



Contents lists available at ScienceDirect

Safety and Health at Work

journal homepage: www.e-shaw.net

Original article

The Assessment of Occupational Injuries of Workers in Pakistan

 Muhammad Noman^{1,☆,*}, Nooreen Mujahid², Ambreen Fatima³
¹ Applied Economics Research Centre (AERC), University of Karachi, Karachi 75080, Pakistan² Department of Economics, University of Karachi, Pakistan³ Applied Economics Research Centre, University of Karachi, Pakistan

ARTICLE INFO

Article history:

Received 29 April 2020

Received in revised form

15 March 2021

Accepted 2 June 2021

Available online 10 June 2021

Keywords:

Index Value Calculation

Labor Force Survey

Occupational Health and Safety

Occupational injuries

ABSTRACT

Background: The prevailing global work scenario and deteriorating health facilities in economies indulge the risk perspective in the labor market model. This is the reason that the risk factor is cautiously attributed to wages and labor market efficiencies specifically in developing and emerging economies. In this respect, Occupational Injuries of Workers (OIW) is considered essential to demonstrate the risk and Occupational Health and Safety (OHS) setups given the constraints of the labor. Intuitively, the prime objective of this study is to make an assessment of the labor market considering the OIW through the indicators of industry division, employment status, occupational distribution, adopted treatment, gender and regionality.

Methods: The assessment strategy of the study has been categorized into trend analysis and Index Value Calculation (IVC) segments employing the data from 2001 to 2018.

Results: The pattern of the selected indicators of the OIW has been observed in the available data while the IVC estimations are considered through time and reference categories. The findings of both exercises revealed absolute and relative heterogeneities at both industry and occupational levels.

Conclusion: The consistency for gender and regional distribution of both assessments points out the need for effective policy initiatives. The study suggests separate analyses of industry and occupations for a better understanding of the OHS setups and up-gradation in Pakistan.

© 2021 Occupational Safety and Health Research Institute, Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

In the pioneering work, it is explained that the wages of workers vary as per their experiences and work conditions [1]. This specific assertion indicates divergent factors in the labor market when a worker accepts a job given the associated benefits and risks. Hence, the inclusion of risk in the wage function is also considered essential in order to ascertain efficiencies of perfect labor markets [2]. In such markets, workers not only have access to complete information specifically in lieu of work-related risks with mobility but also enjoy high compensation in case of an accident. In this regard, the employer is obliged to optimize investment in Occupational Health and Safety (OHS) in order to ensure an edge over his competitors [3]. However, this model has yet not been successfully applied due to various systematic issues, including imperfect knowledge of workers [4], limited mobility, and lack of awareness regarding work-related risks or

occupational injuries [5]. Additionally, occupational injuries implicate an imminent cost on the socioeconomic system [6] as these incur financial losses for industry [7]. Further, it destabilizes the earning capability of labor [8] with adverse effects on the gross productivity levels of a nation. According to the recent estimates of the International Labour Organization (ILO), occupational injuries cause globally 2.78 million deaths and 374 million nonfatal injuries per annum. This adversity incurs a human cost, which results in an annual economic burden of 3.94% of global gross Domestic Product (GDP) due to poor occupational safety and health practices [9].

Referring to the heterogeneities at the global level, developing and underdeveloped economies lag in terms of OHS resulting in high fatality and injury rates. Table 1 explains that America had experienced an improvement in fatality rates in both agriculture and services sector, however, the manufacturing sector experienced more fatalities at the workplace from 2010 to 2014.

* Corresponding author. Applied Economics Research Centre (AERC), University of Karachi, Karachi 75080, Pakistan

E-mail addresses: noman.atiq19@gmail.com (M. Noman), nooreenmujahid111@yahoo.com (N. Mujahid), amber_aerc@yahoo.com (A. Fatima).

☆ Senior Lecturer in the Department of Economics at Mohammad Ali Jinnah University.

Table 1
Estimated fatality occupational injury rates (per 100,000 employees).

Region	Fatality rates of sectors					
	Agriculture		Industry		Services	
	2010	2014	2010	2014	2010	2014
Africa	18.9	No change	21.1	No change	17.7	No change
America	9.3	8.7↓	9.5	11.2↑	6.0	5.7↓
Eastern Mediterranean	13.0	No change	14.9	No change	12.3	No change
Europe	15.7	17.0↑	10.3	13.4↑	5.5	3.5↓
South-East Asia	24.0	27.5↑	9.7	9.9↑	5.1	4.4↓
Western Pacific	24.0	27.5↑	9.7	9.9↑	5.1	4.4↓

Source: Hamalainen, Takala, & Kiat, 2017.

The east Mediterranean region showed consistent rates while all other regions experienced high fatality rates in both traditional and manufacturing sectors. There was also a considerable reduction in the fatality rates of the services sector over the years showing the greater efficiency of the sector in terms of workplace safety reducing occupational injuries. Hence, sectoral divergences at regional explain the fact that safety and health of workers in the agriculture and manufacturing sector is a serious concern irrespective of the income level of an economy. However, it is yet a leading issue for workers precisely in developing economies [10]. Generally, this could be associated with divergent aspects such as poor working environment, the dearth of financial protection of workers; and inappropriate social security [11], etc. The other prominent factor in such economies is the engagement of workers in hazardous jobs precisely in rural areas due to no or less access to medical facilities; violation of labor laws; and unpaid family work [12].

It has been that emphasized globalization has not only changed the labor market yet also altered the edifice of the workplace, way of working; and OHS [13]. However, despite the remarkable strides in the field of OHS, occupational injuries for workers (OIW) have been reported on a regular basis due to poor workplace safety measures. Although risk differs across jobs, sectors, regions, and individuals yet, OIW is declining in advanced economies and increasing in low- and middle-income economies. The reasons for such diversity are obvious as in developed economies, employment protection and social insurance setups have been considered as vital socioeconomic triumph providing income stability. On the other side, labor markets in the developing economies are still characterized by truncated union memberships; and high informality that results in minimum coverage of social insurance [14]. This in turn poses severe outcomes to socioeconomic expansions in the long run. In this respect, numerous aspects stand out including a revolution in the manufacturing sector [15], transition to the services sector [16], persistently high growth of the labor force [17]; and adoption of complex comprehensive systems [18]. All of this goes beyond the capacity of government and associated administrative authorities. Consequently, developing economies are striving hard to enhance labor market efficiency by less hazardous yet more secured job safety [19].

Hence, the concept of OHS is a concern of human well-being in the context of rapid industrialization and growth of the services sector enhancing the need for workplace safety. This is the reason that practitioners, academicians and policymakers consider

Table 2
Base categories of OIW indicators.

OIW indicator	Base category
Industry Division	Construction Industry
Occupational Distribution	Elementary occupations (unskilled)
Employment Status	Employees
Adopted Treatment for Injured Workers	No Treatment
Gender Distribution	Female Injured Workers
Regional Distribution	Rural Areas

Source: Illustrated by Authors.

