



WELCOME



Personal and Socio-economic characteristics, status of fruit and vegetable intake and health related problems of the peoples in arsenic contaminated regions of Bangladesh

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Background:

About 75 million people belonging to 59 districts out of the country's 64 districts are estimated to be arsenicosis victims.

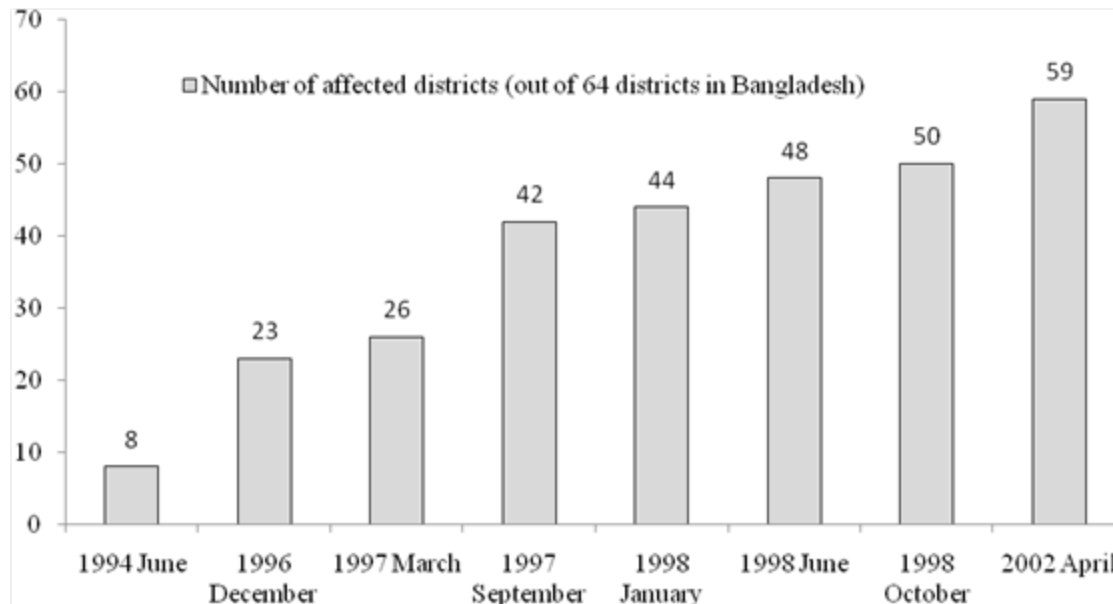


Fig. 1. Trend of arsenic contamination of drinking water

Arsenic problem has a relationship with the nutritional status and personal and socio-economic characteristics of the victims. Therefore, studies on the issue may be conducted for obtaining more information in respect of Bangladesh.

Objective

To find out the effect of arsenic contamination in ground water on personal and socio-economic characteristics, consumption of fruits and vegetables and health related problems of the respondents living in three areas of differing arsenic contaminated tube well water (LOW: $<0.1 \text{ mgL}^{-1}$; MEDIUM: 0.1 mgL^{-1} and HIGH: $>0.1 \text{ mgL}^{-1}$) in Satkhira District, Bangladesh.

Methodology

Study Location

Randomly selected villages under several unions of Kolaroa and Assasuni Upazillas (sub-district) of Satkhira District, Bangladesh.

Sampling Frame

Locations divided in three areas on the basis of arsenic in tube well water ($<0.1 \text{ mgL}^{-1}$, 0.1 mgL^{-1} and $> 0.1 \text{ mgL}^{-1}$ arsenic), according to the BAMWSP (Bangladesh Arsenic Mitigation Water Supply Project) report (2007).

