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Assessment of the Social Impact of Arsenicosis Through Groundwater Arsenic Poisoning in Malda District

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Abstract

Arsenic (As) concentration in groundwater is a significant environmental issue for the different parts of the Ganga basin. The social status of the inhabitants of Malda district has been profoundly distressed by groundwater arsenic toxicity as several symptoms and diseases have been stimulated by the widespread arsenic exposure. Moreover, the systematic study on this vital issue is scarce for the study area and West Bengal. Therefore, the present study has been conducted to depict the social impact of arsenicosis due to arsenic contamination in the groundwater of Malda district of West Bengal. The results show that the most prominent social hazards are difficulties in getting married to arsenicosis victims' women, the problem of social instability, the dominance of the dowry system, preferences to remain unidentified, and the mental stress of women, etc. A mean vulnerability score of the social hazards index (0.65) suggests the arsenicosis victims have endured an assortment of the high level of different social vulnerability due to arsenicosis illness. To overcome the social hazards, increase the study of the environmental education and knowledge of empowerment as it helps to overcome the traditional culture, ostracism, and some superstitious problems related to arsenicosis.

Keywords

Arsenic · Groundwater contamination · Arsenicosis · Social impact

15.1 Introduction

Water, a fundamental element of life, is caused to death when contaminated. So, the water quality should be adequately sustained (Yadav et al. 2012, 2015). Generally, the groundwater is more dangerous to use when it is highly contaminated due to its close interaction with the various minerals such as Fluoride, Salt, Iron, Arsenic, etc., present in the aquifers (Chakraborty et al. 2011). In 1984 groundwater arsenic contamination was discovered in the lower Ganga Plain of West Bengal (Garai et al. 1984). Arsenic is a ubiquitous element in the earth's crust. Still, less

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than 1% of most rocks, coals, and soils constitute this element (Alam et al. 2002), generally released from minerals and some geogenic sources. Human activities have also caused extensive groundwater arsenic contamination in different parts of the world (Rahman et al. 2018; Smith et al. 1998). Due to the significant level of arsenic concentration, groundwater contamination is also a crucial environmental and social issue in Southeast Asian countries.

Extensive groundwater arsenic contamination has affected the highly populated and comparatively low-lying area of Bhagirathi–Ganga delta plain in the southern part of West Bengal (Nickson et al. 1998). Generally, arsenic has naturally released in flood plain sediments (Kinnibugh and Smedley 2001; Acharyya et al. 2005). In West Bengal, the arsenic-polluted areas are primarily located in the east of the Bhagirathi River (Nickson et al. 1998). The severe arsenic-contaminated districts of West Bengal are Malda, Murshidabad, Nadia, North 24 Parganas, South 24 Parganas, Burdwan, Hoogly, Howrah, and Kolkata (Rana 2013; Das 2013, 2015; Farooq et al. 2011). The intensity of the arsenic-caused health effects in the Malda district is too high, and it is the worst-hit arsenic-affected district of West Bengal. The arsenic-affected blocks of Malda district are Kaliachak-I, Kaliachak-II, Kaliachak-III, Manikchak, and English Bazar, Ratua–I, and Ratua–II. So, the arsenic contamination has been considered a localized threat for the inhabitants of the Malda district, where 12 lakh populations of 229 villages of seven blocks of the district and about 696,822 populations are afflicting this problem which is really of considerable concern.

Subsequently, the social status of the inhabitants has been profoundly distressed by such groundwater arsenic toxicity as several symptoms and diseases have been stimulated by the widespread arsenic exposure to human beings (Rahman et al. 2018; Chatterjee et al. 2010). Accordingly, it has generated some societal problems (Ahmed et al. 2011). Furthermore, the hazardous impact of arsenic poisoning has significantly influenced the victims' social lives (Hassan et al. 2005) and ultimately distorted the populations' social structure (Chowdhury et al. 2006). Arsenic contamination has acquired an enormous social impact on its victims in the arsenic-prone region of the study area. Finally, arsenicosis illness triggers social nuisance. Hence, the present chapter has explored the social impact of arsenic toxicity on peoples' daily lives. Moreover, this chapter has focused on the social hazards and the social risk of arsenicosis illness. So, the principal objective of this research work is to find out the social impact of arsenicosis on the inhabitants of the study area.

15.2 Database and Methodology

15.2.1 Study Area

Malda district has been chosen as the study area being located within the latitudes of 24°30′ N to 25°32′ N and longitude of 87°48′ E to 88°30′ E, covering an area of 3566.17 km^2 (Fig. 15.1). The Malda district is divided into15 blocks. Among them, seven blocks are contaminated, having beyond the permissible limit of arsenic concentration in groundwater (0.05 mg/l, Indian standard). Kaliachak-I, Kaliachak-II, Kaliachak-III, Manikchak, and English Bazar are severely affected, whereas, Ratua–I and Ratua–II are less affected. In these blocks' the maximum concentration of arsenic in a shallow tube well varies between 0.072 and 0.929 mg/l (PHE, Malda). The rest of the blocks bear an insignificant amount of arsenic (Fig. 15.2). Moreover, a considerable number of tube wells were contaminated with the presence of arsenic. The water supply depends on groundwater (Madhavan and Subramanian 2006) extracted from the shallow aquifers. In general, the district is a low plain area with a general slope from north to south. It comprises alluvial soil originating from the different rivers like Ganga, Kalindi, Tangon, Punarbhaba, and Mahananda. The Ganga is the principal river of the Malda district. This river moves through the western part of the study area, flowing through the block of Manikchak, Kaliachak-II, and Kaliachak-III. The elevated arsenic occurrences in the groundwater were

found in alluvial sands, concentrated away from the Ganga margin (Purkait and Mukherjee 2008). Additionally, the Holocene sediments coming from the Himalayan Mountain have actively contaminated those areas through which the Ganga River flows actively, and arsenic originated as a groundwater contaminant (Madhavan and Subramanian 2006). The economy is purely rural as most of the work depends on primary activities being the principal source of livelihood.

