

# Cost Estimates based on ILO Global Estimates on the Burden of Accidents and Diseases at Work and Disability Adjusted Life Years

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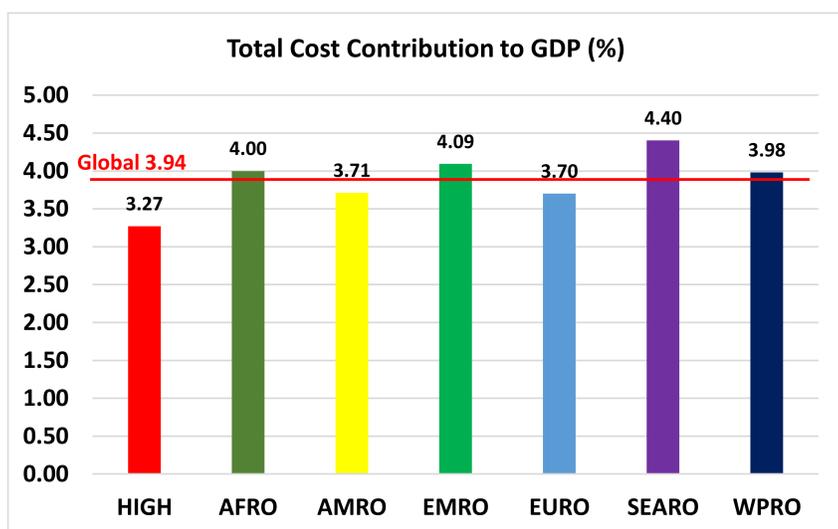
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## Introduction

International Labour Organization (ILO) has made global estimates of occupational injuries and work-related diseases for the past 20 years. Some Member States submitted their injury data to ILO. However, data on work-related diseases was not available from the ILO regular survey. The missing injury data was estimated from a group of “proxy” countries for each region of the World Health Organisation (WHO). Fatal work-related diseases have been estimated using the latest WHO mortality data by WHO regions and major disease groups. Attributable fractions were adjusted from available scientific sources and used for each major disease group and relevant age groups. These estimates on the economic costs of poor or non-existing measures on safety and health would enable regions to prioritise public and private policies, in our quest for zero harm at work.

## Results

The total cost percentage contribution to Gross Domestic Product (GDP) for the WHO regions was shown in the graph below.



The cost of poor or non-existing measures on safety and health were estimated to account for 3.94% of the global GDP.

### Legend

HIGH denotes High Income countries  
AFRO denotes Low- and Middle-Income countries of the African Region  
AMRO denotes Low- and Middle-Income countries of the Americas  
EMRO denotes Low- and Middle-Income countries of the Eastern Mediterranean Region  
EURO denotes Low- and Middle-Income countries of the European Region  
SEARO denotes Low- and Middle-Income countries of the South-East Asia Region  
WPRO denotes Low- and Middle-Income countries of the Western Pacific Region  
For more details, please refer to [www.who.int](http://www.who.int)

## Conclusion

This was the first attempt to estimate the cost contribution as a percentage of GDP loss due to occupational injuries and work-related diseases based on ILO Global Estimates 2017 and Global Burden of Disease (GBD) 2015 of the Institute of Health Metrics and Evaluation (IHME). While the methodology used could be further refined, we hope the figures would be useful during the prioritization of limited sources to combat safety and health issues.

## Methodology

Step 1: Estimate the Disability Adjusted Life Years (DALYs) for the occupational injuries and work-related diseases in the country or region using the following formula:

$$DALYs = YLD^1 + YLL^2 \quad (1)$$

Step 2: Define Employment as the hypothetical number of years that the workforce would have contributed to a country's economy if there were no occupational injuries or diseases. Then, the cost of occupational injuries and diseases can be expressed by using DALY as a proportion of Employment:

$$\text{Cost due to poor working conditions} = \frac{DALYs}{\text{Employment (years)}} \text{ or } \frac{YLL + YLD}{\text{Employment (years)}} \quad (2)$$

