

A review of factors influencing construction workers' nutritional uptake

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Abstract

Purpose: Nutrition is linked with construction worker health and safety (H&S) performance. Some accidents, injuries and in some cases, deaths on construction sites are direct or indirect results of physical and psychological distresses (chronic health conditions and mental instability) arising from poor nutrition of construction workers. This alarming situation could gravely affect construction workers, their families, the industry and the economy as a whole since health will be adversely affected, performance will be hindered, avoidable on-site exigencies, injuries and sometimes deaths will occur, resulting in lost working hours or days, lost wages, increased healthcare costs, and decline in productivity and Gross Domestic Product. This study therefore reviews the factors which influence the nutritional uptake amongst construction workers and possible interventions.

Methods: This study is based on review of previous literature on the construction industry and its H&S performance, as well as factors influencing nutritional uptake and nutrition interventions in the construction industry. The literature review was based on both international and South African context.

Findings: The study revealed that construction workers' nutrition is influenced by personal factors and environmental factors. The study also established feasible nutrition interventions based on these factors. Nutrition promotion initiatives need to target the different influences on construction workers' nutritional uptake.

Value: The study highlights construction workers' nutrition influencers and reveals feasible strategies to improve nutrition and thus safety performance on construction sites.

Practical implications: Findings from this study will inform development and implementation of programmes and policies targeted towards nutritional uptake tailored for construction workers.

Keywords: construction workers, H&S performance, factors, nutritional uptake, nutrition interventions.

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1.0 INTRODUCTION

Nutrition is an occupational H&S concern and has been for decades (Wanjek, 2005). It plays an invaluable role in H&S performance and productivity improvements (Wanjek, *ibid.* and Queensland Government, 2013). Proper nutrition based on consumption of healthy foods from different classes of food nutrients aids construction workers in maintaining healthy bodies and minds, maximum energy levels and alertness to safely undertake their physically and mentally demanding tasks thereby reducing the risks and rates of accidents and injury to them and those around them.

Research indicates that construction workers have poor nutrition (Deacon, 2004; Wanjek, 2005; Men's Health Forum (MHF), 2009; English & Bowen, 2011; Du Plessis, 2011 & 2012 and Tiwary et al., 2012) and that they are at a significantly greater risk of developing chronic diseases such as diabetes, cardiovascular disease, and certain cancers, than workers in other industries (Queensland Government, 2012b). Improving nutrition requires an understanding and targeting of the factors influencing nutritional uptake (European Food Information Council (EUFIC), 2005). There has been research on factors that influence workers' nutritional uptake as well as on interventions. For instance, Wanjek (2005), which had a broader focus, incorporating workers in general, and more recently, Du Plessis (2011 and 2012), focused on construction industry apprentices. Successful nutrition interventions were evinced in Steyn et al. (2009), Du Plessis (2011) and Schroer et al. (2014), but included multi-faceted interventions incorporating other lifestyle components like physical activity.

However, although there has been some research on construction workers' nutrition and nutrition improvements, it appears that very little attention has been paid to the development of interventions targeted at the nutrition of construction workers in particular, taking into consideration the factors which influence their nutritional uptake. This is in spite of what, for example, Schroer et al. (2014) indicated in their study that focusing a lifestyle behaviour such as nutrition in workplace health promotions maximizes effectiveness.

The present paper reviews and incorporates evidence related to construction workers' nutrition and nutrition improvements, and advocates a set of interventions focused on improving nutrition based on the factors which influence construction workers' nutritional uptake. The study will be of help in developing a nutrition-focused intervention model for H&S tailored for construction workers in particular and will result in nutrition being given more attention in H&S performance considerations on construction sites. The objectives of this study are therefore to identify the factors which influence construction workers' nutritional uptake and establish possible interventions based on the factors identified.

