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The Health Status of South African Construction Workers

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Abstract

Construction has a reputation for being a particularly unhealthy industry because its rate of work-related illness is one of the highest across all industrial sectors. Health problems among construction workers are prelevant because of the number of high-risk activities involved and the peripatetic nature of the workforce. Acute and chronic health conditions experienced are generally non-occupational. However, these conditions could be exacerbated by construction activities, ultimately leading to absenteeism, poor performance and construction workers leaving the industry due to ill health. The nature of construction work involves, *inter alia*, building, repairs, renovating, modifying, and demolishing of structures. These activities involve work that varies from fully mechanized activities to hard physical labor. Work sites vary from, for example, being in isolated locations to being in the midst of heavy traffic. This paper reports on studies of two convenience samples of construction workers that sought to establish the health status of construction workers. The authors found that workers complained of several occupational and non-occupational diseases and presented with a range of musculoskeletal disorders, respiratory problems and skin infections. These diseases negatively affected work productivity in the industry and increased absenteeism. Further, the majority of workers required referral, many for unresolved non-occupational such as various skin, upper and lower respiratory and musculoskeletal conditions. Recommended interventions include regular medical surveillance as part of employer-driven health promotion programs.

Key Words**: Medical surveillance, construction industry, health, well-being**

INTRODUCTION

The Labor Force Survey of September 2002 estimated the number of persons employed in the South African construction industry to be in the region of half a million, which includes both formal and informal sectors with only about 214,333 being formally employed – less than 50% of the construction workforce (CIDB, 2004). General and chronic occupational and non-occupational diseases potentially reduce the overall labor force, shift the age structure due to mortality, change the skill composition of the labor supply, and increase labor turnover. Eppenberger and Haupt (2003) in their study of 311 construction workers in South Africa

argue that the accident rates (Figure 1), nature of injuries suffered by construction workers (Table 1), bodily location of these injuries (Table 2) as well as the injury causes may hold some clues to the types of stressors and strains they experience. Direct causes include physical conditions on construction sites such as bad stacking, unsafe walkways, falling objects, inadequate working platforms, dust, and noise just to name a few.

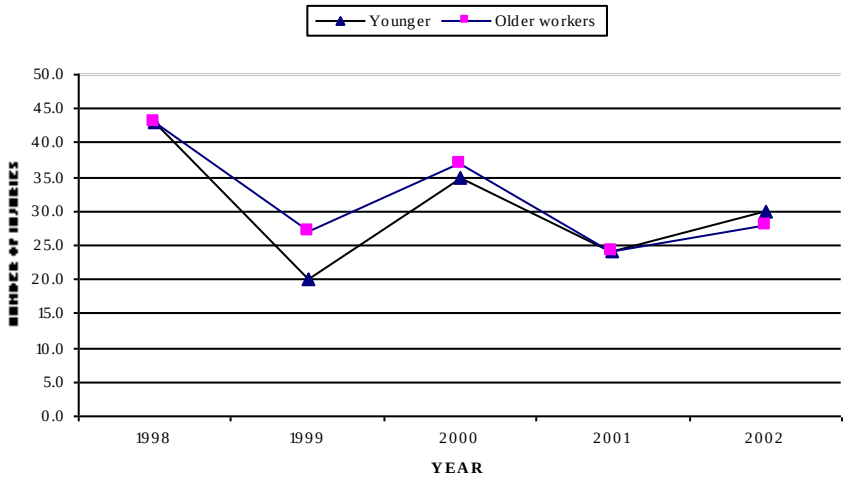

Figure 1. Annual distribution of injuries (Source: Eppenberger and Haupt, 2003)

Table 1. Nature of injuries (Adapted from Eppenberger and Haupt, 2003)

Nature of injury	Frequency	Valid Percent
Superficial wounds incl. burns and scalds	152	48.9
Penetrating wounds	78	25.1
Muscle injury (eg. Strain, torn ligaments)	26	8.4
Bony injury (eg. Fracture, tumor)	24	7.7
Joint injury (eg. Dislocation, sprain)	13	4.2
Multiple injuries	12	3.9
Injury to internal organ with no external open wound (concussion)	5	1.6
Amputation or removal of organ	1	0.3
Total	311	100.0

The most likely body parts of workers to be injured on construction sites were

- Fingers (20.3%);
- Eyes (17.4%); and
- Trunk (10.3%).