15.2.2 Database

The present study is based on primary data sources. Primary data have been collected from the arsenic-affected areas of the study area through a survey method using a questionnaire. Multi-stage sampling is proposed here to find the study areas. In the first stage, identify the affected blocks and villages with a high level of arsenic concentration. These data have been collected from secondary sources. Sample villages have been identified randomly using the random table. The sample size among the seven arsenic concentrated blocks has been calculated using G*Power 3.1.9.7 software. Using this method, the estimated sample villages is 42. All seven blocks have been covered for sampling. For the purposes, simple random sampling with a non-proportionate technique has been adopted due to variations of arsenicosis patients among the villages. After that, calculated the N/n ratio in which N is the total number of inhabited villages. At the same time, n is the total number of sample villages, i.e., 1657 (including the inhabited municipal area of English Bazar block)/42 = 39.45. Using this relationship, one sample village represents every 40 villages of Malda district. After selecting the sample villages, arsenic-affected households were identified. Then, the desired sample size was calculated using Cochran's method (Cochran 1963), as regards the minimum sample size, the approach adopted wherein among all the observations pertaining to various variables lowest prevalence was anticipated at 25%, required minimum sample size came to be 288 at 95% level of confidence. The following formula has been used

$$n = \frac{Z^2 pq}{e^2} \tag{15.1}$$

n = Sample size
$Z = Z$ value found in the Z table at a given confidence interval
p = Estimated proportion of an attribute that is present in the population
$q = 1 - p$
e = Desired level of precision.

To overcome the unavoidable, no response rate of about 4% of the sample respondent is proposed to cover a sample of 300 instead of 288.

15.2.3 Methods

Descriptive statistics of arsenic concentration in groundwater such as Median, Mean, Variance, and Standard deviation have been calculated using SPSS statistical analytics. MS Office Excel, SPSS 15, and R 3.4.3 were used to calculate these statistics.

The social impact of arsenicosis is assessed through a scaling technique. Likert five-point scales are applied here to collect the data regarding the level of such effects related to arsenicosis illness as well as arsenic contamination. The social variables will be measured on a Likert scale, and scores will assign for each statement.

Social vulnerability scores have also been calculated through the scaling technique, consolidated efficiently through a Social Hazards index. The Social hazards index measures the vulnerable condition of arsenicosis patients in social aspects. In each of the vulnerabilities of arsenicosis patients, 22 questions were asked to recognize the social impacts of the victims of arsenicosis patients. Social vulnerabilities are

