Health Expenditure of Home Based Worker & Access to Usable Water & Sanitation: A Case Study of Bidi workers in Purulia of West Bengal

Dr. Maniklal Adhikary[1], Chandrasekhar Hajra[2]
[1]Professor of Economics, Burdwan University, Burdwan, West Bengal, India
[2]Assistant Professor of Economics, Nistarini College, Purulia, West Bengal, India

*Corresponding Author:
Chandrasekhar Hajra
Email: hajrachandrasekhar@gmail.com

Abstract: Bidi rolling is a popular home based work at Purulia. It provides employment for more than two lakhs bidi workers, particularly in the Purulia west region. Purulia comes under extended part of Chhotonagpur Platue, where agriculture is not prosperous. Industry is not developed either. Large number of population is dependent on nonagricultural activities for their survival. Household industries are important employment providers. A descriptive cross-sectional study has been used to assess the impact of access to sanitation facilities and to safe usable water on the health expenditure of bidi workers. A total of 124 household containing 663 people were selected from five villages with highest concentration of Bidi workers of Jhalda II Block. We have used a predesigned, pretested questionnaire for collection of data to be analysed by appropriate statistical method. Most of the bidi workers were living in poor environmental and housing conditions. Around 80% of these workers are suffering from water crisis for domestic use and/or drinking purposes. It was observed that almost 70% of the workers developed occupational health problems as reported by the male and female bidi workers. Our empirical study shows that occupational health hazards are lessened by the access to sanitation facilities and to safe usable water among bidi workers.
Keywords: Bidi rolling, bidi workers, Purulia, occupational health problems, water crisis, Jel Classification: I21, J21, J28, J44

INTRODUCTION

More than ninety percent of *India's workforce* is within the unorganised sector [1]. The workforce remains scattered and the system of contracting and sub-contracting, employing migrant labour, women and child workers prevails. In this sector levels of technology are low, processes of production are decentralised and conditions of work are deplorable. Within this sector, home-based production forms a substantial part. There has been a tremendous growth of home-based work in the last two decades. Big companies sub-contract their work to smaller units or contractors who distribute the work to the workers who work at home according to the requirements of the employers and hand over the finished products to them Home based work relies largely on female labour. The organisation and distribution of work within the home-based production offers less protection to workers, and leads to the non-recognition of issues of occupational health of workers.

Bidi industry is predominantly a home-based industry in India which employs over 4 million people, the lion share being women. The industry is mostly unorganized. In this industry work is done through contractors and by distributing work in private dwelling houses where the workers take the raw material given by the contractor and handover the finished product to him.

Bidi rolling is a highly labour intensive work as each bidi is rolled individually. Women constitute a very high percentage of labour force in the industry as work is done generally from home and women can do it while at the same time attending to their children and other household chores. Deft fingers of women are more suited to bidi rolling & women are considered to be more sincere and hardworking.

Bidi rollers work generally under unhygienic, dingy and overcrowded places having little facilities for safe usable water, toilet or washing as these people are very poor. They cannot afford these facilities due to their financial condition. They spend hours blending or rolling tobacco under conditions that are harmful to their health. The working hours are often indeterminable. Use of child labour is a regular practice. Common occupational health problems faced by the bidi workers are mostly Skeleto-Muscular; Respiratory; Gastrointestinal; Neurological problems.

This is an attempt to find out living conditions of bidi workers and the incidence of the occupational health hazards among them in and around Jhalda,

located in district Purulia, West Bengal. Jhalda comes under extended part of Chhotonagpur Platue & is located 45 km. away from Purulia Town and situated on Purulia Ranchi highway. According to 2011 census the total population of Jhalda II was 1.5 lakhs. Large section of its working population is engaged in Bidi rolling. Several Bidi factories are also located in this area. Both men and women are engaged in bidi rolling here. Lack of other employment opportunities often forces them to earn their livelihood from bidi making alone. The area where the bidi workers live is found to be highly congested and full of squalor and also they are suffering from access to safe water for domestic use or drinking purposes. Exploitation, poverty, dirt and diseases seemed to be living in absolute harmony with the bidi roller.

Bidi workers are working for long hours, to earn their livelihood in a very exploitative and unhealthy framework. They start from early morning and continue up to late night with few breaks. This type of work practice is putting some serious impact on the life style of these people resulting serious health impacts. To earn more money they are putting maximum possible family labour hour resulting less time left for other necessary works and rest. Young ones as well as aged people are also sharing this job regularly. Income earned is associated with higher family health expenditure as well because extra efforts are making them prone to ill health. Large family size is a regular feature here to facilitate more labour hours. Children (below 14 years) are going to school but doing part time job to assist parents. With education in the family it is likely that workers will be more aware about the ill effects of rolling biri and higher level of education generally will imply more informed workers this will also likely to put an impact on the health scenario of the family. Frequency of visit to a doctor is very high among these workers and health workers visit of Labour Welfare Department is very helpful for these people. But as basic medical expertise and medicines only are available in Bidi Workers Health Clinic (SCMMU; Jhalda) they have to go to private clinics and out of stations for treatment. Only people with higher incomes are opting for this but poor ones are accessing local facilities and sometimes selling immovable properties for treatment. Some of the bidi rollers are also engaged with other part time jobs like crop cultivations, wage labour etc. but due to lack of work opportunities they are rolling bidi as a safety net of family income . Long hours of work specially by the females leaves lesser time left for maintaining personal health and hygiene as well as that of other family members especially of young ones and the aged ones in these families. Level of sanitation facilities as toilet, drainage of waste water, disposal of solid wastes etc available in a family and in the neighborhood are in awful situation. Individual toilets are almost unavailable, drainage facilities are there but rarely

cleaned, solid wastes are disposed in the common passage in most cases in the roads in front of houses making it a huge common dustbin. This is a drought prone area. Ground water level is very deep and people are dependent on common water bodies like tanks, ponds, rivers, dug well or bore wells. Through public efforts safe drinking water is available in almost all places but water bodies are very ill maintained and drinking water sources are ill managed. So partly though drinking water sources have increased lack of management of water bodies and drinking water sources usable water availability is still scarce. Accessions of usable water for drinking and household use are inducing health expenditure of these families.

