

Non-fatal occupational accidents in Brunei Darussalam

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Received August 25, 2020 and accepted January 21, 2021

Published online in J-STAGE January 23, 2021

DOI <https://doi.org/10.2486/indhealth.2020-0174>

Abstract: Globally, ILO estimates 374 million non-fatal and 380,500 fatal occupational accidents annually. Slips, trips, falls and contact with objects are the leading modes of injury, with extremities being the most common body part involved. Occupational accidents are of major concern for high risk occupational groups such as migrant workers, or work areas e.g. construction, manufacturing, wholesale, and retail industries. This study was aimed to determine the prevalence of non-fatal occupational injuries and its trends among industry workers in Brunei Darussalam. A retrospective cross-sectional review of occupational accidents notified to the Occupational Health Division, Ministry of Health, over a five-year period from January 2014 until December 2018 was conducted. A total of 424 non-fatal occupational accidents were notified, with increasing trend from 44 in 2014 to 132 in 2018. Accidents were more common in males (98%), migrant workers (86%), in the 30–39 age group (42.5%), and in the construction industry (56.4%). Struck by object (37.7%) was the commonest cause and upper limb (43.9%) was the commonest body part involved. There is a need for workplaces to develop capabilities and support mechanisms for risk assessments, as well as auditing and reviewing performances to minimize occurrence of preventable occupational injuries.

Key words: Non-fatal occupational accidents, Occupational injury, Industry workers, Migrant workers, Construction industry

Introduction

Occupational accident is defined as any occurrence arising out of or in the course of work that results in a non-fatal or fatal injury¹. Occupational accidents remain an important public health issue with global estimates of 374 million workers with non-fatal injuries and 380,500 fatal injuries,

annually². The International Labour Organisation (ILO) estimates that 1 worker dies from a work-related accident or disease every 15 seconds, and 153 workers encounter a work-related accident every 15 seconds³. It is, however, acknowledged that this is likely to be an underestimate due to under-reporting⁴. Global economic loss from occupational accidents and illnesses is estimated to be almost 4% of GDP, primarily as a consequence of employee absenteeism, and temporary and permanent disablements².

Heinrich first described in 1930 that unsafe acts were responsible for 88% of occupational accidents, followed by unsafe working conditions⁵. Various studies have since

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identified other contributing factors for occupational accidents such as human factors (e.g. stress, fatigue), machinery and tools, workplace design, and environmental factors^{6, 7}). Gender and age also appear to have an association, as seen in several studies wherein work sectors have reported a higher number of work-related accidents among younger age group workers and among males⁸⁻¹²). Studies from Qatar and Saudi Arabia reported higher number of occupational accidents among their migrant population. Migrant workers' employment in high risk work sectors, coupled with communication barrier and lack of training were probable factors contributing to a higher number of fatal and non-fatal work-related accident rates^{9, 13, 14}).

Reports and studies from different countries suggest that occupational accidents are a major concern for high risk work sectors such as construction, manufacturing, agriculture, mining, forestry and fishing¹⁵⁻¹⁸). In Brunei Darussalam, construction (60%), mining (14%) and manufacturing (12%) were the leading sectors contributing to fatal workplace accidents from 2012–2016¹⁹). Contact with equipment and falling objects, and slips, trips and falls were the leading causes of occupational injuries in the United States in 2018²⁰). This was similarly seen in the United Kingdom with slips, trips and falls contributing to 29% of incidents; followed by handling, lifting and carrying (20%), and struck by an object (10%)¹⁷). Singapore reported slips, trips and falls as the commonest mode of injury among non-fatal injuries, whereas fall from height was the most common mode for occupational fatalities¹⁶). A previous study in Brunei Darussalam on workplace fatalities reported that fall from height as the leading mode of fatal occupational injuries (38%)¹⁹).

