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Stress, Coping and Mental Health of Arsenic Victims in Bangladesh

Keya, Mahbuba Kaniz

University of Rajshahi

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STRESS, COPING AND MENTAL HEALTH OF ARSENIC VICTIMS IN BANGLADESH

By

Mahbuba Kaniz Keya

A Thesis
Submitted to the University of Rajshahi
in Fulfillment of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

Department of Psychology
University of Rajshahi
Rajshahi, Bangladesh

April, 2005

Dedicated to my mother,

Mastura Khanam

who, with reflections, ever fresh, of her husband – the fallen hero in another, waged an immolating lifelong war for our upbringing. The thought of making her proud had been the motivation that gave me the strength to see this thesis completed.

DECLARATION

I declare that the thesis, entitled: **Stress, Coping and Mental Health of Arsenic Victims in Bangladesh**, submitted to the University of Rajshahi in fulfillment of the requirements for the Degree of **Doctor of Philosophy** is my original work. No part of the thesis, in any form, has been submitted to any other University or Institution for any Degree or Diploma, Associateship or other title.

Mahbuba Kaniz Keya
7.4.2005

Mahbuba Kaniz Keya
Department of Psychology
University of Rajshahi

April, 2005

CERTIFICATE

This is to certify that the thesis, entitled: **Stress, Coping and Mental Health of Arsenic Victims in Bangladesh,** is a record of independent research work carried out by **Mahbuba Kaniz Keya,** Department of Psychology, University of Rajshahi under our supervision. This is the original work of the candidate. We approve of its submission for the award of **Doctor of Philosophy**. This dissertation has not been previously submitted for the award of any Diploma, Degree, Associateship or other title.

7.4.05

Professor A.B.M. Zahirul Haque
Supervisor
Department of Psychology
University of Rajshahi

H. Begum 7.4.2005

Professor Hamida Akhtar Begum
Co-supervisor
Department of Psychology
University of Dhaka

ABSTRACT

The research, strived to study the psychological impact of arsenic toxicity in Bangladesh. It investigated the perceived stress, coping strategies and mental health of the arsenic victims. A total of 394 randomly selected participants (200 arsenic affected and 194 non-affected), employing probability proportional to size (PPS) method, were used as samples. A Perceived Stress Questionnaire was developed to measure the stress. Mental health was measured by the Bengali version of General Health Questionnaire. Ways of Coping Questionnaire, Mastery Scale and Life Orientation Test were adapted in Bengali.

To explore the stressful experience and mental health status of arsenicosis patients 2×2×3 analyses of variance were used with 2 levels of arsenic toxicity (affected and non-affected) 2 levels of gender (female and male), 3 levels of income (low, lower-middle and middle income). Arsenic affected participants were more stressed and poorer in mental health than non-affected ones. Overall gender difference was significant for perceived stress, but not for mental health. Females were more stressed than males. In case of affected participants alone the gender difference was significant for both perceived stress and mental health. Affected females had high stress and poorer mental health compared to affected males. When interaction was looked into, it was found that perceived stress and mental health did not vary as a function of arsenic toxicity, gender and income. However, correlation revealed that increase in age, prolonged duration of arsenicosis elevated stress and deteriorated mental health. On the other hand, high income, high mastery and high optimism decreased the stress level and enhanced the mental health of the victims. Also, elevated stress deteriorated mental health or vice-versa. Regression analysis showed various socio-environmental

and psychological factors as predictors of perceived stress and mental health. Both perceived stress and mental health were explained by these two factors. However, perceived stress was explained more by socio-environmental factors, whereas mental health was explained more by psychological ones. Further, stepwise regression confirmed that arsenic toxicity was the best predictor of perceived stress as well as mental health. Out of 3 psychological factors, perceived stress was identified as the best predictor of mental health.

Multivariate anova found arsenic affected participants significantly different from non-affected participants in using overall 8 ways of coping (confrontive coping, distancing, self-control, accepting responsibility, escape avoidance, planful problem solving and positive reappraisal). Moreover, compared to non-affected participants, affected participants used significantly less of only 5 strategies — confrontive coping, distancing, self-control, accepting responsibility and planful problem solving. Order of use of the 8 different ways of coping was determined. A two-by-two (2×2) multivariate analysis of variance showed that planful problem solving, positive reappraisal and escape avoidance coping varied as a function of gender and arsenic toxicity. When arsenic toxicity was involved, use of planful problem solving was lower and positive reappraisal and escape avoidance were higher for the affected males, whereas use of all 3 strategies were lower for the affected females. Finally, based on the overall findings a stress-coping-mental health model was developed.

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TABL. OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Bangladesh is presently struggling with a massive poisoning of its groundwater resources, which supply drinking water to almost the entire population. Nearly half of the country's 120 million people have been exposed to arsenic contaminations, which can lead to a potential health disaster. A large number of people have already developed various symptoms of arsenic toxicity that ultimately result in arsenicosis – a life threatening illness. There have also been reports of death from arsenicosis.

In addition to physical manifestations of the disease, it has its psychological consequences. Manifestations of skin lesions, pigmentation and other physical symptoms produce gross changes in life styles of the victims. It disrupts all activities of their lives. Vocational, social and personal activities as well as general activities of daily living are affected by arsenicosis that deteriorates victims' quality of life and threatens their subjective well-being and mental health. The victims also experience overwhelming burden of uncertainty, dependency, disability, pain, fatigue, illness intrusiveness, and the stigma and negative stereotypes imposed by others. In this way, each chronicity of disease represents a complex set of ever-changing stressors, adaptive challenges and coping demands.

So far there has been few psychological work on the chronic arsenic toxicity and human health, especially in Bangladesh. This work, the first of its kind, explores stress, coping and mental health condition of the arsenic victims in Bangladesh.

1.1 ARSENIC SITUATION IN BANGLADESH

1.1.1 PHYSICAL ASPECTS

Arsenic contaminations in waters and soils have been reported in increasing numbers recently from different parts of the world: Australia, Argentina, Chile, China, Ghana,

Hungary, Mexico, Mongolia, Myanmar, Nepal, Peru, Thailand, Taiwan and United States (Thornton, 2001; Smedley et. al. 2001; Dey, 2000). The arsenic contamination of groundwater in major aquifers supplying potable water to about 200 million people in Bangladesh and in West Bengal, India is the most serious one (Thornton, 2001; Chatterjee et. al. 1995; Chowdhury et. al. 1997; Smith et. al. 2000; Kinniburgh and Smedley, 2001; Ravenscroft et. al. 2001). The contamination of groundwater with arsenic remained unnoticed for a long time, as arsenic was not included in the routine groundwater quality assessment. Patients with arsenicosis disease and groundwater contamination had been identified in neighboring West Bengal, India as early as in 1983 (Saha, 1995). Presence of arsenic in tubewell (hand pump) water exceeding the acceptable limit was first detected in Baroghoria union of Chapainawabganj district in Bangladesh by Department of Public Health Engineering (DPHE) in late 1993, following reports of extensive contamination of groundwater in the adjacent areas of West Bengal, India. School of Environmental Science (SOES) of Jadavpur University, India organized an International Conference on Arsenic in 1995, which highlighted the urgent need for serious studies across the border. But no attention was given to Bangladesh's arsenic problem until a large number of people were reported to have various symptoms of arsenic toxicity which led to arsenicosis – a life threatening illness caused by chronic arsenic poisoning (Ahmed and Anstiss, 1999). A large number of people by then were reported to have developed arsenicosis. There have also been reports of deaths from this disease. In 1997 a World Bank Mission visited Bangladesh to assess the arsenic scenario and to initiate mitigation program. As more than 95% of the population has been drinking tubewell water since 1980s (WHO, 1999), the potential seriousness of the problem can be imagined.

According to the British Geological Survey (BGS)/DPHE statistical survey (Kinniburgh and Smedley, 2001), which tested 3,534 randomly selected tubewells, 25% of the samples had arsenic contamination above Bangladesh standard of 50 μgL^{-1} for drinking water, while 42% surpassed World Health Organization (WHO) guideline value of 10 μgL^{-1}. Chakraborti et. al. (2001) analyzed a total of 27,000 samples from Bangladesh and found 59% and 73% of them were contaminated with arsenic 50 μgL^{-1} and 10 μgL^{-1} respectively. The later survey, although had much greater number of samples, is likely to give overestimates since the samples were collected from areas with high numbers of arsenic patients.

1.1.1.1 EXTENT OF THE PROBLEM

The magnitude of arsenic contamination of groundwater in Bangladesh is colossal. Smith et. al. (2000) described the situation as the worst mass poisoning in human history. According to Jones (2000) about half of the country's population are at risk. The World Bank feared that 43,000 out of 86,000 villages were at risk or would be at risk in near future (Pearce, 1998).

BGS/DPHE statistical survey (Kinniburgh and Smedley, 2001) using kriging method gave estimates of total population exposed to arsenic contamination at 35.2 and 56.7 million above 50 μgL^{-1} and 10 μgL^{-1} respectively. Based on upazilla statistics, the exposure estimates are 28.1 and 46.6 million exceeding 50 μgL^{-1} and 10 μgL^{-1} respectively. SOES and Dhaka Community Hospital (DCH) (SOES/DCH, 2000) estimates for populations exposed to above 50 μgL^{-1} and 10 μgL^{-1} of arsenic content in 43 districts of Bangladesh are 25 and 51 million respectively. According to Ravenscroft et. al. (2001) at least 28 million people are currently drinking arsenic contaminated water above 50 μgL^{-1}, and many more are drinking above 10 μgL^{-1}. In

fact, it is almost impossible to get a definite estimate owing to limited testing of tubewells; but the general opinion is that at least 30 million people are exposed to arsenic pollution.

1.1.1.2 SPATIAL DISTRIBUTION OF CONTAMINATION

Geologic processes of sediment transport and deposition are responsible for creating variations in arsenic concentration in groundwater. Accordingly, the distribution of arsenic polluted groundwater is related to the geology of the country.

According to the BGS/DPHE statistical survey (Kinniburgh and Smedley, 2001), cited earlier (Section 1.1.1), the highest concentrations of arsenic have been found in the south and southeast of Bangladesh and the lowest in the northwest regions. High contamination also occurs as isolated 'patches', i.e., a cluster of tubewells with high concentrations, in an otherwise low arsenic area. These 'patches' have been termed as hotspots (e.g., 4 km by 5 km Chapainawabganj hotspot in Northwestern Bangladesh). There also exists a large amount of short-range spatial variations, i.e., at a village level there is a great deal of well-to-well variability. Consequently, it is not possible to predict the concentration of an unsampled well in an arsenic-affected area, even if adjacent wells have been tested.

1.1.1.3 CAUSES OF CONTAMINATION

A number of causal explanations for the occurrence of arsenic in groundwater have been considered. Broadly, they fall into two categories: 1) anthropogenic, i. e., human–induced causes and 2) natural, geologic ones. However, the anthropogenic causes of arsenic contamination of groundwater have already been ruled out. It is now the consensus opinion that natural geochemical processes release arsenic into

groundwater from the alluvial sediments that make up much of Bangladesh. It follows that arsenic has been present in groundwater for thousands of years to be tapped.

Although, the current water supply system in Bangladesh is overwhelmingly based on groundwater, its history that practically began with the country's independence is only 20-30 years old. The first discovery of arsenic contamination of groundwater in Barogharia union of Chapainawabganj district in late 1993 ended the pre-awareness phase of arsenic problem in Bangladesh. During this entire period, i.e., from the inception of tubewell to late 1993 people of this country had been drinking the supposedly safe tubewell water without knowing that they were ingesting arsenic from groundwater.

1.1.1.4 ARSENIC IN FOOD CHAIN

Use of contaminated water for irrigation and other purposes has resulted in surface water and soil contaminations in many parts of Bangladesh that, in turn, has given rise to accumulation of arsenic by microbes and plants and its transfer along the food chains and food webs.

Many crops receiving arsenic contaminated groundwater as irrigation have been found to accumulate arsenic at levels that exceed the minimum allowable daily limit (MADL) of 0.2 mg/kg dry weight (Huq and Naidu, 2004). Duxbury (2002) reported that the concentration of total arsenic in 150 samples of rice grain (both *boro* and *aman*) ranged from 10 to 415 μg/kg dry weight. Arsenic concentrations were higher for *boro* (winter) compared to *aman* (monsoon), as would be expected from greater use of groundwater for irrigation in the former.

1.1.2 HEALTH EFFECTS

Inorganic arsenic compounds are classified by International Agency for Research on Cancer (IARC, 1980) in Group I (carcinogenic to humans) on the basis of sufficient

evidence for carcinogenicity in humans. According to WHO (1993) Guideline value for arsenic in drinking water is 0.01 mg per liter. As per Bangladesh Standards for Testing Institution (BSTI, 1989) the maximum permissible limit for arsenic is 0.05 mg per liter.

Normal intake of arsenic is via ingestion of mainly organic forms (inorganic arsenic is 10 times more lethal) and ranges from 8 to 104 micrograms (average 50 micrograms) daily (Ratnaike, 2002). Elevated levels of arsenic can result in chronic poisoning. Arsenic poisoning may be acute or chronic. In the context of community drinking water supply, only chronic exposure is relevant.

According to the National Research Council (NRC) report (1999, p89): "Arsenic exposure interferes with the action of enzymes, essential actions, and transcriptional events in cells in the body, and a multitude of multisystemic non-cancer effects might ensue." The most widely noted non-cancer effects of chronic arsenic consumption are skin lesions. The level of arsenic in drinking water is strongly related to the development of skin lesions ($p<0.0001$) (McCarty et. al. 2004). The first symptoms to appear after initiation of exposure are hyperpigmentation (dark spots on the skin) and hypopigmentation (white spots on the skin). Some physicians collectively refer to these symptoms as melanosis. Hyperpigmentation commonly appear in a raindrop pattern on the trunk or extremities, but also on mucous membranes, such as the tongue (Yeh, 1973). Over time arsenic exposure is associated with keratosis on the hands and feet. Keratosis is a condition where the skin hardens and develops into raised wart-like nodules. These nodules become more pronounced with time, sometimes reaching 1cm in size (NRC, 1999). Tseng et. al. (1977) noted that skin cancers often appear at the sites of existing keratosis. The time from exposure to manifestation is varied in the literature (NRC, 1999). It is likely that differing exposures to arsenic accounts for the

heterogeneity in observations. The youngest age reported for patients with hyperpigmentation and keratosis is 2 years (Rosenberg, 1974). For Bangladesh, Guha Mazumder et. al. (1998) suggests a minimum time gap of five years between first exposure and initial cutaneous manifestations.

1.1.2.1 ARSENICOSIS

There is no widely accepted complete definition of what constitutes arsenicosis. Arsenicosis may be defined as a chronic condition due to prolonged exposure to arsenic above safe level, usually manifested by characteristic skin lesions with or without involvement of internal organs and malignancies (Dey, 2000). In plain language, the collective term attributed to the adverse health effects and cutaneous manifestations of chronic arsenic poisoning is arsenicosis – the arsenic disease. Khan (WHO, 1997) suggested that arsenicosis could be categorized into 3 sequential stages: i) melanosis; ii) keratosis with or without anaemia, conjunctivitis, bronchitis, gastroenteritis and blackfoot disease; and iii) developed keratosis and skin cancer. High arsenic level in nails (>1 mg/kg), skin lesions, urine (>40 μg/day) and consumed water (>50 μg/1), confirms the diagnosis of arsenicosis.

1.1.2.2 NON-CANCER HEALTH EFFECTS

Arsenic is associated with peripheral vascular disease (blackfoot disease) in China (Province of Taiwan) (Tseng, 1977). This condition results in gangrene in the extremities and usually occurs in conjunction with skin lesions. Other cardiovascular problems such as hypertension (Chen et. al. 1995) and ischemic heart disease have been found to be associated with arsenic (Tsuda et. al. 1995). Research into organ damage has concentrated mainly on the liver. Guha Mazumder et. al. (1988) found evidence of liver enlargement and non-cirrhotic portal fibrosis among a small sample of severely affected arsenic patients in West Bengal, India. In a later study, Guha

Mazumder et. al. (1997) also suggested pulmonary health effects. They found restrictive lung disease among 53% of a small sample of severely affected arsenic patients in West Bengal.

In terms of haematological effects, anaemia is commonly cited (NRC, 1999). Another widely suggested health effect is diabetes mellitus. Rahman et. al. (1998) found a significant dose response relationship between arsenic exposure and diabetes mellitus among those suffering from keratosis in Dhaka, Bangladesh.

The consequences of chronic arsenic toxicity are pervasive and impinge on almost all organ systems of the human body. Animal studies have shown that arsenic deficiency may also be detrimental and has been linked with increased mortality, reduced fertility, increased spontaneous abortion rate, low birth weight in offspring and damage to red blood cells (Ratnaike, 2002).

1.1.2.3 NEUROLOGICAL PROBLEMS

Varied neurological involvement due to arsenic exposure can damage both the peripheral (PNS) and the central (CNS) nervous system components with the latter being less frequently observed. Arsenic neuropathy is the commonest type of peripheral neuropathy due to metal or metalloid that far exceeds neuropathies caused by lead, mercury or other metals (Mukherjee et. al. 2004; Mukhopadhayay et. al. 2002).

1.1.2.4 CANCER HEALTH EFFECTS

Hutchinson (1887) identified arsenic as a carcinogen because of the high number of skin cancers occurring on patients treated with arsenicals. A study by Tseng et. al. (1968) found evidence of a dose response relationship between concentration of arsenic in drinking water and prevalence of skin cancer. International Program on Chemical Safety (IPCS, 1981) estimated skin cancer risk from lifetime exposure to

arsenic in drinking water at 5% for 0.2 mg of arsenic per liter, based on the findings of Tseng et. al. (1977).

