



Working Conditions, Illnesses, and Accidents Among Brick Kiln Workers

Eman Al-Abed Mohammed Ibrahim¹, Esraa Mohammed Abd El-Aziz Al Hanbaly², Nashwa Saber Elsayed Atia³, and Salwa Abbas Ali Hassan⁴

1 B.S.c. Nursing, Faculty of Nursing, Zagazig university, Egypt

2 Lecturer of Community Health Nursing, Faculty of Nursing, Zagazig university, Egypt

3 Assistant Professor of Community Health Nursing, Faculty of Nursing, Zagazig university, Egypt

4 Professor of Community Health Nursing, Faculty of Nursing, Zagazig university, Egypt

Corresponding Author: Eman Al-Abed Mohammed

Received: 28 October 2024, **Accepted:** 17 November 2024, **Published:** 20 November 2024

Abstract

Background: Brick kiln workers are exposed to demanding working conditions that may negatively affect their health and increase the risk of work-related accidents and illnesses. Long working hours, lack of employment security, limited social protection, and unsafe work environments are common features of brick kiln work. Therefore, this study aimed to assess working conditions, work-related accidents, and work-related illnesses among brick kiln workers. **Methods; Research design:** A cross-sectional descriptive design was utilized. **Setting:** The study was conducted at two brick kiln factories in Mit Ghamr city, Dakahlia Governorate, Egypt. **Subjects:** A random sample of 240 brick kiln workers. **Tools of data collection:** Data were collected using a structured interview questionnaire covering working conditions, work-related accidents, and work-related illnesses. **Results:** The majority of brick kiln workers were exposed to unsafe working conditions, including long working hours, lack of written employment contracts, high temperatures, and heavy manual work. Most workers were paid per brick and expressed dissatisfaction with their working conditions, mainly due to job insecurity. Regarding work-related accidents, most workers reported experiencing occupational accidents, predominantly cuts and abrasions, with many reporting repeated and severe incidents that required medical care and resulted in work absenteeism. Concerning work-related illnesses, the majority of workers suffered from occupational illnesses, mainly skin and respiratory diseases, with frequent recurrence and subsequent absence from work. **Conclusion:** Brick kiln workers are exposed to poor working conditions that contribute to a high occurrence of work-related accidents and occupational illnesses. **Recommendations:** Improving working conditions, ensuring the availability and proper use of safety equipment, and strengthening occupational health services are recommended to reduce work-related accidents and occupational illnesses among brick kiln workers. **Keywords:** Brick kiln workers, working conditions, work-related accidents, work-related illnesses, and occupational health and safety.

Introduction

The brick-making industry has been one of the cornerstones of economic growth, with clay brick manufacturing involving the sourcing of raw materials, preparation, molding, drying, firing in kilns, and subsequent cooling and storage (Malakar, 2024).

The workplace environment represents the setting where workers spend most of their working hours. Creating a supportive work environment contributes to improved performance and productivity and enhances workers' overall well-being (Gahlot, Rana, & Singh, 2020). Moreover, improving workers' living and working



conditions through the provision of basic facilities and support services benefits not only workers themselves but also the industry by promoting workforce stability and efficiency (Bajracharya et al., 2021).

Brick kiln workers are commonly engaged in labor-intensive activities that require prolonged physical effort, repetitive movements, and manual handling of materials. These job demands often involve extended working hours and physically demanding tasks that may affect workers' general health status over time (Shriraam, Ramamoorthy & Thiruvengadam, 2025).

Despite the importance of this workforce to the construction sector, brick kiln workers often face social and economic disadvantages, including illiteracy, limited awareness, and restricted access to healthcare services. These factors may negatively influence their overall health status and ability to seek appropriate care when needed (Raza & Ali, 2021).

Occupational health nurses are professionals who work in industrial and community settings to promote workers' health and well-being. Their roles include health assessment, health education, coordination of care, assistance with rehabilitation, and referral to appropriate healthcare services. Through these activities, occupational health nurses contribute to maintaining and improving the general health of working populations (Elsayed, Mohamed & Sayed, 2024).

2. Subjects & Methods

2.1. Design:

The present study has been carried out using a cross-sectional descriptive design.

2.2. Setting:

The present study was conducted at two brick kiln factories in Mit Ghamr city, Dakahlia Governorate. These factories were Al-Eman and Al-Gharu factories, which were randomly selected from Mit Ghamr city factories.

2.3. Subjects:

The existing study enrolled 240 brick kiln workers picked up from the above-mentioned setting.

Sample size:

It was found that 40% of brick Kiln workers complained of lower back pain (Saeed, et al 2023). Total number of workers in brick kiln factories in Mit Ghamr district was 669, at confidence level 95%. The sample size was calculated to be 240 workers. Epi Info is statistical software for epidemiology developed by Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia (US). Version 6.02-January 2001 Steven K. Thompson sample size equation

2.4. Data collection tools:

Two tools were employed to conduct the current study; they were:

Tool I: An Interview questionnaire which was developed by the researcher in the light of the current related literature and composed of one *mainpart* assessing working conditions.

Part 1: Working conditions:

It included several questions on the working conditions, such as number of working hours, type of work, access to proper safety equipment, health and medical insurance, and satisfaction with the overall working conditions.

Tool II: Occupational health hazards questionnaire:

It was developed by the researcher and included questions about believing that working in brick kilns is a hazard to health, previous exposure to occupational accidents and its type, frequency, severity, needed hospital treatment, etc., previous exposure to work-related illnesses and its type, frequency, needed hospital treatment, etc.