It was observed that almost 70% of the workers developed occupational health problems as reported by the male and female bidi workers. Apart from the musculo-skeletal problems (65%), there are also gastrointestinal (40%), skin diseases (dermatitis) (37%) cough (27%), breathlessness (20%), and tuberculosis (2.8%) among other problems. Our empirical study shows that the occupational health hazards are lessened by the access to sanitation facilities and to safe usable water among bidi workers.

Against these backdrops, this study was aimed with the following objectives

OBJECTIVES
Bidi workers earn income working long hours and using family labour. We have attempted to find the impact of family income, family size, and number of children below 14 years, family education, total family work hour and sex ratio of these families on their expenditure on health. We have also tried to find out frequency of visit to doctor of these families and impact of it on health expenditure of these families. Access to safe & usable water and sanitation facilities are very important for living healthy. As observed these families are ignoring these issues due to their work practices. We tried to find out the impact of access to safe water and sanitation on the family health expenditure of these families also.

LITERATURE SURVEY
Lot of research works have been made on the bidi workers covering various issues of the workers in different states of India. Important works gone through for this research are listed below.

M. Mohandas, [2], throws light on the conditions of the workers in the bidi industry all over the country. This work has highlighted the miserable life of workers in specific regions of Maharashtra, Karnataka and West Bengal. This paper explains the economic conditions of bidi workers, and highlights the impact of existing labour legislation in the industries of Kerala. He reported high incidence of occupational

diseases owing to exposure to tobacco and postural problems arising out of the monotonous work.

M. Gopal [3] discussed about the production of bidi, through contracting to home-based workers. The home workers work as housewives, care for children and perform her household tasks at the same time they can use their time in wage work. Women put in long hours to fulfill production targets set by employers but have no idea how their wage rate is determined.

Sudarshan R and Kaur R, [4] envisaged gender perspective on the employment situation in the bidi industry and highlighted the policy issues relating to women's employment in this industry. The estimated number of women in the bidi manufacturing in India vary from 2.2 to over 4 million and 192,000 are girls under the age of 14 years. The bargaining position of bidi workers is weak. Various strategies were suggested by the Government for empowering women bidi workers, organizing the workers to demand their rights, and creating new livelihoods for them. Bagwe Bhisey [5] pointed out the elevation of mutagenic burden among bidi industry workers. Kuruvilla *et al.* [6] investigated on occupational dermatoses in bidi rollers. Occurrences of callosities and nail changes were argued to be associated with the extent of work. Mandelia *et al.* [7] analyzed the effects of occupational tobacco exposure on fetal growth and claimed that exposure beyond 6 h per day has trivial but definite adverse effects. According to Bagwe and Bhisey [8] and Swami *et al.* [9] bidi rollers are exposed to unburnt tobacco, mainly through the cutaneous and nasopharyngeal routes. Ranjitsingh and Padmalatha [10] reviewed that bidi rollers were affected by respiratory disorders, skin diseases, gastrointestinal illness, gynecological problems, lumbosacral pain and are susceptible to fungal diseases, peptic ulcer, hemorrhoids and diarrhea. Numbness of the fingers, breathlessness and stomach pains including cramps and gas, have also been reported in bidi rollers [11, 12], found that postural pains, eye problems and burning sensation in the throat are common ailments in women bidi rollers. Bhisey *et al.* [13] recorded that inspirable dust of tobacco in the tobacco factory was associated with chronic bronchitis in workers. Kaur S, Ratna R [4]; Aghi and Gopal [14] reported indurations of the hands and complications of pregnancy in women bidi rollers.

Nakkeeran, Pugalendhi [15] accounted respiratory, gastrointestinal, and osteological problems among bidi rollers in four districts of Tamil Nadu. Yasmin *et al.* [16] shed some light on the work related health issues of female bidi rollers in Patna, Bihar. The study identified lower haemoglobin levels and SGPT (ALT) enzyme concentration among bidi rollers. Joshi *et al.* [20] made an epidemiological survey of occupational health hazards among bidi workers of Amarchinta, Andhra Pradesh and noticed that almost 90% of the workers developed pain in various body parts, the prominent among them being shoulder pain, back pain and neck pain. Prakash Vyas [17] examined the association between occupational tobacco exposure and health risks among women bidi rollers in Ajmer. The tobacco dust contain toxic nitrosamines which is readily absorbed by body tissues giving rise to cough, breathlessness, ocular and dermatological health issues. The ocular manifestations among bidi rollers were furthermore discussed by Mittal *et al.* [12]. Umadevi *et al.* [18] made a study on the Cytogenetic effects in workers occupationally exposed to tobacco dust. An increase in frequencies of chromosomal abbreviations was observed among the exposed group. Mahimkar Bhisey [19] made similar inferences.

ECONOMETRIC MODEL AND METHODOLOGY
Specification of Econometric Models

Frequency of falling ill by members of a bidi roller's family is high due to his/her nature of occupation and so they spend high percentage of their family income on health. We are of the opinion that occupational health problems escalating health expenses at the same time nature of this job (bidi rolling) indirectly inviting some health problems due to time management on work and household duties. We have attempted to find out factors which are influencing health expenditure of bidi rolling families in our study area. First we have quantified health status of the bidi rollers by assuming annual family health expenditure.

We have fitted two simple regression models, at the first model we have taken family health expenditure (EXPH) as our dependent variable and regressed it by Ordinary Least Squares Technique to find out impacts of family income(FAMINC); family size(FAMSIZE); sex ratio (SEXRATIO); number of children below 14 years (of age(NCHILD_14); highest education of the family(FAMHEDN); Off firm job other than the primary job of rolling bidi (SCNDJOB); frequency of visit to the doctor(FREVID); total family work hour devoted for rolling bidi(TFAMWH); level of sanitation(SANITATION) and accession to usable water (ACCESSUSW).