Brunei Darussalam currently has a total employed workforce of 201,742, comprising 58.3% male workers and 25.7% migrant workers. Employment is heavily concentrated in the services sector, particularly in public administration (22.9%), and wholesale and retail trade (12.7%). Construction industry is the third largest employment sector in the country comprising 10.2% of the total workforce. Migrant workers are mainly employed in elementary occupations (38%) such as manual labor, mainly in the construction (28%), manufacturing (8.7%), service (5%), and household (22.5%) sectors²¹). The Workplace Safety and Health Order (WSHO) 2009 and its subsidiary regulations, Employment Order 2009, and Workmen Compensation Act (Revised 1984) are national OSH-related legislations that govern the health, safety and welfare of employees at the workplace in Brunei Darussalam. These judicial measures have provisions that underscore the duties of the employer

and employee with regards to risk assessment and control of hazards, codes of practice, offences and penalties, accident prevention measures, and timely notification of workplace incidents²²).

This study aimed to determine the prevalence of reported cases of non-fatal occupational accidents among industry workers over a five-year period from January 2014 until December 2018. The objectives were to calculate the rate and analyze trend of non-fatal occupational accidents; to determine occurrence by demographic profiles (age, gender, nationality, mode and type of injuries, commonly affected body part); and to determine the accident by type of industry.

Materials and Methods

This retrospective, cross-sectional study reviewed occupational accident records that were notified to Occupational Health Division (OHD), Ministry of Health from January 2014 to December 2018. All notified cases of accidents occurring at the workplace in the government and private sectors were included. Fatal workplace accidents and sharps injuries occurring in the healthcare sector were excluded from the study. The study variables were age, gender, nationality, type of injury sustained, mode of injury, affected body part, and type of industry. Age was stratified into age groups, whereas nationality was categorized into 'local' or 'non-local'. Industry was classified as per ILO International Standard Industrial Classification of all Economic Activities (ISIC) 2004²³). Type and mode of injury and affected body part were classified according to ILO Statistics of Occupational Injuries¹). Data collected were analyzed using SPSS version 25. Frequency and percentage were used to describe categorical variables, and Monte Carlo Exact Test was used as a test of significance to determine for association between demographic variables, industry type, mode and type of injury, and affected body part. A *p* value of less than 0.05 was considered to be statistically significant.

The study obtained approval from the Institute of Health Sciences Research Ethics Committee (UBD/PAPRSBI-HSREC/2017/028).

Results

A total of 424 non-fatal occupational accidents were notified to OHD over the five-year period. The prevalence rate for non-fatal occupational injuries ranged from 2.32 per 10,000 in 2014 to 6.54 per 10,000 in 2018 (Table 1).

There was an increasing trend in number of cases notified year on year from 44 (2014) to 132 (2018) (Fig. 1.). The mean age of injured workers was 37.2 years, with injuries mostly occurring in the 30–39 age group (42.5%) and predominantly in males (98%). Migrant workers accounted for majority of the injured workers (86%) (Table 2).

Our study findings showed that common causes of non-fatal occupational injuries were struck by objects/ falling objects (37.7%), falls from height (25%), and contact with sharp items (20%), all of which were statistically significant (Table 3). 51.1% of injuries were superficial injuries and open wounds, followed by internal injuries (20.2%) and fractures (15.5%); these were significantly higher than other types of injuries sustained (Table 3). Most affected body parts were upper extremities (43.1%), followed by lower extremities (19.3%) and head (18.2%) ($p=0.03$ respectively) (Table 3).

Construction industry recorded the highest number of non-fatal injuries, with a mean of 56.4% over the five years. The second most common industry was wholesale and retail trade, repair of motor vehicles and motorcycles (13%), followed by manufacturing (8.0%) which was significantly higher than the number of non-fatal accidents recorded from other work sectors (Table 4).

Discussion

Our study findings showed that the number of non-fatal occupational accidents in Brunei Darussalam ranged from 44 to 132 per year with a prevalence rate of 2.3 to 6.5 per

10,000 workers during the five-year period. The Ministry of Health had embarked on an electronic patient medical records system in 2013 (Bru-HIMS) in three phases covering government health facilities under the ministry. Prior to 2013, the number of notified occupational injuries via submission of completed ‘Accident at Work Reporting Form’ to OHD were 99 (2010), 167 (2011), 233 (2012), 63 (2013)²⁴. A drop in 2013 is likely to be attributed to the transition period for the implementation of Bru-HIMS coupled with lack of awareness among health professionals in using the online method for notification to OHD. However, the numbers were observed to have improved after 2014 due to regular continuous medical education (CME) sessions that provided a valuable platform to highlight, educate and increase awareness to health professionals on occupational health and safety and reporting mechanism, as well as the role of OHD within the ministry.