The relationship between ingestion of arsenic through drinking water and its health effects are not well established. However, United States Environment Protection Agency (USEPA) multistage model (EPA. 1998), based on increased incidence of skin cancer related to ingestion of arsenic in drinking water, estimates that only 0.17 μgL^{-1} of arsenic in drinking water is associated with an excess lifetime skin cancer risk of 1 in 100,000. Similarly, WHO guideline value is associated with an excess lifetime risk of skin cancer is about 6 in 10, 000 and that with Bangladesh standard is 30 in 10,000 people (WHO, 1993). Using USEPA's Multistage Model and distribution of population exposed to different levels of arsenic, the lifetime risk of skin cancer estimates have been computed (Table 1.1).

Table 1.1 Estimated Incidences of Excess Lifetime Skin Cancer in Bangladesh (BGS/DPHE/MML, 1999).

Drinking Water Supply in Bangladesh	**Estimate Incidence of Excess Lifetime Skin Cancer (% of Present Population)**
At Present Arsenic Contamination Level	415,100 (0.321%)
Satisfying the Bangladesh Standard of 50 μg/L	55,200 (0.043%)
Satisfying the WHO Guideline Value of 10 μg/L	15,200 (0.012%)

Low level chronic arsenic poisoning has a typical latency period of about 10 years from the first exposure to the development of skin lesions, particularly keratosis, and more than 20 years for skin cancer (Smith et. al. 2000). It is found that 68% of shallow tubewells of Bangladesh have been sunk in 1990s or later, i.e., most of them are less than 10 years old (Kinniburgh and Smedley, 2001) – which implies that many of the population who used to drink arsenic contaminated water are still in their

latency period of arsenicosis manifestation. According to Smith et. al. (2000) an estimated 100,000 or more cases of skin lesion caused by arsenic have occurred in Bangladesh. More recently DPHE (www.sdnbd.org/dphe_profile.htm) gives an estimate of 150,000 people affected by and suffering from arsenic dermatitis (black spots, eruptions and even cracking of skin). Although it is not clear how these numbers have been calculated at, they are most likely to be underestimated.

Chen and Wang (1990) using data of arsenic concentrations in 83,656 wells in 314 precincts and townships from 1974-1976 in Taiwan and employing a multiple regression approach to control for socioeconomic confounding factors, compared age adjusted mortality rates with average arsenic concentrations in each township. They found a significant relationship with arsenic concentration and mortality from cancers of liver, nasal cavity, lung, bladder and kidney for both sexes.

Cuzick et. al. (1992) studied a cohort of patients treated with Fowler's solution (potassium arsenite) in England from 1945-1969. In the follow-up until 1991, a significant excess of bladder cancer mortality occurred. The period between first exposure and death from bladder cancer varied from 10 years to over 20 years.

1.1.2.5 EPIDEMIOLOGICAL MODEL

In order to make predictions on the evolution of the disease and its health impact in a village comprising 100 households WHO (2000) devised an epidemiological simulation model.

The model was based partly on data collected from Samta village, in the heavily arsenic contaminated Jessore district of Bangladesh together with published epidemiological literature. Arsenic concentrations in well water ranged from 0-1.37 mg/l, with the mode concentration (49% of wells) occurring in the range of 0.10-0.29 mg/l (Yokota et. al. 1997), which is greatly in excess of the WHO recommended

value of 0.01mg/l. It is assumed that each household has been using arsenic polluted water since tubewell installation began in the 1970s. The natural history of arsenicosis is modeled over a 30 year period. A simulation of the model was run using the best available estimates for parameter values to estimate the impact of arsenicosis on the village in the absence of any mitigation methods. The definition of arsenicosis health states employed in the model was based on the classification of patients used by the Asia Arsenic Network (AAN) researchers, which is similar to that proposed by A.W Khan (WHO, 1997) discussed earlier. Simulation results shows that in the base case, 22.5% of the village is in one of the arsenicosis health states at the end of the 30 year simulation. Five and a half percent (5.5%) have died from skin or internal cancers and 0.5% of villagers have developed skin and internal cancers in the final year of the simulation. The prevalence of late stage keratosis has increased from 1% in the first year to 7.5% at the end of the simulation. This highlights the progressive decline in health status of arsenicosis sufferers over time. The overall prevalence of skin lesions has increased from 8% in the first year to 16.5% at the end.

1.1.3 POVERTY, NUTRITION AND ARSENIC

Bangladesh is a densely populated country (826 persons per sq km), with low per capita GNP (US$ 360) and a member of the third world where many (about 40%) live on poor diets dominated by cereals (rice). Starvation and continued consumption of protein-, fat-, mineral- and vitamin- deficient diet result in undernourished and stunted body. Nutritional stunting due to prolonged insufficiency in food has resulted in marked retardation of growth especially in children. Moreover, common people consume plant-protein (pulses, cereals, beans, nuts and seeds) only, which is cheaper but which also, lacks a number of essential amino acids. Undernourishment has also been documented as an important risk factor for arsenicosis (Chien-Jen Chen, 2002).

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Methylation of arsenic i.e. the enzymatic conversion of inorganic arsenic into methyl-arsenicals has been considered the major metabolic pathway of arsenic in human body (Vahter, 1994; Styblo, 1995; Aposhian, 1997). This pathway is considered a major mechanism for detoxification of arsenic in human body. There will be high demand for certain nutritional factors associated with methylation mechanism of arsenic and also to normal metabolic function of the body, especially in case of malnourished bodies. Methionine, folate, cobalamin, vitamin B-6, riboflavin, vitamin B-12, niacin, chlorine and high quality protein are critically needed for a steady supply of methyl group for sustained methylation reaction. Methionine is especially essential to humans as it cannot be synthesized by human body and is to be supplied in human diet on a daily basis (Stipanuk, 2000; Donohue and Abernathy, 2001).

People taking deficient or poor quality protein diets show greater frequency of arsenic manifestations and diseases. Again, children and infants growing actively require more nutrition and energy; hence dietary deficiency affects them more as more toxic arsenic remains unmethylated in the body.

1.1.4 SOCIO-ECONOMIC CONSEQUENCES

Arsenic poisoning not only causes disease but also creates socio-economic problems. The web of devastation caused by arsenic toxicity extends beyond the victim. Families affected by arsenic not only face health problems, they also suffer from economic and social effects which are not always visible. In addition to the incalculable cost of human suffering, the existing economic burdens of the victim and family are compounded by medical costs and loss of productivity that lead to further income loss. Existing problems of undernutrition and suboptimal health further worsened the situation. Most of the affected people report weakness, breathlessness and lethargy. They find no energy to work, and often fail to continue manual work

and jobs. Consequently, unemployment creates an extra load on the victims. For Bangladesh, Pryer (1989) found earlier that "large" medical expenditure would be paid out of the sale of assets. Pryer also showed that some households would accumulate large consumption loans to finance lost income as a result of the breadwinner's illness.

Arsenicosis related prejudice creates social isolation, marital desolation, unemployment, education problem, discrimination, etc. It is mistakenly believed that arsenic related disease is a contagious one and is incurable. As a result, arsenicosis victims are being treated like those suffering from leprosy (Grunner, 1990). Many arsenicosis sufferers have been ostracized at either the household or village level. The Harvard Public Health Review (1999) highlights the case of a patient suffering from skin lesions whose children were unwilling to eat the food she served, and whose husband eventually divorced her. Many of the arsenic victims do not get job because of the prevailing fear that they might infect others.

In many cases the victims attribute their disease to the fate (Sarkar and Mohiuddin, 2002). Many young women are being compelled to stay unmarried because of the misbelief that arsenicosis is a hereditary disease (Dhaka Community Hospital, 1997). Arsenicosis also breaks down the marital life; wives have been separated or sent back to their parents because of the disease.

It also affects victims' educational life. Many of the affected students have been debarred from the school because of the incorrect assumption that they might infect other students. Moreover, they are discouraged and sometimes forbidden to attend festivals, ceremonies and public functions. It has been reported by Sarkar (1999) that community people refuse to take water and food if it is prepared or even touched by the victims.

Reduced crop productivity and quality, due to lack of suitable water for agriculture is an added burden to the rural poor. In Bangladesh, it is women's job to collect and manage water for household needs; as the water becomes scarce they face added difficulty as they look for safe water in distant places.

McCarty et. al. (2004) reported that higher educational level as a marker of higher socio-economic status was protective in terms of odds of developing skin lesions ($p=0.01$).

Study on arsenicosis vs. economic status found that the poor suffer most (WHO, 2000). A logit regression of household income data versus arsenicosis prevalence showed a negative relationship that is significant beyond the 1% level ($p=0.0078$). This finding may be explained by a number of possible causal factors. According to the National Research Council: "Variability in arsenic metabolism appears to be important in understanding the human response. There is evidence that methylating capacity differs among individuals and population groups. Different capacities would result in variations in tissue concentrations of arsenic. Also, environmental factors, particularly diet, might be important in explaining susceptibility." (National Research Council, pp. 193, 1999).

In humans, the liver methylates inorganic arsenic that is consumed in drinking water. The resulting arsenic metabolites are excreted in the urine. Differences in methylating efficiency may be the reason for variations in arsenic retained in the body, and thus susceptibility to arsenic poisoning. In this context, it will also be important to establish gender differences in exposure and effect. Social roles are likely to affect amount and duration of exposure, and the issue of gender differences in susceptibility to environmental contaminants and carcinogens is increasingly being addressed (IOM, 1998).

Evidence suggests that the role of nutrition may also be important in determining methylation efficiency and toxicity to arsenic retained in the body. Yang and Blackwell (1961) studied nutritional factors in the blackfoot endemic region of China (Province of Taiwan). Their results indicated that residents of this region consume a diet low in protein, and in particular the amino acid methionine. Vahter and Marafante (1987) found that a low amount of methionine or protein in the diet decreased methylation of inorganic arsenic in the rabbit. In addition, insufficient vitamin intake, in particular vitamin B 12, might reduce the ability of the body to methylate arsenic (Buchet and Lauwerys 1985). For these reasons, women, whose nutritional levels are frequently deficient in South Asian countries for reasons linked with cultural norms and reproductive function, may be at particular risk.

It is also suggested that zinc and selenium may provide protection against the toxic effects of accumulated levels of arsenic in the body (NRC, 1999). It is suggested that the diet of blackfoot disease patients in China (Province of Taiwan) is deficient in zinc and selenium (Pan et. al. 1996).

In addition, household income might also be related to water practices in the village. The importance of water storage techniques has been highlighted by Alaerts (1999, cited in WHO, 2000). He highlights the example of the water storage practices of people in the Laxipur area of Bangladesh. In this area water is stored in small vessels to allow the iron oxide to settle on the bottom of the vessel and this enhances the concentration of adsorbed arsenic in the sludge. Higher income households might have greater storage facilities for their tubewell water and might consequently be able to store the water for longer.

Bangladeshi villagers affected by arsenicosis are likely to lose a significant amount of productive time. In addition, the disease may become a burden on villagers' overall

financial and time resources. Therefore, it has been shown, using econometric analysis, that the poorest suffer the most from arsenicosis.

Arsenicosis has a strong social dimension, affecting issues such as relationships both within the family and among families. Social and gender relations thus pose additional threats to security and well-being of the victims. Arsenicosis as a disease has to be socially managed, as well as medically.

1.1.5 PSYCHOLOGICAL IMPACT

Chronic and prolonged illness produces stress and deteriorates quality of life of the victims. Researchers attempted to understand how people cope with different illness stressors and their mental health condition during illness context. Psychological impact of arsenicosis has not been studied so far. Chronically ill people face some common and problematic issues; such as they have to cope with anxiety and depression, managing restrictions on work and social life and cope with threats to self-esteem and self-concept. In arsenicosis, manifestations of dermatological symptoms of skin lesions, discoloration and pigmentation on skin give rise to physical difficulties as well as shame on the victims that might lower their self-esteem. Moreover, they feel weak, inefficient and lethargic that may produce inability on them, their potentialities and working abilities are decreased. Physical illness produces gross changes in lifestyle and deteriorates adjustment and sometimes creates psychological problems–such as depression, insomnia, nightmares, unhappiness, anxiety disorder etc. Taylor and Aspinwall (1990) reported that patients experience intense feeling of disorganization, anxiety, fear and other emotion. Arsenicosis related physical difficulties bring substantial changes in life – physical distortion of appearance, job loss, social discrimination and isolation, implicit negative biases that may be followed by stressful experiences. Moreover, arsenicosis impose restriction on

the resumption of usual activities that have nothing to do with coping. Thus, stress produced by chronic illness limits the victims' ability to cope successfully. Patients are faced by physical, social and psychological disequilibrium (Moos, 1977).

Full impact of chronic disease is not totally biological. Individuals with chronic illness face negative biases (Wright, 1988) and stigma (Susman, 1994). Sometimes, physically healthy people led by negative stereotypes avoid interaction with the disabled and the chronically ill (Fichten, 1988). These negative attitudes also pursue the disease-affected individuals to avoid social interaction with their healthy counterparts that further limits the availability of satisfying and productive interpersonal exchange.

Illness intrusiveness is another impact of chronic condition. It is the illness induced disruptions to valued activities and interests, it is an adaptive challenge faced by the chronically ill person (Devins et. al. 1983). In illness intrusiveness individual experiences reduction of positively reinforcing experiences and personal control which influences psychosocial well-being and quality of life in chronic illness (Devins, 1994, Devins et. al. 1992, Devins et. al. 1993). In addition to disability and dependency are the common phenomena of chronic illness. However it affects all aspects of patients' life (Burish and Bradley 1983; Taylor and Aspinwall 1990).

Cancer is the ultimate point of suffering of arsenicosis. Many studies have been undertaken on the psychological impact of cancer. However, specific research on arsenic related cancer patients is even fewer.

Exposure to toxic substance may cause long-term uncertainty and stress, which pose threat to one's health (Baum, 1986). Edelestein (1988) reported poisoning of groundwater by leachate from close by municipal landfill led to chronic toxification of local inhabitants of Leglar, New Jersy, which resulted in various psychological

problems. Similar chronic toxification has been reported from Love Canal Disaster, which has created long-term distress (Levin, 1982). Levin and Stone (1986) found that Love Canal Disaster was stressful for the area residents. It created uncertainty and threat to health as well as feelings of loss of control and helplessness. In another study, people who were using water that had been contaminated by a toxic landfill, experienced chronic stress (Gibbs, 1986).

Mental consequences of arsenic poisoning are very severe. In an arsenic hazard case in a local community of West Japan in July 1998, where 67 were poisoned, 4 died and 44 hospitalized, 36% of the survivors were diagnosed as full or partial PTSD after the event (Asuki, 1999).

In a study of mental health of the arsenic victims, Keya (2004) showed that mental health of the arsenic affected people was significantly different from that of non-affected people. It was also observed that when duration of arsenicosis increased the mental health deteriorated or vice-versa; arsenic toxicity and duration of arsenicosis were also found as predictors of mental health.

Therefore apart from regular medical treatment for physical illness, psychological intervention is essential in order to provide arsenic victims with mental support through counseling, which can help them cope with this problem.

1.2 THE CONCEPT OF STRESS, COPING AND MENTAL HEALTH

1.2.1 STRESS

People go through many stressful experiences everyday. Stress is an overwhelming crisis. People always try to come out of this crisis employing various coping strategies. Every person passes through the experience of more or less stressful events; it is a normal part of life. Yet, too much stress can take its toll on both physical and psychological health. When stress is severe or when many stressful

demands pile up, one's psychological functioning may get affected. It is the response of events that threaten or challenge a person or his well-being. The impact of stressors varies from person to person. Therefore, it is often explained in terms of stress experience. In defining stress researchers emphasize the relationship between individual and environment. However, to this end researchers take different perspectives. These are as follows:

Stimulus definition of Stress

Stress arises within the person from his/her own environment. The environmental aspects that increase demands upon the individual or disorganize him can impose stress upon the person. The stimuli involved may be drive stimuli e.g., hunger, sex, neurological characteristics as well as negative experiences that are harmful or threatening e.g. death of a loved one, life threatening or incapacitating illness, laid off from work, divorce, examination, etc.

Stimulus theorists of stress use an engineering analogy in explaining human stress. As per the theory, each individual has an innate capacity to withstand environmental stress. When the cumulative stress experienced is greater than the individual's tolerance the person undergoes deterioration in function, which we called stress reaction. Stress reactions vary from person to person. These strain situations are considered as stressful that lead to psychological distress, behavioral disruption, and deterioration of performance and deterioration of mental health.

Researchers identified different kinds of environmental events as stress stimuli, also known as 'stressors' (Selye, 1976a). According to Evans and Cohen (1987), there are three types of stressors: 1) major changes through cataclysms or disastrous events which affect large members of person i.e., earth quake, flood etc. 2) major changes which affect one or few persons i.e., death of a

loved one, a serious illness or injury, being jobless etc. and 3) daily hassles (irritating, but easy to deal with) or our stressful experiences that arise from our roles in living i.e., traffic jam, noise, struggling with rising price, waiting to a line, missing keys ,etc. Another taxonomy of four stressors, defined in terms of duration or chronicity, was proposed by Elliott and Eisdorfer (1982):

1) Acute, time-limited stressors, such as confronting an aggressive dog, awaiting surgery etc.

2) Stressor sequences - Chain of events that occur over long period with initial events, such as jobloss, divorce or death of a family member.

3) Chronic intermittent stressors – periodic conflict filled visit to in laws and sexual difficulties.

4) Chronic stressors, such as permanent disabilities, parental discord, job stress, chronic medical illness, financial stress etc.

