

BRIEF COMMUNICATION

**OCCUPATIONAL EXPOSURES AND RELATED HEALTH EFFECTS
AMONG CONSTRUCTION WORKERS**

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ABSTRACT

Background: A significant number of people are working in construction activities and have different types of health problems relating to their work and workplace environment.

Methods: A questionnaire - based survey was conducted on the construction workers of Maraki campus, Gondar University, in February 2005.

Results: This study showed that the workers were suffering from shoulder- aches, back pains, skin related diseases, problems in the eyes, breathing and noise irritations. The percentage of workers with different health problems varied.

Conclusions: Awareness among workers regarding dangers and risks at work place, use of personal protective equipments, and good personal hygiene practice to minimize unnecessary exposure to worksite contaminants were found to be important to decrease the magnitude of the problems and improve the health status of workers.

Keywords: occupational exposures, construction workers, work related diseases.

INTRODUCTION

Men spend most of their time at work exposing themselves to workplace environments. Developing countries like Ethiopia are striving hard to improve their basic amenities by building schools, hospitals, housing complexes, shops, offices, highways, power plants, industries, bridges and other infrastructures. There is unskilled labor force at cheap rate for construction activities, agriculture and small scale industries. Occupational hazards among these workers are high due to illiteracy, poverty, lack of proper training and information on dangers and risks at the work place and other related factors. Such workers are known to face rapidly changing workplaces, a high degree of competition and bouts of unemployment (1,2).

It is estimated that construction workers are three times more likely to be killed and twice as likely to be injured than workers in any other occupation (3). The results of 19 years of research in the United States of America showed about 11.5% of work related injuries among construction workers and 7.2% among other industrial workers (4). In developing countries the occupational health and safety hazards faced by construction workers are greater than those in industrial countries (5). However, in African countries where traditional hazards have not been dealt with adequately the introduction of new technolo-

gies, chemicals, and materials have led to new occupational and work-related diseases and hazards (6). As evidenced in the literature review, internet and journals survey, little work has been carried out on occupational health aspects in Ethiopia. Faris (7) identified the possible safety and health hazards, sanitary conditions, and health promotion and accident prevention aspects of small scale enterprises in Ethiopia. The prevalence of work related accident rates was 178 per 1000 workers per year in Ethiopia during 1995 (8).

The Ministry of Health (9) reported a prevalence rate of 723 injuries per 1000 exposed workers out of 16,610 large scale industrial workers in Addis Ababa. However, for medium and small scale industries in Gondar town/wereda, the overall prevalence rate of work-related injuries was 335 per 1000 exposed workers (10). There is lack of data about estimation, evaluation, and intervention of work related health problems, accidents and injuries among construction workers. So the present study was carried out with the objective of identifying potential exposures and their effects on construction workers in Gondar town of Amhara region.

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METHODS

Study area: The study area is Gondar town (wereda), the capital of North Gondar Zone in the Amhara Regional State, located 750 km North West of the capital city of Addis Ababa. It is situated between 12°36'N and 33°28'E at an altitude of about 2300 m above the mean sea level with an average temperature of 20°C and an average annual rainfall of 1800 mm. The town, with a population of 186,077 (11), has 21 kebeles, one hospital, 3 health stations, 2 health centers, one university, 4 colleges, 6 secondary schools, one preparatory school (Sr. Sec. School), one technical and vocational school, 27 primary schools, 13 kindergartens, and an airport.

The wereda has a total of 140 small, 16 medium scale and 2 big industries with a total of about 566, 312, and 561 employees, respectively (12, 13). However, no published data is available on the number of workers enrolled in construction activities in the Amhara Region, but judging from personal communications with the Amhara Regional Labor and Social Affairs Bureau, Bahir Dar, approximately 20,000 workers are engaged in this profession. The construction industry includes many types of work like building processes, civil engineering, painting, landscaping, electrical supplies, telecommunications, plastering and paving (14). Due to economic constraints, we have limited our study to the building process, painting, plastering, paving, welding, carpentry and other similar activities under the construction industry.

