



## A Cross Sectional Study of Socio – Demographic and Morbidity Profile of Brick Kiln Workers in Rural Area of Karad, in Satara District

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### ABSTRACT

**Introduction** - As brick industry is an unorganized sector, people working there are exposed to many environmental and occupational hazards along with economic exploitation. To study all these factors study was undertaken in a rural area.

**Objectives** – To study the socio-demographic factors, morbidity profile, living and working conditions and compare it with other occupations.

**Materials and Methods** - This cross sectional-observational study was conducted on brick workers from Karad Taluka. Amongst 8 villages with brick kiln industries one village i.e. Karve was selected randomly. According to the calculated sample size, 80 study subjects (brick kiln workers) were available in that village itself. Controls were selected from the same village Karve who were not engaged in brick kiln work and were matched according to age, sex and socioeconomic status. Data was collected with the help of pre-designed, pretested and validated questionnaire from the study subjects and controls.

**Statistical Analysis** was done by calculating rates, ratios, percentages and Chi-square test.

**Results** – 51 were males and 29 were females in study group, amongst them 7 were children below 14 years. 55% belong to socioeconomic class 4. 71.25% were illiterates. Working hours were more than 8 hours in 50% of brick kiln workers. Addiction was significantly higher. No benefits, health and welfare facilities were provided to them. Morbidities were higher in this group. They had to work in open environment. Living conditions were poor. Accidents were more than controls.

**Keywords** – Brick kiln workers, occupational hazards, unorganized sector.

### INTRODUCTION

Brick making industry is one of the ancient industries <sup>[1]</sup>. India is the second largest producer of bricks in the world next to China and has more than 10,000 operating units, producing about 140 billion bricks annually <sup>[2]</sup>.

Till today the production technology has not undergone much change. Bricks are prepared, processed and baked at the brick kiln in the open spaces usually by the side of river. Brick kilns provide employment to nearly 12 million people in different sub occupations <sup>[3]</sup>.

The workers are exposed to the sun for long hours, high concentration of hazardous dust, open fire, hot surfaces etc. Because of all these things they get various types of illnesses like skin allergy, eye irritation, tuberculosis, joint diseases etc. Due to the exposure to dust particle they have problems like asthma, chronic obstructive pulmonary symptoms, silicosis etc. <sup>[4]</sup>. They meet with accidents while working like slip and fall <sup>[5]</sup>. They work for long hours and are paid less. As they belong to unorganized sector, they have no unions to fight for them. There are no proper drinking water or sanitation facilities. There is no availability of any personal protective equipment. There is neither first aid kit nor provision of any medical facilities. The pattern of labor recruitment in the brick kilns and the mechanism of deployment, payment of advances and wages bear a striking similarity across the country. As the kilns are operating in the remote areas they mostly remain unregulated and wages paid are very often less than the statutory minimum wages <sup>[6]</sup>.

To study these occupational hazards faced by the brick kiln workers and their working and living conditions with the socio-demographic factors and to compare the study parameters of brick kiln workers with other workers, this study was undertaken to make some suggestions and recommendations for the protection of health of this unorganized sector.

#### AIMS AND OBJECTIVES

- 1) To study the socio-economic & demographic characteristics of brick kiln workers.
- 2) To study the morbidity profile of brick workers.
- 3) To study the living and working conditions of brick kiln workers.
- 4) To study the health and welfare facilities available to them.
- 5) To compare study parameters of brick kiln workers with other workers.

#### MATERIAL AND METHODS

This cross sectional-observational study was conducted in Karad Taluka situated along the river Krishna. Amongst 8 villages with brick kiln industries one village i.e. Karve was selected randomly. According to the calculated sample size, 80 study subjects (brick kiln workers) were available in that village itself. Controls were selected from the same village Karve who were not engaged in brick kiln work and were matched according to age, sex and socioeconomic status. Some controls were working in dairy, some in green house and remaining were shopkeepers. Both groups were informed regarding the study, its purpose was explained and only those who were willing were included in the study.

Consent of the Institutional Ethical Committee was obtained for the study. Informed consent was taken from the study and control subjects. Data was collected with the help of pre-designed, pretested and validated questionnaire. It included the socioeconomic and demographic characteristics, health and welfare facilities, observation of the working and living environment, use of protective measures, health hazards faced by them, accidents within one year period, information regarding their habits like smoking, alcohol consumption and tobacco use was collected along with the benefits they get from their owner regarding leaves and wages and social security measures. Same information was collected from the controls.

