

IMPACT OF URANIUM MINE ON HEALTH OF TRIBAL PEOPLE: A STUDY OF JADUGODA REGION

A Thesis Submitted for the Partial Fulfillment of Master
Degree in Development Studies

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DECLARATION

I, hereby declare that I have completed my final year project on “Impact of uranium mine on health of tribal people” at National Institute of Technology, Rourkela, Odisha in the academic year 2014–2015. The information submitted here by me is true and original to the best of my knowledge and belief.

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CERTIFICATE

This is to certify that the dissertation entitled, “Impact of Uranium Mine on Health of Tribal People: A Study of Jadugoda Region” submitted by Neha Kumari in partial fulfillment of the requirement for the degree of Master in Arts in Development Studies of the Department of Humanities and Social Sciences, National Institute of Technology, Rourkela, is an authentic work carried out by him under my supervision. To the best of my knowledge, the matter embodied in the dissertation has not been submitted to any other university/ institute for the award of any degree or diploma.

Dr. Jalandhar Pradhan
(Research Supervisor)

ACKNOWLEDGEMENT

I would like to thank my project guide Prof. Jalandhar Pradhan for his direction. His constant enthusiasm in guiding my work was indeed a source of inspiration to me. I am full of gratitude towards him for his intellectual and moral support in all phases of my project so that it could be brought to this stage of completion.

I have taken note of his critical review of the final version of this thesis, and accommodated his valuable suggestions for improvement.

I am also indebted to my batch mate Narendra Jha for giving me necessary support and encouragement for completing this thesis. I am also beholden to seniors for helping me in completing this project.

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ABSTRACT

The present study revolves around the impact of Uranium Mining on Health of the tribal people of the Jadugoda region. There is general mindfulness amongst the tribal group with respect to conceivable destructive impacts of radiation on wellbeing and prosperity of people. There are number of health related issues that exists in the uranium mining areas which needs maximum attention. There are questions which are needed to be enquired, for instance, the influence of uranium mining on the health of the local community and to explore the impact of uranium mining on employees of the mining companies Vis-a- Vis non-employee. The study has both qualitative and quantitative techniques of data collection to achieve the objectives of the study. Three villages were selected for the study based on random selection. Uranium Corporation of India Limited, a uranium mining company is operating in these villages.

CHAPTER 1

INTRODUCTION

1.1 Introduction:

Jadugoda region is situated in the location of East Singhbhum, Jharkhand, India. Around 53% of the aggregate region of the region is secured by protracted mountains and hills comprising of stone, gneiss, schist and basalt rocks. It is a part of Chotanagpur level. Jaduguda Mines Project was situated up in 1961. In 1967, Jadugoda Mines Venture and Uranium Factory venture was converged to frame an Open Area organization, the UCIL (Uranium Company of India Constrained) under the Division of Nuclear Vitality, Legislature of India. Jaduguda has a little township of UCIL, created in 1965. It is 35 km by street and 20 km via train from the steel city of Jamshedpur. This was the first mines where Uranium was created in India on sensible scales for the most recent five decades.

Among the previous couple of decades there is general mindfulness in the group with respect to conceivable destructive impacts of radiation on wellbeing and prosperity of people. India is one of the main mining nations on the world regarding the generally tonnage of the crude metal materials took care of as well as the quantity of individuals occupied with different sorts of underground and open cast mining activities. Uranium mine has added to both of the advancement of atomic weapon and atomic force plants.

There are Six Uranium Mines in the Condition of Jharkhand which are Jaduguda, Narwapahar, Bhatin, Bagjata, Turamdih and Bandhurang open cast mine and they are overseen by UCIL (Uranium Corporation of India Limited), the government endeavor of India. The zone around mines is precipitous area where the natives have lived. Natives were denied they could call their own property in light of the fact that Uranium is found in their property and dirtied with radioactivity. In the meantime plant tailings after Uranium was evacuated compass to an immense sum consistently that has been tossed into tailing lakes by pipeline in fluid structure. Additionally, the mine – tailings additionally happen, and the amount comes to 10 seasons of the factory tailings. They are left in surroundings with no countermeasure. We have attempted to scale the Polluting in air and water in the surroundings of these mines.

Individuals' drinking water with raised amount of uranium (Kurttio2005), the same inventors discovered evidence that, apart kidneys, bone may be another focus of synthetic lethality of uranium in humans. Almost all mining activities have related occupational health & safety problems. The impacts of radiation may happen in both uncovered people and their future generations through consequences for the uncovered singular's germ cells. The impacts are named either deterministic or doubtful. Tissues with effectively isolating cells are especially touchy to ionizing radiation. Bone marrow, gastrointestinal mucosa, lenses of the eyes, lung and focal sensory systems, skin and thyroid are usually effected organs. Biologic impacts of radiation are both important and genetic. Many health hazards related to uranium mining was affecting the tribal community, fertility related issues like infertility, stillbirth, abortion & birth with congenital deformity, chronic lung diseases, cancer, tuberculosis.

1.2 Literature Review

Mining in the contemporary times has become one of the most dangerous occupations. In United States, there are evidence of the ill effects of uranium mining particularly on the health aspects of the workers and the inhabitants. There are long-term impacts of uranium mining; various research studies have proved the same. The work force in the mining is mainly male dominated, for which the work force should be capable and skilled enough to carry on the work. The history of Uranium mining is very dangerous and the effect of radiation of uranium mining has been a matter of concern for a long time. Number of studies has focused upon lung cancer and the associated risk with it is being assessed. Occupational cancer has now emerged as one of the most emerging diseases to occur amongst the workers as a result of radiation. The associated risk related to uranium mining is twofold, one is the harmful effect of uranium mining due to the release of dust particles and the other is the harmful effect of uranium mining due to the release of radon (C Stephens-2002).