Lost-days among construction workers is a major concern for the industry. The prevalence of both occupational and non-occupational diseases exacerbates the situation in South African construction. The resultant absenteeism, medical incapacity, sick leave and disability pensions, medical care, and loss of productivity potentially affect the direct costs of construction companies. In their study, Eppenberger and Haupt (2003) found the number of days off per injury ranged from 0 to 365 days with the mean number of days off per injury being 9.18 days. It was notable that most injuries (74.3%) did not result in lost days or shifts.

Table 2. Bodily location of injury (Adapted from Eppenberger and Haupt, 2003)

Bodily location	Frequency	Valid Percent
Finger	63	20.3
Eye	54	17.4
Trunk	32	10.3
Head	26	8.3
Multiple	26	8.3
Leg	24	7.8
Foot	22	7.0
Arm	16	5.1
Ankle	13	4.2
Knee	12	3.9
Hand	11	3.5
Shoulder	7	2.3
Neck	4	1.3
Other/unspecified	1	0.3
Total	311	100.0

It therefore makes good sense to improve the health, well-being, workplace environment, and safety of all construction workers. Enabling legislation such as the Construction Regulations promulgated on July 18, 2003 has been introduced in an effort to alleviate this situation. However, without commitment from all participants in construction to implement the legislative provisions proactively construction workers will continue to suffer from poor health.

Table 3. Number of days off per injury (Adapted from Eppenberger and Haupt, 2003)

Days off categories	Frequency	Valid Percent
0	231	74.3
1-4	12	3.9
5-13	38	12.2
14-49	12	3.9
50-99	10	3.2
100-199	5	1.6
200+	3	1.0
Total	311	100.0

This paper reports on the health and well-being of construction workers using the findings of 142 physical medical examinations on construction workers (Sample A) and interviews with 65 other construction workers (Sample B) in the Western Cape Province of South Africa.

Definition Of 'Health'

The widely accepted definition of occupational health by the International Labor Office (ILO) and the World Health Organization (WHO), is 'the promotion and maintenance of the highest degree

of physical, mental and social well-being of workers in all occupations and not merely the absence of disease or injury' (Kickbusch, 1984; Chappel, 1998; Lalonde, 1974). While health contributes to the increase in productivity and consequently to economic growth (NEPAD, 2001), historically, less effort has been directed towards health matters in the construction industry in favor of occupational safety.

Health Challenges In Construction

Hard physical labor, static work, climatic influences, noise, and dust that typically characterize activities on construction sites are considerable burdens for construction workers. Working conditions in the construction industry are hard and extremely stressful in general, the physical workload is heavy and there are many ergonomic challenges (Smallwood and Ehrlich, 1997). Construction workers complain more about the awkward and static working postures, vibration and climate. Causes include aspects such as the physical environment, the actual organization itself, the way the organization is managed overall, interrelationships between workers, their own environment and the organization, as well as personal and social relationships and personal anxieties. Furthermore, heart disease, depression and anxiety, low self-esteem and burnout are a number of the negative outcomes of such stress and stressors. Moreover, injuries among construction workers comprised on average 9.0% (800) of all industrial injuries (8,900) in South Africa (Haupt, 2001), while fatalities on average for the same period represented 11.9% (86) of all industrial deaths (722). Because the number of workers who contracted infections and diseases on construction sites is not easily quantifiable, these statistics are not known.

