

Research Article

Occupational Hazards of Workers at A Bricks Manufacturing Industry in the Polokwane Municipality, Limpopo Province of South Africa

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Abstract

Introduction: Occupational hazards of any nature are a threat to the health and safety of any worker at the workplace. The employer and workers should ensure that the physical work environment is free from any hazard that could pose a threat to the health and safety of workers. The study sought to find out the occupation hazards of workers at bricks manufacturing industry in the Polokwane Municipality, Limpopo Province of South Africa.

Methods: A qualitative, explorative and descriptive study was conducted in a bricks manufacturing industry in the Polokwane municipality. Purposive sampling was used to select workers who worked in high-risk areas to participate in the study. Face-to-face interviews were conducted amongst 22 participants. The eight steps of qualitative data analysis method by Teschs were used to analyze data.

Results: The study yielded one theme with two sub-themes. It was found out that workers in the bricks manufacturing industry were exposed to mechanical and physical. It was further realized that poor maintenance of equipment and machinery together with workers' negligence were responsible for the increase in occupational accidents.

Conclusion: Occupational hazards at the bricks manufacturing were identified. Ensuring that hazards in the physical work environment are either eliminated or controlled may provide workers with a safe work environment. Maintenance of equipment is also important in reducing the increase in occupational accidents.

Keywords: Occupational hazards; Workers; Industry; Physical work environment; Machinery

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Introduction

Occupational accidents are an unplanned event that takes place at a workplace and includes slips, fall from heights, hitting against and object or being caught between machinery. These accidents are as a result of unsafe acts, faulty equipment or nature. Accordingly, globally about 600 workers die every day and that translates into 2.3 million workers dying annually [1]. Occupational injuries due to workplace accidents can affect all parts of the body ranging from hands, heads, eyes, spine and skin and mostly are caused by unsafe actions or procedures in the workplace. In Saudi Arabia, for example, manual handling of material at work accounted to most occupational injuries where 87.2% were for lower arm and 82.9% for wrist [2]. Even though there are global, national and sectoral regulations that guide employers on how to ensure a safe and healthy workplace, occupational accidents continue to occur and are even on the rise [1].

Bricks manufacturing is a common industry in most developing countries due to its high employment intake and low salary. Exploitation of workers is common and non-compliance to regulations is high. The production of bricks; mostly clay bricks, expose workers to multiple hazards. In South Africa bricks manufacturing employs close to a million skilled, semi-skilled and unskilled workers. Most workers are vulnerable to occupational accidents and injuries are common. South Africa produces 3.6 billion bricks per annum [3] but occupational accidents in these industries are not researched in the country. There are very few reports from the Compensation Office regarding occupational accidents in the bricks manufacturing industries in the country. Some of the major causes of occupational accidents in bricks manufacturing industries like mechanical and physical hazards are due to the use of different machines during production [4]. Most reported injuries caused by machinery are skin punctures, being hit by an ejected part, caught between moving parts and lacerations [4]. Noise; as a physical hazard, is reported mostly in bricks manufacturing industries and exposure to it leads to noise-induced hearing loss [5]. Other hazards that are found in the physical work environment are illumination, extreme of temperature and vibration [6]. Any workplace that has too bright or too dim lighting can result to eye injuries and fatigue [7].

Research further shows that some of the causes of occupational accidents in the bricks manufacturing industries are man-made and usually avoidable [8]. For example, lack of protection for workers who perform work at heights has a potential to cause falls and injuries. The use of protective equipment alone could not prevent occupational accidents if workers are not adequately trained on how to perform their duties and undergo refresher courses in dealing with changing demands of the working environment [9]. The rising number of occupational accidents in the bricks manufacturing industries in Polokwane municipality remains a major concern. This study uses the rising occupation accidents in the industries of Polokwane municipality between 2012 and 2014 (33, 59 and 60 respectively) [10] to interrogate the causes of occupational accidents in the bricks manufacturing industries. The Aim of the study is therefore to find out the

occupational hazards of workers in the bricks manufacturing industries of Polokwane municipality.