Data Collection: Considering the ease of access for interviewers, a building construction site at Maraki Campus of the University of Gondar, Gondar, Amhara Region, was selected. The study was carried out during February 2005 and students of Occupational Health and Safety Department were involved in the filling in the questionnaires. The questionnaire was designed keeping in mind the type of work and activities going on at the site. The work and data quality was ensured by the authors through practical sessions in the department prior to the final survey. Out of 100 workers (70 males and 30 females) employed by the contractor were interviewed. They were engaged in different types of construction activities as mentioned above.

The data was generated by using a self administered questionnaire and through personal observations at the site. The filling in of the questionnaire was done carefully in the presence of one of the authors. The collected data was processed with the help of a scientific calculator and the results are presented in the

form of tables and figures. Administrative approval was obtained before conducting the survey and ethical considerations were respected. The workers were told about the aim of the study and were informed that the data would be used only for scientific purposes. They were also given the choice to refuse to participate in the survey. The study did not include a general medical examination of the workers. As mentioned earlier, the operational definition of the construction industry was taken from Hinksman (14) with a slight modifications and that of work-related injury from MOLSA (15).

RESULTS

The participation rate was 100%. During the study, the construction workers were found to be involved in activities like excavation, cutting of stones, and carrying of stones/cement/soil. Male workers were engaged in steel erection, laying of roofs, building, carpentry, painting, welding, and plastering, while females were generally engaged in carrying things to the site or from the site.

Age distribution: Seventy-two percent of the female and 28% of the male construction workers in the study site belonged to 15-20 years of age group. Among the male workers the highest percentage (58%) belonged to the age group of 21-30 years (Table 1).

Musculoskeletal disorders: From the study, it was observed that 81.8% of the female and 54.17% of the male workers were suffering from shoulder-ache or back pain or both. Usually, such complaints were more frequent at the end of the day's work.

Skin disorders: About 84.5% of the female and 62.5% of the male workers reported to have blisters, boils, skin itching and discoloration.

Eye problems: In the present investigation, 63.6% of the female and 68.75% of the male workers reported to have eye problems like eye irritation, eye injuries, eye infections and redness in eyes.

Respiratory problems: Among the workers, 27.30% of the female and 22.9% of the male workers complained of difficulty in breathing.

Workplace accidents : In the present study, accidents varying from life threatening i.e. serious (18.20% in females and 20.8% in males) to slight (24.20% in

Table 1: General characteristics and occupational health related problems among construction workers

S. No.	Criteria	Male workers (N=70) (%)	Female workers (N=30) (%)	Total (N=100) (%)
Socio-demographic characteristics				
Age (yrs.)	15-20	28.0	72.73	42.0
	21-30	58.0	12.12	44.0
	31-40	8.0	12.12	09.0
	41 and above	6.0	3.03	05.0
Work experience (yrs.)	Below one year	35.42	60.60	43.0
	Above 1 year up to 5 years	41.67	39.40	41.0
	Above 5 years up to 10 years	18.75	0	13.0
	Above 10 years	4.17	0	03.0
Use of PPE	0	0	0	
Occupational Health Problems among workers				
Fall accidents at work site	Serious	20.83	18.20	20.0
	Medium	12.50	6.10	11.0
	Slight	16.67	24.20	18.0
	Nil	50.0	51.50	51.0
Hurt by sharp instrument	72.92	33.30	61.0	
Eye problems	68.75	63.63	67.0	
Difficulty in breathing	22.92	27.30	24.0	
Skin disorders (lesions, blisters, discolor etc.)	62.50	84.50	69.0	
Noise irritation	45.83	45.45	46.0	
Head-ache	70.83	57.57	67.0	
Skeleto-muscular problems (Back-ache, neck pain etc.)	54.17	81.81	64.0	

females 16.67% in males) were reported by the workers. Ethically it is the duty of the contractor to immediately provide medical facilities for workers who face accidents at the work site. Serious injuries need immediate attention and medical treatment. However, no reserve vehicle was found at the site to take the workers to hospital. Injuries from sharp instruments was recorded to be higher in male 72.92% than in female (33.3%) workers.

