



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>

Research Paper

Open Access

Environmental issues allied with brick manufacturing and its impact on health : A Study on some selected brick kilns in the surrounding area of Nikum gram panchayat in the Durg district of Chhattisgarh.

Onkar Prasad Chandra^{1*}, Yaser Qureshi²

1- Swargiya Pukeshwar Sigh Bhardiya Govt. College, Nikum, Durg

2- Govt. College Khertha, Balod

*Corresponding author - E-mail= onkarchandra468@gmail.com

Volume 6, Issue 14, Aug 2024

Received: 09 June 2024

Accepted: 19 July 2024

Published: 08 Aug 2024

doi: [10.48047/AFJBS.6.14.2024.3123-3133](https://doi.org/10.48047/AFJBS.6.14.2024.3123-3133)

Abstract

Brick is one of the most essential building materials or units in the underdeveloped countries. The brick industry in India is the second largest in the world. The brick-making businesses belong to the minor industrial segment in this largely rural industry. With the development of cities and increase in population, the number of brick factories is increasing day by day. There are many brick-making kilns in the gram panchayat of Nikum. The brick kilns are situated along the banks of Tandula, Shivnath and other tributaries of the river. Good soil along riverbanks is preferred as raw material for the production of bricks. It facilitates the process of preparing, moulding, drying and burning clay.

Employees are a critical part of the human resources in these recognized industries, but unfortunately, they suffer a lot. As the fuel is burned in the kilns to produce the bricks, the ash and the gaseous pollutants are discharged into the environment. Soil and air pollution are not the only factors that affect the health of people living near the kilns. The purpose of this study was to analyze the effects of brick-making on the environment and on public health. The process used to produce these bricks has adverse effects on the soil and water, air and plants, as well as on people's health. The aim of this study is to analyze the impact of brick-making with primary data sources. Some solutions and recommendations are discussed and storied in this paper to abolish problems of brick manufacturing phenomenon.

Keywords: Brick manufacturing, Brick kiln, Workers, Environment, Pollution.

Introduction

Brick production is one of the oldest traditions in rural India and the world. It is the most widely used building material for thousands of years. The demand for bricks in developing countries, especially India, is on the rise. It is classified as a small industry and is mainly in the rural sectors. The number of brick kilns is increasing every day due to urbanization and population growth. There is a lot of debate on the site regarding environmental issues globally. Environmental degradation is prevalent all over the world [1,3]. The study focuses on the effects of brick-making

on the human health and environment in the gram panchayat of Nikum village and its surrounding areas. Nikum village is one of the richest and most prosperous villages in Durg district. It is close to the national highway-6. One of the main reasons why this settlement is important for brick production is the large number of well-maintained brick kiln sets. The two main rivers that make up the basin of the Nikum village are the Tandula to the north and the Shivnath to the south.

There are three soil types in the area: Laterite, Black, and Alluvial. The Laterite soil is very suitable for brick manufacturing. Winter and summer months are the best times for brick manufacturing. The brick industry thrives on favorable natural conditions. The brick industry is a major hub in the surrounding villages. The brick industry dominates the rural economy of the area surrounding this settlement. Workers are essential for the brick industry's development as it provides them a source of employment. Investors view the brick industry as an important auxiliary industry for the agriculture sector. The availability of high quality soil is crucial for the brick manufacturing activity. Labour availability, raw materials, land and water resources are all very important for the brick industry. When fuel is used to produce bricks, ash and gas pollutants are emitted into the atmosphere [5,7]. The people operating this business have a stable financial situation and have taken the opportunity as a side business.

To create bricks more grounded, clay is blended with a assortment of added substances, such as fly fiery debris, fuel wood, and other rural squander. As it were along riverbanks can one discover the wealthy supplies of fine radish rich soils required for brick manufacturing. Subsequently, the most excellent put to make bricks is along a river's banks or along a river's stream. Amid periods of surge or ideal water level, fine or clay silt are kept on the cleared out and suitable banks of the Shivnath, Tandula, and their tributaries. This fine soil is culminate for making bricks. An research from India claims that specialists are adversely affected by the perilous gases and suspended molecule matter that brick furnaces discharge. Moreover, the inhabitants within the region of the brick fabricating offices are affected by natural issues within the zone of concern.