Let us consider the calculations of YLL and YLD separately.

$$YLL = YLL_{inj}^3 + YLL_{dis}^4 \\ = \frac{YLL_{inj,gbd}^5}{Deaths_{inj,gbd}} \times Deaths_{inj,ilo}^6 + \frac{YLL_{dis,gbd}}{Deaths_{dis,gbd}} \times Deaths_{dis,ilo} \quad (3)$$

$$YLD = YLD_{inj} + YLD_{dis}$$

Based on the data from IHME<sup>7</sup>,

$$YLD = \frac{YLD_{inj,gbd}}{YLL_{inj,gbd}} \times YLL_{inj} + \frac{YLD_{dis,gbd}}{YLL_{dis,gbd}} \times YLL_{dis}$$

Using ILO global estimates,

$$YLD = \frac{YLD_{inj,gbd}}{YLL_{inj,gbd}} \times \left[ \frac{YLL_{inj,gbd}}{Deaths_{inj,gbd}} \times Deaths_{inj,ilo} \right] + \frac{YLD_{dis,gbd}}{YLL_{dis,gbd}} \times \left[ \frac{YLL_{dis,gbd}}{Deaths_{dis,gbd}} \times Deaths_{dis,ilo} \right] \quad (4)$$

An aggregate value of  $\frac{YLD_{dis,gbd}}{YLL_{dis,gbd}}$  was used in equation (4) according to the WHO region it belonged to. Thus equation (4) was modified to:

$$YLD = YLD_{injury} + YLD_{disease} \\ = \frac{YLD_{inj,gbd}}{YLL_{inj,gbd}} \times \left[ \frac{YLL_{inj,gbd}}{Deaths_{inj,gbd}} \times Deaths_{inj,ilo} \right] + \frac{\sum YLD_{dis,gbd}}{\sum YLL_{dis,gbd}} \times \left[ \frac{YLL_{dis,gbd}}{Deaths_{dis,gbd}} \times Deaths_{dis,ilo} \right] \quad (5)$$

However the figures calculated by equation (5) were inconsistent in several developing countries belonging to the WHO regions AFRO, EMRO, EURO and SEARO. This could be due to poor data records and to a shorter life expectancy where workers generally did not live long enough to develop long-latency non-communicable diseases. Thus the disease component of the number of years lived with disability may be less reliable. As such, equation (5) for these 4 WHO regions divisions was modified to:

$$YLD = YLD_{inj} + YLD_{dis} \\ = \frac{YLD_{inj,gbd}}{YLL_{inj,gbd}} \times \left[ \frac{YLL_{inj,gbd}}{Deaths_{inj,gbd}} \times Deaths_{inj,ilo} \right] + YLD_{dis,gbd} \quad (6)$$

Equation (5) would still be used to calculate the YLD for WHO Regions HIGH, AMRO and WPRO.

### Legend

- <sup>1</sup> YLD denotes Years Lived with Disability
- <sup>2</sup> YLL denotes Years of Lives Lost
- <sup>3</sup> inj denotes injuries
- <sup>4</sup> dis denotes diseases
- <sup>5</sup> gbd denotes Global Burden of Disease (GBD) 2015
- <sup>6</sup> ilo denotes ILO Global Estimates 2017
- <sup>7</sup> IHME denotes Institute of Health Metrics and Evaluation

## References

1. Coalition Coordinators: Cost Estimates based on ILO Global Estimates on the Burden of Accidents and Diseases at Work and Disability Adjusted Life Years. Result outcomes of the coalition of the following: ILO, European Agency for Safety and Health at Work, International Commission on Occupational Health, Ministry of Social Affairs and Health, Finland, Finnish Institute of Occupational Health and WSH Institute, Singapore.
2. Päivi Hämäläinen, Jukka Takala, Tan Boon Kiat 21<sup>st</sup> World Congress Poster on Global Estimates of Occupational Accidents and Work-related Illnesses 2017