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Prevalence and factors associated with occupational injuries among building construction workers in the Gambia

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ABSTRACT

Background Although occupational injuries among building construction workers are a major public health concern, limited studies have focused on the prevalence and factors associated with injuries among building construction workers in sub-Saharan Africa. Accordingly, this study investigates the prevalence and factors associated with occupational injuries among building construction workers in the Gambia.

Method Using a cross-sectional design, 504 building construction workers with more than 12 months of work experience in the construction industry and aged ≥ 18 years were recruited from 22 registered companies in the Kanifing Municipality of the Gambia. Data were collected using a structured questionnaire and an observational checklist.

Results More than 56% of the building construction workers reported sustaining work-related injuries in the past 12 months. Majority of injuries reported were abrasions/lacerations (28.2%), followed by cuts (26.6%), backaches (23.8%) and piercing/punctured wounds (22.8%). Results of the multivariate logistic regression analysis showed that being male worker (adjusted OR (aOR), 3.06; 95% CI 1.31 to 7.19), had < 8 hours of work daily (aOR 3.46, 95% CI 1.44 to 7.78), smoke tobacco (aOR 1.97; 95% CI 1.36 to 2.85) and consume alcohol (aOR 0.27; 95% CI 0.08 to 0.95) were significantly associated with injuries from building construction work.

Conclusion Our findings show that injuries among building construction workers are prevalent in the Gambia. Male gender, work hours, tobacco use and alcohol consumption were associated with occupational injuries in building construction. Introducing and enforcing workplace safety policies in the building construction industry may help reduce occupational injury among construction workers in the Gambia.

INTRODUCTION

Occupational injury morbidities and mortalities are a global public health concern. Each year, an estimated 2 million deaths occur due to occupational injuries, and up to 374 million people sustain non-fatal injuries with more than 4 days of absence from work.¹ Beyond fatalities, occupational injuries contribute to the overall impact on global health and development as the human cost and the economic burden of poor occupational health and safety (OHS) practices are estimated to cost an economic loss of up to 6% of the gross domestic product for some countries.¹ Complications from

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Occupational injuries are a trending global public health concern and little attention is given to the health and safety of workers in sub-Saharan Africa.

WHAT THIS STUDY ADDS

⇒ The first injury study conducted among building construction workers in the Gambia; had higher injury prevalence and lesser preventive mechanisms.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Introducing and enforcing workplace safety policies in the building construction industry may help reduce occupational injury among construction workers in the Gambia.

injuries could cause temporal, partial or permanent disabilities to victims.² In addition to physical injuries and deaths, victims of occupational injuries also suffer mental trauma that persists even after their physical injury has healed.

Globally, occupational injuries mortality and morbidity are disproportionately distributed, with more than 90% occurring in low-income and middle-income countries. The mortality rate is more than 12 times higher in low-income countries compared with high-income countries.³ In sub-Saharan Africa, occupational injury rates ranked first, followed by Asia, excluding China and India⁴). Specifically, previous studies revealed that up to 59% of occupational injuries were reported in Ethiopia, Uganda and Ghana.^{5–8}

Although hazards exist in all occupations with the potential to cause injury to workers, the construction industry work environment is responsible for most occupational injuries.² It has been reported to be the second-largest cause of occupational injuries, causing public health and socioeconomic problems.⁹ Globally, occupational fatalities claim up to 20% of the global mortality burden out of every 5000 deaths; thus, 1 in every 5 is occupationally related.¹⁰ The most common occupational fatal injuries from construction works are falls (33%), being struck by an object (11%), electrocution (9%) and being caught in or between objects (6%).¹⁰ For building construction workers, the prevalence of occupational injury was more than 32%,⁶ and musculoskeletal pain accounts for up to 44% of injuries.⁵ Furthermore, lower back (26%), wrist/



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hands (17%) and upper back (16%) were the three leading types of musculoskeletal disorders among building construction workers.⁵