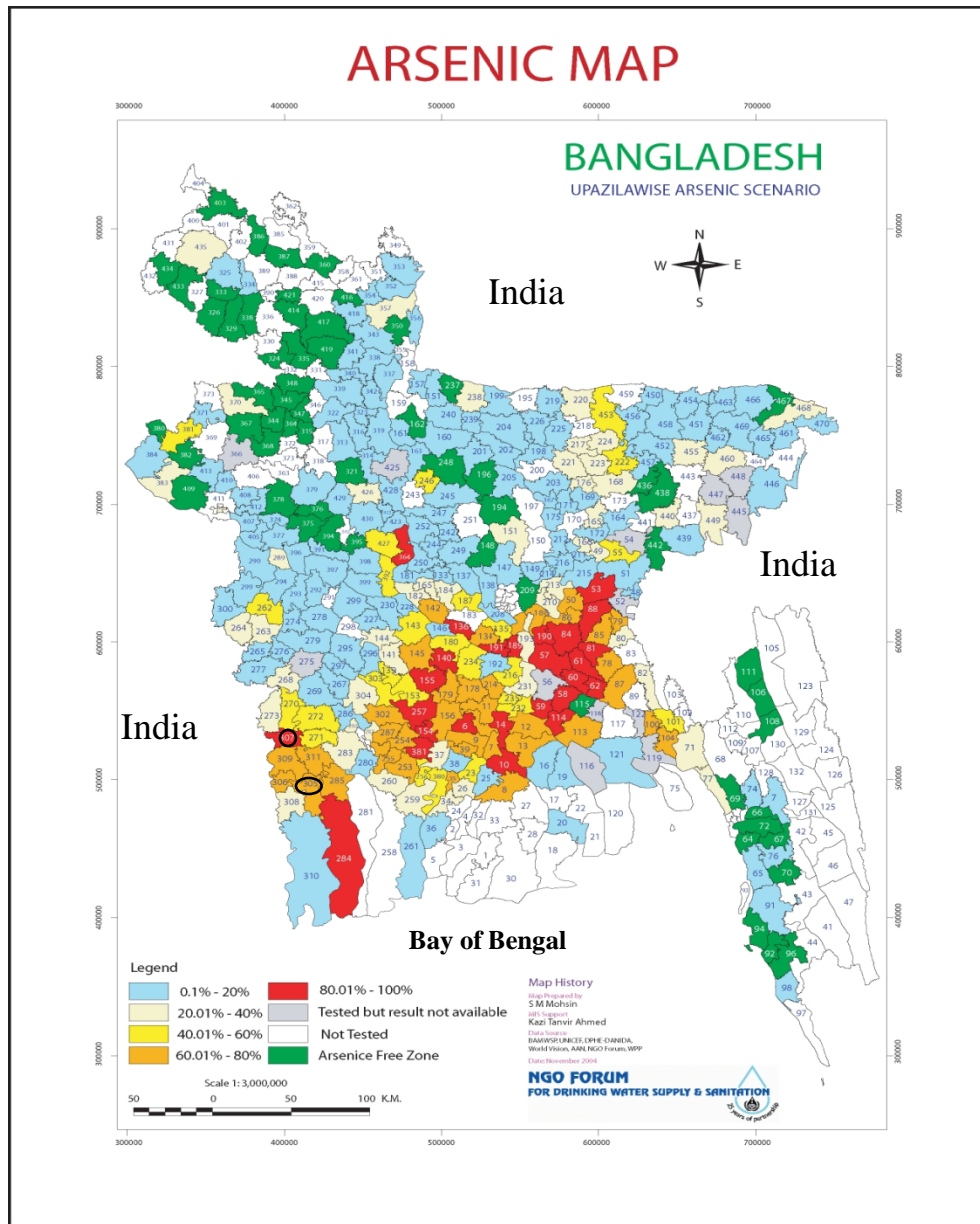
Research Instrument- Questionnaire

An interview-assisted questionnaire was used with three types of items- fixed alternative, open-ended and scales.

