ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Impact of Stone Quarrying on The Environment as Well as on the Lives of Indigenous People: A Case Study on Hatgachha Village of Mohammad Bazar Block of Birbhum District of West Bengal in India.

Dr. Mahuya Sen

Associate Prof. of Geography Birbhum Mahavidyalaya, Suri (Affiliated under Burdwan University) Course Coordinator, Department of Geography and Geoinformatics, Biswa Bangla Biswabidyalaya, Bolpur

DOI: https://doi.org/10.51583/IJLTEMAS.2025.1408000143

Abstract: Mining and quarrying have a direct impact on the environment. The extraction processes contaminate air and water with sulfur dioxide and other pollutants. The aim of the study is to assess the impacts of quarrying activities on the environment and livelihood of people. The study area, Hatgachha village, is located in Mohammad Bazar block of Birbhum district in West Bengal, India where a part of the Chhota Nagpur plateau is situated. Primary data was collected through questionnaires. Secondary data was collected from 2011 census. Most of the people of the village (76.43%) were schedule tribe. Literacy rate is low (48.84%). Quarrying activities in the study area were perceived to have both positive and negative impacts on the environment and the livelihood of people. The major environmental, socio economic and health problems related to quarrying revealed during this study include, dust pollution, noise pollution, land degradation, vibration, health hazards.

I. Introduction:

Mining and quarrying have a direct impact on the environment like landscape alteration, habitat destruction, water and air pollution, and soil erosion. These activities can also contribute to climate change through carbon emissions and impact local communities through noise pollution and resource conflicts. The extraction processes reshape the landscape by creating pits, heaps of waste material, and changing topography as well as contaminate air and water with sulfur dioxide and other pollutants. It lays extensive dust on land and water resources, leading to fundamental change in local environments and biodiversity. Dust pollution from quarrying operation, tends to affect local air quality (particulate matter). A quarry not only pollutes the air, but may also lead to serious health problems especially respiratory problems and affect the surrounding environment. Mining operations also release other pollutants and contribute to greenhouse gas emissions. Quarrying and mining activities generate noise from blasting, machinery, and transportation, which can disrupt local communities and wildlife. Mining activity enhances carbon emissions through transportation and energy use, as well as the extraction of fossil fuels. Soil erosion can lead to the siltation of water bodies, impacting surrounding areas and reducing water availability for plants.

Objective:

The aim of the study is to assess the impact of quarrying activities on the environment and livelihood of people of Hatgachha Village of Mohammod Bazar Block in Birbhum district.

Location of the Study Area:

The study area , Hatgachha village, is located in Mohammad Bazar block of Birbhum district in West Bengal, India where a part of the Chhota Nagpur plateau is situated. The extension is from $24^0$6'54.59"N–$24^0$7'16.82"N" Latitude and $87^0$35'20.33"E – $87^0$35'52.31" E Longitude. Interstate boundary between West Bengal & Jharkhand is 500m away in West direction from the village. Hatgacha Blackstone mining project is situated 10km north of Sotsal. Sotsal is located 23km away from Suri, the district headquarter of Birbhum on Suri – Rampurhat main road. The nearest railway station is at Mollarpur on Sahebgunj loop line of Eastern Railway is 17km from the project site.

II. Methodology:

The study is based on primary and secondary data. Fifty (50) households were selected using simple random sampling technique. The data were collected using survey questionnaire and field observation. Secondary data is collected from 2011 census of Birbhum District.

Landscape:

The village area is gently sloping to flat terrain with general slope of ground towards south east and with occasional high grounds or peaks containing basaltic trap rocks of 90 to 100m AMSL high. These soils are gray to red colour, medium texture, containing gravels, quartz, sand and ferruginous concretions.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