Recent statistics has shown that the miners who work in uranium mining have been subjected to slips and fall related injuries. Most of the injuries which have occurred to the workforce in recent times are slips and fall- related (IIED, 2002). Sprains, fractures to joints, bones and limbs are also widespread. There has been a significant transition of health related issues from injuries to respiratory related issues. Cancer has emerged as one of the most dangerous health hazard due to uranium mining, and the number of cancer related cases has been increasing day by day. (PCS COELHO, 2011).

The effects of uranium mining on human health are not instant and it may take several years before any adverse consequences are known. There are only a few investigations that start to unpack this complex issue for health of populations living near uranium mines. Residents near uranium mining operations, who were possibly exposed to toxicants from mining waste, had increased Geno toxic effects compared with people residing elsewhere.

Health hazards, both for miners and for the people living around them, are amongst the most important issues for local communities who depend on mining. Even when a mine is gone, the men and women who have worked in the mine may continue to experience health impacts for many years, if not generations. Some mined materials, such as uranium, will continue to create health hazards for miners up to 30 years after the miner has left the mine.(Jun 3, 2004 - et al. 2000). In addition radiological risks, uranium and its offspring additionally show compound dangers. With [Zamora1998], surprisingly, a report on the impacts of interminable absorption of uranium with drinking water on humans is nearby. It finds that kidney capacity is influenced by uranium uptakes considered safe in the productions taking into account animals' studies. The people in the Jadugoda area are affected not only by radiation from tailing ponds but also by lack of security at the mines. Fatigue, loosing appetite, respiratory sicknesses, rises in miscarriages, impotency, infant mortality, Down's syndrome, skeletal deformities and different skin diseases, children with big heads, thalassemia have been reported ,also the chances of tuberculosis among the miners is very high (Dr. Nitish Priyadarshi, Dec 14, 2009).

Collaboration with nearby individuals of the area exposes that straightforwardness is not kept up by the UCIL power with respect to the measure of doses individual gets every day. At whatever point an excavator falls wiped out, he is never told about the clinical report. The medicinal reports are kept as nearly protected secret. UCIL likewise rejected laborers who implied at disease. It additionally took plan of action to private work organizations to contract workers (CJ Sonowal, 2003). Anumukti, (Liberation from the Atom, January 2004 issue, Volume 13, Number 1), focuses out that as high as 55.3% of the family in the towns have no less than one individual in regular job with the UCIL. Likewise Sadans, dalits and other in reverse ranks work in the UCIL plants and mines.

The greater part of them work wearing cotton uniforms and leather gloves get specifically exposed to large amounts of radon gas, dust and most astounding radiation and when these laborers carry their dresses home to be hand washed by their wives and youngsters, the whole family members get affected.

1.3 Objectives

In the context of uranium mining in Jadugoda, there are numbers of negative impacts that affect the local resident particularly the tribal people disproportionately and steps are not being taken by the concerned authority to solve the problem of the people. A number of measures are still required to be taken in order to ensure that the local people are not affected and stakeholder's development should be the primary objective. There are number of health related issues that exists in the mining areas which is needed to be solved. There are number of questions needed to be enquired, for instance, how does the uranium mining impact the health of the local community?

The main objectives of the present study is-

- To explore the health status of the local tribal people in the mining affected areas.
- To explore the impact of uranium mining on employees of the mining companies Vis-a-Vis non-employee.

1.4 Hypothesis

(a) Uranium mining has led to number of health related problems, such as tuberculosis, malaria, jaundice, skeletal distortions, hydrocele etc.

(b) Employees are the most affected in terms of negative impact of uranium mining on health as compared to the non-employees. .

The current study was undertaken in order to chalk out the negative impact of uranium mining on the health status of the tribal people. Uranium mining adds to huge revenue to the government but the negative impact which mining has on the tribal people cannot be sidelined. It is very necessary to explore the ill effects of uranium mining on the local tribal people.

1.5 Data type and method

To attain the objectives of the study, data were collected from the primary sources. The study has used quantitative techniques of data collection. During field investigation interactions were held with the local residents. Household schedules were used for the collection of data.

1.6 Sampling procedure:

To achieve the objectives of the study, three villages were selected according to random selection. Uranium Corporation of India Limited, a uranium mining company is operating in these villages and hence greater chances for the population to get affected. From each of the sample village 40 households were taken for the study. Therefore total of 120 households were taken for the study.

1.7 Data analysis

To attain the objectives of the study quantitative data were collected from various sources and the same is analyzed using Microsoft Excel in this report.

1.8 Significance of the Study

The key findings and result will be very much importance for academic purpose as well as the impact of uranium mining on health of the tribal people will be a value addition to the health sector of Jharkhand. The study would not only determine the ill effects of mining on employees of the mines but also on the non-employees. The results can be used to tailor policies to tackle health related issues of both the employees and non-employees.

CHAPTER 2

STUDY PROFILE

2.1 Introduction to the study area

India is one of the main mining nations on the world regarding the by and large capacity of the crude metal materials took care of as well as the quantity of individuals occupied with different sorts of underground and open cast mining activities. Uranium mine has added to both of the advancement of atomic weapon and atomic force plants. There are Six Uranium Mines in the State of Jharkhand which are Jadugoda, Narwapahar, Bhatin, Bagjata, Turamdih and Bandhurang open cast mine and they are overseen by UCIL (Uranium Corporation of India Limited), the government enterprise of India. The present study revolves around Jagugoda village in Purbi singhbhum district of Jharkhand. It was the first uranium mine started in India & it is accountable for the mining & milling of uranium ore in India. The present work mainly focuses on the impacts of uranium mining in the sample villages. The sample consists of three villages called affected areas which are located in East Singhbhum. 120 household data was collected from the sample villages via schedules.