1.1 Overview of the importance of the construction industry

Murie (2007), Giang and Pheng (2011), Osei (2013) and Women in Informal Employment Globalizing and Organizing (WIEGO, 2014) noted that construction contributes immensely to global and national economies, accounting for about 10% of the global Gross Domestic Product (GDP), 7 – 10% of the GDP in developed economies and 3 – 6% in underdeveloped economies. The sector contributes about 4% to the GDP of South Africa (Statistics South Africa, 2014).

The construction industry generates income, alleviates poverty and improves living standards being the second largest employer worldwide (after agriculture) (WIEGO, 2014). It accounts for 7% of global employment (Ambekar Institute for Labour Studies (AILS), 2012), that is, approximately 180 million construction workers worldwide (Murie, 2007 and WIEGO, 2014), made up of about 75% in developing countries. In South Africa, the construction sector employs approximately 8% percent of the total labour force (Statistics South Africa, 2014). The construction sector is therefore undeniably important in most economies of the world.

1.2 Construction H&S Performance

Despite its importance, the construction sector is unfortunately notorious for being one of the most dangerous industries (Murie 2007; Government of Queensland, 2013) along with transportation, mining and agricultural sectors. In comparison to other sectors, the construction industry has the highest rates of accidents, injuries and fatalities (Deacon, 2004; Government of Queensland, 2013; Musonda, 2012; Murie, 2007; AILS, 2012 and Construction Industry Development Board (CIDB, 2009), being responsible for 30 – 40% of the world's fatal injuries (Murie, 2007). According to the International Labour Organization (ILO), one in every six work-related fatal accidents occurs on a construction site (CIDB, 2009). According to Health and Safety Executive (HSE, 2013), the sector accounts for 27% of fatal injuries (39 in number) to employees and 10% of reported major injuries in Britain. In the United States of America, construction accounted for the highest number of fatal work injuries (775 in number) of all industries in 2012 (Bureau of Labour Statistics, 2013). In South Africa, statistics from the Federated Employer's Mutual Assurance Company show construction related fatalities total about 150 a year and the industry suffers about 400 accidents a year (Prinsloo, 2013). 258 accidents and 56 fatalities in construction were reported in 2012 (Department of Labour, quoted by Prinsloo, *ibid.*). These statistics indicate that the construction industry continues to have high incidences of accidents, injuries and deaths and this is grave and tragic because some of these injuries and accidents are avoidable and preventable even with proper nutrition.

1.3 The nature of construction

Construction work is hazardous in nature (ILO, 1995; Murie, 2007 and Walters, 2010) and this is due to the extensive use of sophisticated, dangerous plants and machinery in construction operations. Furthermore, it is arduous (ILO, 1995 and Murie, 2007), labour-intensive, physically and mentally demanding, requiring moderate to maximum levels of physical strength and stamina, manual dexterity and coordination (Construction Labour Contractors (CLC, 2014) as well as mental concentration and alertness, involving a wide range of hazardous work at varying and extreme heights and weather conditions, directly exposed to height, unsafe electrical wiring and appliances, and dangerous chemicals. This underscores the need for considerable attention towards workers' nutrition to help in preventing additional risks to that posed by the nature of their work.

In addition, construction is transient and informal. Being transient means that there is no central and permanent place of work (Queensland Government, 2013). Construction activities do not last long at a particular site. The informality of construction with regard to employment means that workers are employed on a casual basis, without regular contracts or any social protection (Wells, 2007).

Construction workers perform the actual physical work, as opposed to site managers and supervisors. They are the most important resource and constitute assets in the construction industry (Smallwood, 2012). They are the human capital (Deacon, 2004 and Chenoweth, 2011), centre and stronghold of the construction industry and as such they need particular care with regard to the need for continuous reduction of health risks and actualizing capacity and productivity (Deacon, 2004) in a key and important industry such as the construction industry.