2.5. Pilot study:

The pilot study was carried out on a sample of 24 workers representing 10% of the calculated total sample size. The aim was to test clarity of the questions, the format of the questionnaire, comprehensiveness of the items and to estimate the exact time required for filling out the questionnaire sheet. The workers involved in the pilot study were included in the main study sample, since there was no modification in the tools of data collection.

2.6. Field work:

Once permission was granted to proceed with the study, the researcher met with the directors of the selected factories to seek their permission to allow the researcher to carry out the study. The researcher explained the study aim and procedures, as well as the data collection forms to the directors of the selected factories. The researcher



took an orientation tour in each selected factory to be acquainted with the nature of the work. Then, the researcher set a schedule for data collection in collaboration with the director of each factory. The researcher spent some time with workers before the actual data collection procedure to be familiar with them. The researcher met with workers individually, explained to them the study aim, and invited them to participate. Those who gave their oral consent were interviewed using the three data collection tools. The researcher stayed with the workers to answer any specific questions that arose during completing the data collection forms .

Data was collected by interviewing the workers in the previously mentioned setting during the break time at separate periods for every department in the Brick Factory. The needed time for tools of data collection for each worker was about 30 minutes. The researcher went to the brick factory 3 days per week (Saturday, Tuesday & Thursday). The researcher was available at the study setting from 9 AM to 2 PM. The number of workers ranged from 10-12 workers/day. The field work was carried out within the period of around two months, starting from mid of March 2025 to mid of May 2025.

2.7. Validity

It was ascertained by a panel of three experts in the field of community health nursing and community medicine who reviewed the content of the tools for clarity, relevance, comprehensiveness and understandability.

2.8. Ethical consideration:

Firstly, the research protocol was approved by the Research and Ethical Committee (REC) of the Faculty of Nursing, Zagazig University. The researcher clarified the aim and the objectives of the study to the workers who agreed to participate in the study. Before starting data collection, oral consents were obtained from the workers before inclusion in the study; a clear and simple explanation was given according to their level of understanding. They were assured that all the gathered data will be treated confidentially and used for research purposes only. The researcher was assuring maintaining anonymity and confidentiality of subjects' data included in the study. The workers were informed that they are allowed to choose whether to participate or not in the study and that they have the right to withdraw from the study at any time without giving any reason.

2.9. Statistical design:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test, P-value to test association between two variables. Correlation coefficient test @ was used to test the correlation between studied variables. Linear regression model was used to examine the predictors of occupational health and safety vulnerability risks at work. Reliability of the study tools was done using Cronbach's Alpha.

Degrees of significance of results were considered as follows:

- P-value \geq 0.05 Not significant (NS)
- P-value $<$ 0.05 Significant (S)
- P-value $<$ 0.01 Highly Significant (HS).

3. Results

Table 1 illustrates Frequency distribution of the studied brick kiln workers according to their demographic data. The table shows that 43.8% of the studied brick kiln workers are in the age-group 30-<40 years with mean \pm SD 38.29 \pm 10.24 years. As regards educational level and marital status of the workers, 38.8% and 56.7% of them were basic education and married, respectively. In addition, 72.5% of the workers had insufficient income. Also, more than 93.7% of the workers reside at rural areas, and 86.7% of them had crowding index $>$ 1 person in a room.

Table 2 presents the frequency distribution of the studied brick kiln workers according to working conditions. The table shows that 50% of the workers worked 12 hours per day, while 42.5% were engaged in loading and unloading bricks. Furthermore, 77.1% of the workers were not provided with a written employment agreement before starting work. About 73.7% worked six days per week during the season, and 87.5% reported working under high-temperature conditions. Regarding safety equipment, 68.8% of the workers had access to gloves; however, 34.2% reported a limited replacement of safety equipment when damaged. Additionally, 54.6% of the workers received wages on a per-brick basis.

Table 3 illustrates the frequency distribution of the studied brick kiln workers according to economic and employment-related working conditions. The results indicate that 62.5% of the workers had a monthly income



ranging from 4000 to <6000 pounds, with a mean \pm SD of 5677.08 ± 1411.5 pounds. Moreover, 83.3% of the workers received their wages on time but did not receive extra payment for overtime work. About 70.8% paid for the treatment of work-related injuries or illnesses at their own expense, while 50.8% had personal health insurance. Additionally, 95.8% did not receive any form of casual or paid leave. Overall, 74.2% of the workers were not satisfied with the general working conditions, mainly due to lack of job security as reported by 97.1% of dissatisfied workers. Furthermore, 81.7% expressed a desire for improvements in working conditions, particularly increased wages (89.7%).

Table 4 demonstrates the frequency distribution of the studied brick kiln workers according to work-related accidents. The findings reveal that 95.4% of the workers believed their work posed health hazards. Additionally, 91.7% reported experiencing work-related accidents, predominantly cuts and abrasions (81.3%). Recurrent accidents were reported by 77.9% of the workers, and 55% described the accidents as severe. Moreover, 80.5% required hospital treatment, and 65.9% were absent from work for more than one day due to these accidents. Half of the workers reported their accidents, while 81.8% of the incidents did not result in permanent disability.

Table 5 shows the frequency distribution of the studied brick kiln workers according to work-related illnesses. The results indicate that 78.3% of the workers experienced work-related illnesses, with skin diseases being the most common (29.8%). Recurrent illnesses were reported by 71.8% of the workers, and 66.5% were diagnosed by insurance physicians as having occupational diseases. Furthermore, 45.7% required hospital treatment, and 59% were absent from work for more than one day due to work-related illnesses.

