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A survey of work-related injuries among building construction workers in southwestern Ethiopia

Abate Lette[a,1], Argaw Ambelu[b,*,1], Tadesse Getahun[b], Seblework Mekonen[b]

[a] Department of Public Health, Goba Referal Hospital, Madawalabu University, P.O. Box 247, Goba, Ethiopia
[b] Department of Environmental Health Science and Technology, Jimma University, Ethiopia

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ABSTRACT

Construction sites are known to be one of the most dangerous areas for human health and safety. In developing countries, enforcement of safety rules are often negligible to minimize occupational injuries and illnesses. As the result, work related injuries are very rampant. Currently, Ethiopia is one of the developing countries where strong growth of construction industries are observed. However the prevalence of injuries in these industries could vary from place to place and even by company. The present study assessed the prevalence of injury and associated factors among building construction workers in southwestern Ethiopia. Institutional based cross-sectional study was conducted among workers of construction industries located in Jimma town. A stratified multi-stage sampling followed by simple random sampling was used to select the study participants. A pre-tested and structured questionnaire was used to collect data. Physical examination of the study subjects was done to complement self-reported information of occupational injury. Bivariate logistic regression analyses followed by multivariate analyses were employed to identify main causes of injury. The overall prevalence of work-related injuries in the preceding one year was 41.4% [95% CI: (37.8, 49.4)]. The top five injuries were injured by object (36.9%), followed by lower back pain (35.6%), falling injury (23.5%), skin disorder (20.1%), and eye problem (18.2%). Working without personal protective equipment (PPE), absence of vocational training, khat chewing, and working overtime were significantly raised the odds of having work-related injuries among construction workers. The finding revealed that provision of safety equipment and promoting its utilization, avoiding work overload, and controlling khat use in workplace could help to minimize work-related injuries and occupational diseases to ensure construction site safety.

1. Background

Globally, workplace injuries are known to impact the health of the workers in particular and surrounding community in general. Workers spend most of their time at work baring themselves to various work-related hazards. Being exposed to different occupational hazards are known to cause personal injury or disease such as falling, injured by object, musculoskeletal disorder, skin disorders, eye problem, breathing difficulty, cardiovascular disorders, hearing problems and so on (Alazab, 2004; Yiha and Kumie, 2010). However, it is not always easy to label a disease as being work-related or not. There are so many diseases that could be associated to workers' job directly or indirectly. Some health problems may be purely non occupational but could be aggravated by working a specific job (Tadesse and Israel, 2016). Work related injuries or diseases are the most significant cause of work absence, disability, retirement, mutilation, and even death (Nghitanwa and Lindiwe, 2017; Proffitt and Beacham, 2012). Global estimates by ILO indicate that the work-related problems are becoming bigger than before. As the result, it is becoming an epidemic problem in the field of public health in many parts of the world, specifically in developing countries (Moradinazar et al., 2013; Tadesse and Israel, 2016). Every year, about 1.1 million people die of occupational injuries and work-related diseases (Amponsah-Tawiah and Mensah, 2016; Bharara et al., 2012; Hämäläinen et al., 2006; Yiha and Kumie, 2010). Among many sectors, the construction industry contributes large number (17%) of injuries and deaths (Balaji and Kothai, 2014; Bharara et al., 2012; Mo et al., 2008).

Construction work environment is generally more hazardous than most other work environments due to the use of heavy equipment, dangerous tools, hazardous materials, its structural and organizational challenges for risk management and rapidly changing workplace and work conditions (Adane et al., 2013; del Puerto and Gilkey, 2014).

* Corresponding author. P.O. Box 378, Ginjo, Jimma, Ethiopia.
E-mail addresses: abate.lette@yahoo.com (A. Lette), aambelu@yahoo.com (A. Ambelu), tadessegeta@yahoo.com (T. Getahun), seblework2001@yahoo.com (S. Mekonen).
[1] Authors have equal contribution.

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These days, there is increasing trends, not only in terms of volumes of work done, but also in terms of the complexity of construction projects. Many cities in the world have been changed from what they used to be in the early 1990s due to ongoing progresses to road infrastructure, power lines, telecommunication systems, multi-story buildings and expansion of different facilities and business centers. This leads many individuals, both skilled and unskilled workers, to be involved in the construction industry (WIEGO, 2011).

However, the capacity of construction companies in most developing countries hardly pay attention to the safety of their workers. On top of that, majority of construction workers are illiterate and unorganized (Rai Sharma et al., 2008); they perform their daily activates with cheap payment (Adane et al., 2013; Mo et al., 2008); the employees have not formal relationship with the employer (Balaji and Kothai, 2014); and the construction place of work by itself is temporarily. These conditions make the industry very risky work environment, because the challenges related to provision of PPE, training and other health and safety services to the construction employees (Bena et al., 2009; Kurpiewska et al., 2011; Tadesse and Israel, 2016). It is projected that construction employees are 3 times more likely to be killed and twice more likely to be injured than workers in any other job (Hämäläinen et al., 2006). Therefore, injuries and occupational diseases at construction sites are identified as a major public health and development problem throughout the world (Moradinazar et al., 2013; Yiha and Kumie, 2010; Zheng et al., 2010). The results of 19 years of research in the United States of America showed that about 11.5% of work related injuries among construction workers and 7.2% among other industrial workers (Rai Sharma et al., 2008). In China, occupational injuries are the fourth leading cause of death next to malignant tumors, cardiovascular diseases and diseases of respiratory system (Zheng et al., 2010).