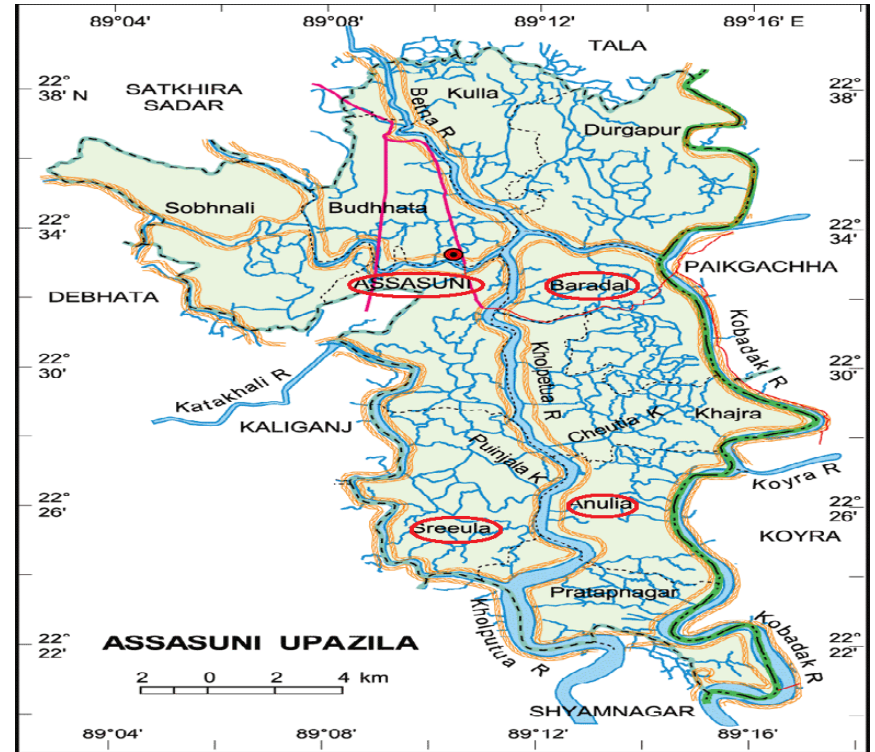
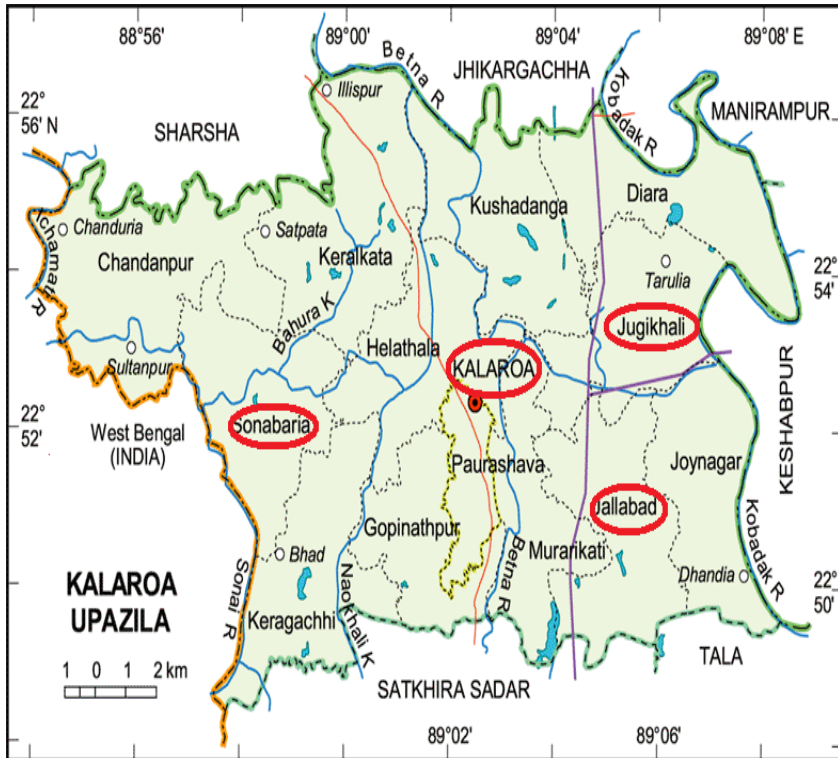
Sample Selection: 200 farm households were randomly selected as study sample from the upazillas (Assasuni and Kolaroa) to have a 10% representative farm house holds of the study area.