Table (1):Frequency distribution of the studied brick kiln workers according to their demographic data(n=240).

demographic data of the studied brick kiln workers		No.	%
Age (years)			
20		40	16.5
30		105	43.8
40		60	25.0
50-60		35	14.6
Mean SD	38.29\pm10.24		
Educational level			
Illiterate		33	13.7
Read and write		39	16.3
Basic education		93	38.8
Intermediate / diploma education		61	25.4
University education		14	5.8
Marital status			
Single		60	25.0
Married		136	56.7
Divorced		30	12.5
Widowed		14	5.8
Income			
Insufficient		174	72.5
Sufficient		50	20.8
Sufficient and save		16	6.7
Residence			
Rural		225	93.7
Urban		15	6.3
Crowding index			
≤ 1		32	13.3
> 1		208	86.7

Notes: SD: Standard deviation.

Table (2):Frequency distribution of the studied brick kiln workers according to working conditions (n=240).



Working conditions of the studied brick kiln workers.	No.	%
Working hours per day		
8 hours	35	14.6
12 hours	120	50.0
12-16 hours	85	35.4
More than 16 hours	0	0.0
Type of work perform in the kiln		
Brick Making	39	16.3
Brick Burning	71	29.5
Loading and Unloading Bricks	102	42.5
Truck Driver	10	4.2
Machine Operator	18	7.5
Provided with a written employment agreement before starting work		
Yes	55	22.9
No	185	77.1
Days do you work per week during the season		
5 days	33	13.8
6 days	177	73.7
7 days	30	12.5
*Working conditions inside the brick kiln		
High Temperature	210	87.5
Poor Ventilation	55	22.9
Inadequate Lighting	25	10.4
Manual Stacking and Heavy Lifting	170	70.8
*Have access to proper safety equipment such as		
Gloves	165	68.8
Helmet	10	4.2
Safety Shoes	10	4.2
Masks	5	2.1
No safety equipment provided	65	27.1
Employers replace safety equipment if it gets damaged		
Always	25	10.4
Limited Supply	82	34.2
Never	63	26.3
Need to buy with personal expenses	70	29.1
Basis do you receive your wages		
Per brick	131	54.6
Per trip	0	0.0
Per hour	0	0.0
Daily	20	8.3
Weekly	50	20.8
Monthly	39	16.3
Contract-based	0	0.0

Table (3): Frequency distribution of the studied brick kiln workers according to working



conditions (n=240).

Working conditions of the studied brick kiln workers.	No.	%
Monthly income (pounds)		
40000-<6000	150	62.5
6000-<8000	70	29.2
8000-10000	20	8.3
Mean SD	5677.08±1411.5	
Range	(4000.00-1000.00)	
Receive your wages on time		
Yes	200	83.3
No, at any time	40	16.7
Get paid extra for overtime work		
Yes	25	10.4
No	200	83.3
Don't know	15	6.3
Pays for the treatment of work-related injuries or illnesses		
Employer	70	29.2
Personal expenses	170	70.8
Have health and medical insurance		
Personal insurance	122	50.8
Industrial insurance	57	23.8
No insurance	61	25.4
Receive any benefits like casual or paid leave		
Yes	10	4.2
No	230	95.8
Satisfied with the general working conditions in the brick kiln		
Satisfied	62	25.8
Not Satisfied	178	74.2
*If not satisfied, what is the reason for dissatisfaction? (n=178)		
Workplace Conflicts	27	15.1
Delayed Wages	46	25.8
No Job Security	173	97.1
Lack of Motivation	113	63.4
Unequal Treatment	20	11.2
Lack of Facilities	11	6.1
There are any specific improvements would like to see in working conditions		
Yes	196	81.7
No	44	18.3
*If yes, what kind of changes(n=196)		
Increase wages	176	89.7
Jobs security	101	51.5
Justice	57	29.1
Health insurance	64	32.6

(*) Responses not mutually exclusive



Table (4): Frequency distribution of the studied brick kiln workers according to work-related accidents (n=240).

Work-related accidents of the studied brick kiln workers.	No.	%
Thinking about there are health hazards from your work in brick kilns		
Yes	229	95.4
No	11	4.6
Had any work-related accidents		
Yes	220	91.7
No	20	8.3
If yes, type (n=220)		
Metal splinters	5	2.3
Burns	36	16.4
Cuts and abrasions	179	81.3
Frequency (n=220)		
Once	33	13.8
More than once	187	77.9
Severity (n=220)		
Severe	121	55.0
Not severe	99	45.0
Required hospital treatment (n=220)		
Yes	177	80.5
No	43	19.5
Caused absence of more than one day (n=220)		
Yes	145	65.9
No	75	34.1
Reported (n=220)		
Yes	100	41.7
No	120	50.0
Resulted in disability (n=220)		
Yes	40	18.2
No	180	81.8



Table (5): Frequency distribution of the studied brick kiln workers according to work-related illnesses (n=240).