Occupational Injuries of Workers (OIW) is a primitive factor to analyze the OHS conditions in order to prevent the potential workers from negative consequences i.e., accidents or deaths. Therefore, in the contemporary era, employers and employees, both are more stringent than ever before regarding the knowledge, quality, health, and safety arrangements at workplace in many economies.

Intuitively, these insights provide the motivation to observe the OHS considerations in Pakistan that is widely overlooked in organizational and institutional fields. According to the recent ILO reports, poor OHS measures are one of the vital facets of the decent work deficit/productivity in Pakistan at both formal and informal workplaces. Additionally, majority of the large enterprises are not even familiar with the OHS enforcement, setups and systems. This is the reason that at the organizational level no importance has been given to the OHS risks and hazards ignoring the urgency of addressing these issues. This, in turn, has exposed the lives of workers in risky sector i.e., construction, mining, and fishing etc. that are the contributing sectors of the economy.

Turning to the implication of legal and institutional supplements, the Pakistan Occupational Health and Safety Act 2018^a aims to ensure safe working conditions for workers. The Act has been designed to authorize the execution of regulatory guidelines for organizations, institutions, and geographical zones governed by the authorities (federal). This piece of legislation facilitates the workers by providing a balanced yet nationally coherent safety structure to secure OHS measures in Pakistan. Further, the policy interventions regarding the OHS conditions contemplate protection of workers through eradication or minimization of risk, effective workplace representations, unionization, training, compliance of measures with the OHS Act, and appropriate scrutiny by designated/accountable personnel. However, the implementation of these insistent procedures in the prevailing workplace environment in Pakistan is yet a quandary situation.

Keeping in view the global and national perspectives of workplace safety, this study is an endeavor to assess occupational injuries at a disaggregated level, considering the trend and Index Value Calculation (IVC) estimates for the economy of Pakistan. Therefore, we have collected the data for the time span between 2001 and 2018 and gauged a trend over the years considering related indicators of OIW. These factors include industry division, occupational distribution, employment status, adopted injury treatment, gender, and region. It is worth mentioning here that while performing data collection a few data limitations had also restricted the assessment of injuries. The Pakistan Bureau of Statistics (PBS) published the data related to types of injuries and affected body parts, yet the information had not been updated since 2006–2007. Hence, in order to ensure data consistency

^a National. Occupational Health and Safety. Policy. 2018. (Assp.Org.Pk) Wp-Content) Uploads) 2019/03).

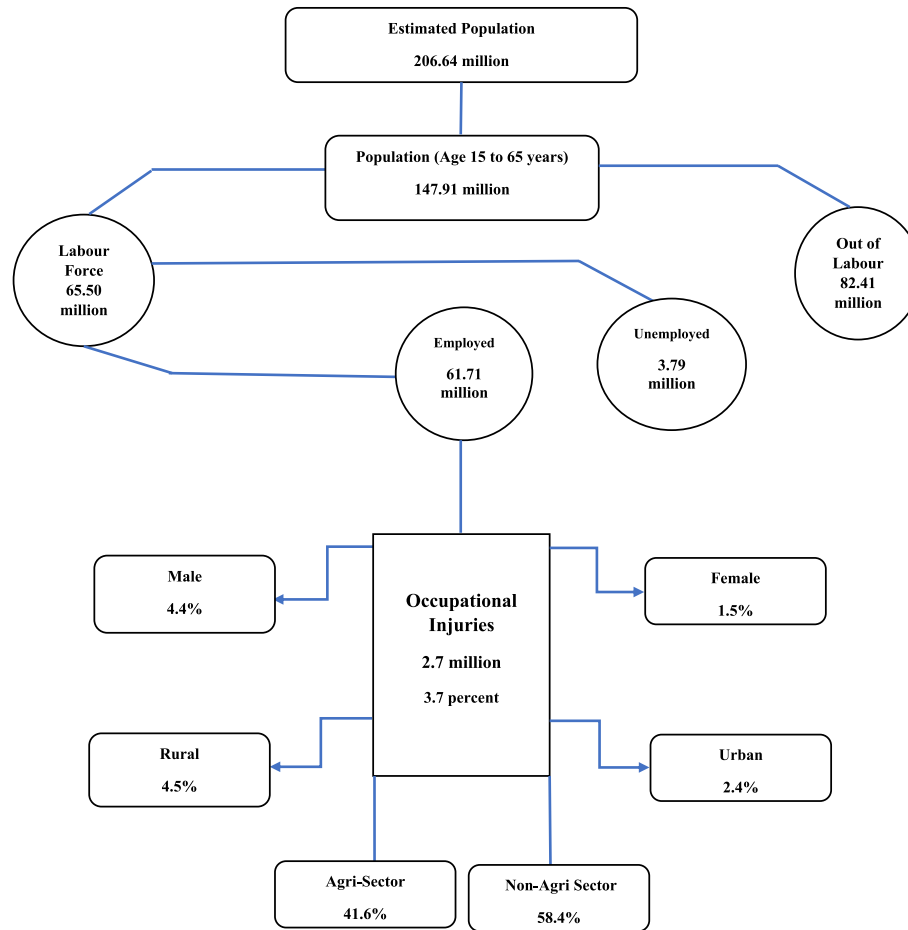


Fig. 1. Labor Market Profile of Pakistan.

throughout the study, all such indicators have not been regarded for the assessment.

Considering the labor market profile of Pakistan in Fig. 1, the economy of Pakistan is well abundant with 206.6 million of the population containing 147.9 million people as a working-age population. This further divulges into the 65.5 million employed labor while the rest of the population is considered inactive. The recent estimates revealed that 2.7 million of the employed population (61.7 million) experienced an injury at work in 2017-18 with a 3.7% of injury rate.

Referring to the gender distribution of injuries, the male workers were more vulnerable than female workers exhibiting a 4.4% rate of injury in the year 2017-2018. On the other side, the regional distribution also reveals disparity as rural areas is still not safe for the worker with a 4.5% injury rate as compared to 2.4% in urban areas. According to the recent Pakistan Economic Survey (PES), the farm sector experienced a decline in employment up to 10% from 48.42% to 38.2% during the time span of 1999-2018. Whereas modern sectors (manufacturing and services) experienced a growth in employment up to 6.56% and 6.56% respectively

Table 3
Index-based industry divisions of injured workers.