Noise irritation: As experienced during the site visits, the noise level at the construction site was high. However, due to the non-availability of noise measuring devices, correct measurement was not possible. Forty-six percent of the workers felt irritation and about 67% reported to have headaches which could be due to noise pollution.

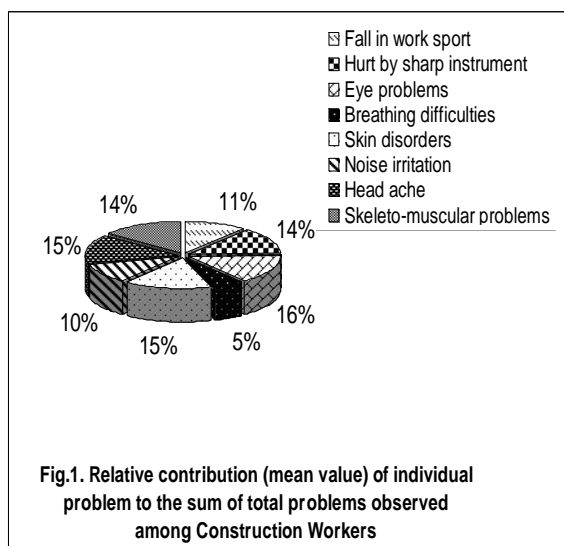
Work place exposure: The different workers at the site were found to have direct exposure to dust, cement, paints, sun rays and noise which may be due to lack of personal protective equipment (PPE).

DISCUSSION

About 30% of the workers at the construction site were females of different age groups which was found to be quite high when compared with the data for developed countries like the USA, where the participation of females in the construction industry was only 8% (4). Among the study population, 72.7% of the female workers were in the age group of 15-20 years. At this age women are stronger and have fewer responsibilities, so they can earn money by

working at informal jobs. The construction industry offers earning opportunities to unskilled laborers where women laborers are usually engaged in the repetitive task of carrying loads of stones, debris, cement, concrete blocks etc. which involves repetitive body movements for 8 hrs/day. The female literacy rate in Ethiopia is about 35%. So, to become economically independent, women choose such types of work. After 15-20 years of age the female percentage in work drops which may be because of marriage and family responsibilities.

The major occupational health problems identified at the construction site during the survey among construction workers in the order of magnitude were skin disorders > eye problems and headaches > musculoskeletal problems > harm by sharp instruments. The percentage of workers with these problems is shown in Table 1 and the relative percentage contribution of individual problems to the sum total of the problems observed among workers is shown in Fig 1.



These problems may be due to work place exposures, type of work, and lack of safety during work. In addition, 86% of the workers belonged to the 15-30 years of age group, and about 43% had work experience of less than one year which might be additional contributory factors for these health problems. The work related diseases among workers may be further aggravated, accelerated, or exacerbated by work-place exposures which may impair the working capacity (16).

Duration and types of risk exposure: The female construction workers at the study site were found to be in construction work for one year and a few

months whereas the male workers were involved for more than 5 years. In the present study, 81.8% of the female workers, and 54.17% of the male workers were reported to have back pain problems. Comparatively, the higher enrollment of female workers than male workers in the repetitive task of carrying, and lifting of stones/blocks and debris from one place to another would be the cause of more incidences of back pain. Lower back pain is not easily defined and classified, but lifting is a well known triggering event for it.

Repetitive motions of different body parts and forceful contractions of muscles by individuals at the workplace may eventually exceed the in ability to their recover from the physical stress. The failure to recover usually causes inflammation of tendons, tendon sheaths, and joints. In due course, chronic fibrous reaction in the tendons may cause calcium deposits and tendon rupture may occur. In a study, Malmo, Sweden, 72% of construction workers reported to have lower back pain while 52% had knee problems and 37% neck-shoulder pains (17). In Hungary, musculoskeletal disorders were observed in workers involved in construction apprentice (18).