Work-related illnesses of the studied brick kiln workers.	No.	%
Experienced any work-related illnesses		
Yes	188	78.3
No	52	21.7
If yes, type (n=188)		
Respiratory diseases	54	28.8
Skin diseases	56	29.8
Kidney diseases	0	0.0
Heat exhaustion	36	19.1
Heart diseases	0	0.0
Eye diseases	42	22.3
Frequency (n=188)		
Once	53	28.2
More than once	135	71.8
Diagnosed by insurance doctor as occupational disease (n=188)		
Yes	125	66.5
No	63	33.5
Required hospital treatment (n=188)		
Yes	86	45.7
No	102	54.3
Caused absence of more than one day (n=188)		
Yes	111	59.0
No	77	41.0

4. Discussion

Regarding working conditions of the studied brick kiln workers, the present study revealed that half of the workers worked 12 hours per day, and nearly three-quarters worked six days per week during the production season. This result might be due to the seasonal nature of brick-making. Kiln owners usually increase working hours during the dry season to meet high production demands, while workers accept long shifts to maximize income before seasonal closure. These findings are in agreement with **Muzamil and Javed (2024)** in Pakistan, who demonstrated that nearly all kiln laborers reported prolonged working hours, often exceeding 10 hours a day. As well, **Aniyikaiye et al.(2021)** in South



Africa who indicated that nearly three quarters of the brick kiln workers work between 10 and 12h daily. Additionally, **Bahadur et al. (2018)** in Nepal found that about half of the participants worked between 11 and 13 hours daily. Likewise, **Ahad Biswas et al. (2018)** in Bangladesh showed that more than one third of the workers worked six days per week.

Moreover, the current findings revealed that nearly half of the kiln laborers were engaged in loading and unloading bricks, and most of them worked under high-temperature conditions. These jobs are often done manually without assistive equipment, attracting mainly young male laborers seeking quick daily earnings. They often work under direct sunlight and in extreme summer heat without any safety measures. This result is consistent with **Baranipriya and Sreanandan (2024)** in India who clarified that one quarter of the brick kiln workers worked in loading and unloading bricks and most of them worked in high temperature. Similarly, **Ali (2023)** in India reported that the majority of workers worked in were exposed to extremely hot conditions. Additionally, **Muzamil and Javed (2024)** in Pakistan indicated that most of the workers were exposed to extreme summer heat. Furthermore, **Das et al. (2017)** in Bangladesh emphasized that nearly all of workers were exposed to extremely hot weather, and more than one third of worked in loading and unloading bricks.

Conversely, **Singh et al. (2020)** in India who reported that more than half of the laborers were involved in the molding process. Likewise, **Percy (2021)** in South Africa documented that the majority of workers were packers and dispatchers. Such discrepancies may be attributed to differences in technological adoption, employer investment in mechanization, and the enforcement of ergonomic and labor standards across settings.

Also, the current study showed that more than two thirds of the workers had access to gloves; however, more than one third of them reported having a limited supply of safety equipment when it became damaged. Workers stated that masks were extremely uncomfortable in the heat, gloves tore easily and slowed down their work, and closed shoes were unsuitable in hot weather, leading them to prefer sandals or slippers. Gloves were mainly worn during lifting hot bricks from the kiln to the trucks.

Similarly, **Bahadur et al. (2018)** in Nepal reported that more than half of the workers used gloves and the factory had not provided any types of personal protective equipment (PPE). As well, **Kayastha (2023) in Nepal** found that the majority of workers stated that there was no provision of PPE at their workplace.

On the other hand, **Gaviola et al. (2024) in Nepal** clarified that most workers reported being able to look for and find respiratory PPE, suggesting that supply was not a major barrier—possibly because workers considered any face covering as PPE when responding. Additionally, **Shrestha and Thygeron (2019)** noted that the majority of workers did not wear gloves, and many fire masters handled coal with bare hands, which may be attributed to the harsh thermal environment during firing activities where workers avoid PPE to reduce heat stress and maintain dexterity. Likewise, **Raza and Ali (2021)** in Pakistan revealed that none of the brick kiln workers wore gloves during work.

In addition, the majority of workers were not provided with a written employment agreement before starting work. This could be explained by the informal and unregulated character of brick-kiln employment. Most workers are hired seasonally through intermediaries or contractors without documentation. Lack of written agreements leads to wage insecurity, exploitation, and inability to claim compensation for injuries or disputes. In the same line, a study done by **Kayastha (2023)** in Nepal reported that most of the workers lacked written employment contracts.

Furthermore, more than half of the workers received wages per brick. Such piece-rate payment systems are typical within informal labor markets. Payment based on output encourages workers to overwork and diverts attention away from occupational safety, as increasing productivity becomes the primary focus. In the same context, **Muzamil and Javed (2024)** in Pakistan who revealed that the laborers wages were based on piece-rate system. As well, **Woodbury (2020)** in Cambodia clarified that all brick-kiln workers were paid according to the number of bricks they produced, otherwise known as piece-work. Additionally, **Kayastha (2023)** in Nepal reported that most workers' wages were piece-rated, and they were paid for the number of bricks they made, loaded, and transported per day. Moreover,



Shrestha and Thygeron (2019) in Nepal found that laborers were paid based on the number of bricks they made or carried.

Moreover, the current study revealed that nearly two thirds of workers earned a monthly income between 4000 and <6000 pounds. Additionally, the majority of workers received their wages on time but did not receive any payment for overtime work. Low and irregular monthly income can be attributed to the informal and piece-rate nature of employment in this sector. The absence of written contracts and lack of regulation further allow employers to maintain low wages without standardized payment structures.

The present study findings matched with that of the study by **Saeed, AbdEL-Aziz and Abd ELRahman (2023)** in Egypt who reported that more than two thirds of workers didn't have sufficient monthly income. As well, **Dangal, Sharma and Bishwa Bartaula (2021)** in Nepal found that most of the workers did not get paid for overtime. Additionally, **Rajvanshi (2022)** in India revealed that most of the workers suffered from Permanent poverty. Likewise, **Das et al. (2017)** in Bangladesh mentioned that more than half of the laborers suffered from low salary.

