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Environmental problems from brick manufacturing and its impact on workers: A Study on some selected brick kilns in Berhampore C.D. block, West Bengal

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Abstract

In developing countries brick is the most important building materials or units. Brick manufacturing is an ancient practiced all over the world. It is a pre -dominantly rural industry with brick making units belonging to small industrial sector. Brick kilns are increasing day by day due to population growth as well as urbanization. Workers are the integral part of man power resources in these recognized sectors but the unfortunately the workers here suffer a salient agony. Air pollution and land pollution are both the most consequences due to brick manufacturing. This research paper is based on primary and secondary data sources. Four Brick Kilns are observed for the same research in Berhampore C.D. Block, Murshidabad. The present study examines the environmental problems and its associated impacts on workers. This paper is also discussing and starched some solutions and recommendations regarding the abolish problems associated with brick manufacturing phenomenon.

Keywords: Brick kiln, worker, environment, pollution, Berhampore block

Introduction

Brick manufacturing is an ancient phenomenon in rural India as well as all over the world. It is most well-liked construction materials for thousands of years. In recent trends the demand of bricks is growing in the developing country especially in India. Brick manufacturing in India is a sector associated with infrastructure development and it's have huge contribution for increasing the Gross Domestic Product (GDP) in India. Employments are generating for people of this country due to soar of brick kilns. It is a predominantly rural industry and belongs to small and industrial sector. Brick kilns are soaring day by day due to population growth as well as urbanization. The owner of brick kilns is too much interested to expand their business area with high grade of brick making. Workers are the important part of man power resources in brick manufacturing. As a negative outcomes of brick manufacturing found environmental pollution in that premises. Air pollution and land pollution are both the most consequences due to brick manufacturing. According to India country report the brick kilns emits toxic gases and suspended particulate matter which affects on workers. Besides, the associated people who are living nearer the brick manufacturing premises also are affected with environmental problems in concern area.

Objectives

The entire research is developed through the selection of following objectives;

- To find out the environmental pollution from brick manufacturing.
- To assess the impact of the problems on the workers engaged with brick kilns.
- To measure the health status of the working people who are affected from brick manufacturing.
- To ensure some solutions and recommendations to abolish such environmental problems regarding with brick kilns.

Research Area

Berhampore C.D. Block has been chosen for the present study which is located in Murshidabad district belongs to West Bengal, India. Berhampore C.D. block is situated at central part of Murshidabad district. The study area also associated with Bhagirathi River. Within the block four brick manufacturing are selected for the research.

The Coordinates of Study Area is 24°10' N and 88°25'E. Berhampore C.D block is covered by the area 194.67 sq.km.

The number of total population of the study area is 446887.

