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Health and Safety Risks Associated with Artisanal Fired Brick Manufacturing in Hwange Town, Zimbabwe

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Abstract

Background: Most brick industries, especially in developing countries, have serious concern to occupational safety and health. Brick making has historically, been a sustainable response to housing demand. For thousands of years, clay

has been in use in the construction industry and this goes back to the time of the Roman Empire. Different raw materials such as clay and coal were used in brick manufacturing industry and many products and by products were produced. Raw materials used in brick making produce particulate matter and other products that have detrimental effects to the health and safety of brick moulders.

Methodology: The study assessed health and safety risks associated with artisanal fired brick manufacturing in a selected town, Zimbabwe. Exploratory case study was used and it incorporated both quantitative and qualitative research design. A total of 90 questionnaires were used to collect data from brick moulders in Hwange. Convenient sampling was used to sample respondents to participate in the research after obtaining consent. The data obtained from questionnaires was computed and analysed using SPSS.

Results: The findings show that brick moulding is highly risky since most tasks performed involved manual handling, repetitive movements and exposure to coal dust. It was also observed that brick moulders perform their tasks for long hours and without protective clothing and or equipment thus exposing themselves to safety and health problems such as burns, cuts, musculoskeletal disorders, respiratory infections and gastro-intestinal diseases. A Chi-square test result indicated that there is an association between time taken to perform tasks and nature of injuries and diseases experienced by brick moulders ($p<0.05$). Chi-square test result further revealed an association between use of Personal Protective Equipment (PPE) and the nature of injuries and diseases experienced by brick moulders. The research finding also indicated that brick moulders lack knowledge on occupational safety and health

Conclusion: The findings indicated that artisanal fired brick making is a labour intensive and risky industry. The findings revealed that most tasks performed by brick moulders involve manual handling, repetitive movements, coal dust and exposure to falls and excessive heat. The results also show that brick moulders are vulnerable to musculoskeletal disorders as shown by injuries such as back ache, muscle strain, painful neck, locking fingers.

Although results indicated that majority of brick moulders are literate, the finding revealed that brick moulders lack knowledge on occupational safety and health. It was noted that brick moulders perform their tasks without any protective equipment and clothing and of the few moulders with protective clothing, it was observed that they were unable to use PPE properly resulting in its use being insignificant. Observations also revealed that brick moulders lack knowledge on proper lifting procedure. Lack of training was observed to be the chief factor contributing to a lack of knowledge by brick moulders on issues surrounding occupational safety and health.

Key words: *Hwange, Zimbabwe, manual handling, coal dust, exposure, musculoskeletal disorders, brick moulding*

Introduction

It has been asserted by Sanjel., (2014) that the study of social and cultural developments can be traced back to and/or linked to study of bricks since clay bricks have been used for many years. In Nepal manufacturing of bricks is part of art and architecture (Pariyar et al.,2013). Karmar and Gosh., (2014) postulates that, in Bangladesh brick manufacturing is an important activity, even though it is not recognised as an industry. In Nepal the traditional brick industry is considered to be a small or cottage industry (Sanjel.,2014).

Developing safe working environments is a huge challenge in most developing countries (Jerie.,2013) This is due to high illiteracy rates, lack of training on safety and health issues and failure by local authorities to implement sound and effective occupational safety and health policies (Jerie.,2013) and Zimbabwe is no exception. Escalating poverty and high unemployment rates in rural regions have forced rural people into engaging in unsafe work such as brick manufacturing, a high-risk industry (Manoharan et al.,2013). In Zimbabwe, the closing down of companies, the economic melt-down and high unemployment rates have forced local people to engage in informal means of earning a living (Jerie.,2013). In the selected town, local people have resorted to artisanal fired brick manufacturing trying to make ends meet. The informal industry absorbs people of different ages and gender. Brick moulders are exposed to physical, chemical and physiological hazards and associated risks. According to (Inbaraj et al.,2013; Dekker et al.,2013) tasks in brick making involve a very wide range of work postures and tasks that could place workers at risk of accidents and injuries. Therefore, this study aimed to assess the health and safety risks associated with artisanal fired brick manufacturing in the town, specifically, to identify health and safety hazards as well as assessing brick moulders' knowledge of safe work practices in artisanal fired brick manufacturing in Hwange town.