Model-1

LOG(EXPH) = C(1) + C(2)*LOG(FAMINC) + C(3)*LOG(FAMSIZE) + C(4)*LOG(SEXRATIO) + C(5)*NCHILD_14 + C(6)*LOG(FAMHEDN) + C(7)*SCNDJOB + C(8)*LOG(FREVID) + C(9)*LOG(TFAMWH) + C(10)*SANITATION + C(11)*ACCESSUSW+U

We have quantified health status of a bidi roller's family by assuming annual health expenditure figures of that family. A healthy family is likely to have less health expenditure than that of a disease prone

family. People give priority to health concerns curtailing other expenditures if necessary. Annual Household family health expenditure (EXPH) is the dependent variable of our regression analysis. By health expenditure we mean expenditures on doctor fees, investigation charges, cost of medicines, transportation fees of patient and attendant.

Level of sanitation (SANITATION) is very important for a healthy living. In rural areas proper sanitation facilities are scarce which increases propensity to fall ill. So level of sanitation facility available in the family is an important determinant of the health expenditure of the family. We measured the sanitation facility by looking at three things own toilet, drainage facility for used water and waste/garbage disposal system if any one of these are available to the family we have considered value of this variable is one other wise zero.

Water is another primary source of health hazards. Our study area is a drought prone area so availability of water is scarce and households spend many hours to collect and /or access safe usable water (ACCESSUSW) for household purposes. It includes both drinking water and water for other household purposes. Now a bidi roller family use his maximum possible time to roll bidi and increase family income so compels to opt for the water source may not be hygienic for them. If a family uses safe usable water source for both drinking as well as other household purposes then we have assumed its value is one otherwise it is zero. Family size is another important determinant of health expenditure. A large size family (FAMSIZE) earns more but obviously increases health expenditure. If most of the members roll bidi then health expenditure will likely to be even greater. Bidi rolling as found mostly done by women hence we have taken sex ratio (SEXRATIO) (i.e. number of females to number of males in a family) is a determinant of health expenditure. A high sex ratio is likely to reduce health expenditure as work will be divided among females of the family. Same is the case with number of children (NCHILD_14). A family with more children is expected to spend more on health so we have taken this variable to test its impact on total health expenditure of the family. Poor people spend on child health only when no other option is left otherwise they control it using traditional practices hereditarily learnt. Its impact may or may not be so significant in our study.

Education gives enlightenment and accession to knowledge bank. So it definitely will have an impact on health expenditure. Households with relatively more education will likely to be less susceptible to health problem and thereby spend less on health expenditure. We have calculated the highest education of the family (FAMHEDN) by taking years in school by a member of a family. Frequency of visiting doctor (FREVID) is

directly related with health expenditure. We have taken data on last six months visit to the doctor by the family in this variable. It is expected that higher visit imply higher health expenditure of the family. As work opportunities are scarce here so people search for second jobs (SCNDJOB) specially the male members and educated ones. Families with second jobs are spending less time in bidi rolling so likely to be less prone to ill health and health expenditure of these families are likely to be less. Total labour hour devoted in bidi rolling (TFAMWH) is another important determinant of health expenditure of the family. More hours of this job are likely to create situation responsible for health problems. So it is going to positively influence health expenditure of the family.

All bidi workers are not of same financial strengths so further we have divided our dataset on four subgroups as families with income below poverty line (BPL), Lower Middle Income Group (LRMIDINCG); Middle Income Group (MIDINCG) and High Income Group (HIGHINCG). Further Total family work hour in rolling bidi have been divided in four groups as FWH_1 means families who are working less than twelve hours a day, FWH_2 means families who are working more than twelve hours but less than twenty four hours a day, FWH_3 means families who are working more than twenty four hours but less than thirty six hours a day, FWH_4 means families who are working more than thirty six hours a day. In our second Model we have regressed family health expenditure(EXPH) with the income status of different families as BPL; Lower Middle Income Group (LRMIDINCG); Middle Income Group (MIDINCG) and with sex ratio; number of children below 14 years of age; highest education of the family; Off firm job other than the primary job of rolling bidi; frequency of visit to the doctor; total family work hours of different categories devoted for rolling bidi; level of sanitation and accession to usable water. This will give us further insight about importance of relative income situation as well as work intensity in the society and its impact on health expenditures of bidi rollers.

Model-2

$$LOG(EXPH) = C(1) + C(2)*BPL + C(3)*LRMIDINCG + C(4)*MIDINCG + C(5)*LOG(FAMSIZE) + C(6)*LOG(SEXRATIO) + C(7)*NCHILD\_14 + C(8)*LOG(FAMHEDN) + C(9)*SCNDJOB + C(10)*LOG(FREVID) + C(11)*FWH\_1 + C(12)*FWH\_2 + C(13)*FWH\_3 + C(14)*FWH\_4 + C(15)*SANITATION + C(16)*ACCESSUSW+U$$

Specification and Measurement of the Variables
EXPH: Represents annual family expenditure on health. Value of the variable is measured in rupees.
FAMINC: It represents annual family income. This is also measured in rupees.

BPL: Represents families with income below poverty line (< Rs.18000/-). The variable is qualitative in nature & takes the values "0" if no or "1" if yes.

LRMIDINCG: It represents families with lower middle income group (Rs.18000/- –Rs. 40000/-). It is qualitative in nature too & takes the values "0" if no or "1" if yes.

MIDINCG: It represents families with middle income group. (Rs.40000/- –Rs. 80000/-) takes the values "0" if no or "1" if yes.

HIGHINCG: It represents families with higher income group. (>Rs. 80000/-) takes the values "0" if no or "1" if yes like other income group variables.

FAMSIZE: Represents family size and measured by numbers.

SEXRATIO: It represents female to male ratio of a family and measured by ratios i.e. number of female divided by number of males.

NCHILD_14: Represents number of children below 14 years of age and measured by numbers.

FAMHEDN: Represents highest family education in years also and measured by numbers.

SCNDJOB: Off firm job other than primary job of rolling bidi takes the values "0" if no or "1" if yes.

FREVID: Represents frequency of visit to doctor of the family in last six months, measured by numbers.

TFAMWH: Represents total family work hours of bidi rolling, measured by numbers.

FWH_1: Represents total family work hours of bidi rolling less than 12 hours a day, the values "0" if no or "1" if yes FWH_2: Represents total family work hours of bidi rolling more than 12 hours but less than 24 hours a day measured by the values "0" if no or "1" if yes .