To our knowledge, information on injury characteristics and factors associated with occupational injuries among building construction workers in the Gambia is unavailable. However, determining the prevalence and characteristics of occupational injuries for building construction workers is an important initial step in developing effective work-related injury prevention strategies to reduce their incidence. Several studies in sub-Saharan Africa have revealed several factors associated with occupational injuries in building construction workers, such as administrative factors (lack of formal training, inadequate and inconsistent use of personal protective equipment (PPE), poor working environment, longer working hours) and personal factors (age, gender, alcohol consumption, marijuana smoking, job dissatisfactions and stress).^{6 8 9 11–13}

However, although these studies were conducted in sub-Saharan Africa, findings may not be inferred to building construction workers in the Gambia due to differences in sociocultural and work environmental factors. Moreover, to our knowledge, no study has investigated injuries from building construction workers in the Gambia. Accordingly, this study investigates the prevalence, injury characteristics and factors associated with building construction workers in the Gambia.

METHODS

Study settings and participants

A cross-sectional study design was used to determine the prevalence, and injury characteristics and identify factors associated with occupational injuries among building construction workers in the Gambia. Participants were recruited from registered construction companies in the Kanifing Municipality (KM).

KM is one of the eight local government administrative areas in the Gambia, accounting for more than 40% of the country's population.¹⁴ The municipality is endowed as the business hub of the country. A mayor heads the administrative organography of the municipality, with elected ward councillors charged with the welfare and development of the municipality.

Participants included building construction workers from 22 registered companies in KM with more than 12 months of work experience in the construction industry and aged ≥ 18 years. Injury from construction work was defined as any physical injury during construction work in the past 12 months before the study. Construction staff (drivers, security officers, office secretaries and managers) who are not directly involved with physical construction activities were excluded from the study. Additionally, sick construction workers during data collection were excluded to avoid precluding the study outcome.

Data collection

Data were collected through face-to-face interviews using a structured questionnaire and observation checklist. Data collectors were final students at the School of Public Health, Gambia College, who had received 4 hours of training to understand key areas of the structured questionnaire, comprehend the interpretation of key variables and how to collect the same information from all participants consistently.

Information collected from participants included sociodemographic variables (age, gender, ethnicity, marital status, level of education and gross monthly income), injury characteristics (body part affected, time taken for injury to health, causes of injury, injury frequency, nature of the injury, place of injury and

time of injury), ergonomic and psychological factors and injury prevalence (sustain an injury in the past 12 months).

The observation checklist was used to corroborate the information collected from participants and for the assessment of the general environment of the work site, including the sanitation of the work environment, use of the right tools for the job, availability and correct use of PPE, display of emergency contacts, presence of first aid box, condition of the first aid kit, presence of a mesh room and utility facilities at the worksite. Both interviews and observations were simultaneously done on-site by data collectors unnoticed.

To ensure reliability, the questionnaire was pretested in two construction companies in the West Coast Region of the Gambia that were not part of the study sample. The instrument displayed good reliability with alpha coefficients of 0.70.

Statistical analysis

All data analyses were conducted using IBM SPSS V.26.0. Socio-demographic characteristics between injured and non-injured participants were compared using Pearson's χ^2 or Fisher's exact test. A multivariable logistic regression model in which adjusted ORs (aORs) and their 95% CIs were computed was used to investigate factors associated with injuries for construction activities among building construction workers. The initial multivariable analysis included variables with a $p < 0.2$ in the bivariate analysis to minimise type II errors in variable selection and biased inferences.¹⁵ A $p < 0.05$ was considered statistically significant in the final model.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

RESULTS

In total, 500 of 504 participants recruited from 22 registered building construction companies in the KM consented to participate in the study resulting in a 99.2% response. More than 56% (56.4%) of the participants reported occupational related-injury in construction activity in the past 12 months. Over a quarter (38.7%) of injured participants reported being injured more than once in the past year. Most injuries reported were abrasions/lacerations (28.2%), and the body parts mostly affected were the lower limbs (61.7%). Notably, cut by a sharp object (34.7%) accounted for most injury mechanisms. Most participants reported more than 5 days (22.6%) to return to work following an injury (table 1 in online supplemental file 1).

