J Life Science, 3(2): 147-156 (2011)
PRINT: ISSN 0975-1270 ONLINE: ISSN 2456-6306 DOI: 10.31901/24566306.2011/03.02.13

# Risk Factors Associated with Morbidity Pattern of Working Children

**Jadab Kumar Pal[1], Manoranjan Pal[1], Hare Ram Tewari[2] and Premananda Bharati[1]**

*[1]Indian Statistical Institute, 203 BT Road, Kolkata 700 108, West Bengal, India*
*[2]Indian Institute of Technology, Kharagpur, West Bengal, India*

**KEYWORDS** Child Worker. Morbidity. Logistic Regression. Socio-economic and Demographic Variables

**ABSTRACT** Children of poor families are often forced to take up low paid jobs to assist their parents. But entry into labor market at an early age of life brings greater risk to the health. In this paper, we have investigated the morbidity pattern of the child workers of Ramna Etbar Nagar, a remote village in West Bengal, India. All the child workers in the village are engaged in production of '*Gamchha'*, a traditional napkin, with the help of traditional handloom. It is seen that the child workers in this area suffer more from cough and cold, abdominal pain, chest pain and fever. It is presumed that the unusually high frequency of chest pain is due to working in the "*gamchha*" producing industry at an early age. To see the impact of socio-economic and demographic variables on morbidity, we have first prepared the bivariate tables taking dummy variable of an illness on one side and a socio-economic or demographic variable on the other side and performed chi-square test of significance. We have, thus, short-listed 20 such variables which seem to affect the morbidity of the working children. For each illness we have tried to find the best set of explanatory variables keeping in mind the significance of the coefficients and the multicollinearity of the set of regressors. We have started with a large number of explanatory variables on the basis of significance of the chi-square values of the contingency tables and carried out the logistic regression taking the illness as the dummy dependent variable and then eliminated the least significant variables one by one. Sometimes we have again added an explanatory variable. The main aim was to reduce number of explanatory variables without reducing the goodness of fit much. It is seen from the regression results that children of higher castes are more vulnerable to most of the diseases. It is also strange to note that the children of higher educated heads are more prone to suffer from fever but are not likely to suffer from abdominal or chest pain. It is seen that the variables, "total number of children under 14", "rest time for children" and "expenditure on education" do not have much significant influence on any of the diseases. However, "total number of children under 14" appears in the most of the regressions with positive influence on the diseases in most cases. i.e., higher the number of children in the family, higher is the risk. Other factors have pronounced effect only on a few of the diseases. An in-depth study of each of these diseases is necessary to arrive at some meaningful conclusion.

## INTRODUCTION

Child workers are usually assumed to be at a greater risk of health problems. The relationship between the child labor and health is complex. It is not always true that the child workers will suffer more than the children who are regularly going to school or who are not child workers, for most of the diseases. The type of disease depends on the type of industry in which children are employed. The general finding is that early entry into the labor market has negative impact on the health status of children. In some cases the impact was not found to be significant. Even the relation was opposite than expected. The impact in some cases was observed only at later stages. The International Congress on Occupational Health, which was held in March 2009 in Cape Town, prepared a "global burden of disease" estimate for child labor. ILO took special note of it (ILO 2010) and worked on the relevant technical issues involved to keep young workers safe.

The pattern and the impact of working status of children on health may be different for different socio-cultural perspectives and climatic conditions. It is, thus, necessary to investigate the studies made in India and in other countries separately.

In a cross-section study undertaken by Joshi et al. (1994) on the health status of children engaged in carpet weaving factories of Jaipur City, a significantly higher morbidity was found in these children compared to the controlled group of children residing around that place. Reduced physical capacity and ill- health are the natural consequences of the low diet and excess labor at an early age leading to low income and longevity (Sekar 2007). When the younger person starts working, there is a greater chance the individual reports being ill as an adult (Edmonds 2009). The types of ill- health are different for different types of child workers. In Jaipur gem industry, the problem of child labor is malnutrition, and more than 30 percent of the children are affected with tuberculosis. The most

common disease in the gem industry is allergic dermatitis, pneumoconiosis, bronchitis, tuberculosis, asthma and loss of eye sight due to fine dust of the stone (Burra 1988). Injuries in the finger, accidents, headache, leg pain, respiratory problems and the problems of eyesight are common in nature (Laskar 2000; Burra 1987; Remington 1996). In the *beedi* industry, 50% of the child workers have respiratory diseases because of their constant exposure to the tobacco dust and *beedi* leaves (Karunanithi 1998). Children in slate industry suffer from silicosis, a lung disease much deadlier than tuberculosis, due to constant inhalation of dense clouds of fine dust. Due to poorly ventilated workplace, children suffer from weak eyesight, especially in stone cutting, *zari* making and embroidery industry. It causes postural deformities and spinal problem due to continuous sitting in the same posture for long hours in *beedi* and *agarbatti* industries. Thus, the future of these children is endangered (Bhatt 2009).