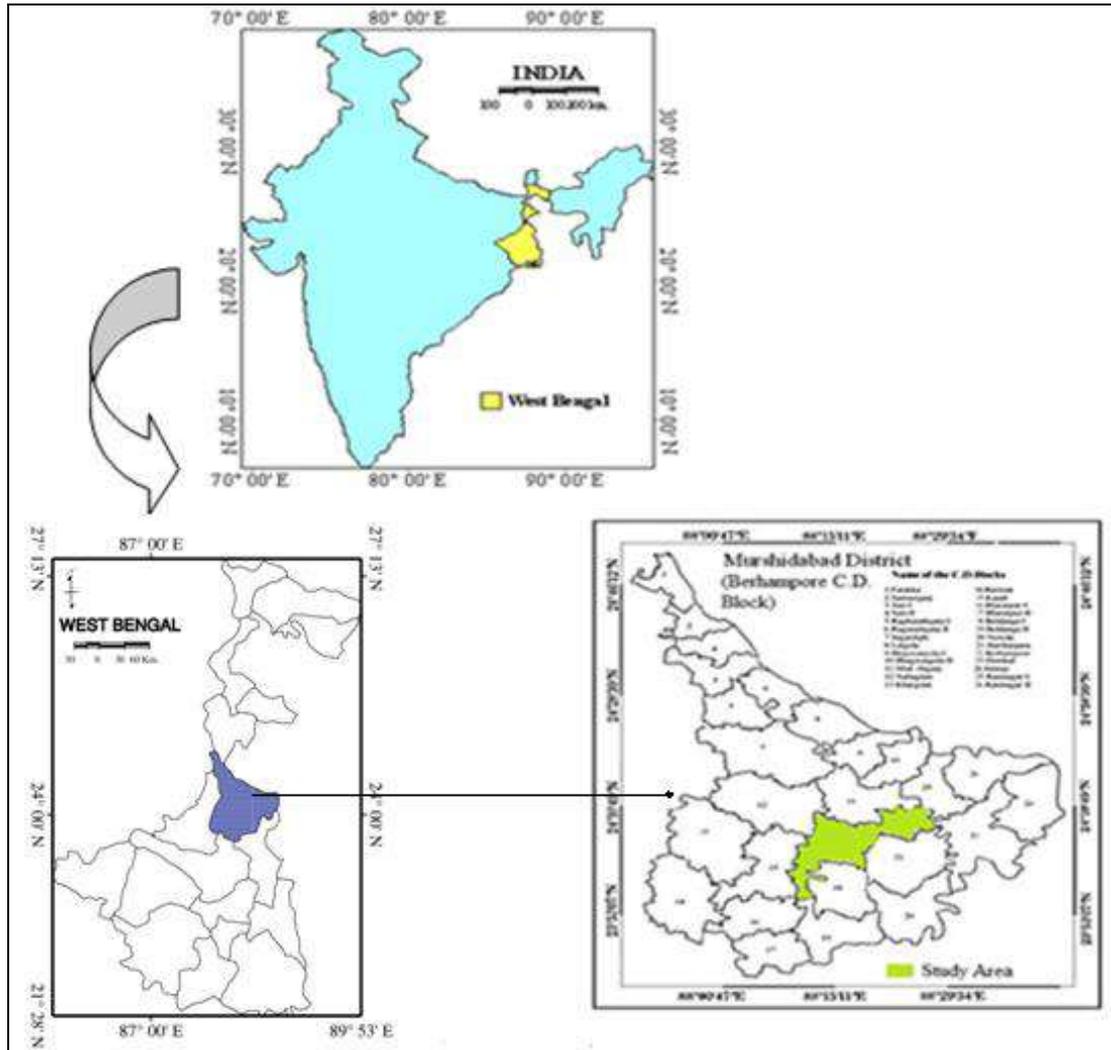


Fig 1: Location Map of the Study Area

Database and Methodology

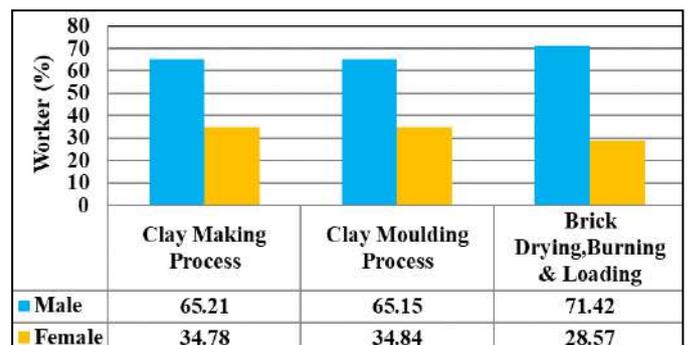
Primary data is used for designed the entire research work. Primary data has been collected through field survey with proper questionnaire according to formulated plan. For the present study, four Brick kilns have been selected to collect the primary data through field survey. All maps and diagrams are prepared with the help of GIS techniques using the software TNT Mips, Q-GIS and Google Earth etc. A method is used for presenting the satisfaction manner of the workers associated with brick kilns by calculating Satisfaction Index. The formula of *Satisfaction Index* is: $SI = (fs - fd) / N$; where, SI = Satisfaction Index, fs = Number of Satisfied Respondents, fd = Number of Dissatisfied Respondents, N = Total Number of Respondents