FWH_3: Represents total family work hours of bidi rolling more than 24 hours but less than 36 hours a day takes the values "0" if no or "1" if yes.

FWH_4: Represents total family work hours of bidi rolling more than 36 hours a day the values "0" if no or "1" if yes.

SANITATION: Sanitation facility available to the family takes the values "0" if no or "1" if yes.

ACCESSUSW: Access to the usable safe water to the family. This is also a qualitative variable taking values "0" if no or "1" if yes.

U: Error term.

Hypotheses

Hypothesis-1: Health expenditure is likely to vary in either direction with family income.

Hypothesis-2: Health expenditure is likely to vary directly with family size.

Hypothesis-3: Health expenditure is likely to increase directly with sex ratio.

Hypothesis-4: Health expenditure is expected to increase with the number of children below 14 years in the family.

Hypothesis-5: Health expenditure is likely to vary directly with the frequency of becoming ill or frequency of visiting doctors.

Hypothesis-6: Health expenditure is likely to vary in either direction with the households having secondary jobs in addition to the primary works of bidi rolling.

Hypothesis-7: Health expenditure is likely to be affected with the education of any member of the family.

Hypothesis-8: Health expenditure is likely to increase with the increase in total hours of working of Bidi rolling.

Hypothesis-9: Access to sanitation facilities is expected to reduce the health expenditure.

Hypothesis-10: Access to safe usable water is certain to moderate the health expenditure of the bidi workers' family.

Data

Research design adopted for this study was descriptive cross-sectional study. With respect to the concentration of bidi workers Purulia district is the fourth highest only after Malda & Murshidabad & Midnapur West. But among the drought prone districts of West Bengal Purulia has got highest concentration of Bidi workers. To study health hazards and impacts of usable water crisis and lack of sanitation practices we have chosen Purulia district. Out of twenty blocks Jhalda II has highest concentration of Bidi workers. More than 60 % of bidi workers are working in this block. We have selected five villages of this block namely Bororalla; Chekya; Bortolia; Majhidih & Matkuma as survey area where participation in bidi rolling is greater than 90%. We have taken sample size proportional to the total households of the village. Number of households selected using random numbers from Bororalla; Chekya; Bortolia; Majhidih & Matkuma were 46, 28, 20, 16 and 14 respectively. On the basis of pilot study conducted in the study area 124 household (containing 663 people) were selected who are employed in bidi rolling. Questionnaire was prepared with the aid of literature and consultation with experts and doctors for interview purpose. Finally 30 questions are formed under five dimensions:

1. Environment and sanitation condition of bidi workers.
2. Socio-economic status of the bidi workers.
3. Physical health and occupational health profile of bidi workers.
4. Emotional fittings.
5. General awareness.

Door to door survey was conducted for data collection by pre-designed, pre-tested questionnaire and analyzed by appropriate statistical methods.

EMPIRICAL ESTIMATES
Summary Statistics

Qualitative status of our sample households are presented in Table 1. Most of the bidi rollers in our sample belong to lower & middle income groups. In our dataset 4.03% households are BPL, 43.55% households are from lower middle income group,

45.16% households are from middle income group and 7.26% households are from high income group as our specification of different groups. Bidi rolling Households also do other economic activities for earnings as cultivation wage work etc. In our sample 53.23% households are doing such secondary jobs. Bidi rolling is a family work. We have calculated time devoted by members of a family and divided them four categories as families devoting less than twelve hours a day; families devoting 12 to 24 hours a day; families devoting 24 to 36 hours a day and families devoting more than 36 hours a day.

Table 1: Percentage Distribution of the Qualitative Status of the Sample Households

Name of the Qualitative Status	%age of Sample Households having the status	
	(Yes=1)	(No=0)
Below the Poverty Line (Yes=1)	4.03	95.97
Lower Middle Income Group (Yes=1)	43.55	56.45
Middle Income Group (Yes=1)	45.16	54.84
High Income Group (Yes=1)	7.26	92.74
Secondary Job (Yes=1)	53.23	46.77
Time Devoted less than 12 Hours/day (Yes=1)	15.32	84.68
Time Devoted between 12 and 24 Hours/day (Yes=1)	38.71	61.29
Time Devoted between 24 and 36 Hours/day (Yes=1)	33.87	66.13
Time Devoted more than 36 Hours/day (Yes=1)	10.48	89.52
Access to Sanitation facilities (Yes=1)	39.52	60.48
Access to Safe Usable Water (Yes=1)	58.87	41.13

Author's own computation based on primary data

Out of total 124 sample households 15% of the sample household families are devoting less than 12 hours a day, 38.71% households are working between 12 to 24 hours and another 33.87 % households are working between 24 to 36 hours a day. As much as 10.48 % of households are working more than 36 hours a day. This suggests that most households are working long hours and with many members together. Access to sanitation facilities and safe usable water is poor to the sample households. Only 39.52 % households have access to sanitation facilities and 58.87% households have access to safe usable water.

Income group wise socioeconomic and demographic conditions are shown in the table 2. Mean annual family level income is only Rs. 15500/- and annual mean health expenditure of BPL households is Rs. 5480/- only with a standard deviation of Rs. 2179/- & Rs. 1238/- respectively. For lower middle income group mean family annual income and health expenditure are Rs. 31148/- and Rs. 10429/- with standard deviation of Rs. 6404/- & Rs. 4493/- respectively. In the middle income group mean annual income and health expenditures are Rs. 57486/- & Rs. 22528/- with standard deviation of Rs. 9504/- & Rs. 8051/- respectively. For the high income group mean annual family income and health expenditures are Rs. 89833/- & Rs. 34778/- with standard deviation of Rs. 6149/- & Rs. 18693/- respectively.

It is seen from our data that all the sample households are spending more than thirty percent of their annual income on health expenditure and percentage health expenditure is higher among relatively rich income categories. This is shown in the figure 1. Among different income groups higher income group families are devoting highest hours in rolling bidi and the BPL families are devoting least hours in Bidi rolling (figure 2). So it can be said that families with more family hours on rolling bidi are comparatively richer in the society. This is substantiated by the average family size of different income groups and number of females in the family also. Higher income group families are having higher family sizes with more female members (figure 4). This is so because bidi rolling is mostly done by female members of a family.