Mitra (1993) studied the health conditions of child workers in a small- scale leather industry in Kolkata, and did not find any difference between working and non- working children so far as nutritional state and general morbidity pattern were concerned. Ambedkar et al. (1999) made a community- based comparative study to access the effect of child labor on the growth of the children. They found that with increasing duration of employment BMI decreased. On the basis of analysis they concluded that the laboring at the young age has a deleterious effect on the growth of the children. Banerjee et al. (2008) conducted a study to explore the socio-economic condition, health and nutritional status of full-time child domestic labor of metropolitan city of Kolkata. Majority of them were girls and migrants. They found that the children were mentally, physically and sexually abused and they suffered from anemia, gastrointestinal infections, vitamin deficiencies, respiratory track infections and skin diseases along with high prevalence of malnutrition.

Tata (2008) reported that girls between the age of 8 to 13 in a hub of 120 cotton ginning factories in Guntur city make their way past mounds of raw cotton into the noisy ginning mills and their health is seriously jeopardized from inhaling fibre and toxic pesticides used in the fields and from the constant exposure of thorn pricked hands to the poisonous pesticides.

Let us now make a short survey of literatures on the studies made outside India. O'Donnel et al. (2003) investigated whether work in childhood impacts negatively on health in a rural setting by using data from the Vietnam Living Standards Survey, 1992-93 and 1997-98. They focused on agricultural work which is the dominant form of child work throughout the world. They used three indicators of health like body mass index, reported illness, and growth. It is found that there was little evidence of a contemporaneous impact of child work on health but work undertaken during childhood raises the risk of illness up to five years later and the risk is increasing with the duration of work and there is no evidence that work impedes the growth of the child.

Francavilla and Lyon (2003) investigated the relationship between involvement in household chores and child health by using survey datasets from six countries, namely Guatemala, Guinea, Peru, Zambia, Brazil and Kazakhstan. The descriptive statistics revealed that there was no clear correlation between household chores and health in the six countries.

Guarcello et al. (2004) looked into the relationship between the intensity of children's work (i.e., children's weekly working hours) and children's health outcomes, making use of household survey data from Bangladesh, Brazil, and Cambodia. The analysis revealed a causal relationship between working hours and children's health outcomes on one hand, and children's health and safety on the other. Marginal effects indicated that each additional weekly hour of work adds about 0.3 percentage points to the probability of suffering work related ill-health in Cambodia, and about 0.1 percentage points to the probability of sustaining a work-related injury in Brazil.

Rosati and Straub (2006) examined the long term impact of child labor on health in Guatemala by controlling the unobserved household specific characteristics. In order to control the unobserved household specific effects, they estimated a conditional fixed effect model using data on siblings. Their results reinforced the conventional wisdom that the child labor is harmful for health in the long run. The estimated effect showed that working as a child led to an increase of 40 percent chances of having bad health as an adult.

Smith (2009) found that an individual's health status during childhood has direct and indirect effects on financial outcomes, including one's ability to earn, total family income, and wealth.

Some of this negative financial impact of poorer childhood health is felt immediately in lower levels of financial resources at the beginning of the adult years while the other is realized through lower growth rates with age in these financial resources. Orazem and Lee (2007) examined whether adults who worked as children experience increased incidence of illness or physical disability. Their results show that the effects of child labor on adult health are complex. When considered in isolation, child labor appears to increase the likelihood of poor health outcomes in adulthood. This result is consistent with evidence that early entry into the labor market and early exit from school is correlated with entry into typically hazardous adult occupations. However, on the basis of data of self reported health as an adult (Orazem and Lee 2009) it is found that delaying entry into child labor while increasing time in school significantly lowers the probability of early onset of physical ailments such as back problems, arthritis, or reduced strength or stamina.

In this paper we are interested in finding the morbidity pattern of the child workers of Ramna Etbar Nagar, a remote village in West Bengal, India. All the child workers in the village are engaged in production of '*Gamchha'*, a traditional napkin, with the help of traditional handloom. We also want to see the impact of socio-economic and demographic variables on morbidity.

We start with a survey of some of the findings on the studies on health status of child workers that were carried out in India and in other countries. In the subsequent sections the data collected by one of the authors (JKP) are analyzed to see the morbidity patterns of the child workers of the Ramna Etbar Nagar village, West Bengal India. We also find the relation between the morbidity pattern and the socio-demographic parameters of these children.

## MATERIAL AND METHODS

The study is based on primary data collected through the field visits to the handloom units in each household as well as interviews and discussions with children and parents working with handloom. The detailed field survey for the present study was conducted during the months of March 2008 to August 2008. The total number of households visited were 327, and in each household only one child between the ages 5-14 was selected for interview.

According to the West Bengal Human Development Report 2004, the Human Development Index (HDI) for the Murshidabad district is 0.46, while it is 0.45 for the Purulia and 0.44 for the Malda district. Thus, the position of Murshidsbad District is the third lowest. This fact coupled with the access to the households for collection of data prompts the researcher to choose Etbar Nagar Mouza of Domkal Block for the field survey. Furthermore, Domkal is directly connected by road from Kolkata that helps us to collect data in a convenient manner. Thus, the present study is not based on data collected from households which are sampled under rigorous sampling procedure. It is rather a case study. This district has been selected because it is one of the poorest districts in the State of West Bengal and this location has been selected because the child labor is predominant in this area and the place is well accessible for collection of data.