In addition, the current study revealed that more than two thirds of the workers paid for the treatment of work-related injuries or illnesses and, one half of them had personal health insurance. This can be explained by the absence of mandatory employer liability schemes and the worker's own lack of awareness about their right to compensation for occupational injuries. In the same line, in a study done by **Ali (2023)** in India who indicated that majority of brick kiln workers had no life health insurance. As well, **Daisy (2016)** in India who mentioned that majority of the respondents paid for on health care and treatment of work related illness. Also **Nizam et al. (2020)** in India who reported that majority of factory workers resorted to self-medication. Additionally, **Woodbury (2020)** in Cambodia who found that all brick kiln workers were not provided health insurance when injured or unwell, all workers paid for health services out of pocket and with no paid sick leave. Furthermore, **Bajracharya et al. (2022)** in Nepal who reported that only one-tenth of brick kiln workers (BKs) provided health and accidental insurance services for their workers, almost all BKs did not provide any health services for their workers.

The current findings revealed that nearly all of the workers didn't receive any casual or paid leave. This might be attributed to the seasonal and output based nature of brick production. Any absence of workers will directly reduce both individual productivity and employer profits. In the same context, **Rajvanshi (2022)** in India who reported that most of the laborers had practically no holidays. Likewise, **Dangal, Sharma and Bishwa Bartaula (2021)** in Nepal who mentioned that though the government regulations provide for paid holidays for certain days in a month or year, nearly all brick kiln workers expressed that they did not get any such holidays. Instead, if the workers took any days off, their salary would be deducted.

On the other hand, the study of **Bajracharya et al. (2022)** in Nepal revealed that nearly half of BKs provided some monetary or non-monetary incentives (i.e., leave) for their work as a reward of their performance to motivate workers and enhance productivity.

Furthermore, the present findings revealed that majority of the workers were not satisfied with the general working conditions in the brick kiln because they did not have job security as reported by nearly all of them. This result might be attributed to that lack of job security is a major factor contributing to worker's dissatisfaction, as it creates feeling of instability and uncertainty about future employment. In the brick industry, where most jobs are seasonal and informal, workers often face irregular income and no assurance of continued work. This negatively affects their motivation, productivity, and overall wellbeing.

In the same vein, a study conducted in India by **Ali (2023)** indicated that two thirds of workers had no job security. In addition, **Malakar (2024)** in Nepal found that more than two thirds of workers not satisfied with working conditions. As well, **Kayastha (2023)** in Nepal indicated that more than two thirds of the workers expressed working at the kilns were insecure as they were often engaged in informal seasonal employment and, nearly half of them were dissatisfied mainly due to untimely payment issues and inadequate basic facilities. Furthermore, **Rajvanshi (2022)** in India mentioned that



majority of workers had no job security. Also, **Baranipriya and Sreanandan (2024)** in India clarified that most of workers dissatisfied with working conditions. Likewise, **Gahlot (2018)** in India stated that majority of the workers were not satisfied with the wages they received. Workers reported that in brick kiln units physical work was too much and for that wages were very low.

The current study revealed that majority of the workers would like to see specific improvements in their working conditions like increasing wages as reported by most of them. From the researcher point of view, these results might be due to low income, long working hours, and physically demanding nature of brick kiln work. The lack of job security and absence of benefits further contributes to dissatisfaction, motivating workers to seek better pay and safer, more stable employment conditions.

These study outcomes matched with those of a study by **Woodbury (2020)** in Cambodia who mentioned that nearly all participants shared their personal recommendations for desired services and resources to promote occupational health and safety. Some of the common recommendations aim to mitigate the financial barriers to accessing health resources.. Additionally, participants want a higher wage to afford proper health care and nutritious food. Similarly, as the availability of work fluctuates, brick kiln workers desired a regular and consistent working schedule to have reliable income. As well, **Daisy (2016)** in India who indicated that most of workers needs wage increase. Additionally, **Das et al. (2017)** in Bangladesh who reported that nearly all of the workers preferred improvements in their working environment.

Regarding occupational health hazards among brick kiln workers, the results of current study revealed that nearly all of the studied brick kiln workers think that there are health hazards from their work in brick kilns. This might be explained by their direct and continuous exposure to dust, smoke, heat, and physical strain during brick production. These study outcomes matched with those of a study by **Gaviola et al. (2024)** in Nepal who clarified that majority of workers agreed that brick kiln dust was unhealthy. As well, **Woodbury (2020)** in Cambodia who mentioned that nearly all workers agreed that the working environment at the brick kiln sites are neither safe nor sanitary. Additionally, **Malakar (2024)** in Nepal who indicated that majority of the respondents had negative views about brick production that is going on at the expense of public health and the natural environment. Also, **Bahadur et al. (2018)** in Nepal who found that majority of participants were aware about the occupational hazards.

On the other hand, this study finding is in disagreement with those of a study conducted by **Raza and Ali (2021)** in Pakistan who clarified that the workers had no awareness about the threats to their health from different working sites. As well, **Shrestha and Thygerson (2019)** in Nepal who indicated that the workers reported they feel safe at the workplace. This contradiction might be related to that the brick kilns were mechanized and used improved technology in the kiln which reduced the health risks in the workplace environment.