Response definition

Response definition of stress states that the response of the individual to various environmental events indicate the presence of stress, which may be neurobiological (levels of monoamines, neuropeptides, corticosteroids), physiological (blood pressure, muscle tension) or psychological (negative affect states, degree of symptomatic distress) (Lazarus and Cohen, 1976). Biological sciences define stress as a response. An individual 'under stress' expresses stress through his reactions. Biological and psychological are the two interrelated components of this response.

"Non specific response of the body to any demand" has been termed as stress (Selye, 1976b). Stress is a disturbance of homeostasis, which is also instrumental in the development of functional derangement and diseases. Peptic ulcers, migraine, skin disease, cold, asthma, chronic backache are aroused as a results of chronic stress. To

a psychologist, stress is the expressions of disorganized or maladaptive functioning that also has impact on mood, affect and psychological adjustment. The most common cause of stress is emotional arousal (Selye, 1974). The common symptoms of prolonged stress are anxiety, depression, irritability, obsessive thoughts, fear, anger, etc.

Relational Definition

Lazarus and Folkman (1984), Lazarus and Launier (1978), Cox (1978) define stress as a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his/her resources and endangering his/her well-being. The continuous processes of interaction between environmental and personal factor that is person-environment transactions are essential for causing stress. There exist great deal of variability in human response to stress. Some people are more vulnerable than others in the same stressful situation that means, the magnitude of psychological stress is different for different person. Cognitive appraisal and coping are central to the relational perspective of stress. Cognitive appraisal is an evaluative process that determines why and to what extent a particular person-environment transaction is stressful. The process of managing the demands of the person-environment relationship is the coping.

Both characteristics of the person and the nature of the environment are taken into account in this concept. Lazarus and Launier (1978) described appraisal of the situation as a determining feature of response to a stressor. They propose that an event can be taken as a loss (or harm), a threat or challenge, and that it is individual's interpretation of the event that prompts a particular set of coping reactions.

1.2.2 COGNITIVE APPRAISAL

Cognitive appraisal process is a mental process through which a person evaluates and categorizes a stressful event. It is a continuously changing set of judgments that vary from person to person. They are of two types:

1) Primary appraisal, also known as appraisal of well-being, is an initial evaluative process in which a person considers a given event to be either (a) irrelevant (b) benign-positive and (c) stressful. When an encounter with the environment carries no implication for a person's well-being – it is irrelevant. When the outcome of an encounter is enhancing for the well-being, such as joy, happiness, love, peacefulness etc., it is benign-positive and when an encounter perceived as a harm/loss, threat and challenge for an individual – it is stressful.

There will be a harmful consequence for the individual, if any demand of stressful event is not met and neutralized. Incapacitating illness, damage in social-esteem, loss of loved one etc. are harmful for the individual.

If external demands are very taxing and available resources to manage this demands are very weak a person may be threatened. Threat, an anticipated concern about harm/loss that has not yet taken place, creates negative impact on the future example. It makes people negatively concerned about the future.

Challenge refers to the possibility of mastery to overcome the stressful situation. It has adaptive implications. People who feel challenged, have better moral, better functioning ability and better somatic health. Challenge provides the least negative and most positive feeling tone. It occurs in response to a possibility for growth or gain.

2) Secondary Appraisal, also known as Appraisal of Coping Resources, is a judgment concerning what might be done to manage or overcome stressful encounters. When an

individual feels threatened or challenged, he/she applies coping resources, it is called secondary appraisal. It is a complex evaluative process that takes into account available coping strategies, and applies a particular or set of strategies effectively. Outcome expectancy (defined as person's evaluation that a given behavior will lead to certain outcomes) and efficacy expectancy (defined as person conviction that he or she can successfully execute the behavior required to produce the outcomes as well as internal and external demands) are important factors that may influence the selection of coping strategies.

Primary and secondary appraisals are not independent processes. Primary appraisal always influences the secondary appraisal, but sometimes secondary appraisal too is instrumental in shaping primary appraisal process. For example, in a flood situation if a millionaire has got his home submerged by water, it does not create that much stress in him. Lazarus and Luiner (1978) cited the interrelated scenario of these processes in an upcoming job interview case. Coping options and primary appraisals of what is at stake interact with each other in shaping the degree of stress and the strength and quality of the emotional reaction. Monroe and Kelly (1995), Lazarus and Folkman (1984) cited that secondary appraisals feedback upon primary appraisal over time in an iterative process, it constitutes the appraisal process and control the degree of stress experienced.

The role of appraisal in the experience of stress is shown in Fig. 1.1

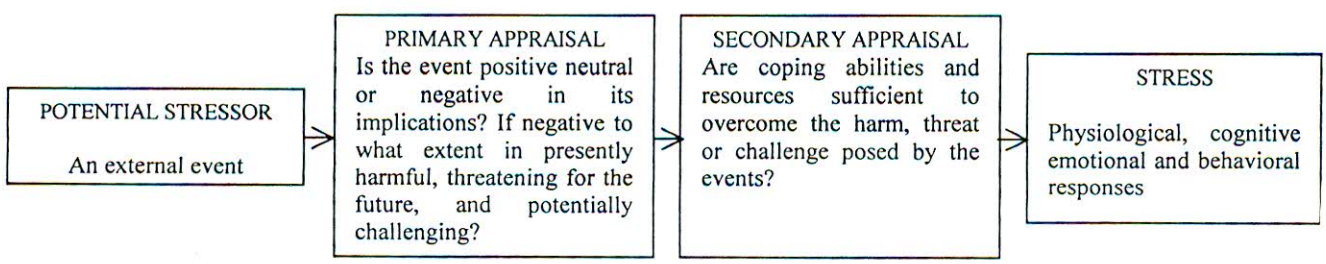


Fig: 1.1 The role of appraisal in the experience of stress (Source: Taylor 1986).

1.2.3 COPING

Lazarus and Folkman (1984) defined coping as the person's constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the person's resources. External demands are the event itself, while internal demands refer to the emotional reactions to the event. Coping is a stabilizing factor that helps maintain individual's psychological adaptation during a stressful situation. It encompasses cognitive and behavioral efforts to reduce or eliminate stressful conditions and associated emotional distress. Lazarus (1993) regarded coping as a psychologically 'normal' and conscious process found in psychiatrically healthy individual. Coping behavior may vary greatly over time. Coping pattern is greatly determined by personality factors (Folkman and Lazarus, 1980) and the situational context in which it took place (Billing and Moose, 1981; Folkman and Lazarus, 1985). If individuals cope effectively with the problems they face, they may be able to reduce the harmful consequences of stress. Different kinds of coping are appropriate for different kinds of stressors.

Based on the assumptions and the primary determinates of coping responses, conceptualizations of coping process can be categorized into 3 approaches:

Dispositional Approach

It assumes that relatively stable person-based factors are instrumental in selecting coping behaviors. The ego-psychoanalytic model is an example of this approach. Ego processes are unconscious cognitive mechanisms whose expression may involve behavioral components. The functions of ego processes are defensive (to distort reality) and emotion focused (to reduce tension). Investigators of the psychoanalytic tradition assume that individuals have relatively stable preference for particular defense and coping styles (Bond et. al. 1983; Vaillant, 1977).

Researchers, who are not psychoanalytically oriented, also use dispositional approach in conceptualizing coping. They use trait assessment for evaluating coping employing interviews intervenes and personality tests (Stone et. al. 1991). For example, Carver et. al. (1989) measured coping by asking individuals what they did in stressful situations, while Endler and Parker (1990) determined how they coped.

Still other dispositionally oriented conceptualizations take into account individuals' characteristic styles of cognitively seeking out or avoiding threat–reduced information (Miller, 1987) and automatic thoughts in everyday life that reflect constructive and destructive ways of thinking (Epstein and Meier, 1989).

Contextual Approach

Contextual approaches assume that more transitory situation-based factors are responsible for individuals' coping responses. Appraisal-based model of Lazarus and his associates (Folkman, 1992; Lazarus, 1981; Lazarus and Folkman, 1984) is the archetype of this approach. According to Lazarus, coping is a response to the stressful situation. The intervening link between life stressors and the individuals' coping responses are the active and conscious appraisals of potential threat. Lazarus sees coping as a dynamic person-environment transactional process changing over time with changing appraisals of the situation.

Other researchers also used contextual approach in their conceptualization of coping. The measurement of coping by indexing the thoughts and actions individuals report they have actually used in coping specific stressful situations – is the common feature of these works (Stone et. al. 1991). Feifal and Strack (1989) may be cited as an example where coping response across five conflict situations: decision–making, defeat in a competitive circumstance, frustration, authority, conflict and peer disagreement are assessed.

Still other contextually oriented conceptualizations determine how individuals actually deal with a specific stressful event (Carver et. al. 1989) or with an important recent problem (Amir Khan, 1990).

Integrative Approach

Contemporary theorists conceptualized coping processes using an integrative framework that sees dispositional and contextual approaches as complementary to each other. Dispositional approach uses generalizable, preferred coping styles that go beyond particular situation (Epstein and Meier 1989). On the other hand, contextual approaches consider how an individual copes with a particular stressful event along with the changes in coping efforts during the event (Carver et. al. 1989; Folkman, 1992). An integrative conceptual framework presented by Moos and Schaefer, (1993) is shown in Fig. 1.2.

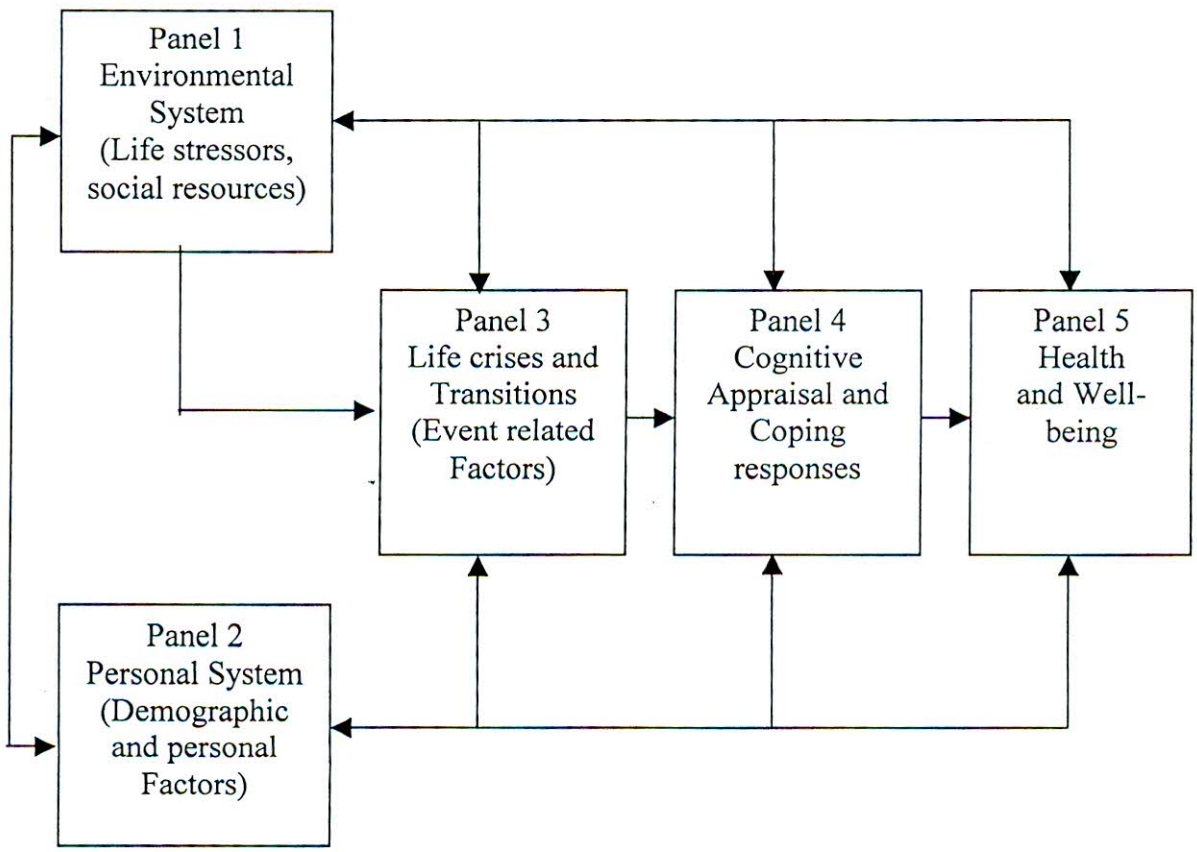


Fig. 1.2 A general conceptual framework of the coping process (Source: Moos and Schaefer, 1993).

In Fig. 1.2 the environmental system (Panel 1) includes ongoing life stressors, such as chronic illness, social coping resources, social support etc. The personal system (Panel 2) lists an individual's socio-demographic characteristics and personal coping resources, such as self-confidence. These environmental and personal influences affect the life crises and transitions individuals face (Panel 3). In turn, these combined influences shape health and well-being (Panel 5) both directly and indirectly through cognitive appraisal and coping responses (panel 4). The bi-directional paths in Fig 1.2 indicate that these processes are transactional and show that reciprocal feedback can occur at each stage. This framework emphasizes the central mediating role of cognitive appraisal and coping responses in stress process.

1.2.3.1 COPING STRATEGIES

According to Fleming, Baum and Singer (1984), coping strategies are adopted by individuals in order to somehow reduce the effects of stress. These are the specific behavioral and psychological efforts that people employ to master, tolerate, reduce or minimize stressful events. Ways of coping are indeed the adaptation processes.

Coping strategies can be of 3 categories:

1) Focus of Coping: The first approach emphasizes the focus of coping, such as a) Problem focused and b) Emotion focused coping.
2) Method of Coping: The second approach emphasizes the method of coping such as a) cognitive and b) behavioral.
3) Integrated approach: Integrating these two approaches, Holahan, Moos and Schaefer (1996) introduced two other domains of Coping a) approach (cognitive approach and behavioral approach) and b) avoidance (cognitive avoidance and behavioral avoidance).

Focus of Coping

Two major functions of coping (Folkman et. al. 1979; Leventhal and Leventhal, 1993) have been recognized; the first one deals with the problem itself (Problem focused coping) and the second concerns with regulating emotions (emotion focused coping).

Problem-focused coping

These strategies attempt to do something active to alleviate or alter stressful circumstances, such as confrontive coping, planful problem solving, seeking social support, cognitive restructuring etc. These strategies actively seek to deal with the situation. Problem-focused strategies are associated with better adjustment (e.g., Dunkel et. al. 1992; Terry et. al. 1995; Vitaliano et. al. 1987; Aspinwall and Taylor, 1992; Holahan and Moos, 1987). In case of low control stress situation, problem-focused coping have deleterious effects; which may endanger the individual through feelings of frustration and disappointment (Roth and Cohen, 1986).

Emotion-focused coping

These strategies regulate the emotional consequences of stressful or potentially stressful events. Different types of emotion-focused coping are identified: a) mentally disengage coping e.g., escapism, wishful thinking (Billings and Moos, 1981; Carver et. al. 1989; Endler and Parker, 1990) and b) behaviorally disengage from the situation, e.g. avoidance, denial, minimization (Carver et. al. 1989; Vitaliano et. al. 1987). The use of emotion-focused coping is associated with poor adjustment (e.g. Manne and Zautra, 1989; Terry et. al. 1995; Aspinwall and Taylor, 1992; Carver et. al. 1993). In case of low control stress situation emotion-focused coping are found adaptive, because of the need to deal with the feelings of hopelessness (Masel et. al. 1996).

People use both types of strategies to handle most stressful events. There is no bad or good coping, it is an effort to manage threatening or challenging situation that may or may not be successful.

Method of Coping

Moos and Schaefer (1993) introduced another coping strategy in which a response requires primarily either cognitive or behavioral methods of coping.

Integrative Approach of Coping

Integrating these two approaches, Holahan et. al. (1996) introduced two other domains of coping – approach and avoidance. Both of them employ two distinct methods: cognitive approach, behavioral approach and cognitive avoidance, behavioral avoidance.

Approach Coping

Approach coping strategies can moderate the potential adverse influence of both negative life change and enduring role stressors on psychological functioning, such as problem solving, seeking information, positive reappraisal etc. (Billings and Moos, 1981; Pearlin and Schooler, 1978). People who rely more on approach coping tend to adapt better to life stressors and experience fewer psychological symptoms

Avoidance Coping

Avoidance coping is the ostrich like strategy of trying not to think or act about the event, often through distraction. It is generally associated with psychological distress. Emotion-focused coping often incorporates avoidance coping mechanisms such as fantasy, self blame, withdrawal, etc. These also correlate with depression (Endler and Parker, 1990).

1.2.3.2 RESOURCES, STRESS AND COPING

The ways people actually cope also depend heavily on the available resources and their constraints for the specific encounter.

The way a person copes is determined in part by his/her personal and social resources, such as (a) physical status, viz., health and energy (b) personality factors, viz., control, belief, commitments, competencies (i.e. problem solving and social skills) and (c) environmental or social factors, viz., social support, material resources, etc. Environmental and personal constraints may thwart coping efforts. Also, high levels of threat can prevent a person from using coping resources effectively. Extreme stress may cause people to question their resources or become disoriented.

Pearlin and Schooler (1978) examined the extent to which resources by themselves buffered the effects of stress as compared to actual coping processes.. They report that resources are more helpful in sustaining people facing strains. These strains arise over which they have little direct control – finance and job.

Physical resources (Health and energy)

Health and energy are the physical resources. In enduring problems or stressful situations an individual has to mobilize his energy. A person who is frail, sick, tired or otherwise debilitated has less energy to spend on coping than a healthy, robust person. Feeling of physically well facilitates energy to mobilize sufficiently.

Personality resources (Problem solving skills)

Problem solving skills include the ability to search for information to analyze situations in order to generate alternative courses of action, weigh alternative courses of action, weigh alternatives with respect to desired or anticipated outcomes and select and implement an appropriate plan of action (Janis, 1974, 1993; Janis and Mann, 1977).