The households have been selected using Simple Random Sampling without Replacement (SRSWOR) technique. 327 households among 1345 households in Ramna Etbar Nagar have been selected. The data were collected from the parents and children between the age group of 5 to 14 years.

Variables considered in the study are many. We ignored some of these variables since these variables were seen to have very less degree of relations with the morbidity. Here we have constructed two artificial variables combining groups of similar variables. These are Enlightenment Index (EI) and Standard of Living Index (SLI). The Enlightenment Index consisted of the following variables: Educational level of the head of household (DEduHoH), Educational level of the spouse of head of household (DEduWife), Whether the head of household trusts family planning (DTrustFP), What should be the ideal number of children in a family (DIdealC2), Whether number of male children and number of female children should be equal (DGendEq), Whether family planning is against the religion (DFPXRel), Opinion about up to what level children should be educated (DMaxStdy), Reasons for working (DWhyWork), Frequency of watching TV (DWatchTV) and Frequency of listening to radio (DLisRad). The Enlightenment Index (EI) is nothing but the sum of these values divided by the maximum possible value 11. The Standard of Living Index (SLI) similarly is found from the following variables: number of rooms (maximum

is 5) (rooms), Nature of the house (DNature), Whether there is separate kitchen (DSepKitc), Type of toilet (DToilet), Type of bathroom (DBathRm), Use of electricity (DElectrc), Type of work shed in the working place(DWorkShd), Whether the household is in the below poverty line level (DBPL) and amount of assets in the house (DAssets). The Standard of Living Index (SLI) is the sum of these values divided by the maximum possible value 20. The list of the variables along with the notations used is given in Table 1.

All the members in the village are Muslims. But there is hierarchy also among Muslims. It was possible to divide all Muslims into two groups, e.g., there are some sects like Ansari, Zola and Momin etc. in Muslims who fall under the category of Other Backward Castes (OBC). Thus, there are 107 households in the higher status group and 220 households in the other

**Table 1: Notation and description of important variable used in this paper**

| *S. No.* | *Variables* | *Notation used* | *Comments* |
|---|---|---|---|
| 1 | Caste of the households | Dcaste | Caste is the manifestation of closed system of stratifications and socially significant |
| 2 | Type of family of the households | Dtypefam | Whether the family is nuclear or joint |
| 3 | Number of male members in the households | Nomale | Male members contribute to earnings of the household and earning may have influence on the diseases |
| 4 | Number of female members in the households | Nofemale | Female members usually take care of the hygienic situation |
| 5 | Number of children of age d" 14 | Dtotal14 | Total number of children of age 14 or less in the household |
| 6 | Size of the households | Hhsize | Larger the household size lesser is the care of health and prevention to disease. However, it is not advisable to take No male, No female and Hhsize together which will give rise to multicollinearity problem |
| 7 | Educational attainment of head of the household | Deduhoh | Educational level plays an important role in eradicating child labor. If the parents are educated then they can take care of the children well |
| 8 | Whether the household has work shed | dworkshd | Place for weaving '*gamcha*' (napkins) etc. Working in the work shed provides proper environment to the workers. Working in the corridor or even in the living room may cause disease due to chemicals in the raw materials |
| 9 | House type | Dmat2grp | Whether the house is "*kutcha*" or "*pucca*" |
| 10 | Whether the family is below the poverty level | Dbplyes | This signifies whether a family is below poverty level (bpl) |
| 11 | Price of the '*gamcha*' | Dprice2 | The price of *gamcha* varies from person to person. It is mainly the burgeoning power singly or collectively. Earning more means spending more for consumption towards a better living leading to better health |
| 12 | Total monthly expenditure of the family | Dtotexpg | Total monthly expense is the indicator of the family status |
| 13 | Sex of the child | Dsexch | This is necessary to see whether there is any gender effect on the morbidity pattern arising out of discrimination between male and female children |
| 14 | Whether the children go to the school | Dgoschoo | Whether the child worker goes to school |
| 15 | Enlightenment | Dei2grp | It is calculated on the basis of a set of variables related with enlightenment |
| 16 | Standard of living | DSLI2Grp | It is calculated on the basis of a set of variables related with standard of living |
| 17 | Expenditure on education | DexpEdu | |
| 18 | Whether the children listen to television | Dlistvgr | It may have positive effect on health |
| 19 | Whether the children listen to radio | Dlisrad | It may have some effect on health |
| 20 | Whether the child has rest time | Dresttme | It may have positive effect on health |

group in the village. Higher status Muslims are given value 1 against 0 for others. 282 of the families are nuclear. The rest 45 families are joint families. Level of education of most of the head of households is primary (235). The rest of the heads have higher educational levels. Level of education of spouses of most of the head of households is also primary (291). Number of rooms in most cases are less than or equal to 3. Only 2 households have 4 rooms and 1 household has 5 rooms. 74 houses are *kutcha*, 55 are *pucca* and the rest 198 houses are *kutcha-pucca*, i.e., mixed type. Most of the families did not have separate kitchen (222). 78 of the households did not have any toilet facilities at all. Also, 183 households did not have any bathroom. 170 houses were without any electricity. The above description is sufficient to give us an idea about the socio-economic conditions of most of the people in the selected area.