Source : (*H P Thakur, 2002*)

Figure 1: Showing political map of Uranium Corporation of India Limited

2.2 Key features of the sample villages:

Table 2.1: Key features of sample villages

Features	Bagjata	Mechua	Tilaitand
Distance from nearby mines (in kms)	0-6	0-6	0-6
Total population	752	1008	470
Social Composition	ST, SC,OBC	ST, SC,OBC	ST, SC,OBC
Livelihoods	Employee of uranium mines and wage labour	Employee of uranium mines and wage labour	Employee of uranium mines and wage labour
Electricity	Yes	Yes	Yes
Source of Drinking water	Tube well	Tube well, supply water given by uranium mines	Supply water

The above table mirrors certain features of the affected villages in terms of separation from the mines, power accessibility, social organization and so forth. These towns are situated inside the span of 0-9km from the mines. Downright population of Bagjata town is 752. The population of Mechua village is around 1008 and that of Tilaitand is about 470. People from all the communities are present in the mining affected villages. There is intense issue of water in the towns and the power is accessible

2.3 Occupation:

Table2.2: Occupation of the Head of the Household

Occupation	Percentage (%)	Number
Daily wage labourer	33.4	40
Skilled wage labourer	10	12
Semi/unskilled wage labourer	9.2	11
Service-Private Sector	17.5	21
Service-govt. Sector	8.4	10
Trade/business	12.5	15
Other Self-employed	9.2	11
Total		120

At the season of data analysis it was discovered that there is an enormous change in the occupation situation of the villagers. The customary control of the individuals has been supplanted after the commencement of mining.60 employee household & 60 non-employee household has been covered in study.

2.4 Composition of Sex & Age

Sex and age are two of the important demographic features of a population. In the present study around 50% of the respondents were male whereas 50% of the respondents were female. The following table reveals the age and sex composition of the sample villages.

Table 2.3 Sex & Age of the Respondents

Age of the Respondents	No. of respondents			
	Male	%	Female	%
18-40	29	24.2	51	42.5
40-60	19	15.9	7	5.9
60-80	9	7.5	3	2.5
80 & Above	2	1.6	0	0
Total	59	49.2	61	50.8

2.5 Annual Income of Family

A substantial change in the income status of the villagers in the sample villages can be observed. The fact is that the mining has brought money, which was not there before when they cultivated and these change in economy changed their livelihood which earlier was nature based but now wholly relies on uranium mines. The table below gives a detailed idea about the annual income of the families:

Table No.2.4: Annual Income of the Family

Income	%	Households
Below 10000	40.9	47
10000- 25000	57.5	69
25000- 50000	3.4	4
Total		120

CHAPTER 3

IMPACT ON HEALTH

3.1 Introduction

There are number of activities in uranium mining which includes underground mining, blasting, uranium transport etc. These activities not only affect the environment of Jadugoda region but also the health of local residents in general. Present chapter focuses on impact of uranium mine on health of three sample village in Jadugoda.

Diverse sorts of uranium related activities have achieved the unsettling influence in the environment which has affected the health condition of the villagers. Environment degradation has not just given a huge shock to the Nature, yet has likewise influenced the villager's wellbeing unequally. At the point when the distinctive sample family units were developed some information about the wellbeing issues after the beginning of mining, they were all that much uneasy about their wellbeing status. Case in point, villagers shouted that, because of ecological contamination and their delayed presentation to the dirtied environment their wellbeing status is not in the slightest degree great. Taking in of air poisons is initiating asthma ambushes or changes in lung limit. Mining of uranium has uncovered the experts and neighborhood gatherings to risky uranium dust, and radiations from uranium transport which has debilitated results for the wellbeing condition of the villagers.

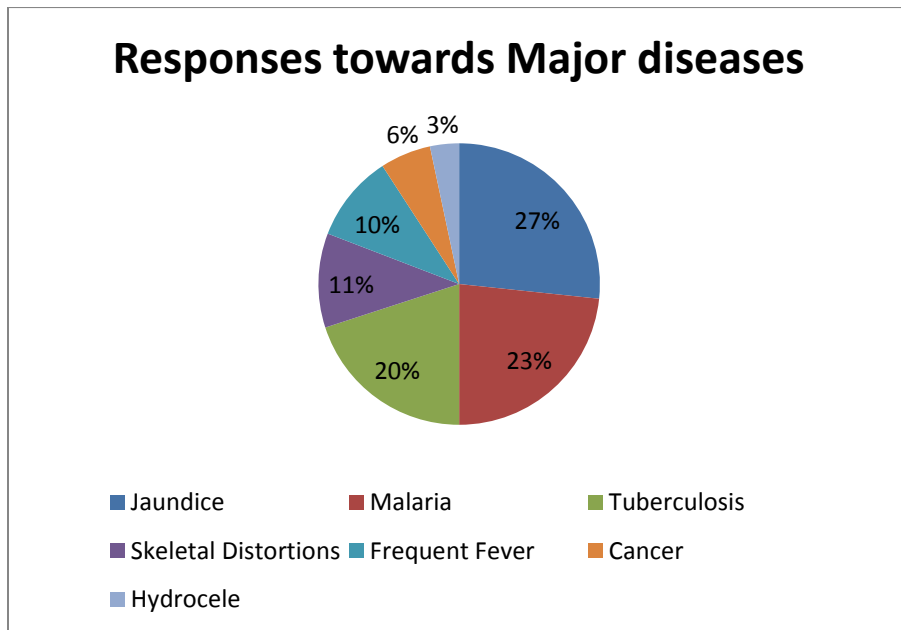
3.2 Prevalence of major diseases:

Table.3.1: Major health hazards faced by inhabitants in Jadugoda

Diseases	Household affected	Percentage (%)
Skeletal Distortions	13	11
Malaria	28	23
Cancer	07	6
Hydrocele	4	3
Jaundice	32	27
Tuberculosis	24	20
Frequent Fever	12	10
Total Households Suffer	120	100

The table above reveals about the diseases which are faced by the households in Jadugoda region due to mining. From the responses we received the information of the head of the different households on type of health problems.