Methods

The researchers instituted an explorative design which used both qualitative and quantitative approaches. Exploratory research offers a great amount of researcher discretion. The lack of structure enables the researcher to direct the progression of the research processes and in that sense, it offers a greater degree of flexibility and freedom. Another pro of exploratory research is the economical way in which the process can be conducted. Exploratory research when done properly can lay a strong foundation for any study that is carried around the same issue in the future.

Population

The study population included all artisanal fired brick moulders as they were in direct contact with raw materials used such as coal, ash, sewer effluent, and clay. Five (5) Environmental Health Officers from Local Board were also included in the study. Their engagement in the study was crucial as it enabled the researcher to gain their perception and deeper insight into health and safety hazards and associated risks, in fired brick manufacturing. The knowledge and perception of environmental health officers gave an insight on health and safety risks that brick manufacturers are exposed to.

Sample Size Determination and Selection

The total number of artisanal brick moulders is not known. As a result, the researcher selected 90 brick moulders to take part in the research. The rationale of selecting 90 respondents is that 90 was "bigger and better", thus enables the researcher to collect adequate data for detailed analysis. As postulated by Kaplan et al., (2020) The phrase "the bigger the sample frame, the better" was adopted in this study. In general, having a larger sample size in a study leads to more accurate and reliable results. This is because a larger sample is more likely to represent the entire population accurately, reducing the margin of error and increasing the validity of the findings. In this study non- probability sampling methods were used. Convenience sampling method was used. Non-probability sampling is often used in research when it is impractical or impossible to use probability sampling methods. When there are constraints in terms of time, budget, or access to a complete sampling

frame, non-probability sampling can be a practical alternative. When studying a specific group of people with certain characteristics, non-probability sampling allows researchers to intentionally select participants who meet these criteria. For studies that focus on understanding experiences, behaviors, or opinions in depth rather than producing generalizable results, non-probability sampling can be very effective (Makwana et al.,2023).

Questionnaires Surveys

Questionnaires were used to gather information from artisanal fired brick moulders in the selected urban area. The use of both closed and open-ended questions gave participants an opportunity to respond to the question based on their own experiences and understanding of occupational health and safety, without giving them a clue on the issue being addressed. To exemplify on the questions, themes were crafted with specific interrogations.

Physical Strain: - Do you experience any pain or discomfort in your back, shoulders, arms, or legs after a day's work? - How often do you take breaks to rest or stretch during your workday?

Posture and Movements: - Do you find yourself in awkward or uncomfortable positions while working? - Are you required to lift heavy objects frequently? If so, how do you lift them?

Tools and Equipment: - Are the tools and equipment you use ergonomically designed? - Do you feel that the tools you use contribute to your fatigue or discomfort?

Work Environment: - Is the work area well-lit and free of clutter? - Do you have enough space to move around comfortably while working?

Work Practices: - Are there any repetitive tasks that you perform regularly? - Have you received any training on proper lifting techniques or ergonomic practices?

Interviews

Face to face interviews that were carried out between the researcher Environmental Health Officer provided information on some of the health and safety risks that the brick workers are exposed to such as injuries, accidents at a workplace and how best these can be reduced and or minimized. Semi-structured interview was also done to acquire information on health and safety risks that brick moulders are exposed to as they carry out their day to day tasks. Probing was used during the interview, this enabled the researcher to dig more information on the concept being studied as it encouraged key informants to elaborate further on their answers.

Field Observations

Direct field observations were undertaken to assess the tasks performed during fired brick production and associated health and safety hazards and associated effects. A hazard identification and risk assessment methodology and a checklist were used as data collection tools. The observations were recorded on the comment section of the checklist. The exercise was carried out in five days. However, brick moulders were not aware that observation was being carried out. This was done to ensure that the workers perform their duties as usual and did not alter their behaviour.

Data Analysis and Presentation

The study used Statistical Package for Social Sciences to compute and analyze data obtained from questionnaire. Quantitative data was obtained from closed ended questions such as demographic characteristics, use of Personal Protective Equipment and clothing and health symptoms associated with tasks carried out by brick moulders. Descriptive statistics was used to analyze single variables such as use of personal protective clothing. Descriptive statistics such as percentages and frequencies were used to present data obtained from closed ended questions.