The South African (SA) Health Review reports that premature adult mortality in the general South African population is high as a result of poverty-related diseases such as tuberculosis (TB) and diarrhea, injuries and emerging chronic diseases such as hypertension (high blood pressure) and diabetes. AIDS however is now changing this pattern. The predominating cause of deaths among males is by injury, followed by TB, which causes death at all ages. Moreover, heart disease, diabetes, cancers, and ischemic strokes present serious problems. The last disease is increasingly a major cause of death and disability in older workers and occurs when a blood vessel becomes occluded or ruptures. Risk factors include improper diet and hypertension (Mattson, 2004). A study conducted by Diez Roux et al. (2002) confirmed that high blood pressure is an established risk factor for cardiovascular disease with age being a key predictor. Typically, large proportions of construction workers come from poor socioeconomic backgrounds.

Apart from one major study in Bergamo, Italy that the authors are aware of where the health condition of 1,000 construction workers is being tracked, there is little data available that gives the current physical status of construction workers. The studies reported on in this paper form the basis of an international collaborative project with these researchers in Italy to determine the extent to which the health problems encountered are generalizable to the construction industry as a whole or whether they are particular to a specific geographic region.

Physical Conditions

Musculoskeletal disorders

Musculoskeletal disorders are difficult to diagnose. Pain is hard to measure and quantify objectively and might be the reason that very few studies examine the prevalence of musculoskeletal disorders based on medical surveillance (Schneider, 2001). Construction workers rarely, if ever, undergo any form of medical surveillance in their job.

Musculoskeletal disorders such as sprains and strains are the most common non-fatal injury in the construction industry. Overexertion or lifting too much at one time is the most common occurrence. The CPWR (1998) reported that in the construction industry in the United States of America the back was the body part mostly affected in comparison to all other body parts injured. In Sweden musculoskeletal injuries among construction workers were studied together with the risk factors that contributed to their injuries[18]. Musculoskeletal symptoms were found to be much more prevalent among construction workers than office workers. Further, there was a clear relationship between the demonstration of these symptoms to heavy work and vibration, exposures, frequent use of handheld tools, repetitive work, and awkward working positions. The study confirmed an association between stress and musculoskeletal disorders and lower back pain, age, smoking, height, poor physical fitness, and diminished muscle strength. Arndt et al. (1996) confirmed these findings in their study during which they compared construction workers to office workers. Increased musculoskeletal problems were identified as being significantly greater among construction workers than office workers in the baseline study and in the follow up study 40% of the construction workers who were retired through disability reported that musculoskeletal disorders were major contributors to their eventual retirement. The disorder known as 'carpet layer's knee' stemmed from the large amount of kneeling by workers laying carpeting and flooring. Concrete reinforcement workers demonstrated high rates of lumbago and sciatica, attributed to the amount of forward bending required. Schneider (2001) suggests that these injuries are to a greater degree related to the work that construction workers perform.

Carpel tunnel syndrome, although neurological in nature is linked to work that is highly repetitive and which requires the use of force, where the wrist is kept in an awkward position for extended periods of time. Carpenters were found to have the highest rate of carpel tunnel syndrome (CPWR, 1998).

Respiratory infections and lung function

On construction sites, workers are at particular risk as a result of the dusts and fumes that they are likely to be exposed to during construction activities. Workers contracting pneumonia are more likely to be hospitalized, have a longer length of stay when hospitalized and have a prolonged recovery often accompanied by subsequent debilitation or decline in performance status despite successful therapy (Meyer, 2002). Prevention and swift diagnosis of pneumonia are therefore essential. The problems of loss of lung elastic recoil, decreased chest wall compliance, and loss of gas exchange surface area are exacerbated if workers are heavy cigarette smokers. Effective interventions include optimization of nutritional status, minimization of the risk of aspiration, inhalation and air pollution, and the cessation of smoking.

Skin infections

The number of persons with significant skin disorders increases linearly with age (Laube, 2004). There is increased morbidity and mortality for a range of infections including the skin and soft

tissues (Cummings and Uttech, 1990). Herpes simplex, shingles, scabies, and fungal infections present problems to workers. Infections are particularly likely following minor trauma, maceration and poor hygiene.

