

Analysis of Occupational Hazards among Workers in the Construction Industry of Harare, Zimbabwe

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Abstract

The aim of this study was to determine the work-related diseases occurring among workers in the construction sector of Harare. The study also assessed the distribution of occupational injuries and common risk factors of these injuries among workers in the construction industry. A detailed descriptive study was undertaken in the construction industries of Harare with a focus on workers employed in the Southerton industrial area (Harare has 67% of the share of the construction industry in Zimbabwe) between February and April 2012. The occupational hazards among construction workers in Harare vary from the very minor spells of aches and pains to severe and even potentially fatal disorders. Major occupational health problems include musculoskeletal disorders, hearing loss, vibration and, contact dermatitis. These problems are preventable through pretesting equipment, products and processes and exposure monitoring and risk assessment are an essential component of occupational health and safety programmes. Occupational health programmes need to be an integral part of the general safety and health approach and medical surveillance is essential to ensure the fitness of workers as well as their suitability for certain construction jobs. Education and training for the construction workers would assist by giving detailed descriptions of safe work practices.

Key words: Construction Industry, Occupational Injuries, Diseases, Risk Factors, Harare, Zimbabwe

Introduction

The 2009 world recession and a decade of national economic melt down that was experienced in Zimbabwe left many construction projects around the country undeveloped (Saungweme, 2011). Low savings emanating from little to no disposable incomes impacted negatively on the private sectors' local demand for building materials and construction services. Unprecedented high levels of government debt coupled with zero external financial handouts spared not the

public sector projects most of which were abandoned. Liquidity challenges to recapitalise and adopt state of the art technology have translated into minimum sector output and service exports. Today, however, the construction sector is among the sectors in Zimbabwe which have been on the recovering path since 2010.

Construction workers are the 'human capital' of the construction industry, and need particular care (Deacon 2003). This together with the need for continuous improvement of skills (training), reduction of health risks and actualising capacity and production (input/output) makes the construction worker appear as at the centre of the construction industry as shown in Figure. 1.

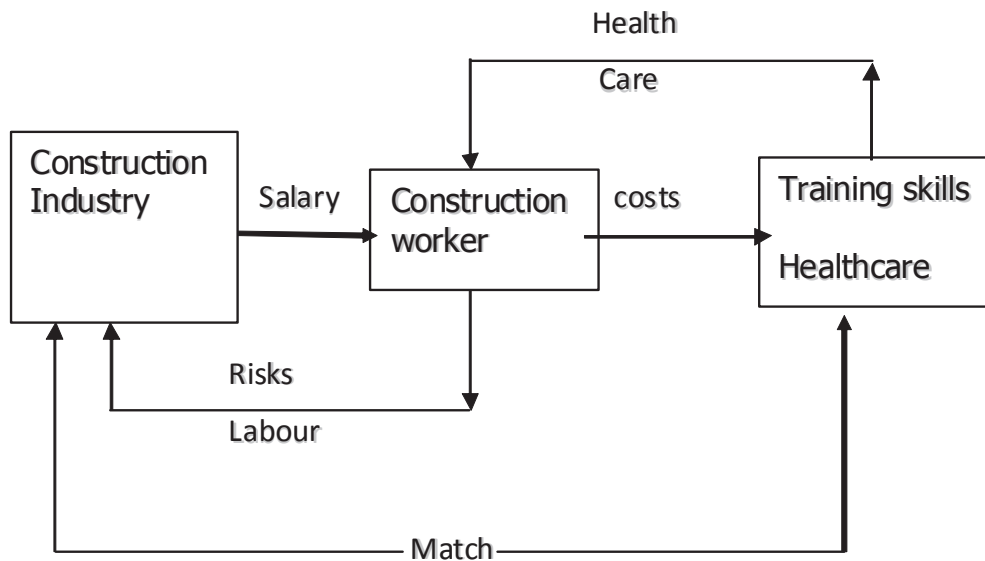


Figure 1. The central function of the construction worker in the construction industry Source: Haupt *et. al.* (2003:5)

