



## Research Article

# INTERPRETATION OF ARSENIC CONTAMINATION IN GROUND WATER BY THE FARMERS: THE PERCEPTION AND IMPACT

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**Abstract:** Arsenic contamination is one of the serious concerns for public health aspect throughout the world. Sometimes arsenic affected people may not be severely impaired but society may point them as Dangerous or poisonous ones. Study on this topic was carried out at Nonaghata-uttarpara village of the Haringhata block of Nadia district in West Bengal taking 70 respondents randomly. Variables like age, cropping intensity, source of irrigation, communication variables are taken for collection of reliable data. The present study well identified some of the important factors (age, education, cropping intensity, communication exposures, homestead land) to study the perception of individuals regarding arsenic contamination. Special education/training programs are much needed for sufferers with lower income and education status in order to improve perception about consequences of chronic arsenic contamination; this will be an important element for abating the ever increasing social crisis.

**Keywords:** Arsenic, Education, Irrigation, Perception

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## Introduction

Arsenic contamination is one of the serious concerns for public health aspect throughout the world. Sometimes arsenic affected people may not be severely impaired but society may point them as Dangerous or poisonous ones [3]. It has reported that maximum of dangers caused by arsenic toxicity due to lack of knowledge about the source of this metal [2]. Fear of nearness has separated number of families, done social isolation in schools and people living in highly contaminated areas are generally avoided much [1]. Sarker (2010) has also seen that arsenic poisoning causes lot of health issues as well as social and psychological sufferings such as community refusal, social discrimination, unhappy married life, child development issues, mental disorder etc. Drinking of arsenic-contaminated tubewell water has become a serious health threat in Bangladesh. Study has conducted on this topic to generate classified information on perception on arsenic contamination, to estimate the level of impact on the rural people in terms of socio-ecological factor and it will generate micro level policy implication based on the empirical study.

## Methods

### Research locale and sampling

Nonaghata-uttarpara village of the Haringhata block of Nadia district in West Bengal was randomly selected for the study. The area has been selected for the study because of-a) There is sample scope for collecting relevant data for the present study, b) Acquaintance with the local people as well as local language, c) The concern area was very easily accessible to the researcher in terms of place of residence, d) The area was very easily accessible to the researcher in terms of transportation and e) The closer familiarities of the student researchers with the area, people, officials and local dialects. Before starting the main field study, a pilot study was conducted to understand the area, community, people, natural resources and knowledge and perception of the people towards arsenic contamination concept.

Table-1 Sampling Techniques and Sampling Design

Step	Items	Level	Approach
1	State	West Bengal	Purposive
2	District	Nadia	Purposive
3	Subdivision	Kalyani	Purposive
4	Block	Haringhata	Purposive
5	Gram Panchayat	Mollabilia	Purposive
6	Village	Nonaghata-uttarpara	Purposive
7	Respondents	70	Random

After reviewing various literatures related to the field of study and consultation with respected chairman Advisory Committee and other experts, a list of variables was prepared.

Table-2 Empirical Measurement of the Independent Variables

Independent Variables: SL No	Variables	Notation
1	Age	X1
2	Education	X2
3	Family size	X3
4	Occupation	X4
5	Size of land Holding	X5
6	Homestead land	X6
7	Land under Irrigation	X7
8	Source of Irrigation	X8
9	Communication Variables	X9
10	Cropping Intensity	X10

Dependent Variable: Y-Perception on Arsenic (1-10 scale)

## Results and Discussion

The [Table-3] presents the coefficient of correlation between Y: Perception on arsenic vs. 10 independent variables(x1-x10). It has been found that following variables viz. Age -(X1), Family size-(X3), Occupation-(X4), Homestead land-(X6), Communication Variables-(X9) and Cropping Intensity-(X10) have recorded significant correlation with the dependent variable.

Table-3 Co-efficient of correlation between Y (Perception on arsenic) vs. 10 independent variables(x1-x10)

Variables	r Value	Remarks
Age(X1)	0.469	**
Education(X2)	0.043	
Family Size(X3)	0.391	**
Occupation(X4)	-0.370	**
Size of Land Holding(X5)	-0.084	
Homestead Land(X6)	-0.370	**
Land Under Irrigation(X7)	-0.104	
Source of Irrigation(X8)	-0.037	
Communication Exposure(X9)	-0.296	*
Cropping Intensity(X10)	0.325	**

When,  $r=0.232$  and  $r=0.302$  are significant at 5% and 1% level of significance respectively.  $1\%>0.302=**$ ,  $5\%>0.232=*$