#### Sample Size Calculation

According to a study conducted in Thane District <sup>[15]</sup> workers who had some kind of health problem were 73.3% i.e. p

Workers who had no health problems q=26.7%

With 5% level of significance and 10% error minimum brick kiln workers required to be studied are according to  $n=4pq/L^2=79$  i.e. the sample size is 79.

Same number of age, sex and socio-economic wise matched controls were taken for the study

from other non-organized sector (Dairy, green-house and shopkeepers).

**STATISTICAL ANALYSIS**

Was done by calculating rates, ratios and percentages. Chi-Square test was applied to compare the study parameters in study and control group.

**OBSERVATIONS AND RESULTS**

**Table 1:** Age and Sex wise distribution of Brick kiln workers

Age in years	Male	Female	Total
<14	3(3.75%)	4(5%)	7(8.75%)
15-24	17(21.25%)	7(8.75%)	24(30%)
25-34	14(17.50%)	5(6.25%)	19(23.75%)
35-44	10(12.50%)	10(12.50%)	20(25.00%)
45-54	4(5.00%)	0(0%)	4(5%)
55-64	3(3.75%)	2(2.50%)	5(6.25%)
>65	0(0%)	1(1.25%)	1(1.25%)
Total	51(63.75%)	29(36.25%)	80(100%)

Seven children were working in the Brick kiln having age less than 14 years. Amongst these there were four girls and three boys who worked for 8 hours. They were not going to school at all. They were also paid less as compare to other adult workers. Though the Government is trying hard to abolish child labour still we see children working in such unorganized sectors for money. One worker was of the age of 68 years.

**Table 2:** Age and Sex wise distribution of Control group

Age in years	Males	Females	Total
15-24	11 (13.75%)	2 (2.50%)	13 (16.25%)
25-34	19 (23.75%)	5 (6.25%)	24 (30%)
35-44	6 (7.50%)	4 (5%)	10 (12.50%)
45-54	17 (21.25%)	8 (10%)	25 (31.25%)
55-64	7 (8.75%)	1 (1.25%)	8 (10%)
Total	60 (75%)	20 (25%)	80 (100%)

In control group there was no worker below 14 years and above 65 years of age.

**Table 3:** Distribution of Brick kiln workers and Control group according to period of working

Period of working in years	Brick kiln workers	Control Group
1 – 5	41(51%)	30(37.5%)
6 – 10	14(17.5%)	15(18.75%)
11 – 15	11(13.5%)	10(12.5%)
16 – 20	4(5%)	3(3.75%)
21 – 25	5(6.25%)	10(12.5%)
26 – 30	0(0%)	3(3.75%)
31 – 35	0(0%)	9(11.25%)
>35	5(6.25%)	-
	80(100%)	80(100%)

Five Brick Kiln workers were working for more than 35 years. This may be because they started working at an early age. Also they are not getting any other job as they are illiterate and also they are bonded with the owner of the brick kiln who gives money to them in advance. In control group no worker was found to be working for more than 35 years. These were not bonded workers.

**Table 4-**Monthly income of brick kiln workers

Monthly income (Rs.)	No. of workers
<5,000 /-	17 (21.25%)
5,001 - 10,000 /-	51 (63.75%)
10,001 – 15,000 /-	11 (13.75%)
>15,000 /-	01 (1.25%)
Total	80 (100%)

Only one person is receiving more than 15000 as he is doing designing of bricks as well as driving. 14% workers were receiving income of 10001-15000 as they are designing the bricks. 64% workers were receiving 5001-10000 as they are doing less skill job of carrying and keeping the bricks and drying the bricks. 21% workers were unskilled workers and receiving less than 5000 as they were only carrying the load of bricks. These also included 7 children. All were bonded workers as they have taken money in advance.

**Table 5:** Distribution of Brick kiln workers and control group according to Socio Economic Status

Socio economic class	Brick workers	Control
1	4(5%)	1(1.25%)
2	17(21.5%)	22(27.50%)
3	8(10%)	21(26.25)
4	44(55%)	25(31.5%)
5	7(8.75)	11(13.75)
	80(100%)	80(100%)

Chi-square value = 14.389, p=0.0062

Most of the brick kiln workers belong to socio-economic class 4 and are significantly higher (55%, p=0.0062) as compared to controls.