Objectives

The entire study is developed through the selection of following objectives -

- Identifying environmental issues related to brick production.
- Checking the health status of active people affected by brick production activities.
- Identifying corrective measures and recommendations to eliminate health and environmental problems associated with brick kilns.

Research Area

The study area selected for this study was Nikum Gram Panchayat located in Durg district of Chhattishgarh, India. Nikum is located in the central part of Durg district, 22 kilometers south of the district headquarters on NH-6. Tandula and Shivnath river are also connected to the study area. Four brick kilns of Nikum gram panchayat were selected for the study. The coordinates of Study Area is 21⁰ 05' N and 81⁰ 24' E. Nikum gram panchayat and they cover 1313.64 hectare area. The number of total population of the study area is 4764 where 2416 male and 2348 female.

Methodology and observation

The study was divided into two parts : a questionnaire environmental problems and health examination of workers. Primary data was collected through field survey and relevant

questionnaire according to the planned strategy. The research team used identified groups and discussions to create a structured questionnaire with simple easy-to-answer questions. Finally, the answers and opinions of the experts served as a pre-test.

The purpose of the survey was to find out how much local people know about various environmental problems and health risks related to brick kiln emissions. To conduct the survey, personal interviews were conducted with respondents of the researched fields. Four brick kilns workers participated in the survey, with a total of two hundred (200) respondents. The Satisfaction Index is calculated using a technique that show the level of satisfaction of brick kiln workers.

[A] Brick production causes environmental problems. Burning fuel into bricks releases ash and gaseous pollutants into the surrounding air. The following list shows the negative effects of this brick process on soil, water, air and vegetation:

[1] Air pollution

As seen in figure-1, air pollution may have both local and global effects. The air around brick kilns is highly polluted. The main pollutants in the brick process are particles (dust, fly ash, smoke, etc.) and a various gases such as carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO), and carbon dioxide (CO₂). Black smoke is mostly expels due to incomplete combustion of coal, resulting in suspended particulate matter (SPM). The sources of air pollution from brick kilns are a significant amount of fine coal dust, boiler ash found in coal, and burnt clay particles which produces carbon monoxide (CO) and hydrocarbons as a result of partial fuel combustion [3,5]. In addition, it has been observed that the dirt load spreads when the ash layer is removed and placed on top of the furnace, and when the ash accumulated on the around the furnace is steamed.



Fig -1, Source of air pollution

[2] Land Pollution

In the areas surrounding the brick factory, it was observed that due to the coal dust and ash covering the area, the agricultural land is of poor quality. The large amount of waste generated by brick kilns is also a cause of concern. As a result of land pollution, it is clear that the productivity of agricultural land is decreasing day by day. Most of the waste materials are fly ash, boiler ash and stone dust[3,7]. Good soil is used to make high quality bricks. So the owner of the brick factory tried to bring good quality soil from the river side area. Here, Shivnath and Tandula watershed were selected as grounds. So soil erosion is due to the gradual increase in land filling. There is increase in marshy region in Tandula river which can be seen in figure-2.



Fig -2- Siltation of Tandula River

[3] Deteriorated vegetation

The massive portion of agricultural land is deducted surrounded by brick kilns because farmers give preference to brick-kilns rather than growing agricultural crops, because brick kiln owners offer much more money than they can earn from agriculture[1,3]. Hence, they had forced to cultivators to give the agricultural land for expanding their manufacturing area. The owner of brick kilns wants the surrounded land with four or five years lease and they will pay the money with installment method to the farmers. The figure-3, showing the total land occupied through yearly changing of the vegetation pattern.



Fig -3 - Changing of the vegetation pattern

[4] Water pollution

The biological, chemical, and physical properties of surface water serve as indicators of its ecological potential and sustenance quality. The variations in turbidity observed in surface water at various sites may be attributed to the levels of pollution present in the water. Massive volumes of particulates, including fly ash and suspended particles, were released into surface water bodies during the brick-making process. The presence of dissolved solids, particulate matter, and oxygen-demanding wastes in the surface water may be the cause of the increase colour concentration of the water [5,7].