Methods

Study area

The study was conducted amongst worker in the bricks manufacturing industry in the Polokwane Municipality, Limpopo Province. The industry was selected because it was reported to have the second highest number of occupational accidents in the Polokwane municipality during the period 2012-2014. The industry is situated around the city of Polokwane. The city of Polokwane is the economic hub of the province of Limpopo and three neighboring countries, which are Botswana, Zimbabwe and Mozambique. The brick manufacturing industry contributes much towards the economy of the municipality and province as it employs close to 150 workers; who in turn, support more than 600 family members. The existence of the bricks manufacturing industry also created at least 30 extra jobs for those who offer catering and transportation to workers.

Study design

The study applied a qualitative research method where the researcher collected data using interviews to determine the occupational hazards of workers in the bricks manufacturing industries of Polokwane municipality.

Population

The population for the study was selected from the bricks manufacturing industry of the Polokwane municipality. Participants were limited to workers who worked in high-risk areas like production, packing and sorting of bricks and had encountered an occupational accident at the workplace within the past 5 years of being employed. In total, a combined total workforce at the bricks manufacturing industry for those working in high risk areas was 80.

Sampling methods

Purposive sampling technique was used to select participants. This is because the method was convenient to select workers in high risk areas of the bricks manufacturing industry of Polokwane municipality. In accordance with ethical guidelines, only workers in the bricks manufacturing industry who gave permission were selected to participate in the study. Each participant completed a consent form before the interviews commenced. No participant was included or excluded in the study based on their sex, age or race. Sample size was determined by data saturation. In total; after data saturation, 22 workers out of the possible 80 participated in the study and were interviewed.

Data collection and quality control

Data was collected through face-to-face interviews with participants in the bricks manufacturing industry of Polokwane municipality. The face-to-face interviews were based on the central question 'What are the causes of occupational accidents at the bricks manufacturing industry in Polokwane municipality?' Through interviews, the researcher was able to lead the questioning in order to further probe into area relevant to the central question. The line of questioning was focused on potential hazards that are associated with bricks manufacturing industries. In some instances, probing questions were asked for clarity. Interviews were conducted either in English or Sepedi as the participants requested to use the language that they were most comfortable with so that they could express their views comfortably. With

the permission of participants, a voice recorder was used to capture all the information. In some cases, field notes were also taken for non-verbal responses. The voice recorder and field notes were safely kept to ensure that nobody tempers with information before data analysis and for ethical reasons. Collected data was transcribed; those that were in Sepedi were translated to English, and cleaned before it was analyzed.

Data analysis

The eight steps of the Tesch's open coding data analysis method were used to analyze data [11]. The researcher followed these eight steps during data analysis:

- A. Transcribed data was read and reread until saturation to understand the depth of the content. Through this process of repeated reading, the researcher was able to patterns identify within the data and to be familiarized with the content. As certain ideas emerged, they were noted them down. In some cases, and colored highlighters were used to classify related patterns together.
- B. As each transcript was read to further understand the content, a summary of the interview was written, keeping the purpose of the study in mind.
- C. A list of codes was generated thereafter, similar subjects were grouped together into themes, and codes that did not fit were set aside. During this stage of data analysis, codes were generated after having had an idea of what was in the transcribed data.
- D. Codes were then developed after going back to the data. During this stage of data analysis, it was determined if there were new categories and codes that had emerged. During coding, a combination of open and closed codes was used.
- E. Once patterns had been identified and coded, the codes were sorted into potential themes. During this stage, a mind-map was used as a way of generating themes from the identified codes. Using a mind-map, codes were sorted into themes by combining groups of codes with similar meanings. The relationship between identified themes was indicated in the form of diagrams.
- F. After the themes and sub-themes were generated, they were then refined. The process of refining was concluded with some themes being merged and others being completely discarded.
- G. The identified themes were reviewed and linked them with the aim of the study and how they respond to the research questions. The identified themes were then linked to the broader literature and context of the study.
- H. Once the themes had been satisfactorily refined, the write-up stage began. During the writing process, the identified themes were systematically presented as findings and were supported by relevant quotations from the transcribed data.