Industry division	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18	Slope*
Agriculture, Forestry, Hunting and Fishing	42.88	44.87	39.89	40.94	46.84	50.43	50.16	49.8	49.15	51.2	48	41.6	0.4997
Mining and Quarrying	0.12	0.01	0.52	0.29	0.09	0.33	0.12	0.2	0.21	0.3	0.3	0.3	0.0097
Manufacturing	14.5	14.61	17.1	15.21	12.72	13.96	12.8	15.8	13.32	14.2	15.9	16.9	0.0571
Electricity, Gas and Water	0.73	0.95	0.58	0.87	0.51	0.71	0.37	0.2	0.5	0.3	0.3	0.6	-0.0432
Construction	12.54	10.65	13.21	14.55	14.93	14.54	14.25	13	15.24	14.1	16.3	17.3	0.3735
Wholesale and Retail Trade and Restaurants and Hotels	8.64	9.13	9.54	9.26	7.96	8.49	10.6	10.3	9.2	8.6	7.1	11	0.0348
Transport, Storage and Communication	9.38	8.94	9.46	7.98	8.02	8.14	8.02	7.1	7.3	7.5	7.5	7.8	-0.176
Financing, Insurance, Real Estate and Business Services	0.06	0.53	0.35	0.34	0.35	0.17	0.1	0.3	0.1	0.1	0.1	0.4	-0.0115
Community, Social and Personal Services	11.15	10.31	9.34	10.56	8.39	3.23	3.58	3.3	5.1	3.7	4.5	4.1	-0.7397

Source: Calculated by Authors.

Table 4
Employment status of injured workers.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18	Slope
Employers	0.8	0.7	0.5	0.4	0.8	0.2	0.6	1	0.7	0.5	0.5	0.7	-0.0014
Self-employed	45.9	48.7	42.1	43.1	38.6	38.8	41.6	40.9	38.8	42	40.6	37.7	-0.614
Unpaid family Helpers	12.3	10.1	11.9	14.6	20.5	22.7	20.2	22	22.4	19.6	18.3	15.2	0.7014
Employees	41	40.5	45.4	41.9	40.1	38.3	37.6	35.1	38.1	37.9	40.6	46.4	-0.09141

Source: Calculated by Authors.

in the same time period. The sectoral trends of injury rate unveil that out of 3.7%, 41.6% injuries were yet reported in the agricultural sector while 58.4% were found in the modern sectors.

Correspondingly, a surge in working-age (15 to 65 years) population and sectoral transition in the economy of Pakistan demand an efficient labor market set up which cannot be attained without an effective Occupational Health And Safety (OHS) system at all levels.

Following the introduction, the subsequent segment unveils the assessment strategy of the article while section three elucidates the assessment findings of the study. Whereas the discussion section assesses to compare and differentiate the absolute and relative perspective for occupational injuries of workers (OIW) in Pakistan with concluding comments on the assessment.

2. Materials and methods

The assessment of OIW has been done by adopting two different approaches. The first approach endeavors to perform a trend assessment through published data of the Pakistan Bureau of Statistics (PBS). The other strand of assessment has been completed by employing the Index Value Calculation (IVC) method. The rationale behind using both assessments is to make a comparison of published and estimated data in the study. This has assessed to observe OIW in terms of both absolute and relative terms. Further, this approach metaphorically differentiates this study from other previous studies.

In order to determine the trend of the selected indicators for OIW, we have gathered the date of Labor Force Survey (LFS) from the website of PBS given the time span of 2001–2018 considering various issues of LFS. The study has indulged six broad perspectives of OIW in Pakistan, including industry division, occupational distribution, employment status, adopted treatment after injury, gender, and regionality. Moreover, the secular trend has also been calculated employing slope estimations to analyze the change in the variable under consideration over the years. The following equation of the formula of least squares is used to calculate the slope.

$$\text{Slope} = \frac{\sum xy}{\sum x^2}$$

where, y is the variable under consideration and x is the coded time, which is the year minus the midpoint of two years for an even number of years. Hence, the negative value of slope shows a downward trend while a positive value of slope exhibits an upward trend.

The Index Value Calculation (IVC) method is a simple way to estimate OIW given divergent indicators of job and risks. It is pertinent to mention here that the IVC assessment has been prompted by the national study [10]. Further, the IVC method had been judiciously employed in the economies of Turkey [20] and Korea [21] for the assessment and estimation of occupational accidents.

Following these studies, the estimates of IVC are based on two broad implications. First, the assessment has been done by considering the reference year 2001-02 as the data collection of OIW in Pakistan had been initiated in the mentioned year. Second, each indicator has been evaluated referring to a base category in order to incorporate the relativeness of items in each indicator. Precisely, these base categories have opted on the absolute outcomes that were extracted from the trend assessment exercise. Table 2 elucidates the base category of each indicator used in this study.

The general form of the IVC for the base year has been given below:

$$\text{Index Value Calculation (IVC)} = \frac{\text{Injury Rate of Current Year}}{\text{Injury Rate of Base Year}} \times 100$$

The general form of the IVC for the base category is:

$$\text{Index Value} = \frac{\text{Injury Rate of Category}}{\text{Injury Rate of Base Category}} \times 100$$

Precisely, these IVC estimates are used to identify the growth

Table 5
Occupational distribution of injured workers.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18	Slope
Legislators, senior officials & managers	6.7	6.3	7.6	7.4	5.4	4.1	5.5	4.1	4.6	0.4	0.4	0.5	-0.658
Professionals	0.3	0.4	0.9	0.5	0.1	0.1	0.1	0.3	0.4	0.8	0.9	1	0.0406
Technicians and associate professionals	2.3	2.3	1.7	1.2	1.2	1	0.9	1.2	1.3	1.1	0.9	1.5	-0.088
Clerks	1.2	1	0.3	0.7	0.7	0.3	0.2	0.2	0.2	0.2	0.1	0.6	-0.068
Service and shop and market sales workers	3.8	2.8	3.4	3.7	3.3	2.1	3.1	1.9	3.7	6.8	5.9	7.5	0.312
Skilled agricultural and fishery workers	37.6	38.7	34.4	37.2	40.6	44.9	43.5	44.6	43.5	45	42.8	33.5	0.378
Craft and related trade workers	20.9	21.4	21.5	23.9	21.5	22.1	18.9	20.5	18.8	19	19.8	20.2	-0.249
Plant and machine operators & assembly line workers	7.4	5.7	6.1	6.2	5.3	5.6	5.5	4.9	6.6	7.5	9.2	10.1	0.250
Elementary (unskilled) occupations	19.8	21.4	24.1	19.2	21.9	19.8	22.3	22.3	20.9	19.2	20	25.1	0.082

Source: Calculated by Authors.

Table 6
Adopted medical treatment after injury.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18	Slope
Hospitalized	14.7	12.2	15.8	13.7	10.5	10.9	11	8.9	10.9	7.8	7.8	10.6	-0.557
Consulted a Doctor or other Medical Professional	48.8	61.1	65.1	61.2	53.6	51.1	51.3	52.6	46.4	52.3	58.6	49.8	-0.622
Took time off work	19.3	19	14.9	18.9	24.1	25.8	22.4	23.3	22.4	23.4	20.5	25.3	0.5269
No Treatment	17.2	7.7	4.2	6.2	11.8	12.2	14.3	15.2	20.3	16.5	13.1	14.3	0.649

Source: Calculated by Authors.

and relativeness of the OIW given the hazardous job-related injuries in Pakistan.

