational accidents in Kashan City in 2020 was substantial, amounting to 523.138 DALYs. Both premature mortality (YLL) and disability (YLD) contributed significantly to this burden. These findings highlight the urgent need for strengthened occupational health policies, preventive measures, and improved safety culture within industries.

Future studies should explore longitudinal trends and evaluate intervention effectiveness to further reduce occupational injury burden.

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