The study observed that the degree of color in the surface water increased in figure -4, every year and the rate of increasing the trend indicating declined the surface water quality that oxygen depletion occurs by the pollutants affecting the taste, odors, and colors in surface water and also affects aquatic life.



Fig -4- Degree of color in the surface water

[5] Change environmental temperature

On large scale burning of fuels- coal, oil, gas etc. to supply energy to industries, households and means of transportation is the main reason of change environmental temperature. It is estimated that almost 90% of the increase temperature are related with the combustion of fuel [2,4]. Impact of thermo-pollution caused by small brick kilns located in rural areas seen in fig -5. They change environmental temperature and they cause adverse affects on workers, local nearby residents as well as crops in the surrounding area.



Fig-5- Source of thermo pollution surrounding the brick kilns

[6] Noise pollution

The increased uses of heavy and more machinery in brick kiln clusters of haphazard workers set-up in a small area has resulted main source of noise in the study area [3,1]. The study observed that the machinery used in the brick kilns created a higher intensity of noise is seen in fig-6, and it has had harmful effects on human health and the environment. A vastly noise levels were observed during peak working hours (09:30 AM – 04:30 PM) at the near machinery setup area in brick kilns. However, the noise affects human beings physically and psychologically.



Fig -6- Heavy Machinery and clusters of workers in brick kilns

[B] Health Problems of the workers in brick kilns

The field survey and interview results identified that most of the workers are affected by the health problems in the brick kilns [6]. The majority of the persons in the surrounding area of the brick kiln were more concerned about environmental issues. Brick kilns produce a variety of harmful pollution components as well as human dangers [4,7]. People are suffering from diseases such as muscular discomfort, heart disease, pulmonary disease, skin disease, eye burning, and loss of visibility, which has accelerated the number of accidents in surrounding area of brick kilns.

Results and Discussion

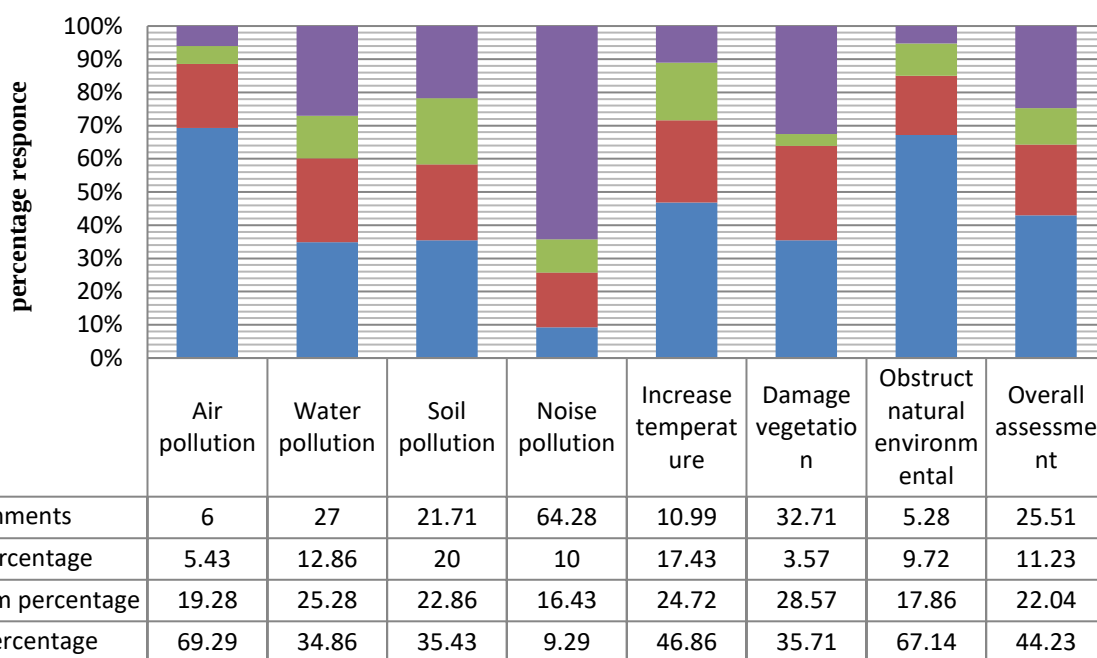
The study investigated the effects of brick kiln emissions in the surrounding area of the kilns. Several respondents shared their perspectives the influence of brick kilns in environmental issues and health condition. The results of the field survey and physical observation are analyzed and discussed in the sections that follow.