3. Results

Table 3 demonstrates the industry distribution of injured workers over the time period of 2001–2018 with the calculated slope of the respective industry. The table explains that the injury rate of the traditional farm sector initiated with 42.8% in 2001–02, attained its peak in 2008–09, and ended up with a relatively low yet higher injury rate than the other industries in 2017–18. The highest injury rate in the sector could conveniently be explained through divergent factors including structural transformation, attachment of rural masses to the sector; and high population cluster in the farm areas, and backward and forward linkages with the modern sectors (manufacturing and services) [10].

The second-highest rate of injuries has been outlined in the construction sector, which has been persistently increasing. Given the time period, there was a 4.8% increase in the injury rate of the industry, which was higher than that of the farm sector. The latest study professed that high unemployment in Pakistan induced workers to do risky jobs in the construction sector despite not being compensated for the risk [22]. Whereas employer's neglect was also measured as it is the main reason for accidents within the construction sector globally [23]. The manufacturing sector has revealed an increasing trend in injury rate with the highest value of 17.1% and 16.9% in 2005–06 and 2017–18 respectively. On the whole, these three sectors contributed up to 76% of total injuries in 2017–18 which was nearly 6% higher in 2001–02 (69.8%). According to [24], the high rate of injuries in the manufacturing sector could be attributed to two prime factors. First, the overall economic scenario favored an upsurge in business activities and hence resulted in more injuries. Second, an increase in unemployment would reduce the bargaining power of workers and unions enforcing them to work in the manufacturing sector at low wages. Hence, the dearth of occupational diversity due to lower employment prospects is prominent in the context of Pakistan.

Additionally, other sectors in terms of prominent injury rates were wholesale and retail trade and restaurants and hotels (11%); and transport, storage, and communication (7.8%) in 2017–18. The industries in the services sector (finance, insurance, real estate, and community, social, and business services) were found to be the safest industries in terms of OIW in 2017–18. Despite the possibility of high exposure to risk, among all nine industries, the mining and quarrying sector showed the least rate of injuries in the current year with only 0.3% of injury rate. Turning to the slope estimations, most of the industries exhibit an increasing trend in injury rates. On

the other side, the mining and quarrying sector has been declared as the safest industry among all others in terms of injury rates. Here, we present two probable justifications from the literature. First, the sector exhibits a small share in the GDP despite fatalities, feeble enforcement measures, and a poor working environment. Second, it is highlighted that relying on fatality rates was not a sufficient measure to observe the OHS in the mining sector of an economy [25]. The authors used a different proxy (loss of work time) rather than incidence rates to evaluate job safety and health performance of the labor market in the USA. The study findings declared that the measure was more credible to identify the high-risk processes in the mining sector.

The employment status of injured workers in Table 4 explains that the employee segment of the labor market still faces high risk while performing their jobs. The data show that 46.4% of total injuries had been faced by employees in the year 2017–18. Although there was a declining trend between 2008 and 2011, however, it did not sustain in subsequent years.

Meanwhile, the negative slope of this employed group implies a better outcome on the whole. Whereas self-employed and unpaid workers experienced a relative decline in injury rates over the years. The respective positive and negative slope values for both are 0.61 and 0.70. Meanwhile, the employee segment remains the safest among all with a negative slope value of 0.001.

The occupational distribution of injured workers has been assessed in Table 5 in order to dilate the analysis at a disaggregated level. Predominantly, this helped to compare skilled and unskilled workers and their likelihood to get an injury. Thus, the table provides injury rates of nine major occupational groups including elementary occupations.

We have found a divergence among these occupations as injury rates among skilled workers of farms and fishery were highest with 33.5% in 2017–18. Though this is lower than in previous years, yet it is highest as compared to other occupational groups. Further, workers engaged in elementary professions also face high danger with a value of 25.1% in 2017–18. Both occupations have experienced a positive trend with slope values of 0.3 and 0.08, respectively. The other risky occupation for workers was craft and trade with a 20.2% of injury rate yet with a negative slope value of 0.2. These three occupations jointly account for 78.8% of total injuries. This shows that workers (both skilled and unskilled) engaged with the main occupations in Pakistan were more vulnerable to job risk. This finding is consistent with the study of [10]. The author explained that fast mechanization and technical conversion of industries in Pakistan has not been well transmuted due to a lack of training and skills endangering workplace safety for workers in these vital yet productive occupations.

Table 7
Gender distribution of occupational injuries.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18	Slope
Male	3.9	3.2	3.4	2.4	2.4	3.1	3.5	4.1	4.5	4.9	4.7	4.4	0.16
Female	1.5	1	0.8	0.4	0.8	1.1	0.9	1.5	2.3	2.2	1.7	1.5	0.1

Source: Calculated by Authors.

Table 8
Regional distribution of occupational injuries.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18	Slope
Urban	2.9	2.2	2.7	1.6	1.6	1.8	1.8	2.3	2.6	2.9	2.6	2.5	0.18
Rural	3.9	3.1	3	2.2	2.2	3.1	3.4	4	4.7	4.9	4.6	4.5	0.03

Source: Calculated by Authors.

Hence, such a scenario in the labor market demands comprehensive planning by employers and labor market regulators focusing on an accessible economic advantage in terms of compensation and job-related safety [26].

An assurance has been provided that workplace safety is an important initiative, which must be taken into account for the epidemiological analysis for work-related injuries [27]. An arduous analysis of the adopted treatment of injured workers would provide an intuition regarding workplace safety in Pakistan. Table 6 incorporates the treatment options for a worker after injury given other related factors. The data indicate that 49.8% of total workers in 2017-18 consulted a doctor or a medical professional after an injury with a negative slope value of 0.62. This recent value is 8.8% lower than the previous year.

Additionally, the year 2005-06 stands out with 65.1% showed an overall decline in workplace safety of workers in Pakistan. Besides, in the same year, 2.3% of workers preferred to take a leave while only 10.6% were hospitalized after facing an injury. The workers with no treatment after injury comprise 14.3% in 2017-18 with a positive slope over the years.

According to the recent Labor Force Survey (LFS) data, the refined activity rate for females was 14.1% than 68% of males, indicating the possibility of high injury rates among male

workers. In this regard, Table 7 desegregates male and female injured workers.

It is well evident that male workers were more exposed to risks than females. Moreover, both have positive slope values showing an increasing trend over the years in injuries.

Considering the activity status of workers at the regional level, 28.0% of labor was associated with the formal economy while 72.0% was working in the informal economy (LFS, 2017-18). In the case of Pakistan, most of the informal economy clustered in rural regions of the country determining the possibility of high injuries in rural areas. The study has indulged the regionality perspective in order to trace such probabilities. Table 8 explains that 4.5% of injured workers were working in rural areas while 2.5% of injured workers were engaged in urban clusters.

Further, both have positive trend values of 0.18 and 0.03. Hence, a prominent disparity at the regional level has been traced out.

4. Discussion

Turning to the relative assessments of OIW, Table 9 explains the IVC estimates for industry segregation based on time and category. Contrary to the trend assessment of OIW in the previous section, the IVC values in the table indicate that the financing and business

Table 9
Industry distribution of occupational injuries.