Methodology

Relative to Sample A data was collected by means of individual physical medical examinations and recording of occupational histories from a sample drawn from building contractors in the Western Cape of 142 construction workers on a voluntary informed consent basis. These workers had worked as carpenters, roofers, bricklayers, plasterers, painters, and general laborers. In particular, data was collected, *inter alia*, on chronological age, work experience, injury record, health record, work areas and activities that cause injuries, concerns and difficulties encountered by workers during execution of their work, tasks, social, psychological and emotional needs of workers, and minimum performance expectations of employers.

A fully standardized protocol for medical examinations was used to establish a baseline. The data was encoded and analyzed using the SPSS software package. Participants were identified only with a unique identifier assigned by the investigators. No master list of names of participants was compiled or kept ensuring anonymity. During the interviews and medical examinations consent procedures were outlined, highlighting the fact that participation was entirely voluntary and that identifying information would be kept confidential. The provisions of the South African national policy for medical testing were strictly adhered to. Coded worker and construction firm identifiers were used in such a way that the name of no worker or employer could be associated with the data once it was collected and verified. Proper measures were taken to protect the identity of all participants during the data collection, entry and analysis processes. There were no major risks to participants.

With respect to Sample B, for the phase of an ongoing study reported in this paper a sample of 65 construction workers were interviewed during their tea and lunch breaks on construction sites by prior arrangement with the site management on a voluntary and informed consent basis.

Sample A

The sample of 142 workers had a mean age of 48 years. Only 44% had worked exclusively in construction. The study found that the work category was strongly associated with the level of education and also the number of years employed in a particular category. For example, workers with lower levels of education would most likely remain in the unskilled or semi-skilled categories of work in construction. The study found that 50% of the workers examined were ‘unskilled’, with a further 9% being ‘semi-skilled.’ This finding partially supports the suggestion that older workers are likely to have a lower education and be employed in unskilled positions and therefore be at greater risk of serious injury. A further contributory cause of high rates of injury to workers is the low level of literacy. The study found that those who had been injured were indeed among those with minimal education, with 38% of workers having Grade 1 to 7 education and 13% no formal education.

The majority of workers (94%) reported exposure to dust and noise during their entire working history, with 20% reporting exposure to dust, noise and other agencies, *inter alia*, chemicals, paint,

stress, welding fumes, cement, asbestos and working at heights. A relatively small number (13%) of workers cited problems with their ears and hearing. Prior occupational exposures of workers have a direct relationship on their susceptibility to developing occupational diseases. This is particularly so especially with continued exposure to the same health hazards (Rasmor and Brown, 2001; Koh and Jeyaratnam, 2001). These authors as well as Gibb et al. (1999) further suggest that occupational diseases occur as a result of exposure to physical, chemical, biological, mechanical or psychosocial factors in the workplace. Examples of the factors that affect the health of construction workers is shown in Table 2.

Table 2. Factors that affect health of workers

Physical	Biological	Chemical	Mechanical	Psycho-social
Noise	Insects	Liquids	Posture	Stress
Vibration	Fungi	Fumes	Movement	Work pressure
Heat and cold	Bacteria	Gases	Repetitive tasks	Monotony
Dust	Viruses	Fibers		Unsociable hours
		Mists		Ergonomics
		Vapors		

Adapted from Gibb et al. (1999)

Many occupational diseases occur exclusively among workers who are exposed to specific hazards such as silica, noise and other physical stressors raising the risk of noise induced hearing loss (NIHL), respiratory diseases, and musculoskeletal disorders.

Musculoskeletal disorders

The medical history established that 15% of workers experienced musculoskeletal problems, 31% reported back problems and 1% had suffered from a slipped disc. The study identified that this group was largely obese, undertook no physical exercise and had few leisure activities. No major abnormalities were identified during examination. Cross tabulation of back problems with age as shown in Table 3 indicated that of the sample of workers the 51 to 55 years age group were most at risk making up 30% of all workers examined. However, within the 61 to 65 years age category 83% reported back problems. General workers (13%) were the group who mostly experienced problems followed by carpenters (6%). Of the workers who reported back problems, 14% commented that their back problems were ongoing and unresolved with 1% of them experiencing backache when lifting heavy objects. A further 11% of workers reported they had experienced backache, but it was not a problem at the time of the examination.