Figure 2: Percentage distribution of major diseases



The above reflects about the different types of diseases which are confronted by the family. From the reactions that were gotten from the head of diverse families on the type of health issues, it came into light that among the sample family, Jaundice is all that much broad who represents around 27% took after by malaria which represents 23% of the health issue. Villagers shouted that in the pre-mining period, they never experienced such problems regularly yet it's because of the bad impacts of uranium mining that has brought about an increment in the recurrence of infections. 20% of the families are faces from tuberculosis though 11 % of the family reported of having skeletal distortions. Villagers communicated that the villagers concern which is developing in their towns are Tuberculosis (TB). Generally death cases in that sample village are due to tuberculosis. Field study it was uncovered that around 6 of the family reported in regards to the issue of cancer took after by 10% of the example family reported of having hydrocele problem. 3% of the family units have experienced frequent fever to their family members after the origin of mining.

The diseases that are prevalent in the affected villages reflect about the discouraging health state of the villagers in the uranium mining territory. The poor families who are especially non-workers of UCIL need to be taken care of in particular.

3.3 Major Issues faced by Female family members

Villagers exclaimed that women and children specifically are confronting the persistent results of mining. There has been increment in the quantity of instances of hospitalizations, therapeutic costs, stress, injury, physical abuse and so forth. More than 80% of the example family units ensured that repeat of women and children to distinctive illnesses have extended immensely after post mining. Due to reliable presentation of dust particles they are more disposed to the diseases like skin tainting moreover experiencing coming up short of diverse material organs, which have a whole deal impact on their conceptive wellbeing.

After a couple of many years of mining in the district, individuals living around the mines and the tailing ponds are at long last falling kill to radiation. A few instances of disease have been accounted for from individuals living close to the tailing ponds at Tilaitand. There have equally been an expanded number of marked births in the territory, and additionally more instances of. Countless have encountered disturbance of menstrual cycle or loss of fertility. Many married couple not having conceived for at least three years after the marriage, and not utilizing any system for contraception.

Figure 3: Percentage distribution of married women who faced problem in pregnancy

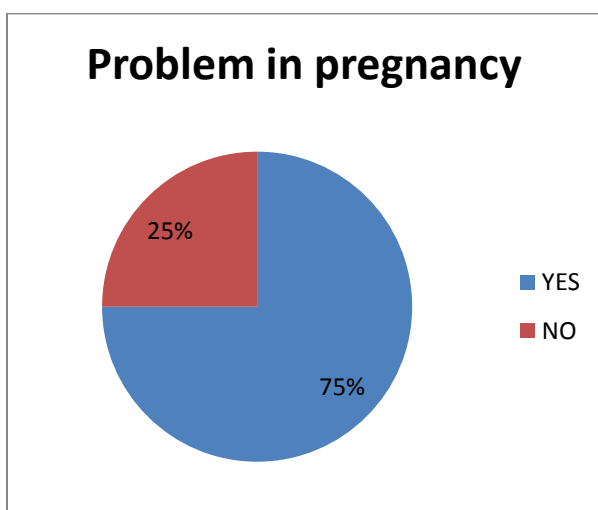


Table 3.2: Responses towards problem in pregnancy

Age group (18-49)	No. of responses	Percentage (in %)
Yes	41	75
No	13	25
Total	54	100

The above figure reflects that 75% of sample household married female members have faced problem in pregnancy. Where number of responses towards yes is 41 & no is 25. It was found out that after 3 years of marriage women did not conceived even without using any

contraception. Most of the women conceived after medical treatment. One women of nearby Tilaitand village claimed that her husband abandoned her because she could not get pregnant.

Figure 4: Percentage distribution of married women who experienced recurrent white/foul discharge

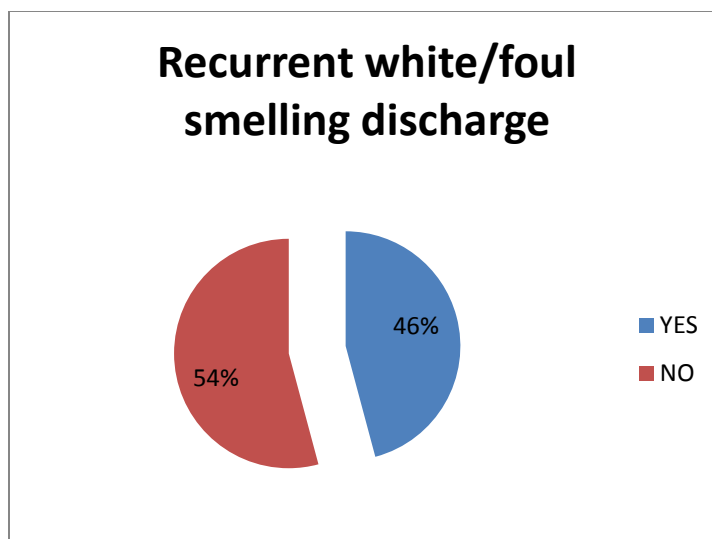


Table no 3.3: Responses towards recurrent white/ foul

Age Group(18-49)	No. of Responses	Percentage (in %)
Yes	25	46
No	29	54
Total	54	100

The above figure reflects that 46% of sample households' female members are suffering from recurrent white/foul smelling discharge from more than 2 years. Where number of responses towards yes is 25 and no is 29. Also, they are not going for treatment just because of their unawareness about this health problem. It was very ironical that the women were not even aware or had any idea about foul smell discharge.

Figure 5: Percentage distribution of married women who experienced spontaneous abortions/still birth



Table 3.4: Responses towards spontaneous abortions/still birth

Age Group(18-49)	No. of Responses	Percentage (in %)
Yes	16	29
No	38	71
Total	54	100

The above figure reflects that 29% of female respondent from the sample villages claimed they had still birth. Where cases number of spontaneous abortions are 16. Most of the women claimed that babies that they gave birth, died after completion of 24 weeks but mostly still birth cases were found in their first baby. It was also revealed that it took a long time for women to conceive again.