Industry division	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18
Index Values by Time												
Agriculture, Forestry, Hunting and Fishing	100	104.6	93.02	95.47	109.2	117.6	116.9	116.1	114.6	119.4	111.9	97.015
Mining and Quarrying	100	8.333	433.3	241.6	75	275	100	166.6	175	250	250	250
Manufacturing	100	100.7	117.9	104.9	87.72	96.27	88.27	108.9	91.86	97.93	109.6	116.5
Electricity, Gas and Water	100	130.1	79.45	119.1	69.86	97.26	50.68	27.39	68.49	41.09	41.09	82.192
Construction	100	84.92	105.3	116	119	115.9	113.6	103.6	121.5	112.4	129.9	137.9
Wholesale and Retail Trade and Restaurants and Hotels	100	105.6	110.4	107.1	92.13	98.26	122.6	119.2	106.4	99.53	82.17	127.31
Transport, Storage and Communication	100	95.30	100.8	85.07	85.50	86.78	85.50	75.69	77.82	79.95	79.95	83.156
Financing, Insurance, Real Estate and Business Services	100	883.3	583.3	566.6	583.3	283.3	166.6	500	166.6	166.6	166.6	666.67
Community, Social and Personal Services	100	92.46	83.76	94.70	75.24	28.96	32.10	29.59	45.74	33.18	40.35	36.771
Index Value by Category												
Agriculture, Forestry, Hunting and Fishing	341.95	421.3	301.9	281.3	313.7	346.8	352	383.0	322.5	363.1	294.4	240.46
Mining and Quarrying	0.9569	0.093	3.936	1.993	0.602	2.269	0.842	1.538	1.378	2.127	1.840	1.7341
Manufacturing	115.63	137.1	129.4	104.5	85.19	96.01	89.82	121.5	87.40	100.7	97.54	97.68
Electricity, Gas and Water	5.8214	8.920	4.390	5.979	3.415	4.883	2.596	1.538	3.280	2.127	1.840	3.4682
Construction	100	100	100	100	100	100	100	100	100	100	100	100
Wholesale and Retail Trade and Restaurants and Hotels	68.9	85.72	72.21	63.64	53.31	58.39	74.38	79.23	60.36	60.99	43.55	63.584
Transport, Storage and Communication	74.801	83.94	71.61	54.84	53.71	55.98	56.28	54.61	47.9	53.19	46.01	45.087
Financing, Insurance, Real Estate and Business Services	0.4785	4.976	2.649	2.336	2.344	1.169	0.701	2.307	0.656	0.709	0.613	2.3121
Community, Social and Personal Services	88.915	96.80	70.70	72.57	56.19	22.21	25.12	25.38	33.46	26.24	27.60	23.699

Source: Calculated by Authors.

Table 10
Employment status of injured workers.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18
Index Values by Time												
Employers	100	87.5	62.5	50	100	25	75	125	87.5	62.5	62.5	87.5
Self-employed	100	106.1	91.721	93.9	84.096	84.532	90.632	89.107	84.532	91.503	88.453	82.135
Unpaid family helpers	100	82.114	96.748	118.7	166.67	184.55	164.23	178.86	182.11	159.35	148.78	123.58
Employees	100	98.78	110.73	102.2	97.805	93.415	91.707	85.61	92.927	92.439	99.024	113.17
Index Value by Category												
Employers	1.9512	1.7284	1.1013	0.9547	1.995	0.5222	1.5957	2.849	1.8373	1.3193	1.2315	1.5086
Self-employed	111.95	120.25	92.731	102.86	96.259	101.31	110.64	116.52	101.84	110.82	100	81.25
Unpaid family helpers	30	24.938	26.211	34.845	51.122	59.269	53.723	62.678	58.793	51.715	45.074	32.759
Employees	100	100	100	100	100	100	100	100	100	100	100	100

Source: Calculated by Authors.

sector showed the highest growth over the years. This difference could be explained through the argument provided by [28]. The authors observed the fall-related injuries and declared that the finance, real estate and insurance sector showed the highest growth in injuries as the accidents were spotted outside the workplace. The workers were affected by fractures, sprains and strains after fall or slip accidents. Further, the social and community sector was found to be the least dangerous in the context of Pakistan. This is the reason that the government intends to encourage and reactivate the institutions of shop stewards, work councils, and joint management boards to ensure their rightful participation and labor management.

The construction sector has been taken as the reference category due to the fact that the building industry is globally considered dangerous with high injury rates [20,29]. Referring to the IVC category, the farm sector is found to experience more growth (140.6%) in injuries while the mining and quarrying sector remarkably showed the least development in 2017-18. Given the fact that labor laws are not consistently implemented, the OHS act follows International Labour Organization (ILO) conventions in the farm sector. These conventions were designed to ensure labor inspection specifically for the agriculture sector; however, its fruitful benefits have not been experienced so far.

On a concluding note, the study has explored the prominent variations in the industry distribution provided by trend and Index Value Calculation (IVC) analysis. This difference highlights the fact that occupational injuries of workers (OIW) must be taken into account through more comprehensive statistics and techniques covering both absolute and relative aspects of the labor market. Besides, the government shall authorize appropriate legislative structure for the construction sector like other formal sectors including benefits of compensation, social security, and old-age pension, etc. ensuring horizontal equity of Occupational Health And Safety (OHS).

Considering the employment status of injured workers, the base year estimations in Table 10 revealed that unpaid family workers were more vulnerable to work conditions showing a growth of 23.58%. This outcome is quite convincing and well-discussed in the national literature that mostly women serve as unpaid family helpers in various farm and informal activities specifically in rural areas [30–32]. Whereas the injury growth declined for the employers in 2017-18. Therefore, women require more awareness regarding their working environment precisely in the informal sector. This potentially effective segment of the society must be facilitated through maternity sieves and codes of conduct with the availability of daycare centers at the workplace.