Results and Discussions

Distribution of workers according to working process in Brick kilns

In Berhampore C.D. block four brick manufacturing are selected for present study. Surveyed total number of workers are 191 among them male workers are 128 and female workers are 63. Here, male population concentration is high than the female population. In fig 2 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; brick drying, burning and loading are 65.21 percent, 65.15 percent, 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 and for brick drying, burning and loading is 28.57 percent.



Source: Field Survey, 2017

Fig 2: Population distributions according to working process

Wages of Workers in Brick Manufacturing

Table 1 explains the names of surveyed brick fields are CBF, BRIGHT, DSAHA and BBF. Wages of the worker varies with working process in brick kilns. In clay making process, the mean wages of the workers is Rs.4475 per month. The mean wages for the clay molding process is

Rs.340 per 1000 bricks. And also the mean wages for bricks drying, burning and loading is Rs.705 per 1000 bricks. So, there are seen low wages rate for workers in the Brick kilns. That’s why the economic well-being of the workers is not satisfied.

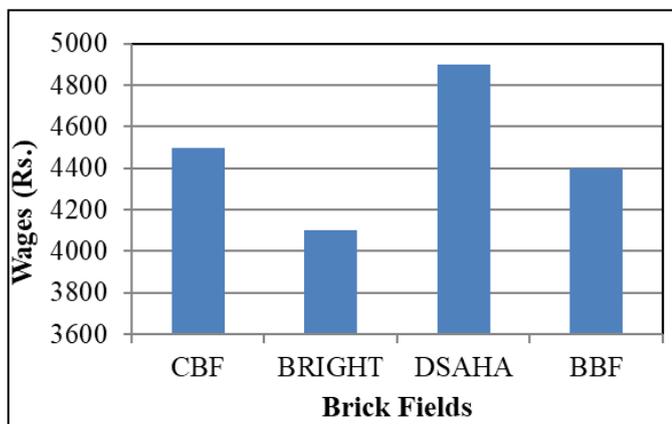
Table 1: Wages of workers in brick manufacturing

Name of the brick fields	Clay making Process Wages in Rs. /Month)	Clay Molding Process (Wages in Rs./1000 bricks)	Drying and Transportation (Wages in Rs./1000 bricks)
CBF	4500	300	700
BRIGHT	4100	350	650
DSAHA	4900	370	750
BBF	4400	340	720

Source: Field Survey, 2017

Child Labours in Brick Kilns

Child labour is the most important crucial matter in present society. It is also a social pollution as well as environmental problems which occurred by the increasing of school dropout. Many child labours are engaged with brick kilns. From field survey, in fig 3 it is found that 22.23 percent child labours are engaged in CBF brick field, 21.42 percent for BRIGHT, 11.32 percent for DSAHA and 30.55 percent for BBF brick field. So, in respect to total labours averagely 21.65 percent child labours are engaged in brick kilns.



Source: Field Survey, 2017

Fig 3: Child Labour in Brick Kilns

Environmental Pollution from brick manufacturing
Air pollution

Fig 4 demonstrates air pollution could have local as well as global impacts. Brick kilns play a vital role to pollute the air surrounded by it. Major pollutants from brick manufacturing are Particulate Matters (smoke, dust, fly ash etc.), Various Gases like Sulfur dioxide (SO₂), Nitrogen oxides (NO), carbon monoxide (CO), carbon dioxide (CO₂) etc. Suspended Particulate Matter (SPM) is generated mainly due to incomplete flaming of coal and created the black smoke. Massive amount of subtle coal dust, boiler ash present in coal and burnt clay particles which are also the sources of air pollutants from brick kilns.