**Table 6 (a):** Sex-wise distribution of brick kiln workers according to literacy status

Sex	Literates	Illiterates	Total
Females	6(7.5%)	23(28.75%)	29(36.25%)
Males	17(21.25%)	34(42.5%)	51(63.75%)
	23(28.75%)	57(71.25%)	80(100%)

Chi square value=3.65, p=0.45

Above table shows that the illiterates (71.25%) are higher in proportion than literates (28.75%) in brick kiln workers.

**Table 6 (b):** Sex-wise distribution of controls according to literacy status

Sex	Literate	Illiterate	Total
Female	17(21.25%)	3(3.75)	20(25%)
Male	60(75%)	0(0%)	60(75%)
	77(96.25%)	3(3.75%)	80(100%)

Chi square value = 9.35, p=0.0093

In the control group literacy is significantly higher (p=0.0093) than the illiteracy, i.e.in controls literates (96.25%) are more than the brick kiln workers.

**Table 7 :** Sex-wise distribution of brick kiln workers according to working hours

Sex	Working hours			Total
	8 hrs	8-10 hrs	>10 hrs	
Female	2(2.5%)	17(21.25%)	10(12.5%)	29(36.25%)
Male	12(15%)	23(28.75%)	16(20%)	51(36.75%)
Total	14(17.5%)	40(50%)	26(32.5%)	80(100%)

Chi square value = 3.65, p=0.45

There was no limit of working hours in brick kiln workers. They had to work for long hours even for 12 hours a day. Females and children had to work along with the males. Females also had to do their household work. So the main burden of work was on them. Children could not attend schools because they have to work for full day.

**Table 8 :** Comparision of Morbidity profile of brick kiln workers and Control

	Illnesses	Brick workers	Control
Heavy load	Yes	35(43.75%)	23(28.75%)
Muscular disorder	One joint	3(3.75%)	27(33.75%)
	TWO	8(10%)	14(17.5%)
	THREE	30(37.5%)	5(6.25%)
Respiratory illness	ONE illness	17((21.25%))	10(12.5%)
	More than Two	5(6.25%)	2(2.5%)
Allergies	Skin allergy	1(1.25%)	2(2.5%)
	Eye irritation	23(28.75%)	3(3.75%)
	Throat irritation	2(2.5%)	3(3.75%)
	Two or more	14(17.5%)	1(1.25%)
Digestive disorder	Abdominal pain	11(13.75)	1(1.25%)
	Others	2(2.5%)	0(0%)

Chi-square value =69.858, p=<0.001

Morbidities like muscular disorders, respiratory illnesses, allergies, digestive disorders were significantly higher in brick kiln workers than controls (p=<0.001). All the workers used to carry load of bricks on their head and transporting it to storage site. 99% workers had awkward posture because they have to repeatedly bend to dry the bricks. Controls sometimes had to carry heavy loads but not have to bend repeatedly. Therefore they were not having awkward position.

Single joint pain was seen more in control group i.e. in 27(33.75%) people but in brick kiln workers only three had single joint pain. 30(37.5%) brick kiln workers had three and more than three joint pain as compared to 5 (6.25%) in control group.

In respiratory illnesses, breathlessness was seen more in brick kiln workers (28.75%) as they were exposed to large amount of dust as compared to controls. More than two respiratory illnesses were again more in the study subjects <sup>[14]</sup> which was absent in control group.

Eye irritation was more in study group again because of exposure to mud, dust and heat.

In digestive disorders abdominal pain was more in the study subjects <sup>[11]</sup> may be because of worm infestation as they come in direct contact with mud. But complains of passing worms was given by only one person.

Heat stress was seen in all brick kiln workers as they were exposed to both environmental as well as from the kiln itself. No control was exposed to heat stress.

**Table 9:** Distribution of brick workers and controls according to the addiction

Habits	Brick workers	Control
1 habit	10(12.5%)	28(35%)
2 habits	18(22.5%)	5(6.25%)
3 habits	9(11.25%)	2(2.5%)
4 habits	1(1.25%)	1(1.25%)

Chi-square value = 20.289, p=0.0001

Addiction was significantly higher in brick kiln workers than the controls (p=0.0001). But only one habit was in 10 (12.5%) workers while that in control group it was 28 (35%). But a combination of different addictions was seen more in 28 brick workers (35%) whereas in control group it was only in 8 (10%) people.