The mean age of the participants was 33.8 years, mostly males (93.2%) and 61.0% were married. About 24% of the participants had no formal education, and only 8.6% attained tertiary education. Up to 6% were non-Gambians, and 39.2% had work experience of 1–5 years. Majority of the participants were temporal workers (40%), worked 8 hours daily (70.8%) and worked 6 days a week (28%), and earned a gross monthly income of D10 000–D15 000 (31.8%). On behavioural characteristics, 46.2% of the participants reported using tobacco products and alcohol consumption (2.8%) (table 2).

Nearly three-quarters (70.4%) of building construction workers reported using PPE. The most commonly used PPEs were hand gloves accounting for more than 63.7% of all reported PPE use. The main reason for PPE non-use reported was the unavailability (76.6%). These PPEs were reportedly used when performing a risky job (32.7%). More than 94% of the

Table 1 Injury characteristics among building construction workers

Variables	N (%)
Occupational injury	
Yes	282 (56.4)
No	218 (43.6)
Frequency of injury (n=282)	
Once	87 (17.3)
More than once	195 (38.7)
Nature of injury*	
Abrasion/laceration	142 (28.2)
Eye injury	38 (7.5)
Punctured	115 (22.8)
Dislocation/fractured	39 (7.8)
Cut	134 (26.6)
Backache/sprain	120 (23.8)
Electric shock	26 (5.2)
Amputation	2 (0.4)
Mechanism of injury*	
Fell from height	87 (17.3)
Cut by a sharp object	175 (34.7)
Hit by a falling object	103 (20.4)
Punctured by material	113 (22.4)
Overexertion during lifting	80 (15.9)
Struck by a machine	20 (4.0)
contact with the electric line	28 (5.6)
Others	7 (1.4)
Body part injured*	
Head and neck	61 (12.1)
Upper limbs	240 (47.7)
Lower limbs	312 (61.9)
Chest and abdomen	107 (21.2)
Others	1 (0.2)
Time to return to work (days)	
<1	66 (13.1)
2–3	46 (9.1)
4–5	53 (10.5)
>5	115 (22.6)

*Multiple responses.

participants reported that their construction sites do not have a health and safety unit (table 3).

Table 4 shows the results of multivariate logistic regression analyses of factors associated with occupational injuries among building construction workers. Compared with females, male building construction workers had increased odds of occupational injuries (aOR 3.06, 95% CI 1.31 to 7.19). Participants who had <8 hours of work daily had increased odds of occupational injuries (aOR 3.457, 95% CI 1.436 to 7.781) compared with those who worked >8 hours per day. Participants who reported the use of tobacco products had increased odds (aOR 1.965, 95% CI 1.355 to 2.848) of occupational injuries compared with those who do not report tobacco use. However, participants who reported alcohol consumption had decreased odds (aOR 0.25, 95% CI 0.08 to 0.95) compared with those who reported non-alcohol consumption.

DISCUSSION

The study was conducted to determine the occupational injury prevalence, characteristics and factors associated with occupational injuries among building construction workers in the Gambia. This was the first study specifically conducted to assess

Table 2 The sociodemographic characteristics of building construction who had sustained occupational injuries in the Gambia