Coding on qualitative data from participants on their level of awareness on occupational health and safety practices, type of protective clothing and equipment, length of working hours, safety and health hazards was done. Narrative analysis was used to analyze data from

various sources such as interviews of respondents, personal observations. The experiences shared by respondents were used to draw conclusions on health and safety risks associated with artisanal fired brick manufacturing. Their experiences were captured through shadowing. Data was presented in tables, pie charts, and graphs.

Ethical Issues

Permission to conduct the study was sought from the health services director. Participation in the study was on voluntary basis through verbal agreement and participants were free to opt out at any given stage with no victimization at all.

Results

Men were 1.5 times more to be artisanal brick molders than females. Most participants were between the ages of 25-44 which is the standard working class people (Table 1). About 17.8 were under age brick molders. Married people were 2.94 over represented in the study population

Table 1: Artisanal Brick Moulders Demographic Characteristics

VARIABLE	FREQUENCY	PERCENTAGE
Gender		
Female	36	40
Male	54	60
AGE		
Below 17	16	17.8
18-24	17	18.9
25-34	26	28.9
35-44	23	25.6
45-64	8	8.9
64+	0	0
MARITAL STATUS		
Married	53	58.9
Divorced	12	13.3
Single	18	20
Widowed	7	7.8
LEVEL OF EDUCATION		
Primary	16	17.8
Secondary	55	61.1
Tertiary	17	18.9
Non formal	2	2.2
SOURCE OF INCOME		
Full time employed brick molding	9	10
Self employed	34	37.8
Retired	3	3.3
Unemployed	44	48.9

Figure 1 shows the varying tasks carried out by both males and females.

Generically, women performed lighter duties like packing and dispatch, dehacking and performed less on heavier tasks like mixing of raw materials and firing. Men specialised more on heavier tasks like mixing of raw-materials, forming and firing. Men performed less on lighter tasks like dehacking, packing and dispatch.