Table-4 Regression analysis: Y (Perception on arsenic) vs 10 causal variables (x1-x10) [Multiple R-sq. =42.70%, S.E=235.58]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	Beta	Std. Error	Beta		
X1(Age)	0.031	0.014	0.304	2.172	0.034
X2(Education)	0.118	0.040	0.327	2.975	0.004
X3(Family size)	0.034	0.038	0.118	0.900	0.372
X4(Occupation)	-0.158	0.111	-0.172	-1.420	0.161
X5(Size of land holding)	0.053	0.039	0.437	1.371	0.175
X6(Homestead land)	-0.046	0.076	-0.076	-0.597	0.553
X7(Land under irrigation)	-0.076	0.042	-0.555	-1.782	0.080
X8(Source of irrigation)	-0.057	0.159	-0.038	-0.360	0.720
X9(Communication exposure)	-0.211	0.126	-0.189	-1.674	0.099
X10(Cropping intensity)	0.188	0.135	0.165	1.391	0.169

Table-5 Regression Analysis: Y (Perception on Arsenic) vs 3 causal variables (x1, x2, x4)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	Beta	Std. Error	Beta		
X1(Age)	0.048	0.012	0.465	4.096	0.000
X2(Education)	0.096	0.039	0.267	2.484	0.015
X4(Occupation)	-0.231	0.101	-0.250	-2.289	0.025

Multiple R-sq. =32.20 % (75.40 percent of total  $R_2$  value has been contributed by these three variables), S.E=.47

### Revelation

The [Table-3] reveals that age, family size and cropping intensity are contributing positively to the perception on arsenic. So, for the higher age group the perception on arsenic goes up, the respondent with higher family size have shown higher propensity to this. It is also has been pre-dominant for farmers having high C.I. In agro-irrigation based cropping system higher C.I. means more frequent exposure of ground water to raise crops. Again, respondents with lower occupational status, smaller size of home stead land and poorer communication variables are more vulnerable to perception on arsenic with different degree. Studies stated that socio- economic loss for people in arsenic areas are acute and rapidly worsening (WHO 2000). Increase in education level and family income has positive relation to the perception on arsenic. Socio-economic status variables vary according to the knowledge of the health issues related to arsenic exposure [1]. Parvez *et al.* (2006) found that people with higher socio-economic status (*i.e.*, non- labour occupation of the head of the household and better housing) are more aware of the arsenic contamination.

### Step Down Regression

The [Table-5] presents the multiple regression analysis between exogenous variable Y: Perception on Arsenic vs. 10 causal variables(x1-x10): It has been found that the variables X1(Age), X2(Education) and X4(Occupation) have contributed to the substantive variance embedded with the consequent variable Y; Perception on Arsenic. The  $R_2$  value being 0.427, it is to infer that 42.70% of variation in the consequent variable has been explained by the combination of these 10 causal variables. Next Table presents the step wise regression and it has been depicted that the 3 causal variables, X1:=Age, X2=Education and X4=Occupation have been retained at the last step. The variables (x1, x2, and x4) have been retained at the last step which is explaining 32.20 percent out of 42.70%. So, these variables have been explained 75.40(32.2/42.7\*100)% of total  $R_2$  in respect of Y3.

### Revelation

The step wise regression analysis reveals that reaching at the 8th step three critical variables(x1=age, x2=education, x4=occupation) have contributed to the variance with expenditure on intervention. These three variables have contributed 75.40 percent of total variance, explained in the full model summary. So, while dealing with the problem of arsenicosis suffer by the ill-fated responses, proper intervention should be made at proper age, proper knowledge as well as proper awareness is required against arsenicosis and improves the socio-economic status of people. It has seen that about 52% of respondents have no formal education where 46% of respondents have primary and 2% respondents have secondary and higher secondary education. For them agriculture is the main source of income and the average family income is around 3,874 Tk. (US\$ 56.97) per month. The most of the respondents are 57%, 22%, 8%, 6% and 7% housewives, agriculture, business, service, and others, respectively. This is very sad that a major portion of the respondents (32%) are disliked by their neighbours for participation in social activities [6].

### Conclusion

The problem of arsenic contamination is becoming extremely complex. Around 120 blocks in West Bengal, on the eastern part of river Ganges encompassing districts like Maldah, Murshidabad, Nadia, North 24 parganas, South 24 parganas are vulnerable to this social and ecological menace. So, special education/training programs are much needed for sufferers with lower income and education status in order to improve perception about consequences of chronic arsenic contamination; this will be an important element for abating the ever increasing social crisis.

### Application of research:

- Raising public awareness and changing water use behaviour.

- Safe, affordable, and convenient alternative options and how communities and agencies should identify these.
- Building self-help and community mobilisation.
- Staff training to build sufficient skills for public education and mobilisation

**Research Category:** Arsenic Contamination

**Abbreviations:** WHO-World Health Organization, CI-Cropping Intensity.

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**Study area / Sample Collection:** Nonaghata-uttarpara village of the Haringhata block of Nadia district in West Bengal.

**Cultivar / Variety name:** Nil

**Conflict of Interest:** None declared

**Ethical approval:** This article does not contain any studies with human participants or animals performed by any of the authors.  
Ethical Committee Approval Number: Nil

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