Table 1. Distribution of respondents in the study area

Level of arsenic (mgL ⁻¹)	Sub-districts (Upazillas)	No. of Unions	No. of villages	Total sample	Reserve list
<0.1	Assassuni	2	4	33	4
	Kolaroa	2	4	33	4
0.1	Assassuni	2	4	34	4
	Kolaroa	2	4	33	4
>0.1	Assassuni	2	4	33	4
	Kolaroa	2	4	34	4
				200	24



Map. The arsenic map of Bangladesh showing the arsenic contaminated areas and study locations



Map: Study locations

Selection and Measurement of the Variables

Age: Actual years (Young: up to 34 years; Middle aged 35-54 years; Old: 55 and above)

Level of education: Years of schooling (Illiterate: 0 years; Primary: 1-5 years; Secondary: 6-10 years; above secondary: 11 years and above)

Family size: Number of family members (Small: 2-4; medium: 5-7; Large: 8 & above)

Farm size: (Small: <1 ha; medium: 1.1-2 ha; Large: >2 ha)

Annual income: Total yearly earnings from agriculture and other sources (Low: 25,000-75,000 Tk.; Medium, 75,001-100,000 TK.; High: >100,000 TK.)

Annual expenditure: Cumulative yearly expenditure

Organizational participation: Nature of involvement (Ordinary member, executive committee member, executive committee officer) and duration of affiliation in organizations (8).

Social interaction: Monthly or yearly visit (Not even once, 1-2 times, 3-4 times, 5-6 times) to different places external to own social system (Friend or relative or other known person's house located outside of own village, Union Parishad Office, Own Upazilla Sadar, Own District Sadar, Thana or District Sadar other than own, Capital City).

Media exposure: Extent of contact (very low, low, medium & high) with information media.

Fruit & Vegetable intake: Observed in respect of 20 fruits and 16 vegetables in the summer and winter season.

<u>Fruit intake behavior</u>	<u>Number of fruit/fruitlet intake</u>
1.No intake	0 Fruit/fruitlet
2.Very rare intake	1-2 fruits/fruitlets per week
3.Rare intake	1-2 fruits/fruitlets in 2-3 days
4.Occasional intake	1-2 fruits/fruitlets in a day
5.Frequent intake	4-5 fruits/fruitlets in a day

Vegetable intake behavior

1. No intake
2. Very rare intake
3. Rare intake
4. Occasional intake
5. Frequent intake

Number of vegetable intake

- 0 intake
- 1 times/week
- 1 times/2-3 days
- 1 times/day
- 2-3 times/day

Information on health related problems: Extent of health related problems (not at all, less severe, moderate severe & severe) being faced by the respondents or his/her family members.

Data collation: After field survey data were compiled, tabulated and analyzed. All qualitative data were converted into quantitative form by code and score whenever necessary.

Statistical Analyses: Data analyzed using SPSS (version 16 for Windows[®], Chicago, IL). Relationships between variables were examined by cross-tabulations and chi square statistics.

RESULTS:

Personal and socio-economic characteristics:

Except farm size, the personal and socio-economic characteristics of the respondents did not differ significantly.

Table. 2: Personal and socio-economic characteristics of the respondents

Personal & socio-economic characteristics		Arsenic level			P value
		Low (n=66)	Medium (n=67)	High) (n=67)	
		%			
Gender					0.284
	Male	88	90	81	
	Female	12	10	19	
Age					0.082
	Young	17	28	30	
	Middle	41	30	45	
	Old	42	42	25	

Contd. Table . 2

Personal & socio-economic characteristics		Arsenic level			P value
		Low (n=66)	Medium (n=67)	High (n=67)	
		%			
Education					0.432
	Illiterate	11	22	15	
	Primary	36	30	40	
	Secondary	46	36	34	
	>secondary	7	12	11	
Family size					0.094
	Small	39	37	51	
	Medium	61	60	43	
	Large	0	3	6	
Farm size					0.036
	Small	77	57	73	
	Medium	9	27	19	
	Large	14	16	8	
Annual income					0.833
	Low	38	36	37	
	Medium	24	25	18	
	High	38	39	45	