Variables	No	Yes	P value
	n (%)	n (%)	
Age—years (mean±SD) (33.8±9.5)			0.695
18–25	34 (6.8)	38 (7.6)	
26–35	85 (17.0)	119 (23.8)	
≥36	99 (19.8)	125 (25.0)	
Gender			0.014
Male	194 (38.8)	272 (54.4)	
Female	24 (4.8)	10 (2.0)	
Religion			0.808
Muslim	203 (40.6)	261 (52.2)	
Christian	15 (3.0)	21 (4.2)	
Nationality			0.718
Gambian	206 (41.2)	266 (53.2)	
Non-Gambian	12 (2.4)	16 (3.2)	
Marital status			0.525
Single	86 (17.2)	103 (20.6)	
Married	131 (26.2)	174 (34.8)	
Divorced/widow	1 (0.2)	5 (0.8)	
Educational level			0.433
No formal education	53 (10.6)	99 (13.2)	
Primary	48 (9.6)	60 (12.0)	
Secondary	74 (14.8)	113 (40.1)	
Tertiary	43 (8.6)	43 (8.6)	
Work experience (years)			0.414
1–5	82 (16.4)	114 (22.8)	
6–10	67 (13.4)	94 (18.8)	
≥11	69 (13.8)	74 (14.8)	
Employment type			0.722
Daily paid	73 (14.6)	102 (20.4)	
Temporal	87 (17.4)	113 (22.6)	
Permanent	58 (11.6)	67 (13.4)	
Hours worked per day			0.005
<8	34 (6.8)	74 (14.8)	
8	162 (32.4)	192 (38.4)	
>8	22 (4.4)	16 (3.2)	
Estimated gross monthly income			0.812
<10 000	101 (20.2)	126 (25.2)	
10 000–15 000	66 (13.2)	93 (18.6)	
>15 000	51 (10.2)	63 (12.6)	
Smoking			<0.001
Yes	81 (16.2)	150 (30)	
No	137 (27.4)	132 (26.4)	
Alcohol consumption			0.041
Yes	267 (53.7)	14 (2.8)	
No	213 (42.9)	3 (0.6)	

injury prevalence among construction workers in the Gambia, to the authors' knowledge.

The occupational injury prevalence among building construction workers in the Gambia reported in the last 12 months was nearly 60%. This prevalence is high, like several similar studies conducted in sub-Saharan Africa,^{5–7 16–19} but a study conducted by Amisshah *et al* has similar results.⁸ These variations and similarities in the prevalence of occupational injuries could be associated with the difference in socioeconomic background, professional training in the construction industry and OHS services standards. Although establishing a construction company is highly regulated in the Gambia, individual workers health and safety

Table 3 Behavioural and psychological characteristics of the participants

Variables	N (%)
Use of PPE	
Yes 355	355 (70.4)
No 145	145 (28.8)
Type of PPE*	
Gloves 321	321 (63.7)
Helmet 225	225 (44.6)
Hard Boots 282	282 (56.0)
Nose mask/respirator 28	28 (5.6)
Overall 92	92 (18.3)
Reflective vest 57	57 (11.3)
PPE use frequency	
Always 45	45 (8.9)
During all procedures 141	141 (28.0)
Performing risky job 165	165 (32.7)
During OSHA supervisory visit 4	4 (0.8)
Reasons for not using PPE (n=145)	
Unavailable 111	111 (76.6)
Uncomfortable 32	32 (22)
Unaffordable 105	105 (72.4)
Presence of health and safety unit	
Yes	18 (3.6)
No	482 (96.4)
Smoking status	
Yes	231 (45.8)
No	269 (53.4)
Product smoked*	
Cigarette	226 (44.8)
Tobacco leaf/manis	17 (3.4)
Cannabis	71 (14.1)
Drink alcohol	
Yes	17 (3.4)
No	483 (96.6)

*Multiple responses.
OSHA, Occupation Safety and Health Administration; PPE, personal protective equipment.

is not prioritised. Additionally, most people in this sector do not receive professional training in construction; the trade is learnt through apprenticeship.

Conversely, a study done to assess the occupational hazards among construction workers revealed a high prevalence of occupational health risks generally among building construction workers in the Gambia.²⁰ As such, these hazards prone workers to occupational injuries, and the effectiveness and efficiency of OHS in the construction industry in the country is still undesirable.