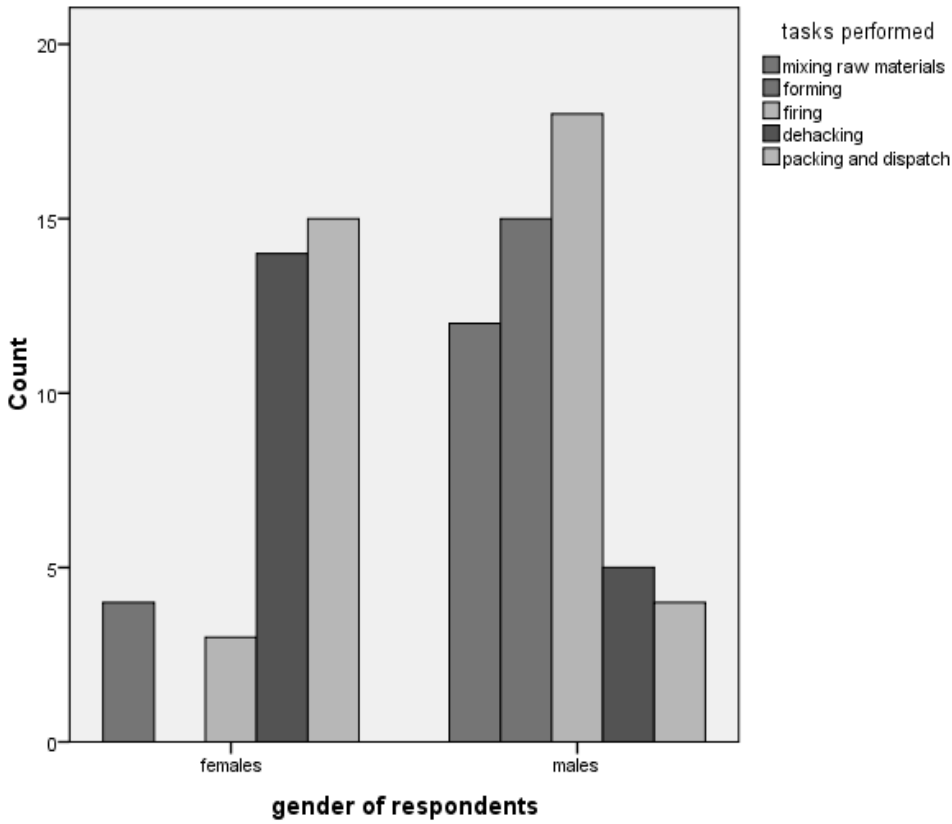


Figure 1: Tasks carried out by both males and females

It has been noted repetitive movement (RM) and manual handling (MH) were ranked higher than other hazards being 3.28 higher than falls from heights (FFH), 1.29 than coal dust inhalation (CD), 1.80 more than intake of sewer water (SW) and 1.04 more than excessive heat (EH) presence. This may be presented mathematically e.g., RM or MH > 3.28FFH > 1.29CD > 1.80SW > 1.04 EH.

Table 2: health and safety hazards associated with artisanal brick manufacturing

		n	**Percent of Cases (%)**
hazards	excessive heat (EH)	69	76.7
	repetitive movement (RM)	72	80.0
	coal dust (CD)	56	62.2
	manual handling (MH)	72	80.0
	falls from heights (FFH)	22	24.4
	sewer water (SW)	40	44.4
Total		90	100

Table 2: Repetitive movement and manual handling were ranked higher than other hazards being 3,28 higher than falls from heights, 1,29 than coal dust inhalation, 1,80 more than intake of sewer water and 1.04 more than excessive presence. Out of the total 90 workers,40 workers (44.4%) were exposed to sewage water risks. This high percentage indicates that a significant portion of the workforce is at risk, highlighting the need for urgent measures to mitigate exposure and protect the workers health.

Table 3: Nature of injuries and diseases in artisanal fired brick making
There were higher chances for artisanal brick makers to suffer from back pain (BP) than GIT disease (2.51 times more), 1.67 times than RI, 1.16 times than MS. Such data description allows consumers of this important data to be used by health experts to decide what type of medication to take with them on out reaches or at clinics used by these people

		n	**Percentage of Cases (%)**
health and safety	back pain (BP)	65	73.9
	respiratory infections (RI)	39	44.3
	muscle strain (MS)	56	63.6
	Burns (B)	62	70.5
	Cuts (C)	51	58.0
	gastro-intestinal (GIT) diseases	26	29.5
Total		90	100

Figure 2 depicts the time taken to perform tasks and nature of injuries and diseases.

A significant majority of workers reported backpain. This suggests a widespread issue, likely due to the nature of work, which involves heavy lifting, poor ergonomics and repetitive strain. Nearly half of the workers, experienced respiratory infections. This high percentage might be indicative of exposure to coal dust and other pollutants and inadequate protective measures against respiratory hazards.MS affects more than half of the workers, showing that many workers experience physical exertion, possibly due to demanding physical tasks or insufficient training on proper techniques to avoid strain. With 70.5 % of workers reporting burns, this is a major concern. It points to potential hazards in the working environment, such as excessive heat, or inadequate PPEC. More than half of the workers,58%, have cuts, indicating a high risk of injury from sharp objects. This underscores the need for better safety protocols and protective gear.

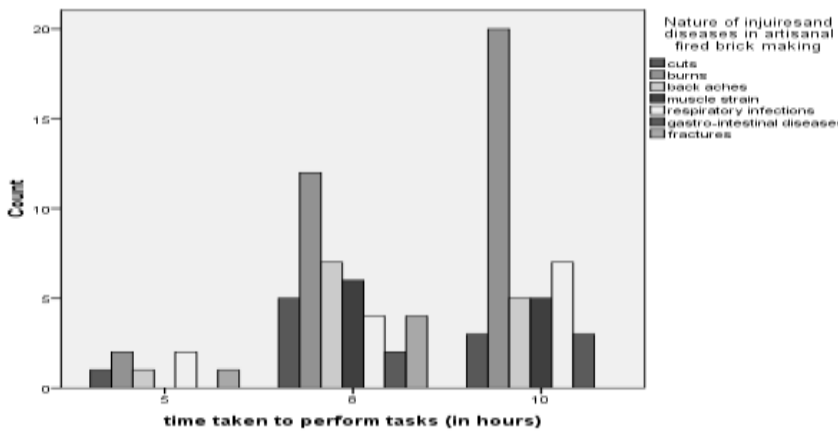


Figure 2: Time taken to perform tasks and nature of injuries and diseases

Figure 2: depicts the time taken to perform tasks and nature of injuries or diseases. The longer the time taken to perform a task resulted in an increase in the nature of injuries or diseases. Burns occurred when the time span to accomplish a task was elongated (more than three hours) in both males and females as respondents. The shorter (less than three hours) the period taken to perform a task resulted in reduced exposure, for instance back-aches, burns and cuts were reduced when the time span to accomplish the task was reduced.