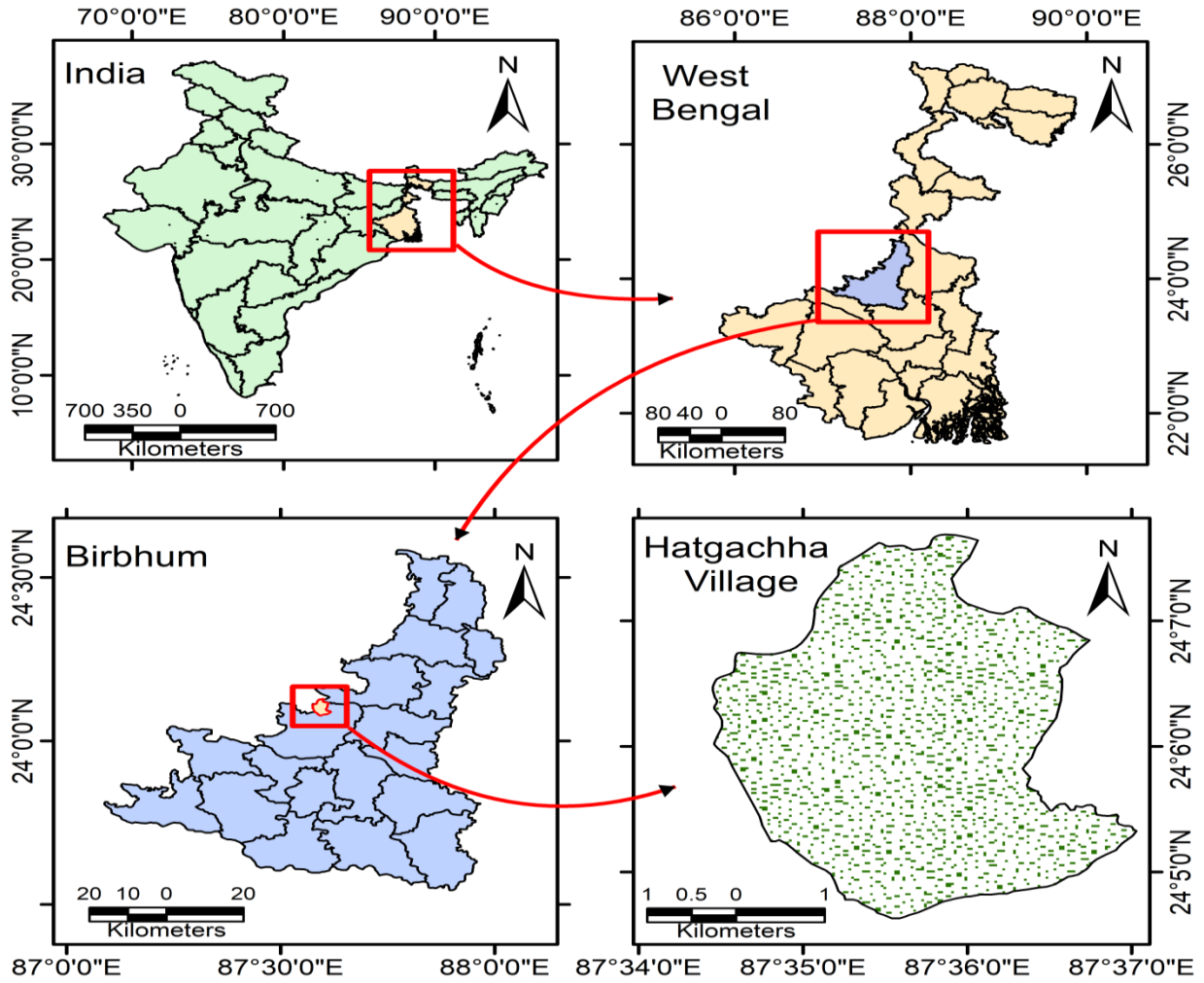

Fig. No. 1

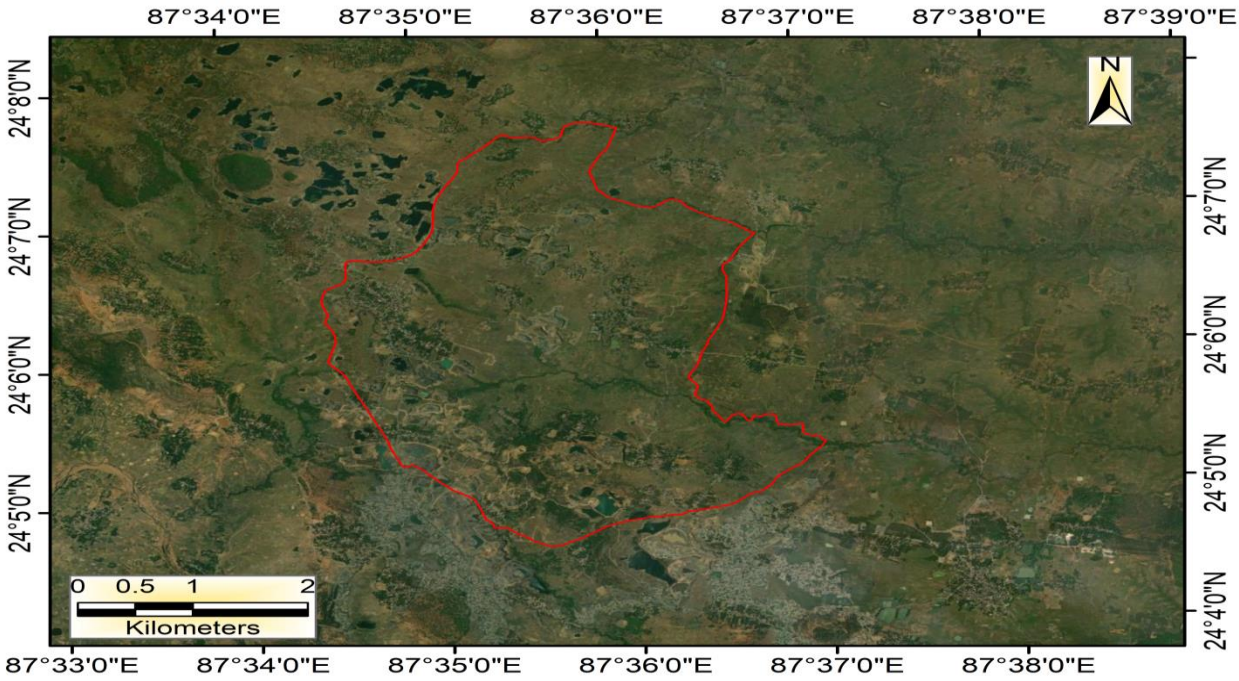

Fig. No. 2

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Climate:

The study area experiences a tropical climate round the year. A dry and hot summer with temperatures often rises above normal. During summers, the mercury rises well above 400 C (1040 F). As for the direction of the wind, it is always blows from the southeast. The summers start from middle of March and lasts till the middle of June. Winters in the region marks the mercury dropping less than 100 C (500 F). While the day time is pleasingly cool, with the fall of night even temperature lowers further, making the nights chilly and cold. During winters, wind usually blows from the north-west direction. The winter starts from December and last till the month of February. The monsoon sets in middle of June and continues up to the end of September. Average annual rainfall is 1430.5mm and 85% of the total precipitation takes place during monsoon. The maximum number of rainy days was observed in the month of July & August.

Socio-Economic Condition obtained from secondary data (census 2011):

The village is very poorly served in terms of medical facilities. No Hospitals & Dispensaries are available here. Block Primary Health Center (BPHC) along with Child welfare center is at Mollarpur, which is 17km away in SE direction. Hand pumps are the main source of drinking water in the study area. No tap water facility is there in the 10km radii area. Post office is present in Mollarpur town, 17km in the SE direction of the village. With the expansion of mobile facility, telecommunication is available in almost all the villages. Police station at block head quarter Mohammad Bazar is providing all necessary police assistance in the study area. Weekly market takes place at Deocha, Salbadra & Ganpur and all facilities are available in Mollarpur. The total geographical area of village is 1471.05 hectares. Hatgachha is a large village with total 1093 families.

From the fig number 3 the Hatgachha village has population of 5557 of which 2784 are males while 2773 are females as per Population Census 2011. it is found that male female distribution of population are almost same i.e. 50.09 % male and 49.90% female. In Hatgachha village population of children with age 0-6 is 860 which makes up 15.48 % of total population of village. Average Sex Ratio of Hatgachha village is 996 which is higher than West Bengal state average of 950. Child Sex Ratio for the Hatgachha as per census is 995, higher than West Bengal average of 956. From fig.no. 4 it is observed that most of the people of the village (76.43%) were schedule tribe, 17% General caste and only 7% Schedule Caste population. From fig no. 5 & 6 it is found that Hatgachha village has lower literacy rate compared to West Bengal. In 2011, literacy rate of Hatgachha village was 48.84 % compared to 76.26 % of West Bengal. In Hatgachha from fig no illiterate female are more in number . Male literacy stands at 59.54 % while female literacy rate was 38.10 %. From fig. no. 7&8 it is observed that main workers are 60.17% and marginal workers are 39.82% where male main workers are higher than females and male marginal workers are lesser than females.

