Health-Seeking Behaviour of People with Arsenicosis in Rural Bangladesh

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Abstract

Arsenic contamination of tubewell water, which constitutes the primary source of drinking water, has emerged as a serious health problem in Bangladesh. Many Bangladeshis are now suffering from arsenic-related diseases ranging from melanosis to skin cancer. The objectives of this paper are to examine the health-seeking behaviour of people exposed to elevated levels of arsenic in rural Bangladesh and to identify the underlying factors for such behaviour. Questionnaire surveys distributed among residents of the two most arsenic-impacted rural areas in Bangladesh provided the major data source for this study. Twelve villages were selected from the two study sites, and a total of 663 people who suffer from arsenic poisoning were interviewed. Analysis of survey data reveals that about 35% of all respondents sought medical treatment for their arsenic-related illnesses. In both study sites, respondents had a variety of healthcare options, but the majority of respondents utilized practitioners with formal degrees in Western medicine. They associate arsenic-related diseases with Western technology and, therefore, they believe that the appropriate treatment for their illness should be obtained from practitioners of Western medicine. Application of logistic regression analysis suggests that illness stage, perceived threat, symptoms identification time and education level were significant for explaining respondent probability of seeking care for arsenicosis symptoms. Based on a rigorous analysis of the survey data, a number of recommendations are offered.

Introduction

Arsenic contamination of tubewell water, which constitutes the primary source of drinking water, has caused a severe public health problem in Bangladesh (Caldwell et al. 2003). Many people in this South Asian nation are believed to be exposed to arsenic in drinking water that far exceeds the World Health Organization's (WHO) recommended level of 10 parts/billion (ppb) (Yu et al. 2003).

Adverse health effects resulting from consumption of this contaminated water range from skin abnormalities to several types of cancers, such as skin, lung, liver, kidney or bladder (WHO 2000). Other adverse health effects include an increase in the prevalence of diabetes mellitus, hypertension and respiratory diseases (Milton and Rahman 2002). An increased risk of stillbirths and pregnancy complications related to arsenic exposure has also been reported (Hasnat 2004).

Millions of Bangladeshis are already suffering symptoms from arsenic-related illnesses, and the incidence of arsenicosis (arsenic poisoning) has been increasing at an alarming rate (Paul 2004). Yu et al. (2003) believe that there are some two million cases of skin lesions in the country caused by drinking arsenic contaminated water, and these researchers estimate 3,000 people die every year in Bangladesh from arsenic-related illnesses. Arsenic poisoning also affects the productivity of the people who suffer its effects and may become liabilities for their families.

Arsenic poisoning results from long-term exposure to this heavy metal. Early symptoms include various skin lesions that develop over an incubation period of 5–10 years after continuous exposure. After 10–20 years of prolonged exposure, afflicted persons often develop arsenic-related cancers (Paul and Brock 2005). Chronic arsenic poisoning has four recognized stages. In the first, or pre-clinical stage, patients show no symptoms, but arsenic can be detected in urine or body tissue samples. In the second stage, visual symptoms begin to appear, which include a darkening of skin on the palms, dark spots on the chest (spotted melanosis), back, limbs or gums. Spotted melanosis is generally a pre-cursor of skin cancer (Paul and De 2000). In the third stage, clinical manifestations become more pronounced, and the internal organs are affected. In the final stage, affected persons may develop skin, lung or bladder cancer.

The first two stages of arsenicosis occur before the condition becomes irreversible. It is therefore imperative that people suffering from arsenic poisoning recognize early symptoms and seek medical treatment so that they can avoid reaching later, irreversible stages. Although no specific treatment has yet proved effective, people experiencing arsenic poisoning tend to seek treatment from health professionals.

Use of antioxidant multivitamins (vitamins A, C and E) along with arsenic-free water and various skin lotions have been shown to be beneficial for people who are in the initial stages (1 and 2) of arsenicosis (Guha Mazumder 1996; Hasnat 2004). Taking drugs, such as d-penicillamine dimercaptosuccinic acid, and eating selenium-rich foods, such as fresh fruits, vegetables, eggs and milk, help to diminish the effects of arsenic poisoning (Paul and De 2000). Arsenic patients who are in the advanced stages (3 and 4) may require amputation of their legs, arms and/or hands; some may also develop arsenic-related cancers.

The objectives of this study are to examine the health-seeking behaviour of individuals exposed to elevated levels of arsenic in rural Bangladesh, and to identify the underlying factors for such behaviour. Such a study is essential to an understanding of how people who suffer from arsenic poisoning and their families respond to a new health crisis. This understanding will not only provide useful insights guiding arsenic prevention efforts in the country, it may, more importantly, help save many lives.

A brief review of health-seeking behavioural studies is presented in the next section to provide necessary background information. This review forms the basis for conceptualizing the health-seeking behaviour of Bangladeshi arsenicosis sufferers and provides a broader context for this research. Research methods employed in the present study are then discussed, followed by a presentation of the results and concluding remarks.

Health-Seeking Behaviour: A Review

Since few attempts have been made to study the treatment-choice behaviour of people who suffer from arsenic poisoning in Bangladesh and other countries, this section presents a careful review of the existing literature focusing on the health-seeking behaviour of people suffering from other illnesses and their determinants. Emphasis in this review is on developing countries where a medically pluralistic healthcare system provides people with a wide range of therapeutic choices – as is the case in Bangladesh.

Health-seeking behaviour refers to the sequence of actions that sufferers and/or their parents undertake in order to recover and/or seek relief from a perceived or actual illness (Ward et al. 1996). This behaviour begins with symptom identification; often, a strategy for treatment is then formulated by the head of the household in consultation with other adult family members (Shaheen and Rahman 2003). Depending on the type of illness, various family members may play the leading role in this decision-making process. For example, in complicated child-delivery cases in developing countries, often the mother or mother-in-law makes the decision to utilize the services of an institutional birth centre (Uzma et al. 1999).