## RESULTS

### Morbidity Patterns among the Child Workers of Ramna Etbar Nagar Village

The children of the Ramna Etbar Nagar in the family based handloom industry were working and living in a very poor state of affairs. All the children were generally sent to the Dumkol Sub-Divisional Hospital for their treatment. We asked the children whether they had fallen sick during the last two weeks. Generally the children were ailing from the Cough and Cold, Abdominal Pain, Chest Pain, Neck Pain, Eye Infection, Ear Infection, Tooth Infection, Neck Pain, Anemia, Breathing Problems, Fever and Skin Problems. We put the data in binary form. In case of 'Yes' the value assigned is 1, and for 'No' the value is 0. Table 2 indicates the frequency of the disease suffered by the children during the last two weeks.

Since the frequencies of breathing problems (2), skin problem (2), anemia (1), allergy (1) and vomiting (1) are very less we merge it into one group of diseases and omitted these diseases from the list and analyzed the causes of other diseases only. We can see from the above list that most of the children suffered from cough and cold, which is the most common type of illness in tropical region. Since the work involves a lot of physical work mostly sitting at a place, we suspect that the children are likely to suffer from neck pain. Surprisingly we found only a small number of children having neck pain. Instead, they suffered from other pains like abdominal pain and chest pain. Chest pain may be caused due to the type of work they perform. But abdominal pain should be due to other reasons like food habits and diet pattern. Unfortunately, we do not have systematic data on the diet pattern and food habits of these children. Frequencies of eye, ear and tooth infections are not much and are expected to be so even in non-working children. Diarrhoea and abdominal pains may be interrelated. But there is no child who is suffering from both. When the frequency of one variable is very small, it is useless to analyze the variable statistically. Also, there may be very small cross frequencies. In that case the statistical tests e.g., 'Chi-square', 'F' etc. tests are not valid.

**Table 2: Descriptive statistics of some selected diseases**

| *Diseases* | *Number of children* | | *Percent of children* | |
|---|---|---|---|---|
| | *Did not suffer* | *Suffered* | *Did not suffer* | *Suffered* |
| Cough and cold | 199 | 128 | 60.9 | 39.1 |
| Abdominal pain | 251 | 76 | 76.8 | 23.2 |
| Chest pain | 254 | 73 | 77.7 | 22.3 |
| Fever | 270 | 57 | 82.6 | 17.4 |
| Tooth infection | 297 | 30 | 90.8 | 9.2 |
| Neck pain | 305 | 22 | 93.3 | 6.7 |
| Diarrhoea | 307 | 20 | 93.9 | 6.1 |
| Ear infection | 312 | 15 | 95.4 | 4.6 |
| Eye infection | 315 | 12 | 96.3 | 3.7 |
| Other problems* | 320 | 7 | 97.9 | 2.1 |

*Other problems include breathing problem, skin problem, allergies, vomiting or anemia

### Impact of Socio-economic and Demographic Variables on Morbidity

Among the various socio-economic and demographic variables, which seem to have influence on the types of illness mentioned above, we have taken some variables that have been collected during the survey along with the constructed dummy variables that have considerable frequencies of occurrences so that a meaningful analysis is possible.

The Pearson correlation coefficients have been calculated for the illness variables with the associated socio-demographic variables. It is shown in Table 3.

Strictly speaking the coefficients and the associated tests are not meaningful since these variables are not continuous. But the values can