In developing countries, the risks that foster ill health are estimated to be 10 to 20 times higher than in developed countries (Amponsah-Tawiah and Mensah, 2016; Hämäläinen et al., 2006; Tadesse and Israel, 2016). In Egypt, about 13% of work-related deaths and 18% of occupational injuries were recorded among workers in the construction industry (Alazab, 2004). In Ethiopia, little work has been done on occupational health and safety, especially on building construction workers. The prevalence of work-related injuries among building construction workers in Gondar is identified to be 38.7% [6] and in Addis Ababa 38.3% (Tadesse and Israel, 2016). Still the health and safety problems of construction industry were not reduced in many parts of developing countries (Balaji and Kothai, 2014). Lack of regulatory enforcement in the construction industry could also contribute to occupational injury where application of occupational health and safety standards could be limited. This problem is more severe for construction industries that are located far from the capital Addis Ababa, where many illiterates are being employed and absence of routine monitoring of the safety standards. Therefore, this study is designed to identify major factors that contribute work-related injuries among building construction workers in Jimma town, southwestern Ethiopia.

2. Methods

2.1. Study design, area and period

An institutional based cross-sectional study design was carried out in March 2016 in Jimma town, southwestern Ethiopia. Many building construction activities are being held in Jimma. By the time of this study, about ten Level 1 building construction industries were performing building construction work in the town.

2.2. Sample size determination and sampling techniques

Single population proportion formula was used to determine the sample size by taking 38.7% expected proportion of injury (Adane et al., 2013), 5% confidence limit, 95% confidence level, 10% non-response rate. And we didn't use design effect since stratified sampling gains precision. Our design didn't loss efficiency as many researchers agree that stratification is applied to decrease the sampling variance or sampling error, and clustering raises the sampling variance significantly. We used simple random sampling assumption with an appropriate allocation rule, in this case the design effect always less than or equal to one (Mukhopadhyay, 2016).

A stratified multi-stage sampling technique was used to select the study participants. From 10 construction sites 5 sites (50%) were randomly selected using random number generator (Sambo et al., 2003). The building construction industry workers were first stratified by their job category, namely excavation work, daily laborer (carrying and transporting building materials within the site), mason, plasterer, welder, painter, and machine operator. It is apparent that work-related injuries could differ with the nature of the work and working conditions since a particular job will generate predominantly a specific hazard (Rai Sharma et al., 2008; Yiha and Kumie, 2010). The appropriate sample size of workers from each stratum was determined by using proportional allocation. Finally, simple random sampling technique was employed to selected the study participants and determine the sample size from each stratum (i.e. 34 to excavation work ($N_1 = 240$), 135 to daily laborer ($N_2 = 947$), 81 to mason ($N_3 = 570$), 64 to plasterer ($N_4 = 439$), 22 to painter ($N_5 = 141$), 14 to welder ($N_6 = 95$), and 10 to machine operators ($N_7 = 65$)). We used the payroll as a sampling frame to pick the study participants using simple random sampling method. Five experienced nurses participated in the data collection processes.

2.3. Data collection and data quality control

Data were collected from all workers who were directly involved in the construction activity until the required sample size was attained. A structured and pre-tested interview questionnaire was used to collect the data. Physical examination by experienced nurses was done to complement self-reported information. Detailed information about the socio-demographic, behavioral characteristics, work environment, personal history, work history, awareness and practice towards safety and health in the work place among construction workers and occurrences of injuries in the preceding one year were collected.

Data quality was assured with tool development and pretest, training, data collection, coding, entry and analysis. The training of data collectors and supervisors mainly focused on issues such as data collection tools, field methods, inclusion–exclusion criteria and record keeping. The investigators coordinated the interview process, and reviewed the completed questionnaire on a daily basis to ensure the completeness and consistency of the data collected. The questionnaire was pre-tested on 18 construction workers outside the companies selected for this study.

2.4. Safety practices assessment

A likert scale items were designed to evaluate regulatory activities of the construction industry regarding on the implementation of safety practices. The responses from “strongly disagree” to “strongly agree,” were numerically assigned 1 to 5. Lower mean scores point out stronger disagreement while higher mean scores show stronger agreement for each of the questions. All foremen and site engineers were interviewed with semi structured self-administered questioner. The Cronbach's coefficient alpha of the consistency and validity of the instrument was put at 0.995. This is highly acceptable and the instrument has met the reliability requirement for the study.

2.5. Data management and analyses

The data was entered to EPI-data 3.1 and then exported to SPSS