Table 3. Cross tabulation of back problems with age

Age Category	Problems with your back? (% within age category)		Problems with your back? (% of sample)	
	Yes	No	Yes	No
33-35	33.3%	66.7%	6.8%	6.1%
36-40	27.3%	72.7%	13.6%	16.3%
41-45	24.0%	76.0%	13.6%	19.4%

46-50	25.8%	74.2%	18.2%	23.5%
51-55	38.2%	61.8%	29.5%	21.4%
56-60	20.0%	80.0%	6.8%	12.2%
61-65	83.3%	16.7%	11.5%	1.1%
Total	31.0%	69.0%		

Many workers (40%) reported that they had been injured at work. Most (24%) of the injuries had resulted from falls from different heights, confirming the findings of Eppenberger and Haupt (2003). Sprains and strains caused 6% of the injuries. Only 5% of injuries were to the back. The study found that the most frequently injured anatomical regions were multiple in origin. For example, several workers had experienced fractures of the pelvis, back and wrist. Additionally, 8% of workers reported injuries to their eyes.

Several workers (16%) reported that they experienced problems with their muscles, bones and joints. Of these, 4% reported problems with arthritis of their knees, and 2% arthritis of their arms or wrists. Evidently, unskilled workers (6%), general workers (5%), and skilled workers (7%), and more specifically carpenters (3%) were the group most affected.

Because of the difficulty in diagnosing and identifying the cause, most employers ignore the complaints of workers about their backs because of the high incidence of fraudulent complaints that are rejected by the Compensation Commissioner. Consequently, they do not submit claims to the Compensation Commissioner.

Respiratory infections and lung function

Most of the workers were found to have a normal respiratory system, with only a very small percentage (1%) having major abnormalities of their lungs. Scarisbrick and Hendrick (1995) suggest that asthmatic workers may need to be protected. A worker identified as asthmatic reported having been on regular medication from the local clinic, had been infected with TB in 1983, with increased asthmatic episodes in winter. This particular worker had also worked on underground mines in Johannesburg for three years, then as a construction painter for nine years, and had been working with carpenters for the past 22 years.

The Western Cape Province reportedly has an annual risk of TB infection of greater than 3%. None of the workers reported that they were currently receiving treatment for TB. Several workers (8%) indicated that they had been coughing for more than 2 weeks. Any cough that persists for more than 2 weeks should be considered pathological and should be investigated. Correlation of the variables relative to lower respiratory tract infections indicated a significant relationship between those coughing for more than 2 weeks, and those who had previously had TB and a significant relationship between those who had asthma and previous TB. These results are shown in Table 4.

Table 4. Correlation of lower respiratory tract conditions

		Coughing for more than two (2) weeks	Bronchitis	TB	Asthma
Coughing for more than two (2) weeks	Pearson Correlation	1	0.151	0.249**	0.150
	Significance (2-tailed)		0.074	0.003	0.077
	N	142	141	142	139
TB	Pearson Correlation	0.249**	-0.038	1	0.192*
	Significance (2-tailed)	0.003	0.650		0.023
	N	142	141	142	139
Asthma	Pearson Correlation	0.150	-0.022	0.192*	1
	Significance (2-tailed)	0.077	0.796	0.023	
	N	139	138	139	139

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Skin infections

Workers were asked whether they had ever experienced skin problems, such as sores or rashes. The study found that 14% of the population had some form of minor skin problem, while 9% reported they had or had experienced skin problems that required treatment. Most of these respondents had visited their doctor or local clinic for treatment. One worker had been receiving care since 1983 for skin cancer. These findings confirm that dermatological disease rarely caused serious illness but could reduce worker efficiency if not adequately treated (Todd and Carman, 2001).