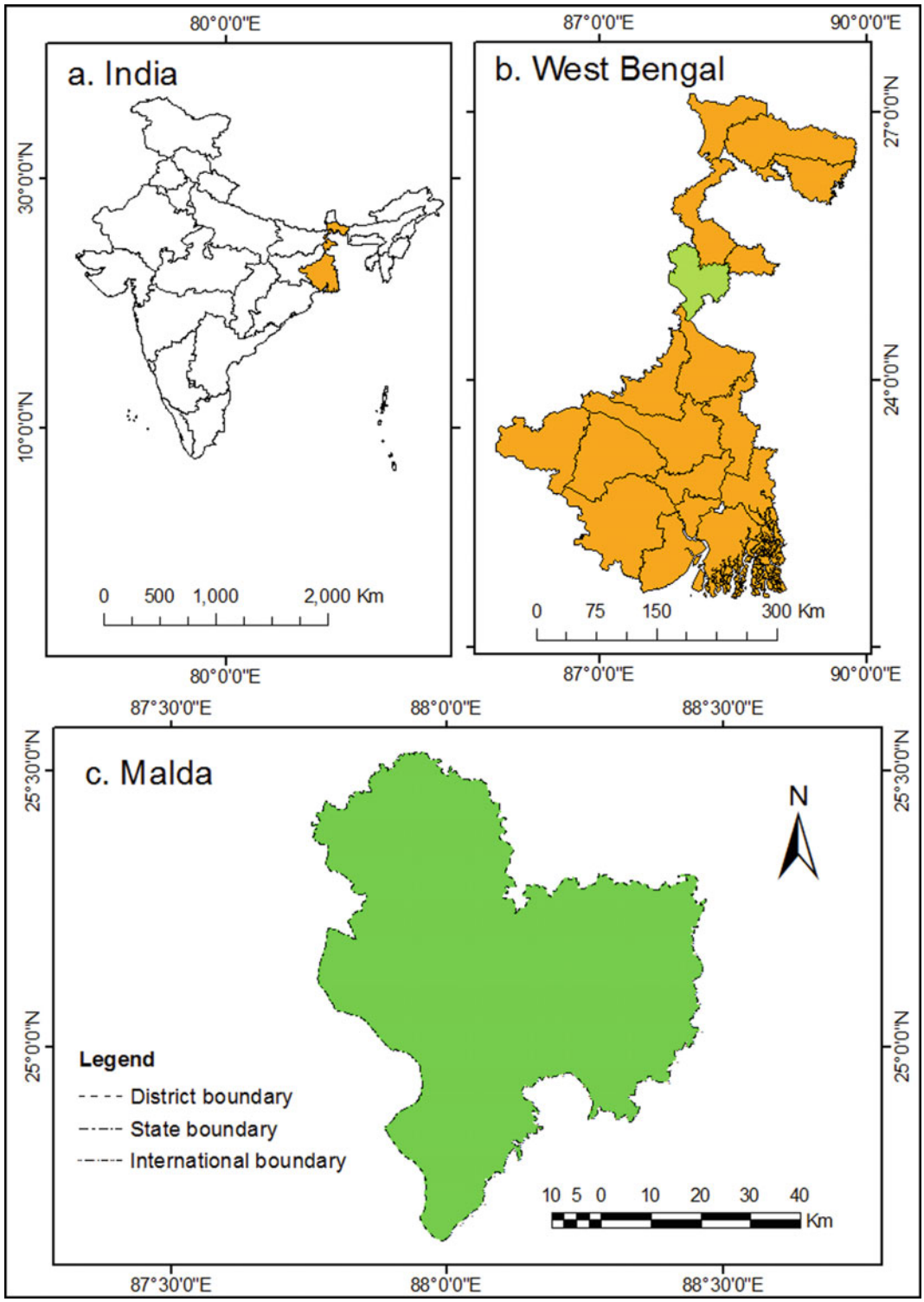

Fig. 15.1 Location map of the study area

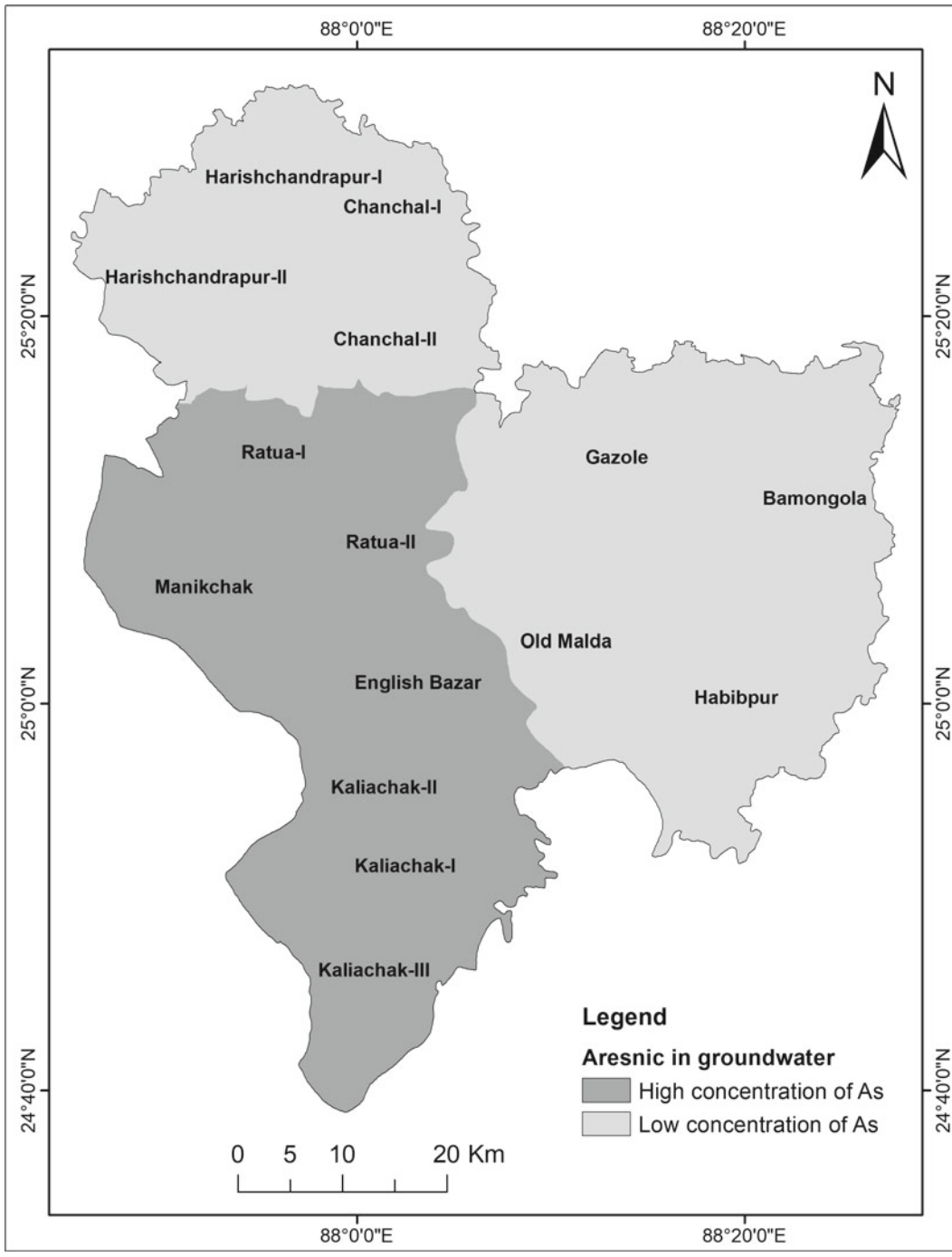

Fig. 15.2 Location of high and low arsenic concentrated blocks of Malda district

Table 15.1 Five stages of social vulnerabilities

Sl. No.	Vulnerability	Scores
1	Strongly disagree	1
2	Disagree	2
3	Neutral	3
4	Agree	4
5	Strongly agree	5

assessed at five stages. They are 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree. The scoring pattern of the vulnerability for these five stages is given in Table 15.1.