Measures to ensure Trustworthiness

For credibility, there was prolonged engagement with each interview lasting an average of 30 minutes. There was an also persistent observation to identify the characteristics of the phenomenon under investigation. Member checking was done with participants after the analysis stage at their workplace to verify their responses. Transferability was achieved using purposive sampling method to select participants who worked in high risk areas and had experienced accidents

in the workplace. For conformability interviews were voice-recorded, an independent transcriber was used to transcribe voice recording and a co-coder ensured that the themes that were identified from the analysis were correct and evidence-based. Bracketing was used to ensure that all questions that were asked were based on the central question and not based on what the researcher was thinking. Only participants who were working in high-risk areas and had worked for the industry for at least two years were selected to participate. Dependability was achieved by fully explaining the methodology that was applied in the study.

Results

Variable	Frequency	Percentage (%)
Sex		
Male	18	81.1
Female	4	18.9
Job category		
Operators	6	27.27
Packers/dispatchers	8	36.36
Mixers	4	18.18
Forklift drivers	4	18.18
Work experience		
5 - 6 years	8	36.4
6 and more	14	63.6

Table 1: Socio-demographics of workers in the bricks manufacturing industry in the Polokwane municipality.

Socio-demographic of workers

From Table 1 above it can be observed that twenty-two manufacturing industry workers participated in the study. There were more male (N=18) than female workers (N=04). This could be attributed to the fact high-risk areas are deemed to be too risky for women because they require physical strength. The majority of workers interviewed were packers and dispatchers (N=8) followed by Operators (N=6) and then mixers and forklift drivers who were four per category. All participants have worked for five or more years with the majority (N=14) having worked for six or more years and few (N=08) having worked between 5 and 6 years.

Theme	Sub-themes
There are a variety of hazards linked to a number of factors	1. What are the identified hazards in the workplace? 2. Why occupational accidents continue to increase in the manufacturing industries

Table 2: Theme and sub-themes from Workers.
Theme and sub-themes from the analysis

From the analysis of the data, one theme and two sub-themes emerged. The theme of the study is there are a variety of hazards linked to a number of factors in the bricks manufacturing industry in the Polokwane municipality and the two sub-themes are ‘what are the identified hazards in the workplace and why occupational accidents continue to increase in the bricks manufacturing industry in the Polokwane municipality.

Sub-theme 1: What are the identified hazards in the workplace?

Two types of hazards were identified in the bricks manufacturing industry. The two types of hazards that workers reported were mechanical and physical hazard. Mechanical hazards are those hazards linked to the use of different machinery in the production process. These include heavy moving machinery and forklifts. Machinery in the bricks manufacturing industry like front loaders that they use to load raw material like sand and cement were found to be hazardous. A worker in one of the industries reported an accident caused by a front loader by saying:

‘The front loader reversed and it reversed over somebody so we got the flash this morning’ (Worker 1)

Apart from mechanical hazards workers reported physical hazards as a cause of occupational accidents in the industry. Workers reported physical hazards like noise, sorting of products and packaging to be a huge challenge in their industry. Workers frequently reported noise as a hazard that they are confronted with daily at work. A Worker supported the statement by saying:

‘That person did not see it [forklift] because that is where they were loading ... where there was a lot of noise so it [forklift] reversed and drove over him and he passed away... we took almost 2 weeks without working’ (Worker 3)

Another worker mentioned the amount of noise that was hazardous. The worker said:

‘Because there is always noise here, some machines are different, there are others that make a lot of noise so maybe a forklift might hit me while reversing unintentionally or maybe the TLB might be reversing, you are passing and other machines are making noise and it [TLB] hits you’ (worker 4)

Dust that is generated during mixing like cement dust was reported to be a challenge that workers are exposed to daily. Although workers work in an open space that is well-ventilated, once mixing begins a lot of dust is released and workers inhale it.