Figure 6: Percentage distribution of married women who experienced premature birth

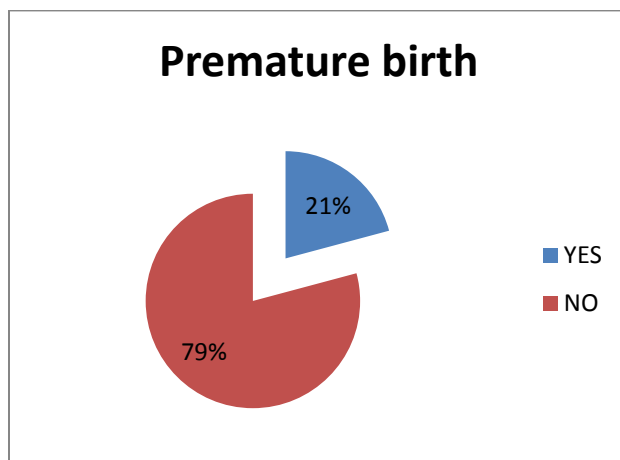


Table 3.5: Responses towards premature birth

Age Group(18-49)	No. of Responses	Percentage (in %)
Yes	12	21
No	42	79
Total	54	100

The above table reflects that 21% of household female member has responded that they had given premature birth. Where cases number of premature birth is 12. A respondent named Sugurmuni Hansda living nearby Bagjata claimed that she thrice had undergone premature delivery. Most of the families were not even aware about women health issues. Also negligence becomes cause of increasing health problem among women population.

It can be said that there is unawareness along with illiteracy that has aggravated the health related problem of the women in particular. Uranium radiation is the chief source of health related problems in the affected area. Villagers are literally unaware of the harmful impact of the uranium mining; steps should be taken by the concerned authority to pacify the health related issues of the tribal people.

CHAPTER 4

COMPARATIVE STUDY OF HEALTH STATUS BETWEEN EMPLOYEES AND NON EMPLOYEES

4.1 Introduction

In the context of uranium mining, its positive impacts, for instance, the financial benefits are often discussed but the negative effects of uranium mining are not given due consideration. Mining companies often give statistics about the jobs which is created, investments made, revenues that government earns through mining but hardly the mining companies discuss about the impact of uranium mining on the health of the employees and non- employees.

According to Center for Research on Multinational Corporation, Uranium mines employees and other workers are apprehensive for their wellbeing and way of life because of the direct effect of uranium mining. Several laborers have claimed that they are encompassing breathe in of dust and radon gas. The radon gas makes the body to vulnerable to alpha radiation, which is dangerous. Presentation to radiation is frequently connected with disease; however it can likewise have other destructive impacts. Low level radiation can add to conception deformities, high infant mortality and interminable lung, eye, skin diseases.

According to the Indian Doctors for Peace and Development (IDPD), each and every mining operation has health issues. Uranium mines present peril to the workers and individuals in general. There is always a radiation risk that poses a number of health related problems for the workers and the residents living nearby.

There has been ample evidence of cancer related cases which has been caused inhalation of uranium by the mine workers. Uranium is highly toxic and it affects the inner organs. Uranium also causes birth defects in fetuses and infants. There is always a probability of leukemia due to uranium mining, other blood related diseases, bone marrow, psychological disorders, kidney and skin related diseases, bronchial and skin cancer can also be triggered due to uranium mining (IPPW, 2010).

4.2 Health issues in employee and non-employee

There are number of health related issues that concerns both the employees and non –employees family members. Total population of sample household is 508. During field survey, it was revealed that both the employees and non –employees family members have been facing the negative impact of uranium mining.

Figure 7: Percentage distribution of respondents who suffered from Jaundice

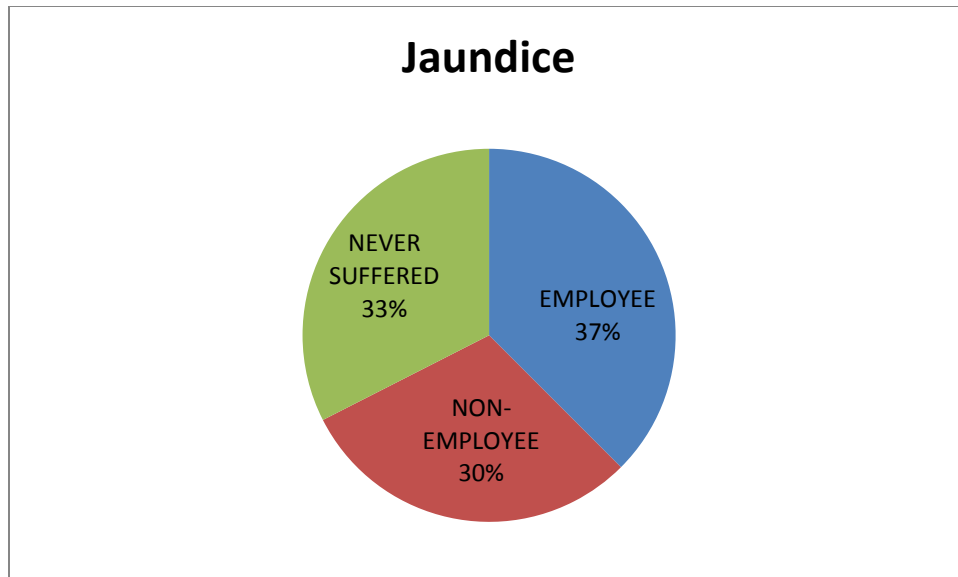


Table 4.1: Number of respondents who suffered from Jaundice (Employees & Non employees)

No of cases (Employee)	No of cases (Non-employee)	Never suffered	Total
188	152	168	508

The above graph shows that around 37% of the sample household population had suffered from jaundice that belongs to employee’s family whereas around 30% of the sampling population who belongs to non-employee family had jaundice. On the other hand around 33% of the sample

population had no problems of jaundice. Villagers cited that after the inception of mining, water pollution has increased and mining organization are not taking any steps for regular cleaning of pipelines as a result of which the incidence of jaundice has become a major threat .