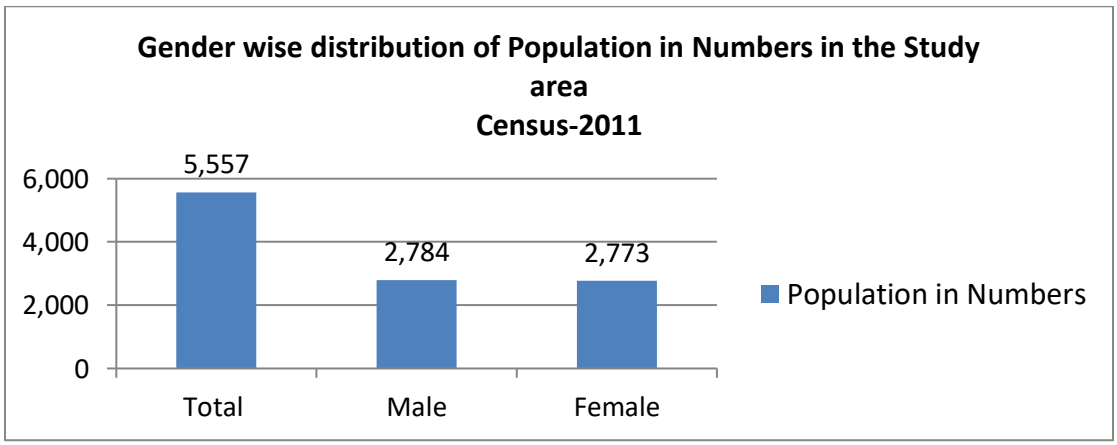

Fig. No. 3

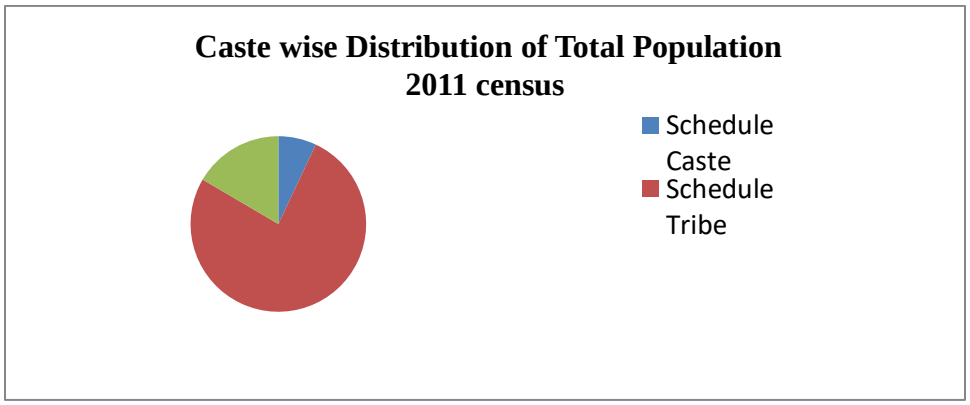

Fig. No. 4

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

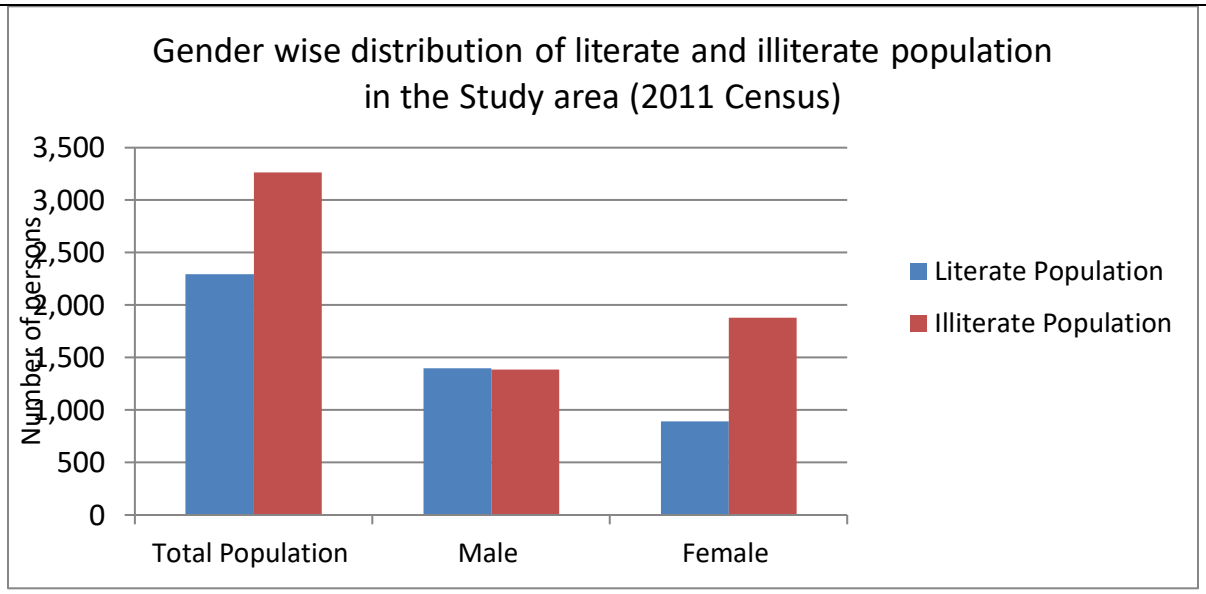

Fig. No. 5

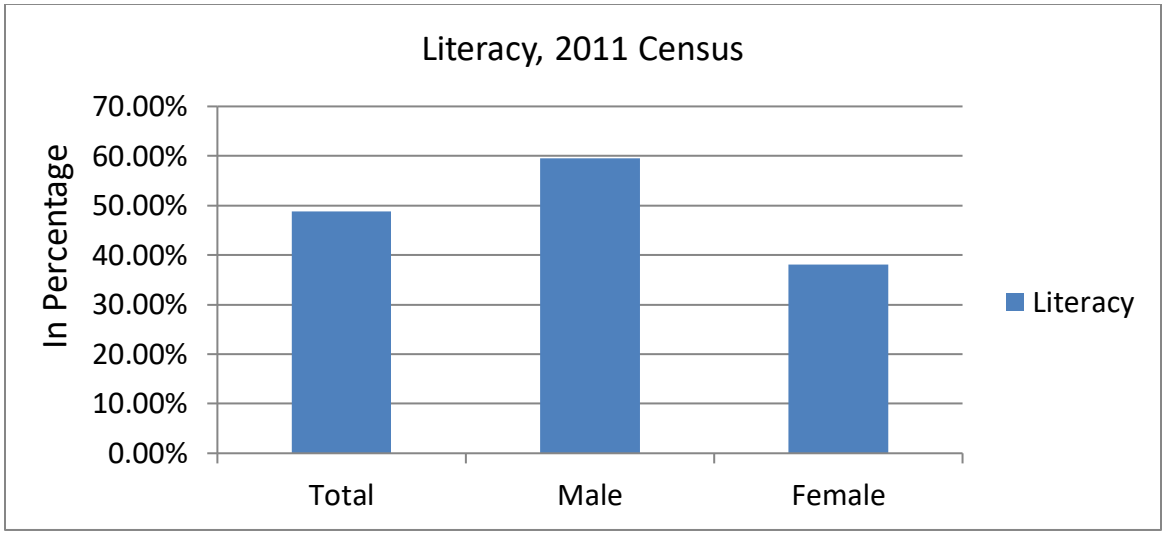

Fig. No. 6

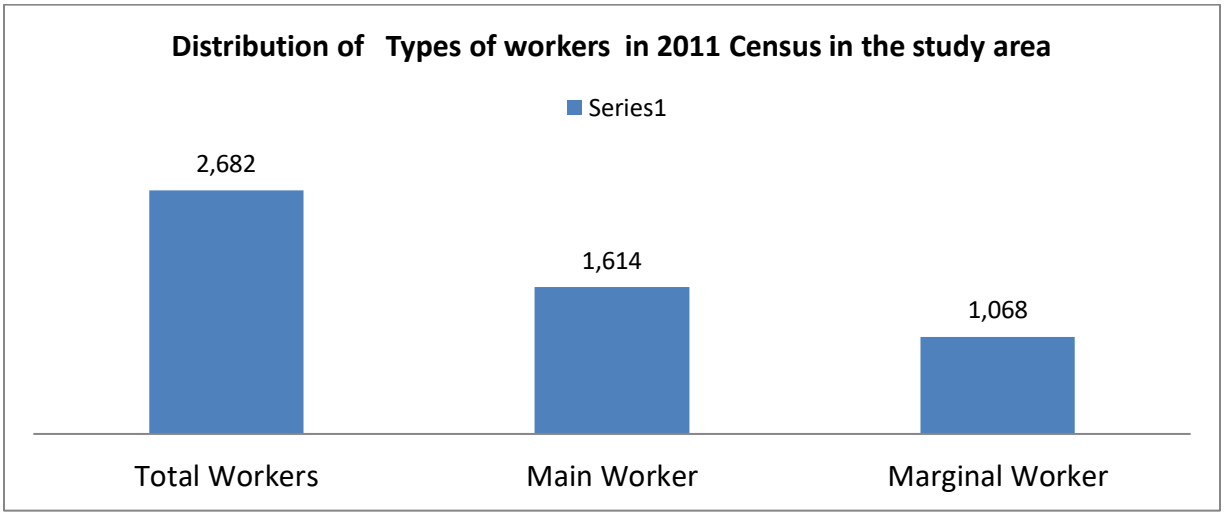

Fig. No. 7

Distribution of Total workers, Main workers and Marginal workers in the study area in 2011 census

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

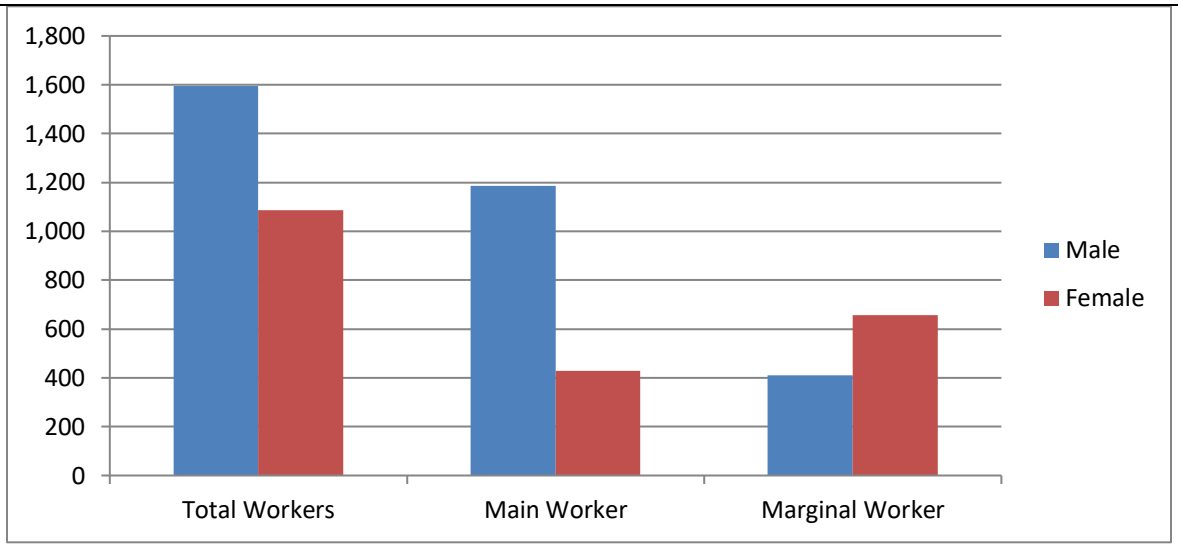

Fig. No. 8

Gender wise distribution of workers in the study area in 2011 census

Socio –economic status of the surveyed area:

In the surveyed study area it is seen from fig. no. 9 that males & females were more in number in 16- 50 age group . Aged people are lesser in number . So the dependency ratio is lower. Literacy rate of study area surveyed is 41.28% out of which 50.32% males and 32.20% females are literate. From fig.no. 10 it is found that most of the males and females have with V-VII levels of Education. Average number of males and females have of IX to XII levels of education and very few are attaining higher studies. This is may be for poor socio - economic background of the village people. They are engaging themselves in the economic activity of the region. From fig.no. 11 it is observed that from class 1 to 3 boys and girls are same in number but in class IV boys are more in number than girls. It can be said that girls education is neglected from class IV. From fig. no. 12 we can see that after class V girl students totally dropped out to onwards classes. Boys are also very few in numbers from class V . Fig. no. 11& 12 depict those education levels of the village is very poor which is mainly due to their socio economic background. Majority of males are working in different occupational levels. Most of the females are not working. From fig.no.13 it is found that majority of males are engaged in agriculture. Some of the males are engaged in business and service sectors. Very few females are engaged in labour activity. From fig.no. 14 it is found that 19 households have 1 to 3 bigha land whereas 16 household have no land. Fig. no. 15 states that 60% of houses are brick built and 40% are mud house. This is due to government initiatives of Abas jojona scheme. From fig no. 16 it can be seen that most of the households have lower income levels i.e Rs.1000 to Rs.3000 and very few households have more than Rs. 9000 income levels.