1.4 The role of nutrition in industry performance

Poor nutrition potentially leads to the development of chronic diseases such as diabetes, cardiovascular disease, and certain cancers, raised levels of fatigue and reduced alertness that affect the safe operation of plant and machinery; reduced effectiveness and productivity of workers due to impaired physical and mental functioning, leading to project delays; increased rate of injuries (including an increased probability of slips, trips, falls and musculoskeletal injury) and absenteeism, leading to higher workers' compensation claims/premiums and skills shortages; accelerated health decline due to physical nature of the work, resulting in older workers with valuable skills and experience leaving the industry prematurely; increased rate of worksite incidents and near-misses, posing a risk to other workers on-site and affecting compliance with work H&S legislation (Queensland Government, 2012a; 2012b and 2013).

2.0 LITERATURE REVIEW

2.1 Review of factors influencing construction workers' nutritional uptake

According to Wanjek (2005) construction workers' nutrition is influenced by availability and cost of healthy food alternatives on site or nearby, wages, work schedules (including length of meal breaks, since people generally don't make healthy food choices when they are rushed), work-related and welfare facilities (such as provision of eating areas) and economic environment. In his opinion, construction workers sometimes have no place to eat or money to purchase food; local and nearby restaurants can be expensive or in short supply and street foods are bacteria laden. In addition, the lackadaisical attitude of employers and unions towards nutrition was indicated to exacerbate the situation. Workers' access to food at construction sites was not a top union concern. Main concerns included wages, distribution of working time and non-unionized migrant workers. Construction employers on their part are usually more interested in maximizing productivity and profits (Deacon, 2004) and meeting tight deadlines, with little regard to their workers' wellbeing and health pursuits (Queensland Government, 2013). Wanjek (2005) had a broad scope, including workers in general and focusing on food quality and quantity.

Thabit et al. (2013) found that lack of healthy dietary options in the workplace and low level of awareness among employees regarding healthy diet partly contributed to poor nutritional uptake amongst construction workers in Ireland. The authors viewed that this lead to the prevalence of cardio metabolic disease risks such as obesity and diabetes amongst the workers.

The Government of Queensland (2012b) identified work schedules, regular travel between worksites due to the transient nature of construction, and limited on-site catering facilities

(e.g. a kitchen and/or healthy food) as environmental factors on a typical construction worksite which can influence workers' eating lifestyle. Regular travel between worksites means workers do not have a central workplace and may not be familiar with worksites long enough to participate in nutrition intervention programmes, and thus lack of nutritional awareness persists. However, this study focused on the environmental factors and excludes personal factors which could influence nutritional uptake on a construction site.

In another study, Du Plessis (2011) found that nutritional uptake of construction workers is influenced by nutritional knowledge and cooking skills, familial factors (socio-economic status of parents and parental influence), peer influence, food supply and acquisition (e.g., at home, work or through fast-food outlets) demographic factors (age and gender differences, income, ethnicity and cultural variables); dietary restraint (conscious choice to regulate body weight), work and financial responsibilities, unhealthy childhood and adolescent food practices which endure into adulthood. The other factors were found to be media and stereotypical views about nutrition (since men generally view nutrition and cooking as socially prescribed for women and are relatively unconcerned about health and diet). Findings from a similar study (Du Plessis, 2012) which explored these factors using focus groups and thematic analysis found that apprentices' dietary practices were moderated by convenience, availability and cost of foods, nutritional beliefs, significant others, colleagues in the workplace and body image. However, the studies by Du Plessis only focused on apprentices in the construction industry and therefore their results cannot be generalized.

According to Tiwary et al. (2012), socio-economic status influenced nutritional uptake. The authors contended that since most building and construction workers (Indian) were breadwinners to large families and were poorly paid, their situation lead to regular consumption of staple foods inadequate in quantity and quality. Koehn and Reddy (cited by Agumba and Haupt, 2011) agreed that construction workers (Indian) had low income and could not afford proper nutrition. In addition to the low wages which construction workers earn owing to their low level of education and informality of employment (WIEGO, 2014), rising costs of essentials was reported to influence Indian construction workers' nutrition (Nadu, 2008). Foods consisting of refined grains, added sugars and fats, which are far more affordable than recommended "healthful" diets and of course, good tasting and convenient are usually opted for (Drewnowski and Darmon, 2005).