[1] Environmental problem survey response

The respondents in the study area were assumed to face several environmental degradation issues. The tabulation of primary data of considered several assessment parameters of environmental problems in Table 1.

Table-1, Survey responses to environmental problems.

Assessment parameters	Assessment on vulnerability level			No comments [%]
	High [%]	Medium[%]	Low[%]	
Air pollution	69.29	19.28	5.43	6.0
Water pollution	34.86	25.28	12.86	27.0
Soil pollution	35.43	22.86	20.0	21.71
Noise pollution	9.29	16.43	10.0	64.28
Increase temperature	46.86	24.72	17.43	10.99
Damage vegetation	35.71	28.57	3.57	32.15
Obstruct natural environment	67.14	17.86	9.72	5.28
Overall assessment	42.65	22.15	11.29	23.91

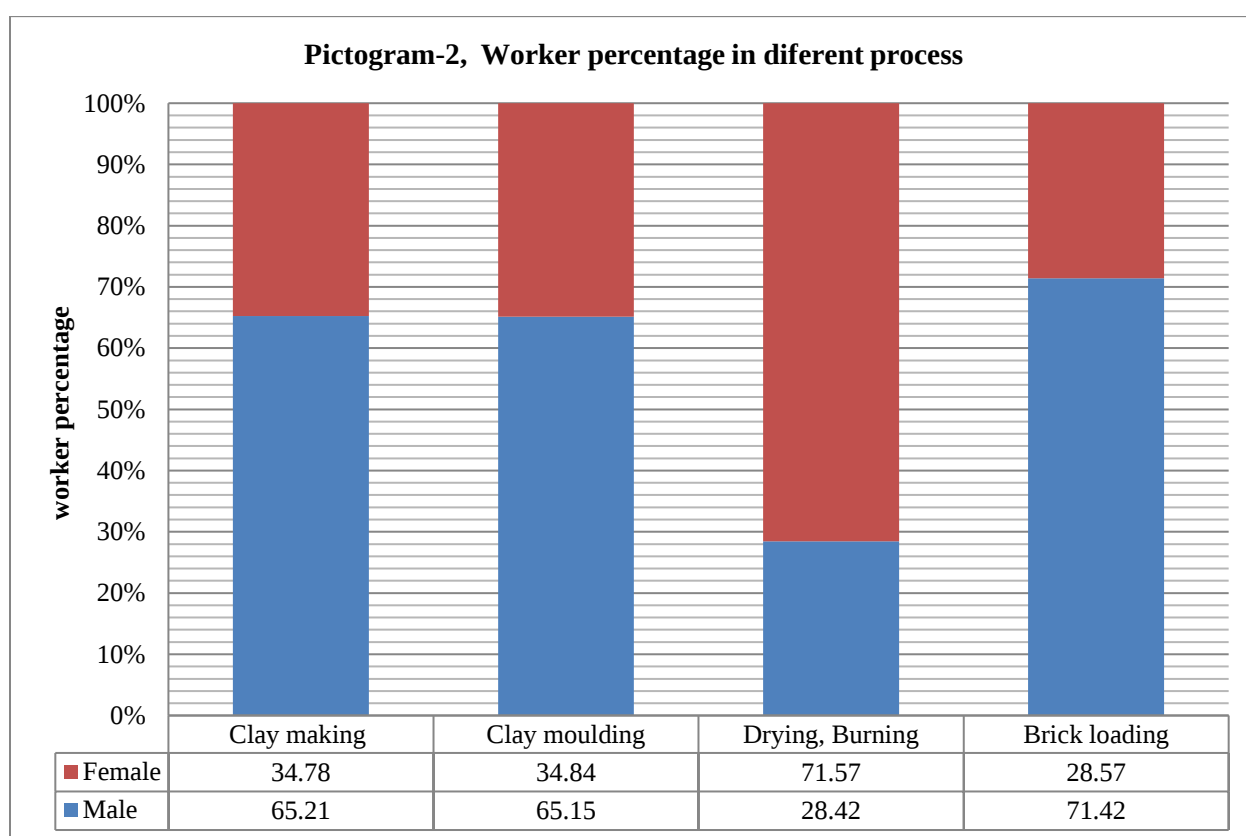
Pictogram-1, Response percentage regarding various environmental problems