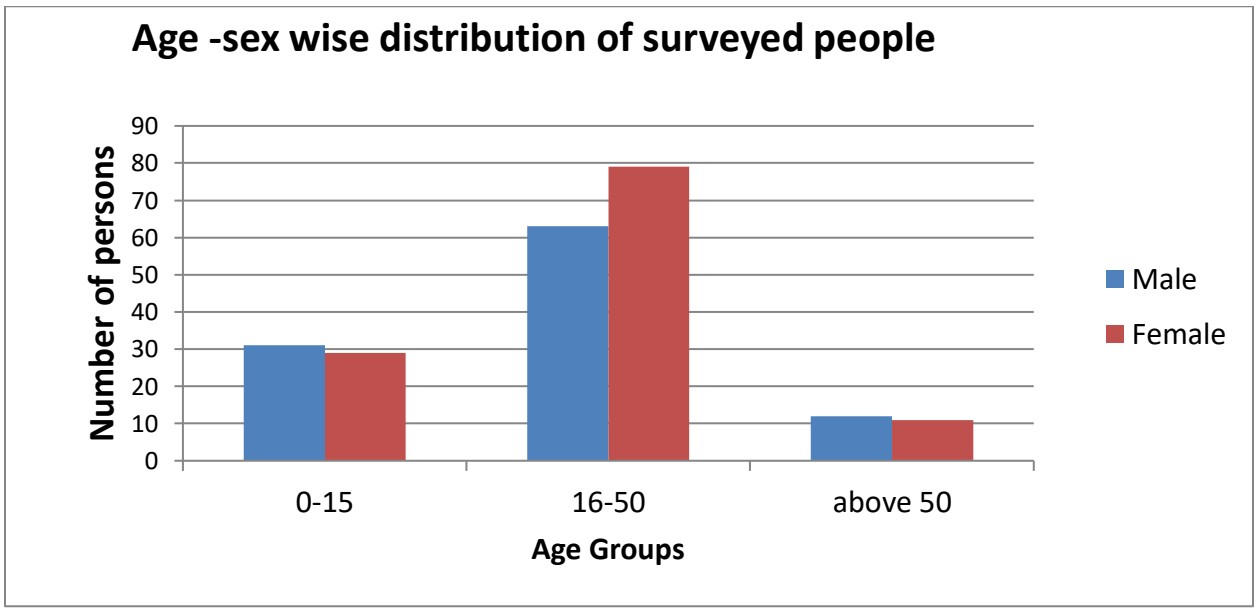

Fig. No. 9

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

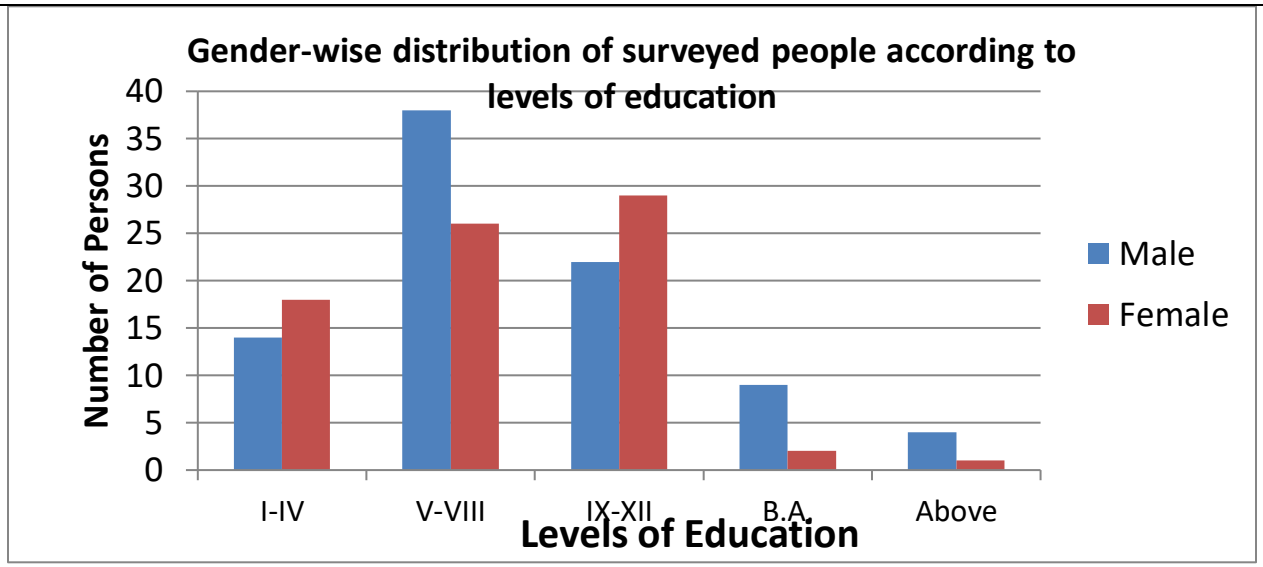

Fig. No. 10

Gender wise levels of education in the study area

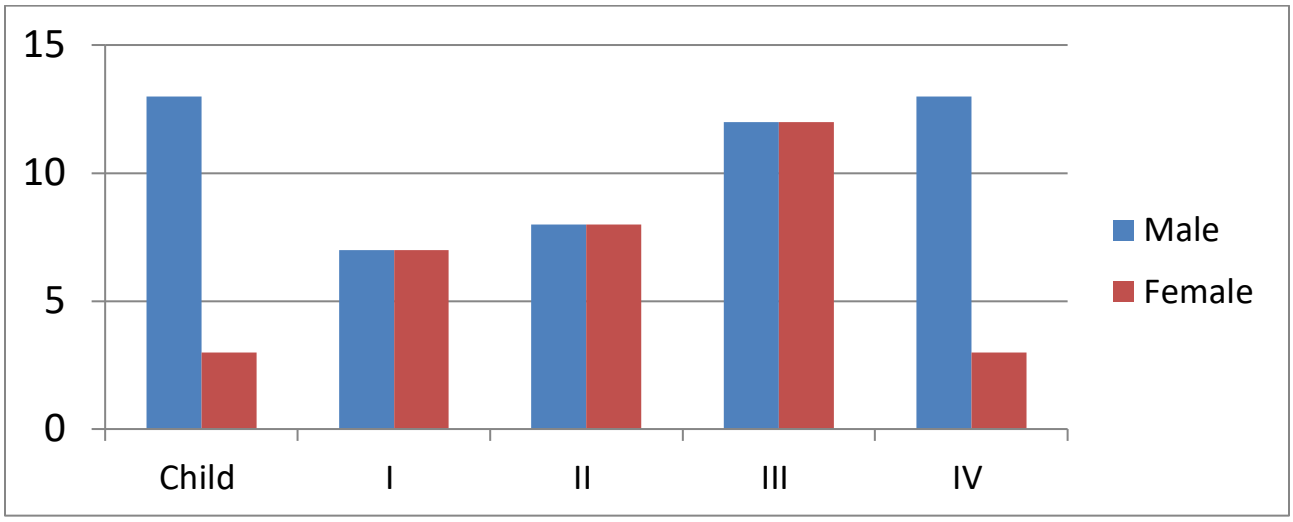

Fig. No. 11

Number of students in different classes in the primary school of study area ,2023-2024

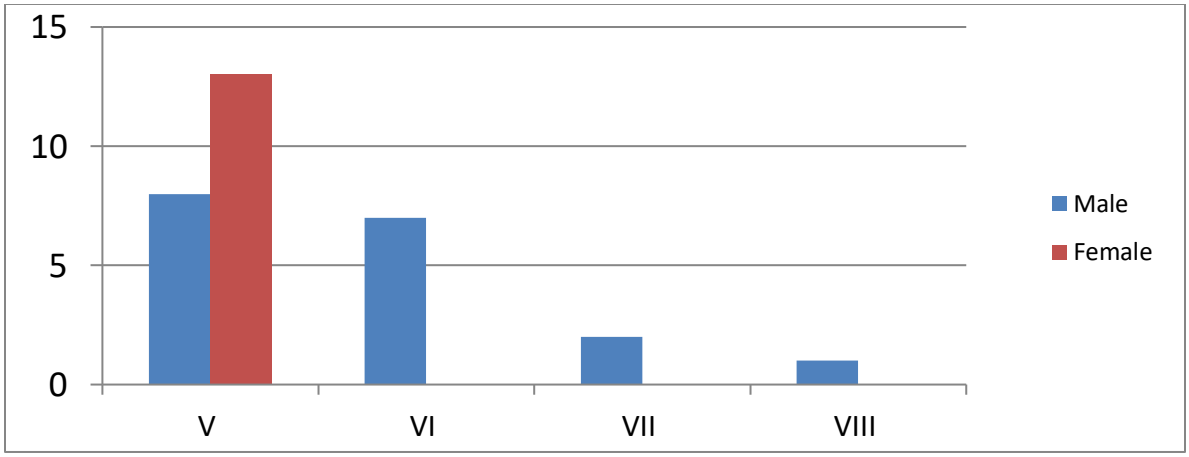

Fig. No. 12

Number of students in different classes in the junior high school of study area, 2023-2024