The actual process of seeking healthcare usually involves multiple steps, which are influenced by factors such as illness type and severity, past experience, pre-existing beliefs about illness causation, the range and accessibility of therapeutic options available, their perceived efficacy and cost of treatment (Helman 1995; Shafie 2000). Generally, the steps to consultation are: first, making a decision about whether help from a practitioner is needed; second, mobilizing resources; third, selecting a healthcare provider; fourth, actually seeking medical consultation. Perceived minor illnesses are often dealt with using a "wait-and-see" approach (Manderbacka et al. 1999). Perceived serious problems usually result in seeking some form of care, usually traditional healthcare; and if the condition does not improve, a second practitioner is usually consulted – most commonly a Western practitioner (Paul 1992; Uzma et al. 1999).

As indicated, in many developing countries, treatment choice is undertaken within an existing pluralist medical milieu. Because of the existence of several distinct therapeutic systems in a single cultural setting, with their distinctive ideologies about disease causation and the nature of medical intervention, health-seeking behaviour in such societies is a complex process. The significance of medical pluralism in most developing countries lies in the fact that indigenous and naturalized medical traditions exist along with the Western or scientific (frequently termed allopathic or biomedical) systems.

Kleinman (1980) provides a useful typology of therapeutic choices available in developing countries. He characterized healthcare resources into three overlapping categories, or sectors: (1) the popular sector, consisting of families, members of a larger social network and the patients themselves; (2) the folk sector, consisting of traditional healers; (3) the professional sector, meaning practitioners of biomedicine. His popular sector refers to the lay (non-professional) arena of care where the symptoms of ill health are often first detected and health treatment initiated. This self-care, or "home remedies" option includes traditional and modern forms of self-treatment, such as taking analgesics and antacids, which are readily available without prescription. Existing literature suggests that the search for medical intervention for a particular illness generally begins after the failure of home treatment and/or self-medication (Ahmed et al. 2000).

The "folk" or traditional healthcare sector includes diverse practitioners of secular healing who adopt a holistic approach that takes into account both physical and emotional symptoms in the broader context of people's lives (Ahmed et al. 2000). In Bangladesh, this sector comprises treatment seeking within faith healing and traditional systems of medicine including *Ayurvedic* and *Unani* (Paul 1992). Homeopathy is often included in this traditional sector, although it was developed in the late 1700s in Germany (Ahmed et al. 2000). The homeopathic tradition seeks to stimulate the body's own defence mechanisms and processes so as to prevent or treat illness. Although homeopathic medical degrees are available in Bangladesh, most homeopath practitioners are working without such a degree.

The "professional" healthcare sector refers to organized, legally sanctioned practitioners of Western medicine, who are often called "qualified allopaths" or M.B.B.S. doctors (Kleinman, 1980). They receive a formal medical degree from a five-year medical college and serve one year residency. In the context of Bangladesh, Ahmed et al. (2000) added two additional categories of healthcare resources: (1) "paraprofessional" treatment-seeking, which consists of consultations with *Palli Chikishoks* (village practitioners who receive a year of training in diagnosing and treating the most common local ailments), medical assistants (who complete a comprehensive three-year medical

training program), and government and non-government community health workers who receive only very basic preventive and curative healthcare training and provide treatment primarily with allopathic drugs: (2) "unqualified allopaths," which refers to non-graduate practitioners of Western medicine (Ahmed et al. 2000).

Although both M.B.B.S. doctors and paraprofessionals practice Western medicine, one of the main distinctions between them is the duration of medical course work and training. While the overwhelming majority of M.B.B.S. doctors practice in large urban centres, paraprofessionals are primarily responsible for providing comprehensive (first level) curative services to people living in small towns and rural areas (Osman 2004). Also, the consultation fees are much higher for M.B.B.S. doctors compared to their paraprofessional counterparts.

With the hope of a quick recovery from illness, individuals often seek treatment from two or more medical systems (consecutively or concurrently) for the same health problem (Good 1987). Beals (1976) observed a typical progression in India from the cheapest and most accessible care, to treatments that are more expensive and harder to procure. Gupta and Dasgupta (2003) reported that work status, education, age, household size and household income were significant variables related to explaining the probability of seeking medical care in rural India. These researchers found that people belonging to a relatively high-income group usually use Western practitioners, those with more modest income show a preference for both Western and traditional practitioners, and individuals in the low-income group generally use practitioners of traditional medicine.

Another important factor noted in health-seeking behaviour is the relative proximity of services (Paul and Rumsey 2002; Uzma et al. 1999). The nearest healthcare resources are frequently used whenever possible. Using a set of cross-sectional data collected from Bangladesh, Ahmed et al. (2000) observed a difference in health-seeking behaviour between members of nongovernmental organizations (NGOs) and non-members. These researchers reported that NGO members exhibited a greater tendency to seek treatment from the professional sector than from folk and/or popular sectors. Many factors, then, influence the choice of health service use – especially in medically pluralistic societies. These same factors not only influence which type(s) of medical system might be used, they also often determine whether medical consultation will even be sought.

Methods

The research underlying this study has made use of both primary and secondary data sources. Primary data collection has been based on respondent answers to questionnaire surveys completed by people living in two rural areas in Bangladesh who suffer from arsenic poisoning. Qualitative methods, such as informal discussions with people who suffer from arsenic poisoning, village leaders and health workers, and focus groups were also used to augment information obtained through the questionnaire surveys.

Selection of the Study Area and Subjects

After consulting with several experts on arsenic poisoning, two thanas – Ramganj from the Lakhipur district, and Ramchandrapur from the Chapai Nawabganj district – were selected for this study (Figure 1). A thana is the lowest administrative unit in Bangladesh. It is composed of 10–15 unions, each containing between 10–30 villages. A district is the second largest administrative unit with an average population of two million people or more.