Table 4: shows the Chi-square test result for time taken to performs tasks and nature of injuries and diseases among brick moulders

Table 4: Chi square test result on time taken to perform tasks

	Value	Df	Asymptote. Sig. (2-sided)
Pearson Chi-Square	1.502E2[a]	24	.000
Likelihood Ratio	150.233	24	.000
n of Valid Cases	90		

The large Chi-square value (1.502E2) along with the small p value indicates a very strong association between time taken to perform tasks. With 24 degrees of freedom, the high Chi-square statistic further supports the strong association. A high likelihood ratio (150.233) suggests a strong association between variables.

Table 5: shows the symptoms on health and safety problems experienced by artisanal brick moulders.

Table 5: Symptoms experienced by brick moulders

		n	Percent of Cases (%)
symptoms experienced by brick moulders	back pain (BP)	53	73.9
	shoulder pains and stiffness (SPS)	48	61.5
	painful joints (PJ)	34	43.6
	elbow pains (EP)	51	65.4
	locking of fingers (LF)	45	57.7
	neck pain (NP)	39	50.0
	skin irritation (SI)	26	33.3
	Stress (S)	32	41.0
Total		**90**	**100**

Table 5 depicts high prevalence of musculoskeletal issues: the high percentages of BP, SPS, PJ, LF and NP suggest that the workers might be engaged in physically demanding tasks or repetitive motions that lead to these problems. The significant number of workers experiencing SI and S could point to issues with the work environment, such as exposure to harmful substances or inadequate protective equipment.

Figure 3 shows the relationship between the use of Personal Protective Equipment and nature of injuries and diseases experienced by artisanal fired brick moulders

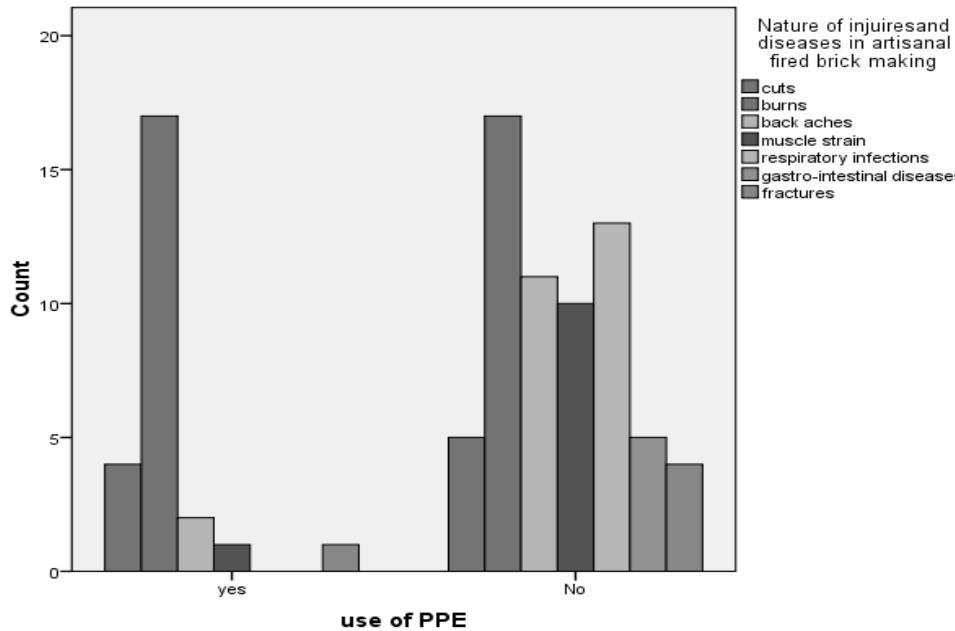


Figure 3: Use of Personal Protective clothing/equipment and nature of injuries and diseases