Moreover, the current findings revealed that most of the workers had work-related accidents such as cuts and abrasions as reported by majority of them. The high rate of accidents observed in the current study could be explained by the unsafe working environment, lack of safety training, low safety awareness, absence of protective measures, absence of proper workplace regulations and the use of manual handling techniques. Also, workers are usually paid according to the number of bricks they produce, which encourages them to work faster and often carelessly.

These results are consistent with those of a study conducted by **Das (2020)** in India who found that more than half of the workers had work related injuries such as cuts and abrasions as reported by nearly one quarter of them. As well, **Sanjel (2016)** in Nepal who indicated that more than half of the workers had work related injuries such as cuts and, bruises or open wounds as reported by one third of them. Furthermore, **Das (2015)** in India who mentioned that most of the workers had work related injuries such as cuts and or bruises as reported by most of them. Additionally, **Chanda (2016)** in Bangladesh found that most of workers had injuries during work.

The current study revealed that majority of the workers had work-related accidents more than once and more than half of them had severe accidents. This can be attributed to that brick kiln work is mainly



manual in nature and workers deal continuously with heavy loads and repetitive handling tasks without adequate protective equipments, such continuous exposure increases the likelihood of repeated minor injuries, and with cumulative strain overtime these events may progress to more severe accidents. The previous finding is in agreement with that of a study conducted by **Das (2020)** in India who reported that two thirds of the injuries were severe injuries. As well, **Das (2015)** in India who found that more than two thirds of workers have had very bad injuries at work.

On the other hand, the previous findings were in disagreement with those of a study by **Khanam et al. (2019)** in India who found that nearly two thirds of work related injuries were minor injuries. The discrepancy could be attributed to variations in job tasks, exposure intensity, and risk control measures across different kiln environments.

Moreover, the current findings revealed that majority of the work related accidents required hospital treatment but did not result in any disability. This could be attributed to the type of accidents commonly occurring in the brick kilns which are usually acute and treatable, requiring hospital care but not causing long term disability such as cuts, abrasions and musculoskeletal overload. This result is in agreement with **Das (2020)** in India who indicated that more than two thirds of worker's injuries were treated at the hospital. As well, **Das (2015)** in India who mentioned that majority of injured workers went to a clinic or hospital.

Conversely, a study conducted by **Sanjel (2016)** in Nepal who indicated that less than one quarter of brick kiln workers sought clinical or hospital care for their injuries. This might be attributed to variations in access to health services, worker's awareness, and affordability of treatment which could influence the decision to seek medical care.

Also, two thirds of the workers were absent from work for more than one day due to work-related accidents and half of them reported their accidents. Absence from work has been noted as a common consequence of brick kiln related injuries. However, underreporting of accidents is also frequently observed due to fear of wage deduction, job insecurity and lack of formal reporting systems. This finding is in the same line with, **Kumari (2018)** in India who mentioned that most of workers reported injuries during work. As well, **Das (2015)** in India who found that most of workers were kept out of work due to work-related injuries. Additionally, **Das (2020)** indicated that more than two thirds of work-related injuries were reported by workers to brickfield organization

Concerning work-related illnesses among brick kiln workers, the present study results clarified that majority of the studied brick kiln workers had work-related illnesses from their work in brick kilns and more than two thirds of them were diagnosed by insurance doctors as occupational disease. From the researcher point of view, this might be due to that brick-making process involves continuous exposure to dust and combustion products, especially carbon monoxide and particulate matter, which irritate the respiratory tract and skin. Most workers also didn't use protective equipments, further increasing their susceptibility.

In the same vein, a study conducted in Nepal by **Sanjel (2016)** indicated that most of brick kiln workers complained of any type of work related health illnesses. As well, **Kale and Kale (2024)** in India indicated that more than one third of workers had work related illness. Additionally, these results are supported by **Malakar (2024)** in Nepal who found that most of the workers have suffered from different health problems. Also, **Patil, Durgawale and Gordhanbhal (2017)** in India who indicated that majority of brick kiln workers had some kinds of health problems.

Furthermore, **Kazi and Bote (2019)** in India who found that nearly all of the workers suffered from health complaints. Moreover, **Vikrant et al. (2016)** in India who indicated that majority of brick kiln workers had health problems.

Moreover, the current study revealed that one third of brick kiln workers had skin diseases. This could be related to their continuous exposure to dust, sun heat, and chemical components during their work. Likewise, **Uzair et al. (2024)** in Afghanistan who found that half of brick kiln workers had skin diseases. In addition, **Saeed, AbdEL-Aziz and AbdELRahman (2023)** in Egypt who mentioned that one third of brick kiln workers had dry skin and one fifth of them had skin infection. Also, **Gahlot**



(2018) in India who indicated that one quarter of brick kiln workers had skin diseases.

On the other hand, **Vikrant et al. (2016)** in India reported contrasting findings, where the most of brick kiln workers didn't experience work related skin diseases. This variation may be attributed to differences in geographical climate, exposure intensity to dust and pollutants, and variations in hygienic practices.

Moreover, the present study showed that more than two thirds of the workers experienced recurrent work related illnesses, nearly half of them required hospital treatment, and more than half were absent from work for more than one day as a result of these illnesses. This may be attributed to the continuous and repeated exposure of workers to multiple occupational hazards in brick kilns without proper preventive measures, which consequently leads to repeated illnesses and frequent absenteeism from work. In the same context, **Nizam et al. (2020)** in India indicated that nearly one third of brick kiln workers were referred to higher centers for further check-up and treatment. Also, **Bahadur et al. (2018) in Nepal** found that nearly half of the workers had visited government health institution for treatment of work related illnesses. Additionally, **Das (2015)** in India estimated that majority of brick kiln workers visited hospital due to illness.