The selected thanas are severely impacted by arsenic contamination and constitute a portion of the high-risk zone for arsenic (BGS/DPHE 2001). From each selected thana, six contiguous villages were chosen for this study. In selecting villages, consideration was given to the logistical support available in collecting information from respondents. Although villages selected represent the arsenic level of their respective thanas, such samples are not representative of Bangladesh as a whole.

Almost all families in the selected villages use tubewell water for drinking and cooking, and more than 90% of all tested tubewells in these two thanas are contaminated with arsenic. The target population of this study was all people with symptoms of arsenicosis within the selected villages.

A complete list of all individuals manifesting symptoms of arsenicosis in the selected villages was compiled by an intensive, house-to-house survey during the first phase of the field work. Arsenicosis is defined as the presence of characteristic arsenical skin lesions combined with a history of drinking arsenic-contaminated water for at least six months (Hasnat 2004).

All people who have arsenicosis were identified by physicians, trained field workers, sufferers themselves and their relatives and friends. Most were diagnosed with arsenicosis by examination of the visible signs and/or symptoms such as the appearance of black spots (melanosis), thickening of the skin on the palm and sole (keratosis), the appearance of black and white patches (leukomelanosis), pustules on the skin (hyperkeratosis), burning of eyes, headache, dizziness and poor vision. For an overwhelming majority of survey respondents, arsenicosis symptoms were identified 0–5 years before compilation of the list of arsenicosis sufferers for this study.

Data Collection and Data Analysis

A structured questionnaire was developed and approved by the Committee for Research Involving Human Subjects (IRB) at the Kansas State University. It was later administered among all 759 arsenicosis sufferers identified in the house-to-house survey. The questionnaire included two broad sections: (1) a socio-demographic section to collect information regarding age, gender, education, occupation and landholding size of participants; (2) a section focusing on health-seeking behaviour. In section two, the nature and order of treatment measures undertaken and other relevant information were recorded. This questionnaire was pre-tested in a pilot study by a trained field survey team, which consisted of six male and two female graduate students in geography from the University of Dhaka, Bangladesh. All members of this team had previous field research experience, including identifying people who have arsenicosis and testing of arsenic levels in tubewell water.

In order to obtain a more complete picture of the health-seeking behaviour of arsenicosis sufferers, four focus group meetings were held with local leaders, NGO and government officials, and village health workers. Two focus group meetings were organized in each study site; one before and one after completion of the questionnaire survey. The first meeting helped to identify the vocabulary the target audience uses for the concepts being studied. The second meeting allowed efficient and effective communication, discussion and clarification of issues raised in the individual interviews. Each focus group was composed of between 6–10 persons, and these group meetings were held in a local school or a government/NGO office. For each of the focus group discussions, a moderator facilitated the process.

Identification of the important determinants of health-seeking behaviour of people with arsenicosis was performed in two stages. In the first stage, chi-square tests were employed to examine whether associations between selected independent variables and health-seeking behaviour were statistically significant. Since the dependent variable is binary in form (sought medical treatment from a physician at any time prior to the questionnaire survey for arsenicosis problem or not), a logistic regression model was used to explore the influence of the selected independent variables on the health-seeking behaviour of people who have been exposed to arsenic (Neter et al. 1983).

Based on the literature survey and focus group meetings, 11 independent variables (age, gender, literacy, occupation, landholding size, annual household income, NGO membership status, stage of illness, symptoms identification time, perceived threat and study site) were included in this analysis. Two focus group meetings organized before administration of the questionnaire survey and subsequent conversations with a number of respondents and key personnel made it clear that access to healthcare resources was not an important factor in influencing the health-seeking behaviour of individuals from both study sites. This was because both sites were regularly visited by physicians and healthcare workers sponsored by both NGOs and public agencies (Paul and Brock 2006). This is the reason distance to nearest health personnel and/or facility was not included as a variable in this study.

Several other variables, such as knowledge of healthcare, cost of care and perceived quality of care were not included for two reasons. First, field visits and focus group meetings revealed that most residents of the study sites had little knowledge regarding treatment options available for people

who have arsenicosis. This is most likely because this illness is relatively new in Bangladesh. Second, since a considerable proportion of the respondents had sought and received treatment free of cost from physicians who visited the study sites several times in the past as members of medical teams, cost of care and perceived quality of care were also not included in the analysis.

Table 1. Selected characteristics of the respondents

Characteristic	Ramganj (n=334) No. (%)	Ramchadrapur (n=329) No. (%)	Total (n=663) No. (%)
Landholding Size			
Landless	49 (14.67)	66 (20.06)	115 (17.35)
Small	273 (81.74)	198 (60.18)	471 (71.04)
Medium and large	12 (3.59)	65 (19.76)	77 (11.61)
χ^2 =51.181 (p<0.001; d.f.=2)			
Occupation			
Farming	98 (29.34)	107 (32.52)	205 (30.92)
Business	100 (29.94)	102 (31.00)	202 (30.47)
Service	61 (18.26)	29 (8.81)	90 (13.58)
Others	75 (22.460)	91 (27.66)	166 (25.03)
χ^2 =13.301 (p=0.010; d.f.=3)			
Annual Household Income (in Taka)			
<30,000	69 (20.66)	81 (24.62)	150 (22.62)
30,000–60,000	163 (30.24)	168 (51.06)	331 (50.08)
>60,000	102 (30.24)	80 (24.32)	182 (27.30)
χ^2 =3.407 (p=0.182; d.f.=2)			
Education (years in schools)			
Illiterate	104 (31.14)	159 (48.33)	263 (39.67)
Up to 5th grade	48 (14.37)	23 (6.99)	71 (10.71)
6–10th grade	122 (31.14)	101 (30.70)	223 (33.63)
>10th grade	60 (17.96)	46 (13.98)	106 (15.99)
χ^2 =24.095 (p<0.001; d.f.=3)			
Age			
<30 years	99 (29.64)	151 (45.90)	250 (37.71)
30–44 years	147 (44.01)	119 (36.17)	266 (40.12)
45–64 years	73 (21.86)	40 (12.16)	113 (17.04)
>64 years	15 (4.49)	19 (5.78)	34 (5.13)
χ^2 =23.835 (p<0.001; d.f.=3)			
Gender			
Male	139 (41.62)	182 (55.32)	321 (48.42)
Female	195 (58.38)	147 (44.68)	342 (51.58)
χ^2 =12.460 (p<0.001; d.f.=1)			
NGO Membership			
Yes	5 (1.50)	58 (17.63)	63 (9.50)
No	329 (98.50)	271 (82.37)	600 (90.50)
χ^2 =50.159 (p<0.001; d.f.=1)			