**Table 3: Pearson correlation coefficients of illness and the associated variables**

| *Sv* | *Dabd pain* | *Dcgh cold* | *Deye inf* | *Dfever* | *Dchst pai* | *Dneck* | *Dear inf* | *Dteeth* | *Ddiarrh.* |
|---|---|---|---|---|---|---|---|---|---|
| 01. Dcaste | 0.064 | 0.322*** | 0.141** | 0.006 | 0.017 | 0.073 | 0.096* | 0.049 | -0.151*** |
| 02. Dtypefam | -0.095* | -0.116 | -0.064 | 0.020 | 0.001 | -0.070 | -0.125 | 0.065 | 0.028 |
| 03. Nomale | -0.139** | -0.026 | 0.006 | 0.017 | -0.045 | -0.040 | 0.013 | -0.001 | 0.106* |
| 04. Nofemale | 0.054 | 0.139** | 0.004 | -0.029 | 0.042 | -0.021 | 0.041 | -0.063 | -0.060 |
| 05. DTot142g | 0.042 | 0.071 | 0.067 | -0.116 | 0.053 | -0.019 | 0.008 | 0.012 | 0.062 |
| 06. DHhsize2 | -0.056 | 0.028 | 0.051 | 0.037 | 0.006 | -0.014 | 0.050 | -0.021 | 0.002 |
| 07. Deduhoh | -0.135 | -0.140** | -0.014 | 0.179*** | -0.107* | 0.022 | -0.040 | -0.057 | -0.018 |
| 08. Dworkshd | -0.042 | -0.095* | -0.106** | 0.133** | -0.100* | -0.030 | 0.054 | 0.028 | -0.018 |
| 09. Dmat2grp | -0.021 | 0.087 | 0.020 | -0.122** | 0.003 | 0.017 | 0.076 | 0.058 | -0.058 |
| 10. Dbplyes | 0.030 | -0.038 | 0.065 | -0.111** | -0.139** | 0.115** | -0.066 | -0.006 | 0.058 |
| 11. Dprice2g | -0.205*** | -0.289*** | -0.102* | 0.028 | 0-.012 | -0.112** | -0.098 | 0.004 | 0.071 |
| 12. Dtotexpg | 0.044 | 0.235*** | 0.061 | -0.085 | 0.085 | 0.026 | 0.080 | 0.000 | -0.076 |
| 13. Dsexch | -0.165*** | 0.000 | 0.036 | -0.017 | 0.016 | 0.004 | -0.041 | 0.005 | 0.157*** |
| 14. Dgoschoo | 0.047 | 0.115** | -0.025 | -0.042 | 0.067 | -0.026 | 0.070 | 0.030 | -0.043 |
| 15. Dei2grp | -0.062 | -0.182*** | 0.047 | 0.015 | -0.018 | 0.078 | -0.015 | 0.066 | 0.009 |
| 16. Dsli2grp | -0.020 | -0.049 | 0.000 | 0.120** | -0.021 | -0.009 | 0.062 | 0.022 | 0.009 |
| 17. DExpEdu | 0.094 | 0.188*** | 0.041 | -0.097* | 0.125** | 0.047 | 0.063 | 0.043 | -0.024 |
| 18. Dlistvgr | 0.001 | -0.181*** | -0.003 | -0.074 | -0.005 | 0.034 | 0.064 | 0.015 | 0.075 |
| 19. Dlisrad | -0.101 | -0.280*** | -0.043 | -0.032 | 0.009 | -0.063 | -0.026 | -0.017 | 0.038 |
| 20. Dresttime | -0.045 | 0.019 | 0.124** | -0.058 | -0.048 | 0.092* | -0.062 | -0.004 | -0.029 |

***: Significant at 1 percent level.**: Significant at 5 percent level. *: Significant at 10 percent level.
(Significance tests of correlation coefficients have been made assuming a continuous bivariate distribution)

be compared with each other to see the relative importance. Also, the direction of influence can be found by noting the sign of the values. We have also prepared a number of two-way tables taking the type of disease at one hand and the suspected causing variable on the other side. The tables are not being presented here due to shortage of space. As already mentioned, some of the illnesses like breathing problems, tooth infection and diarrhoea have been taken out of consideration because of very low frequency of occurrence. We summarize these findings through Table 4, which gives the chi-square á-values arising out of the contingency tables. The variables for which the á-values are found to be less than 0.05 are of interest, because these are the variables which affect the diseases significantly.

One can see that the Tables 3 and 4 more or less give similar pictures of association though the chi-square test of contingency is more scientific. The only advantage of the correlation table is that it gives the direction of relation, that is, when the value of one variable increases, whether the value of the other variable also increases. If it is so then it is positive and in the opposite case it is negative. For each illness, we have thus a long list of 20 variables from which we shall have to choose a subset according to the significance level given in the above table. We have performed binary logistic regression of the illness on these predicting variables. Starting with the maximum number of plausible predicting variables we have deleted variables by group or one by one that least affected the type of disease concerned, as found by the t-values of the coefficients of the Logistic Regression, and/or contributed to high inflation factor, as found by the corresponding linear regression, which signifies multicollinearity. To guard against multicollinearity[1] we have found the condition index[2]. The value of the condition index greater than 30 gives signals to the existence of multicollinearity. The result of the linear regression model along with the goodness of fit values is shown corresponding to each logistic regression model of each type of illness. Choice of regressors is a strenuous process and is found by trial and error method. Sometimes we have added some new variables after deleting a set of variables. The final results are shown in Table 5.

Abdominal pain is negatively related with education level of head of the household, price of *gamchha* and listening to radio (Table 5). Girls suffer more from it. Abdominal pain may be due to irregular consumption of food. Less educated families may be unaware of danger of suffering from various stomach problems including acidity and then gastric ulcer due to sustained irregularity in the consumption habit of food. Extreme poverty also may force the children taking meals irregularly. But this is not reflected here to