Table 11
Occupational distribution of injured workers.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18
Index Values by Time												
Legislators, senior officials & managers	100	94.03	113.4	110.4	80.6	61.19	82.09	61.19	68.66	5.97	5.97	7.46
Professionals	100	133.	300	166.	33.3	33.3	33.3	100	133.	267	300	333
Technicians and associate professionals	100	100	73.91	52.17	52.17	43.48	39.13	52.17	56.52	47.8	39.1	65.2
Clerks	100	83.3	25	58.3	58.3	25	16.6	16.6	16.6	16.7	8.33	50
Service and shop and market sales workers	100	73.68	89.47	97.37	86.84	55.26	81.58	50	97.37	179	155	197
Skilled agricultural and fishery workers	100	102.9	91.49	98.94	108	119.4	115.7	118.6	115.7	120	114	89.1
Craft and related trade workers	100	102.4	102.9	114.4	102.9	105.7	90.43	98.09	89.95	90.9	94.7	96.7
Plant and machine operators & assembles	100	77.03	82.43	83.78	71.62	75.68	74.32	66.22	89.19	101	124	136
Elementary (unskilled) occupations	100	108.1	121.7	96.97	110.6	100	112.6	112.6	105.6	97	101	127
Index Values by Category												
Legislators, senior officials & managers	33.8	29.44	31.54	38.54	24.66	20.71	24.66	18.39	22.01	2.08	0.4	1.99
Professionals	1.52	1.869	3.734	2.604	0.457	0.505	0.448	1.345	1.914	4.17	0.9	3.98
Technicians and associate professionals	11.6	10.75	7.054	6.25	5.479	5.051	4.036	5.381	6.22	5.73	0.9	5.98
Clerks	6.06	4.673	1.245	3.646	3.196	1.515	0.897	0.897	0.957	1.04	0.1	2.39
Service and shop and market sales workers	19.2	13.08	14.11	19.27	15.07	10.61	13.9	8.52	17.7	35.4	5.9	29.9
Skilled agricultural and fishery workers	190	180.8	142.7	193.8	185.4	226.8	195.1	200	208.1	234	42.8	133
Craft and related trade workers	106	100	89.21	124.5	98.17	111.6	84.75	91.93	89.95	99	19.8	80.5
Plant and machine operators & assemblers	37.4	26.64	25.31	32.29	24.2	28.28	24.66	21.97	31.58	39.1	9.2	40.2
Elementary (unskilled) occupations	100	100	100	100	100	100	100	100	100	100	100	100

Source: Calculated by Authors.

Table 12
Adopted medical treatment.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18
Index Values by Time												
Hospitalized	100	83	107	93.2	71.4	74.1	74.8	60.5	74.15	53.06	53.1	72.11
Consulted a Doctor or other Medical Professional	100	125	133	125	110	105	105	108	95.08	107.2	120	102
Took time off work	100	98.4	77.2	97.9	125	134	116	121	116.1	121.2	106	131.1
None	100	44.8	24.4	36	68.6	70.9	83.1	88.4	118	95.93	76.2	83.14
Index Values by Category												
Hospitalized	85.47	158	376	221	89	89.3	76.9	58.6	53.69	47.27	59.5	74.13
Consulted a Doctor or other Medical Professional	283.7	794	1550	987	454	419	359	346	228.6	317	447	348.3
Took time off work	112.2	247	355	305	204	211	157	153	110.3	141.8	156	176.9
None	100	100	100	100	100	100	100	100	100	100	100	100

Source: Calculated by Authors.

On the other side, the relative category assessment showed that employers had experienced a decline in injury growth up to 98.49% than employees in the year 2017-18. Additionally, unpaid family workers and self-employed individuals exhibited a decline of 67.24% and 18.75% respectively. Correspondingly, employees are considered as the most vulnerable among other workers. This finding is in line with the recent study of [33] as the authors explained that long working hours of employees indulged them into more risk at work.

The occupational diversity of injured workers provides a disaggregate perspective of the labor market in Table 11. The results of the IVC exercise declared the occupations of the services sector (including shop and market sales) as the most vulnerable with a growth rate of 97% in 2017-18. The plausible explanation is that workers in shops, malls, and departmental stores are responsible to perform repetitive tasks and manual lifting which is intrinsic in these occupations [34]. Hence incidences of slip, trip and fall menaces are common in each and every part of these places. Besides, the high rate of labor force in the services sector could also be a reasonable justification. The workers engaged in plants, machine operations, and assembling experienced second-highest injury growth over the years with 36%. This increasing trend is followed by the unskilled labor pertaining a growth of 27%. Thus, an increase in specific industries and occupations requires apt goals in order to enhance the injury inhibition efforts [35].

Keeping unskilled occupations as a base category, skilled workers involved in agriculture and fishery showed a growth of 33%, while the highly skilled professionals (legislators, senior officials, and managers) exhibited a decline up to 98.01% during the time span of 18 years. The plausible explanation for this increase that accidents (fall, slip, etc.); and environmental effects during various farm-based activities are likely to affect the injury exacerbation [36]. Further, unskilled occupations demand a well-developed safety and training program with strong implication strategies to enforce laws for workplace safety [37]. This heterogeneity in the occupations points out the fact that both skilled farm

workers and unskilled workers in elementary occupations are equally of more concern in terms of workplace safety.

In order to enhance the understanding of the association between fatal versus nonfatal occupations, we have opted for the elementary occupations as a base category in Table 11. The reason behind this was quite obvious that unskilled workers are more exposed to injuries due to a lack of skills and training. This argument was well elaborated in the studies of [10,38]. The analysis revealed that the occupation of skilled workers (legislators, senior managers, and managers) faced the least exposure to injuries, whereas craft and related trade workers were found to be more vulnerable in the year 2017-18. Thus, skilled workers of the farm sector were at greater risk, indicating a relatively high burden of injuries of farm skilled workers in Pakistan [39].

Considering the base year of 2001-02, injured workers preferred to take leave from work after having an injury over the years with an increase of 31% in 2017-18 in Table 12. Additionally, we have also found a declining trend in the workers in the same year for not taking treatment as there was a 16.86% decline in growth of avoiding any kind of treatment. Despite the mere growth of 2%, workers opted to consult a doctor or physician, however, this trend was much lower than the previous years.

Turning to the base category estimates, workers in Pakistan preferred to consult a doctor or medical professional after an injury rather than getting no treatment. Although, in the year 2017-18, workers were facilitated with a growth rate of 248.3% yet the IVC values from previous were much higher than this. Meanwhile, workers did not consider being hospitalized after the injury as the category showed a decline of 25.87%.

The improvement in treatment could be due to the accessibility of injured workers to the adjacent hospitals (both public and private). It has also been jagged out the commendable efforts of Social Security Institutions of Provincial Employees in Pakistan [10]. These public welfare institutions are responsible to secure after-injury healthcare and economic advantages to commercial or industrial employees

Table 13
Gender distribution of occupational injuries.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18
Index Values by Time												
Male	100	82.051	87.179	61.538	61.538	79.487	89.744	105.13	115.38	125.64	120.51	112.82
Female	100	66.667	53.333	26.667	53.333	73.333	60	100	153.33	146.67	113.33	100
Index Values by Category												
Male	260	320	425	600	300	281.82	388.89	273.33	195.65	222.73	276.47	293.33
Female	100	100	100	100	100	100	100	100	100	100	100	100

Source: Calculated by Authors.

Table 14
Regional distribution of occupational injuries.

	2001-02	2003-04	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2017-18
Index Values by Time												
Urban	100	75.862	93.103	55.172	55.172	62.069	62.069	79.31	89.655	100	89.655	86.207
Rural	100	79.487	76.923	56.41	56.41	79.487	87.179	102.56	120.51	125.64	117.95	115.38
Index Values by Category												
Urban	100	100	100	100	100	100	100	100	100	100	100	100
Rural	134.48	140.91	111.11	137.5	137.5	172.22	188.89	173.91	180.77	168.97	176.92	180

Source: Calculated by Authors.

and their families. Further, the author stressed that the role of institutional reforms cannot be overlooked as the employer of any licensed institution (with five or more staff) is legally obliged to pay 6% of their salary to the affected worker. On the other side, a recent study identified a serious gap in service delivery of the public sector and stressed removing the multilayer gap requiring solid reforms for OHS in Pakistan [40]. Yet, it can be underlined that the horizon of such institutions and social security services must be broadened to the public health sector for better prevention of illness with an insight of the good health of workers.