According to the public's perception of various forms of environmental degradation, brick kilns are responsible for approximately 69.29%, 46.86%, and 68% of those who are highly vulnerable to air pollution, temperature increases, and obstructions of the natural environment; similarly, brick kilns are responsible for 34.86%, 35.43%, and 35.71% of those who are highly vulnerable to water pollution, soil pollution, and vegetation damage. Nonetheless, regarding noise pollution brought on by brick kilns, almost 64.28 percent of respondents said nothing.

The majority of respondents believed that brick kilns were highly to moderately vulnerable to several environmental degradation factors, according to the data. According to the findings of the vulnerability overall assessment, the chosen criteria significantly affect the surrounding environment in the brick kiln regions.

[2]Health Problems of the workers in brick kilns

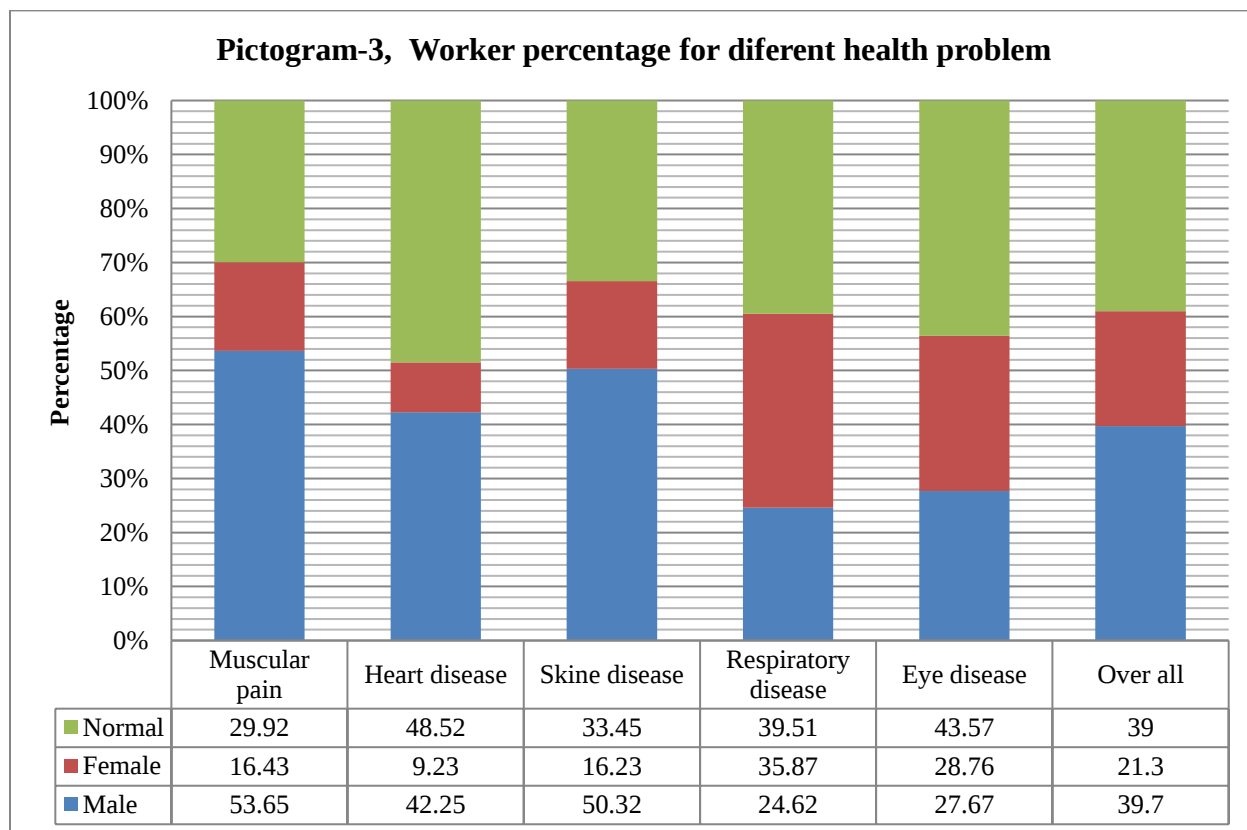
In Nikum gram panchayat four brick manufacturing are selected for present study. Surveyed total number of workers are 200 among them male workers are 128 and female workers are 72. Here, male population is high than the female population. According to working process it is observed that males and females both are engaged with clay making process, clay molding process, brick drying, burning and loading. So, the percentage of male workers who are engaged with clay making process; clay molding process; bricks drying, burning and loading are 65.21 percent, 65.15 percent, 28.42 percent and brick loading 71.42 percent respectively. In terms of female workers, the percentage of clay making process is 34.78 percent, for clay molding process is 34.84 percent, for brick drying, burning is 71.57 percent and loading is 28.57 percent which are represent in pictogram -2.