Findings have shown that very little exists in terms of medical surveillance and health monitoring of workers in Africa, which in itself should be a major concern for the construction industry and its workers (Gyi, Gibb and Haslam 1999; Deacon, 2003). Approximately 35 000 workers undergo voluntary medical surveillance each year in the Netherlands (Deacon, 2003). Subjective data is collected by questionnaire surveys concerning their health and working conditions, which is verified by the Occupational Medicine Practitioner (OMP). Findings are published in an 'Atlas'

per profession and sector, for both the blue and white collar workers (van Duivenbooden, van der Molen, Broersen and Rovekamp, 1999: 31). Little is also known about occupational safety and health in the South African construction industry. Health care is perceived to be the provision of primary health care and first aid services to workers (Deacon, 2003; Smallwood and Ehrlich, 2001). In two separate South African studies, it was determined that a relatively low number of general contractors (GCs) conduct any form of medical surveillance to determine the existence and development of occupational disease (Deacon and Smallwood, 2001; Wheeler and Smallwood, 1998). In a study conducted among members of the South African Federation of Civil Engineering Contractors (SAFCEC) it was determined that health specific actions by their members were virtually zero, over 55.6% never conducted pre-employment medicals, and 61.1% never conducted exit medicals (Smallwood and Wheeler, 1998: 153).

The construction industry is recognised as a major economic force in Malaysia and it is also one of the most hazardous industries. Based on the Social Security Organisation (SOCSCO) report in 2000, the fatality rate in the construction industry in Malaysia was of more than three times of all workplaces (Hamid *et al.*, 2003). The compensation costs paid out by SOCSCO amounted to RM 650 Million (SOCSCO, 2000). The hidden or indirect cost of an accident in Malaysia is eight to 33 times more than direct costs and the total cost of an accident can run into billions of ringgit (Hamid *et al.*, 2003). As far as occupational safety and health is concerned, Malaysia is now moving away from the traditional approach whereby it is believed that all occupational hazards can be controlled through detailed regulations. Since the introduction of the Occupational Safety and Health Act (OSHA) of 1994, there has been a marked reduction in the number of industrial accidents and the rate of accidents per 1 000 workers, there has not been a credible improvement over the last 10 years (Hamid *et al.*, 2003). The rate per 1 000 workers has been at a peak of 9.5 10.5 persons while for developed nations, it is three to four persons per 1 000 workers (SOCSCO, 2000). The level of awareness and practicability of occupational safety and health regulations within the Malaysian construction industry society has been lower than expected despite the comprehensiveness of the regulations.

The aim of the study is to determine the work-related diseases occurring among workers in the construction sector of Harare. The study also assesses the distribution of occupational injuries and common risk factors of these injuries among workers in the construction industry. Workers in the construction industry are exposed to work-related diseases which have been defined by the World Health Organisation (WHO) as diseases that may be aggravated, accelerated or exacerbated by workplace exposures and that may impair working capacity (WHO 2011).

Building and construction companies and service providers are widely spread in Zimbabwe, but have higher concentration in Harare and Bulawayo with these cities having 67% and 22% of the share respectively (Saungweme 2011). The construction industry is not only the process of building, but involves many other types besides from the building process such as painting, landscaping, electrical supply, telecommunications, plastering, and paving. Scholars have classified the hazards associated with the construction industry into chemical hazards (dusts, fumes, mists, vapours and gases), physical hazards (extreme heat or cold, work in windy, rainy, snowy or foggy weather, non-ionising ultraviolet radiation and electric arc welding), biological hazards (animal attacks and histoplasmosis) as well as social hazards such as living in work camps away from one's home and family (Alazab, 2004; AVRHS, 2002; Huang and Chen, 2002; Tsuyoshi and Ton, 2010). These features of construction work as well as heavy workload, limited control and limited social support are the factors associated with stress and these warrant investigation in the context of Harare in Zimbabwe.