A worker who uses cement on a daily basis in the industry indicated that:

‘Yes, we experience such problems, especially somebody like me. Sometimes we use this thing cement. It [cement dust] is in the form of powder so it [cement] turns into dust and sometimes come into contact with the skin then cause skin irritation’ (Worker 5)

A worker was asked about chemical exposure at work and the response was:

‘What is more dangerous is this cement before it [cement] is mixed with water, it [cement] is still powder that then releases dust, that is what causes the problem (Worker 6).

The use of cement is regarded as hazardous even though workers are provided with protective equipment. One worker who had frequent contact with cement elaborated:

‘They provide us with gloves but now the cement penetrate through or sometimes the respirators are not of the correct size that covers only one side so the dust sometimes penetrate and burns our faces’ (Worker 7)

Sub-theme 2: Why occupational accidents continue to increase in the bricks manufacturing industry

Workers in the bricks manufacturing industry of Polokwane indicated 3 reasons why mechanical, physical and chemical hazards exist in their industries. These included:

- a) Old machinery and tools
- b) Less quality assurance
- c) Lack of machinery maintenance

One occupational hazard that was identified was the forklifts that workers use to pack, unpack and load products and raw materials. One worker reported that:

‘Eish, there are about three that look very old but recently after the appointment of the supervisor some were replaced. Forklifts are very old; ever since I arrived here I never saw them replaced’ (Worker 9).

Another worker further indicated the less quality assurance on the equipment and hence workers use equipment with moving parts which then cause injury by saying:

‘If you check some of them [forklifts] they have no tyres, one of them had very defective tyres and when it rains I don’t know how the operator operates it [forklift], that forklift is a serious risk’ (Worker 10)

There are times when mobile machinery in the industry has a tendency to fail while in operation, as one worker explained the hazardous working environment by saying:

Because there is mobile machinery, mobile machines in the yard... sometimes they [mobile cranes and machines] reverse will fail... you try to reverse and it [mobile machine] beeps. I am aware of the incident where a certain person had a serious fracture to their leg due to mobile equipment... (Worker 11)

Defective or improper use of such machinery led to some occupational accidents because they were hazardous to work with. Another mechanical hazard reported by workers was faulty moving machinery as reported by one worker who said:

‘Any moving machine really can start at any time we know electrical things get... it’s [moving machine] got a relay, relay can go faulty, emergency stop button can be faulty, if you want to push it’ [moving machine] (Worker 12)

Workers also identified lack of machinery maintenance or replacement of old machinery as a hazard. The potential for an accident was a concern as indicated by a worker who said:

‘The machines, I think eh, to my, my idea neh, I think the machine is old enough like eh, for an example I can say, eh, we produce but sometimes the machine is not running in the good progress, the, the, I think the tools and the material that they use is no longer good. They need to have, eh, another one to use’ (Worker 13)

Manual sorting of products was one of the hazards reported by workers. A co-worker witnessed other workers using their hands when sorting bricks in the factory. The workers reported that:

‘When they put the bricks there is a high possibility that they might fall and injure our workers... is like if they are working you

find that there is someone is right here and someone right there all of them they are putting the bricks over to the conveyer so you will find that someone when he put the bricks maybe he didn’t put it [bricks] well then it [bricks] falls and cause an injury but erh time-to-time that happens in this factory’ (Worker 14)