As it is mentioned earlier that male workers in Pakistan faced more exposure to injuries, the IVC by time has also endorsed more possibility of injuries with the growth of 12% in the year 2017-18 in Table 13. This growth was much lower than the last 8 years. Keeping in view this scenario, we have selected females as a base category in order to relate the injury growth among male workers. We have explored that male workers worked with a risk of 193.33% getting injured than females in the year 2017-18.

In this study, men were found to be at a greater danger of work-related injury than women, which is endorsed by both trend and IVC assessments. The finding is in line with the studies of [41,42]. Intuitively, this could be due to the elevated proportion of male employees in the labor market, however, female workers opted for safer jobs given the low compensations [43]. Hence, this finding segregates the men and women workers on the basis of their preferences for risky or safer jobs which may or may not be subjected to their wages [22]. Moreover, we could not find any policy convention related to OHS for females in the OHS act demanding reconsideration of the policy on equity grounds.

The decline in growth rate in injuries in urban areas points out towards better medical and work facilities for workers than the base year in Table 14. Meanwhile, the base category analysis revealed that injuries in rural areas have been enhanced by 80% showing the persistent deterioration of health and medical facilities in rural areas of Pakistan.

The consistency of both trend and IVC results for regional distribution is justified as a major share of employment has been grabbed by the rural employees due to their attachment to the traditional farm sector [44]. Further, the OHS facilities in the rural clusters are associated with the inefficient allocation of resources and development infrastructure gaps between rural and urban regions [45]. In this respect, the availability of secondary and tertiary healthcare facilities is also a big impediment for injured employees as the majority of the hospitals and doctors are located in cities [46]. Therefore, an improvement in health, equity in finances, and responsiveness to the medical need of the population are highly required.

The trend and IVC assessments of OIW have been evaluated to analyze the prevailing OHS condition of injured workers in the labor market of Pakistan. This exercise has pointed out prominent heterogeneities at the industry level demanding a comprehensive and integrated framework for OHS improvements. In this respect,

the performance and efficiency of each major industry must be considered to capture the intact labor market settings at the sectoral level. As per the study expectation, the employee segment is found to have more probability of getting an injury during the job. Further, the occupational diversity extracted from both measures rejuvenates a need for extended analysis at the disaggregated level of the labor market. This finding is subject to insufficient job-related security measures for both skilled and unskilled workers. Therefore, the compatibility of skilled workers with modern production techniques and safety arrangements for unskilled workers is crucial for the ongoing development progress of Pakistan. Essentially, the data for vertical and horizontal job segregation of injured workers must be incorporated into the LFS of Pakistan. Considering the after-injury treatment, a positive trend for consultation shows an improvement in OHS facilities for workers given the fact that this area of the labor market has been widely overlooked. Further, the gender and regional distribution of OIW has been assessed to contemplate working disparities in Pakistan. On the whole, this research demonstrates a mix of results reflecting both assertive and negative outcomes for injured workers in Pakistan. In a nutshell, it is concluded that OIW must be examined considering both absolute and relative aspects of the labor market in order to enhance the productivity and security of the labor. For this purpose, rationalization and consolidation of labor laws are rudimentary to implicate with the OHS act in Pakistan. However, this is not an easy task as these laws are complex yet overlapping and anomalous. Correspondingly, the depiction of laws through the subject matter is much more complicated even for the subordinates. The prescription of penalties for offences and noncompliance are low and framed as well. All these factors jointly turned into the prevailing deteriorated situation of the OHS arrangement in Pakistan. It is thus recommended to segregate the labor laws into core constituents such as industrial relations, employment, service conditions, OHS considerations, human resource development, labor welfare and social security etc. Further, the divergences at the industry and occupational level are decisive to understand and update the OHS setups given the health sector issues for the labor segment in Pakistan.

Conflicts of interest

No potential conflicts of interest related to this article were reported.

References

- [1] Smith A. *The wealth of nations*. New York: Modern Library; 1937. Originally published. 1776;3.
- [2] Lebeau M, Duguay P. *The costs of occupational injuries: a review of the literature*. Institut de recherche Robert-Sauvé en santé et en sécurité du travail; 2013.
- [3] Thiede I, Thiede M. *Quantifying the costs and benefits of occupational health and safety interventions at a Bangladesh shipbuilding company*. *Int J Occup Environ Health* 2015;21(2):127–36.