From figure 3, respondents who used PPE were less likely to be exposed to muscle pain, cuts, backache and muscle strain. Brick moulders who did not use PPE were exposed fractures, gastro-intestinal diseases, respiratory infections, muscle strain, back ache, cuts and burns.: On muscle strain, statistically this indicates that the "No" response is more popular or frequent than the "Yes" response by a notable margin. The ratio of "No" to "Yes" is 4:1, meaning for every one person who says "Yes," four people say "No." With respect to burns, there is statistical equivalence. Both responses are represented equally among the surveyed population. The ratio is 1:1, indicating that the opinions are evenly split. Statistical measures imply that the variance would be zero because they are evenly distributed. In this the standard deviation would also be zero. Also, since both responses are equally common, they would both have a z-score of zero. For burns, the "No" responses are significantly more common than the "Yes" responses. However, we can qualitatively state

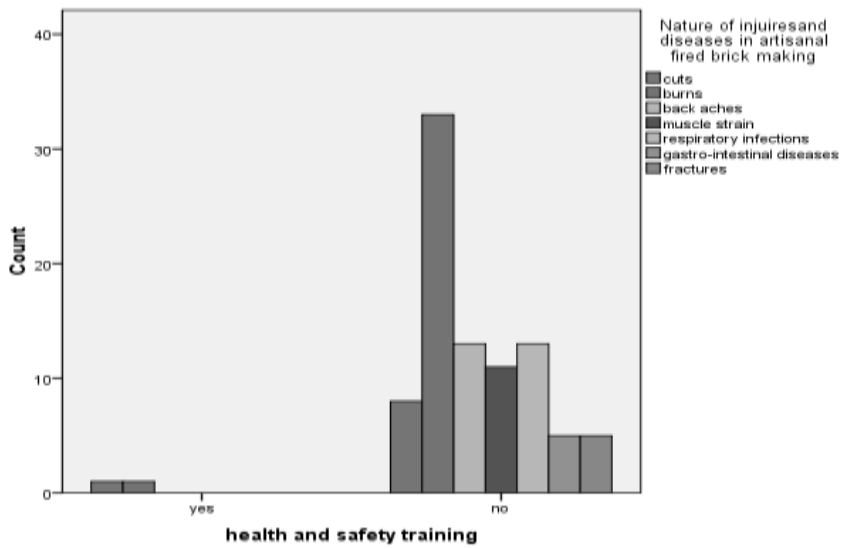
that "No" responses are much more prevalent than "Yes.", the mean response rate for the two options would be:6%.

Table 6: Chi square test results on association between use of PPE and nature of injury/ disease

	Value	**df**	**Asymptote Sig. (2-sided)**
Pearson Chi-Square	19.599[a]	6	0.003
Likelihood Ratio	23.984	6	0.001
N of Valid Cases	90		

For the Asymptotic Significance (p-value) (0.003): Since this p-value is less than 0.05, it indicates that the association between the variables is statistically significant. For Likelihood Ratio Chi-Square Value: 23.984 with Asymptotic Significance (p-value): 0.001 and p-value is also less than 0.05, it confirms that the association is statistically significant. The summary interpretation is that- both the Pearson Chi-Square and Likelihood Ratio tests indicate a statistically significant association between the variables, with p-values well below the 0.05 threshold. This analysis reveals a significant association between the categorical variables.

Figure 4 depicts health and safety training and nature of injuries and diseases in brick moulders.



We compare the calculated chi-square value to the critical value from the chi-square distribution table at a significance level (e.g., 0.05). For df = 1, the critical value is approximately 3.84. Since 169.28 is much larger than 3.84, we reject the null hypothesis, indicating that the difference in injury rates between trained and untrained groups is statistically significant. Training is associated with a significant reduction in injury rates. This demonstrates the importance of training in preventing injuries.

Discussion

Health and Safety Hazards Associated with the Brick Industry

The results of the study revealed that artisanal fired brick making is a labour-intensive industry and is characterised by a number of hazards such as coal dust, repetitive movements, and excessive heat which expose brick moulders to health and safety risks. During baking process materials such as coal and coal dust are burn to fire the brick kilns resulting in the emissions of poisonous gases such that have detrimental effects to safety and health of workers. A study by Manoharan et al., (2103) show similar findings, they point out that a number of factors on health and safety risks exist in the brick industry, these factors include emission of gases, extreme temperatures, contaminated and unsanitary environments, and these lead to safety and health problems. Furthermore, a study by Manoharan et al., (2013) also indicate that in Bangladesh raw materials such as coal, wood plastics and tires are burnt to fire the brick kilns during baking process, causing air pollution as a result brick moulders become vulnerable to safety and health problems.