As indicated, arsenic exposure affects people differently. Infants are more sensitive to arsenic than adults (Paul and De 2000). Physicians suggest that dietary intake is the most vital factor in determining who is afflicted with arsenic poisoning. Poor nutrition renders individuals more vulnerable (Lepkowski 1998). It has been found that protein-rich food is able to delay the effects of arsenic-related manifestations; however, most economically-challenged families in rural Bangladesh are unable to purchase such food. Since women in Bangladesh bear the heavier burden of poverty, there also tends to be a gender bias in arsenic poisoning (Sultana 2006). Nutritional intake is not included in this study as an independent variable primarily because of its high correlation with household income (WHO 2000).

Five of the 11 independent variables considered in this study (landholding size, annual household income, educational level, age and symptom identification time) were treated as interval or ratio scale data in the logistic regression model. Another five variables – NGO membership (no or yes), stage of illness (initial or advanced stage), perceived threat (no or yes), study site (Ramganj or Ramchandrapur) and gender (female or male) – were binary variables, while occupation variable was categorized into four groups (see Table 1). After testing for multicollinearity problem, all 11 variables were included in the logistic regression model. Because of the small sample size, no attempt was made to include interaction effects in the logistic regression model.

Respondent Profile

Of the 759 individuals identified with arsenicosis symptoms, it was possible to interview 697 of them from the two study sites. Additionally, 34 questionnaires had to be discarded from the analysis because they were improperly completed. Accordingly, the analysis in this study was based on 663 properly completed questionnaires. Table 1 shows that 115 (17.35%) of the 663 respondents were landless. The percentage of respondent households possessing small landholdings was slightly over 71. The calculated chi-square value indicates that the two study sites differ significantly with respect to respondent household landholding size. Table 1 indicates that average landholding size is higher among respondents from Ramchandrapur compared to respondents of Ramganj. It is important to note that the chi-square is testing the difference of selected variables between the two study sites.

Table 1 shows respondent occupation is categorized in four groups: farmers, businessmen, service holders and others. The last group includes housewives, labourers, students, unemployed and retired people. Survey data indicate nearly 31% of all study respondents engaged in farming, a lower percentage than for the country as a whole. This is simply because respondents grouped under the housewife and student occupation categories originate from farming households.

Table 1 shows that about 23% of respondent households earned less than Tk. 30,000 (US $520) per year, while 27% earned more than Tk. 60,000 (US $1,040). Table 1 indicates that the largest proportion of respondents belongs to the 30–44 year age cohort. The number of female respondents is slightly higher than male respondents. Analysis of respondent characteristics reveals that, excluding annual household income, the two study sites differ significantly in all other characteristics considered in this study.

Results

Illness Treatment Choice

Data from the survey reveal that nearly 35% of all people who have arsenicosis (230 out of 663) consulted physicians regarding their illness. This rate of physician utilization can be considered relatively high, which indicates that arsenicosis has become a serious health concern in the affected region. Survey data further indicate a discernible difference in the likelihood of health-seeking behaviour between respondents of the two study sites. A greater proportion of Ramganj respondents (39%) sought medical treatment from practitioners (of various medical systems) than their counterparts living in Ramchandrapur (31%). This difference in healthcare-seeking behaviour between respondents of the two study sites is statistically significant at the 0.05 level.

Information regarding frequency and types of physicians consulted by the respondents who sought medical intervention for their arsenicosis problem is presented in Table 2. This table indicates that 230 people who have arsenicosis made 294 visits to physicians, which means each respondent made 1.28 visits. Nearly 46% of all visits were to M.B.B.S. doctors, 20% of visits were to paraprofessionals and about 16% consulted unqualified allopathic practitioners. These figures suggest that respondents were not generally relying on traditional healers for treating their illness. It was revealed both from the focus group meetings and informal conversations that respondents consider arsenicosis a new disease caused by consuming arsenic-contaminated tubewell water. Further, respondents believe that this illness is an outcome of Western technology used to extract water from underground, so they believe it should be treated by practitioners of Western medicine.

Table 2 further shows that physician type consulted differs by study site. As expected, respondents of Ramganj utilized M.B.B.S doctors to a greater extent than respondents from Ramchandrapur. In contrast, respondents of the latter site depended more on other types of modern physicians, such as paraprofessionals (see Table 2). Indeed, respondents of Ramchandrapur reported the use of homeopathic care almost three times as frequently as respondents from Ramganj. At both study sites, only a few respondents consulted practitioners of ethnomedicine for treatment of their illness.

Table 2. Types of physicians consulted*

Healthcare sought	Ramganj (n=129) No. (%)	Ramchandrapur (n=101) No. (%)	Study Area (n=230) No. (%)
Modern			
M.B.B.S.	95 (73.64)	40 (39.60)	135 (58.70)
Paraprofessionals	31 (24.03)	28 (27.72)	59 (25.65)
Unqualified allopaths	22 (17.05)	24 (23.76)	46 (20.00)
Homeopath	11 (8.53)	25 (24.75)	36 (15.65)
Traditional			
Kabiraj	9 (6.98)	5 (4.95)	14 (7.49)
Hakim	4 (3.10)	0 (0.00)	4 (1.74)
Frequency of consultation	172	122	294
Average	1.33	1.21	1.28

*Multiple response possible

The two study sites also differ regarding the frequency of physician consultation by respondents. On average, respondents in Ramganj utilized 1.33 physicians compared with 1.21 physicians consulted by respondents of Ramchandrapur (see Table 2). This pattern is consistent with findings reported on treatment choices by respondents of the two study sites. Survey data show that nearly one-third of the respondents of both study sites consulted more than one type of physician. These respondents either switched from one type of physician to another or utilized more than one type concurrently – probably with the hope of a fast cure from their symptoms. A careful review of field data suggests that this "switching" occurred usually from the care of M.B.B.S. doctors and paraprofessionals to other physicians of Western medicine.