Further, 35% of workers worked with cement and concrete on a daily basis. However, the examinations failed to diagnose any cases of dermatitis as a result of this work and exposure. According to Davies and Rycroft (1995) and Todd and Carman (2001) the distinction between occupational and non-occupational dermatoses (termed eczema or dermatitis) is difficult, largely because of the similarity of the clinical appearances of these conditions. Workers (4%) reported they had either had eczema or dermatitis. On investigating whether these conditions were work related or not it was found that 2% of respondents had in fact worked as bricklayers or plasterers, and had thus been regularly exposed to cementatious products. One carpenter reported having eczema. Another worker had psoriasis.

SAMPLE B

The mean age of the 65 construction workers interviewed was 38.3 years. They had worked for a mean number of 10.7 years in construction, for 3.7 years for current employers. Those who had worked in other industries had done so for a mean of 5.0 years. Most workers (53.9%) had worked

as general workers while 30.8% had worked as bricklayers. According to 60% of respondents, construction had affected their physical health.

Musculoskeletal disorders

The predominating ways in which their health was affected included a range of aches and pains. The MSDs reported were

Backache (73.0%);
Sore muscles and joints (71.8%);
Shoulder pains (61.5%);
Hand and palm pains (40.5%);

These findings mirror the findings of the medical examinations of Sample A. Back ache was correlated with sore muscles and joints (0.437; 0.01 level) and shoulder pains (0.613; 0.01 level). Shoulder pains were correlated with sore muscles and joints (0.443; 0.01 level) and hand and palm pains (0.345: 0.05 level).

From Table 5 it is evident that the 30-50 year age cohort demonstrates most prevalence of MSD manifestations. Arguably considering that this age cohort constitutes the most productive workers in the industry, there is cause for concern.

Table 5. Crosstabulation of MSD manifestations with age

	Age category				
Manifestation	20-30 years	30-40 years	40-50 years	50-60 years	> 60 years
Sore muscles and joints	17.9%	25.0%	35.7%	17.9%	3.6%
Backache	14.8%	22.2%	40.7%	18.5%	3.7%
Hand and palm pains	13.3%	33.3%	40.0%	13.3%	0.0%
Shoulder pains	16.7%	25.0%	37.5%	16.7%	4.2%

The findings in Table 6 indicate that workers who have been in construction for between 5 and 15 years were most likely to report manifestations of MSDs, suggesting that the likelihood of MSD manifestation increases the longer workers remain in the industry.

Table 6. Crosstabulation of MSD manifestations with length of time in construction

	Length of time in construction				
Manifestation	0-5 years	5-10 years	10-15 years	15-20 years	> 20 years
Sore muscles and joints	14.3%	28.6%	25.0%	14.3%	17.9%
Backache	11.1%	29.6%	25.9%	14.8%	18.5%
Hand and palm pains	6.7%	40.0%	20.0%	20.0%	13.3%
Shoulder pains	8.3%	33.3%	25.0%	16.7%	16.7%

Respiratory infections and lung function

Several workers reported respiratory problems in the form of breathing difficulties (27.8%) and lung infections presenting in the form of coughing (29.7%). Lung infections were positively correlated with breathing problems (0.397; 0.05 level). From Table 7 it is evident that the 30-40 year and 50-60 year age cohorts demonstrate most prevalence of breathing problems and lung infections.

Table 7. Crosstabulation of respiratory infections and lung function with age

	Age category				
Manifestation	20-30 years	30-40 years	40-50 years	50-60 years	> 60 years
Breathing problems	10.0%	40.0%	10.0%	30.0%	10.0%
Lung infections	18.2%	27.3%	9.1%	36.4%	9.1%

The findings in Table 8 indicate that workers who have been in construction for between 5 and 15 years were most likely to report respiratory infections and lung function, suggesting that the likelihood of breathing problems and lung infections increase the longer workers remain in the industry.

Table 8. Crosstabulation of respiratory infections and lung function with length of time in construction

	Length of time in construction				
Manifestation	0-5 years	5-10 years	10-15 years	15-20 years	> 20 years
Breathing problems	0.0%	40.0%	30.0%	10.0%	20.0%
Lung infections	0.0%	36.4%	27.3%	18.2%	18.2%

Skin infections

Almost a quarter of the workers (24.3%) reported that they had experienced skin problems during their time in construction.