During field observation, a number of hazards were noted some of them being excessive heat, repetitive movements, coal dust and use of sewer water. Excessive heat was computed at 37.8% and repetitive movement was at 25.6%. A study by Manorahan et al., (2013) how similar results, the findings revealed brick moulders exposed to excessive heat were 95.27%, repetitive gesture 95.02% and bent trunk 95.02%. This depicts high prevalence of musculoskeletal issues and also suggest that the workers might be engaged in physically demanding tasks or repetitive motions that lead to these problems. This points out significant issues with the work environment, such as exposure to heat, harmful substances or inadequate protective equipment

Health and Safety Risks Associated with Fired Brick Manufacturing

Brick moulders perform a wide range of tasks which include, raw material mixing, forming, firing, de-hacking and packing and dispatch. 23.3% of respondents indicated that they were involved in firing, forming 16.7%, raw material mixers 17.8%, and 21.1% of brick moulders were involved in de-hacking, packing and dispatch. A study by Krisha et al., (2018) how similar results, various tasks are performed by brick field workers during brick production and this is in accordance to their job responsibilities or designation that were highly repetitive where 17.16% were coalman, 17.6% mud, carrier and loader and 15.7% were moulders. Both results indicate repetitive movements are the main characteristic feature in brick making. Most injuries among brick moulders is attributable factors such as manual handling of tasks, nature of tasks performed work design and individual capacity (Akinshipe and Komelius.,2015).

Forty-eight percent (48.9%) of respondents were unemployed and 37.8% were self-employed. As a result, brick makers spend a significant time performing their tasks. The study revealed that 47.8% spent 10 hours and 44.4% spent 8 hours while 7.8% spent 5 hours. The findings contradicted with results by Jerie., (2013) who found out that about 39.3% of the workers usually worked 7-8 hours in a day, 33.08% of them worked 8-9hours, and 27.61% worked more than 10 hours a day. An observation in India indicated that the majority of workers, worked 7 to 8 hours per day. 33.08% of the workers were working above 8 hours against limits of 48 hours per week. This reveals common worktimes and processes among brick moulders worldwide. A study by SEED., (2013) also reveal that, continuous demand by brick moulders to meet targets force them to spent more time performing their tasks.

Long working hours together with tasks performed expose workers to health and safety problems. The chi square test show that an association exists between time taken to perform tasks and nature of injuries and diseases ($p=0.00$). It was denoted that time spent by brick moulders performing their tasks and nature of tasks carried out, have a bearing on the health and safety in brick moulders. As asserted by Bertin et al., (2013) factors such as work posture, work design and weight of the load affects the load applied to lumbar region which leads to musculoskeletal disorders. A similar study by Fernando et al., (2017) revealed that poor working postures such as prolonged squatting and

sitting, manual handling of tasks such as carrying and pushing a trolley and the mixing of raw materials are among the chief causes of such kind of locomotion difficulties.

Brick moulders are often at risks of experiencing injuries and diseases such as burns, cuts, back aches, muscle strain, respiratory infections and gastro intestinal infections. The findings from the research revealed 14.4% back aches, 12.2% muscle strain. This indicate that tasks performed by brick moulders are risky and pose severe and life-threatening health problems. However, the results contradicted with findings by Krishna et al., (2018) who observed that more than 95.52% of body pain was felt due to repetitive movement of hands. Most brick moulders are vulnerable to musculoskeletal disorders. Responses from the questionnaire survey indicated that brick moulders are at risk of experiencing ergonomic problems such as back and neck pain, strained muscles, locking fingers, shoulder pain and stiffness and stress. Training to mitigate ergonomic conditions is needed among brick workers.

Working environment, mainly poor-quality fuel in inefficient and outdated technology, flying dusts in air, nature of work and smoking are strong predictors of developing symptoms of respiratory problem (Pariyar et al.,2013). Gautam and Prasan., (2015) states that a research conducted in Brisbane, Australia also demonstrated the significant association between ambient air pollutants such as particles, ozone, sulphur dioxide, and nitrogen dioxide on respiratory diseases, cardiovascular ailments.