According to the field survey and interview and physical observation results that most of the workers are affected various health problems in brick kilns. From the pictogram-3, it is cleared that 23.65 percent male and 16.43 percent female workers are affected by muscular pain in knees, legs, heaps and hands; for heart disease it is 12.25 percent for male and female 9.23 percent due to long duration working activity of clay moldings and bricks loading.

As the outcome of water and air pollution due to clay making, drying and burning we found the various type of diseases among the workers like skin disease, respiratory disease, eye diseases etc. The percentage of skin disease is 10.32 percent in male and 6.23 percent in female; the percentage of Respiratory disease are 15.87 and 14.62 respectively in female and male. The percentage of eye

disease is 8.76 in female and 7.67 in male workers. Hence, local residents are also facing problems due to the pollution by brick kilns.



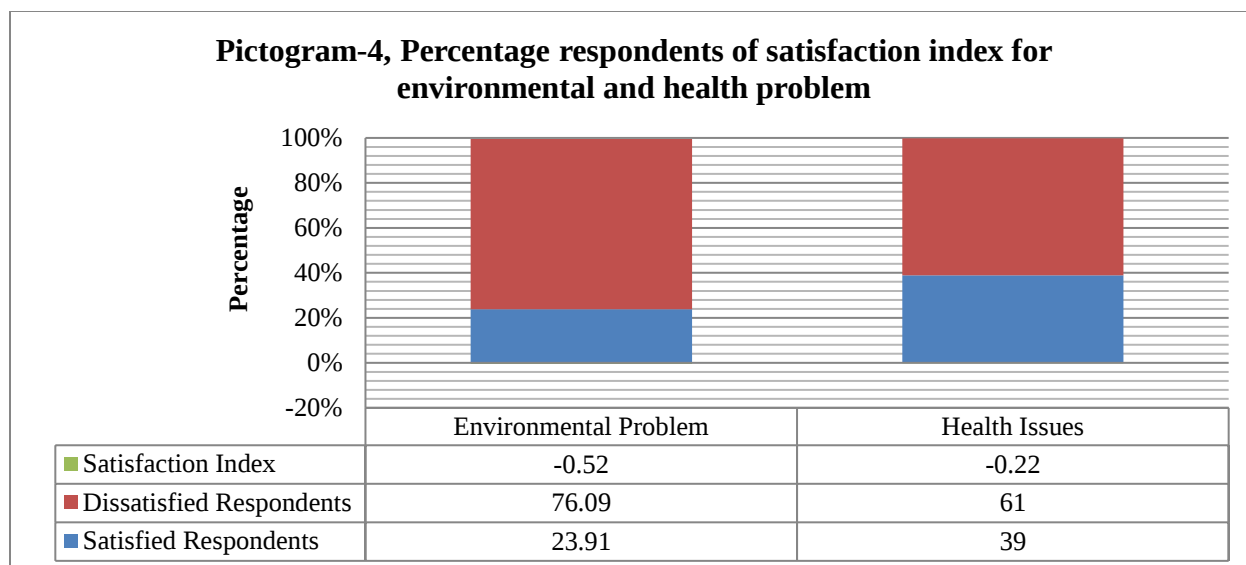
[3]Satisfaction Index of workers in brick kilns