Number of male members, sex ratio & number of children below 14 years in a family shows lesser variability among different income groups. Greater family size obviously explains number of male members and number of children but adverse sex ratio may be a cause of poverty of BPL households.

Two more interesting features are seen in our dataset as frequency of visiting doctor in last six months is highest among the BPL families and comparatively low among richer families where as highest family education in a family is higher among poor families than with richer families. With education people become health conscious so visit to doctor is likely to increase but affordability.

Table 2: Socio-Economic-Demographic Profile of Bidi Workers in the District of Purulia (WB), 2014

| Income Status	Socio-Economic-Demographic Parameters	Mean	Median	Std. Dev.	C. V.
Below Poverty Level (5)	Expenditure on Health (Rs)	5480	5000	1238	22.59
	Family Income (Rs)	15500	16000	2179	14.06
	Time Devoted by the Family Members (Hours)	11.6	12	0.89	7.71
	Frequency of Visiting Doctors	26.6	24	8.71	32.73
	Family Size	4.4	4	1.52	34.47
	Number of Female Members	2.4	2	1.67	69.72
	Number of Male Members	2	2	1.22	61.24
	Sex Ratio (Female/Male)	1.9	0.5	2.04	107.54
	Number of Children below 14	1.2	1	0.84	69.72
	Highest Education in the Family (Years)	5.4	6	0.89	16.56
Lower Income Group (54)	Expenditure on Health (Rs)	10429	10000	4493	43.08
	Family Income (Rs)	31148	33000	6404	20.56
	Time Devoted by the Family Members (Hours)	16.13	15.5	3.59	22.24
	Frequency of Visiting Doctors	22.20	21	10.54	47.47
	Family Size	4.54	5	1.28	28.31
	Number of Female Members	2.67	2.5	1.52	56.89
	Number of Male Members	2.09	2	0.87	41.79
	Sex Ratio (Female/Male)	1.49	1.5	1.12	75.14
	Number of Children below 14	1.57	2	1.02	64.84
	Highest Education in the Family (Years)	4.69	4	2.60	55.60
Middle Income Group (56)	Expenditure on Health (Rs)	22528	21120	8051	35.74
	Family Income (Rs)	57486	55000	9504	16.53
	Time Devoted by the Family Members (Hours)	30.27	30	4.80	15.84
	Frequency of Visiting Doctors	17.39	15	8.65	49.71
	Family Size	5.93	6	1.54	25.90
	Number of Female Members	3.63	3	1.93	53.09
	Number of Male Members	2.77	3	1.11	40.17
	Sex Ratio (Female/Male)	1.37	1.5	0.59	42.99
	Number of Children below 14	1.80	2	0.96	53.31
	Highest Education in the Family (Years)	4.71	4.5	2.39	50.80
High Income Group (9)	Expenditure on Health (Rs)	34778	28000	18693	53.75
	Family Income (Rs)	89833	88000	6149	6.85
	Time Devoted by the Family Members (Hours)	45.00	45	2.50	5.56
	Frequency of Visiting Doctors	17.56	15	7.84	44.68
	Family Size	7.11	7	2.37	33.31
	Number of Female Members	5.78	6	2.68	46.42
	Number of Male Members	3.11	3	1.05	33.88
	Sex Ratio (Female/Male)	1.49	1.5	0.44	29.55
	Number of Children below 14	2.22	2	1.09	49.18
	Highest Education in the Family (Years)	4.22	4	1.39	33.03

Author's own computation based on primary data
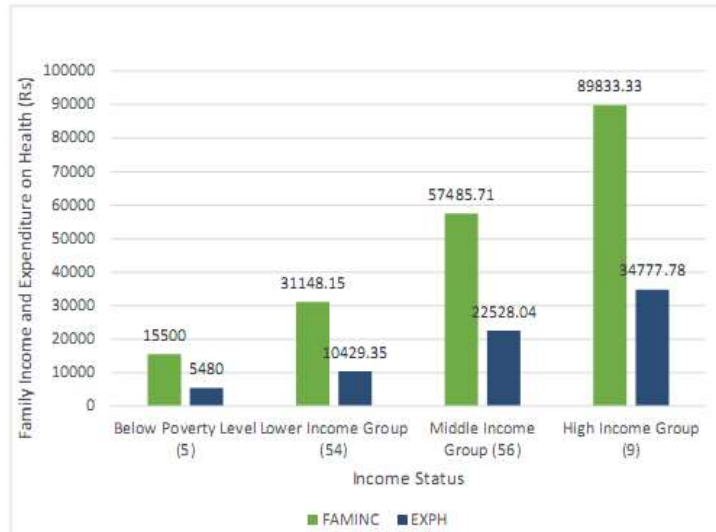
Fig-1: Family Income and Expenditure on Health (Rs) of Bidi Workers in Purulia (WB) in 2014
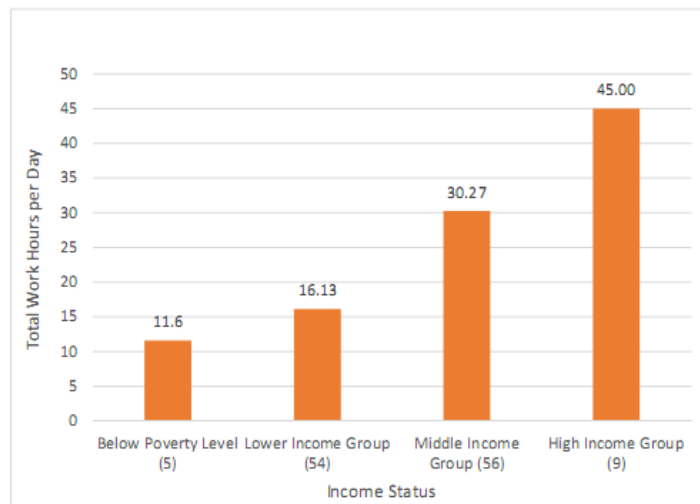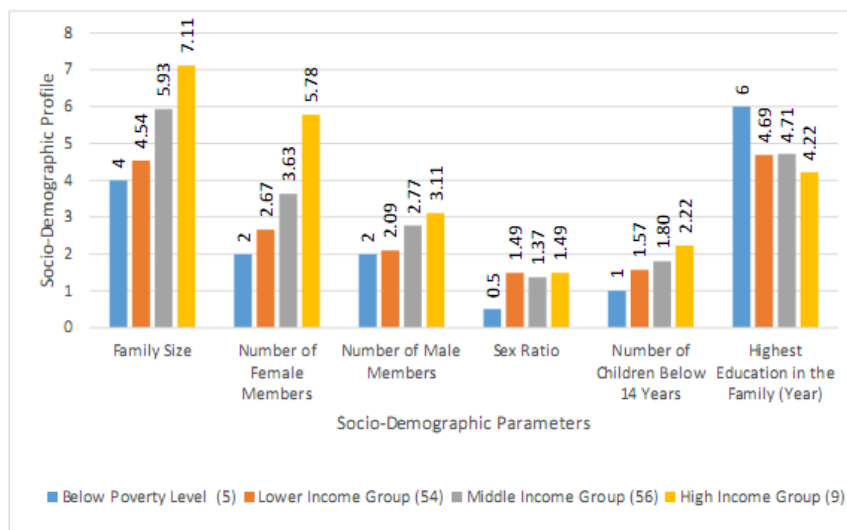