The Men's Health Forum (MHF, 2009) in the United Kingdom undertook research exploring the diet habits of male construction workers as an aspect of their health by reviewing existing evidence and speaking with industry stakeholders and construction workers themselves. This study revealed that construction workers have poor dietary behaviours due to limited on-site catering facilities (which seldom offer healthy alternatives or information about nutrition where they exist) and low level of nutritional knowledge. It was indicated that male construction workers had less knowledge of particular foods, are cynical about public health messages and reject healthy food on the grounds of poor taste and inability to satisfy. High-fat foods are instead consumed in the belief that this will enable them to undertake a physically-demanding job. This study however did not propose or advocate intervention measures, but suggested that men are more in need of interventions than women.

A cross-sectional study (Kolbe-Alexander et al., 2008) using focus groups and clinical measures indicated that insufficient time to prepare healthier meals at home, and seasonality influenced dietary behaviours amongst South African employees. Participants felt that they generally followed healthier diets during summer when their intake of salads was higher and

there was a greater variety of fruits and vegetables. Availability of healthy foods, a factor noted by Wanjek (2005) and Du Plessis (2012), on construction sites depends on the season. Kolbe-Alexander et al (2008) evaluated the effectiveness of an on-going workplace wellness programme which was conducted on South African employees, but not specifically on construction workers.

However, Kolver (2012), commenting on construction workers specifically, argued that many construction workers in South Africa have poor nutrition and this is due to lack of consistent access to healthy foods, lack of awareness of the poor nutritional value of the foods they eat regularly, long and time-consuming travels between workplaces, and financial constraints.

Literature reviewed in this section seems to suggest that some nutrition-influences are personal whereas others are environmental and as such, suggesting that they may be beyond an individual's control. Therefore, nutrition-intervention measures should target these factors individually and collectively to ensure effectiveness. This study sought therefore to establish and synthesize factors that influence construction workers' nutritional uptake.

2.2 Towards improving nutrition of construction workers

Workplaces should aim to implement programs and services based on the identification of solutions to the influences on workers' healthy eating, ensuring that all workers can get involved, access support and make changes to their lifestyle (Queensland Government, 2012b). A number of construction companies, organizations and governments have implemented initiatives to mitigate the impact of the above-mentioned factors and lead to positive outcomes for workers and the wider construction industry. The following intervention measures were identified from a review of various studies.

Supplementary feeding programmes: These are programmes primarily designed to distribute food among beneficiaries through the support of donors, agencies and local governments (FAO, 2001). For instance, according to Queensland Government (2012b), "fat-free Fridays" were offered as part of a health program (Your Health, Your Future) implemented through a collaborative partnership between construction unions and subcontractors, aimed to offer a health and wellbeing program tailored for construction workers. This program offered workers free healthy meals at onsite canteen over six months, during construction of the Gatton Correctional Centre. Evaluation at the end of the program which also included voluntary participation in health checks, individualized feedback and referral, monthly educational talks and seminars, demonstrated a 5-15% overall improvement in waist circumference, total cholesterol, blood glucose, physical activity levels and alcohol consumption; 25-35% overall reduction in blood pressure and nutrition scores; and a total group weight loss of 111.90 kilograms with an average loss of 3.6 kilograms per worker.

Evidence shows that fruit and vegetables interventions are generally effective at the workplace (Quintiliani, Poulsen and Sorensen, 2010). Initial results of studies in Denmark examining the impact of free-fruit program in the workplace showed that 96% of employees, when provided with fruit free or at 50% of cost, ate fruit daily or near daily; and the consumption of sweet snacks, fizzy drinks and candy declined by 50% (Anon., 2009).