Hence, creates the Hydrocarbons and Carbon monoxide (CO) for combusting of fuel partially. There are also seen the mote pollution propagated during removal and laying down of ash layer on the top of the kiln and also due to whiffing of ash heaped on the top and around of kilns.



Source: Field Survey, 2017

Fig 4: Source of Air Pollution

Land Pollution

In surrounded area of brick manufacturing, there are observed that the good quality of agriculture land is damaged due to covering the coal dust and ashes in that area. Large quantities of waste materials created from brick kilns is also a matter of concern. As the consequence of land pollution it is cleared that the productivity of agricultural land is declining day by day. Most of the waste materials are fly ash, boiler ash and stone dust.



Source: Field Survey, 2017

Fig 5: Land Pollution

Land Cutting Problems

The good quality of soil is used for making the high qualities of bricks. So, the owner of brick manufacturing tried to bring good qualities of soil form the river side region. Here, Bhagirathi river basin area is chosen for the soil. So, Soil erosion is seen due to increasing the land cutting activity gradually. The land cuttings also affects on the Bhagirathi River. The siltation of Bhagirathi River is the progressive way. Even sometimes, the good agricultural lands are used for brick kiln purpose and also affected by this process. It converts the agricultural land to fallow land due to entire removal of topsoil.

Reduction of agricultural land:

The table 2 explains a 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. 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 diagram (fig.6) showing the total land occupied through yearly changing of the pattern. From the year of 2003 to 2017 the net area each brick kiln is increased day by day. The increasing area of brick kilns from 2003 to 2017, in CBF it is 0.167 Acre, for BRIGHT it is 0.182 Acre, for

DSAHA it is 0.181 Acre and for BBF it is 0.219 Acre. The highest changing pattern of total land occupied is identified in BBF brick field.

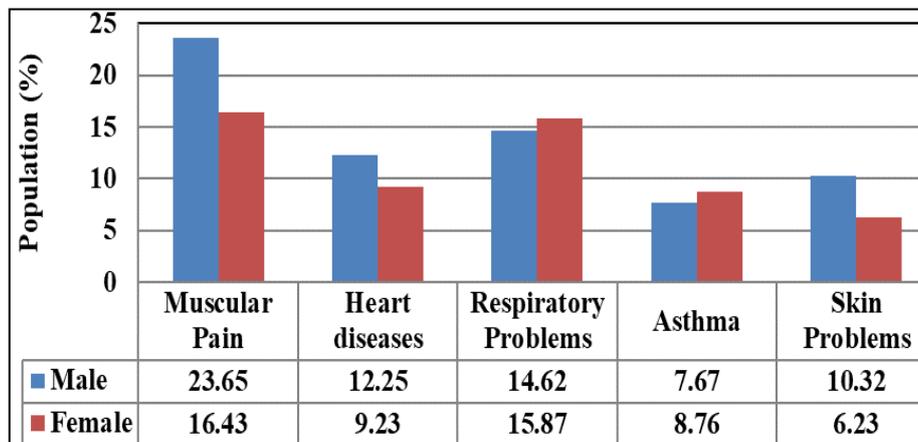
Table 2: Year Wise Changing pattern of occupied agricultural land by Brick Kilns

Year/Brick Kilns	2003 (in Acre)	2010 (in Acre)	2017 (in Acre)
CBF	0.263	0.34	0.43
BRIGHT	0.31	0.351	0.492
DSAHA	0.215	0.265	0.396
BBF	0.198	0.329	0.417

Source: Offices of Brick Kilns, 2017

Health Problems of the workers in brick kilns

Fig 6 shows as the field survey and interview results identified that most of the workers are affected by the health problems in the brick kilns. From the study 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 due to long duration working activity. As the outcome of air pollution found the various type of diseases among the workers like skin disease, heart disease, respiratory problems, asthma etc. The percentage of affection from skin disease is 10.32 percent and 6.23 percent; from heart disease it is 12.25 percent for male and female 9.23 percent; the percentage of Respiratory problems and Asthma are 15.24 and 8.21 respectively. Hence, local residents are also facing the problems due to the affect of air pollution.