Survey data also show that practitioners with an M.B.B.S. degree were utilized both once and more than once by the majority of respondents from both study sites. No respondent consulted a Kabiraj or a Hakim only, which implies that respondents who consulted traditional practitioners also utilized other physicians. It is likely that these individuals were not completely satisfied with the treatment received from traditional healers, and that is why they switched to other practitioners. As

noted earlier, many people in the study area related arsenicosis with Western technology and many of them believed that the illness could be treated only by consultation of physicians of modern medical systems.

Survey data also suggest that in the quest for therapy, about 14% of the respondents who sought treatment from more than one physician consulted up to four physicians. In each one of these four choices, an overwhelming majority of respondents from both study sites preferred M.B.B.S. doctors for medical consultation. Failure of the treatment from the first referral was the primary reason given by respondents for seeking treatment from another physician(s); further physician consultation was generally attributed to dissatisfaction with a previous provider. In nearly 8% of the cases where treatment by another physician was sought, the reason given was recommendation of the respondent's previous medical care providers, most of whom were practitioners without an M.B.B.S. degree.

Questionnaire survey data reveal that some respondents in both study sites used two different physicians of the same medical system, but from different places. However, respondents who sought treatment from more than one source did not frequently change their treatment modes. Such respondents were usually under the same physician's care for a relatively long period of time before switching to another physician. Switching generally occurred to the same type of physician (i.e., from one M.B.B.S. doctor to another M.B.B.S. doctor or from another physician of Western medicine to a physician with an M.B.B.S. degree).

Respondents who sought treatment from a third and/or fourth physician reported that they were very frustrated with the treatment they received for their illness. Most of these respondents were either moderately or severely affected by arsenicosis and their continuation of symptoms forced them to continue treatment. Their previously held greater belief in modern medicine lessened, and at the time of the interview, these respondents were inclined more toward ethnomedicine treatment options. A similar observation was also reported by Shafie (2000) who studied health-seeking behaviour of arsenic patients in a village in northern Bangladesh. The present study noted that nine respondents from both study sites went back to their original physicians for treatment after seeking help from other medical practitioners.

Determinants of Health-Seeking Behaviour of Arsenic Patients

Table 3 shows that, similar to study site, landholding size is strongly associated with the treatment-seeking behaviour of people in the study area who have arsenicosis. Only 20% of all landless households consulted medical personnel for their illness. Thirty-six per cent of households with small landholdings consulted medical personnel, while 48% of people with arsenicosis from households with medium or large landholdings did so. Surprisingly, annual household income had no significant impact on the treatment-seeking behaviour of arsenicosis sufferers (see Table 3). As expected, respondents employed in non-farming occupations sought medical treatment more frequently than respondents who were farmers.

Table 3 further shows a strong positive relationship between educational level of the respondents and consultation of medical personnel for their arsenicosis symptoms. In contrast, respondent age exhibits an inverted U-shaped relationship with treatment seeking from healthcare professionals (see Table 3). The calculated chi-square value is also highly significant, indicating the health-seeking behaviour of respondents differs by age group.

Contrary to expectation, no gender difference was found with respect to utilization of healthcare personnel for arsenicosis symptoms. This unexpected finding might be associated with the social stigma linked to some arsenicosis symptoms. Because of skin manifestations associated with arsenicosis, parents are often unable to get their afflicted daughters married. For this reason, before skin manifestations become highly visible, parents take them to physicians for treatment. Arsenicosis-afflicted married women also seek treatment to avoid unfortunate consequences. It has been reported that some married women with skin lesions due to chronic arsenic exposure were rejected by their spouse and sent back to their parents, or their husbands took a second wife (Paul and De 2000; Bhuiyan and Uddin 2001).

Table 3. Use of medical personnel for arsenicosis by selected factors

Factor	Used (%)	Not used (%)	Total (%)
Study Site			
Ramganj	129 (38.62)	205 (61.38)	334 (100.00)
Ramchandrapur	101 (30.70)	228 (69.30)	230 (100.00)
χ^2 =4.593 (p-value=0.032; d.f.=1)			
Landholding Size			
Landless	23 (20.00)	92 (80.00)	115 (100.00)
Small	170 (36.09)	301 (63.91)	471 (100.00)
Medium and large	37 (48.05)	40 (51.95)	77 (100.00)
χ^2 =17.431 (p-value <0.001; d.f.=2)			
Annual Household Income (in Tk.)			
<30,000	47 (31.33)	103 (68.67)	150 (100.00)
30,000–6,000	110 (33.23)	221 (66.77)	331 (100.00)
>60,000	73 (40.11)	109 (59.89)	182 (100.00)
χ^2 =3.416 (p-value =0.181; d.f.=2)			
Occupation			
Farming	72 (35.12)	133 (64.88)	205 (100.00)
Business	76 (37.62)	126 (62.38)	202 (100.00)
Service	43 (47.78)	47 (52.22)	90 (100.00)
Others	39 (23.50)	127 (76.50)	166 (100.00)
χ^2 =17.549 (p-value =0.023; d.f.=3)			
Education			
Illiterate	64 (24.33)	199 (75.67)	263 (100.00)
Up to 5th grade	20 (28.17)	51 (71.83)	71 (100.00)
6–10th grade	90 (40.36)	133 (59.64)	223 (100.00)
>10th grade	56 (52.83)	50 (47.17)	106 (100.00)
χ^2 =32.339 (p-value <0.001; d.f.=3)			
Age			
<30 years	70 (28.00)	180 (72.00)	250 (100.00)
30–44 years	112 (42.11)	154 (57.89)	266 (100.00)
45–64 years	42 (37.17)	71 (62.83)	113 (100.00)
>64 years	6 (17.65)	28 (82.35)	34 (100.00)
χ^2 =16.060 (p-value <0.001; d.f.=3)			
Gender			
Male	111 (34.58)	210 (65.42)	321 (100.00)
Female	119 (34.80)	223 (65.20)	342 (100.00)
χ^2 =0.003 (p-value=0.954; d.f.=1)			
NGO Membership			
Yes	17 (26.98)	46 (73.02)	63 (9.50)
No	213 (35.50)	387 (64.50)	600 (90.50)
χ^2 =1.825 (p-value=0.177; d.f.=1)			
Symptoms Identification (months ago)			
<12	13 (24.53)	40 (75.47)	53 (100.00)
12–60	111 (26.37)	311 (73.63)	421 (100.00)
>60	106 (56.09)	83 (43.91)	189 (100.00)
χ^2 =53.476 (p-value <0.001;d.f.=2)			