### Health and Welfare Facilities

No separate rest place was provided for brick kiln workers. Same was observed with the control group. Even the other facilities like drinking water, urinals, and latrines were not provided.

They didn't have any medical facilities nor was a first aid kit kept there. They were unaware of these facilities which should be provided by the owner of the Brick kiln. In the control group there were urinals and drinking water was provided to them.

### Benefits

They were not given any leaves and holidays. If they remain absent their money was cut for that period. In controls, workers who were temporarily employed were not given any leave or holidays. Those who had completed one year were given only national holidays. Only those workers who worked for more than 5 years avail the leaves.

### Working Environment

As the brick kiln industry is built in open area there is good ventilation and light. No overcrowding was observed. But there was no temperature control and these workers were exposed to heavy heat and also to sunlight. They were also exposed to dust and fumes heavily.

There was good lighting and ventilation, in the control group and they were not exposed to any heat, dust and fumes. There was no overcrowding. No control was exposed to any kind of dust nor fumes and heat.

### Protective Measures

No protective measures were used by the brick kiln workers at all. They were not using any gloves while working with the bricks. No helmets were used while carrying the brick loads. No goggles and protective clothes were provided though they were exposed to heavy dust and fumes. They were not using masks and shoes while working with mud and were exposed to the dust created by the mud they use for making bricks and also during loading and unloading of bricks. Even in the control group they were not using any protective measures.

### Living Conditions

The living condition of the brick kiln workers were very basic and shanty. They had poor housing, no toilets; they use to get water from far place. During off season women workers did the job like tailoring, needlecraft, poultry rising which use to supplement their income.

**Table 10:** Accidents in brick workers within one year

Accidents	No. of workers	Controls
Slips and fall	11(13.75%)	2(2.5%)
Fall from heights	02(2.5%)	0(0%)
Burns on fire	03(3.75%)	0(0%)
Falling objects	07(8.75%)	1(1.25%)
Snake bites	01(1.25)	2(2.5%)

Accidents were more in brick kiln workers than the controls within one year period. Falls from the ladder while loading and unloading were more and were seen in older age group. The mud which is used to make bricks is slippery. Falls at ground level were also found. There were three cases of mild burns one in female and two in males. In 7 cases while carrying the load of bricks the load fell on the workers but the injuries were mild. In controls falls were again in older subjects. There was no fall from heights and burns. Snake bites were seen in two controls who worked in farms.

### DISCUSSION

In this cross-sectional-observational study male workers were 63.75% and females were 36.25%. There were 7 (8.75%) children working in the kiln. In a study conducted at Thane females were more (57%) and children were 11% <sup>(15)</sup> i.e. females and children comprise large number of working population in brick kilns. In the study in Coimbatore 80% were males and 20% were females <sup>(6)</sup>. No children were found working in control group. These children worked for 8 hours and were not going to school at all. This is in contradiction with Child Labour Act and Right to Education for universal education of children up to 14 years of age.

Majority of workers were working in the kilns for 1-5 years (51%). 5 brick kiln workers were working for more than 35 years. This may be because they started working at an early age and were not getting any other job as they were illiterate. In control group no worker was working for more than 35 years. In a study in Southern India majority of the workers were employed for more than 10 years <sup>[20]</sup> but did not have any coverage of social security. Same was the case with this study. In the study in Thane majority of workers (59%) have been working for more than five years <sup>[15]</sup>.

Majority of the workers (63.75%) were receiving income in the range of 5001-10,000. In a study by Zia-ur-Rahman in Pakistan same was observed <sup>(5)</sup>. 21% of workers were receiving less than 5000. Study at Thane says that workers were earning wages between 100-150 rupees per day which was nearly same as compared to this study <sup>[15]</sup>. All the workers in the present study had taken advance money.

The socioeconomic class 4 was significantly higher in the study group as compared to the control group ( $p=0.0062$ ). But controls in class 3 are higher than brick workers. In a study at Thane 27% of workers were earning wages below 160 rupees which is less than daily wages provided to workers under MNREGA Act 2005 <sup>[15]</sup>.

Illiterates were higher in proportion than literates in the study group whereas literacy was significantly higher than illiteracy in controls ( $p=0.0093$ ). In the study at Thane 90% of workers were illiterate. Among 11 child workers 10 have never attended school <sup>[15]</sup>. Same was seen in this study; children never attended the school. In a study by Dr.R.Santha 41% had just primary school education <sup>[6]</sup>. In a study in Pakistan 68.2% of workers were illiterate <sup>[13]</sup>.