Based on sociodemographic characteristics, the study revealed a higher injury prevalence among male workers (54.4%), signifying that the construction industry is a dominantly male enterprise in the Gambia. Construction work requires rigorous physical work, strength and agility; thus, male dominance is desirable by construction firm owners. Additionally, sociocultural concerns lead to gender stereotypes of female involvement in the physical works of construction works. Thus, the study revealed that female involvement in the construction industry is attached to more technical work than the physical work section of building construction.

Additionally, the age category of 35 and above years had the highest prevalence (25.0%) of occupational injuries, and work

Table 4 Multivariate analysis of factors associated with occupational injuries among participants

Variables	aOR	95% CI	P value
Gender			
Male	3.06	1.305 to 7.185	0.002*
Female	1		
Age (in years)			
18–25	1.023	0.55 to 1.902	0.944
26–34	1.281	0.778 to 2.109	0.33
≥35	1		
Work section			
Mason	0.792	0.315 to 1.988	0.619
Carpenter	1.534	0.561 to 4.194	0.404
Labourer	0.618	0.237 to 1.612	0.325
Steel bender	2.794	0.814 to 9.589	0.102
Tile Man	1.054	0.389 to 2.854	0.918
Plumber	0.298	0.098 to 0.907	0.033*
Electrician	1		
Hours worked per day			
<8 hours	3.457	1.536 to 7.781	0.003*
8 hours	1.893	0.919 to 3.899	0.084
>8 hours	1		
Estimated monthly income			
<10 000	0.93	0.541 to 1.598	0.792
10 000–15 000	1.071	0.635 to 1.806	0.797
>15 000	1		
Days worked per week			
4	0.66	0.215 to 2.03	0.634
5	1.73	0.71 to 4.212	0.111
6	0.936	0.55 to 1.592	0.991
7	1		
Work experience (in years)			
1–5	1.296	0.84 to 2	0.241
6–10	1.308	0.831 to 2.059	0.246
≥11	1		
Smoking			
Yes	1.965	1.355 to 2.848	<0.001*
No	1		
Alcohol consumption			
Yes	0.269	0.076 to 0.947	0.041*
No	1		

*Statistical significance at p<0.05.
aOR, adjusted OR.

experience of less than 5 years also had an injury prevalence of 22.8%. The finding denotes the country's youthful population, and evidence revealed that young and amateur workers are more liable to occupational injuries. High vulnerability risk is noted among youths at work, thereby influencing occupational injury. The sociodemographic characteristics are similar to findings from studies conducted in Kampala and Kumasi.^{7 8 21}

The injury characteristics of the study revealed that the nature of the injuries were abrasions/lacerations 28.2%, cuts 26.6%, backaches 23.8% and pierced/punctured wounds 22.8%. The findings are in a similarity to many studies, such as a study in Ghana,²² Ethiopia,²¹ the USA,¹³ the Gambia²³ and Egypt,¹⁶ which all recorded open wounds/laceration, cuts and sprains were the major injuries sustained by their participants. The study further revealed that being cut by a sharp object, punctured by construction material, hit by a falling object and falling from height were

the reported occupational injury mechanisms (causes) among the participants.

The study depicted that the lower limbs, upper limbs and the chest and abdomen are major anatomical features used in building construction works. They were also found to be the frequently recorded injury characteristics (61.7%, 47.7% and 21.2%), respectively. The repetitive involvement of these anatomical features in construction work increase the risk of occupational injuries. Studies that assessed injury characteristics have recorded similar findings in Egypt¹⁶ and Ethiopia.^{9 18 21}

The study identified that most injuries happened on the ground floor, on walls and at height from the ground level. The ground floor and wall constructions are tedious and labourious activities in building construction yet may require the services of unskilled construction workers (labourers). This could translate into occupational injury prevalence among such categories (section). The injury time frequently occurred mostly in the afternoon and the evening (28.4% and 15.7%) as physical and environmental factors played a role in the injury characteristic.