These skills are actually drawn from other resources, such as a wide range of experiences, the person's store of knowledge and the capacity for self-control.

Social resources or skills

Social skills to communicate and to effectively behave with others have pervasive role in social functioning. These resources facilitate greater control over social interactions and coping. Social resources are represented in the interpersonal networks of which people are a part. Family, friends, fellow workers, neighbors and voluntary associations are potential sources of crucial supports. Role of social integration (Myers et. al., 1975), social support in stress and coping have been reported by many researches (Antonvsky, 1979; Cohen and Wills 1985; Cohen et. al. 1986; Fondacaro and Moos 1987). Moos et. al. (1990) found that late life problem drinkers who have better relationships with their spouse and friends are more likely to rely on positive reappraisal and support seeking and less likely to use cognitive avoidance and emotional discharge. Thus, by providing emotional support and informational guidance, social support strengthens coping efforts. Emotional support bolsters feeling of self-esteem and self-confidence and information aids in assessing threat and planning coping strategies (Carpenter and Scott, 1992).

Material resources

People with money, provided who is in a position to use it effectively, generally cope better in stressful events than those without. Lower income people are exposed to more stressful life events beyond their control than higher income respondents (Dohrenwend and Dohrenwend, 1970). Monetary resources greatly increase coping options in almost any stressful transaction. They provide easier and often more effective access to legal, medical, financial and other professional assistance.

Economic solvency may reduce the person's vulnerability to threat, and in this way also facilitate effective coping.

1.2.4 PERSONALITY, STRESS AND COPING

A complete psychology of human behavior is the perquisite of fully understanding stress and coping. Stress and coping are intrinsic part of the fabric of action and experience. A number of environmental, social and personal factors may have impact on life stressors and coping. The magnitude of stress depends on personality as well as contextual environmental factors. Personal and environmental factors along with individual's appraisal of the situation provide a context for the selection and effectiveness of coping responses. Coping processes are affected by both personal and situational factors.

"Personality is a system defined by personality traits and the dynamic processes by which they affect the individual's psychological functioning" (Mc Crae and Costa, 1986). Ben-Porath and Tellegen (1990) and Krohne (1990) found personal dispositions interact with the situation in shaping perception of stress. Caspi and Moffitt (1993) pointed out that the stability of stressful situation – both ambiguous and threatening – accentuates existing traits. Individual's real dispositions are best revealed under stress. Lazarus (1990) viewed stress as a part of the full complex of human emotions, which are intimately tied both to personality dispositions and environmental setting.

Personality characteristics are the psychological resources that people draw upon to help them withstand threats posed by events and objects in their environment. These resources are facets of personality, such as mastery or personal control, self-efficacy, external-internal control, self-esteem, hardiness, optimism, etc. These personality

factors, residing within the self, can be formidable barriers to the stressful consequences of social strain. These resources also affect coping.

1.2.4.1 HARDINESS

The ability of the individual that includes commitment, challenge and control associated with strong stress resistance is hardiness. Through altering stress appraisal, it may reduce the effect of stress (Florian et. al. 1995). Hardy individuals appraise potentially stressful events as less threatening, less undesirable than others do (Raodwalt and Zone, 1989). As a result, they take direct action and learn about the people and events involved – a process that makes them even better prepared to deal with future situations (Kobasa, 1979).

1.2.4.2 PERSONAL CONTROL

It is a generalized beliefs and/ or personality disposition by which people assume they can control events and their outcomes. Personal control over one's life is central to psychological adjustment (e.g. Bandura, 1982; Taylor, 1983). It is the extent to which people feel confident of their powers of mastery over environment (Averill, 1973; Lefcourt, 1976). Beliefs about personal control involve feeling of mastery and confidence. Mastery is defined as the "extent to which one regards one's life chances as being under one's own control in contrast to being fatalistically ruled" (Pearlin and Schooler, 1978).

Perceived control is a belief about the capability of one's control – belief of contingency and competency (Grob and Flammer, 1999) or outcome expectancy and efficacy expectancy (Bandura, 1977, 1986). It is a dispositional concept, both in terms of stability over time and in terms of relative vulnerability over domains (Nowicki and Stricklan, 1973; Phares, 1976). It concerns people's perception of their control in particular situations. Control means managing certain processes,

attainment, maintenance or the avoidance of certain state of affairs. There is also person-to-person variation in control belief; some have more control than others.

In Lazarus's viewpoint perceived control is explained in the general framework of control appraisal. It is a process of assessment of the situation. Diener et. al. (1995) found perceived control is composed of two factors control expectancy and control appraisal.

Appraisal of stressful events is dependent in part, upon the specificity of environment as well as on the person's belief about the potential for mastery. (Lazarus and Lauiner, 1978). In contextual or situational viewpoints control refers to the extent to which a person believes that he/she can shape or influence a particular stressful person-environment relationship. These situational appraisals are the products of individual's evaluations of the demands of the situation, his/her coping resources and ability to implement these strategies. They will shape his/her all appraisals, regardless of the situation. Such belief would undoubtedly also give a characteristic tone to an individual's appraisals across all circumstances. General beliefs about control are most likely to affect appraisal in ambiguous situations. Situational appraisals of control, on the other hand, will affect emotion and coping, which are not restricted to expectations about the environment.

Coping in situations in which little or nothing can be done to influence the nature or outcome of the situation have been studied in numerous research (e.g. Folkman, 1984; Roth and Cohen 1986; Folkman et. al. 1986) found that the effectiveness of a particular coping strategy depends on the goodness of fit between the strategy and the controllability of the event. Perceived control is an important predictor of subjective well-being. A positive sense of control fosters people's self-esteem and satisfaction.

1.2.4.3 OPTIMISM

Dispositional optimism has great influences in dealing with stress of life. There is a link between optimism and coping (Lazarus et. al.1980; Reker and Wong 1985; Chang, 1998; Rim 1990; Scheier et. al. (1994). According to Scheier and Carver (1985) optimism and pessimism are defined as generalized positive and negative outcome expectancies. Stable individual differences are represented by these dispositions. These variables promote or abate psychological and physical well-being. Optimism leads to securing positive outcomes whereas pessimism to incurring negative outcomes. It can directly influence adjustment and mitigate the effects of stressors on psychological functioning. Optimistic individuals cope more effectively with stress, which in turn, reduce their risk for illness (Horowitz et. al. 1983, 1988; Scheier and Carver, 1985). The expectation of positive outcomes has been tied to better physical health (Scheier et. al. 1989) and to more successful coping with health challenges (Carver et at., 1993; Stanton and Snider 1993). Optimists cope differently with stressors, experience less negative mood and may be more adaptive to health behavior. Scheier et. al. (1989) found that optimistic patients undergoing bypass surgery recover faster and have fewer postoperative complaints than pessimistic patients. Marshall et. al. (1992) reported that pessimism correlated highly with neuroticism and negative affect, whereas optimism with extraversion and positive affect. Optimism and self-mastery were negatively correlated with symptoms of depression (Marshall and Lang, 1990).

Optimists are better adjusted than their pessimist counterparts. According to Scheier and Carver Model (1985), optimistic people often attempt to change conditions related to stressful situation (e.g. engage in problem solving) rather than ignore or withdraw from them (e.g. denial of the problem). This kind of active coping is likely

to resolve the problems related to stressful situation. Chang (1998) found that stress-related appraisals were associated with optimism, coping and adjustment. Optimists differed significantly from pessimists in secondary appraisal, coping and adjustment. They experienced greater thoughts of control and effectiveness for dealing with the exam and used more cognitive restructuring strategies whereas pessimists used more wishful thinking, self-criticism and social withdrawal strategies. Optimists reported greater life satisfaction while pessimists more depression and physical symptoms. Optimism is positively associated with engaged coping (e.g. problem-focused coping, positive reinterpretation) and negatively associated with disengaged coping strategies (e.g. denial, distancing) (Scheier et. al. 1986, Chang 1998, Taylor et. al. 1992).

From the above discussion, it is evident that optimistic individual effectively employ his/her coping options and resources (secondary appraisal) as a powerful determinant of psychological and behavioral adjustment.

1.2.5 SITUATIONAL FACTORS, STRESS AND COPING

Appraisals of potentially stressful events are also influenced by the various aspects of the situation. It is the characteristics of the situations that make the event potentially harmful, dangerous, threatening and challenging, such as novelty, event uncertainty, timing, ambiguity, demands and life transitions.

1.2.5.1 NOVELTY

Novel situation is stressful. Novel and inexperienced events give rise to appraisal of threat, only if some aspects of it have been related to harm. Combination of novelty and inadequate information produce inappropriate appraisal and coping. In case of arsenic situation in Bangladesh, the poor and illiterate population does not have the real picture of arsenic toxicity. Therefore, joint effect of inadequate information and novelty about arsenicosis give faulty appraisal of the event and produce stress on

them. If people are aware of the risk with limited comprehension of a novel and ambiguous situation, they are likely to experience high degree of uncertainty and threat.

1.2.5.2 EVENT UNCERTAINTY

Event uncertainty has greater potential for creating psychological stress. Lack of opportunity to get relevant information about the event always results in helplessness, confusion, tension, poorer adjustment, threat, excessive worry, fear, anxiety (Breaznitz, 1976). The consequent anxiety or threat blocks the cognitive functioning of the individual and makes coping difficult.

Event uncertainty resulting in threat more widely reported in physical illness and disability. Moos and Tsu (1977) and Cohen and Lazarus (1979) examined how people cope with the stress of physical illness and found dealing with uncertainty as a major adaptive task.

1.2.5.3 AMBIGUITY

Lack of necessary information or unclear or insufficient information about the event can play important role in stress appraisal. By limiting the individual's sense of control or increasing helplessness over the danger, ambiguity can intensify threat.

1.2.5.4 TIMIING OF EVENTS

The more impending an event is, the more intense or urgent its appraisal becomes. Degree of stress response was greater under suspense than surprise. Duration of a stressful event greatly influence appraisal. In case of chronic illness, persisting presence of disease makes a person psychologically and physically down (Selye, 1956). Deviations from expected timetable are stressful (Lazarus and Folkman, 1984). People expect that certain life events will occur at certain times, such as time table of finishing school, marrying, having children. Having an event too early can deprive a

person to prepare for new role. Too late events deteriorate the sense of satisfaction and pride.

1.2.5.5 DESIRABILITY

Stress appraisal is profoundly affected by desirability factor of the situation. Undesirable events are appraised as stressful than desirable events (Suls and Mullen, 1981a).

1.2.5.6 TRANSITION

Life transitions tend to be stressful. There are numerous events not related to normative life transitions such as – sudden rise or fall of fortunes, loss of reputation, work disability etc. (Schaefer and Moos, 1991; Pearline and Lieberman 1981; Lazarus and Cohen, 1978). Moreover, when people shift from one role to other they also create stress, such as getting married, entering new job, becoming parent, retirement, etc.

1.2.5.7 CONTROLLABILITY

Situation beyond the control of the individual has effects on appraisal process. People tend to appraise an uncontrollable event as being more stressful than a controllable event (Thompson, 1981, Suls and Mullen, 1981b). Most control experiences are rooted in personal control experiences (failure or success).

People try to exercise control the events that affect their lives (Seligman, 1975; White 1959). In Bangladesh, arsenic free drinking water is beyond the control of arsenic victims. Lack of control over the situation precipitates the onset of stress.

1.2.6 CHRONIC DISEASE

It is difficult to define chronic disease, as there are numerous diseases of chronic nature with different causes, course, changeability and consequences. However, it is well known that chronic illness represents the most prevalent diseases, afflicts large

number of individuals, impacts heavily on health care system, and the consequent outcome is high rate of mortality. Illness, a chronic stressor, is an unexpected and novel experience that occurs repeatedly over weeks, months or years. Cancers, asthma, diabetes, Perkinson's disease, multiple sclerosis, migraine etc. are the example of chronic diseases.

Chronic illness creates a situation characterized by uncertainties, worries, anxieties and emotional distress. Research findings provide evidence that people are not habituated to chronic or recurrent stress resulting from illness (Lepore, 1995; Zautra et. al. 1988). In many cases, diagnostic difficulties, and uncertainties threaten the sense of security and future predictability (Musulin, et. al. 1994). When effective treatment does not yet exist in a specific chronic illness situation, a feeling of ambiguity results that is very stressful. Cassileth et. al. (1984) reports that patients in the initial and final stage of disease show higher levels of stress and lower levels of well-being than comparable healthy subjects.

In addition, chronic illness can generate a host of common life stressors ranging from economic (jobloss) and social loss (divorce) to the sacrifice of life goals (e.g. giving up a carrier due to the disease).

From the preceding discussion, it is obvious that chronic illness is associated with psychological and social outcomes, which may lead to stressful experiences. The degree to which illness is a source of psychological stress depends on the personal and social resources. These resources will moderate the perceived threat of disease and facilitate barriers to adaptation. It is impossible to fully appreciate the impact of a chronic disease without considering its interaction with the individual's social, environmental and life goals.

1.2.6.1 SRESS-COPING AND CHRONIC ILLNESS

Stress and coping in chronic illness can be explained by Lazarus and Folkman model which takes into account the feature of illness, individuals' ongoing effort to solving the problems and the psychological reality of the disease (emotional reaction).

1.2.6.1.1 The Lazarus and Folkman Stress-Coping model

The basic assumption of the Lazarus-Folkman model is that people who are confronted with a chronic disease (stressor) evaluate the later that, in turn, determines their emotional or behavioral reactions. Lazarus and Folkman (1984) reported primary and secondary appraisal processes (cited in earlier section 1.2.2) of evaluation. Primary appraisal assesses the personal meaning of an event and indicates whether the event or the stressor has positive, neutral or negative meaning for the individual. If the interpretation is positive in any encounter, positive emotion arises whereas if the stressor threatens the physical and psychological health and psychological self, negative emotions arises. When the individual perceives the stressor as a threat, outcome is the feeling of anxiety. Again, when stressors are perceived as personal damage, it creates feelings of anger and grief. These negative emotions are evident during the initial phase of illness.

Secondary appraisal is the judgment made about available coping options. When people encounter stressful situation, they explore their capacities to reduce the threat, damage or loss caused by the event. People, who are suffering from chronic illness, engage their full effort to manage or overcome the stressful event using appropriate coping strategies. Illness produces external (illness event itself) and internal demands (emotional reactions due to illness) on them. These demands determine which coping is to be used: emotion-focused coping or problem-focused coping. During the coping process, thoughts and actions directed at the external or/and internal stressor produce

emotional and behavioral consequences. People vary in employing different coping strategies for their illness. Psychological, social and physical impacts of chronic disease determine the mode of coping behavior.

In this model, person-situation transaction is important, but situation dimension is not adequately represented.

1.2.6.1.2 Perrez and Reicherts Modified Model of stress-coping illness (fully incorporating situation)

In an attempt to extend Lazarus model, emphasizing cognitive approach of situation interpretation, Perrez and Reicherts (1992) came up with a new model of stress, coping and illness. It explains the cognitive dimension of the illness situation:

1) Valance (or the inherent stressfulness of a situation);
2) Controllability (the inherent opportunities for control within a situation);
3) Changeability (the probability that the situation will change by itself);
4) Ambiguity (the degree to which a situation is inherently lacking in sufficient information, which distorts the meaning of the situation that needs to be ascertained), and
5) Recurrence (inherent likelihood of the stressful situation happening again).

The cognitive properties of an individual in perceiving the environmental situation rather than the cognitive reorientations of environmental attitudes are highlighted in this model. Cognitive properties of the individual in illness situation, not the cognitive representation of the environmental attribution is important here.

1.2.6.1.3 Commonsense model of stress coping illness

Leventhal (1970) and Leventhal and Nerenz (1983) presented a situationally oriented empirical commonsense model of stress-coping-illness. In this model, five sets of

attributes of illness threats appear to describe an individual's representation of the features of a disease threat. These are:

1) The identity or label and disease-specific symptoms of the illness;
2) Its time line or duration (acute, cyclic, chronic);
3) Its causes (genetic, infection, food poisoning etc.);
4) Consequences (fatal, painful, etc.);
5) Its controllability (susceptible to medical treatment).

These dimensions of chronic disease hypothesize that confrontation with a chronic disease have a high threat valance (e.g. cancer with a painful symptom, low controllability via medical intervention and an unchangeable and chronic time line) will have powerful impact on the individual. They also require a complex assessment of the self and its relation to the social context. Acceptance of the chronicity of the condition is essential for adaptation, but it is accompanied by different factors or emotions (depression, anxiety, hopelessness, etc.). Disease-related stressors with medium valance, high controllability and/or changeability, medium ambiguity and low likelihood of recurrence will have less impact and leave more room for active problem-oriented forms of coping.

All three models were not developed for specific disease at a specific point of time; rather they have a very general frame of reference. Moreover, these models have neglected interactions with the context. Although extrinsic life events create chronic diseases, contribution of social support or other environmental factors have also been ignored. Similarly, biological effects and emotional impacts have not been given proper importance.

1.2.6.1.4 Extended model for coping with chronic disease

Lazarus and Folkman original model as well as its modified version have overlooked the effects of the individual's life goals and social relations. These limitations led to elaboration of the stress-coping model by Maes et. al. (1996) who introduced extended model based on the insight of Lazarus' expectancy value theory (1991) and the works of Hobfoll (1988; 1987); Moos (1988); Moos and Schaefer, (1993); and Taylor (1991).