On the other hand, this study finding is in disagreement with those of a study conducted by **Kumari (2018)** in India who reported that most brick kiln workers didn't receive treatment for work related illnesses. As well, **Sanjel (2016)** in Nepal indicated that most brick kiln workers didn't receive clinic or hospital treatment for illness. Similarly, **Chanda (2016)** in Bangladesh found that the majority of workers did not seek any medical treatment largely due to their economical condition which indicates their inability to afford the higher medical facility.

5. Conclusion

The current study results bring about the conclusion that:

Brick kiln workers were exposed to various occupational health and safety vulnerability risks due to the nature of their work environment. These risks mainly arise from exposure to physical, chemical, mechanical, and psychological hazards, which adversely affect workers' health and safety. Additionally, occupational health and safety vulnerability risks were significantly associated with several socio-demographic characteristics, particularly age, educational level, crowding index, marital status and income.

6. Recommendations:

Based on the study findings, it was recommended to:

- Improve working conditions by reducing long working hours, ensuring job security, and providing written contracts and social protection for workers.
- Ensure the availability and proper use of personal protective equipment, along with implementing effective occupational health and safety measures to prevent work-related accidents.
- Conduct regular medical examinations and periodic health screening for early detection and management of occupational diseases, especially respiratory and skin disorders

Acknowledgment

The authors would like to thank all the workers who participated in this study and wish good health and wellness for them.

Declaration of Conflicting Interests

There is no conflict of interest declared by the author (s).

Funding

There was no specific grant given to this research by any funding organization in the public, commercial, or nonprofit sectors.



References

- Abd El-Samie, A.A. & Soror, K.M. (2023):** Respiratory Health Study of Brick Industry Workers, Survey And Environmental Assessment, Egyptian Journal of Occupational Medicine; 47(3): 1-15.
- AhadBiswas, A.A., Saha, M.K., Hasan, I., Faisal, M. & Prokash, J.(2018):** Occupational musculoskeletal and respiratory illness among brick kiln industry workers in Bangladesh, Caspian Journal of Health Research;3(3):80-85.
- Ali, S.E.(2023):** A Case Study on Working Condition of Brick Kiln Workers of Rohilkhand region, U.P, India; Research Square:1-16 Available at: <https://doi.org/10.21203/rs.3.rs-3163109/v1>.
- Aniyikaiye, T.E., Edokpayi, J.N., Odiyo, J.O.; Piketh, S.J.(2021):** Traditional Brick Making, Environmental and Socio-Economic Impacts: A Case Study of Vhembe District, South Africa, Sustainability ; 13(10659):2-24. <https://doi.org/10.3390/su131910659>.
- Bahadur, K., Budhathoki, A., Sushmita, K.C. & Karki, K. (2018):** PRACTICE RELATED TO OCCUPATIONAL HEALTH AND SAFETY AMONG WORKERS OF BRICK FACTORIES AT BHAKTAPUR, NEPAL,©International Journal Of Research - GRANTHAALAYAH;6(3):2394-3629.
- Bajracharya, S.B., Gurung, K., Mathema, L., Sharma, S., & Mishra, A. (2021):** Forgotten Contributors in the Brick Sector in Nepal ,International Journal of Environmental Research and Public Health;18(12):1-11.
- Bajracharya, S. B., Mishra, A., Hussain, A., Gurung, K., Mathema, L., & Pradhan, B. B. (2022):** Do working and living conditions influence brick-kiln productivity? Evidence from Nepal ,International Journal of Occupational Safety and Ergonomics;28(3):1452-1460.
- Baranipriya, A. & Sreeanandan (2024):** A Comprehensive Study On Working Conditions And Health Hazards Of Brick Kiln Workers In Coimbatore District, Indian Journal Of Research;13(2):85-87.
- Chanda, D.(2016):** A Study on Socio Demographic & Health Condition of Brick Field Workers in Different Areas of Bangladesh(Unpublished master's thesis), East West University, Dhaka, Bangladesh:1-73.
- Daisy, I.(2016):** Challenges And Opportunities In Brick Kiln Industry, International Journal Of Innovative Social Science & Humanities Research;3(4):48-61.
- Dangal, M.R., Sharma, B. & Bishwa Bartaula, J.(2021):** Worker and Workers' Perception on Existing Labor Laws in Nepal: A Case of Brick Kilns Worker of Lalitpur District, Labour Journal of Nepal;1(1): 1-10.
- Das, B.(2021):** Assessment of ergonomic exposure, work related occupational injuries, and prevention: Child work in the brickfield industry in India, Toxicology and Industrial Health; 37(8) 481–495.
- Das, M.(2020): Industrial Accidents And Occupational Health Hazards:** A Study Of Perception Of Workers--Employers Of Brick Industry In Karimganj District Of Assam, Journal Of Critical Reviews;7(2):1404-1418.
- Das, R.(2015):** “Physical and Psychological Hazards Faced by Child Labour in the Brick Kilns of Khejuri Blocks of PurbaMedinipur District in West Bengal”-An Assessment., International Journal of Humanities and Social Science Invention;4(3): 32-47.
- Das, S., Hasan, S.Q., Akhter, R., Huque,S., Khandaker, S., Gorapi, H.Z. &Shahriar, M.(2017):** Socioeconomic conditions and health hazards of brick field workers: A case study of Mymensingh brick industrial area of Bangladesh, J. Public Health Epidemiol; 9(7): 198-205.
- Elsayed, N.B., Mohamed, H.M. & Sayed, S.M.(2024):** Occupational Health Hazards among Workers in Chemical Factories, Egyptian Journal of Health Care;15(2):881-891.
- Gahlot , N., Rana , K., & Singh , K. (2020):** Workplace environment assessment of brick kiln units, The Pharma Innovation Journal;9(1):433-438.
- Gaviola, C., Nicolaou, L., Nicolaou, A.K. et al.(2024):** knowledge, attitudes and practices regarding respirable silica exposure and personal protective equipment use among brick kiln workers in Nepal, Workplace; 81:287–295.
- Kale, M.V.& Kale, K.(2024):** A study to assess occupational health hazards among brick factory workers in RahataTaluka, Journal of Emerging Technologies and Innovative Research;11(1):723-730.



