

Full Length Research Paper

Arsenicosis in rural areas of Bangladesh: Socio-demographic correlation

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Accepted 23 June, 2018

The aim of this study is to identify the impacts of socio-demographic variables on arsenicosis affected rural areas in Chapainawabganj district, Bangladesh. For this, a total number of 200 respondents have been interviewed through a structured questionnaire by purposive sampling technique. In this study, logistic regression model is used to identify the risk factors on arsenicosis. In this analysis, it is indicated that respondent's age, education, occupation, income and land ownership have high significant impacts on arsenicosis. Poor socio-economic groups are significantly higher and poor people suffer more from arsenic toxicity, more intervention activities may be useful for them.

Key words: Arsenicosis, socio-demographic variables, logistic regression analysis, Bangladesh.

INTRODUCTION

Bangladesh is one of the most densely populated countries with accelerated population growth in the world. Bangladesh is a small country of 147,570 square kilometers area with a population of around 147 million people in 2006 (934 people per square kilometers) (U.N, 2006) and 150 million population in 2007 (CIA, 2007). Bangladesh has already experienced the biggest catastrophe in the world due to arsenic contamination of drinking water. Approximately 35 to 77 million Bangladeshi are at risk of drinking water contaminated with arsenic (Smith et al., 2000). In Bangladesh, the susceptibility to arsenic-induced skin lesions by age and sex, in a population drinking water from its contaminated tube wells was assessed. Respondent's response relationship for both sexes and increased risk with increasing socio-economic status was also considered. Males had a higher risk of obtaining skin lesions than females. The results demonstrated that males are more susceptible than females to develop skin lesions when exposed to water from tube wells (Rahman et al., 2006). Arsenic-contaminated drinking water is highly toxic and hazardous to human health. Chronic exposure to high levels of

arsenic for a long time is reported to be associated with a variety of adverse health effects (Siegenthaler et al., 2005). In the context of Bangladesh, people who are living in houses with brick/concrete and cement walls, and floors are socio-economically better off than others. Similarly, possession of household amenities such as electricity and television are some of the indicators of high socio-economic status, as is food availability in the household. Food deficiency indicates that people are not well off. Many factors such as low income due to low education and having insufficient land may be related to the deficiency of food throughout the year. Our results revealed that relatively rich people (indicated by the above mentioned household characteristics) are at lower risk of drinking arsenic contaminated water compared to poor people. It is expected that socio-economically wealthy people are better educated and more health conscious than poor people (Hadi, 2003).

Thus, the purpose of the present work is to identify the factors affecting arsenicosis in affected rural areas of Chapainababganj district, Bangladesh. This paper is constructed as follows:

Sources of data are included in section 2; section 3 contains methodology of this study while results and discussion are narrated in section 4. Lastly, section 5 contains conclusion and recommendations.

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Table1. Profile of the respondents by socio-demographic variables.

Characteristics	Number of respondents	Percentage
Age (years)		
<30	72	36.00
30 - 39	91	45.50
40 and above	37	18.50
Sex		
Male	112	56.00
Female	88	44.00
Education		
Illiterate	29	14.50
Literate	171	85.50
Occupation		
Housewife	71	35.50
Agriculture	80	40.00
Others	49	24.50
Income (annual)		
Low income	105	52.50
Medium income	67	33.50
High income	28	14.00
Own land		
No	46	23.00
Yes	154	77.00

SOURCES OF DATA

In this study, a total of 200 respondents were questioned during the survey period in June, 2006. The respondents were randomly interviewed with some selected questions from several affected rural areas in Chapainababganj district, Bangladesh by purposive sampling technique. Various socio-economic and demographic variables were considered at the time of data collection. Socio-economic variables are education, occupation, income and landed property among others and demographic variables are age, sex among others while arsenicosis means arsenic patients.

METHODOLOGY

To test the association between the categorical variables, bivariate analysis is used in the present study. Logistic regression analysis was carried out using the software SPSS10.0. Logistic regression is a form of regression, which is used when the dependent is a dichotomy and the independents are of any type. In logistic analysis arsenicosis is treated as a dependent variable. Let Y be arsenicosis that is, a dichotomous dependent variable, which takes values 1 and 0. Y is classified in the following way:

$$Y_i = \begin{cases} 1, & \text{Arsenicosis occurred} \\ 0, & \text{Otherwise} \end{cases}, i=1,2,3, \dots, n$$

Respondent's age, sex, education, occupation, income and land owners are considered as independent variables.

RESULTS OF THIS STUDY

This analysis was able to examine 135 from the 200 (67.5%) respondents in the area for arsenic poisoning. About 36.00% of the respondents fell in the age group of less than 30 years while 45.5% were in age group 30 – 39 years and 18.5% lied in 40 years and above (Table 1). The proportion of male respondents was 56% and female was 44%. In this study, 85.5% respondents were literate (literacy means knowledge of words) and very few respondents were illiterate (14.5%) (Table 2). We observed that 35.5% respondents were engaged as housewives, 40% were agriculturist and 24.5% were of other occupations such as students, servicemen and teachers among others. Hence, 52.5% of the respondent's were annual-, 33.5% was medium- and only 14% were high-income earners (Table 2) while 77% of the respondents are land owners.