Table 3. Continued

Factor	Used (%)	Not used (%)	Total (%)
Perceived Threat			
Yes	188 (41.59)	264 (58.41)	452 (100.00)
No	42 (19.91)	169 (80.09)	211 (100.00)
χ^2 =29.864 (p-value <0.001; d.f.=1)			
Illness Stage			
Initial	204 (32.96)	415 (67.04)	619 (100,00)
Advance	26 (59.09)	18 (40.91)	44 (100.00)
χ^2 =12.384 (p-value <0.001; d.f.=1)			

Information presented in Table 3 indicates no significant difference between NGO membership and consultation of healthcare personnel for arsenicosis-related symptoms among survey respondents. Because of empowerment programs sponsored by various NGOs, it was expected there would be a direct relationship between these two variables. However, this unexpected finding might be associated with the small number of survey respondents who are members of one or more NGOs.

Table 3 clearly shows that the remaining three variables (time of symptom identification, perceived threat and illness stage) are strongly associated with the health-seeking behaviour of respondents in the study area. Respondents whose symptoms were identified more than five years before the survey were much more likely to seek treatment from healthcare personnel than respondents whose symptoms were identified less than five years prior to this survey. Similarly, respondents who were in advanced stages of arsenicosis and who perceived it as a life threatening illness were more likely to seek treatment than those respondents who were in more initial stages and did not perceive their arsenicosis symptoms as life threatening. These observed patterns are consistent with expected patterns.

Results of the chi-square tests provided in Table 3 clearly show that in a bivariate analysis, time of symptom identification is the most influential determinant of health-seeking behaviour of people who have arsenicosis in the study area, followed by the education level of respondents, perceived threat, occupation, landholding size, age, illness stage and study site, respectively. This suggests cognitive, symptom-appraisal, as well as social and demographic factors were important determinants of health-seeking behaviour among survey respondents in the study area.

Results of the application of the logistic regression model are shown in Table 4. This model is statistically significant at the 0.01 level and the variables: illness stage, perceived threat, symptom identification time and education level were significant for explaining the probability of respondents seeking care for their arsenicosis-related symptoms. This implies that the economic status of the respondents surveyed does not exert a strong influence on their treatment-seeking behaviour. Paradoxically, both landholding size and annual household income are negatively associated with respondent health-seeking behaviour.

Table 4 also presents odds ratios for the 11 variables included in the final model along with the reference category for binary variables. For example, the initial stage is the reference category for the variable illness stage. The table suggests that the odds of seeking treatment from healthcare personnel by respondents who perceived themselves to be in the most advanced stage of arsenicosis were 11.635 times higher than those respondents who perceived their illness to be in the initial stage. These odds ratios can be interpreted in a similar way for other variables included in the model. Based on these ratios, illness stage emerged as the leading factor for utilization of medical practitioners by respondents for arsenicosis symptoms followed by gender and perceived threat.

Discussion

Several important observations have emerged from the foregoing analysis of the health-seeking behaviour of arsenic-afflicted respondents. First, the rate of utilization of healthcare personnel, particularly practitioners of modern medicine, is relatively high at both study sites. Available studies (e.g., Paul 1992) suggest that people in Bangladesh, in general, avoid treatment until an illness causes a serious physical disability or becomes life threatening. As a result, the overall utilization of healthcare personnel is very low in the country. One reason for the high rate of physician consultation by people with arsenicosis in the study area is associated with mitigation efforts undertaken by both government agencies and NGOs. These organizations dispatched mobile medical teams to arsenic-impacted areas – including the study sites – to identify people who have arsenicosis and provide care to them (Rabbani et al. 2002). These teams consisted of both foreign and domestic physicians of Western medicine. In addition, a number of NGOs conducted health camps in the affected areas. Members of the mobile arsenic teams and participants of the camps provided services to people with arsenicosis either without charge or at minimal cost. Based on informal interviews and focus group meetings, it appears that there was no perceived difference in the coverage of mobile clinics and medical camps among the two study sites.