As mentioned earlier, the workers were found to have different types of exposure from the work place environment and because of failure to use PPE. No male and female worker was observed to have hard hats, eye and respiratory protection, ear muffs, goggles, safety foot-wears and other sorts of PPE. In addition to this, exposure to physical, chemical, and mechanical hazards, psychosocial factors, work arrangements, socio-demographic characteristics of workers as well as environmental and social conditions are other potential risk factors which affect the overall wellbeing of workers (19-22).

Skin disorders: In comparison with other occupational health problems, skin disorders are more often and easily diagnosed. Over eighty-four (84.5%) percent of the female and 62.5% of the male workers had skin problems. This may be because of chromium hypersensitivity (23) as out of the total chromium concentration in cement, 50-80% of chromium is in hexavalent form (24). Irritants and allergens like cement and other chemical exposures at the work place may cause itching as the primary symptoms of contact dermatitis including dryness and blisters, etc. Alazab (25) found out that due to cement used in construction industry, 18% of the Egyptian construction workers had dermatitis. Out of the total studied, 1473 cases of occupational skin diseases in Germany in 1990, about 16% of were among construction

workers (26). Occupational skin disease is also a leading cause of loss of time of work. From 20 to 25% of all reported occupational skin disease causes loss on average of 11 working days annually (27).

Eye problems: Many different types of dusts during sweeping, mixing of different components, and chemicals from painting and varnishing may cause eye injuries at construction sites. Besides, unknowing contact of the eyes with dusty hands during work, mechanical injury during the breaking of stones and continuously working in full sun also increase the risk of eye disorders. In the present study, 68.75% of the male and 63.6% of the female workers reported to have eye irritation but no worker was observed to wear eye spectacles for protection. In a similar study in Egypt, about 23.6% of the workers showed the prevalence of eye complaints like conjunctivitis and foreign bodies in the eyes (25). Sixty-seven percent of the construction workers reported to have headaches which may be due to noise, direct sun exposure, and eye problems.

Respiratory problems: The construction sites inspected were dusty due to stone cutting, drilling, welding, wood work, cement mixing, and other activities going on simultaneously. About 22.9% of the male and 27.30% of the female workers complained about difficulty in breathing. It could be attributed to prolonged exposure to dust without the use of personal protective devices, as no worker was found to wear a cloth mask or any other protective device. Complaints about respiratory problems were lower (11.5%) in the present study compared with construction workers in Egypt (25).

Work related accidents: The International Labor Organization (ILO) estimated more than 257,000 total work related injuries during 2002 in sub-Saharan Africa (6). The construction industry has traditionally been considered as a hazardous occupation due to the high incidence of fatal injuries (28). Due to the lack of comprehensive data collection systems in developing countries, the exact figure of fatal accidents in the construction occupation and their percentage contribution to all occupational fatal accidents is not known. However, in Argentina, USA, Spain, France, and Japan, 16.1%, 19%, 25%, 26%, and 40% respectively of the fatalities were reported in the construction sector (28). In the present study, 50% of the male and 48.5% of the female workers reported accidental injuries ranging from serious (20.83% male, 18.20% female), medium injuries (12.50% male; 6.10 female) to slight injuries (16.67% male; 24.20 female). The accidental injuries reported among workers were either falling from a height, hit by falling objects and strike by an object. The injuries from falling or sharp instruments

depended on the nature of the work performed by the workers in addition to their carelessness and lack of personal protective devices. Other significant contributing factors for work-related injuries observed among different industrial workers in Ethiopia were service duration, work place supervision, sleep disorders, and job satisfaction (10).

In conclusion, construction workers were observed to have different types of occupational exposures and related health problems. Skin disorders, eye problems, headaches, and skeletomuscular problems were the most common occupation-related health problems observed among workers. Initial training, creating awareness of risk factors, use of personal protective devices, and proper cleanliness during meal times may help to overcome these health problems among workers. Further, availability of transportation facilities must be available at the site to overcome the extent of workplace accidents. Finally, it must be pointed out that our research was based on 100 construction workers at only one site of Gondar town. More comprehensive studies need to be carried out at different sites and among workers enrolled at different construction activities along with monitoring and laboratory analysis and medical checkups of the workers to get more relevant and evidence-based information about construction workers. More over, the present data may be used as base-line information for further studies.

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