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

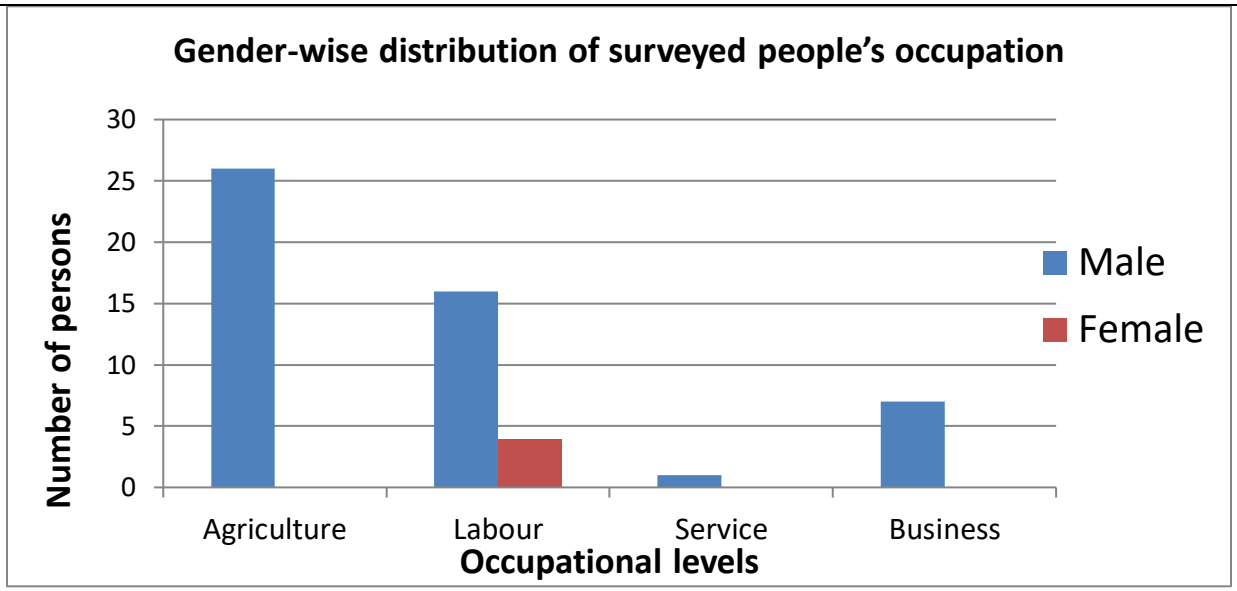

Fig. No. 13

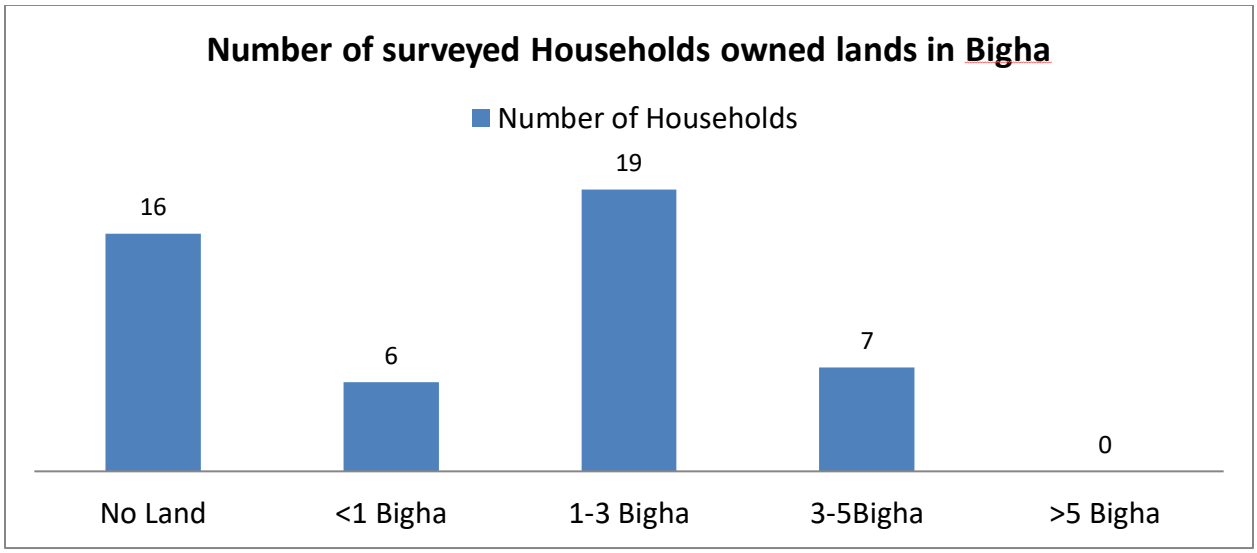

Fig. No. 14

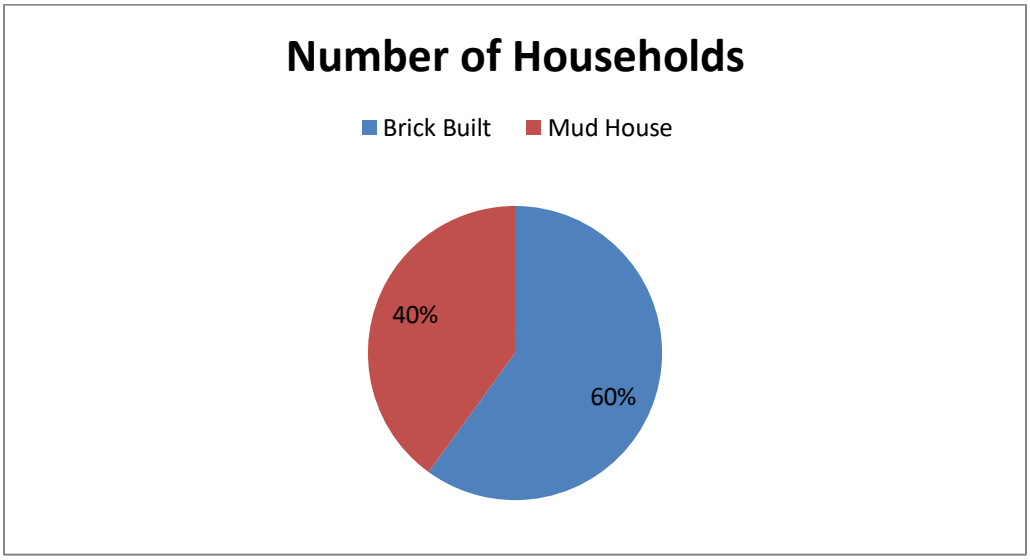

Fig. No. 15

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

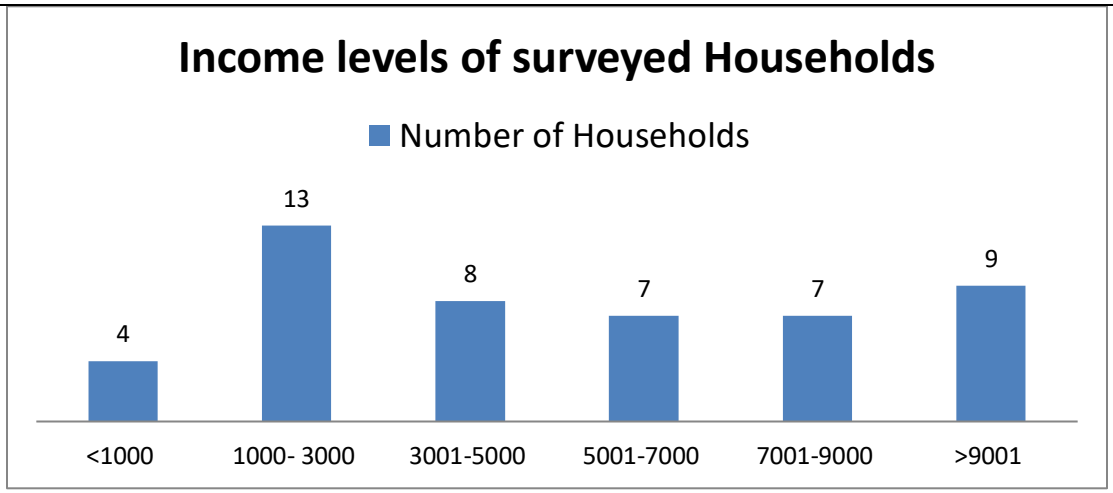

Fig. No. 16

Stone Mining area in the Study area

Stone Mining Work process Fallow Land

Current Project area and its circumstances:

One project work namely 'Hatgacha Black Stone Mines over 108.53 acres (43.94 hectare) of West Bengal Mineral Development & Trading Corporation is going on. It is a new mining lease and was granted on 25.02.2011, vide letter no. 169-CI41/010/Mines for a period of 20years, area of 43.921 ha comprises of 16.89 ha agriculture land, 13.74 ha waste land, 1.15 ha road, 0.08 ha habitation, 0.12 ha water bodies, 0.61 ha lateritic up land and 11.331 ha of other lands. No forest land is involved in the lease area. But very recently the Central Bureau of Investigation (CBI) and the Enforcement Directorate (ED) have allegedly found illegal mines which in turn led to more such teams looking for more such illegal operations.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

This has resulted in the complete shutdown of various stone quarries and mines, as a result of which, thousands of workers, mostly Adivasis (India's indigenous tribal communities) have lost their only source of livelihood, causing much anxiety.