Keeping this scoring pattern as the base for the Social Hazards index (SHI) is constituted.

Mathematically, the social hazards index is presented as

$$\mathrm{SHI} = \sum_{i=1}^{n} \mathrm{EV}_i$$

where

EV_i = *Vulnerability in variable i.*
SHI = *Social hazard index.*
i = 1, …, *n or Number of vulnerability variables included in the index.*
n = 22.

The following six independent socio-economic variables are chosen to conduct an ANCOVA test. These are family size (X_1), age (X_2), monthly household income (X_3), marital status (X_4), education status (X_5), and occupation (X_6). And the dependent variables of different social impacts Y were selected. In this study, a one-factor ANOVA attempts to explore the relationship between an impact and a variable by measuring the effect of the social background of the arsenicosis inhabitants on the perceived social consequences of arsenicosis disease. These socio-economic variables have significantly influenced the severity of the social impact of arsenicosis diseases.

15.3 Results and Discussion

15.3.1 Exploratory Statistics of Social Impact of Arsenicosis

Table 15.2 exhibits the descriptive statistics of social hazards due to arsenicosis in the sample respondents of Malda district. Arsenicosis patients have faced enormous social risks in the study area. Difficulties in getting married to arsenicosis victims women are among the most significant social hazards due to arsenicosis illness, have acquired the first rank with a maximum mean value of 4.82. At the same time, its' standard deviation is 0.78, and its skewness is −4.48. Moreover, the problem of social instability has got the second rank as its mean value is 4.48, and the standard deviation is 0.80. Simultaneously, the third rank has been achieved by the social hazards of the dowry system with a mean and standard deviation of 4.29 and 0.45, respectively. While its skewness is 0.93. Concurrently, the social problem of patients who prefer to remain unidentified has obtained the fourth rank with a mean and standard deviation of 4.09 and 0.75, respectively. The next rank has been achieved by the social hazards of "women face mental stress" with a mean of 4.06. Though the arsenicosis patients are treated as "untouchable" as this social stigma has obtained 15 ranks but, it got the highest standard deviation with skewness of −0.05, and kurtosis is −1.53. At the same time, the standard deviation of the social hazards varies from 0.45 to 1.55, with an average value of 1.1. The maximum value is found in

Table 15.2 Descriptive statistics of different social hazards due to arsenicosis in the sample respondents of Malda district

Sl. No.	Variable	Mean	SD	Skewness	Kurtosis	Rank
1	Social instability	4.48	0.8	−1.75	3.32	2
2	Forced to leave the village	2.95	1.19	0.6	−1.36	17
3	Migration due to arsenic threat	2.94	1.06	0.52	−1.26	18
4	Arsenic patients are treated as untouchable	3	1.55	−0.05	−1.53	15
5	Relatives discontinued visiting arsenic-affected villages	3	1.03	−0.27	−1.17	16
6	School of dropout	3.34	0.95	−0.52	−1.34	14
7	Child labor due to arsenicosis	3.64	1.07	−0.62	−0.38	9
8	Lack of cooperation	3.87	0.92	−0.44	-0.62	7
9	Refused water collection from the neighbors	3.47	0.93	−0.64	0.42	12
10	Problem of selling cultivated products	2.16	0.65	0.28	0.73	25
11	The affected are avoided in social activities	2.81	0.82	−0.67	0.69	19
12	Suffering from depression	3.63	1.15	−0.41	−0.58	10
13	Patients prefer to remain unidentified	4.09	0.75	−1.15	1.93	4
14	Loss of faith	3.49	1.16	−0.19	−0.65	11
15	Parents are suffering from depression, thinking of social exclusion due to the arsenic threat	2.76	1.34	0.22	−0.87	20
16	Not able to educate children	4.06	1.27	−1.48	1.08	6
17	Spending money on treatment is a waste	3.37	1.53	−0.53	−1.29	13
18	Arsenic patients often try committing suicide	2.17	0.93	0.19	−0.78	24
19	Woman faces the mental stress due to arsenicosis related problem	4.06	0.94	−0.89	0.62	5
20	Women are finding it difficult to get married	4.82	0.78	−4.48	18.69	1
21	Dowry	4.29	0.45	0.93	−1.14	3
22	Women's are debarred from social function	2.53	0.84	0.78	0.87	23

Source Household survey, 2019

arsenic patients treated as untouchable as significant social stigma. In contrast, a minimum value is found in increasing the dowry system. At the same time, it has acquired the third rank (Fig. 15.3).

The result of the ANCOVA test (F) is displayed in Table 15.3. Except for the problem of loss of faith, all kinds of social vulnerability are significantly influenced by the concerned socio-economic variables since the respective "F" statistics of these impacts are significant at 95% significance level, where $p \leq 0.0001$.

15.3.2 Social Instability

"Arsenicosis" as a threat of groundwater arsenic contamination causes extensive social instability in human life. Generally, arsenicosis sufferers have faced some incredible difficulties allied to social instability (Rahman et al. 2018). The study of Brinkel et al. (2009) has described arsenicosis victims of Bangladesh have also suffered from the problem of social instability. Simultaneously, social instability has produced considerable social problems in arsenic vulnerable regions of