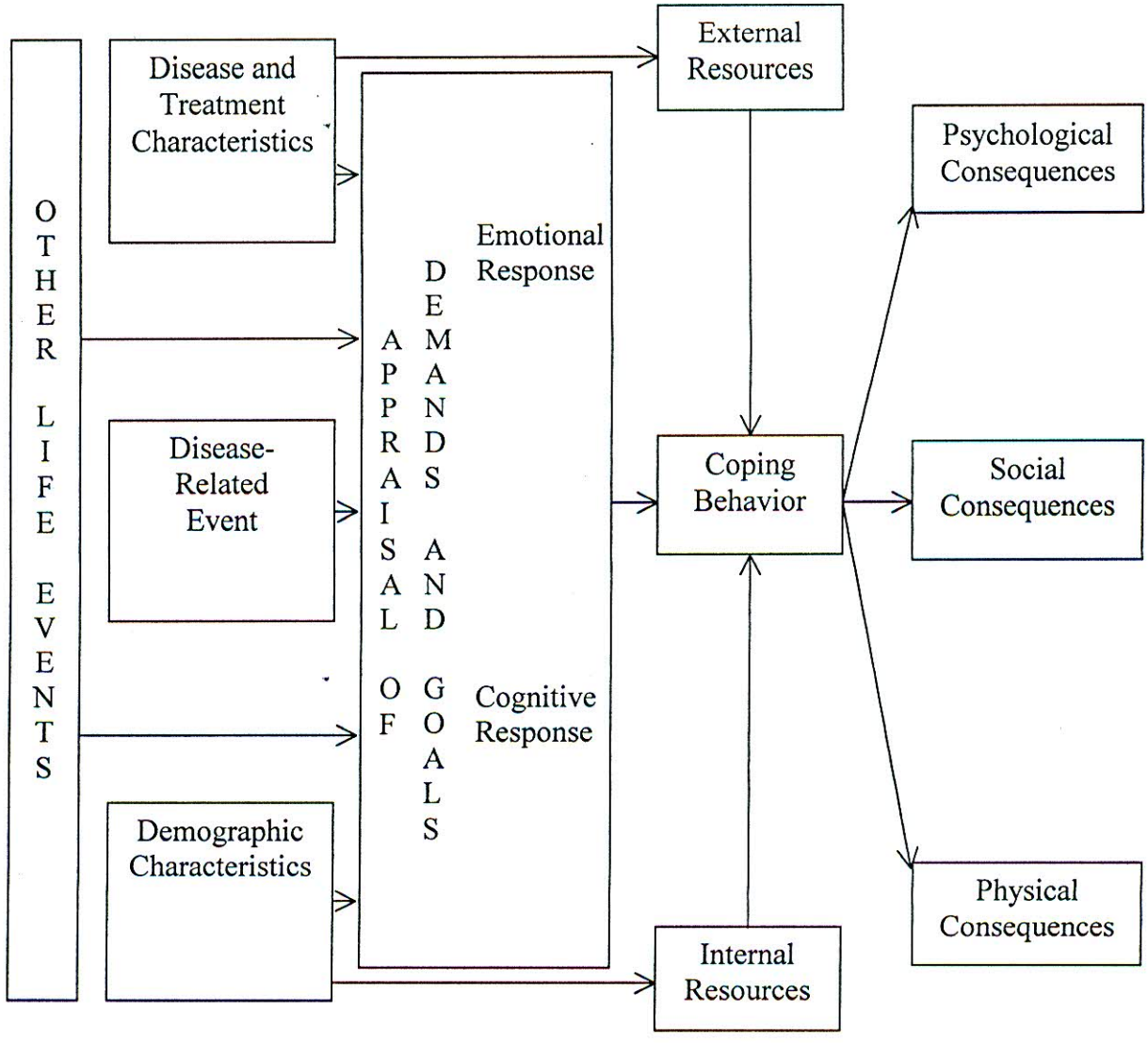


Fig 1.3 Model for coping with chronic disease (Source: Maes et. al. 1996).

According to the extended model, other important life events contribute to the appraisal of disease-related events. Many severe life events are related with disease events. Disease and treatment characteristics can have major impact on appraisal and coping. Person's inherent stressfulness in disease situation, controllability on disease and ambiguity about disease determine his/her coping strategies. Treatment characteristics also contribute to the appraisal of disease related event, such as type of medical treatments (surgery, chemotherapy, hospitalization, etc.), impacts on patients' perception and experience of illness (Taylor and Aspinwall, 1993). Moreover, demographic characteristics, such as age, gender, and social class contribute to the interpretation of chronic illness.

From the previous discussion, it is clear that appraisal of the event is not only determined by event characteristics, but also by goals or values. This expectancy value theory is the core of this model. Expectancies can be defined as people's degree of confidence of attaining their goals. When expectancies are favorable, people will invest effort to attain their goals. If expectancies are not favorable, people may cease their effort (Carver et. al. 1992). Putting efforts to attain a goal is a adaptive form of behavior, but when a person is confronting a serious illness, he cannot continue to pursue his/her current goals of life, which may break up his values in life and lead to self-destruction. The more the goals are threatened by the stressor and the more these goals are important, the more stressful the experience will be.

Personal resources include personal characteristics or energies and external resources include money, time, distance from professional help, social support, etc. These resources refer to as internal or external conditions that can be used to cope with demand-goal conflicts.

This model expresses psychological, physical and social consequences through depicting many different aspects that affect appraisal and coping behavior.

1.2.7 MENTAL HEALTH

WHO Constitution defines "health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief or economic and social condition" (1994). Mental health includes subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational dependence and self-actualization of one's intellectual and emotional potential (WHO, 2001). Although, many criteria of this definition of mental health are introduced from outside researches (e.g. maturity, autonomy), in psychology, subjective well-being is the determinant of mental health. Subjective well-being includes mental health, quality of life and social gerontology. In 1960 Gurin et. al. studied subjective well-being under the banner of "mental health". It is individual's own perspective about his/her own life activities, which range from negative to positive mental states.

Mental health is evaluated by assessing individuals' life, such as satisfactions, emotions and his/her psychological well-being (e.g. absence of any psychological or affective symptoms like depression, anxiety). According to Ostrom (1969), Diener and Fujita (1994) subjective well-being (mental health) comprises people's evaluations, both affective and cognitive. Ryff and Keyes (1995) propose six aspects of well-being: self-acceptance, positive relation with others, autonomy, environmental mastery, purpose in life and personal growth. This explanation is consistent with WHO's definition of mental health.

1.2.7.1 THEORIES OF PSYCHOLOGICAL WELL-BEING

1.2.7.1.1 Self-determination theory of Psychological Well-being

Self-determination model of well-being based on intrinsic motivation is introduced by Ryan, Sheldon, Kasser and Deci (1996). This model presupposes that gratification of three needs are predictors of psychological well-being. They are autonomy, competency and relatedness. To be more precise, the fulfillment of personal growth, autonomy, enhancement of others and communities – the intrinsic goals will provide people with a deep sense of satisfaction. On the other hand, fulfillment of extrinsic goals, such as financial success, physical attractiveness and social reputation would not provide people with such satisfaction (Ryan, 1995; Sheldon et. al. 1997). Sheldon and Kesser (1998) found that people engaged in activities for intrinsic resources were happier. In other words, according to the self-determination theory, the "good life" is the one in which an individual strives for personal growth, independence, meaningful relationships with others, and community service.

1.2.7.1.2 Multidimensional Model of Psychological well-being

Multidimensional model of well-being based on human development is proposed by Ryff 1989; Ryff and Keyes 1995; Schmutte and Ryff 1997. Here psychological functioning is assessed in terms of self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery and autonomy rather than emotional well-being. According to this view, salient aspects of well-being could vary across life span, i.e. they differ in various developmental stages of life. Purpose in life and personal growth decrease over time, whereas environmental mastery and autonomy increase over time. That means, active pursuit of goals and self-improvement characterize young adulthood and self-control characterizes later life.

Intended purpose in life and worthy relationships with others are the primary factors of positive mental health (Ryff and Singer 1998). Although empirical findings indicate a qualitative shift in the definition of "good life" across life span, the model seems to emphasize a universal significance of purpose in life and excellent relationships with others as the primary features of positive human health.

1.2.7.1.3 The Goal Approach Model to Psychological Well-being

Unlike the ones discussed earlier that are based on the universality of positive self-regard, community service, purpose in life and positive relationships with others, this model considers individual differences and developmental shifts as the indicators of well-being (e.g. Brunstein, 1993; Cantor et. al., 1991; Diener and Fujita, 1995; Emmons, 1986, 1991; Harlow and Cantor, 1996; Palys and Little, 1983). The goal is a moderator model of well-being. The model assumes that indicators of well-being vary across individuals, depending on their goals and values (Oishi et. al. 1999). The idea of the goal as a moderator model is that people gain and maintain their well-being mostly from the area they consider important. Also individuals' differences in their goals and values cause dissimilitude in their sources of satisfaction. According to Oishi et. al. (1999) values of Schwartz and Sagiv (1995) – the guiding principles of life are the higher-order goals. On the other hand, personal striving of Emmons (1986) – what individuals are characteristically trying to do in everyday life is taken as the lower order goals.

1.2.7.2 Components of Mental Health

Different psychological and demographical conditions of individuals correlate with the mental health or pleasant and unpleasant affect. Subjective well-being (SWB) is composed of multiple components (Diener and Suh, 1997). It is important to investigate the separable components of SWB, such as age, sex, income, illness,

worry, mastery, optimism, etc. It includes several essential components such as life satisfaction, financial satisfaction, pleasant affect and the absence of unpleasant affect. Each of the components reflects people's evaluation, both affective and cognitive, of their own lives.

Age

Theories of age effect in SWB state that

1) SWB is influenced by the objective conditions of individual's life (e.g. income, health, social support) and these conditions tend to worsen as one ages (Diener and Suh, 1998; Wilson, 1967).
2) SWB is influenced by individual's ability to regulate one's emotion and this ability tends to improve as individual ages (Corstensen 1995).

More recent studies concluded that age effects on subjective well-being. Okma and Veenhoven (in press, cited in Lucas and Gohm, 2000) found that affective well-being showed consistent decline across the life span. Affect balance decreases slowly from 18 to 48 and after age 65. However, from age 18 to 90 life satisfaction exhibits almost no change. Diener and Suh (1998) reported that from age 18 to 90 life satisfaction is stable. The positive and negative emotions exhibited slightly different patterns. Positive affect showed a slow but steady decline across all age groups (20 - 80 years). Negative affect also showed a slight decline from 20s to 60s, but rebounded slightly among respondents 70s – 80s. It is also found by Gross et. al. (1997) that negative emotional experience, namely anger decreased with age. Pleasant affect decreases steadily throughout the life span, while unpleasant affect decreases at first stage and then increases among the elderly (Lucus and Gohm, 2000).

Sex

Intensity and frequency of emotion vary with gender. Females experience greater intensity of emotions (Fujita et. al., 1991) but they do not differ in frequency of experienced emotions (Allen and Haccoun 1976). Researchers are in agreement that women generally tend to report more intense and frequent negative, unpleasant, internalizing emotions than men (e.g., Brody and Hall, 1993; Manstead, 1992; Nolen–Hoeksema 1990). Lucus and Gohm (2000) found gender differences in internally focused emotion of fear and sadness. Women suffer from higher rates of psychological disorders. They also report more frequent and intense internally focused moods, such as sadness, fear, seriousness, shame and guilt. These differences mirror the elevated rates of internalizing disorders, such as depression, anxiety disorder, etc. However, in case of externalizing emotions, such as anger, women do not experience more anger than men. Working in Bangladesh, Huque (2004) found males had higher psychological well-being than females.

Income

Economic prosperity helps people meet their inherent needs, which produce heightened well-being. McLeod and Kesser (1990) found associations between socio-economic status (SES) and exposure to negative life events. Persons low in socio-economic status (SES) suffer from poorer health. SES differences are found higher rates of mortality and morbidity from almost every disease condition (Antonovsky, 1967; Illsley and Baker, 1991). Pappas et. al. (1993) suggested that those lowest in SES (especially, in income) have a higher risk. The effects of sever poverty on health may seem obvious through the impact of poor nutrition, crowded and unsanitary living condition, poor health care and greater environmental risk. Adler et. al. (1994) showed consistent association of SES and physical (smoking, physical inactivity and

substance use) and psychological (depression, hostility and stress) health outcomes. This is also consistent with Cohen et. al. (1999).

From the findings (Dienier and Oishi, 2000), it is clear that poor society suffers higher from mental and physical health problems. Bangladesh is a poverty-stricken society where majority of the inhabitants live below poverty line. Therefore, when they suffer from any disease, it gets accentuated as a consequence of their poverty. Poverty breeds the onset of disease as well as increases severity of disease that is dangerous for the well-being.

Worry

In every day life, when peoples' health and safety are threatened, they experience different types of worry in them that may develop dissatisfaction, negative feeling and unhappiness. Worry is considered as a subtype of anxiety which indicating poor mental health (Davey and Tallis, 1994; Eysenck, 1992). According to Boehnke et. al. (1998) worry is a disturbing cognition about some domain of life (health, safety, etc.) that has becomes discordant with its desired state. Daily worries may trouble any one whereas prolonged, intense and uncontrollable worries are associated with severe anxiety (Borkovec et. al. 1983).

In terms of objects worry that is threatened, it is classified into micro worries (e.g. being unattractive, that my parent will die, suffering with chronic disease) and macro worries (e.g. unemployment in our country, people in the world dyeing of hunger). When micro worries are more intense, people have poorer cognitive and affective SWB (Boehnke et. al. 1998). Intense micro worry may undermine coping with threat, leading to poorer outcomes, to problems of adaptation, and to escalation of negative affect (Davey and Tallis, 1994). Schwartz and Melech (2000) found that micro worries are negatively correlated with satisfaction of life, positive affect, percent of

happy time and positively correlated with negative affect and percent of sad time. On the other hand, intensity of macro worries is often unrelated to well-being and some times positively related (Boehnke 1995; Griffin and Prior 1990). In terms of life domain that worry refers to, it may be considered a threat to a micro or macro object in at least one of the domains of life. Boehnke et. al., identified seven different domains of life in the list of worries health, safety, environment, social relations, meaning in life, achievement in work and studies and economics.

1.2.7.3 STRESS AND MENTAL HEALTH

Chronic and prolonged stressful experiences generate many types of psychological problems and mental disorder. Studies indicated that, stress may contribute to poor academic performance (Lloyd et. al. 1980), negative affect (Van Eck et. al. 1998), insomnia (Hartmann, 1985), nightmares (Cernovskey,1989),sexual difficulties (Malatesta and Adams, 1984), drug abuse (Lester et. al.1994) and unhappiness, (Heady and Wearing, 1989). Stress has been found to trigger the onset of psychological disorders, including depression (Gruen, 1993), eating disorder (Strober, 1989), Schizophrenia (Spring, 1989). Most of the theories of schizophrenia assume that stress is instrumental in triggering schizophrenia. High stress precipitates the onset of anxiety disorder (Lester et. al. 1994; Blazer et. al. 1987). Men who experienced high stress were 8.5 times more likely to develop this disorder than men under low stress. Johnson and Roberts, 1995; Kendler et. al. 1995 found strong link between stress and the mood disorder. These findings illustrated the detrimental consequences of stress on peoples' mental and physical health.

1.3 RATIONALE OF THE STUDY

Bangladesh is currently grappled with a massive arsenic contamination of its groundwater – the main source of drinking water. A large number of people have

already developed various symptoms of arsenic toxicity, which lead to arsenicosis. A half of the country's population is at risk. There have also been reports of deaths from arsenicosis. Bangladesh is one of the most densely populated countries and per capita income amongst the lowest, where about a half of the population lives on poor diets dominated by cereals (rice). As a result, starvation and continued consumption of protein- and- vitamin- deficient diets have resulted in undernourished and stunned body and poor health. Nutritional stunting due to prolonged insufficiency of food has caused marked retardation of growth, which was further worsened by the arsenic toxicity. People taking deficient or poor quality protein diets show greater frequency of arsenic manifestations and diseases. Similarly, poor arsenic victims are at more risk and vulnerable condition including non-availability of safe drinking water, poorer health care, greater environmental risk and inadequate information about arsenic toxicity.

Scientists of various disciplines have already been undertaking research on this arsenic issue. However, so far the researcher's knowledge goes no psychological studies have been done to date. Although, there are numerous psychological research on chronic illness, (Cassileth et. al. 1984; Susman, 1994; Devins, 1994; Devins et. al. 1993), extensive literature survey shows that few psychological research on arsenicosis to date anywhere. This work, namely stress, coping and mental health of arsenic victims will be a novel attempt in this regard.

The present study has been designed to provide information about the perceived experience of stress in arsenicosis patients, to identify the coping strategies used by them encountering the chronic stressful events of arsenicosis and to study the effects of arsenic toxicity on mental health. This work has attempted to develop an integrated stress-coping-mental health model of arsenic victims in light of transactional theory of

stress-coping by Lazarus and Folkman (1984; 1987) as well as its modified views (Perrez and Reichert, 1992) and its extended model (Maes et. al. 1996).

According to transactional stress theory (Lazarus and Folkman, 1984), the most important determinant of an event's impact is how it is appraised. Appraisal is the cognitive process through which the individual evaluates a situation in terms of its significance for well-being (primary appraisal) and his/her capabilities of dealing with it (Secondary appraisal). Appraisal can be thought of as the 'final common pathway' (Monroe and Kelley, 1995) that will determine whether a given event leads to a stress response. Extended model of Maes et. al. (1996). also emphasizes the disease related events, demographic characteristics and personal resources in explaining stress, coping and illness. Personality (mastery, optimism, hardiness, self-esteem, etc.) and socio-environmental factors (social support, income, sex, etc.) act to determine the magnitude of stress and the appraisal process that may lead to select appropriate coping measure for reducing stress. Excessive stress and lack of personality and environmental resources to overcome this situation deteriorate the mental health condition of the victims.