Gastro-intestinal diseases are attributable to unsafe and unhygienic brick moulding environments. Responses from questionnaire survey and interview with the Environmental Health officer indicated that brick moulders use raw sewer when moulding bricks since they are not connected to water pipes. This expose them to gastro-intestinal infections and the study revealed that of the 90 respondents, 5.6% experience the infection. Frenando., (2017) state that gastrointestinal problems may be due to unhygienic food and unhealthy toilet, polluted environment and consumption of contaminated pond water. A study by Krishna et al., (2018) show similar results as indicated by 29.1% of brick workers who suffer from diarrhoea.

Knowledge of Brick Moulders on Occupational Safety and Health.

Response from the study indicate that 61.1% of brick moulders attained secondary education, which shows that majority of brick moulders are

literate. This is a positive response considering that it is a lucrative business as many people are building and cannot afford commercial bricks. This contradicts with the research carried out by Vidya et al., (2015) whose findings reveal that the majority of the workers appear to drop out during or just after primary school and were not highly educated.

Inadequate knowledge on issues surrounding occupational safety and health can be attributed to lack of training by brick moulders on occupational safety and health as shown by 97.8% of brick moulders who indicated that they did not undergo training (Vidya et al.,2015). Islam et al., (2013) asserts that the absence of training at the beginning of employment is a risk factor and thus training is vital to circumvent accidents. Brick moulders lack knowledge on hazards and risks associated with brick making, hence most of them are vulnerable to injuries and diseases. Similar findings by Manoharan et al., (2013) reveal that different types of site of injury were identified in the study as the majority of the workers were not aware about safety measures and none was practicing such measures, as well as no monitoring and supervision of safety.

During field observation, it was also noted that most brick moulders do not use proper Personal Protective clothing and Equipment. The findings show that 72.2% of brick moulders do not use PPE when performing their tasks. When brick moulders were asked why they do not use PPE, brick moulders cited lack of funding to purchase PPE discomfort that comes with use of PPE such as respiratory masks and gloves and. Although use of PPE is the last line of defence according the OSH hierarchy of controls, its effective use provides a barrier between the worker and the hazards in the workplace thus reducing the health impacts. However, of the 27.5% of brick moulders who indicated that they use PPE, it was observed that inappropriate use of PPE could be due to lack of training.

Conclusion

The findings indicated that artisanal fired brick making is a labour intensive and risky industry. The findings revealed that most tasks performed by brick moulders involve manual handling, repetitive movements, coal dust and exposure to falls and excessive heat. It was noted that these hazards pose serious threat to safety and health of moulders. The results also show that brick moulders are vulnerable to musculoskeletal disorders as shown by injuries such as back ache, muscle

strain, painful neck, locking fingers. Although results indicated that majority of brick moulders are literate, the finding revealed that brick moulders lack knowledge on occupational safety and health. This was indicated by failure to prioritise use of personal protective clothing and or equipment, though PPE is the last line on hierarchy of control. It was noted that brick moulders perform their tasks without any protective equipment and clothing and of the few moulders with protective clothing, it was observed that they were unable to use PPE properly resulting in its use being insignificant. Observations also revealed that brick moulders lack knowledge on proper lifting procedure. Lack of training was observed to be the chief factor contributing to a lack of knowledge by brick moulders on issues surrounding occupational safety and health.

Recommendations

- Brick moulders are encouraged to source for donations and invest on machinery, equipment and personal protective clothing.
- There is need to formalise fired brick industry to ensure that all procedures and process are guided by legislation.
- Efforts by the town`s Local Board should be made in training brick moulders on occupational safety and health issues associated with brick manufacturing

Key Messages

- Artisanal fired brick making is a labour intensive and risky industry
- Brick moulders are vulnerable to musculoskeletal disorders as shown by injuries such as back ache, muscle strain, painful neck, locking fingers
- Brick moulders lack knowledge on occupational safety and health
- Lack of training chiefly contributed to lack of knowledge on occupational safety and health.

Declaration

We as authors do declare that the study was a self-financed initiative and no conflicts of interest exist. The work has not been published before and we are the original creators of this piece of work.

Acknowledgements

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