Other

Workers reported that they had experienced the following manifestations of health problems due to working in construction:

Headaches (62.2%);
Tension (35.1%); and
Eyesight problems (vision) (12.8%).

Further, other afflictions that workers had experienced during their working life and not necessarily as a result of working in construction included:

Hearing loss (7.9%);
High blood pressure (hypertension) (5.0%);

Diabetes (5.0%);
Tuberculosis (7.9%);
Diarrhoea (10.9%);
Respiratory infections (breathing) (12.7%);
Skin infections (herpes, simplex, warts) (14.3%); and
Central nervous system disorders (3.2%).

These last findings suggest that apart from the health difficulties encountered as a direct consequence of working in construction workers experienced other afflictions which were not necessarily contracted while working in the industry. These could probably be regarded as non-occupational and/or pre-existing conditions. The authors argue that these could result not only in claims in terms of The Compensation for Occupational Injuries and Diseases Act 1993 (No 130 of 1993) but also be exacerbated by construction activities and tasks on sites.

Age and respiratory infections were negatively correlated (-0.304; 0.01 level). There were no correlations between age and other reported afflictions. Respiratory infections were positively correlated with breathing problems (0.710: 0.01 level); lung function or coughing (0.367; 0.05 level); TB (0.417; 0.01). Lung infection or coughing was positively correlated with breathing problems (0.397; 0.01 level). TB which is an opportunistic infection associated with HIV and AIDS is positively correlated with breathing problems (0.465; 0.01 level); lung function or coughing (0.551; 0.01 level).

CONCLUSION

Considering the steady decline in the numbers of new recruits to the skilled construction workforce worldwide, the poor image of the industry, and the effects of the HIV and AIDS pandemic, construction workers and their health are critically important for the sustainability of the South African construction industry. There is a general lack of occupational health care with respect to construction workers. This study found in both worker samples that they had problems with several occupational and non-occupational diseases and presented in particular with a range of musculoskeletal disorders, respiratory problems and skin infections. Further, the longer they worked on construction sites the more likely they were to present with these health problems. The 30 to 50 year age cohort predominated with manifestation of ill health. These diseases negatively affected work productivity in the industry and increased absenteeism potentially resulting in increased costs of construction. Additionally, many of these afflictions were potentially exacerbated by exposures while carrying out construction activities and tasks. The study found that many construction workers had worked in other industries prior to entering construction and several reported health problems were possibly pre-existing potentially resulting in compensation claims while in current employment. The employer contribution towards these claims can be substantial.

Given that the majority of workers required referral, many for unresolved non-occupational illnesses and diseases such as various skin, upper and lower respiratory, and musculoskeletal conditions, a construction employer-driven health promotion programme is strongly recommended that addresses these aspects and includes regular medical surveillance and effective treatment interventions. Interventions that construction employers could consider as part of such a program would be vaccinations against various potential infections, information about the importance of

nutrition to boost workers' immune systems, and promotion of primary health care. There is a clear business case to be made for employer driven investment into the health status of their workforce.

Employers in the construction industry need to take the 'Higher duty of Care' and 'egg shell skull principle' seriously, as the findings of this study indicate that construction workers are at high risk, and not necessarily from work related conditions but also from chronic diseases linked to aging. In doing so, workers will be assured of not having existing conditions exacerbated by the harsh working environment of construction projects. This approach would be very positive for the sector as a whole. Arguably, if younger workers became aware that their occupational and general health would be looked after throughout their employment, and deemed important, they might be attracted into the industry. This aspect would, furthermore, improve its current poor image. Furthermore, there are cost benefits of optimum worker health as a result of improved overall performance. Unfortunately, due to the predominating focus of the industry on time, cost and quality the contracting sector in particular has neither recognized nor accepted that investing in programs that maintain and improve the health condition of the workers is an investment in the long term sustainability of their own businesses. Consequently it is recommended that the level of awareness be raised among all construction stakeholders in this regard. This paper makes such a contribution.

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