This project is important in that it will reveal why health, safety and hygiene should be perceived as a priority in the construction industries of Harare. Usually industry owners and managers do not provide sufficient maintenance and funds to buy protective equipment. Not much attention is thus given to the safety of processing machines, equipment and tools as well as their link to health requirements in such enterprises. It is expected that this project will assist in ensuring compliance to legal requirements by the construction industry in guaranteeing safe and healthy working conditions for the workers including an adequate regime for their rest and nutrition. Current practice in industry has tended to focus knowledge on production processes and profit at the expense of the health and safety of the construction worker. It is expected that the study with its focus on health and safety issues will add a vital dimension which, if ignored, can affect the reputation of an industry should fatalities and injuries persist.

Methodology

A detailed descriptive study was undertaken in the construction industries of Harare with a focus on workers employed in the Southerton industrial area (Harare has 67% of the share of the construction industry in Zimbabwe) between February and April 2012. Observations of working conditions were undertaken to have first hand information on the working conditions. Stratified random sampling was employed targeting the workers and management of the construction enterprises. Preliminary

surveys of company records indicated that a sample size of 266 workers could be drawn representing 10% of a total of 2660 workers in the study area. The criteria for selection are as follows: workers who had been doing the work for at least three years who worked in one of the following crafts-building, excavation, laying of roofs, plastering, painting and paving and who began their work without past history of chronic diseases or disability. For the literature survey, medical journals, periodicals, textbooks, and the internet were reviewed. Study forms (interview sheets) were used to collect the subjects' personal history, occupational history, present history, past history and their history of accidents and injuries and questionnaires would also have questions that eliminate other causes such as those that are home based. Also included were a general medical examination, the results of laboratory investigations, X-rays, computed tomography (CT), and magnetic resonance imaging. The administrators' approval was sought before conducting the study and ethical considerations are to be respected. The data obtained was analysed using SPSS for frequencies, ranges, mean, standard deviations and correlation co-efficients. The incident rate of disabling or fatal injuries per 100-full-time employees was calculated using the formula: number of disabling or fatal injuries x 266 divided by employee hours worked. The accident disability rate is calculated using the formula: total number of days lost divided by total number of accidents and the disabling injuries are defined as days away from work or days of restricted activity.

Results and discussion

The construction industry in Harare exposes workers to many hazards that include chemicals, physical and emotional stressors, ergonomic and heavy physical work. All these aspects impact on the health of the worker and ultimately the ability of the worker to perform daily tasks. The job description and type of health hazards workers are exposed to in the construction industry of Harare are shown in Table 1.

Table1. Type of exposures among workers by job type

Craft	No.	%	Job description	Type of exposure
Excavation	54	11	Digging the area	Dust, Injuries
Superstructure	67	13	Erection of the columns	Dust, ergonomics
Steel erection	49	10	Erection of the steel	Ergonomics, stress, dust
Laying of roofs	52	10	Laying concrete	Dust
Builder	71	14	Fixing bricks to each other	Dust
Plasterer	63	12	Covering walls with cement	Chemicals, dust
Painter	77	15	Interior finishing	Chemicals, dust
Pavers	55	11	Laying tiles on the floor	Dust, chemicals

According to Table 1 the most common exposures are dust, vibration, ergonomic stress, chemicals and injuries. Table 2 shows the prevalence of work-related diseases among the workers studied. It shows that musculoskeletal disorders (24%), eye complaints (19%), respiratory problems (15%), noise-induced hearing loss(11%) and stress (10%) were the most prevalent diseases among the workers.

Table 2 Work-related diseases among the construction workers

Diseases	% Affected
Respiratory diseases (asthma)	15
Musculoskeletal disorders	24
Cardiovascular diseases	6
Gastrointestinal diseases	4
Nasal diseases	4
Skin diseases	5
Eye complaints	19
Varicose veins	1
Hernia	1
Noise induced hearing loss	11
Stress	10

The most common accidents leading to injuries include being struck by an object (4%), falling at ground level (4%) and being hit by falling objects (2.7%). The incident rate for disabling injuries increased from 0.7 in 2000 to 18.1 in 2002 and the incident rate for fatal injuries decreased from 0.7 in year 2000 to 0.3 in year 2002. Table 3 shows that the head, (23.5%), upper limb (15.1%) and eye (14.6%) were the body parts most often injured in accidents.