**Table 4: Values of the chi square for contingency tables between diseases and the associated variables**

| *Variables* | *Abd pain* | *Cold cough* | *Fever* | *Chest pain* | *Neck pain* | *Ear infection* | *Eyeinfection* |
|---|---|---|---|---|---|---|---|
| 1. Dcaste | 0.266 | 0.000*** | 1.000 | 0.778 | 0.239 | 0.082* | 0.023** |
| 2. Dtypefam | 0.090 | 0.048** | 0.834 | 1.000 | 0.204 | 0.041** | 0.220 |
| 3. Nomale | 0.002*** | 0.898 | 0.309 | 0.401 | 0.721 | 0.136 | 0.998 |
| 4. Nofemale | 0.444 | 0.173 | 0.443 | 0.226 | 0.994 | 0.683 | 0.007*** |
| 5. DTot142g[3] | 0.508 | 0.208 | 0.039** | 0.350 | 0.824 | 1.000 | 0.372 |
| 6. DHhsize2 | 0.390 | 0.622 | 0.525 | 1.000 | 1.000 | 0.391 | 0.349 |
| 7. Deduhoh | 0.014** | 0.012** | 0.002*** | 0.056* | 0.806 | 0.570 | 1.000 |
| 8. Dworkshd | 0.534 | 0.106 | 0.023** | 0.082* | 0.794 | 0.348 | 0.075* |
| 9. Dmat2grp | 0.700 | 0.127 | 0.032** | 1.000 | 1.000 | 0.324 | 1.000 |
| 10. Dbplyes | 0.584 | 0.551 | 0.047** | 0.012** | 0.060* | 0.279 | 0.352 |
| 11. Dprice2g | 0.001*** | 0.000*** | 0.743 | 0.880 | 0.078* | 0.132 | 0.095* |
| 12. Dtotexpg | 0.472 | 0.021** | 0.996 | 0.287 | 0.153 | 0.000*** | 0.186 |
| 13. Dsexch | 0.004*** | 1.000 | 0.773 | 0.792 | 1.000 | 0.599 | 0.569 |
| 14. Dgoschoo | 0.064* | 0.042** | 0.514 | 0.239 | 0.627 | 0.253 | 0.743 |
| 15. Dei2grp | 0.279 | 0.001*** | 0.880 | 0.783 | 0.178 | 0.789 | 0.546 |
| 16. Dsli2grp | 0.782 | 0.402 | 0.044** | 0.779 | 1.000 | 0.273 | 1.000 |
| 17. DExpEdu | 0.101 | 0.001*** | 0.095* | 0.031** | 0.462 | 0.370 | 0.738 |
| 18. Dlistvgr | 1.000 | 0.001*** | 0.184 | 1.000 | 1.000 | 0.619 | 1.000 |
| 19. Dlisrad | 0.089* | 0.000*** | 0.662 | 0.895 | 0.277 | 0.793 | 0.560 |
| 20. Dresttime | 0.425 | 0.817 | 0.301 | 0.416 | 0.116 | 0.287 | 0.032** |

***: Significant at 1 percent level.**: Significant at 5 percent level. *: Significant at 10 percent level.

**Table 5: Result of logistic regression of on the socio-demographic variables**

| *Variables* | *Abdominal pain* | *Cough and cold* | *Eye in fection* | *Fever* | *Chest pain* | *Neck pain* | *Ear pain* | *Diarrhea* |
|---|---|---|---|---|---|---|---|---|
| Constant | -0.038 | -0.553 | -8.905 | 0.086 | -1.935 | -4.590 | -3.012 | -2.930 |
| | (0.892) | (0.200) | (0.000) | (0.883) | (0.000) | (0.000) | (0.009) | (0.000) |
| Education of head of house hold | -0.652 | -0.474 | | 1.004 | -0.666 | | | |
| | (0.059) | (0.140) | | (0.004) | (0.068) | | | |
| Whether below poverty level | 0.245 | 0.416 | 1.873 | | -0.912 | 1.614 | -0.589 | |
| | (0.423) | (0.188) | (0.016) | | (0.008) | (0.003) | (0.395) | |
| Price of *gamchha* | -0.813 | -0.778 | | | | | | |
| | (0.009) | (0.012) | | | | | | |
| Sex of child | -0.777 | | 0.594 | | 0.191 | | | 1.486 |
| | (0.006) | | (0.365) | | (0.494) | | | (0.011) |
| Whether listens to radio | -0.294 | -1.088 | -1.160 | | 0.376 | -1.201 | | |
| | (0.352) | (0.001) | (0.130) | | (0.262) | (0.041) | | |
| Caste | | 1.303 | 2.622 | | | 1.025 | 0.632 | -2.234 |
| | | (0.000) | (0.002) | | | (0.061) | (0.261) | (0.032) |
| Type of house | | 0.720 | | -1.292 | | | 1.413 | -0.843 |
| | | (0.038) | | (0.002) | | | (0.184) | (0.158) |
| No.of children of age $\leq$ 14 | | | | -0.264 | | | | |
| | | | | (0.148) | | | | |
| DTot142G | | 0.323 | 1.293 | | 0.278 | -0.158 | | |
| | | (0.234) | (0.097) | | (0.350) | (0.748) | | |
| Level of enlightenment | | 0.299 | 1.763 | -0.475 | 0.214 | 1.460 | | |
| | | (0.368) | (0.043) | (0.187) | (0.536) | (0.022) | | |
| Standard of living | | -0.575 | | 1.045 | -0.237 | | | 0.651 |
| | | (0.068) | | (0.007) | (0.442) | | | (0.253) |
| Does the child has rest time? | | | 2.061 | -0.428 | | 0.807 | -0.660 | |
| | | | (0.059) | (0.200) | | (0.142) | (0.225) | |
| Expenditure on education | | | | -0.580 | 0.736 | 0.528 | | |
| | | | | (0.116) | (0.053) | (0.421) | | |
| Family type | | | | | | -0.564 | -1.299 | |
| | | | | | | (0.344) | (0.030) | |
| -2 Log likelihood | 322.290 | 352.733 | 78.607 | 270.635 | 322.756 | 139.588 | 110.875 | 131.258 |
| Cox and Snell $R^2$ | 0.080 | 0.196 | 0.072 | 0.091 | 0.055 | 0.064 | 0.033 | 0.057 |
| Nagelkerke $R^2$ | 0.120 | 0.266 | 0.265 | 0.151 | 0.085 | 0.163 | 0.105 | 0.155 |