There was no limit of working hours in brick kiln workers. Females and children had to work along with the males. Working hours were fixed in control group. In the study in Southern India the workers were made to work overtime due to the continuous demand to meet the target number of

bricks <sup>[20]</sup>. In a study in Pakistan same was observed <sup>[5]</sup>.

Morbidities like muscular disorders, respiratory illnesses, allergies, digestive disorders were significantly higher ( $p < 0.001$ ) in brick kiln workers than controls. In a study at Thane, majority of workers (58.7%) complaint of musculoskeletal problems, along with digestive disorders in 19% and respiratory problems in 11% <sup>[15]</sup>. In a study in Southern India majority of study subjects (87%) experience some kind of pain <sup>[20]</sup>. In the study in Pakistan same hazards were faced by the workers along with dehydration, cold, heat stress, muscular disorders <sup>[5]</sup>. In a study at Gujarat same morbidities were found <sup>[17]</sup>.

One or other form of addiction was significantly higher ( $p = 0.0001$ ) in the brick workers than the control group. Tobacco chewing in this group was more. In the Shiraz Shaikh study 42.9% were smokers <sup>[13]</sup>.

Health and welfare facilities were not provided at all for the workers in this study. In the control group drinking water and urinals were there. Same was seen in a study in Pakistan <sup>[5]</sup>.

Workers were not receiving any benefits of leaves and holidays which were same in the study at Pakistan <sup>[5]</sup>.

In working environment there was good ventilation and lighting as the kilns were in open spaces. But the workers were exposed to lots of dust, fumes and heat. Same was seen in other studies by Monga V. <sup>[4]</sup>, in Pakistan <sup>[5][13]</sup> and Thane <sup>[15]</sup>.

No protective measures were used by any brick workers. They neither were aware of these measures nor were their owners interested. Same was observed in other studies by Monga V. <sup>[4]</sup>, in Pakistan <sup>[5]</sup>, and in Thane <sup>[15]</sup>.

Accidents were more in brick kiln workers than in controls. Amongst these falls and slips were more (13.75%) next to falling objects (8.75%).

## CONCLUSION

In the present study total study subjects were 160 out of which 80 were in study group and 80 were in control group. Amongst these males were 63.75% and females were 36.25%. 7 children were found working in the kilns. They were working for full day and were not going to school at all. They were also paid less as compare to other adult workers. There were no children in control group. Most of the brick workers were working for more than 10 years. As they are unskilled workers and illiterate they don't get other jobs easily. Most of them were bonded workers. Monthly income of worker was very less, 63.75% were receiving income between 5001 to 10,000. Socioeconomic status of the brick kiln workers was significantly low ( $p = 0.0062$ ). Illiteracy was very high in the study group.

Morbidities like muscular disorders, respiratory illnesses, allergies, digestive disorders were significantly higher in brick kiln workers than controls ( $p < 0.001$ )

Heat stress was seen in all brick kiln workers as they were exposed to both environmental as well as from the kiln itself.

Addiction was significantly higher in brick kiln workers than the controls ( $p = 0.0001$ ). But only one habit was in 12.5% workers while that in control group it was 35%. But a combination of different addictions was seen more in brick workers (35%) whereas in control group it was only in 10% people.

No health and welfare facilities were provided to the brick kiln workers. They were not given any benefits like leaves or holidays.

The working environment has good ventilation and lighting, there was no overcrowding but the workers were exposed to heavy heat of kilns and sunlight and also to dust and fumes.

No protective measures were used by the brick kiln workers at all.

There were more accidents in brick kiln workers than the controls in last one year. There was no time limit for working in brick kilns. They had to

work for long hours even for more than 12 hours a day.

The living condition of the brick kiln workers were very basic and shanty.

During off season women workers do tailoring, needlecraft, poultry rising which can supplement their income.

Awkward postures adopted by brick kiln workers during their work are related to their musculoskeletal disorders.

Study recommends detailed research, health education regarding safety to the workers, implementation and monitoring of laws in such unorganized sectors to tackle morbidity and their standard of living.

More studies are required to identify the air pollutants, alternatives in the process of manufacturing, work friendly technology to be introduced.

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