Table 3: Injuries % by accident type and parts of the body affected

Accidents	Head	Eyes	Neck	Trunk	Upper Limb	Lower Limb	Multiple	Total
Struck against an object	3	6	1	0	2	4	0	16
Struck by an object	6	3	5	3	9	2	0	28
Hit by falling objects	5	6	1	1	2	4	0	19
Falling at ground level	7	0	1	11	1	1	16	37
Total	21	15	8	15	14	11	16	100

Table 4: Factors contributing to the occurrence of disabling injuries (%)

Factors	% of workers affected
Human factors	
Failure to follow safety rules	17
Lack of attention	7
Improper posture	10
Improper lifting	5
More than one factor	13
Total	51
Environmental factors	
Broken floors	8
Misplaced objects	4
Slippery floors	3
Hazardous chemicals	3
Poor illumination	2
Source of electricity	1
More than one factor	3
Total	24
Mechanical factors	
Rapidly moving parts	3
Heavy tools	1
Unsafe tools	2
More than one factor	3
Total	9
Combination of factors	
Human, environmental and mechanical factors	16

The most prevalent hazards that affected the construction employees were dust, noise, vibration, ergonomic stress and chemicals. Dust is a major health hazard in the construction industry of Harare. Eye problems were due to daily exposure to dust generated from sweeping, drywall sanding, motor mixing and tamping. In as far as musculoskeletal disorders are concerned, ergonomic hazards were found to be prevalent in the construction sites of Harare. Ergonomics aims to ensure that humans needs for safe and efficient working are met in the design of work systems (Bridger, 1995; Deacon, 2003; Gibb et al. 1999b). Unsafe, unhealthy, uncomfortable or inefficient situations at work can be avoided by taking account of the physical and psychological capabilities of humans (Gibb et al., 1999b). There were several ergonomic hazards that were observed in the workplaces in Harare such as bending,

kneeling, twisting, reaching out, awkward postures, heavy lifting and exposure to vibration, repetitive handling work, static work or working at the extremes of the range of movements of the body increases the risk of injury to the worker. Workers who were found to be affected by such ergonomic hazards included scaffolding operators, pipe fitters and riggers who move handling loads; those involved in commissioning and de-commissioning of pipes and valves as well as carpenters and joiners in the erection and stripping of form work. Some respirable dust may be fibrogenic and cause scarring of the lungs. Free silica (quartz) and asbestos observed at most construction sites of Harare are of special concern. Asbestosis usually develops several years after the onset of exposure. Pleural diseases such as pleural thickening or plaques, and even parenchymal asbestosis are seen particularly in insulation workers and plumbers, but both masons and painters occasionally develop signs of this pneumoconiosis, possibly due to indirect asbestos exposure in the past. The radiographic appearance of the pleura and the scarred lung tissue are characteristic of this disease, and detailed diagnostic criteria have been developed. This type of pneumoconiosis often causes dyspnoea, dry cough and chest pain. A more serious effect is the development of pleural and peritoneal mesothelioma and certain carcinomas, particularly in the lungs (Parks, 1982). These types of cancers may affect up to 50% of insulation workers exposed to asbestos and even limited exposure levels may be hazardous according to exposure-response relationships. The workers involved in concrete grinding, drilling and chiselling as well as marble finishing run a specific silicosis risk. Silicosis is sometimes associated with an increased risk of tuberculosis.