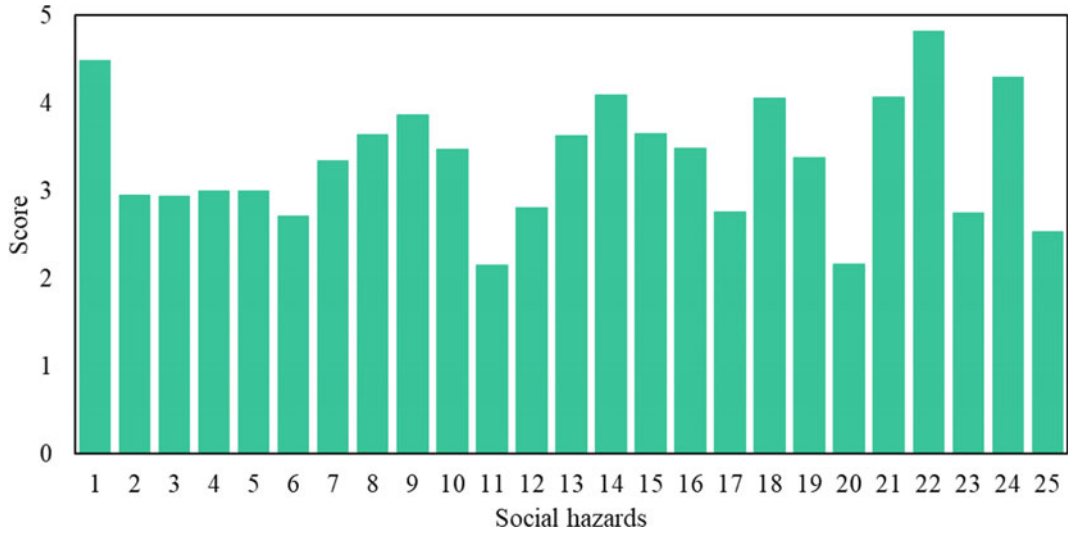

Fig. 15.3 Different social hazards due to arsenicosis

Malda district in diverse ways. Such instability, a significant social impact of arsenicosis illness is influenced by socio-economic variables such as family size, age, monthly household income, marital status, education status, and occupation of the arsenicosis patients.

On the other hand, most of the sample respondents (62.67%) strongly agreed with the concept that social instability originated through arsenicosis illness. Only 1% of study participants strongly disagreed with this concept, while 8.33% of respondents are neutral about such impact of arsenicosis.

Some significant evidence of social instability that arsenicosis victims of Malda district have experienced is discussed below.

15.3.2.1 Forced to Leave the Village

"Arsenicosis" sufferers of the study area have often been forced to leave the villages, raising unsafe circumstances in society. Such instability is highly varied with some socio-economic variables as mentioned above. When they were asked whether the arsenicosis patients were forced to leave villages, the majority of the respondents (59.67%) disagreed with such impact, whereas 14% of study participants strongly disagreed with this. In contrast, 26.33% of respondents agreed with this question. There is a significant effect of the family size, age, monthly household income, marital status, education status, and occupation on the enforcement of the victims to leave the villages.

15.3.2.2 Migration Due to Arsenicosis Illness

The incidence of migration frequently ensues among the arsenicosis victims in the study area as some unstable conditions arise in the individuals' social life. Arsenicosis patients have practiced such movement mainly for the following issues. Some have migrated to consume the required arsenic-free safe water to conquer such arsenicosis disease. Some of them have intended to migrate to defeat the negligence of neighborhoods they desired to depart from such unstable conditions. Such social impact is considerably controlled by some variables such as family size, age, monthly household income, marital status, education status, and occupation status of the sufferers. The maximum proportion of the respondents (51.67%) has disagreed with the question of whether arsenicosis patients have practiced an occurrence of migration. Whereas about 29.67% of respondents have acquired a contrary view, and they are agreed with such impact. About 8% of respondents are strongly agreed with this social impact. At the same time,

Table 15.3 The level of respondents' responses concerning the different social impacts of arsenicosis

Sl. No.	Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	*F*
1	Social instability	1	1.67	8.33	26.33	62.67	2.92
2	Forced to leave the village	14	59.67	0	26.33	0	2.06
3	Migration due to arsenic threat	0	51.67	10.67	29.67	8	1.8
4	Arsenic patients are treated as untouchable	27	15.33	12.33	21.33	24	18.3
5	Relatives discontinued visiting arsenic-affected villages	6.67	31.33	19	41.33	1.67	5
6	School of dropout	0	30.33	8	58.67	3	6.7
7	Child labor due to arsenicosis	3.33	14.67	17.67	43	21.33	3
8	Lack of cooperation	5.67	9	22.33	41.67	21.33	5.02
9	Refused water collection from the neighbors	4.33	8	34	43.67	10	4.84
10	Problem of selling cultivated products	12.67	60.33	26	0.67	0.33	3.94
11	The affected are avoided in social activities	10.33	12.67	63.67	12.33	1	4.13
12	Suffering from depression	5	9.33	33	23.33	29.33	1.67
13	Patients prefer to remain unidentified	0	7	3	64	26	2.94
14	Loss of faith	6	9	42.67	15	27.33	1.07
15	Parents are suffering from depression thinking of social exclusion due to the arsenic threat	25.33	11.67	41.33	5.33	16.33	3.14
16	Not able to educate children	11	2.33	4.33	34.33	48	4.95
17	Spending money on treatment is a waste	21.33	12.33	2.33	35.67	28.33	8.05
18	Arsenic patients often try committing suicide	29.67	29.67	35.67	4.33	0.67	3.46
19	Woman faces the mental stress due to arsenicosis related problem	2	2.33	21.67	35.33	38.67	2.17
20	Women are finding it difficult to get married	3.67	0	1	1	94.33	7.12
21	Dowry	0	0	0	71	29	2.87
22	Women's are debarred from social function	6	48.33	35.33	7	3.33	1.94

Source Household survey, 2019

approximately 10.67% of study participants have attained a neutral approach.