It is evident from the studies that the consequences of illness (chronic or acute) are not totally biological but rather psychological and social (e.g. Cohen and Willamson 1988; Moos, 1977; Taylor and Aspinwall, 1990). When people are affected by arsenicosis, in addition to the physiological symptoms they experience overwhelming burden of uncertainty, dependency, pain, frustration, and social isolation that may create anxiety, emotional distress and higher level of stress. These negative impacts damage the mental health of the victims. Moreover, they have been suffering from economic and social problems. Arsenic related prejudice creates social isolation, marital dissolution, unemployment, discrimination, disintegration etc. These pose

additional threats to security and well-being of the victims (The Harvard Public Health Review, 1999; Dhaka Community Hospital, 1997; Sarker, 1999); while they keep fighting for their survival. In order to encounter the stressful situation of arsenicosis, the victims have to adopt some coping strategies to reduce the effects of stress.

The study strives to investigate the stress level, coping strategies and mental health condition of the arsenic victims. As both event or contextual characteristics and personal characteristics are important determinants of an individual's perceived stress, coping and mental health, the present study includes mastery, optimism (personality resources) and arsenic toxicity, duration of arsenicosis, age, income (socio-environmental resources) as predictors of stress and mental health, and singled out these factors according to their amount of effects.

The findings of the study were expected to contribute to the knowledge of planners, policy makers and practioners to chalk out a meaningful action scheme for the psychological intervention of the arsenic victims.

1.4 AIMS AND OBJECTIVES OF THE STUDY

The present research aimed at examining the psychological impact of arsenicosis on the victims in Bangladesh. The broad objective of the present work was to conduct an empirical study to explore mental health, perceived stress and ways of coping of arsenic victims. Their prevailing situation, mental health, perceived stress level as related to gender, income and arsenic toxicity; socio-environmental and psychological factors as the predictors of mental health and perceived stress were explored. Similarly, how arsenic affected patients cope with the stressful situation of arsenicosis, comparison of ways of coping by non-affected people vis-à-vis affected,

ways of coping as related to gender and effect of arsenic toxicity also were to be investigated. The specific objectives of the study were:

(1) To explore the situation of arsenic victims.

(2) To assess and compare the mental health of arsenic affected and non-affected participants.

(3) To investigate whether mental health varies with arsenic toxicity, gender and income.

(4) To assess and compare perceived stress of arsenic affected and non-affected participants.

(5) To investigate whether perceived stress varies with arsenic toxicity, gender and income.

(6) To investigate the gender differences in mental health and perceived stress of the participants.

(7) To examine the relationship of socio-environmental and psychological factors (such as, income, age, arsenic toxicity, duration of arsenicosis, mastery and optimism) with mental health and perceived stress.

(8) To identify which psychological and socio-environmental factors are the best predictors of mental health.

(9) To identify which psychological and socio-environmental factors are the best predictors of perceived stress.

(10) To assess and compare the coping strategies of arsenic affected and non-affected participants.

(11) To investigate whether coping strategies vary with arsenic toxicity and gender.

(12) To formulate a stress-coping-mental health model of the arsenicosis patients.

CHAPTER 2

METHODS

The methodology of the study was comprised of a multi–method approach. Field study, interview, and tests were used for the data collection. A questionnaire was constructed incorporating socio-demographic and arsenic related items. Considering the cultural context of Bangladesh, a new tool for stress measurement had to be constructed and piloted in the field situation. It was factor analyzed and reliability was determined by the alpha value. For measuring the mental health, ways of coping, mastery and optimism, specific tools had to be adapted in Bengali and field tested for their appropriateness and reliability.

Sample of this study was selected from the randomly selected 4 areas of two districts (Rajarampur and Sutrajitpur of Chapainawabganj district and Miapur and Harirampur of Rajshahi district). A sample of 200 arsenic affected patients (having arsenicosis symptoms) was randomly drawn from these areas. A control group of 194 non-affected participants (those who have not been suffering from arsenicosis) was also randomly taken. Control group was matched with experimental group for variables like gender, age, income, marital status, educational level, etc. Forty two percent (42.8%) of the affected sample was female and the rest male; their age ranged from 15 to 70. In control group, 44.3% was female and 55.7% male with mean age ranging from 15 to 75.

In the present study, arsenic toxicity, gender and income were taken as independent variables. Rating of the participants on each scale used was taken as dependent variables. For three specific independent variables, consisting of two levels of arsenic toxicity (affected – non affected), two levels of gender (female-male) and three levels of income (low income, lower middle income and middle income), factorial design

was employed. Socio-environmental and personality factors were examined as predictors of mental health and stress.

For the present study, Perceived Stress Questionnaire (PSQ) was constructed and Ways of Coping Questionnaire (WCQ) adapted in Bengali. Two other measures for personality factors Mastery Scale (MS) and Life Orientation Test (LOT) were also adapted in Bengali. The other measure used in this study was General Health Questionnaire (GHQ) developed by Sorcar and Rahman (1989). Details of the selection of study areas, samples selection procedure and instruments used for data collection are described below.

2.1 SELECTION OF STUDY AREAS

Out of 268 arsenic hotspot areas of the country, 4 areas of Rajshahi and Chapainawabganj districts in the northwestern Bangladesh were selected as the study area. Charghat municipality and Bagha upazilla of Rajshahi district and Chapainawabganj municipality and Shibganj upazilla of Chapainawabganj district were purposefully selected. These hotspots were selected considering the proximity and convenience of communication as well as the limited budget and time frame of the current work.

Four villages were randomly chosen as study area in the 4 selected hotspots. They were Rajarampur area of Chapainawabganj municipality, Sutrajitpur union of Shibganj upazilla, Miapur area of Charghat municipality and Harirampur village of Bagha upazilla.

Charghat Municipality

Charghat upazilla, occupying an area of 164.52 sq. km, is situated by the river Padma. It has a population of 163,862, of which 84,589 are males and 79,273 females. The upazilla is bounded on the north by Puthia upazilla, on the east Bagatipara by Natore district, on the south by Bagha upazilla and on the west by Boalia upazilla and the

river Padma. It consists of 6 unions, 93 mauzas and 129 villages. The average population of each union and each village are 27, 310 and 1,270 respectively. For drinking purposes 85.87% households uses tubewell, 1.07% running water, 12.60% dug–well, 0.35% pond and 0.10% river water (Bangladesh Population Census, 1991).

Bagha Upazilla

Bagha upazilla of Rajshahi district is located by the river Padma. The upazilla occupies an area of 184.25 sq. km. It is bounded on the north by Charghat upazilla and Bagatipara upazilla of Natore district, on the east by Lalpur upazilla of Nator district, on the South by the river Padma and on the west by India. It consists of 6 unions, 98 mauzas and 101 villages. The average population of each union and each village are 26,665 and 1,524 respectively. It has a population of 153,931. For drinking purposes 89.38% of the households use tubewell and 0.03% running water (Bangladesh Population Census, 1991).

Chapinawabgang Municipality

Chapinawabganj Sadar Upazilla of Chapinawabganj district is situated by the river Mahnanda. It is bounded on the north by Nachole and Shibganj Upazillas of Chapinawabganj district, on the east by Tanore and Godagari Upazillas of Rajshai district, on the south by India and on the west by Shibjanj Upazilla and India. It consists of 14 unions, 5 wards and 192 villages. The average population of this upazilla is 189.524. Chapinawabganj municipality, the only urban area of the district consists of 5 wards. In Chapinawabganj Upazilla, 82.29% on the dwelling households uses tubewell, 2.99% running water, 8.76% dug well, 0.68% pond and 32% river as the source of drinking water (Bangladesh Population Census, 1991).

Shibganj Upazilla

Shibganj upazilla is bounded by the north by Bholahat upazilla of Chapinawabganj district and India, on the east by Gomastapur, Nachole and Chapinawabganj sadar upazillas of Chapinawabganj district and on the west by India. It consists of 15 unions, 3 wards and 367 villages. It has population of 422,347. In this upazilla 85.58% of the household uses tubewell, 0.43% running water, 13.43% dug well, 0.08% pond and o.48% river water as the source of drinking water (Bangladesh Population Census, 1991).

2.2 SAMPLE

2.2.1 SAMPLING PROCEDURE

Field data of this study was collected from Rajarampur (Chapinawabganj municipality), Sutrajitpur (Shibganj upazilla) of Chapainawabganj district and Miapur (Charghat municipality), Harirampur (Bagha upazilla) of Rajshahi district. Probability-Proportional-to-Size (PPS) method was used as the sampling technique.

Probability Proportional to Size (PPS) Technique of Sampling

To collect samples from different areas, stratified random sampling procedure was followed. It often helps to study the heterogeneity among the sampling units producing better results. There are different ways of stratified sampling but the simplest and the most popular one the probability proportional to size (PPS) technique (Cochran, 1987). Here, the sample size of each stratum is taken proportional to its population. Suppose the population is of size N, which is distributed in K strata. Let Ni be the population size of the Nth stratum so that $N = \sum_{i=1}^{k} N_1$. The chosen sample of size of a study n is to be collected from these strata. The sample size of each ni stratum, is to be determined by the formula: $ni = \frac{N_i}{N} \times n.$

After determining the sample size for different strata, simple random sampling procedure was used to collect samples from each stratum.

2.2.2 SAMPLE OF ARSENIC AFFECTED PARTICIPANTS

In this study secondary data list of arsenicosis patients identified by Watson Partnership Project (WPP) was used. Watson Partnership Project (2001–2003) surveyed 640 villages of Rajshahi and Chapainawabganj districts in order to screen out arsenic patients and contaminated tube wells. Arsenic survey team of WPP consisting of non-medical workers made the preliminary identification of the arsenicosis patients to be later randomly checked and validated by medical doctors, who prepared the final list of the patients.

Form Rajarampur area of Chapainawabganj, out of 160 patients from WPP list 75 patients were included as participants of this study using Probability-Proportional-to-Size (PPS) method. These 75 participants were randomly selected from the list of the arsenic patients. In Sutrajitpur union of Shibganj, out of 141 patients 67 were randomly picked up from the list using PPS method.

In Miapur area of Charghat, 32 were randomly selected as sample using PPS method from total 67 in the WPP list. Out of 56 patients in Harirampur village of Bagha using WPP list, 26 were randomly selected as the participants using PPS method.

Table 2.2.2.1 Sample Distribution of Arsenic Affected Participants.

District	Upazilla / Municipality	Village	Total Population	Affected Population	Sample Size
Rajshahi	Charghat Municipality	Miapur area	2964	67	32
	Bagha Upazilla	Harirampur Village	2890	56	26
Chapai-nawabganj	Chapai-nawabganj Municipality	Rajarampur Area	6625	160	75
	Shibganj Upazilla	Sutrajitpur Union	20926	141	67
		Total	33495	424	200

2.2.3 SAMPLE OF NON-AFFECTED PARTICIPANTS

The control group was drawn from all 4 selected sample areas. Those people, who had not been suffering from arsenicosis symptoms as well as never used arsenic contaminated tube well water were selected for the control group. The sample of control groups were matched with the experimental group in their age, gender, income, marital status, educational level etc.

Table 2.2.3.1 Sample Distribution of Non–affected Participants.

District	Upazilla / Municipality	Village	Total number of population	total number of non-affected people (not affected with arsenicosis)	Sample size of non-affected people
Rajshahi	Charghat Municipality	Miapur	2964	2897 (2964-67)	17
	Bagha Upazilla	Harirampur Village	2890	2834 (2890-56)	17
Chapai-nawabganj	Chapainawabganj Municipality	Rajarampur	6625	6465 (6625-160)	38
	Shibganj Uapzilla	Sutrajit pur Union	20926	20785 (20926-141)	122
		Total	33495	32981	194

2.3 INSTRUMENTS USED

2.3.1. QUESTIONNAIRE FOR DEMOGRAPHY AND ARSENIC RELATED INFORMATION

A questionnaire was specifically developed to elicit socio-demographic and arsenic related information from the participants. The questionnaire consisted of items, such as occupation, income, number of family members, duration of stay in respondents' present residence, main problem faced by them, use of water, source of water, awareness about arsenic, etc. For the affected respondents, the history of arsenic poisoning, symptoms, duration of arsenicosis, medication used, social and physiological problems, social isolation, assistance received from government and

non- government organization, etc. were included in the questionnaire. These questions were excluded from the questionnaire for the non- affected respondents. This questionnaire was developed consulting various research reports on arsenic poisoning.

The questionnaire had two parts: One part covered socio-demographic information, while the other arsenic related information. It also included the questions regarding the awareness about arsenic.Additionally, it included the questions on the source of water (Appendices B,C).

2.3.2 PERCEIVED STRESS QUESTIONNAIRE (PSQ)

Study population for test construction

Ninety (90) participants (40 female and 50 male), 18 years of age and older (mean age: 26.2, standard deviation: 13.3) from lower middle class (mean income = 2500/- per month) were selected for administering different item sets for developing the perceived stress questionnaire (PSQ).

Item selection

A number of lower middle class people (both female and male) were interviewed about what they felt or did when they experienced a stressful situation (i.e. unpredictable, uncontrollable and overloaded for their lives). On the basis of the theoretical consideration and direct interview with some selected respondents about their feelings on a very unpredictable, harmful, challenging situation, data were gathered for the item selection of perceived stress inventory. Interviewers used a structured protocol to elicit self- report information about the experience of stressful situation. The following instructions were given:

"We are interested to know how people experience when their lives are in dangerous, difficult or challenging situation or stressful situation. There are lots of feelings that

people experience in stressful situations. This questionnaire asks you to indicate what you generally feel or do, when you experience stressful events. Think about your experience of stress and express your feelings or responses in that stressful situation. There is no right or wrong answer".

Depending on the answers of the respondents and consulting the stress related literature 52 items were selected and examined by 4 judges for appropriateness of the items. Three professors of the Department of Psychology and a psychiatrist of the Rajshahi Medical Collage judged these items, and finally 40 items were selected for the administration.

Reliability and Factor Analysis

The final item set (40 items) was completed by 90 respondents. Their responses were subjected to a principal-factors factor analysis, using an oblique rotation to allow for correlations among the factors (Lee and Comrey, 1979). Five administrations for each 90 subjects were entered so that 450 observations were used in the factor analysis.

These analysis yielded 15 factors with eigen values greater than 1. The remaining factors had no item loading exceeding 1.

Factor structure

The 40-item PSQ was factor analyzed using a principal component method with varimax rotation. The principal component analysis revealed that there were 15 factors with eigenvalues over 1.0, which together accounted for 73.61% of total variance (results of factor analysis was presented in the appendix A). Item nos. 2, 3, 4 and 7 were loaded on the first factor around 0.5 or above. Item nos. 1, 6, 16 loaded on the 2nd factor, item nos. 31, 32, 36 loaded on the 3rd factor, item nos. 9, 11 and 13 loaded on the 4th factor, item nos. 22, 23 loaded on the 7th factor, item nos. 34, 39 loaded on the 8th factor, item nos. 21, 25 loaded on the 9th factor, item nos. 24, 30

loaded on the 10th factor, item nos.18, 19 loaded the 11th factor item nos. 33, 37 loaded on the 12th factor and item nos. 20 and 26 loaded on the 13th factor at around 0.5 respectively. Item nos. 14, 27, 5 and 8 were singly loaded on individual factor at around 0.5 level.

Table: 2.3.2.1 Cronbach Alpha Reliability Analysis.

Factor	α	F	P
1 (2, 3, 4, 7)	.7388	5.9057	.0006
2 (1, 6, 16)	.6431	5.3275	.0057
3 (31, 32, 36)	.7476	18.260	.0000
4 (9, 11, 13)	.5764	16.1082	.0000
5 (14)	N/A		
7 (22, 23)	.6195	.000	.05
8 (34, 39)	.6653	6.9575	.0099
9 (21, 25)	.6515	12.1201	.0008
10 (24, 30)	70.36	13.668	.0004
Total alpha	.7652	34.15	$p \approx .oo$

Table: 2.3.2.1 shows that result of the internal consistency of items associated with the 10 characteristics using the Cronbach alpha model (based on the average inter-item correlation). Reliability estimates ranged from .58 to .74. For early stages of research Cronbach alpha of at least .60 are acceptable (Cronbach, 1970).

Cronbach alpha was calculated for each factor to test its reliability. The alpha values were as follows: (1st factor = .74, 2nd = .64, 3rd = .75, 4th = .58, 7th = 62, 8th = .67, 9th = .65, 10th = .70, 11th = .49, 12th = .34, and 13th = .47.) Those factors, which contained alpha values above .6 or close to .6, were included in the PSQ scale. Hence items from the factor 1, 2, 3, 4, 7, 8, 9, 10, were included. Single item factor (5th

factor: item 14) also included but factor 6, 14 and 15 were discarded considering their similar nature with other items. The alpha value for the entire scale was also high (α .77, F=34.15, P≈ .00).

The First factor (7.45% of the variance) most heavily weighted those items that reflected feelings (i.e. feeling of disturbance, uncertainty, mental pressure, numbness), 2nd factor (6.39% of variance) most heavily weighted those items that were emotionally negative natured (i.e. nervousness, depression and repetitive thinking), 3rd factor (5.36% of variance) indicated the physical symptoms of illness (i.e. cold, high blood pressure and diabetes) 4th factor (5.30% of variance) reflected the loss of control feeling or self-control ability (i.e. failure to control events and agitation) 5th factor (5.29% of variance) reflected the level of attentiveness and 7th factor (5.04% of variance) reflected the self-determination state (i.e. self-confidence, resolution). Physiological response was reflected in 8th factor (5.01% of variance), especially in physiological natured (i.e. backache, tiredness), 9th factor (4.45% of variance) indicated the adaptive ability (i.e. control over irritating events and acceptance of problem situation), 10th factor (4.62% of variance) indicated the defensive behavior (i.e. avoidance, illness). Reliability coefficient of all these factors were significant at < .05 level.