Bronchial asthma (type 1 allergy) related to occupational exposure is another hazard construction workers in Harare are exposed to. This is particularly so in those individuals who are allergic to house dust or certain fungal spores may experience acute attacks when exposed during repair work. The carpenters and building workers are exposed to dusts from exotic woods and these are a documented source of respiratory allergens. The inhalation of chemicals and organic dusts present on most construction premises in Harare is a potent source of allergic reactions (type 1 allergy). Long term exposure to welding or asphalt fumes can lead to respiratory impairment. Smoking is a known leading cause of lung disease, however, some contributing factors maybe occupational exposures. Welders in the construction sites of Harare are also exposed to freshly formed metal oxide aerosols whose inhalation can result in zinc fever that lasts for 1 -2 days.

Hard physical labour in construction work promotes the development of degenerative disease and low back pain. Severe lumbar disc degeneration has been

found in 30-40% of workers in jobs with exposure to back loads whereas the prevalence of this disorder in reference groups was usually 20% (Wickstrom, 1978). In some cases long-term overstraining of the spine at the muscular insertions may cause fracture of the spinal processes. Shovelling work observed in the construction sites of the industrial areas of Harare results in digger fracture and a radiograph is essential to diagnose this. A common musculoskeletal disease associated with construction work is tenosynovitis and results in an inflammatory reaction of the tendons due to excessive muscular work and this causes swelling and pain in the tendons of the patient. The kneeling positions of floor workers, tile layers, masons may cause occupational disease of the knee and prepatellar bursa may be the site of a degenerative transformation, caused by the prolonged pressure and irritation of the area. This good thing about this disease is that it causes only a few days of sick leave. Repeated bending of the knees may cause excessive wear of the meniscuses of the knees and surgery may be required to correct the problem. The carrying of timber, steel rods and other forms of construction equipment on the shoulder may paralyse nerves of several shoulder muscles. Sitting in a crouching or kneeling position may cause pressure on the external or internal popliteal and other nerves. Muscular tension and muscle knots are in general frequent in construction workers and may cause increased morbidity and decreased work performance. Many concrete reinforcement workers retire early as a result of musculoskeletal disorders and this seems to be the case with other construction workers. Older workers in the construction industry generally complained about their working conditions and health problems.

Dermatological diseases or skin diseases and especially contact dermatitis, is one of the commonest occupational diseases in the construction industry of Harare. Cement is widely used in the construction industry of Harare and is the leading cause of dermatitis among construction workers. Among painters, chemicals are an aggravating factor of dermatitis and dermatitis induced by cement presents as a dry, fissured, erythematous lesion. Contact dermatitis occurs in two forms. Toxic eczema is usually caused by degreasing or cleaning agents and by irritating or otherwise injurious chemicals. This irritant type of dermatitis may predispose the patient to subsequent development of an allergic eczema caused by delayed allergy (type IV reaction) to a specific substance. In the construction industry of Harare, the most common skin disease is 'cement dermatitis'. Cement causes toxic eczema in workers and some may develop the allergic form later on in life. The allergen is usually caused by soluble chromate, cobalt and nickel. Irritant dermatitis occurs

in the form of cement burn, while contact allergic dermatitis presents in the form of eczematous lesion. The cement burn usually occurs on the legs and feet following prolonged contact with wet cement inside boots. Contact allergic dermatitis usually appears on the skin of workers hands and fingers.

Another hazard observed in the construction industry of Harare is noise induced hearing loss and this may be either temporary or permanent. Noise produces different effects on the autonomic nervous system and can reduce the alertness of a construction worker and impair performance (psychological fatigue). The frequency of occupational deafness increases with age i.e. years of exposure to noise. Hearing aids may be of some assistance to patients with noise-induced hearing loss. Another hazardous phenomenon observed in the construction industry of Harare is that of vibration. Whole body vibration results from the driving of heavy construction machines and the workers are likely to develop back pain. The increased morbidity in construction workers exposed to whole body vibration seems to involve musculoskeletal diseases and ischemic heart disease. A known result of long-term use of hand-held pneumatic equipment is 'dead (or white) fingers', or Raynard's phenomenon. This disease is characterised by loss of sensitivity, later followed by increased flow of blood in the fingers and tingling pain and the whole attack may last for several hours. Very high frequency vibration may cause local muscle and nerve changes in the hands, leading to tingling and painful sensations, numbness or cramps and the disorders are reversible when the exposure ceases.