According to Kolver (2012), in South Africa, workplace nutrition provider TRRC Nutrition provided workers in the construction industry as well as mining, forestry and agricultural

workers, with energy-giving foods. These products, which are packaged according to the dynamics of a particular operation, are of high-quality nutrition and are affordable, compared with the cost related to accidents. This initiative helped to sustain workers, keeping them focused and alert and thus reducing accident rates and financial strain on companies with regard to accidents.

Nutrition Education: Wanjek (2005) identified several workplace campaigns where education was key in motivating employees to eat well. He found that a lack of employee education led to employees rejecting healthy food offering to the extent that vendors refused to provide them anymore because they didn't sell. Groenveld et al. (2011) found that after six to twelve months of delivering individual counselling in the form of motivational interviews, there was a statistically significant beneficial effect on snack and fruit intake amongst male construction workers which was sustained 6 months after the intervention had ended. Another study (Anon., 2013) showed that three sessions of nutrition training and instructions (whereby basics about nutrients, cooking techniques and ways of increasing limited food resources, e.g., gardening were delivered) lead to increased vegetable intake, decreased "fast-food" intake and increased attention to food labels amongst low-income women who participated in the classes. In 2004, educating construction workers and managers on nutrition, and food safety and hygiene improved nutrition and health of Chinese construction workers in Beijing who got ill from food contamination as a result of improper handling of food and limited on-site catering facilities (Wanjek, 2005).

Environmental changes: Workplace environmental changes such as establishing designated areas for eating can improve nutrition at construction sites. Construction sites are dirty (ILO, 1995 and Murie, 2007) and harbour debris and dangerous chemicals. Special areas like mess rooms on construction sites, not only provide shelter from the dirty environment and inclement weather, but also provide means of food preservation and storage. Wanjek (2005) opined that improving nutrition not only has to do with what people eat, but also how they eat; the environment/atmosphere/ambience in which they eat mattered greatly. Nutrition also has to do with food hygiene and safety. Lead could be ingested accidentally, leading to nausea, dizziness and muscle weakness, all of which can affect the working capacity of a construction worker and could be fatal. Again, some foods, especially proteins, stored at room temperature go bad quickly and cause ill-health (diarrhoea, for instance). Therefore provision of welfare facilities such as for washing before eating, safe drinking water, for preparing and eating meals as well as for food storage (refrigerator, cupboards and microwave) is very essential (ILO, 1995). Provision of canteens is vital for those who build canteens to prevent food contamination from site dust and tiny debris.

Improving access to healthy foods by ensuring that food vendors at construction sites sell a variety of healthy nutritious foods has been advocated (Wanjek, 2005 and ILO, n. d.). If meals are not provided at the site, workers should be able to get reasonably priced and healthy foods nearby, as is the case in Japan (Wanjek, 2005), where convenience stores selling boxed lunches are ubiquitous and within walking distance of construction sites owing to Japan's dense population. Moreover, the traditional Japanese diet is among the healthiest in the world (Wanjek, *ibid.*).

Mapping out more time (by employers) for lunch breaks ensures that workers can have enough time to eat (Wanjek, *ibid.*). Workers who do not have enough time to eat could rely on snacks such as packet chips, sweets and fizzy drinks or burger and fries, instead of healthy lunches prepared at home with lots of vegetables and lean meat or fish or poultry.

Nutritional Policies: Meal vouchers given by employers or governments (on a national level) can encourage workers to eat healthily. Food vouchers are meal tickets which can be used to purchase ready-to-eat meals in affiliated eating places. It is usually issued by the Government, enforced by law (Wanjek, 2005). Therefore, at the national level, the government has a responsibility to improve the nutrition of workers. In France, meal vouchers are commonly used by construction workers for particular restaurants selling healthy foods (Wanjek, *ibid.*). Construction employers can also work with food vendors on construction sites to provide and sell healthier and fortified foods at lower costs. Unsurprisingly, Steyn et al. (2009) share this view and argue in their South African study that nutrition interventions whereby changes are made with regard to increasing availability of healthy food options and selling at reduced prices, as well as involving dieticians in multi-media nutrition education programmes, proved to be successful in influencing positive dietary behaviours. In their review of lifestyle interventions in the workplace, Schroer et al. (2014) concluded that workplace health promotions should focus on either physical activity or weight or nutrition behaviour to maximize effectiveness.