In South East Asia region, the occupational injury rate in Brunei Darussalam is lower than that of Malaysia (28 per 10,000 workers) and Singapore (35.5 per 10,000 workers for minor occupational injuries and 1.74 per 10,000 workers for major occupational injuries)^{16, 25}.

A high proportion of occupational accidents were seen in male workers as males are more likely to be employed in labour-intensive and high risk industries such as construction and manufacturing. A similar result was seen with nationality; this is because migrant workers are mostly employed in labour-intensive and service industries and therefore are susceptible to workplace injuries.

Our study showed that most occupational accidents oc-

Fig. 1. Trends of Non-fatal Occupational Accidents from 2010 until 2018.

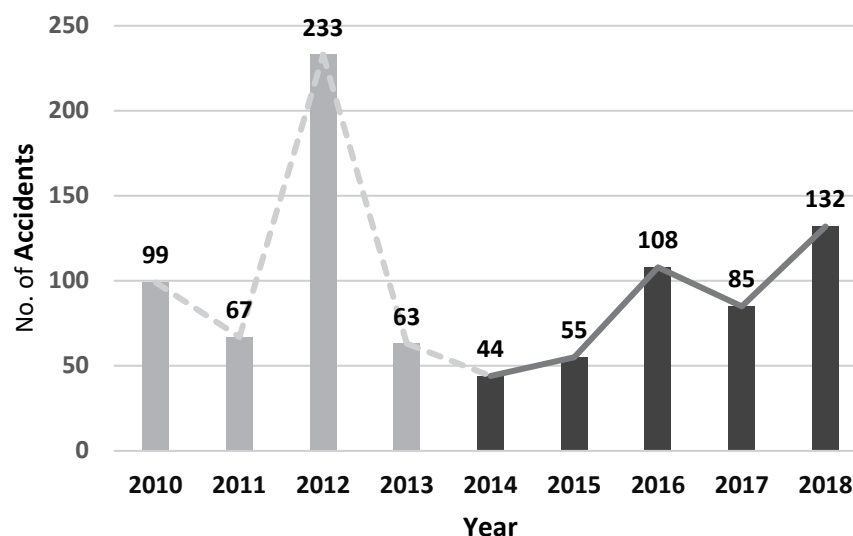


Table 1. Prevalence rate of occupational accidents by year per 10,000 workers.

Year	No of accidents	No of workers	Prevalence Rate (per 10,000)*
2014	44	189, 573	2.32
2015	55	188, 678**	2.91
2016	108	187, 783**	5.75
2017	85	186, 886	4.54
2018	132	201, 742	6.54

*Accident Prevalence Rate = Number of accidents in workers aged 15 years and above / Workforce x 10,000 workers.

** Estimates are based on employed workforce data for 2014 and 2017 (Labour Force Survey by Department of Economic Planning and Development).

Table 2. Demographics of workers.

Variable	2014 n (%)	2015 n (%)	2016 n (%)	2017 n (%)	2018 n (%)	Total
Age (years)						
20-29	5 (11.4)	11 (20)	18 (16.7)	24 (28.2)	29 (22)	87 (20.5)
30-39	18 (40.9)	23 (41.8)	41 (38)	34 (40.0)	64 (48.5)	180 (42.5)
40-49	17 (38.6)	18 (32.7)	39 (36.1)	18 (21.2)	33 (25)	125 (29.5)
50-59	4 (9.1)	3 (5.5)	10 (9.3)	6 (7.1)	6 (4.5)	29 (6.8)
>60	0	0	0	3 (3.5)	0	3 (0.7)
Mean age	38	37	38	37	36	37.2
(Range)	(24-51)	(21-52)	(22-58)	(20-69)	(20-57)	(20-69)
Gender						
Male	44 (100)	55 (100)	107 (99.1)	82 (96.5)	128 (97)	416 (98)
Female	0	0	1 (0.9)	3 (3.5)	4 (3)	8 (2)
Nationality						
Local	0	5 (9.1)	18 (16.7)	8 (9.4)	20 (15.2)	51(12)
Non-Local	40 (90.9)	46 (83.6)	90 (83.3)	77 (90.6)	112 (84.8)	365 (86)
Unknown	4 (9.1)	4 (7.3)	0	0	0	8 (2)

Table 3. Mode and Type of Injuries, and Affected body part.