Respondent's ages have a high significant impact on arsenicosis (Table 3). Odds ratios suggested that arsenicosis in the age group 30 - 39 years was 3.412 times and in the age group 40 years and above, 4.254 times and thus at higher risks than that of the age group less than

Table 2. Logistic regression estimates for the impacts socio-demographic variables on arsenicosis as the dependent variable.

Risk factors	Arsenicosis			
	Co-efficient (B)	S.E of estimates (B)	Odds ratio	Confidence interval (95%)
Age				
<30(Ref.)	-	-	1.000	
30 - 39	1.227	0.418	3.412 ^{***}	1.504-7.740
> = 40	1.448	0.655	4.254 ^{**}	1.179-15.348
Sex				
Male (Ref.)	-	-	1.000	
Female	-0.503	0.717	0.605	0.148-2.464
Education				
Illiterate (Ref.)	-	-	-	
Literate	-1.685	0.502	0.185 ^{***}	0.065-0.495
Occupation				
Housewife (Ref.)	-	-	-	
Agriculture	-1.682	0.788	0.186 ^{**}	0.040-0.872
Others	-1.085	0.671	0.338	0.091-1.258
Income (annual)				
Low income (Ref.)	-	-	-	
Medium income	-0.700	0.406	0.454 ^{**}	0.205-1.006
High income	-0.847	0.516	0.429	0.156-1.177
Own land				
No (Ref.)	-	-	-	
Yes	-0.989	0.517	0.372 ^{**}	0.135-1.024
Constant	2.707	0.963	14.987 ^{***}	

Model chi-square: 55.795; -2Loglikelihood: 196.438; R²: 0.243^{***}Significant at p < 0.01; ^{**}Significant at p < 0.05; *Significant at p < 0.1 Ref: reference category.

Table 3. Correlation co-efficient of arsenicosis by selected socio-demographic variables.

	Y	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
Y	1.000	0.314 ^{**}	0.307 ^{**}	-0.260 ^{**}	-0.225 ^{***}	-0.179 ^{**}	-0.202 ^{**}
X ₁		1.000	0.539 ^{**}	-0.079	-0.569 ^{**}	-0.044	-0.258 ^{**}
X ₂			1.000	0.081	-0.326 ^{**}	-0.121	-0.117
X ₃				1.000	0.041	0.043	0.124
X ₄					1.000	0.195 ^{**}	0.154 [*]
X ₅						1.000	-0.012
X ₆							1.000

*Correlation is significant at the 5% levels, **Correlation is the significant at the 1% levels. Y= arsenicosis; X₁= age; X₂ = sex; X₃= education; X₄= occupation; X₅= income (annual); X₆ = own land.

30 years in the population (Table 2). In this analysis, education has a link with arsenicosis; that association was statistically significant (Table 3). The odds ratio 0.185 means that literates are 0.185 times at lower risk than illiterates. Occupation is one of the most important indicators of socio-demographic status of the patients. From study areas; housewives are at more risks for arsenic than agriculturist and other groups such as students,

teachers and servicemen among others. Housewives, who are handling arsenic contaminated water, are more exposed to the risk of arsenicosis. Housewives are more connected with tube well water for cooking and washing as well as drinking arsenic contaminated tube well water along with others hence, they are more exposed to the risks of arsenicosis. Respondent's occupation is found to have a strong and positive influence on arsenicosis. The

odd ratio 0.186 for the respondents who are engaged in agricultural occupation shows that they are 0.186 times at lesser risk compared to housewives. Income is the important indicator of the socio-demographic status of the patients. Since majority of the patients mainly come from the group of housewives and students, they depend on the income of their family members or others and as such, they have no income sources. The medium and high income groups have odd ratios of 0.454 and 0.429, respectively, which suggests low risks to arsenics than the low-income group; thus it was statistically significant. This results show that, the odd ratio 0.372 predicts 0.372 times lower risks to arsenics for those who are land owners than those who are not, but it was statistically significant (Table 2).

CONCLUSION AND RECOMMENDATION

In this study it was found that, 45.90% (majority of respondents) were in the age group 30 - 39 years while 18.50% were in the age group 40 years and above. The proportion of male respondents was more. One-third of the respondents were literate and very few respondents were illiterate. It was observed that 35.5% respondents are engaged housewives, 40% were agriculturist and 24.5% were of other occupations such as students, serviceman and teachers among others. It was found that age group 30 - 39 and 40 years and above where at risk than age group less than 30 years and thus increased

arsenicosis in the old populations. In the study areas, literate respondents are at lower risk to arsenicosis than illiterates. Housewives are more connected with tube well water for cooking and washing thus, they are more exposed to the risks of arsenicosis. It is therefore recommended that provisions for education and more employment opportunities for respondents should be made to increase their consciousness about health, especially women empowerment in rural areas.

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