Discussion

The findings support earlier evidence that there are numerous occupational hazards and accidents faced by workers in the bricks manufacturing industry in the Polokwane municipality. These hazards include mechanical and physical. The study went further to identify some of the main hazards and the various causes of these hazards. Repeated exposure to dust during the production of bricks as reported by some workers in the bricks manufacturing industry in the Polokwane municipality exposes workers to multiple air pollutants. Airborne pollutants produced during the production of bricks are a cause of respiratory diseases [12]. Respiratory diseases caused by such air-borne pollutants such as cement and clay soil dust continue to be an environmental health hazard among workers in the bricks manufacturing industries [13]. Continuous exposure to cement and clay soil dust by workers in the bricks manufacturing industry in the Polokwane municipality has serious health risks. Those exposed inhale toxic metal oxide like silicone oxide, magnesium oxide and calcium oxides amongst others [14]. Common diseases that are caused by such exposures include reduced lung function, asthma and bronchitis [15].

Bricks manufacturing is one of the most physically demanding job that requires workers’ strength [16]. There is a high likelihood of injuries and reported by some workers in the manufacturing industry of Polokwane municipality, hand sorting is one of those hazards that they are exposed to daily. Although bricks manufacturing industries recommend hand sorting of bricks for quality purposes, most workers get injured in the process. The risks of hand injuries are worsened by faulty machinery, conveyor belts and tools. Globally it is reported that 29% of trauma treated in hospital emergency rooms are hand injuries [17]. Most of these injuries result in hand reconstruction or permanent disability [18] with other listed common hand injuries being lacerations, crushes punctures and detachments. To improve hand injuries, the workplace should have proper monitoring of workers during work, provision of relevant PPE and well services equipment [19]. Noise exposure, as indicated by workers in the bricks manufacturing industry in the Polokwane municipality, could have both long term and short term health effects to them. Most bricks manufacturing industries are exposing workers to noise levels exceeding 75 db and most of those exposed are not aware of the dangers [20]. Globally it is estimated that up to 24% of reported hearing loss is due to exposure to noise at the workplace [21]. The most common health effects are hearing loss with other health effects being hypertension [22]. In some cases, continuous exposure could lead to elevated blood pressure [23,24], sleep disorder and psychosocial effects [25].

Unfit equipment that is damaged and equipment failure are reported to be one of the causes of occupational accidents among industry workers [26,27]. Equipment should be reliable and failure to improve, maintain and replace such equipment increases the likelihood of more occupational accidents [28]. Findings from the bricks manufacturing industries in the Polokwane municipality indicated equipment failures as one of the causes of occupational accidents. Workers’ interaction with machinery could be dangerous; especially if less care is taken regarding the working condition of such machinery. Often workers get entangled by rotating machinery or got struck by mobile

machinery [29]. Similarly, studying 700 accidents revealed that 7.7% of them were caused by malfunctioning equipment. The reported high number of accidental events due to equipment failure has a likelihood of causing accidents at workplaces [30]. The existing occupational accidents indicate lack of support that workers are receiving at the bricks manufacturing industry in the Polokwane municipality. Productivity is affected as most of the workers are either off-work injured or cannot perform as best as they should.

The strength of the study

The findings of the study indicate that there are hazards in the bricks manufacturing industry in the Polokwane municipality. Both management and workers will be able to be aware of what they are exposed to at work and will know how to manage the risks.

Weakness of the study

Since this was a qualitative study, some workers with more information might have been left out.

Conclusion

The study concludes that workers in the bricks manufacturing industry in the Polokwane municipality are exposed to hazards that are a risk to their health. Production seems to be a priority over workers' safety as much is not done to ensure that workers are protected as they perform their duties. There is little that exposed workers could do because they value their jobs more.

Recommendations

The author recommends that a training workshop be held with management, supervisor/s and workers in the bricks manufacturing industry to ensure that everybody is aware of the hazards exposed to and how to have a healthy and safe workplace.

Consent for publication

There is no consent for publication

Ethical approval and consent to participate

The study received ethical approval from the Turfloop Research and Ethics Committee. It further received approval from Limpopo Department of Health Research Committee to collect data in the Province. All participants gave their consent to participate in the study after the purpose of the study and their rights were explained to them. Participants' names and their industries were not mentioned in the study.

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