Fig-2: Total Work Hours per Day Devoted by Family Members of Bidi Workers in Purulia (WB) in 2014
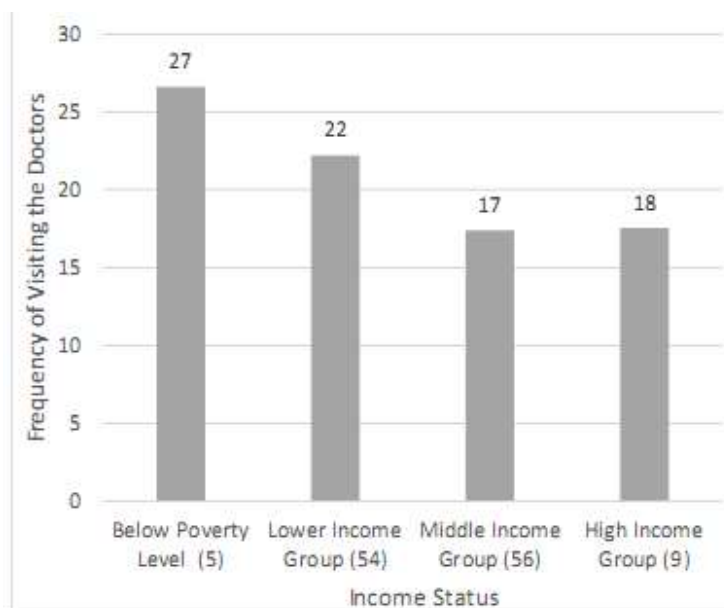
Fig-3: Frequency of Visiting the Doctors by the Bidi Workers in Purulia (WB) in 2014

Fig-4: Socio-Demographic Profile of Bidi Workers in Purulia (WB) in 2014

REGRESSION RESULTS

Table 3 & Table 4 show estimated values of our first & second regression models respectively.

In our first estimated model coefficient of family income LOG (FAMINC) is 0.905 which implies that elasticity of family health expenditure of Bidi rollers with their income is close to one that is with increase in income families are spending more on health. With hundred percent increase in family income

health expenditure is increasing by 90%. This is obvious because increase in family income increases affordability on health, nutritious food and makes better arrangement for sanitation facilities and usable water sources and its management. Hence increase in family income increasing health expenditure but at a lesser rate. In our study this is an important explanatory variable with 99% confidence interval and found with a significant t value.

Table 3: Determinants of Health Expenditure of the Bidi Workers in Purulia (WB), 2014

Model_1: LOG(EXPH) = C(1) + C(2)*LOG(FAMINC) + C(3)*LOG(FAMSIZE) + C(4)*LOG(SEXRATIO) + C(5)*NCHILD_14 + C(6)*LOG(FAMHEDN) + C(7)*SCNDJOB + C(8)*LOG(FREVID) + C(9)*LOG(TFAMWH) + C(10)*SANITATION + C(11)*ACCESSUSW+U; Included observations: 124			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.908	1.503	-0.605	0.547
LOG(FAMINC)	0.905	0.192	4.716	0.000
LOG(FAMSIZE)	-0.445	0.101	-4.394	0.000
LOG(SEXRATIO)	-0.006	0.043	-0.136	0.892
NCHILD_14	0.004	0.026	0.170	0.865
LOG(FAMHEDN)	0.013	0.052	0.256	0.799
SCNDJOB	-0.001	0.053	-0.016	0.987
LOG(FREVID)	0.110	0.057	1.936	0.055
LOG(TFAMWH)	0.459	0.209	2.193	0.030
SANITATION	-0.291	0.053	-5.490	0.000
ACCESSUSW	-0.136	0.053	-2.546	0.012
R-squared: 0.81; Adjusted R-squared: 0.80; F-statistic: 49.006; Durbin-Watson stat: 1.933			

Author's own computation based on primary data

Coefficient of family size LOG (FAMSIZE) is -0.445 which implies that elasticity of family health expenditure of Bidi rollers and size of the family is negatively related with hundred percent increases in family size health expenditure is likely to decrease by 44.5%. This is obvious because increase in family size will facilitate sharing the jobs between members and lowering individual further it makes possible to manage

household basic amenities to be managed in a better way to make the family less susceptible to health hazards. In our findings this important explanatory variable for explaining family health expenditure with 99% confidence interval and found with a significant t value.