Figure no 8: Percentage distribution of respondents who suffered from Malaria

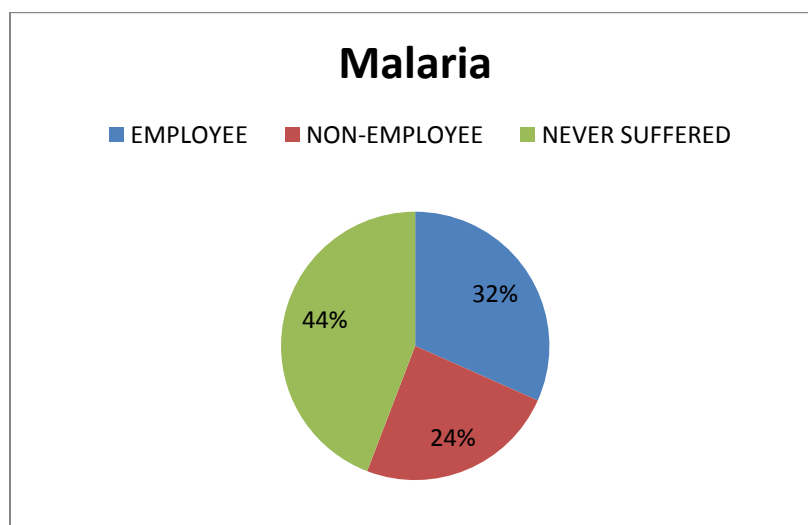


Table 4.2: Number of respondents who suffered from Malaria (Employees and Non-employees)

No of cases (employee)	No of cases (non-employee)	Never suffered	Total
162	122	224	508

The above figure states that 32% of the sample household population who belongs to employee’s family had malaria, whereas around 24% of the sample population belongs to non- employee’s families had malaria. Whereas around 44% of the sample population had never suffered from malaria.

Figure 9: Percentage distribution of respondents who suffered from Tuberculosis

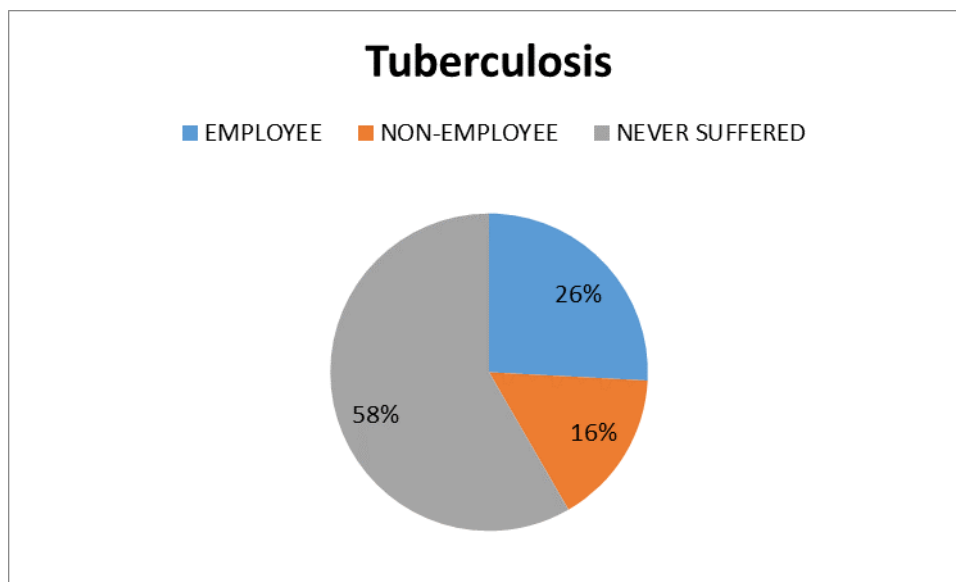


Table 4.3: Number of respondent who suffered from Tuberculosis (Employees and Non-employees)

No of cases(employee)	No of cases (non -employee)	Never suffered	Total
132	82	294	508

The above graph shows that around 26% of the sample population had suffered from tuberculosis whereas around 16% of the sample population who belongs to non-employees family had tuberculosis where as 58 % of the population had no problems. The reason that most of the employee cited for the disease is that uranium contains certain poisonous content which has resulted in tuberculosis and they are in direct contact with uranium, whereas non- employees cited that the reason for them

Figure 10: Percentage distribution of respondents who suffered from Skeletal Distortions

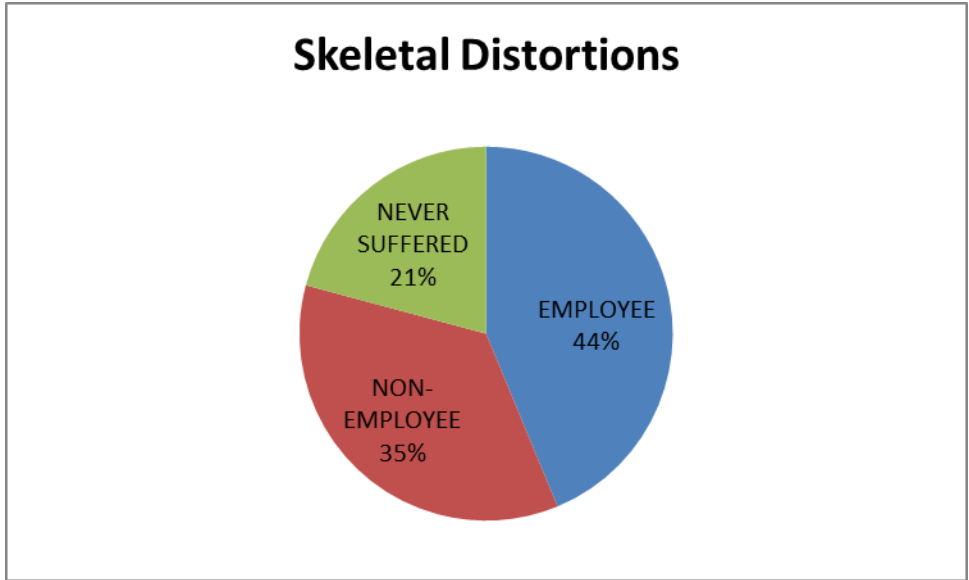


Table 4.4: Number of respondent who suffered from skeletal distortions (Employees and Non-employees)