In the pictogram 1 and 3, the degree of satisfaction index has been calculated on the basis of responses of the working people in brick kilns. The Satisfaction Index developed by Hall, Yen and Tan (1975) through the formula: $SI = (fs - fd) / N$ where, fs mean satisfied respondents, fd mean dissatisfied respondents and N mean the total population. So, in terms of environmental problem, workers are not satisfied with SI is -0.52, and lastly they are not satisfies for health issues with SI is -0.22 and the result are represented in pictogram- 4.

Based on the responses of the workers in brick kilns, the degree of satisfaction index has been calculated in pictograms 1 and 3. The Satisfaction Index was calculated by Hall, Yen, and Tan (1975) formula -

$$SI = (fs - fd) / N,$$

where N represents the entire population and fs and fd represent satisfied and dissatisfied respondents, respectively. Thus, workers' satisfaction with environmental problems is -0.52, and their satisfaction with health-related problems is -0.22. These results are shown in pictogram-4.



CONCLUSION

It is obviously noticeable that progressively reducing the agricultural land resources due to land cutting and soil erosion problems by brick kilns. Additionally, because of the harmful chemicals that are emitted by brick kilns, it is thought to be lowering air and water quality. Soil and the organic world become contaminated due to solid brick wastes and various harmful pollutant components. Many workers and most of the people in the region of bricks kiln are affected with adverse health conditions that are associated with brick manufacturing. People are suffering various diseases like respiratory, nasal cognition, burning of eyes and loss of visibility, which has led to an increase in accidents in that area.

Brick kiln air pollution should be measured and reduced with the use of latest technology and high quality equipment. Owner should try to reduce the wastage materials in brick kilns and save good quality agricultural land. In order to prevent land deterioration and environmental pollution by brick kilns through plantation by local people with Land Reforms Department. Ensuring a high standard of living and providing sufficient facilities for both male and female employees. Government has to be strictly apply rules and regulations for providing good quality healthcare facilities and controlling child labour in brick kilns .

REFERENCE

- [1] B. Skinder M, A. Sheikh Q, A. Pandit K, and B. GanaiA, "Brick kiln emissions and its environmental impact: a review," *Journal of Ecology and the Natural Environment*, vol. 6, no. 1, pp. 1–11, 2014.
- [2] Das B. Impact of In-Bed and On-Bank Soil Cutting by Brick Fields on Moribund Deltaic Rivers: A Study of Nadia River in West Bengal, *The NEHU Journal* 2014;12(2):101-111.
- [3] Das R. Land Degradation in Terms of Environmental Cost Due to the Emergence and Development of Brick Kilns - A Study On Khejuri CD Blocks Over Coastal Medinipur in West Bengal, *International Journal of Science and Research* 2015;4(2):1942-1952.

- [4] Das S, Hasan M, Akhter R, Huque S, Shahriar. Socioeconomic conditions and health hazards of brick field workers: A case study of Mymensingh brick industrial area of Bangladesh, *Journal of Public Health and Epidemiology* 2017;9(7):198-205.
- [5] Prasad M, Nayak S, Mudey A, Dhande N, Chandrakar D. Assessment of Health Status of the Brick Industry Workers in Wardha District, *Journal of Academia and Industrial Research* 2016;5(1):1-4.
- [6] Pariyar S, Das T, Ferdous T. Environment and Health Impact for Brick Kilns in Kathmandu Valley, *International Journal of Scientific & Technology Research* 2013;2(5):84-187.
- [7] Motalib M, Lasco R, Pacardo E, Rebancos C, Dizon A. Health Impact of Air Pollution on Dhaka City by Different Technologies Brick Kilns, *International Journal of Technology Enhancements and Emerging Engineering Research* 2015;3(5):127-133.