Factors 12 and 13 were discarded because of their alpha value were .34 and .47 respectively and also P values were not found at accepted level.

Finally, PSQ was constructed with 20 items as an internally reliable measure of perceived stress in the socio- cultural context of Bangladesh (Appendices D, E).

Scoring

Respondents were asked to rate each item on a 5 point scale with not at all (0), a little bit (1), a moderate amount (2) quite a bit (3), and a great deal (4) as response

categories. Item nos. 7, 9, 10, 11 and 12 were reversed prior to the scoring. High scores reflected high perceived stress.

2.3.3 WAYS OF COPING QUESTIONNAIRE (WCQ)

The ways of coping questionnaire (revised version by Folkman et. al. 1986; 1988) was used to measure eight coping strategies in specific stressful encounters (arsenicosis) (Appendix F). It was adapted in Bengali for the present study (Appendix G). In this self-report measure of coping strategies, initial instructions asked subjects to describe the most stressful situation they had encountered in the last two months.

The ways of coping questionnaire (WCQ), originally termed WCC (Ways of Coping Checklist), developed by Folkman and Lazarus (1980) contained 68 items. It was designed to assess patterns of two basic coping strategies: problem-focused coping and emotion-focused coping. The strategies of coping were originally drawn from published literature (e.g. Mechanic, 1962; Silde et. al.1969; Weisman and Worden 1976–77) and constructed from their own theoretical framework (Lazarus and Luiner, 1978). This inventory had been used in such diverse settings as Japan (Motoaki et. al. 1990; Nakano, 1991), Hongkong (Chan, 1995; Chan and Hui, 1995), Thailand (Nolrajsuwat, 1996), Czechoslovakia (Krivohlavy, 1989) and Iran (Haghighatgou and Peterson, 1995).

The revised version of ways of coping (WCQ) differed from the original (WCC) in that redundant and unclear items were deleted or reworded, several new items were added and the response format was changed from yes- no to a 4-point Likert Scale (0=does not apply and /or not used; 1 – used some what; 2 = used quite a bit, 3 – used a great deal). This revised version contained 50 items. It identified a form of emotion focused coping – self- control and two forms of problem focused coping – confrontive coping and planful problem solving that was not identified in the previous version.

WCQ was administered to 85 married couples on five different occasions over 6 months and selected 50 items to be factor analyzed, which eventually produced eight coping scales. The eight scales accounted for 46.2% of the variance. These scales had moderate alpha coefficients ranging from .61 to .79. However, the test retest reliability for the WCQ has not been reported in the literature. The 8 ways of coping scales were as follows:

(1) Confrontive coping (Cc, Scale 1): described aggressive efforts to alter the situation. It also suggested the degree of hostility and risk taking. Item nos. 2, 3, 13, 21, 26, 37 were included in this scale. It was an aggressive and interpersonal form of coping.

(2) Distancing (Dis., Scale 2): described efforts to detach one self and creating a positive out look. Item nos. 8, 9, 11, 16, 32, 35 were included in this scale..

(3) Self- control (Sc, Scale 3): described efforts to regulate one's own feelings and actions. It included 7 items (6, 10, 27, 34, 44, 49, 50).

(4) Seeking Social Support (Sss, scale 4): described efforts to seek informational support, tangible support and emotional support. It contained 6 items (4, 14, 17, 24, 33, 36).

(5) Accepting responsibility (Ar, Scale 5): acknowledged one's own role into the problem with a concomitant theme of trying to put things right. This scale contained 4 items (5, 19, 22, 42).

(6) Escape avoidance (Ea, Scale 6): described wishful thinking and behavioral efforts to escape or avoid. It included 8 items (7, 12, 25, 31, 38, 41, 46, 47).

(7) Planful problem solving (Pps, Scale 7): described deliberate problem focused efforts to alter the situation coupled with an analytic approach to solving the

problem. It included 6 items (1, 20, 30, 39, 40, 43). It was cool, deliberate and non-interpersonal problem focused coping.

(8) Positive reappraisal (Pr, scale 8): described efforts to create positive meaning by focusing on personal growth. It also had a religious tone. It included 7 items (15, 18, 23, 28, 29, 45, 48).

Scoring

Scores were calculated by summing up the ratings for each scale on each occasion. To standardize the total score of the each item, subject's mean score on each coping scale had to be calculated (subject's total rating in each items had to be divided by the total number of items).

Reliability

The translated version of the ways of coping questionnaire was validated by the judges. Bengali version of the ways of coping questionnaire was reviewed by two bilingual professors at the University of Rajshahi (Professors in English and Psychology). The translated questionnaire was then administered among 40 respondents (villagers from lower middle class) twice with an interval of two weeks to test for reliability. The Spearman's test retest reliability was applied, the correlation showed an acceptable measure (Cc = .68, Dis = .62, Sc = .67, Ss = .74, Ar = .63, Ea = .67, Pps = .70, Pr = .76)

2.3.4 GENERAL HEALTH QUESTIONNAIRE (GHQ)

The Bengali version of General Health Questionnaire (GHQ-12), adapted by Sorcar and Rahman (1989), was used to measure mental health of the participants (Appendix I). GHQ-12, originally developed by Goldberg (1972) (Appendix H), was designed to detect minor psychiatric disorders in community and primary health care settings (Piccinelli et. al. 1993). The 12 GHQ items was derived from 60 items in the original

version. Reliability measures showed that the GHQ –12 had a high degree of internal consistency with alpha values ranging from 0.82 to 0.90 (Gurije, 1991). Banks et. al. (1980) used it to measure mental health in occupational studies and found it to be a useful measure of mental health in employment and occupational problems. The development studies (Goldberg, 1972) showed high internal consistency (0.65), test-retest reliability (0.73) over a period of 6 months and validity in terms of a good linear relationship with clinical check- up records as the criteria (r= 0.70)

Validity coefficient of the GHQ-12 had been found to be comparable to those of GHQ -20, GHQ –30 and GHQ – 60 item versions (sensitivity: $\underline{M}$ = 74%; Specificity $\underline{M}$ = 82%; misclassification rate- 18%) (Chan and Chan, 1983; Piccnelli, et. al. 1993). GHQ in other language also showed validity coefficient like English version.

The answering pattern of the original GHQ- 12 was 'less than usual' or 'more than usual' format. But, in Bengali version this scoring system had to be changed because of its linguistic difficulties. Sorcar and Rahaman adapted new Likert type scoring system in which true keyed items (all positively worded items) of their questionnaire weights of 0, 1, 2, and 3 were assigned for 'not at all', 'some what', 'to a considerable extent' and 'to a great extent' respectively. The scoring for the false-keyed items was reversed. The total scores ranged from 0 to 48, with low scores being indicative of poor mental health.

Bengali version of GHQ had been widely used in Bangladesh. Banu and Akhter (1996); Sorcar and Rahman (1989); Huq et. al. (2000) and Sorcar and Rahman (1993) used this scale as a measure of mental health. Uddin et. al. (1989), using it as a measure of mental health, assessed the relationship of occupational stress, Job involvement with mental health of doctors and nurses and of private and public hospitals . Banu and Akhter (1996) used it to assess the relationship between mental

and social support among parents with mentally handicapped children. Rahman (1989) used this instrument to assess occupational stress and mental health among factory workers while Sorcar and Rahman (1993) used it to measure mental health of the working women.

The original GHQ had frequently been used as an instrument in psychological disturbance among disaster-impact populations. Studies on Fijian cyclone (Fairley et. al. 1986), Australian railway disaster (Singh and Raphael, 1981) the Australian Ash Wednesday fire (McFarlane and Papay, 1992) and Chernobyl nuclear accident (Vinnamaki et. al. 1995) used GHQ-12 as the source of mental health.

2.3.5 PERSONAL MASTERY SCALE (MS)

Psychological control was assessed through Bengali version of Pearlin et. al. (1981) 7 item scale of personal mastery. This mastery scale was originally constructed by Pearlin and Schooler (1978) on the basis of schedule interviews with 2300 males and females (ages between 18 and 65). Continuing a longitudinal study: 1st (1972-73) and 2nd (1976 – 1977) phases with 1106 respondents, Pearlin et. al. finally published the Mastery scale in 1981 (Appendix J).

Seven (7) items mastery scale was established via factor analysis; the correlation between time 1 and time 2 measures was .33. It was concluded that the relationship between constructs and indicators remained stable over time. The validity of this scale was indicated by its consistent relationships with other scales and variables.

This scale was adapted in Bengali for the current study (Appendix K). Translated form of the mastery scale was reviewed by three professors in English and Psychology. Then it was piloted twice on 44 respondents to test its test retest reliability coefficient. Spearman test– retest reliability correlation, over a 3 weeks interval, was $r = .72$, $p < .03$, $(n = 44)$. Bengali version of mastery scale was validated

through using it on the Santal community. This scale was administered on 30 Santal female, mean mastery score of Santal female was found to be very low (3.2) in comparison to Bengali women's mastery score (M = 4.5).

Scoring

The respondents rated the items on 4-point Likert type scales: (1 – strongly agree, 2 – agree, 3 – disagree, 4 – strongly disagree). Item nos. 6 and 7 were reversed prior to the scoring. Total score ranged from 7 to 28, high score being indicative high mastery and low score indicative low mastery.

2.3.6 LIFE ORIENTATION TEST (LOT)

The LOT was a 12-item scale designed to measure dispositional optimism, developed by Scheier and Carver (1985) (Appendix L). This scale assessed the extent to which individuals possess favorable expectations regarding life outcomes. Four items were positively phrased 7,4,5 and 11 (i.e. certain times, I usually except the best) and four were negatively phrased items, 3, 8, 9 and 12 (i.e. if something can go wrong for me, it will). In addition, four items were fillers. The response format was 'true' or 'false'. Negatively worded items were reversed prior to scoring. High score indicated high optimism.

The LOT had acceptable psychometric properties and discriminated validity with respect to related concepts such as locus of control and helplessness. The mean scale score, standard deviation for the LOT were M = 2.98, SD = .43. Mean levels of optimism did not differ significantly from college student data provided by Scheier and Carver (1985). Cronbach alpha for the scale was .76 and the test retest reliability coefficient was .79 (over a 4 week interval). Evidence of convergent and discriminant validity had also been compiled with respect to a number of other personality

variables (ibid). It was adapted in Bengali and determined test-retest reliability ($r = .68$, $p < 103$, $n = 44$) (Appendix M).

2.4 TRAINING OF THE INTERVIEWERS

To ensure the consistency and standardization in administering questionnaires, 8 interviewers were trained prior to the survey. Particular attention was given to the interviewers' understanding and ability to communicate with the village people. Knowledge about psychological research and data collection was considered while selecting the interviewers. The interviewers were recruited from among the graduate students of the Department of Psychology. All of them were properly trained regarding how to establish rapport with the participants and to interview the participants. Training period continued for three days: one day for orientation on questionnaire, the 2nd day for practical demonstration with arsenicosis patients and the third day for direct training from Arsenic survey WPP team for identification of patient and overall planning of the field visit. They were briefly informed about the health and socio-economic and psychological conditions of the arsenic affected participants as well as about the importance of this study. Interviewers were oriented to the purpose and objectives of the study, field sampling, source of sampling bias and general interviewing procedures (including issues related to interviewing attitudes and personal conduct, standardization, interviewing behavior and potential interviewer and respondent biases).

2.5 PROCEDURE

The data was collected through interviews using questionnaires at the participants' households, or convenient place of the village. The interviewers collected data over a 6-week period during September–October, 2003. Interviewers went to the arsenic affected villages or areas accompanied by the community members, who introduced

them to the villagers that helped them to be acceptable in the locality. At the beginning, people had grievances and agitation towards the interviewers, because a number of visitors would come to them and asked them questions, examined them, but they delivered no tangible service that would benefit the victims.

After repeated visits, the interviewers managed to establish an easy and spontaneous relationship with the participants. Sometimes, interviewers provided them with some vitamins, assured them that they would convey participants' miserable condition to the government and welfare organizations.

The interviewers would start with collecting demographic and arsenic related information from the participants using relevant questionnaire. Once the participants gave their personal and arsenic related information, they told about their miserable experiences of arsenicosis. Interviewers had to show patience in order to share their experiences and to extend support during the entire course of the participants' deliberation. In this way, they gradually established rapport and went through the rest of the questionnaires. The perceived stress questionnaire (PSQ) was completed followed by the ways of coping questionnaire (WCQ), general health questionnaire (GHQ), mastery scale (MS) and life orientation scale (LOT) respectively. During a interview, when the participant was showing signs of boredom and tiredness the field investigator would pause and gave a break for a while, and then would proceed again. Thus, it took a long time to complete one full questionnaire. However non-affected participants took relatively less time to complete than the affected ones. Orientation program on interviewing and arsenic related information helped the interviewers successfully communicate both with the villagers and the arsenic victims.

Participation in the study was voluntary and was without monetary compensation. To ensure informed consent, leaders of each of the sampled communities were consulted

during the reconnaissance survey and all respondents were informed of the purpose and content of the questionnaire prior to its administration. Participants, in no way, were coerced, deceived or otherwise misled to encourage their participation in the study. An introductory statement by the interviewer was used to ensure pertinent information relating to the study was consistently disseminated to the participants. Any respondent wishing to withdraw from the study, for any reason, and at any time during the interview, was permitted to do so.

2.5.1 SCORING AND CODING RESPONSES

Upon completion of the data collection from selected areas, necessary scoring and coding for data analyses were done.

2.5.2 DATA ANALYSES

Data analyses were done using SPSS for Windows 10.0. The following statistical analyses were performed.

1) Descriptive Statistics: To give a current account of the arsenic victims, descriptive statistics was used.
2) t-test analyses: To compare affected female and male on mental health and perceived stress, t – test was employed.
3) Three- way analyses of variance: To examine perceived stress, mental health according to gender, arsenic toxicity and income 3- way analysis of variance were employed.
4) Coefficient of Correlation: To examine the relationships of personal and socio- environmental factors with perceived stress and mental health, coefficient of correlation was used.
5) Regression analyses: To identify best predictors of mental health and perceived stress regression analysis was employed.
6) Two- way analyses of variance: To find out the variation of coping strategies according to gender and arsenic toxicity, 2- way analysis of variance was employed.

7) Multivariate analyses of variance: To assess and compare of eight ways of coping between affected and healthy participants, multivariable anova was employed.

8) Factor analysis: To develop PSQ, factor analysis was employed.

The findings of all these statistical procedures have been presented in the next chapter.

2.6 LIMITATIONS

1. Samples were taken from the 4 hotspot areas of the northern part of Bangladesh. It would have been more comprehensive to collect samples from all over the country. Due to financial constraints, paucity of time and communication difficulties it was not feasible.
2. Affected participants were randomly taken from the secondary data list of arsenicosis patients of WPP. They identified arsenicosis patients by an arsenic survey team consisting of trained non-medical personnel (NGO workers) under the supervision of medical doctors. It would have been more appropriate if all the patients were screened by the medical doctors. No other pertaining data for the study area were available.
3. As the participants were illiterate, data were collected through the interview method. It was very tedious and time consuming to get all 5 questionnaires completed. In a few cases, owing to this limitation, participants refused to complete the entire questionnaire.
4. Due to dermatological manifestations of arsenicosis and stereotypical attitude towards arsenicosis patients, they were not comfortable coming up front. Interviewers had to be more supportive and acceptable by repeatedly going to them, thereby establishing rapport.
5. Most of the patients had to face repeated interviews. In return, they would not get any help for safe (arsenic free) source of water and medical treatments. This reality created grievances and made them angry to give any further interview.
6. Since this psychological research on arsenic toxicity was first of its kind, relevant literature on chronic arsenicosis or poisoning was limited.

CHAPTER 3

RESULTS

The present study was conducted to investigate the psychological impact of arsenicosis and to find out the prevalent situation of the arsenic affected patients. It explored their perceived stress level, coping strategies and mental health condition, and finally formulated a stress-coping-mental health model of arsenic victims.

3.1 DEMOGRAPHIC CHARACTERISTICS OF SAMPLES

Descriptive statistics was used to ascertain a detailed situation of the arsenic victims in terms of their socio-demographic characteristics, arsenic related information i.e. source of water, history of arsenic poisoning, symptoms, duration of arsenicosis, type of medication used, social isolation, government and non government assistance etc.

The demographic characteristics of all participants (arsenic affected and non-affected) are presented in Table 3.1.1

Table 3.1.1 Demographic Characteristics.

	Affected		**Non-Affected**	
Sample size:	N	= 200	N	= 194
Age (years):	Mean	= 34.84	Mean	= 30.48
	SD	= 14.19	SD	= 10.43
	Range	= 15 – 80	Range	= 15 – 70
Sex:	Male	= 57.2%	Male	= 55.7%
	Female	= 42.8%	Female	= 44.3%
Marital status:	Single	= 22.8%	Single	= 23.2%
	Married	= 77.2%	Married	= 76.8%
Income (monthly):	Mean	= 2600	Mean	= 3292.84
	SD	= 1255.82	SD	= 1452.73
	Range	= 500 – 8000	Range	= 600 – 7500
Number of family members:	Mean	= 5.81	Mean	= 4.70
	SD	= 2.50	SD	= 2.02
Occupation:	Agriculture	= 16.8%	Agriculture	= 14.6%
	Business	= 21.2%	Business	= 7.0%
	Service	= 8.8%	Service	= 4.3%
	House wife	= 31.9%	House wife	= 54.6%
	Unemployed	= 16.4%	Unemployed	= 6.5%
	Labor = 4.9%		Labor	= 13%

According to Table 3.1.1 mean ages of the affected and non-affected participants were 34.84 and 30.48 years respectively. Out of 200 affected participants, 57.2% were males and 42.8% were females, 22.8% unmarried, 77.2% married. Out of 194 non-affected participants, 55.7% were males, 44.3% were females and 23.2% were unmarried and 76.8% were married. Mean incomes of the affected and non-affected participants were 2600/-, 3300/-taka per month respectively. Mean numbers of family members were 6 and 5. Nearly seventeen percent (16.8%) affected participants were engaged in agriculture, 21.2% in business, 8.8% in service, 4.9% in labor with 31.9% house wife and 16.4% unemployed, whereas 14.6% of non-affected participants were engaged in agriculture, 7.0% in business, 4.3% in service, 13% in labor with 54.6% housewife and 6.5% unemployed.