No. of cases (employee)	No. of cases (non-employee)	Never suffered	Total
223	178	107	508

The above figure reflects that around 44% of the sample population had suffered from skeletal distortions whereas around 35% of the non-employees family members had suffered from skeletal distortions and around 21% of the respondents did not suffer at all from skeletal distortions. Learned employees claimed that skeletal distortions are caused by genetic mutation which is caused by radiation caused by uranium mining. Whereas most of the non- employee stated that they did not had any idea as to what is the primary reason for them getting skeletal distortion because of their illiteracy.

Figure 11: Percentage distribution of respondents who suffered from Frequent Fever

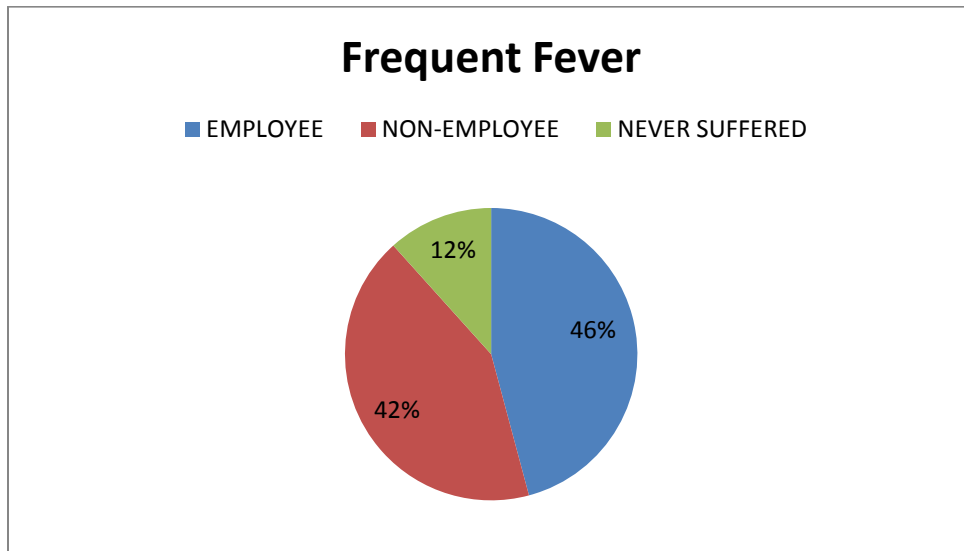


Table 4.5: Number of respondents who suffered from frequent fever (Employees and Non-employees)

No. of cases (employee)	No. of cases (non-employee)	Never suffered	Total
233	214	61	508

The above figure shows that around 42% of the non-employee family member had suffered from fever which is very much regular in nature whereas around 46% of the employee’s family members cited that that have suffered from fever. The reasons cited by both the employees as well as non-employees is that the after the mining has started operating in their area the frequency and incidence of fever in their area has increased than what it used to be earlier. The number of cases of fever has increased just because their immunity system has received a set back because of the polluted environment compounded by excessive mining and lack of awareness amongst the non-employee who are generally wage labor and live in poverty.

Figure no 12: Percentage distribution of respondents who suffered from Tuberculosis

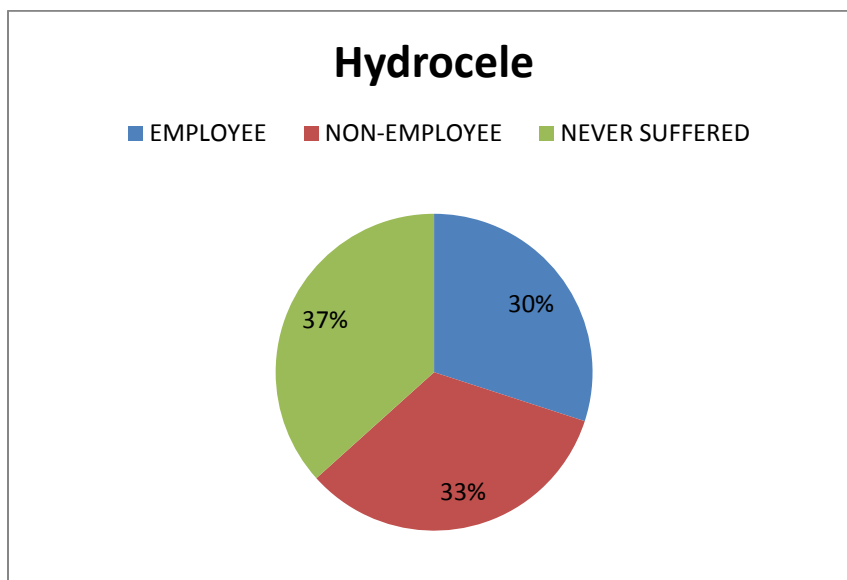


Table 4.6: Number of respondents who suffered from hydrocele (Employees and Non-employees)

No. of cases (employee)	No. of cases (non-employee)	Never suffered	Total
152	168	188	508

The above table reveals that around 30% of the sample population who belongs to employee’s family has suffered from hydrocele whereas around 33% of the non- employee had suffered from hydrocele and around 30% of the respondents never had hydrocele. There was a case in the village Tilaitand, and a tailing pond located in the village, where the villagers claimed that due to the pipeline leakage from the tailing pond which has caused hue and cry in the village. Single most case of hydrocele was found in this village as compared to the other two villages. The reason which was cited by the inhabitants for hydrocele are pollutants which come as a result of uranium mining which mixes with water and air and degrades the environment.

