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Importance of healthy older construction workers

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Abstract

Older construction workers constitute a major proportion of total South African construction employment. Demographic changes and an apparent growing loss of interest among young people in careers in the construction industry are contributing to an increase in the proportion of older workers in the industry. There is a resultant decline in the growth of new cohorts entering the labour market. Consequently the size of the older cohort relative to the size of the younger cohort increases. Additionally, general and chronic occupational and non occupational diseases potentially reduce the overall labour force, shift the age structure due to mortality, change the skill composition of the labour supply, and increase labour turnover. This article reports on a study that sought to establish the health status of the older worker cohort in construction. The study found that older workers had problems with 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, musculoskeletal, as well as upper and lower respiratory disorders. Recommended interventions include regular medical surveillance as part of employer driven health promotion programs.

Keywords: medical surveillance, construction industry, older workers, health

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Abstrak

Ouer konstruksiewerkers verteenwoordig 'n groot deel van Suid Afrika se totale konstruksie werkers. Demografiese veranderinge en 'n toenemende gebrek aan belangstelling in beroepe in die konstruksiebedryf onder die jeug dra by tot die groei van ouer werkers in die industrie. Algemene en kroniese beroeps en nie beroeps verwante siektes verminder die groot meerderheid arbeidsmag, die ouderdom struktuur verskuif as gevolg van sterftes, die vaardigheid same stelling van arbeidverskaffing verskuif en arbeidsomset word verhoog. Hierdie artikel doen verslag oor 'n studie wat gedoen is op die gesondheid status van die ouer werkerskorps in die konstruksiebedryf. Die studie het getoon dat ouer werkers probleme ondervind met onder andere spierkwale, asemhalingspro bleme en vel infeksies. Hierdie siektes beïnvloed produktiwiteit en dra by tot af wesigheid van die werk. Die meerderheid werkers het verwysings gevra vir on opgeloste nie beroepsverwante siektes soos verskeie vel, spier en asemhaling siektes. Werkgewers kan gesondheidsbewusmakings programme aanbied om werkers te help.

Sleutelwoorde: mediese ondersoeke, konstruksie industrie, ouer werkers, gesondheid

1. Introduction

As a sector, South African construction contributed 5.1% of GDP and construction activity amounted to R45.4 billion at 2000 constant prices in 2002 (CIDB, 2004). It is estimated that 520 000 workers are employed in construction with only about 214 333 being formally employed – less than 50% of the construction workforce. Anecdotal evidence suggests that many of the experienced workers in construction are chronologically older persons. Demographic changes and an apparent growing loss of interest among young people in careers in the construction industry are contributing to an increase in the proportion of older workers in the industry. There is a resultant decline in the growth of new cohorts entering the labour market. Consequently the size of the older cohort relative to the size of the younger cohort increases (Haupt & Smallwood, 2003). Additionally, general and chronic occupational and non-occupational diseases potentially reduce the overall labour force, shift the age structure due to mortality, change the skill composition of the labour supply, and increase labour turnover.

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. It therefore makes good sense to improve the health, well-being, workplace environment, and safety of all construction workers, especially older ones who generally have longer periods of recuperation. 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. According to NEPAD (2001), the most obvious effects of health improvement on the African working population are the reduction in lost working days due to sick leave and the increase in productivity.

This paper reports some of the findings of a study that sought to test the following hypotheses:

- Older workers comprise an increasingly large proportion of the construction workforce;
- The prevalence of injuries/disease/disability is higher among older than younger workers;
- Older workers have problems related to several occupational and non-occupational diseases such as deafness or noise induced hearing loss (NIHL), TB, high blood pressure (hypertension), diabetes, and HIV and AIDS;
- These diseases affect absenteeism among and work performance of older workers;
- Contractors do not undertake nor support health related interventions;
- Medical surveillance and testing is necessary to identify the health condition of workers and implement effective treatment interventions.

2. Definition of 'older workers'

It can become very complicated to not use chronological age as a major defining criterion for 'older workers' considering that by itself it is not a completely effective measure (Haupt & Smallwood, 2003). In a recent pilot study on general contractor perceptions regarding older workers, 67% of general contractors subscribed to the term 'older workers.' Additionally, the range in age group defined by them as older workers ranged from >35 years to >61 years and older. However, the mean age was 50 years and older (Smallwood & Haupt, 2004).