15.3.2.3 Untouchability

The term "untouchability" is associated with arsenicosis patients as this concept has emerged in some unstable conditions in society (Hassan et al. 2005). Generally, such patients are being neglected as they have been treated as untouchable, based on some superstitious belief. About 27% of sample respondents have strongly disagreed with this belief, whereas nearly same percentage (24%) of respondents have strongly agreed. On the other hand, only 12.33% of sample respondents have practiced neutral behavior with this perception, and 15.33% disagreed with untouchability (Table 15.3). Some variables usually influence such perceptions about arsenicosis. The relationship between family size, age, monthly household income, marital status, education status, occupation (independent variables), and beliefs of untouchability about arsenicosis patients is statistically significant. In Bangladesh, this type of social impact of arsenicosis was also detected by Chowdhury et al. (2006).

15.3.2.4 Relatives Discontinued Visiting Arsenic-Affected Villages

In the Malda district, some study participants have experienced relatives being discontinued from visiting arsenic-affected villages due to arsenicosis disease. Consequently, it has raised instability in social life as considered as an imperative social impact of arsenicosis illness. The majority of the respondents (41.33%) agree with this view, while a tiny proportion (1.67%) of participants strongly agree with this vulnerability. On the contrary, about 31.33% of the study participants disagree with this consequence. Only 6.67% of respondents are strongly disagreed with this assessment. Besides this, about 19% of the study participants are neutral with such social instability. The relationship between concerned socio-economic variables and this social problem is statistically significant (Table 15.3).

15.3.2.5 Increasing Rate of Dropout

The social stigma of "untouchability" toward clinically ill arsenicosis children often debars them from continued schooling. On the flip side, children from families with arsenicosis ailment of the earning members end up shouldering the cited responsibility of being the breading earners for the family, adding to an increased rate of dropouts. This situation is precarious for such children. On the other hand, such social impact is usually varied with some socio-economic variables. In other words, a significant effect of these socio-economic variables such as family size, age, monthly household income, marital status, education status, and occupation is found on the occurrences of school dropout due to arsenicosis illness. The majority of the respondents (58.67%) agree with whether arsenicosis illness is responsible for school dropouts. In contrast, only 3% of participants are strongly agreed with this subject. At the same time, about 30.33% of sample respondents have given disagreed attitudes toward this quarry.

15.3.2.6 Child Labor

One of the most considerable social instability caused by arsenicosis ailments is the production of child labor in society. The concerned disease takes a substantial toll on the lives of children under 14 by aiding liability of becoming the earning members of their families as their parents are shorn of being victims of arsenicosis, thereby pushing the former group into child laboring. About 43% of sample respondents in the Malda district have agreed with this concept. In contrast, only a very small proportion of the sample respondents (3.33%) strongly disagreed with this view that child labor is really formed through arsenicosis illness. On the other hand, about 17.67% of study participants have neutral attitudes toward this observation. Such social impact of arsenicosis is highly influenced by these socio-economic variables such as family size, age, monthly household income, marital status, education status, and occupation.

15.3.2.7 Noncooperation

Arsenicosis victims have suffered from the lack of cooperation in society in various aspects as it is indeed a big issue for raising social instability. Most of the study participants are agreed (41.67%) with this view, whereas; a very small proportion (5.67%) of the study participants are strongly disagreed (41.67%). At the same time, about 22.33% of the sample respondents have acquired a neutral approach as they cannot decide whether the patients with arsenicosis have suffered from a lack of cooperation. On the other hand, 21.33% of participants are strongly agreed with this social problem. Besides this, some socio-economic variables have influenced the severity of non-cooperation. A significant association existed between the concerned socio-economic variables and the problem of noncooperation due to arsenicosis ailments.

15.3.2.8 Refused to Water Collection

In Malda district, the arsenicosis victims have abstained from water collection from their neighbor's tube wells and ponds; this is truly a severe social problem as well as the social impact of arsenicosis illness. Such social impact is also identified in Bangladesh by Chowdhury et al. (2006) in their research work. Though most of the respondents have experienced arsenicosis, patients have refused to collect water as well as they agree

with this observation, whereas 34% of sample respondents have neutral approaches toward this societal problem. At the same time, a tiny proportion of the sample respondents have carried out a contradictory view as they strongly disagreed with such kind of social impact (Table 15.3).

15.3.2.9 Problem of Selling Cultivated Products

The farmers with arsenicosis illness have faced trouble to selling their cultivated products based on untouchability. This societal problem has generally provided an unstable condition for the victims. On the other hand, such impact of arsenicosis is varied with different socio-economic variables. Besides this, about 60.33% of sample respondents disagree about social instability. In comparison, 12.67% of study participants are strongly disagreed. On the other hand, about 26% of sample victims are neutral about this problem. At the same time, about 0.67% of sample respondents agree, and 0.33% strongly agree with this social vulnerability.

15.3.2.10 Avoided Social Activities

Arsenicosis patients have frequently been shunned in social activities as this kind of social hazard has assembled some unstable conditions in the society in the Malda district. They have quite often been debarred from social participation and social work. But this societal problem is highly influenced by several variables such as family size, age, monthly household income, marital status, education status, and occupation status of the respondents. Most of the sample respondents (63.67%) have acquired neutral feelings toward the social violence of abandonment to participation in social activities as a tremendous social instability. Concurrently, 12.67% of sample respondents disagree with this opinion. Surprisingly, nearly the same proportion (12.33%) of the sample respondents agreed with this impact. On the other hand, about 10.33% of the study participants strongly disagreed with such consequences, whereas only 1% of sample respondents strongly agreed.