The construction industry is a very stressful environment to work in (Smallwood and Ehrlich, 1997; Akkers, 1999). The causes of stress in the construction industry of Harare include the physical environment, the actual organisation itself, the overall organisation of the company, as well as personal and social relationships and personal anxieties. The negative outcomes of such stress and stressors include heart disease, depression and anxiety, low self-esteem and burnout (Smallwood and Ehrlich, 1997).

What can be done?

All occupational diseases and accidents are preventable provided the correct interventions are made. This is because the causes of these hazards that emanate from the construction trade are caused by specific preventable hazards or a combination of such factors. Safety and health and health are essential in all the stages of the construction work and prevention can be undertaken at different levels. It is essential to institute safety planning procedures from the planning

phase of the construction projects and these include the substitution of hazardous substances with less hazardous ones and also by improving the design of machines and equipment so that they become less hazardous. There may not be need to totally ban the use of a certain compound or work process, but simply to limit the hazard or exposure. In the case of the construction industry in Harare, noisy machines need to be enclosed in a wood to reduce the noise levels, pons cylinders could be employed to reduce the vibration of pneumatic tools. The impact of contact dermatitis could be reduced by neutralising the effect of chromate through the addition of 0.1-0.2% ferrous content and the use of high organic content paints has been progressively replaced with less dangerous water-based paints. There is need for education on health and safety issues in the construction industry so as to improve the working conditions. Workers themselves need basic education on health and this goes as far as clear labels on dangerous substances, provision of safety data sheets for all chemicals and risks and safe handling of all substances.

It is also vital that workers adhere closely to the code of work practices published by the International Labour Organisation on how to minimise or avoid hazardous working conditions in the construction industry. This code recommends the maximum weights for lifting as well a whole range of rules that ensure safety at the work place. Personal Protective equipment or clothing is extremely vital in the construction sites and this includes hard hats, work clothes, safety boots, goggles and ear muffs. Gloves or ointments are essential in for the prevention of contact dermatitis and water resistant knee protection or respirators may also be acquired. It is therefore important to develop occupational safety and health programmes at the workplace in order to promote and maintain the highest possible level of health among the gainfully employed. In order to meet these objectives, it is necessary to identify and bring under control at the construction workplace all chemical, physical, mechanical, biological and psychological agents that are known to be or suspected of being hazardous and to discover and improve work situations that may contribute to the overall ill health of workers. The safety and health programme needs to incorporate both environmental monitoring (industrial hygiene) and health surveillance. Environmental monitoring identifies risks and assesses the magnitude of potentially hazardous factors. Health surveillance is vital to evaluate the fitness of a worker for a certain job. The surveillance is vital in providing baseline data to be used in long-term follow ups of construction workers and hence an indication of health hazards. Safety organisations in the construction industry need to be voluntarily formed by the workers and be active so as to advise on safety and health issues.

Conclusion and Recommendations

The occupational hazards among construction workers in Harare vary from the very minor spells of aches and pains to severe and even potentially fatal disorders. Major occupational health problems include musculoskeletal disorders, hearing loss, vibration, contact dermatitis. These problems are preventable through pretesting equipment, products and processes and exposure monitoring and risk assessment are an essential component of occupational health and safety programmes. In this regard safety data sheets for the chemicals, products and other inputs used at the construction sites need to be available and so should basic information on first aid- in a presented in a manner understood by all workers. Occupational health programmes need to be an integral part of the general safety and health approach and medical surveillance is essential to ensure that fitness of workers as well as their suitability for certain construction jobs. Education and training for the construction workers would assist by giving detailed descriptions of safe work practices. The education and training needs to be extended to the employers, planners and personnel involved in occupational health and safety services such as NSSA in Zimbabwe.

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