Contd. Table 2

Personal & socio-economic characteristics		Arsenic level			P value
		Low (n=66)	Medium (n=67)	High (n=67)	
		%			
Annual expenditure					0.296
	Low	59	46	60	
	Medium	21	31	28	
	High	20	23	12	
Organizational affiliation					0.130
	None	65	51	70	
	Low	23	37	25	
	Moderate	9	10	2	
	High	3	2	3	
Social interaction					0.133
	Low	49	49	39	
	Moderate	39	45	40	
	High	12	6	21	
Media exposure					0.126
	Very low	2	8	2	
	Low	47	42	45	
	Medium	47	40	37	
	High	4	10	16	

Health related problems of the respondents:

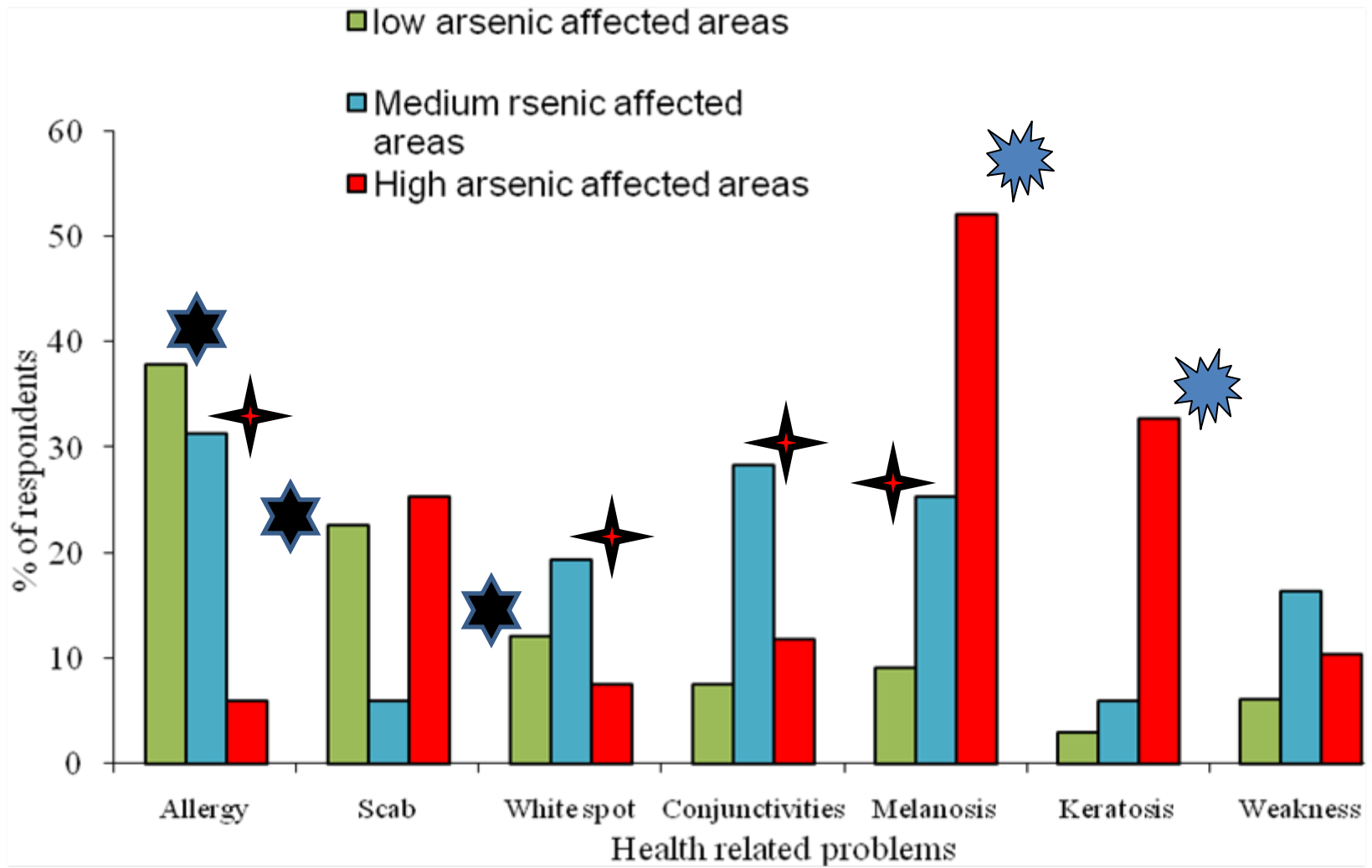


Fig. 1. Reported health problems in arsenic affected areas

Health problems in affected areas

Low contaminated



Medium contaminated



High contaminated



Melanosis & Keratosis in affected areas



White spot/skin lesion & scabies in affected areas



Conjunctivitis in affected areas

Table 3. Number of family members facing health related problems

Number of family members facing health related problems	Level of arsenic		
	Low (n= 66)	Medium (n=67)	High (n=67)
	%		
0	27	2	0
1	58	67	69
2	12	27	24
3	2	3	6
4	1	1	1

P<0.0001

Table 4. Self reported severity of health related problems

Level of severity	Level of Arsenic in study areas (P=0.00)		
	Low (n=66)	Medium (n=67)	High (n=66)
	%		
No problem	27	2	0
Less severe	32	16	0
Mod. severe	35	61	49
Severe	6	21	51
	Gender (P=0.874)		
	Male (n=172)	Female (n=28)	
No problem	10	7	
Less severe	16	18	
Mod. severe	47	54	
Severe	27	21	
	Age of the respondents (P=0.965)		
	Young (up to 34 yrs.) n=50	Middle (35-54 yrs.) n=77	Old (>55 yrs.) n=73
No problem	8	9	11
Less severe	18	13	18
Mod. severe	50	49	47
Severe	24	29	24

Contd. Table 4

Level of severity	Level of education (P=0.206)			
	Illiterate (n=32)	Primary (n=71)	Secondary (n=77)	>secondary (n=20)