Table 4. Results derived from the logistic regression model

Explanatory Variable	Coefficient	Odds Ratio
Landholding Size	-0.020	1.046
NGO Membership (yes)	-0.209	1.232
Annual Household Income	-0.000	0.000
Illness Stage (initial)	-2.454**	11.635
Perceived Threat (no)	1.001**	2.721
Study Site (Ramchandrapur)	0.262	1.300
Time of Symptoms Identification	0.030**	1.031
Gender (male)	-13.570	4.817
Age	0.010	1.010
Educational Level	0.128**	1.137
Occupation (farming)		
Business	0.342	1.408
Service	0.100	1.105
Others	0.918	2.504
Intercept	9.804	571.700
-2 Log-likelihood 146.028 (p<0.001)		

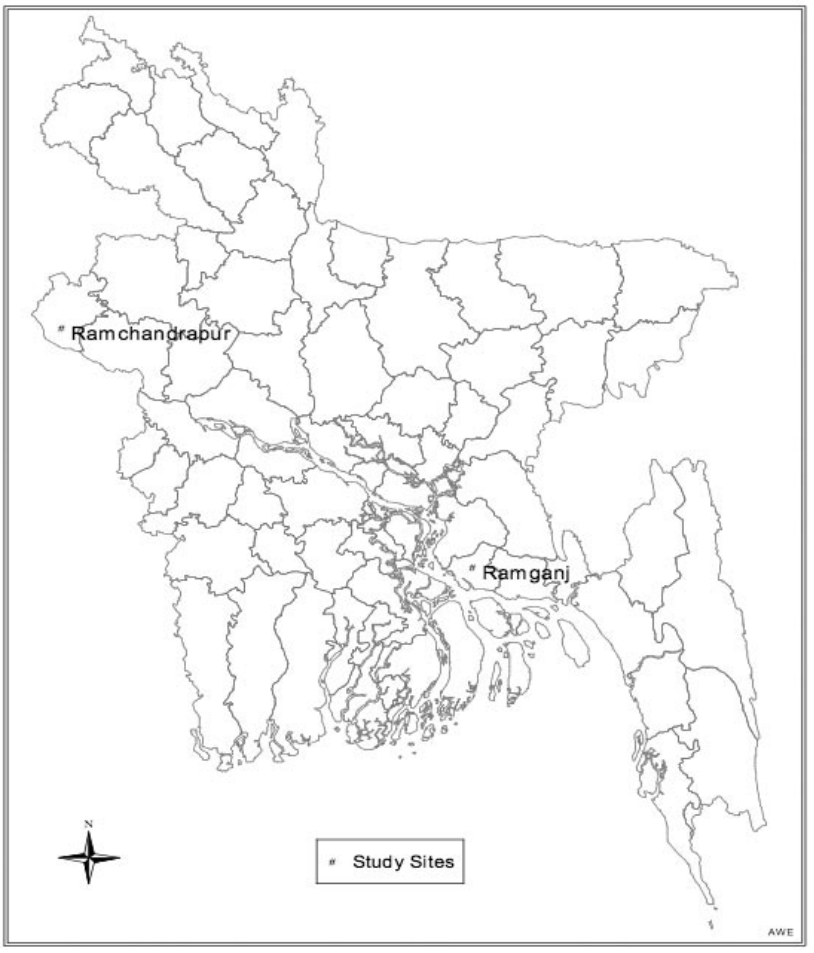
*p#0.05
**p#0.01

Despite this similar coverage, the two study sites do differ in healthcare-seeking behaviour and this may be associated with the level of development of the sites. Ramganj has a better relative location than Ramchandrapur, because the former site is well connected to Dhaka, the capital and development core of Bangladesh (Figure 1). It takes less than three hours by bus to reach Dhaka from Ramganj, while it requires at least 10 hours by bus to reach Dhaka from Ramchandrapur. Also, compared with Ramchandrapur, more Ramganj residents work abroad and regularly send money back to their homes. Fifteen respondents from the latter study site reported that at least one member of their family is currently living in a Middle Eastern country as a guest worker. In contrast, no respondent household member from the former site lives in a foreign country.

It is clear from this study that most respondents consider appropriate treatment for arsenicosis symptoms should be obtained from practitioners of modern medicine. In this context, paraprofessionals can play an important role in providing necessary consultation to people who have arseni-

cosis. Paraprofessionals are a viable alternative to M.B.B.S. doctors whose treatments are much more expensive. As mentioned, members of mobile medical teams, many qualified physicians of Western medicine visited both study sites and provided free consultation to arsenicosis sufferers. Since these visits were one of the important sources of treatment for arsenic-related symptoms among survey respondents, these visits need to be continued in the future.

Figure 1. Study area



Logistic regression analysis performed in this study clearly suggests that cognitive and symptom-appraisal are more important determinants of treatment-seeking behaviour of respondents than are social and economic factors. As noted, both landholding size and annual household income are inversely associated with respondent health-seeking behaviour. This relationship might, however, be explained in the context of the healthcare services provided by members of medical teams frequently sent by both NGOs and government agencies to the study area. These teams, as noted, provided medical care either free of charge or at minimal cost to individuals with arsenic-related symptoms. Additionally, several NGOs and government agencies distributed vitamins – free of cost – among the poorest people who have arsenicosis.

The finding that cognitive and symptom-appraisal are more important than the economic status of the respondents is encouraging in the sense that it is difficult to alter socio-economic characteristics of individuals, but underlying cognitive mechanisms affecting treatment–seeking behaviour may be amenable to change through public campaigns and/or heath education efforts. Health professionals, government agencies and NGOs involved in arsenic mitigation programs should take note of this important finding.

This study, however, has at least two limitations. First, several variables, such as the distance to the nearest healthcare facility and/or personnel, and dietary intake, were not included in this study. These variables are generally considered important determinants of health-seeking behaviour of arsenicosis and other patients, but were excluded for the reasons given earlier. Because this empirical study is based on samples drawn from only two rural areas in Bangladesh, generalizing findings here to all areas of Bangladesh is therefore limited.

Conclusions

Arsenic has been found at levels considered "unsafe" in tubewells that supply drinking water to much of rural Bangladesh. This problem is so pervasive that it may impact as many as two-thirds of the total population of this country. The objectives of this study were to examine the health-seeking behaviour of people who have arsenicosis and to identify the underlying factors affecting their behaviour. Survey data show that only about 35% of all respondents consulted healthcare personnel regarding their symptoms. Although all types of available healthcare resources were utilized by people with arsenicosis, the majority of respondents who sought medical treatment preferred physicians with M.B.B.S. degrees, followed by paraprofessionals.