Figure no 13: Percentage distribution of respondents who suffered from cancer

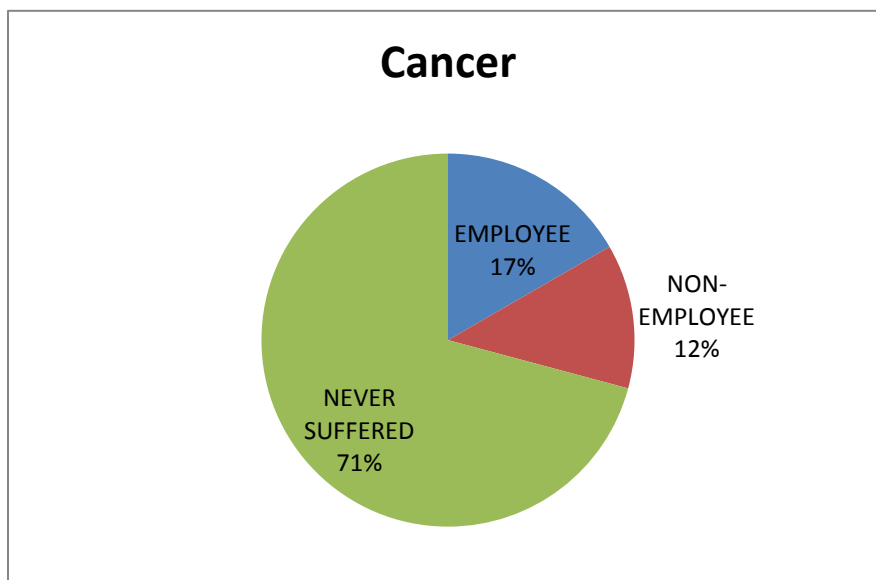


Table 4.7: Number of respondents who suffered from cancer (Employees and Non-employees)

No. of cases (employee)	No. of cases (non-employee)	Never suffered	Total
87	61	360	508

The above figure states that around 17% of the sample population who belongs to employee’s family had cancer whereas around 12% of the non –employee family reported to have cancer. Majority of the sample population around 71% of the respondent did not report of having cancer. The non-employees complained of not receiving any monetary compensation or any direct support from the concerned authority. Furthermore, non-employees claimed that due to their illiteracy and lack of knowledge about the health problems, they came to know about cancer in a later stage as compared to the employees. The reason which they cited for cancer is harmful radiation which comes out from the uranium which in turn causes cancer and many other diseases

CHAPTER 5

CONCLUSION AND DISCUSSION

To complete the objectives of the study three mining impacted villages were taken as sample. Hence a total of 100 such family units were the example for the present investigation. Data accumulated were both subjective and quantitative. Considering the examination, it can be said that mining has a mixed impact on the people's lifestyle.

It was noticed that because of mining activities, their health issues of the villagers is not in the positive direction. The findings of the present investigation confirm the hypothesis that the health of indigenous people around uranium mining is more prone to health related risks. People living around Jadugoda, major finding of the study shows that, Jaundice is all that much broad who represents around 27% took after by malaria which represents 23% of the health issue. Tuberculosis as a cause of death is more common in villages near uranium mine. As demonstrated by the villagers, there has been increment in the frequencies of illness, for example, tuberculosis, Jaundice, Malaria, Cancer, Skeletal Distortions, Frequent fever, skin diseases and so on.

There has been increment in the quantity of instances of hospitalizations, therapeutic costs, stress, injury, physical abuse and so forth. More than 80% of the example family units ensured that repeat of women and children to distinctive illnesses have extended immensely after post mining. Among married women primary sterility is more common for them who are residing near uranium mine. Due to illiteracy women failed to diagnose about the negative impacts on their wellbeing.

REFERENCES

- Patnaik, R. L., Jha, V. N., Kumar, R., Srivastava, V. S., Ravi, P. M., & Tripathi, R. M. (2014), "Distribution of ²²⁶Ra body burden of workers in an underground uranium mine in India", *Radiation and environmental biophysics*, 53(4), 739-744.
- Stephens, C, & Ahern, M (2001), "Worker and community health impacts related to mining operations internationally -A rapid review of the literature", *London, Mining and Minerals for Sustainable Development Project*, 25.
- Sonowal, C. J, & Jojo, S. K. (2003), "Radiation and tribal health in Jadugoda: the contention between science and sufferings", *Studies of Tribes and Tribal*, 1(2), 111-126.
- Karlsson, B. G. (2009), "Nuclear lives: Uranium Mining, indigenous peoples, and Development in India", *Economic and Political Weekly*, 43-49.
- Sirnate, V. (2009)," Students versus the State: The Politics of Uranium Mining in Meghalaya", *Economic and Political Weekly*, 18-23.
- Mathur, L. (2007). Employment guarantee: progress so far. *Economic and Political Weekly*, 17-20.
- Thakur, H. P. & Sapra, B. K. (2013),"Baseline survey of health status of population in 2006 around uranium mining Site in Jadugoda, India", *Radiation Emergency Medicine*, 2(1), 14-22.
- Nagaraju, A. R., & Kumar, M. (2004), "Health survey of the villagers residing around Jadugoda Tailings Pond", *Development and Environment: Development of Geo energy Resources and Its Impact on Environment and Man of Northeast India*, 127.
- Kumar, a. (2012), "Economics of migrating villagers of South Chotanagpur region of Jharkhand: an empirical study", *Journal of Economic and Social Development*, 8(1).
- Jadugoda Tragedy, Price of Superpower Ambitions, an article published in Anumukti,a journal, (2004), Volume1, Number , by Shreekumar Sanghmitra, Surendra & Vinayak
- Brugge D and Buchner V (2011), "Health effects of uranium: new research findings", *Rev Environ Health* 26: 231- 249.
- IDPD (2007) Black magic of Uranium at Jadugoda: study on Health Status of indigenous people around Jadugoda Uranium mines in India.