The association between occupational injuries and male gender in the construction industry could result from male dominance in construction. The risk associated and labourious job demands of construction work in the Gambia has more male involvement than female gender. Interestingly, female construction workers in this study were more into technical positions than physical, yet they also reported some occupational injuries. Amissah *et al* have highlighted that construction work in Ghana is restricted to the male gender.⁸ However, some studies have shown no statistical significance between gender and occupational injuries in construction as in the USA, Egypt and South East Ethiopia.^{9 13 16 18}

The study has depicted that a section in building construction was associated with occupational injuries. The mason section, steel benders and carpenters all had adjusted odds of occupational injuries compared with electricians. These section workers are vulnerable to injuries due to their work nature and the tools used. Notably, the carpentry section in building construction work from height and sharp cutting tools is an added risk to their work.

Hours of work were also associated with occupational injuries; construction workers who work for a period of <8 hours have an adjusted odd of nearly four times to sustain occupation (aOR 3.457; 95% CI 01.536 to 7.781) as compared with workers who spend more than 8 hours of work in construction. Interestingly, this finding differs from the evidence that working more than normal working hours (8 hours) increases the risk of fatigue and injury. However, temporal employment accounted for 40% of the employment type in this study. The duration of hours spent at work determines the completion of the assigned temporal job and even the pay. Thus, the anticipation of finishing the job, overtime payment, and overexertion due to fatigue could lead to increased occupational injury among building construction workers.

Injury is one of many adverse consequences of substance use and misuse, and is therefore often suspected of contributing to occupational injuries. Interestingly, the study also revealed a statistically significant relationship between our respondents' psychological and behavioural characteristics and occupational injuries. Several studies have reported an association between occupational injuries and psychological and behavioural factors.^{2 6-8 12 21} However, alcohol consumption in this study is deemed a protective factor to occupational injuries among building construction workers (aOR 0.269, 95% CI 0.076 to 0.947), and this finding contradicts many studies conducted in

sub-Saharan Africa.^{2 6-8 12 21} Few respondents reported that they consumed alcohol, and all of them consumed it after work and off day.

There are several limitations to this study. First, since a cross-sectional study design was used, the causality of the factors identified cannot be ascertained. Second, the results may not be generalised to all building construction workers since this study focused only on companies registered in KM. Those working in companies registered in other regions might have different work procedures, environments and injury characteristics. Third, the information reported by participants could not be validated. Participants might have intentionally exaggerated their injuries in the hope of compensation. Fourth, although all participants were carefully interviewed, misclassifying the injury as occupational and non-occupational injury could not be eliminated, which might have overestimated or underestimated the injury characteristics, and the effects of factors associated with occupational injuries. Finally, there are possibilities of recalled bias as occupational injuries that occurred in the past 12 months might not have been reported, which could have underestimated the prevalence of occupational injuries.

Despite the limitations, to our knowledge, this is the first study in the Gambia to specifically investigate occupational injuries among building construction workers. Moreover, the study had a large sample size which signifies the power of the study, and the findings could be generalised to construction workers in the KM. Using an observation checklist helps validate the insufficiencies in the construction site's environmental and occupational health service needs.

CONCLUSION

Like many LMICs, the Gambia is experiencing rapid infrastructural development with little or no attention to workers' safety. Our findings show that injuries among building construction workers are prevalent in the Gambia. These injuries were mostly abrasions/lacerations and cuts affecting the upper and lower extremities. Male gender, work hours, tobacco use and alcohol consumption were associated with occupational injuries in building construction.

Attempts at combating occupational injuries should target proprietors or owners of building construction companies in the Gambia. They should establish OHS units, provide appropriate personal protective equipment and train construction workers on health and safety. Introducing and enforcing workplace safety policies in the building construction industry may help reduce occupational injury among construction workers in the Gambia.

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