- Kayastha,A.(2023):** Assessing The Living And Working Conditions Of Brick Kiln Workers In Bhaktapur District, Sustainability Lab, Brigham Young University:1-82.
- Kazi, R.N. & Bote, M.M.(2019):** cross sectional study to determine the health profile of brick kiln workers, International Journal of Community Medicine and Public Health;6(12):5135-5141.
- Kekana, P.(2021):** Occupational Hazards Of Workers at A Bricks Manufacturing Industry in the Polokwane Municipality, Limpopo Province of South Africa. J Community Med Public Health Care 8(1):1-6.
- Khanam, N. , Wagh, V. , Gaidhane, A.M. & Quazi, S.Z.(2019):** Assessment of work-related musculoskeletal morbidity, perceived causes and preventive activities practiced to reduce morbidity among brick field workers, INDIAN JOURNAL OF COMMUNITY HEALTH; 31(2):213-219.
- Muzamil, M. & Javed, A. (2024):** Occupational health risks and safety practices among brick kiln workers: A case study from Pakistan, International Journal of Occupational Health and Safety;15(2): 112–125. <https://doi.org/10.5678/ijohs.2024.15207>.
- Nicolaou, L., Fiona, S., Isabel, V., Lord, K. et al.(2023):** Brick kiln pollution and its impact on health: A systematic review and meta-analysis, Environmental Research;257:1-38 .
- Nizam, J., Manjunath, S., Vidya, G.& Chandrakala.(2020):** Evaluation of Occupational Health among Brick Factory Workers, The Journal of Medical Sciences;6(4):58-60.
- Patil, S., Durgawale,P.&Gordhanbhal, S.R.(2017):** A Cross Sectional Study of Socio – Demographic and Morbidity Profile of Brick Kiln Workers in Rural Area of Karad, in Satara District;5(1): 15313-15321.
- Percy, K.M.(2021):** Occupational Hazards of Workers at A Bricks Manufacturing Industry in the Polokwane Municipality, Limpopo Province of South Africa, HSOA Journal of Community Medicine and Public Health Care;8(1):1-6.
- Rajvanshi, N.(2022):** Socio-Economic Conditions Of Brick Kiln Workers In India, Ilkogretim Online - Elementary Education Online;21(2): 283-292.
- Shrestha, S. and Thygerson, S.M. (2019):** Brick Kilns of Nepal: A Non-Governmental Organization Perspective, Open Journal of Safety Science and Technology; 9:1-6. <https://doi.org/10.4236/ojsst.2019.91001>.
- Raza , A. &Ali, Z. (2021):** Impact of Air Pollution Generated by Brick Kilns on the Pulmonary Health of Workers, Journal of Health & Pollution;11(31)1:10.
- Singh, L., Mukherjee, S., Bhattacharyya, N., Mukherjee, M. & Majumdar, S. 2020:** Respiratory morbidities related to the concentration of airborne particulate matter among brick kiln workers- a cross sectional study in Charhi block, Jharkhand, International Journal of Research and Review;7(2):449-455.
- Shriraam,V., Ramamoorthy, S. & Thiruvengadam, G. (2025):** Chronic respiratory morbidity, musculoskeletal disorders and other self-reported illness among migrant brick kiln workers in rural South India, International Journal of Occupational Safety and Health; 15(3): 161-168.
- Saeed, A.S., Abd EL-Aziz, M.S. &AbdELRahman, B.M. (2023):** Occupational Health Hazards among Workers at Abo Mashhour Brick Factory, Journal of Nursing Science Benha University; 4(1):382-397.
- Sanjel, S., Khanal, S., Thygerson, S., Khanal, K., Zunu, P., Tamang, S.& Joshi, S.K.(2016):** Airborne particulate matter and health condition in Brick Kiln workers in Kathmandu Valley, Nepal. Kathmandu University Medical Journal ;14(54):159 –166.
- Uzair, H., Hikmatullah, H., Abdul Waheed, W., Ihsanullah, H. &Tariq, H.M.(2024):** Effects of Surkh-Rod District Brick Kilns Emissions on Human Health, INTERNATIOANL JOURNAL OF BIOSCIENCES;3(ICCC Special Issue):74-79.
- Vikrant, P., Mukesh, B., Parth, V. &Shinde, R.R.(2016):** Epidemiological Study Of Health Hazards & Working Conditions Of Brick Kiln Workers In Rural Area Of North Maharashtra, World Journal Of Pharmaceutical And Medical Research; 2(6):86-89.
- Woodbury, P.(2020): Bricked In:** Occupational health and safety concerns of Cambodian brick kiln workers. Master's thesis, University of Washington, ProQuest LLC.