- [4] Dorman P. The economics of safety, health, and well-being at work: an overview. Geneva: ILO; 2000.
- [5] Yanar B, Kosny A, Smith PM. Occupational health and safety vulnerability of recent immigrants and refugees. *Int J Environ Res Publ Health* 2018;15(9):2004.
- [6] Yokoyama K, Iijima S, Hiroto IT, Mari KA. The socio-economic impact of occupational diseases and injuries. *Ind Health* 2013;51(5):459.
- [7] Ramaswamy SK, Mosher GA. Using workers' compensation claims data to characterize occupational injuries in the commercial grain elevator industry. *J Agric Saf Health* 2017;23(3):203–17.
- [8] Ehrenberg RG. Workers' compensation, wages, and the risk of injury. National Bureau of Economic Research; 1985.
- [9] International Labour organization. World day for safety and health at work: facts on safety and health at work [Internet]. [cited 2019 Jun 10]. Available from: <https://www.ilo.org/global/topics/safety-and-health-at-work/lang-en/index.htm>.
- [10] Abbas M. Trend of Occupational Injuries/Diseases in Pakistan: Index value analysis of injured employed persons from 2001–02 to 2012–13. *Saf Health Work* 2015;6(3):218–26.
- [11] Rundmo T. Safety climate, attitudes and risk perception in Norsk Hydro. *Saf Sci* 2000;34(1–3):47–59.
- [12] Smith J. Time use among new mothers, the economic value of unpaid care work and gender aspects of superannuation tax concessions. *Australian Journal of Labour Economics* 2007;10(2):99.
- [13] Mock CN, Smith KR, Kobusingye O, Nugent R, Abdalla S, Ahuja RB, Apramian SS, Bachani AM, Bellis MA, Butchart A, Cantley L. Injury prevention and environmental health: key messages from Disease Control Priorities. *Injury Prevention and Environmental Health* 2017:1.
- [14] Fox L. Why are worker benefits and protections so limited in developing economies? Brookings Blum Roundtable 2016. Post-Conference Report. Washington, D.C.: The Brookings Institute. 2017. Available from: www.brookings.edu/wp-content/uploads/2016/07/Global_20160720_Blum_FoxWeb.pdf.
- [15] Min J, Kim Y, Lee S, Jang TW, Kim I, Song J. The fourth industrial revolution and its impact on occupational health & safety, worker's compensation and labor conditions. *Saf Health Work* 2019;10(4):400–8. <https://doi.org/10.1016/j.shaw.2019.09.005>. In this issue.
- [16] Kelly M, Strazdins L, Ellora TD, Khamman S, Seubsmann SA, Sleight AC. Thailand's work and health transition. *Int Lab Rev* 2010;149(3):373–86.
- [17] Ronconi L. Enforcement of labor regulations in developing countries. *IZA World Lab* 2019;457:1–9. <https://doi.org/10.15185/izawol.457>. Available from: <https://wol.iza.org/articles/enforcement-of-labor-regulations-in-developing-countries/long>. [Accessed 7 January 2020]. In this issue.
- [18] Wachter JK, Yorjo PL. A system of safety management practices and worker engagement for reducing and preventing accidents: an empirical and theoretical investigation. *Accid Anal Prevent* 2014;68:117–30.
- [19] Duval MR, Loungani MP. Designing labor market institutions in emerging and developing economies: evidence and policy options. *Int Monetary Fund* 2019: 1–58. SDN/19/04. <https://www.bookstore.imf.org/books/designing-labor-market-institutions-in-emerging-and-developing-economies>. [Accessed 15 January 2020]; 2019.
- [20] Unsar S, Sut N. General assessment of the occupational accidents that occurred in Turkey between the years 2000 and 2005. *Saf Sci* 2009;47(5):614–9.
- [21] Rhee KY, Choe SW, Kim YS, Koo KH. The trend of occupational injuries in Korea from 2001 to 2010. *Saf Health Work* 2013 Mar 1;4(1):63–70.
- [22] Khan AM, Hyder A. The statistical value of injury risk in Pakistan's construction and manufacturing sectors; 2017. Available from: <http://121.52.153.178:8080/xmlui/bitstream/handle/123456789/15541/01.pdf?sequence=1&isAllowed=y>.
- [23] Abdullah DN, Wern GC. An analysis of accidents statistics in Malaysian construction sector. In: International conference on E-business, management and economics, vol. 3. Honk Kong: IACSIT Press; 2011. p. 1–4.
- [24] Robinson JC. The rising long-term trend in occupational injury rates. *Am J Publ Health* 1988;78(3):276–81.
- [25] Coleman PJ, Kerkering JC. Measuring mining safety with injury statistics: lost workdays as indicators of risk. *J Saf Res* 2007;38(5):523–33.
- [26] Kachan D, Fleming LE, LeBlanc WG, Goodman E, Arheart KL, Caban-Martinez AJ, Clarke TC, Ocasio MA, Christ S, Lee DJ. Worker populations at risk for work-related injuries across the life course. *Am J Ind Med* 2012;55(4):361–6.
- [27] Jacinto C, Aspinwall E. A survey on occupational accidents' reporting and registration systems in the European Union. *Saf Sci* 2004;42(10):933–60.
- [28] Yoon HY, Lockhart TE. Nonfatal occupational injuries associated with slips and falls in the United States. *Int J Ind Ergon* 2006;36(1):83–92.
- [29] Jung DY, Kim HC, Leem JH, Park SG, Lee DH, Lee SJ, Kim GW. Estimated occupational injury rate and work related factors based on data from the fourth Korea National Health and Nutrition Examination Survey. *Kor J Occup Environ Med* 2011 Jun 1;23(2):149–63.
- [30] International Labor Organization. Women and men in the informal economy: a statistical picture. [Internet]; 2019 [cited 2019 Jun 20]. Available from: https://www.ilo.org/global/publications/books/WCMS_626831/lang-en/index.htm.
- [31] Begum R, Yasmeen G. Contribution of Pakistani women in agriculture: productivity and constraints. *Sarhad J Agric* 2011;27(4):637–43.
- [32] Amin H, Ali T, Ahmad M, Zafar MI. Participation level of rural women in agricultural activities. *Pak J Agric Sci* 2009;46(4):294–301.
- [33] Friedman LS, Almberg KS, Cohen RA. Injuries associated with long working hours among employees in the US mining industry: risk factors and adverse outcomes. *Occup Environ Med* 2019;76(6):389–95.
- [34] Bush J. Safety in store: from the back room to the parking lot, retail workers face many hazards on the job; 2018 [cited 2019 Nov 15]. Available from: <https://www.safetyandhealthmagazine.com/articles/16667-safety-hazards-retail-workers>.
- [35] Bailer AJ, Stayner LT, Stout NA, Reed LD, Gilbert SJ. Trends in rates of occupational fatal injuries in the United States (1983–92). *Occup Environ Med* 1998;55(7):485–9.
- [36] Chae H, Min K, Park J, Kim K, Kim H, Lee K. Estimated rate of agricultural injury: the Korean farmers' occupational disease and injury survey. *Ann Occup Environ Med* 2014;26(1):8.
- [37] Mekkodathil A, El-Menyar A, Al-Thani H. Occupational injuries in workers from different ethnicities. *Int J Crit Illness Inj Sci* 2016;6(1):25.
- [38] Hanvold TN, Kines P, Nykänen M, Thomée S, Holte KA, Vuori J, Wærsted M, Veiersted KB. Occupational safety and health among young workers in the nordic countries: a systematic literature review. *Saf Health Work* 2019;10(1): 3–20.
- [39] Rabbani U, Fatmi Z. Incidence, patterns and associated factors for occupational injuries among agricultural workers in a developing country. *Med J Islam Repub Iran* 2018;32:88.
- [40] Khaliq F, Ahmad W. State of health sector in Pakistan. SBP staff notes; 2018 [cited 2019 Nov 15]. Available from: <https://www.google.com/search?q=State+of+Health+Sector+in+Pakistan&sourceid=chrome&ie=UTF-8#>.
- [41] Holizki T, McDonald R, Foster V, Guzmicky M. Causes of work-related injuries among young workers in British Columbia. *Am J Ind Med* 2008;51(5):357–63.
- [42] Ince H, Ince N, Ozyildirim BA. Occupational accidents and forensic medicine in Turkey. *J Clin Forensic Med* 2006;13(6–8):326–30.
- [43] Schaffner S, Kluge J. Gender wage differentials and the occupational injury risk: evidence from Germany and the US. *Ruhr Econ Papers* 2007 Feb 1;28.
- [44] Chandrarot K, Liv D. Rural development and employment opportunities in Cambodia: how can a national employment policy contribute towards realization of decent work in rural areas? ILO; 2013.
- [45] International Labor Organization. Health and safety at work: facts and figures. Fact sheet [Internet]; 2013 [cited 2018 Dec 15]. Available from: http://www.ilo.org/global/about-the-ilo/media-centre/issuebriefs/WCMS_206117/lang-en/index.htm.
- [46] Mashhadi SF, Hamid S, Roshan R, Fawad A. Healthcare in Pakistan—a systems perspective. *Pak Armed Forces Med J* 2016;66(1):136–42.