In summary, to meet the need for proper meals of construction workers, facilities should be made available for boiling water and heating food and for vendors to sell hot and cold food (including provision of space, shelter, water, heating and rubbish bins); arrangements made with a canteen on site and/or restaurants nearby to supply cooked meals, packaged meals, snacks and beverages (ILO, n. d).

3.0 RESEARCH METHODS

The study sought to establish what the factors which influence the predominant nutritional uptake of construction workers and what the possible interventions to improve the status quo could be. Consequently, a review of literature on practice and policies with regard to nutrition and H&S in the construction industry was conducted. Various sources were consulted in order to meet the objectives of the study. These sources include accredited academic and professional journals, books, government reports, newspapers, magazines, theses and dissertations. This paper will therefore report on findings from the study.

4.0 DISCUSSIONS

This section discusses the objectives of the study and answers the research questions posed.

4.1 Factors influencing construction workers' nutrition

This paper identifies the following factors which influence the nutritional uptake of site workers in the construction industry:

- personal factors including preferences based on satiety and taste, level of nutritional knowledge, family and peer/colleagues' influences, ethnicity and cultural variables, income, lifetime unhealthy dietary habits, perceptions of value, motivation, convenience, nutritional beliefs, dietary restraint due to body image, and attitudes; and
- environmental factors including organizational influences (work schedules and length of break times), limited on-site eating facilities, wages, unvaried healthy food options on site, and availability and costs of healthy foods.

Some of these factors, like wages and work schedules are due to the informal and transient nature of industry and are therefore difficult to change, but their effects can be mitigated. Also, individuals have control over nutrition and can therefore make positive changes with regard to personal factors such as nutritional knowledge, habits and perceptions. These findings underscore the need for a comprehensive program targeting the nutrition of construction workers which can be modified to suit individual differences of the construction workforce stratified by age, gender and ethnicity.

4.2 Possible interventions to improve construction workers' nutritional uptake

The present paper identifies measures which could be tailored for construction workers and streamlined and targeted at improving their nutrition. These measures are nutrition education, supplementary feeding programmes, provision of nutrition facilities on site for food preparation and safety, ensuring adequate and varied healthy food alternatives to choose from, and nutritional policies (reduction of prices of healthier foods on site and offering meal vouchers can help to alleviate the problem of financial constraints arising from the low wages that construction workers earn).

Since individuals have different tastes and preferences, it is important to ensure access to varied healthy choices. Also, workers who are aware of the benefits of healthy eating will invariably make better food choices, when offered more access to healthy foods, compared to those who are not. In this regard, continuous nutrition training and instructions are indispensable in ensuring that workers are well informed about the benefits of proper nutrition in order to make the necessary changes in nutritional uptake. Workers need an understanding of what constitutes a good diet for health and the skills and motivation to make good food choices. Also, nutrition education will enlighten workers' unions about the importance of enforcing the rights to proper nutrition with respect to their members' health and site safety performance. Construction employers also need to be trained to enlighten them regarding the invaluable role of nutrition in H&S performance improvements.

5.0 CONCLUSION

The paper set out to establish the factors which could influence the nutritional uptake of construction workers as it appears that construction workers' predominant nutritional uptake is poor and moderated by various factors. The study also sought to establish feasible intervention measures to improve the status quo. The factors and possible interventions have been established. The objectives of the study have therefore been met.

There is a need to develop a nutrition-based intervention model for H&S focusing on construction workers and taking into consideration the personal and environmental factors which influence their nutrition. This is especially necessary in South Africa since it appears that very little has been done focusing on the nutrition of construction workers. These nutrition-influencers need to be dealt with individually and collectively to ensure effectiveness and sustainability.

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