Preliminary data extracted from the Workplace Skills Plans (WPSPs) submitted to the Construction Education and Training Authority (CETA) suggest that 60% of skilled workers are over the age of 40 years with about 50% of these being between 40 and 49 years old. Using the same CETA database, 69% of plant and machine operators are over the age of 40 years. Therefore, it is not unrealistic to extrapolate that the same proportion of unskilled workers would also fall within this age cohort. A conservative estimate of the number of older workers in construction could arguably be in the region

of 250 000 persons. Unless interventions are introduced to retain this cohort in the industry the consequences might be disastrous for the sector considering the additional impacts of diseases such as tuberculosis (TB), sexually transmitted infections (STIs), and HIV and AIDS. For the purpose of this paper, older workers are those construction workers aged 40 years and older who worked on construction sites and in the main executed manual construction activities.

3. Definition of 'health'

The widely accepted definition of occupational health by the International Labour 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 favour of occupational safety.

4. Health challenges in construction

Hard physical labour, 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 problems (Smallwood & Ehrlich, 1997). Construction workers complain more about the awkward and static postures, vibration and climate, and older workers are more likely to complain in general. 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 recent report on mortality for the period 1997 through 2003 indicates that premature adult mortality in the general South African population is high as a result of poverty-related diseases such as tuberculosis (TB) and diarrhoea, injuries and emerging chronic diseases such as hypertension (high blood pressure) and diabetes (Statistics South Africa, 2005). 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 for the 45 to 59 year age group – the older worker cohort. The last disease is increasingly a major cause of death and disability in older persons 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. They also found that the presence of hypertension became more prevalent in older persons in low socioeconomic positions. Typically, large proportions of construction workers come from poor socio-economic backgrounds. Further, Mattson (2004) found that the central nervous systems of older persons are known to be vulnerable to TB infections.

There is little data available that gives the current physical status of construction workers in terms of age or experience. Most literature addresses audiometry (hearing) and lung function testing, and most recommendations state that pre-employment examinations must be done. These medical examinations should include a job and medical history, a physical examination, audiometry, test of visual acuity, electrocardiography (ECG), lung function, and a blood and serum analysis. One of the key issues for construction firms in South Africa is to encourage and support their workers' take up of voluntary testing and counselling.

5. Age effects and influence

The possible ill effects on older construction workers of the harsh environmental work conditions of noise, dust, toxins, and fumes are often more of a concern than in other industries. Older workers, as

defined earlier, bring desirable construction experience to the workplace. They often have specific knowledge of construction means and methods, use of tools, process management and material usage that can help improve productivity, health and safety in construction workplaces. To ensure sustainability of the SA construction industry, employers need to become more aware of the benefits of looking after their older workers. In two studies (Banki, 1979 & Hinze, 1981) it was found that first aid accidents were over three times higher when construction workers' ideas were never considered. Thus, it is likely by taking into consideration the work concerns of older workers to reduce accidents and improve project performance.

It is also likely that older workers are more susceptible to disease and their debilitating effects. In this regard employers can play a pivotal role in educating them in healthy living and providing appropriate counselling as required. However, the authors argue that positive improvements are possible if employer driven health promotion includes lowering personal and work related risk factors and improvements in occupational safety and industrial hygiene. Additional roles for employers include within structured employment policies the provision of proper treatment and counselling to workers who have contracted diseases such as TB, hypertension, diabetes, and HIV and AIDS accompanied by the elimination of prejudice against older workers and initiating policies and procedures that actually encourage and support the work performance of this highly valuable age group. In the United Kingdom pressure ulcers were found to be the consequence of the lack of routine health care and prevalence was likely to increase. Therefore, programs targeted at prevention are encouraged (Bennett, Dealey & Posnett, 2004).

6. Physical conditions

The physical performance of older workers is often perceived by their employers to be reduced in a work environment that is commonly harsh and has heavy physical demands. However, not in all cases do older workers exhibit lower physical work output (Driver, 1994). Physiologically, in general, older workers exhibit lowered physical stamina and strength, and increased fatigue and time to recover from fatigue. These compromise their physical abilities, safety performance, and productivity at the immediate work site (Oglesby,

Parker & Howell, 1989 and Laufer & Moore, 1983). In addition, older workers – like all other older people – have more concerns owing to various recorded medical conditions that are a normal part of aging.

6.1 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. Demographic changes and loss of interest among younger individuals in a career in the construction industry have resulted in an increase in the proportion of older workers relative to younger workers in the construction industry. Consequently, older workers potentially have a limited ability to choose another occupation or to transfer into another field of work (Arndt *et al.*, 1996).

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 Center to Protect Workers Rights (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 (Schneider, 2001). 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.

Carpal 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 carpal tunnel syndrome (CPWR, 1998).