Based on the results of this study, a number of recommendations are offered to the Bangladesh government and NGOs involved in arsenic mitigation and prevention efforts. These recommendations will help save the lives of many Bangladeshis who live in arsenic-impacted rural areas. Since the surveyed arsenicosis sufferers expressed their faith in Western medicine, paraprofessionals (who are more available, accessible and affordable than M.B.B.S. doctors) should assume a more dominant role in providing healthcare services to people who have arsenicosis. Concerned agencies also need to continue to dispatch mobile medical teams to arsenic-impacted areas. These teams were important sources of quality care for many people who suffer the effects of arsenic poisoning in the study area.

In the absence of sufficient empirical studies on the heath-seeking behaviour of arsenicosis sufferers in Bangladesh and elsewhere, this research provides important and useful insights guiding arsenic prevention and mitigation efforts in Bangladesh. It makes an original contribution to the existing literature on the health-seeking behaviour of people who have been poisoned by arsenic in a country characterized by widespread poverty, illiteracy and a poor state of heath among most of its citizens. For a more complete understanding, further research needs to be directed toward this topic in moderate- and low-arsenic risk zones in Bangladesh. Such research might be able to determine whether health-seeking behaviour differs by risk zone. If so, different policies and programs may be needed to mitigate and prevent arsenicosis in different arsenic-impacted areas of Bangladesh.

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Appendix

Health-Seeking Behaviour of Arsenic Patients in Rural Bangladesh

Sample No.: _____ Study Site: _____
Name of Village: _____ Name of Thana: _____

1. How long ago did you first notice any symptom(s) of arsenic poisoning? _____ months
2. What was the symptom? _____
3. Did you identify the symptom(s)? _____ Yes; _____ No

If answer to question # 3 is no, answer questions 4-5 (otherwise continue with question #6):

4. Who identified the symptom(s)? _____
5. Specify your relation with the person(s): _____
6. After identification of arsenic-related symptom(s), what did you do?

   _____ Nothing _____ Consulted friends/relatives/neighbours
   _____ Consulted physician _____ Other (specify): _____

If answer to question # 6 is consulted physician, answer questions 7-20
(otherwise skip to question # 21):

7. To date, with what type of physicians have you consulted?

   ____ Kabiraj _____ Hakim
   ____ Homeopath _____ Folk Practitioners
   ____ Non-qualified Allopath _____ Qualified Allopath, but not MBBS Doctors
   ____ MBBS Doctors _____ Others (specify): _____
8. Why did you select the above type(s) of physicians(s)?

   _____

   _____
9. How long since symptom(s) were identified before you consulted a physician? ____ months

If answer to question # 9 is more than two months, answer question # 10
(otherwise continue with question # 11):

10. What are the reasons for delay in consulting a physician(s)?

    _____
11. Did you change physician due to arsenic-related symptom(s) since your first visit to a physician? ____ Yes; _____ No

If answer to question # 11 is Yes, please answer questions 12-18 (otherwise skip to question # 19):

12. How many times did you change physician? _____ times

13. Specify the sequence of change from first physician to last/current physician (if you simultaneously sought or are seeking treatment from more than one type of physician, please use same sequence number):

Sequence	Type of Physician	Reason
_____	_____	_____
_____	_____	_____
_____	_____	_____

14. Have you ever visited a medical facility for treatment of arsenic-related illnesses?
_____ Yes; _____ No

If answer to question # 14 is Yes, please answer questions 15-18 (otherwise skip to question # 19):

15. Which medical facility did you visit? _____
16. What was the reason for medical facility visit? _____
17. How many times did you visit medical facility? _____
18. How long did you stay in each visit? _____ days
19. Did you experience any problem(s) in seeking treatment? _____ Yes; _____ No

If answer to question # 19 is Yes, please answer question 20 (otherwise skip to question # 22):

20. Please specify any problem(s) experienced:
_____
_____
21. Why did you not consult a physician?
_____
22. Do you think that arsenic poisoning constitute a serious threat to life? ____Yes; ____ No
23. Do you think that your life is threatened by arsenic-related illnesses? ____ Yes; ____ No
24. What is the main cause of arsenic-related illness? _____
25. What are the diseases caused by arsenic poisoning? _____
26. What medicines are available for the treatment of arsenic-related illnesses?
_____
27. What can a victim do once he/she knows he/she has the symptom(s)?
_____
28. What can be done to prevent arsenic poisoning?
_____
29. What is your gender? ____ Male; ____ Female
30. What is your age?
31. What is your marital status? ____ Single; ____ Married; ____ Widowed; ____ Other
32. Specify number of years you have attended schools (write 0 if you have never attended school): _____

33. Specify your employment status:

_____ Employed (full-time) _____ Employed (part-time)

_____ Student _____ Unemployed

_____ Other (specify): _____

If your answer to question # 33 is employed, please answer question 34 (otherwise skip to question #35):

34. Specify your occupation: _____

35. What is your annual household income? Tk. _____

36. How much land does your family own? _____ acres

37. What is your household size? _____

38. How many people suffer from arsenic-related illnesses in your family? _____

39. Is any person in your family member of a NGO? _____ Yes; _____ No

40. Please specify distance (in mile) from your home to the following:

Kabiraj: _____ Hakim: _____

Homeopath: _____ Folk Practitioner: _____

Non-qualified Allopath: _____ Qualified Allopath, but not MBBS Doctor: _____

MBBS Doctor: _____ Hospital: _____

If the respondent and household head (HD) is not the same person, please ask following questions to HD:

41. What is your gender? _____ Male; _____ Female

42. What is your age?

43. What is your marital status? ____ Single; ____ Married; ____ Widowed; ____ Other

44. Specify number of years you have attended schools (write 0 if you have never attended school): _____

45. Specify your employment status:

_____ Employed (full-time) _____ Employed (part-time)

_____ Student _____ Unemployed

_____ Other (specify): _____

If answer to question # 45 is employed, please answer question # 46 (for others, please stop here):

46. Specify your Occupation: _____