15.3.3 Ostracism and Depression

Ostracism is the curse for arsenicosis patients (Rakib et al. 2015). In Malda district, a significant number of arsenicosis patients have suffered from this social vulnerability. According to the observational status, a considerable number of arsenicosis victims in Bangladesh were also facing the problem of ostracism, as reported by Ahmed et al. (2007). Though 29.33% of study participants strongly agreed with the belief that arsenicosis patients have carried out the problem of ostracism, and 23.33% of sample respondents agreed with this. Unexpectedly, 33% of study participants have a neutral mentality concerning the arsenicosis patients suffering from ostracism. But this social impact is influenced by some socio-economic variables such as education status, occupational status, etc.

15.3.3.1 Preference of Remain Unidentified

A further social instability as well as the social impact of arsenicosis ailments is the preference of arsenicosis patients to remain unidentified themselves to evade some social vulnerability. A similar problem has noticed in Bangladesh by Hassan et al. in 2005. Such social instability is responsible for generating the victims' hesitation regarding their illness. On the other hand, some of them are not intended to disclose their problem for fear of noncooperation (Ahmed et al. 2007). There is prevailed a significant relationship between the concerned socio-economic variables (family size, age, monthly household income, marital status, education status, and occupation status) and this social crisis. A large proportion of the study participants (64%) agreed that arsenicosis patients preferred to stay unidentified themselves. At the same time, about 26% of respondents strongly agreed, and 7% of participants disagreed with such a question. But there are, none of the respondents strongly disagreed with this query. But, only 3% of sample respondents have practiced a neutral approach to this view.

15.3.3.2 Loss of Faith

Arsenicosis patients have experienced the problem of loss of faith, which is one of the most significant social impacts of arsenicosis illness. Most of the respondents (42.67%) had practiced neutral approaches with such impact. At the same time, the percentage of the sample respondents who are strongly agreed with this belief is 27.33%. Concurrently, about 9% of respondents disagree with this view, and 65% strongly disagree. This social impact does not influence by these concerned socio-economic variables (family size, age, monthly household income, marital status, education status, and occupation).

15.3.3.3 Parent's Depression

Sometimes, the parents with arsenicosis diseases in the Malda district have experienced the dilemma of depression regarding different issues. Such kinds of problems naturally arise unstable conditions in their social life. This problem also has a significant social impact on arsenicosis patients. Only 5.33% of sample respondents have believed and agreed with the view of the emergence of depression among the parents through social exclusion due to arsenic threat. At the same time, the percentage of the respondents with strongly agreed with such a view is 16.33%. On the contradiction, about 11.67% of the study participants disagree, and 25.33% strongly disagree with such social impact. Besides this, the percentage of the respondents with neutral attitudes toward such a view is 41.33%.

15.3.3.4 Hamper the Child Education

Arsenicosis diseases hinder child education as it has emerged as an unstable situation in society. A large proportion of the respondents (48%) have acquired a maximum score of "5" since study participants strongly agreed with this social impact as such victims have obstructed to continuing their child's education. At the same time, the percentage of the respondents who have obtained a score of "4" agreed with this problem is 34.33%. On the other hand, about 11% of the sample respondents are strongly disagreed, whereas only 2.33% of the respondents disagreed with this social nuisance of arsenicosis ailments. Family size, age, monthly household income, marital status, education status, and occupation (socio-economic variables) significantly impact this social problem (hamper the child's education).

15.3.3.5 Spending Money on Treatment is a Waste of Opinion

While the respondents who agree that spending money on treatment purposes is waste cover a maximum proportion of the respondents (35.33%), whereas 2.33% of respondents have attained neutral attitudes with such estimation. At the same time, about 21.33% of sample respondents have acquired a score of "1" as they strongly disagreed with this perception. Whereas 12.33% of respondents have provided a contrary view and disagreed with this query. Such social impact differs with family size, age, monthly household income, marital status, education status, and occupation status of the respondents.

15.3.3.6 Tendency to Suicide

In several cases, arsenicosis patients lead a bleak life as they cannot involve any common social interaction. Consequently, they become depressed and attempt to commit suicide. There was a significant effect of family size, age, monthly household income, marital status, education status, and occupation on the tendency to suicide due to such problem. The majority of the study participants (35.67%) have acquired a score of "3" as they have practiced neutral attitudes toward this approach. At the same time, an equal proportion of the sample respondents have obtained a 1 and 2 scores as they strongly disagreed and disagreed with this social and mental problem. On the contrary, only 0.67% of respondents strongly agreed. The respondents who have acquired a score of "4" as they are agreed is 4.33% (Table 15.3).

15.3.4 Impact on Women

Females patients in Malda district are the worst victims of arsenicosis as they are a significant vulnerable group in society. The difficulties of

women are manifested in different forms. Some of them are neglected by their husbands, whereas; some are divorced or separated. Such kind of impact is also noticed in Bangladesh by Rahman et al. (2018).

15.3.4.1 Mental Stress

The problem of mental stress due to arsenicosis illness has generated a substantial social impact on a woman. However, such a result is naturally influenced by some variables mentioned above. The maximum proportion of the study participants (38.67%) strongly agreed with this question. On the other hand, the percentage of the respondents who agreed with such social instability is 35.33%. About 21.67% of respondents have practiced neutral attitudes toward this view. At the same time, small proportions of the respondents who agree and strongly disagree with this question are 2.33% and 2%, respectively.