6.2 Respiratory infections and lung function

Respiratory infections are reported to be one of the leading causes of death in older persons due to infections (Meyer, 2004). On construction sites, older workers are at particular risk as a result of the dusts and fumes that they are likely to be exposed to during construction activities. The hospitalization rates for pneumonia, for example, suggest an increase with increase in age. Older workers are, therefore, 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 to reducing the scourge that the disease may present to older persons. Both non-immune and immune defences against infection such as coughing, mucociliary clearance and antigen-specific inflammatory responses tend to decrease with advancing age (Meyer, 2002). With advancing age the likelihood of acquiring at least one significant medical illness such as pneumonia increases due to alterations in microbial clearance and immunity. Most episodes of pneumonia are initiated by aspiration and inhalation of contaminated material from the upper airway of the lung (Chouinard, 2000). Ciliary abnormalities appear with aging and contribute to increased susceptibility to respiratory infection.

Altered body weight and the decline in muscle mass associated with aging may account for decrease in diaphragmatic strength (Evans & Campbell, 1993). Consequently, older persons with respiratory infections might struggle with mucociliary clearance. Further, many other aspects of lung function decline in aging persons. These include loss of lung elastic recoil, decreased chest wall compliance,

and loss of gas exchange surface area. These problems are exacerbated if older 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.

6.3 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 & Uttech, 1990). The skin of older persons differs structurally and functionally from other age groups. The epidermis is thinner and has a slower cell turnover rate resulting in less resistance to external injury and prolonged wound healing (Laube, 2004). There is also possible decline of immune function with age. Often, skin infections in older persons are more difficult to diagnose because they tend to have fewer symptoms and signs. Herpes simplex, shingles, scabies, and fungal infections present problems to older persons. Infections are particularly likely following minor trauma, maceration and poor hygiene.

7. Methodology

For the purposes of the phase of the study reported on in this paper, 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 older construction workers as defined on an entirely voluntary informed consent basis. These workers had worked as carpenters, roofers, bricklayers, plasterers, painters, and general labourers. In particular, data was collected, *inter alia*, on chronological age, work experience, injury record, health record, work areas and activities that cause injuries to older workers, concerns and difficulties encountered by older workers during execution of their work attributable to the aging process, tasks that can be performed most effectively by older workers, social, psychological and emotional needs of older workers, minimum performance expectations of employers, and details of programs that cater to the needs of older workers.

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.

8. Research results

The sample of 142 workers had a mean age of 48 years. Only 44% had worked exclusively in construction. The study found no statistical relationship between age, occupation and education, but a strong relationship between age and the number of years employed in a particular category of work, suggesting that there is a greater possibility of a worker aging in a particular category. Further, 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 & Brown, 2001 and Koh & 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 1.

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.

Table 1: Factors that affect health of workers

<i>Physical</i>	<i>Biological</i>	<i>Chemical</i>	<i>Mechanical</i>	<i>Psycho social</i>
Noise	Insects	Liquids	Posture	Stress
Vibration	Fungi	Fumes	Movement	Work pressure
Heat and cold	Bacteria	Gases	Repetitive tasks	Monotony
Dust	Viruses	Fibers		Unsocioable hours
		Mists		Ergonomics
		Vapours		

Adapted from Gibb *et al.* 1999

8.1 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 2 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. The next susceptible age group was 51 to 55 years where 38% encountered 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 2: 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 & 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.

Considering that musculoskeletal disorders are difficult to diagnose and pain is hard to measure and quantify objectively, very few studies have been done that look at the prevalence of musculoskeletal disorders based on medical surveillance. In the construction industry workers are rarely, if ever, exposed to any form of

medical surveillance. 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.

8.2 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 & 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 has 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 3.

8.3 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

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rarely causes serious illness but could reduce worker efficiency if not adequately treated (Todd & 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 & Rycroft (1995) and Todd & 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 cementitious products. One carpenter reported having eczema while another worker had psoriasis.

Table 3: Correlation of lower respiratory tract conditions

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

9. Conclusion

Considering the continuing decline in the numbers of new recruits, the poor image of the industry, and the effects of the HIV and AIDS pandemic, the older construction worker cohort that arguably constitutes about 50% of total construction employment, is 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 that older workers had problems with 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.

Given that the majority of workers required referral, many for unresolved non-occupational conditions such as various skin, musculoskeletal, upper and lower respiratory disorders, a construction employer-driven health promotion programme is strongly recommended. This programme should include 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.

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, emphasis needs to be placed upon the cost benefits of optimum worker health as a result of improved overall performance. Consequently it is recommended that the level of awareness be raised among all construction stakeholders in this regard.

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