Sex ratio, jobs other than rolling bidi, number of children aged less than 14 years, highest education in the family are influencing health expenditure but not in a significant way. Sex ratio is likely to be correlated with family size so it has become insignificant though decreasing health expenditure with increase in values of sex ratio as expected. It is not possible to disentangle the effect. Number of children below 14 years is increasing health expenditure but insignificantly. It may have two reasons one, people are attending bidi health clinics or local PHCs for kids or ignoring their problems and treat them with household level knowledge of traditional practices. Availability of second job is reducing health expenditure but not significantly. Second job throughout the year is scarce. Lack of availability of other economic activity perhaps is making this variable so insignificant. It is not brining enough income in this drought prone area as agriculture is non prosperous here. More visit to doctor will increase health expenditure. In our model the estimated coefficient is 0.110 which is statistically significant at 5.5% level. An increase of 100 per cent to doctors' visit will cause an 11% increase in their health expenditures. This may imply two things one, they are probably falling ill by common diseases and two, they are availing mostly facilities of the BIDI Hospital nearby or that of PHCs nearby which helps a lot to curtail their health expenditures.

It was observed that almost 70% of the workers developed occupational health problems as reported by the male and female bidi workers. Apart from the musculo-skeletal problems (65%), there are also gastrointestinal (40%), skin diseases (dermatitis) (37%) cough (27%), breathlessness (20%), and tuberculosis (2.8%) among other problems. Only 39.52 % households have accession to sanitation facilities and 58.87% households have accession to safe usable water. Gastrointestinal, skin diseases common cough are regular problems in these families these are draining family income regularly and likely aggravating occupational health problems.

Level of sanitation has negative impacts on health expenditures as expected. The estimated coefficient is – 0.291 implies a 100 % increase in sanitation will reduce health expenditure by 29.1 %. It is significant at 97% and with a significant t values. As expected accession to safe usable water have also negative impact on health expenditures of these families. The estimated coefficient is –0.136 which is statistically significant at 99% with a significant t values. An improvement in accession to the safe useable water is expected to reduce health expenditure by 13.6%. So improvement in sanitation and accession in usable safe water can reduce health expenditure of these families by more than 40 %.

Total family work hour devoted to bidi works have positive impact on the health expenditures among these families as people are working more hours they fall ill also when labour is shared between family members work environment near/ within becomes responsible (as concentration of smoke dust & toxicity increases) for ill health. The estimated elasticity is 0.459 which is significant at 95%. It tells that a 100 % increase in work hour increase health expenditure by 45.9 %. As we calculated total work hour of a family by adding total time spending on bidi rolling by all the family members it is clear that high work rate among these workers is very much responsible for their ill health too as it is found in various studies in the literature.

In our second model we found similar results with some extra insights as we have divided the data set with respect to different income groups as below poverty line, lower middle income group, middle income group and high income group. Estimated values of income group coefficients are as follows. Higher income group has been considered as contrast in our model. For high income group estimated value is 10.585. The estimated value is statistically significant at 1% level. This implies health expenditures of high income group families are significantly explained by their average annual family income. For the BPL category estimated value is 10.585 – 1.055 = 9.530, which is also statistically significant at 1% level. Estimated values for the LRMIDINCG is 10.585 – 0.708 = 9.877, statistically significant & that of MIDINCG is 10.585 - 0.230 = 10.355, which is not so significant. Estimated coefficient is not significantly explaining variations in health expenditures of these families. Further, total family work hour devoted to bidi works had given positive impact on the health expenditures among biri roller's families in our first model. But in our second model estimated coefficient are with negative signs for first two categories of families but with positive sign for the next two categories of families. The coefficient of Total Family Work Hour of category 1(FWH_1) i.e., who are working less than twelve hours a day is – 0.647 which is significant at 95%. It tells that a 100 % increase in work hour decreases health expenditure by 64.7 %. It simply tells that with more members engaged in bidi work family gets more work hour and more health benefits from institutional schemes. For other categories results are not so significant but families who are working more hours in biri rolling their health expenditures are increasing with more hours of biri rolling. Occupational health problems as indicated in the literature are greater among these families.

Table 4: Determinants of Health Expenditure of the Bidi Workers in Purulia (WB), 2014

Model_3: LOG(EXPH) = C(1) + C(2)*BPL + C(3)*LRMIDINCG + C(4)*MIDINCG + C(5)*LOG(FAMSIZE) + C(6)*LOG(SEXRATIO) + C(7)*NCHILD_14 + C(8)*LOG(FAMHEDN) + C(9)*SCNDJOB + C(10)*LOG(FREVID) + C(11)*FWH_1 + C(12)*FWH_2 + C(13)*FWH_3 + C(14)*FWH_4 + C(15)*SANITATION + C(16)*ACCESSUSW+U: Included observations: 124

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.585	0.399	26.541	0.000
BPL	-1.055	0.311	-3.393	0.001
LRMIDINCG	-0.708	0.252	-2.804	0.006
MIDINCG	-0.230	0.207	-1.112	0.269
LOG(FAMSIZE)	-0.308	0.118	-2.607	0.010
LOG(SEXRATIO)	-0.007	0.053	-0.124	0.902
NCHILD_14	0.004	0.031	0.123	0.903
LOG(FAMHEDN)	0.031	0.062	0.495	0.621
SCNDJOB	-0.019	0.063	-0.294	0.769
LOG(FREVID)	0.069	0.069	0.995	0.322
FWH_1	-0.647	0.294	-2.202	0.030
FWH_2	-0.148	0.272	-0.544	0.587
FWH_3	0.149	0.246	0.606	0.546
FWH_4	0.282	0.293	0.963	0.338
SANITATION	-0.272	0.067	-4.059	0.000
ACCESSUSW	-0.165	0.064	-2.588	0.011
R-squared: 0.75; Adjusted R-squared: 0.72; F-statistic: 21.700; Durbin-Watson stat: 1.955				

Author's own computation based on primary data

Coefficient of family size LOG (FAMSIZE) is -0.308 implies family health expenditure of Bidi rollers and size of the family is negatively related. With hundred percent increase in family size health expenditure is likely to decrease by 30.8%. This is a significant variable with 99% confidence interval and found again with significant t value. Sex ratio, jobs other than rolling bidi, number of children aged less than 14 years, highest education in the family are influencing health expenditure but not in a significant way again.

The estimated coefficient of sanitation which is – 0.272 implies that a 100 % increase in sanitation will reduce health expenditure by 27.2 %. Estimated value is significant at 99% and with a significant t value. As expected, access to safe usable water has been found to exert negative impact on health expenditure. The estimated coefficient is –o.165 which is statistically significant at 1% level. An improvement in access to the safe useable water is expected to reduce health expenditure by 16.5%. So improvement in sanitation and access in usable safe water can reduce health expenditure of these families by more than 43.7 %.