31-year-old Parameshwar Baksey, who used to work in one such facility, told that, "We are completely dependent on the stone industry. We have been involved with the stone industry since we were children." The situation had been bleak during the Covid-19 induced Lockdown as well. "The stone quarry was closed for a long time during the Lockdown. During the lockdown we were unemployed at home and our situation was miserable,"

Impact on health:

There is the impact on the health of mine and quarry workers. Most people suffer from respiratory diseases. A disease called Silicosis is spreading throughout the region. According to the health portal of the government of West Bengal, "Silicosis is an incurable lung disease caused by inhalation of dust that contains free crystalline silica." It further says, "Silicosis patients are also vulnerable to pulmonary tuberculosis infection, which often becomes difficult to treat and with uncertain treatment outcome." Understandably, residents and quarry workers are experiencing tremendous anxiety due to this, and their predicament is compounded by the fact that their already meager resources are shrinking daily in the absence of a steady source of income in wake of the closure of the mines. There are many risks involved in working in the mines. The dust and sand take a toll. The workers are granted some kind of an allowance to tide over their dire situation. With the closure of mines and quarries dealing this double whammy to their income and health, the residents have now come together and demanded that the mine owners of Birbhum restart the mines and begin their trade only with valid documents.

Conclusion:

The blackstone of Birbhum District, popularly known as "Pakur Stone" are being used in most of the constructional activities including roads, railways and irrigation projects within and outside the state of West Bengal. The demand for stones is ever growing with the growth of the infrastructure sector in our country. The minor mineral is used mainly in the construction industry like roads, buildings, bridges, civil constructions, railways etc. There is a direct and indirect employment opportunity by virtue of the mining project in Hatgacha Village. The local areas will be benefited by the generation of employment opportunities, both direct and indirect employment. There will be an overall improvement in the income level of the local people. The project shall create direct employment for 102 persons once the mine comes to its operational stage. Top priority will be given to locals for Semi-Skilled and Unskilled jobs. With the development of this mining activity there will be lot of scope for more ancillary development, which in turn will benefit the nation. There will be generally positive and beneficial impacts by way of economic improvements, transportation, aesthetic environment and business generation. Quarrying activities in the study area were perceived to have both positive and negative impacts on the environment and the livelihood of people. The major environmental, socio economic and health problems related to quarrying revealed during this study include, dust pollution, noise pollution, land degradation, vibration, health hazards.

Mud House

Brick Build House

Animal store House

Electricity connection

Hand Pump & Sanitary toilet

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Natural Pond

Water deposited after stone mining

Water seepage through underneath rocks

water stored in the bed of stone mining

Survey Team

Annexure

Table No. 1 Demography of Hatagachha Village according to 2011 Census

Particulars	Total	Male	Female
Total No. of Houses	**1,093**	-	-
Population	**5,557**	2,784	2,773
Child (0-6)	**860**	431	429
Schedule Caste	**390**	190	200
Schedule Tribe	**4,247**	2,082	2,165
Literacy	**48.84%**	59.54%	38.10%

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Total Workers	**2,682**	1,596	1,086
Main Worker	**1,614**	-	-
Marginal Worker	**1,068**	411	657

Table No. 2 Gender wise distribution of males and females of surveyed area

Age Groups	0-15	16-50	above 50	Total
Male	31	63	12	106
Female	29	79	11	119
Total	60	142	23	225

Table No.3 Gender wise distribution of literate and illiterate males and females of Hatgachha Village, 2011 census

Types of Population	Total Population	Male	Female
Literate Population	2,294	1,401	893
Illiterate Population	3,263	1,383	1,880

Table No.4 Education level wise number of males and females of the surveyed area

Educational Level	I-IV	V-VIII	IX-XII	B.A.	Above
Male	14	38	22	9	4
Female	18	26	29	2	1

Table No.5 Gender wise occupational level of the surveyed area

Occupation	Agriculture	Labour	Service	Business	Total
Male	26	16	1	7	50
Female	0	4	0	0	04

Table No.6 Distribution of lands among the households of Hatgachha Village

Land Owner	No Land	<1 Bigha	1-3 Bigha	3-5Bigha	>5 Bigha	Total
Number of Households	16	6	19	7	0	48

Table No.7 Tentulbandhi Hatgachha Santal Primary School Number of students in different classes

	Session-2023-2024	
Class	Male	Female
Child	13	03
I	07	07
II	08	08
III	12	12
IV	13	03

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Table No.8 Tentulbandhi Hatgachha Junior High School Number of students in different classes

	Session-2023	
Class	Male	Female
V	08	13
VI	07	00
VII	02	00
VIII	01	00

Table No.9 Number of households with brick and mud built

Types of house	**Brick Built**	**Mud House**
Number of Households	30	20

Table No.10 Number of households with income level

Income level in Rs.	<1000	1000- 3000	3001-5000	5001-7000	7001-9000	>9001
Number of Households	4	13	8	7	7	9

References:

1. Odum E.P. (1971). Fundamental Ecology, 5th Ed., Saunders.
2. Oliver S. Owen. (1980). Natural Resources conservation - An Ecological approach, 3rd Ed., Macmillan Publishing Co.Inc. New York.
3. Kumar H.D. (1995). General Ecology, I Ed. Vikas Publishing House Pvt. Ltd., NewDelhi
4. Stern A.C. (1986). Air Pollution Vol.I-VIII, Academic Press.
5. Nandini N, Sunitha N and Sucharita Tandon. (2007). Environmental Studies, Sapna Book House, Bangalore
6. Benjamin O. Fundamental principles of occupational health and safety.
7. Keith Smith and David N. Petley. Environmental Hazards: Assessing Risk and Reducing Disaster.
8. Daniel D. Chiras. (1994). Environmental Science. 4th edition.
9. Satyanaraya, Sitre S.R, Zade S.B, Meshram P.U. A Textbook of Environmental Studies: Allied Publisher.