No problem	3	13	12	0
Less severe	19	10	19	20
Mod. severe	59	48	40	65
Severe	19	29	29	15
	Level of income (P=0.639)			
	Low (n=74)	Low (n=74)	Low (n=74)	Low (n=74)
No problem	7	11	11	11
Less severe	16	22	12	12
Mod. severe	51	38	52	52
Severe	26	29	25	25
	Level of social interaction (P=0.911)			
	Low (n=91)	Moderate (n=83)	High (n=26)	High (n=26)
No problem	11	8	8	8
Less severe	15	16	19	19
Mod. severe	52	47	42	42
Severe	22	29	31	31

Contd. Table 4

Level of severity	Level of organizational affiliation (P=0.089)				
	None (n=124)	Low (n=57)	Moderate (n=14)	High (n=5)	
No problem	10	4	7	0	
Less severe	13	17	36	60	
Mod. severe	49	51	50	20	
Severe	28	28	7	20	
	Level of media contact (p=0.400)				
	Very low (n=7)	Low (n=89)	Medium (n=83)	High (n=21)	
No problem	0	10	12	0	
Less severe	14	11	22	14	
Mod. severe	71	53	40	57	
Severe	15	26	26	29	
	Number of family members facing health related problems (p=0.00)				
	0 (n=19)	1 (n=129)	2 (n=42)	3 (n=7)	4 (n=3)
No problem	100	0	0	0	0
Less severe	0	18	19	14	0
Mod. severe	0	54	48	57	100
Severe	0	28	33	29	0

Table 5. Consumption of fruits and vegetables according to levels of arsenic in the study area

Level of consumption	Level of arsenic		
	Low (n=66)	Medium (n= 67)	High (n=66)
	%		
<u>Summer Fruits (P=0.016)</u>			
Little or no intake	0	2	0
Very rare	29	22	29
Rare	64	51	40
Occasionally	7	25	31
<u>Winter Fruits (P<0.0001)</u>			
Little or no intake	71	100	100
Very rare	29	0	0
<u>Summer Vegetables (P=0.05)</u>			
Little or no intake	5	2	3
Very rare	17	30	18
Rare	60	67	74
Occasionally	18	1	5
<u>Winter Vegetables (P<0.0001)</u>			
Little or no intake	0	2	0
Very rare	15	31	15
Rare	46	40	52
Occasionally	17	27	31
Frequently	22	0	2

Table 6: Consumption of fruits and vegetables according to the age of the respondents