Variable	2014 n (%)	2015 n (%)	2016 n (%)	2017 n (%)	2018 n (%)	Total	p-value** (95% CI)
Mode of Injury*							
A. Contact with electrical voltage, hazardous substances, or temp.	1 (2.3)	3 (5.5)	4 (3.7)	6 (7.1)	6 (4.5)	20 (4.7)	0.00 (0.00-0.01)
C. Falls	16 (36.4)	15 (27.3)	35 (32.4)	13 (15.3)	27 (20.5)	106 (25)	
D. Struck by falling objects	16 (36.4)	18 (32.7)	39 (36.1)	25 (29.4)	62 (47)	160 (37.7)	
E. Contact with sharps	4 (9.1)	10 (18.2)	15 (13.9)	31 (36.5)	25 (18.9)	85 (20)	
F. Crushed between objects	4 (9.1)	4 (7.3)	9 (8.3)	8 (9.4)	7 (5.3)	32 (7.5)	
G. Acute overloading of body	0	0	0	1 (1.2)	5 (3.8)	6 (1.4)	
H. Animal bites	0	1 (1.8)	1 (0.9)	1 (1.2)	0	3 (0.7)	
Z. Unidentified	3 (6.8)	4 (7.3)	5 (4.6)	0	0	12 (2.8)	
Type of Injury*							
A. Superficial Injuries and open wounds	14 (31.8)	38 (69.1)	62 (57.4)	37 (43.5)	66 (50)	217 (51.2)	0.00 (0.00-0.00)
B. Fractures	15 (34.1)	9 (16.4)	22 (20.4)	3 (3.5)	17 (12.9)	66 (15.5)	
C. Dislocations, sprain and strain	1 (2.3)	0	5 (4.6)	0	5 (3.8)	11 (2.6)	
D. Traumatic amputations	2 (4.5)	1 (1.8)	3 (2.8)	4 (4.7)	4 (3)	14 (3.3)	
E. Internal injuries	4 (9.1)	2 (3.6)	9 (8.3)	36 (42.4)	35 (26.5)	86 (20.3)	
F. Burns, corrosion and scalds	1 (2.3)	3 (5.5)	4 (3.7)	4 (4.7)	4 (3)	16 (3.8)	
H. Others specified types of injuries	0	0	0	1 (1.2)	1 (0.8)	2 (0.5)	
Z. Unspecified	7 (15.9)	2 (3.6)	3 (2.8)	0	0	12 (2.8)	
Affected body part*							
A. Head	10 (22.7)	10 (18.2)	11 (10.2)	12 (14.1)	34 (25.8)	77 (18.2)	0.03 (0.03-0.04)
C. Back, Trunk and Internal Organs	1 (2.3)	1 (1.8)	8 (7.4)	5 (5.9)	10 (7.6)	25 (5.9)	
D. Upper Extremities	15 (34.1)	25 (45.5)	48 (44.4)	39 (45.9)	59 (44.7)	186 (43.9)	
E. Lower Extremities	10 (22.7)	10 (18.2)	24 (22.2)	19 (22.4)	19 (14.4)	82 (19.3)	
F. Multiple Body Parts	7 (15.9)	5 (9.1)	11 (10.2)	10 (11.8)	10 (7.6)	43 (10.1)	
X. Unspecified	1 (2.3)	4 (7.3)	6 (5.6)	0	0	11 (2.6)	

*Classification as per International Labour Organization, Statistics of Occupational Injuries, 1998.