that extent. This is, however, partially reflected by the fact that the children with less attack of stomach pain usually get higher price of *gamchha* prepared by them. Higher price means more income. Higher price may reflect higher quality, but there is no evidence that higher price leads to production of less number of *gamchha.*

When we perform logistic regression for cough and cold we get some mixed results as shown in Table 5. Children of enlightened households have less risk of catching cough and cold. Price of *gamchha,* which varies from household to household, is a sign of bargaining power and awareness to the economic situation. The children of households, who get higher price for their *gamchha,* are less likely to suffer from cough and cold. This is also confirmed by the fact that attack of cough and cold is negatively related with standard of living. Again, those who listen to radio are expected to be more knowledgeable than others. They also get some rest when they listen to radio. All these factors lead to less attack of cough and cold. However it is not clear why the higher caste children suffer more from cough and cold. Is it because higher caste people have less immunity due to less work habit? It is also not clear why the children residing in *pucca* house will suffer more from it. Number of children in a family may also become a factor.

The same is true with eye infection also. High caste children are more prone to be infected with eye diseases which are sometimes contagious. Eye infection has been found to be positively related with household size, especially with the number of children. If there is some kind of conjunctivitis caught by a member in the household, it is likely that the other members in the household will also catch the same disease. Thus, the probability of catching it is higher with larger household size. The puzzling fact is that richer (among the poor) and more enlightened children are more likely to have eye infection. This is also true for children who get more rest time.

*Pucca hous*es (that is, made of Bricks or RBC) protect children from attack of diseases. In Table 5 this is found to be true in case of fever. But, children of educated families are seen to suffer more from fever. It is also strange to get a positive relation between standard of living and attack from fever.

Poor children suffer less from chest pain. Chest pain has been found to be more in the families with large number of children. Also, children of more educated households suffer less from chest pain.

There are four variables which significantly affect neck pain of children. These are castes, poverty, overall enlightenment and enlightenment through listening to radio. All these variables except listening to radio have positive effect on neck pain. Poor children suffer more from it.

Children of joint families have been seen to suffer from ear infection more than the children of nuclear families though there is no apparent explanation behind it.

Tooth problems usually occur only at higher ages. In our survey also we have found only a few children who suffered from it. Moreover, none of the variables considered by us have been found to be responsible for it.

The effective variables towards occurrence of diarrhea are also sought through logistic regression. Diarrhoea has been seen to occur only with lower caste children that too with boys. Boys usually take outside food and are usually seen to be less hygienic.

## DISCUSSION

The child workers of Ramna Etbar Nagar village suffer mostly from abdominal pain, cough and cold, fever and chest pain. Chest pain is not a common type of illness among the children. It is possibly due to excess physical work.

It is seen from the logistic regression that children of higher caste are more vulnerable to most of the diseases. It is strange to note that the children of higher educated heads are more prone to suffer from fever but are not likely to suffer from abdominal or chest pain. It is also seen that the variables "total number of children under 14", "rest time for children" and "expenditure on education" do not have much significant influence on any of the diseases. However, "total number of children under 14" appears in the most of the regressions with positive influence on the diseases in most cases. Thus, higher the number of children in the family, higher is the risk. Other factors have pronounced effect only to a few of the diseases.

## CONCLUSION

One should not forget that most of the families in the selected village are poor and others

are in the borderline cases. Where hunger reigns supreme many of the variables are not expected move in the right direction. Still, we have found some results which are worth reporting. Moreover, children are more vulnerable to diseases especially in unfriendly situations (Yadav and Sengupta 2009).

An in-depth study of each of these diseases is necessary to arrive at some meaningful conclusion. Also, we need comparable data to assess the situations. Agnihotram (2005) found that the children employed in carpet weaving in the Jaipur city suffered substantially more from acute respiratory problems compared to normal children of the same community. Non-availability of such comparable data in our case restricts our analysis much. However, most of the studies in this field have the same limitations of dealing with factual data and without giving due consideration to the counterfactuals (O'Donnell et al. 2002).