CONCLUSION AND POLICY PRESCRIPTION
Bidi workers and their family members are suffering from various diseases. These families are spending very high percentage of their family income on health expenditure. Family income, frequency of visit to doctors, total work hours devoted to rolling bidi, access to sanitation and availability of usable water resources are important and significant determinants of the bidi workers' family health expenditure. For the improvement of the bidi workers following recommendations are suggested.

1. Rolling biri is not good for health. Bidi rollers also know this but it is chosen as a work opportunity as it uses family labour, requires low skill, no personal investment and can be done throughout a year with some institutional benefits. To take out them from this trap alternative earning opportunities need to be explored. District Industries Centre is regularly providing skill development training programmes but special programmes should be designed for bidi workers only.

2. Government will implement minimum wage law strictly.

3. Family planning benefits would be given to bidi rollers to discourage big family size. The scheme is already there but not properly used by bidi rollers due to lack of awareness.

4. Living in unhygienic condition (as poor access to usable water, poor sanitation facility etc.) invites diseases. Ensuring access to usable water and sanitation reduces 44% health expenditures of these families. Different schemes of govt. on sanitation and water supply are there but not implemented at Purulia. This is a drought prone area. Usable water sources are scarce. Different government schemes as Jal dharo Jal Bharo, Sajal dhara should be implemented urgently. The schemes are already running successfully at different places of India but not in Purulia.

5. Existing water bodies are to be monitored by govt. authorities especially at summer and at rainy season and Panchayet should take remedial measures to maintain the usability of water at these places. Regular tap water supply will stop use of contaminated water and that will lead to improvement of the conditions of living.

6. Different counselling sessions for these workers especially for women should be designed to maintain work life balance and keep their family safe at least from preventive diseases.

REFERENCES

1. Government of India. (2012). Report of the Committee on Unorganised Sector Statistics, National Statistical Commission; New Delhi.
2. Mohandas, M. (1980). Beedi workers in Kerala: Conditions of life and work. *Economic and Political Weekly*, 1517-1523.
3. Gopal, M. (1999). Disempowered despite wage work: women workers in beedi industry. *Economic and Political Weekly*, WS12-WS20.
4. Sudarshan, R., & Kaur, R. (1999). The tobacco industry and women's employment: Old concerns and new imperatives. *The Indian journal of labour economics*, *42*(4), 26.
5. Bagwe, A. N., & Bhisey, R. A. (1995). Occupational exposure to unburnt bidi tobacco elevates mutagenic burden among tobacco processors. *Carcinogenesis*, *16*(5), 1095-1099.
6. Kuruvila, M., Mukhi, S. V., Kumar, P., Rao, G. S., Sridhar, K. S., & Kotian, M. S. (2002). Occupational dermatoses in Beedi rollers. *Indian Journal of Dermatology, Venereology, and Leprology*, *68*(1), 10.
7. Mandelia, C., & Subba, S. H. (2014). Effects of Occupational Tobacco Exposure on Foetal Growth, among Beedi Rollers in Coastal Karnataka. *Journal of clinical and diagnostic research: JCDR*, *8*(5), JC01.
8. Bagwe, A. N., & Bhisey, R. A. (1991). Mutagenicity of processed bidi tobacco: possible relevance to bidi industry workers. *Mutation Research/Genetic Toxicology*, *261*(2), 93-99.
9. Swami, S., Suryakar, A. N., Katkam, R. V., & Kumbar, K. M. (2005). Absorption of nicotine induces oxidative stress among bidi workers. *Indian journal of public health*, *50*(4), 231-235.
10. Ranjitsingh, A. J. A., & Padmalatha, C. (1995). Occupational illness of beedi rollers in south India. *Environment and ecology. Kalyani*, *13*(4), 875-879.
11. Dikshit, R. P., & Kanhere, S. (2000). Tobacco habits and risk of lung, oropharyngeal and oral cavity cancer: a population-based case-control study in Bhopal, India. *International Journal of epidemiology*, *29*(4), 609-614.
12. Mittal, S., Mittal, A., & Rengappa, R. (2008). Ocular manifestations in bidi industry workers: Possible consequences of occupational exposure to tobacco dust. *Indian journal of ophthalmology*, *56*(4), 319.
13. Bhisey, R. A., Bagwe, A. N., Mahimkar, M. B., & Buch, S. C. (1999). Biological monitoring of bidi industry workers occupationally exposed to tobacco. *Toxicology letters*, *108*(2), 259-265.
14. Aghi, M. B. (2003). Exploiting women and children-India′ bidi industry. *Database on tobacco control research in India*, *201*.
15. Nakkeeran Senthilkumar, A. (2010). Study on Occupational Health Hazards Among Women Beedi Rollers In Tamilnadu.
16. Yasmin, S., Afroz, B., Hyat, B., & D'Souza, D. (2010). Occupational health hazards in women beedi rollers in Bihar, India. *Bulletin of environmental contamination and toxicology*, *85*(1), 87-91.
17. Prakash, B., & Vyas, U. (2013). Association between occupational tobacco exposure of health hazards in women laborers of bidi industry of Ajmer. *International Journal of Pharma Medicine and Biological Sciences*, *2*(1).
18. Umadevi, B., Swarna, M., Padmavathi, P., Jyothi, A., & Reddy, P. P. (2003). Cytogenetic effects in workers occupationally exposed to tobacco dust. *Mutation Research/Genetic Toxicology and Environmental Mutagenesis*, *535*(2), 147-154.
19. Mahimkar, M. B., & Bhisey, R. A. (1995). Occupational exposure to bidi tobacco increases chromosomal aberrations in tobacco processors. *Mutation Research/Environmental Mutagenesis and Related Subjects*, *334*(2), 139-144.
20. Joshi, K.P., Robins, M., Parashramlu, Venu, & Mallikarjunaih K.M.(2013). An epidemiological study of occupational health hazards among bidi workers of Amarchinta, Andhra Pradesh. *J. Acad. Indus. Res.* 1(9), 561-564.