**Monte-Carlo Exact Test was used for statistical association as >20% of cell for expected values were less than 5.

occurred in the construction sector and the three leading causes of occupational accidents were struck by falling objects, fall from height, and contact with sharp items. A meta-analysis study on seventy-five articles found that fall from height was the leading cause of reported serious and fatal injuries in most countries, with the highest rate observed amongst construction workers when compared to other industries²⁶. Contributing factors for occupational accidents were lack of and/or non-adherence to company safety policies, lack of proper supervision, lack of training and educational programs for workers, incorrect work pro-

cedures, and negligence on personal protective equipment usage²⁷.

Superficial injuries and open wounds (51.1%) were the commonest type of injury in our study. Internal injuries (20.3%) and fracture (15.5%) were the next leading types of injuries, which was similarly seen in a study conducted in Malaysia where 10% of occupational injuries resulted in fractures²⁸.

This study showed that 43.9% of injuries occurred in upper extremities followed by 19.3% in lower extremities and 18.2% for head injuries. This was similarly seen in reports

Table 4. Incidence of occupational accidents categorised by industry and year.

Type of Industry*	2014 n (%)	2015 n (%)	2016 n (%)	2017 n (%)	2018 n (%)	Total n (%)	<i>p</i> -value** (95% CI)
A. Agriculture, forestry and fishing	1 (2.3)	0	0	6 (7.1)	2 (1.5)	09 (2.1)	0.00 (0.00-0.00)
B. Mining and quarrying	0	0	2 (1.9)	0	0	2 (0.5)	
C. Manufacturing	7 (15.9)	10 (18.2)	8 (7.4)	4 (4.7)	5 (3.8)	34 (8)	
D. Electricity gas, steam and air-conditioning supply	2 (4.5)	1 (1.8)	3 (2.8)	0	4 (3)	10 (2.4)	
F. Construction	22 (50)	22 (40)	49(45.4)	55(64.7)	91(68.9)	239 (56.4)	
G. Wholesale and retail trade, repair of motor vehicles and motorcycles	2 (4.5)	3 (5.5)	16 (14.8)	15(17.6)	19(14.4)	55 (13)	
H. Transportation and storage	0	3 (5.5)	3 (2.8)	0	2 (1.5)	8 (1.9)	
I. Accommodation and food service activities	3 (6.8)	1 (1.8)	4 (3.7)	4 (4.7)	9 (6.8)	21 (5)	
J. Information and communication	0	2 (3.6)	0	0	0	2 (0.5)	
L. Real estate activities	0	1 (1.8)	0	0	0	1 (0.2)	
S. Other service activities	4 (9.1)	3 (5.5)	14 (13)	0	0	21 (5)	
T. Activities of households as employers; undifferentiated goods and services-producing activities of households	0	2 (3.6)	0	0	0	2 (0.5)	
X. Unknown	3 (6.8)	7 (12.7)	9 (8.3)	1 (1.2)	0	20 (4.7)	

*Classification as per International Standard Industrial Classification of all Economic Activities (ISIC), 2004.

** Monte-Carlo Exact Test was used for statistical association as >20% of cell for expected values were less than 5.

from countries such as United States, Ireland, and Malaysia where common non-fatal occupational injuries occurred in upper extremities, lower extremities and head^{29–31}).

Conclusion

Our study showed that occupational accidents mostly occurred in male, migrant workers in the 30–39 age group. The main cause of workplace injury was struck by falling objects which resulted in superficial and open wounds, with upper limbs being affected the most. Majority of the accidents occurred in the construction industry. More proactive interventions are needed at the organisational and individual levels. Organisations should develop capabilities and support mechanisms for risk assessments, auditing and reviewing performances, as well as cultivate an open communication between employer and employees. Employees should instill in themselves a safety culture at the workplace, and pro-actively work with their employer or management to integrate and maintain a high standard of health and safety practices at their workplace.

Acknowledgements

The authors would like to thank Dr Norizni Mosli from Occupational Health Division, Ministry of Health for assisting with the work-related injury registry; and Dr Kyaw Thu from Disease Control Division, Ministry of Health for his support with data analysis.

Conflict of Interest

The authors declare that this study did not have any conflict of interest.

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