Level of consumption	Age of the respondents (yrs.)		
	Young (n=50)	Middle (n=77)	Old (n=73)
	%		
<u>Summer Fruits (P=0.025)</u>			
Little or no intake	2	0	0
Very rare	30	36	14
Rare	48	48	57
Occasionally	20	16	29
<u>Winter Fruits (P<0.0001)</u>			
Little or no intake	100	91	84
Very rare	0	9	16
<u>Winter Vegetables (P=0.021)</u>			
Little or no intake	2	0	0
Very rare	28	21	15
Rare	50	48	41
Occasionally	20	26	27
Frequently	0	5	17

Table 7: Consumption of winter vegetables according to education level

Level of consumption	Level of education			
	Illiterate (n=32)	Primary (n=71)	Secondary (n=77)	>secondary (n=20)
	%			
<u>Winter Vegetables (P=0.014)</u>				
Little or no intake	0	0	0	5
Very rare	16	25	22	5
Rare	53	37	53	40
Occasionally	25	27	17	50
Frequently	6	11	8	0

Table 8: Consumption of winter vegetables according to annual income

Level of consumption	Level of income (TK.)		
	Low (n=74)	Medium (n=45)	High (n=81)
<u>Winter Vegetables (P<0.0001)</u>			
Little or no intake	0	0	1
Very rare	19	20	22
Rare	54	51	36
Occasionally	23	25	27
Frequently	4	4	14

Table 9: Consumption of fruits and vegetables according to the level of social interaction

Level of consumption	Level of social interaction		
	Low (n=91)	Medium (n=83)	High (n=26)
	%		
<u>Summer Fruits (P<0.0001)</u>			
Little or no intake	1	0	0
Very rare	43	15	8
Rare	44	60	50
Occasionally	12	25	42
<u>Winter Fruits (P=0.007)</u>			
Little or no intake	83	95	100
Very rare	17	5	0
<u>Winter Vegetables (P<0.0001)</u>			
Little or no intake	0	1	0
Very rare	35	11	0
Rare	28	63	58
Occasionally	25	22	35
Frequently	12	4	7

Table 10: Consumption of fruits and vegetables according to the level of media contact

Level of consumption	Level of media exposure			
	Very low (n=7)	Low (n=89)	Medium (n=83)	High (n=21)
	%			
<u>Summer Fruits (P<0.0001)</u>				
Little or no intake	14	0	0	0
Very rare	0	31	30	0
Rare	43	53	54	38
Occasionally	43	16	16	62
<u>Winter Vegetables (P=0.014)</u>				
Little or no intake	0	1	0	0
Very rare	14	18	29	0
Rare	0	46	49	48
Occasionally	71	27	15	43
Frequently	15	8	7	9

Table 11. Consumption of fruits and vegetables according to the number of family members facing health related problems

Level of consumption	Number of family members facing health related problems				
	0 (n=19)	1 (n=129)	2 (n=42)	3 (n=7)	4 (n=3)
	%				
<u>Winter Fruits (P<0.0001)</u>					
Little or no intake	63	91	100	86	100
Very rare	37	9	0	14	0
<u>Winter Vegetables (P=0.038)</u>					
Little or no intake	0	1	0	0	0
Very rare	16	25	12	0	34
Rare	42	40	62	71	33
Occasionally	11	27	24	29	33
Frequently	31	7	2	0	0

Conclusion

- ❖ Personal and socio-economic characteristics mostly reflect the general features of the farm holdings in rural Bangladesh.
- ❖ Health related problems differs significantly in the areas with varying levels of arsenic contaminations.
- ❖ Consumption of fruits and vegetables differs significantly according to contamination level and the personal and socio-economic characteristics.
- ❖ Health related problems cited - allergy, scab or dermatitis, white spot or skin lesions, conjunctivitis, melanosis, keratosis and weakness.
- ❖ Health related problems are still in the initial stages of progression from chronic arsenic exposure.

Recommendations

- Use of surface water for irrigation and household works
- Encourage the inhabitants to intake more fruits and vegetables
- Preservation of rain water, renovation of water bodies and digging of ponds
- Installation of water treatment plants
- Conducting more studies and epidemiological research for characterizing and quantifying the arsenic-related public health burden



**THANK
YOU**