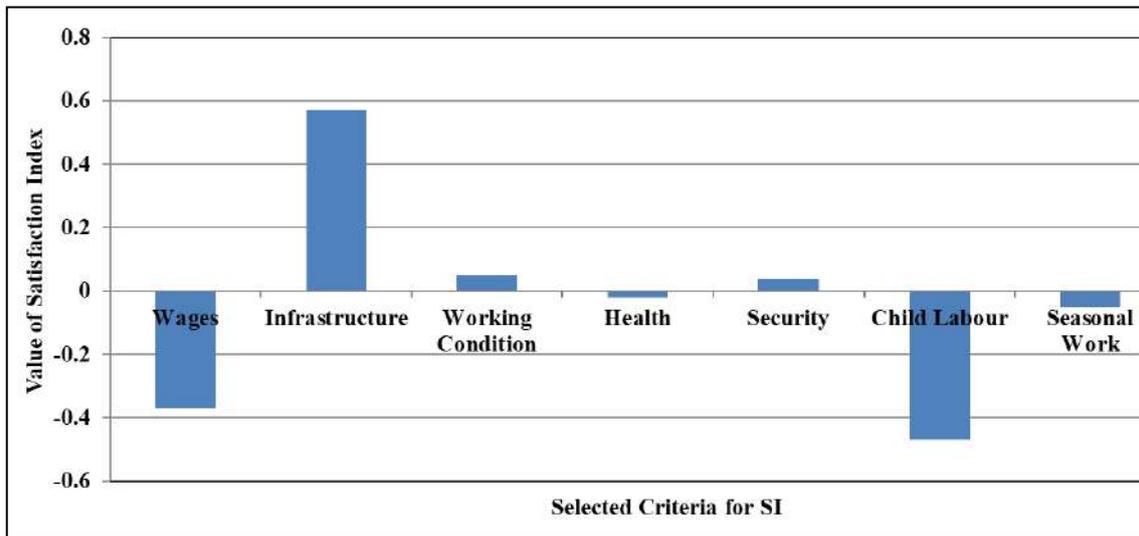
Source: Primary Survey, 2017

Fig 6 Health Problems of Workers in Brick Kilns

Satisfaction Index of workers in brick kilns

In the fig 7, 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 wages, workers are not satisfied with amount of paid money

(SI is -0.37), for infrastructure workers are moderately satisfied (SI is 0.57), for working condition they are poor satisfied (SI is 0.05); for health condition workers are not satisfied (SI is -0.02) due to air pollution in kilns; for security they are slight satisfied (SI is 0.036); for child labour they are not satisfied (SI is -0.47) and lastly they are not satisfies for seasonal work (SI is -0.05). Half of the year especially in rainy season, they have not work in brick kilns.



Source: Primary Survey, 2017

Fig 7: Satisfaction Index of workers in Brick Manufacturing

Conclusion with Recommendations

It is clearly visible that gradually reducing the agricultural land resources and soil erosion due to land cutting problems. Also, it is seen as degrading air quality due to chemical and toxic substances emission from the Brick kilns. Solid brick wastes leads to the contamination of soil, water, air and organic world. Many workers are affected with unfavorable health conditions that are associated with brick manufacturing. Child labour is found there. Low labour cost and per capita income reflects the poverty and economic insecurity. It should be measured to reduce the air pollution from brick kilns using high technological tools and equipment. Owner should try to reduce the wastage materials and conservation of good quality agricultural land associated with brick kilns. The Agriculture and Land Reforms Department should come frontward to put off land degradation and environmental pollution in brick kiln factories. It should be ensured the good quality of life with confirmation of life insurance for workers and arrangement the sufficient wages for man and women workers. Government has to be promoted a rules and regulations for controlling the child labour from brick kilns. Local Government body should visit in brick kilns to reduce the environmental problems as well as social economic problems.

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