## NOTES

1. Since logistic regression package does not have the provision for showing multicollinearity, we have also run the linear regression along with the logistic regression. The linear probability model (LPM) showed the values of the regression coefficients very close to those of logistic regression. LPM enables us to see the multicollinearity problem but does not give good forecast outside the range of predicting variables. If we are not interested in forecasting then we can as well take the LPM values.
2. Condition Index is the ratio between the maximum and the minimum of all Eigen values of a square matrix, the condition number is the square root value of the same. More specifically, condition index is the ratio between a specific Eigen value and the maximum of all Eigen values. Here the square matrix refers to the X'X matrix, where X is the matrix of observations of the predicting variables.
3. DTot142g: This variable takes value 0 for less than or equal to 1 children of age 14 or less and 1 otherwise.

## REFERENCES


Agnihotram RV 2005. An overview of occupational health research in India. *Ind J Occupational and Environmental Med,* 9: 10-14.

Ambedkar NN, Wahab SN, Zodpey SP, Khandait DW 1999. Effects of child labor on growth of children. *Pub Health,* 113: 303-306.

Banerjee SR, Bharati P, Vasulu TS, Chakraborty S, Banerjee P 2008. Whole time domestic child labor in metropolitan city of Kolkata. *Ind Pedia,* 45: 579-581.

Bhatt KN 2009. Child labor in *beedi* industry: Findings of a study in Allahabad. In: Vinod Chandra (Ed.): *Childhood Realities: Abused and Exploited Children.* New Delhi: Serial Publishers, pp. 6-20.

Burra N 1987. Exploitation of child workers in lock industry of Aligarh. *Eco Polit Week,* July11, pp. 1117-1121.

Burra N 1988. Exploitation of children in Jaipur gem industry, II health hazards of gem polishing. *Eco Polit Week,* January 23, pp. 131-138.

*West Bengal Human Development Report 2004.* Development and Planning Department, Government of West Bengal, West Bengal.

Edmonds Eric V 2009. *Public Health in the Economics of Child Labor*. Dartmouth College, IZA and NBER.

Francavilla F, Lyon S 2003. *Household Chores and Child Health: Preliminary Evidence from Six Countries.* Understanding Children's Work Discussion Paper, Innocenti Research Centre, Florence.

Guarcello L, Lyon S, Rosati FC 2004. Impact of Working Time on Children's Health. *Understanding Children's Work Discussion Paper*, Innocenti Research Centre, Florence.

ILO 2010. Accelerating Action against Child Labor. *Report of the Director-General, International Labor Conference*, 99th Session 2010, Report I(B), International Labor Office, Geneva.

Joshi SK, Sharma P, Pathak SS, Sitaraman S, Verma CR 1994. Health status of carpet weaving children. *Ind Pediatr,* 31: 571-574.

Karunanithi G 1998. Plight of pledged children in *beedi* works. *Eco Polit Week,* February 28, 450-452.

Laskar Baharul Islam 2000. Child labor in Aligarh lock industry. *Eco Polit Week,* February 12, 510-613.

Mitra S 1993. A study of the health conditions of child workers in a small scale leather industry in Calcutta. *Br J Ind Med,* 50: 938-940.

O'Donnell O, Van Doorslaer E, Rosati FC 2002. Child labor and health: Evidence and Research Issues. Working Paper, *UCW Project Working Paper Series.* Innocenti Research Centre, Florence. From <http://www.ucw-project.org/pdf/publications/standard_ChildLabor_Health_Review_withappendix. pdf>.

O'Donnel O, Van Doorslaer E, Rosati FC 2003. *Health Effects of Children's Work: Evidence from Vietnam.* UCW Project Working Paper Series. Innocenti Research Centre, Florence.

O'Donnell O, Rosati FC, Van Doorslaer E 2002. Child labor and health: Evidence and research issues. *Understanding Children's Work Discussion Paper*, Innocenti Research Centre, Florence.

Orazem Peter F, Chanyoung Lee 2007. Life time Health Consequences of Child Labor in Brazil. Department of Economics, Iowa State University, Ames IA 50011-1070. U.S.A. Lee. From <cylee@iastate.edu.Orazem: pfo@iastate.edu>.

Orazem Peter F, Chanyoung Lee 2009. Life Time Health Consequences of Child Labor in Brazil. Samsung Economic Research Institute, Korea, chanyoung7. lee@samsung.com and Department of Economics, Iowa State University, Ames IA 50011-1070, USA, From <pfo@iastate.edu>.

Remington, Francoise 1996. Child labor: A global crisis without a global response. *Eco Polit Week,* December 28, 3354-3355.

Rosati Furio, Ronald Straub 2006. Does work during childhood affect adult's health? An analysis for Guatemala. *Understanding Children's Work Discussion Paper*, Innocenti Research Centre, Florence.

Sekar Helen R 2007. Impact of technological change on the demand for child labor in brassware industries in Moradabad. *NLI Research Studies Series 047/ 2007*, Noida; NLI.

Smith, James P 2009. The Impact of Childhood Health on adult labor market outcomes. *IZA Discussion Paper No. 4274*, Bonn, Germany: IZA

Tata Madhavi 2008. The Wrapped Weft. *Out Look*, 25th Feb.68-69.

Yadav SK, Sengupta G 2009. Environmental and occupational health problems of child labor: Some issues and challenges for future. *J Hum Ecol*, 28: 143-148.