15.3.4.2 Denied of Marriage

Difficulties in getting married manifested in various manners. Such as, a woman with such diseases has faced some social problems principally related to pre-marital and post-marital relationships. Since people become indisposed to establishing marital rapport with arsenicosis victims' families, which ultimately results in significant social hazards in Malda district. Chowdhury et al. (2006) have also found such a problem in Bangladesh. The highest percentage of the sample respondents (94.33%) has acquired a score of "5" as they strongly agreed with the view that arsenicosis women patients have suffered from the problem of getting married (Table 15.3). Surprisingly, there was not a single respondent who disagreed with this view. Still, only 3.67% of sample respondents are strongly disagreed. A significant association has existed between the concerned socio-economic variables (family size, age, monthly household income, marital status, education status, and occupation status) and difficulties in getting married as social instability due to arsenicosis diseases.

15.3.4.3 Dowry

Dowry is imperative to social violence in society. Moreover, arsenicosis is accountable for enhancing this societal problem (Rahman et al. 2018). It is tremendously difficult for the parents to arrange the marriage for their young girl suffering from arsenicosis without offering a considerable dowry. There was prevailed a significant effect of the family size, age, monthly household income, marital status, education status, and occupation on the growing quantity of dowry. The vulnerability of such social impact is as widespread as none of the respondents have acquired disagree, strongly disagree, or neutral attitudes toward this view. On the other hand, all the respondents have similar experiences with this social violence. About 71% of study participants agreed with this hazard. At the same time, about 29% of the sample participants strongly agreed with this impact (Table 15.3).

15.3.4.4 Debarred from the Social Function

In the preference of social stigma of untouchability, arsenicosis women often debar from social function. In the Malda district, such social vulnerability has prevailed on a minor scale. The majority of the respondents (48.33%) disagree with the question of whether women arsenicosis sufferers are debarred from social function? At the same time, 6% of sample respondents are strongly disagreed with this question. On the other hand, the respondents with neutral attitudes are 35.33%. On the contrary, about 7% of the sample respondents agreed with such an impact. In comparison, 3.33% of the respondents have acquired a maximum score of "5" as they strongly agreed with this question. The relationship between these socio-economic variables like family size, age, monthly household income, marital status, education status, occupation, and the avoidance of the social function of the arsenicosis woman patient is statistically significant.

Table 15.4 Level of social vulnerability in the sample respondents of Malda district

Level	Social index	Number	Percentage (%)	Mean score
Low vulnerability	<0.50	82	27.33	0.46
Medium vulnerability	0.50–0.61	146	48.67	0.58
High vulnerability	>0.61	72	24.00	0.65

Source Household survey, 2019

15.3.5 Social Vulnerability Index

Based on the level of vulnerability, the respondents are categorized into three categories as

(1) Respondents with a high level of vulnerability
(2) Respondents with a medium level of vulnerability
(3) Respondents with a low level of vulnerability.

In order to group the different categories of respondents into three categories, the mean score has been used.

Table 15.4 exhibits the level of social vulnerability of arsenicosis patients. About 146 (48.67%) respondents have faced a medium level of vulnerability with a mean score of 0.58. On the other hand, 82 (27.33%) respondents have experienced a low level of vulnerability with a mean score of 0.46. At the same time, 72 (24%) respondents belong to a high level of vulnerability group. Though the percentage of the respondents with a low level of vulnerability is more (27.33%) than a high level (24.33%) but a mean vulnerability score of the respondents with a high level of vulnerability is more (0.65%) than a low level of vulnerability group (0.46%).

15.4 Conclusion

The problem of arsenicosis is a vast and severe burden to the society of Malda district and the country itself. Since some significant social hazards have emerged in the study area's arsenic-affected region. Such difficulty has elicited several unpredicted social harms. Simultaneously, arsenicosis has caused the fallout of the social structure. Such patients have experienced severe negative social impacts such as social uncertainty, social injustice, social isolation, problematic family issues, breaking marital relationships, untouchability, social stigma, etc. The most significant social problems in the study area are difficulties in getting married to arsenicosis victims women, the issue of social instability, the dominance of the dowry system, preferences to remain unidentified, and the mental stress of women, etc. Furthermore, a mean vulnerability score of the Social hazards index (0.65%) suggests that respondents with a high level of social vulnerability are more. Hence, the arsenicosis victims have endured an assortment of high levels of different social vulnerability due to arsenicosis illness. Due to the improper knowledge regarding arsenicosis, many victims are not permitted to participate in the social program. Therefore, arsenicosis patients with visible symptoms have been shunned in the community. Perhaps the worst social disaster is yet to come, though it can be avoided if some suitable strategies are assumed and a systematic plan can solve this social threat.

Arsenicosis patients should contact social services and some sanitary authorities to decrease the exclusion of sick individuals from society and others. To overcome the social hazards, improve the quality of social life by improving some social indicators. Such as increasing the literacy rate and studying environmental education and knowledge empowerment to achieve sustainability helps to overcome the traditional culture, ostracism, and some superstitious problems. At the same time, the community members and law enforcement authorities should construct some laws to prevent separation and ostracism as it may help to improve

the mental health of the arsenic victims. On the other hand, some rehabilitation programs for arsenicosis patients, especially women, are needed. Several community activities such as group discussions and community education regarding arsenicosis should be organized to reduce the social discrimination against the patients. After all, psychosocial support should be needed to overcome the social crisis. At the same time, in the arsenic hot-spot areas of Malda district, a preventive campaign should be organized to raise awareness, judge the scale and severity of such social problems, and plan for prevention or mitigation. During the study, we perceived an enormous social impact on its victims, and eventually, arsenicosis illness triggered several social nuisances.

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