From the above description, it is evident that in mean monthly income affected participants were poorer than non-affected participants and affected participants were more unemployed than the non-affected participants. Affected people were also less engaged in day labor and service than non-affected participants.

3.2 SITUATION OF ARSENIC VICTIMS: A DESCRIPTIVE ACCOUNT

On the basis of the questionnaire (based on demographic, personal and arsenic related questions), relevant socio-demographic information of all the participants are described. Additionally, different aspects of various arsenic related information, such as source of water, problem faced by them, awareness about arsenic, source of arsenic information as well as arsenicosis (disease) related information, such as type of symptoms, use of medication, duration of sufferings etc. are explored in this chapter.

Table 3.2.1 Income, Age and Occupation Category of the Participants (both Arsenic Affected and Non-Affected).

Variables		Frequency	Valid Percent	Cumulative Percent
Age	15-29	167	42.39	42.39
	30-44	149	37.81	80.2
	45+	78	19.80	100.0
	Total	394	100.0	
Income	500-3000	79	20.05	20.05
	3000-5000	265	67.26	87.31
	5000-above	50	12.69	100.0
	Total	394	100.0	
Occupation	Agriculture	49	12.43	12.43
	Business	56	14.22	26.65
	Service	26	6.60	33.25
	House wife	183	46.45	79.70
	Unemployed	47	11.93	91.63
	Day labor	33	8.37	100.0
	Total	394	100.0	

From Table: 3.2.1 it was found that 42.39% of the total participants were in 15 – 29 age range, 37.81% were in 30 – 44 and 19.80% were in 45 and above age. Twenty percent (20.05%) of the total participants belong to 500 – 3000 taka (monthly) income group, 67.26% to 3000 – 5000 income group and 12.69% to 5000 and up group. Nearly twelve percent (12:43%) participants' occupation were agriculture, 14.22% engaged in business, 6.60% in service, 8.37% day labor, 11.93% unemployed and 46.45% housewife.

Table 3.2.2 Causes of Arsenicosis Perceived by the Participants (both Affected and Non-Affected).

Causes of Arsenicosis	Frequency	Valid Percent	Cumulative Percent
Water	382	97.0	97.0
Others	12	3.0	100.0
Total	394		

Most of the participants (97%) had identified tube well water as the cause of arsenicosis.

For arsenic affected participants

Source of water, duration of use, ect.

Table 3.2.3 Sources of Water, Duration of Using Present Water Sources, Main Problems and Use of Contaminated Tubewells.

Items		Frequency	Valid Percent	Cumulative Percent
Water source	Tubewell	132	66.0	66.0
	well	63	31.5	97.5
	River/pond	5	2.5	100.0
	Total	200	100.0	
Duration of using present water source	1-2	54	27.0	27.00
	3-6	107	53.5	80.5
	6+	39	19.5	100.0
	Total	200	100.0	
Main problem faced by the arsenicosis patients	Arsenic polluted water	195	97.5	97.5
	Others	5	2.5	100.0
	Total	200	100.0	

From the descriptive information of the affected participants (Table 3.2.3) it was found that 66% of the affected people used tube well water, 31.5% used well water and only 2.5% used river or pond water. Majority of the people (53.5%) used their present source of water for 3 to 6 years; 27% used for 1 to 2 years and 19.5% used above 6 years. Table 3.2.3 also shows that 97% of the total respondents expressed arsenic contaminated water as their main problem whereas, only 3% cited other problems.

Arsenic Awareness

Table 3.2.4 Duration and Source of the Knowledge about Arsenic Contamination.

Items		Frequency	Valid Percent	Cumulative Percent
Arsenic Awareness (Years)	1-2	58	29.0	29.0
	2-3	110	55.0	84.0
	3-4	6	3.0	87.0
	4-5	26	13.0	100.0
	Total	200	100.0	
Source of Information	Health Worker	167	83.5	83.5
	NGO	12	6.0	89.5
	People	21	10.5	100.0
	Total	200	100.0	

Majority of the affected people (55%) had been aware of arsenic for 2 to 3 years, 29% for 1 to 2 years and 13% for 4 to 5 years and only 3% for 3 to 4 years. Eighty three percent (83.5%) people had known the information from NGO workers and 10.5% from their neighbors and relatives with only 6% form the practicing doctors (Table 3.2.4).

Arsenic Contamination (arsenicosis) and Medication used

Table 3.2.5 Number of Affected Members in the Family, Symptoms, Detections of Symptoms and Medication Used.

Items		Frequency	Valid Percent	Cumulative Percent
Number of affected members in the family	1-2	112	56.0	56.0
	3-4	55	27.5	83.5
	5-6	22	11.0	94.5
	7-10	11	5.5	100
	Total	200	100.0	
Symptoms	Melanosis or Hypopigmentation	85	42.5	42.5
	Develped Keratosis	23	11.5	54.0
	Late Stage Melanosis or Cancer	92	46.0	100.0
	Total	200	100.0	
Symptoms detection	Doctor	34	17.0	17.0
	NGO workers	158	79.0	96.0
	Relatives	8	4.0	100.0
	Total	200	100.0	
Medication	No medication	54	27.0	27.0
	Allopathic	146	73.0	100.0
	Total	200	100.0	

Table 3.2.5 shows that in 56% of the family 1 to 2 members had been suffering from arsenicosis, in 27.5% of the family 3 to 4 members, in 11% of the family 5 to 6 members and in 5.5% of the family 7 to 10 members. Of the total affected participants, 46% had been suffering from late stage melanosis or cancer, 42.5% melanosis or hypopigmention and 11.5% keratosis. Most of the arsenicosis patients were not diagnosed by the doctors. Only 17% were diagnosed by the doctors while

79% by the NGO workers and 4% by the relatives. Seventy three percent (73%) patients had received allopathic treatments whereas, 27% patients had not yet taken any treatment.

Problems of Arsenicosis Patients

Table 3.2.6 Problem Faced by the Arsenicosis Patient and Services from Government and NGO.

Items		Frequency	Valid Percent	Cumulative Percent
Problems	Physical	157	78.5	78.5
	Both physical and social	43	21.5	100.0
	Total	200	100.0	
Feeling of isolation	no	153	76.5	76.5
	yes	47	23.5	100.0
	Total	200	100.0	
Getting Services	Don't get any Service	142	71%	71
	Get NGO Service	68	29%	100
	Total	200	100	

Table 3.2.6 shows that seventy nine percent (78.5%) of the patients experienced physical problems and 21.5% patients expressed both physical and social problems. Most of the patients (76.5%) didn't feel social isolation while 23.5% patients did. Seventy one percent (71%) of the patients (arsenicosis) expressed that they did not get any service or remidial care from the Government or NGO. However 29% of the participants confirmed casual NGO services.

3.3 PSYCHOLOGICAL IMPACT

To assess and compare the perceived stress and mental health of arsenic affected and non-affected participants a three-way analysis of variance was employed. Comparisons were also made between female and male participants as well as among three income groups (lower, lower-middle and middle). This study investigated both

perceived stress and mental health of arsenic victims according to arsenic toxicity, sex and income.

3.3.1 MENTAL HEALTH AS A FUNCTION OF GENDER, INCOME AND ARSENIC TOXICITY

To assess and compare the mental health of all participants mental health scores were analyzed by a 2×2×3 analysis of variance (Anova) with two levels of arsenic toxicity (affected, non-effected), two levels of gender (female, male) and three levels of income (low, lower-middle, middle). The results of this analysis are shown in Table 3.3.1.1

Table 3.3.1.1 Summary of 3–way Anova of Mental Health of Affected and Non-Affected Participants of Different Gender and Income Categories.

Source of Variance		Sum of Squares	Df	Mean sum Squares	F value	Sig.
Main Effects	(Combined)	81639.86	1	81639.86	2790.99	.00
	Arsenic toxicity	8664.14	1	8664.14	296.20	.00
	Sex	61.25	1	61.25	2.09	.14
	Income	117.24	2	58.62	2.00	.14
2 way interaction	Arsenic toxicity by Sex	49.28	1	49.28	1.69	.19
	Arsenic toxicity by income	39.18	2	19.59	.670	.51
	Sex by income	14.00	2	7.00	.239	.78
3 way interaction	Arsenic toxicity by sex by income	8.88	2	4.44	.152	.85
Residual		11173.96	382	29.251		
Total		222134.00	394			

It shows that the main effect of arsenic toxicity on mental health score was highly significant ($F = (1,382) = 296.2$, $p \approx .00$). This indicates that mental health varied significantly as a function of the participants' arsenic toxicity (arsenicosis). Inspection of the means presented in Table 3.3.2.2 reveals that arsenic affected participants had poorer mental health ($M = 14.87$) than that of the non-affected participants ($M = 29.28$).

The main effect of gender (F (1,382) = 2.09, p = <.14) and income (F (1,382) = 2.00, p<.14) were not significant. This indicates that mental health did not differ significantly as a function of participants' gender and income.

Interaction between arsenic toxicity and sex (F (1,382) = 1.69 P<.19), arsenic toxicity and income (F = .670 P < .51), sex and income, F (1,382) = .239, P<.78) and arsenic toxicity, sex and income (F = .152, P = <.85) were not significant.

3.3.2 PERCEIVED STRESS AS A FUNCTION OF GENDER, INCOME AND ARSENIC TOXICITY

To assess the effect of arsenic toxicity on perceived stress and whether perceived stress score varied as a function of arsenic toxicity, gender and income a 2×2×3 anova was performed with two categories of arsenic toxicity (affected, non-affected), two levels of sex (male, female) and three levels of income (low, lower middle, middle). The results of these analyses are presented in Table 3.3.2.1

Table 3.3.2.1 Summary of 3–way Anova of Perceived Stress of Arsenic Affected and Non-affected Participants of Different Gender and Different Income Categories.

Source of Variance		Sum of Squares	df	Mean Sum Squares	F value	Sig.
Main Effects	(Combined)	255023.22	1	255023.22	5617.96	.000
	Arsenic toxicity	20986.81	1	20986.81	462.32	.000
	Sex	722.50	1	722.50	15.92	.000
	Income	137.16	2	68.58	1.51	.222
2 way interaction	Arsenic toxicity by Sex	5.062	1	5.06	.11	.739
	Arsenic toxicity by income	169.62	2	84.81	1.87	.156
	Sex by income	138.98	2	69.49	1.53	.218
3 way interaction	Arsenic toxicity by sex by income	60.80	2	30.40	.670	.512
Residual		17340.57	382	45.39		
Total		672364.00	394			

It reveals significant main effects of arsenic toxicity on perceived stress (F (1,382) = 462.32, P ≈ .00). This indicates that perceived stress varied significantly as a function of the arsenic toxicity of the participants. Mean scores of the participants' perceived stress (presented in Table 3.3.2.2) indicate that arsenic affected participants were more stressed (M = 50.15) than that of the non-affected participants (M = 27.83). These findings explored the perceived stress level of the participants and compared their stress with non-affected participants.

The main effect of gender on perceived stress score was found highly significant (F (1,382) = 15.92, P ≈ .00). That means, perceived stress significantly varied as a function of sex. As can be seen in Table 3.3.2.2 females had higher stress (M = 41.21) than that of the male participants (M = 37.46). Although, effect of income on perceived stress score was not significant (F (1,382) = 1.51, P < .22).

Significant interactions were not found for perceived stress between arsenic toxicity and sex (F (1,382) = .11, P <. 739), arsenic toxicity and income (F (1,382) = 1.87, P < .156), sex and income (F (1,382) = 1.53, P < .218) as well as arsenic toxicity, sex and income (F (1,382) = .670, P < .512).

Table 3.3.2.2 Means and Standard Deviations of Major Variables.

Groups	Mental health		Perceived Stress	
	M	SD	M	SD
Affected	14.87	6.99	50.15	7.68
Non affected	29.28	3.09	27.83	6.22
Female	21.32	9.48	41.21	13.09
Male	22.50	8.63	37.46	13.03
Low income (500 – 3000 Tk.)	19.11	9.13	42.83	13.98
Lower middle income (3000 – 5000 Tk.)	21.90	8.96	39.58	12.64
Middle income (5000 Tk. and above)	26.80	7.18	31.10	11.18

Table 3.3.2.3 Comparison between Females and Males (Affected Only).

D.V.	Female	Male	t–test results
Perceived Stress	49.7426	44.3111	t (198) = 3.833 p ≈ .000
Mental health	15.2871	18.5778	t (198) = -2.997 p ≈ .003
Mastery	14.1089	15.6593	t (198) = -3.348 p ≈ .001
Optimism	5.9307	6.1259	t (198) = -1.041 p < .29

Preliminary analysis of the present data (Table 3.3.2.3) indicates that there were significant sex differences on perceived stress and mental health of the arsenic affected patients. Females, compared with males, reported significantly higher stress (M=49.74, t=3.833, p≈ .00), poorer mental health (M=15.29, t=2.997, p≈ .003) and lower mastery (M=14.11, t=-3.35, p= .001).

3.3.3 MENTAL HEALTH, PERCEIVED STRESS AND GENDER

The gender differences in mental health and perceived stress were also examined by two sets of Anova (presented in Table 3.3.1.1 and 3.3.2.1). The results showed that the main effect of sex on mental health was non-significant (F (1,382) = 2.09 P < .14), whereas the main effect of sex on perceived stress was highly significant (F (1,382) = 15.92, p ≈ .00), indicating that perceived stress varied as a function of the sex. Mean perceived stress scores (Table 3.3.2.2) showed that females were more stressed (M = 41.21) than their male counterparts (M = 37.46).

In order to have a more specific look on gender differences on mental health and perceived stress of the arsenic affected participants (arsenicosis patients) t-tests were employed. Table 3.3.2.3 shows that females and males differed significantly on mental health (t (198) = -2.997, P ≈ .003) and perceived stress (t, 198 = 3.833, P ≈ .00). Arsenic affected females were poorer in mental health (M = 15.29) than their male counterparts (M = 18.58). Similarly arsenic affected females reported high stress

(M = 49.74) than that of the affected male participants (M = 44.31). These results are indicative of gender differences in mental health and perceived stress in case of affected participants.

With regard to personality characteristics–mastery and optimism (two important determinants of stress and mental health) gender difference also existed. Results indicated that females and males were significantly different in mastery (t (198) = - 3.348, P ≈ .001). Affected males showed high mastery (M = 15.66) than their female counterparts (M = 14.11). However gender difference was not found on optimism (t (198) = - 1.041, P < .29) (presented in Table 3.3.2.3).

3.3.4 CORRELATES OF PERCEIVED STRESS AND MENTAL HEALTH

To examine the relationship among the psychological (mastery and optimism) and socio-environmental factors (income, age, duration of arsenicosis) with mental health and perceived stress, Pearson's product moment correlation was computed.

This analysis examined whether mental health and perceived stress were related to psychological and socio- environmental variables (Table 3.3.4.1).

Table-3.3.4.1 Correlation Matrix of Variables.

Variables	Age	Income	Duration	Mastery	Optimism	Perceived Stress	Mental Health
Age	1.000						
Income	-.004	1.000					
Duration of Arsenichosis	.177**	-.189**	1.000				
Mastery	.017	.307**	-.432	1.000			
Optimism	-.061	.139**	-.297**	.372**	1.000		
Perceived stress	.197**	-.350**	.619**	-.621**	-.455**	1.000	
Mental Health	-.125*	.329**	-.585**	.679**	.469**	-.819**	1.000

Note: ** ≅. 00, * p< .01

Table 3.3.4.1 indicates that age, income, duration of arsenicosis, mastery, optimism and mental health were significantly correlated with the perceived stress. Perceived

stress had the largest negative correlation (-.819, P ≈ .00) with mental health followed by mastery (-.621, P≈ .00), optimism (-.455, P≈ .00) and income (-.350, P≈ .00). On the other hand, age (.197, p≈ .00) and duration of arsenicosis (.619, p≈ .00) were positively correlated with perceived stress. That means, when mental health condition, mastery, optimism and income increased perceived stress decreased or vice–versa, whereas when age and duration of arsenicosis increased perceived stress also increased or vice–versa.

Table-3.3.4.1 also indicates that age, income, duration of arsenicosis, perceived stress, mastery and optimism variables were significantly correlated with another dependent variable, viz. mental health. Age, duration of arsenicosis, perceived stress was negatively correlated with the mental health, while income, mastery and optimism were positively correlated with the latter. Mental health had the largest negative correlation with (-.819, P≈ .00) perceived stress followed by duration of arsenicosis (-.585, p≈ .00) and age (-.125, P<0.1). On the other hand, mastery had the positive correlation with the mental health (.679, P≈ .00), followed by optimism (.469, P≈ .00) and income (.329, P≈ .00). That means, when mastery, optimism and income increased mental health condition increased or vice–versa, whereas when perceived stress, age and duration of arsenicosis increased mental health condition decreased or vice–versa.

Table-3.3.4.1 also shows that the intercorrelation among the independent variables (age, income, duration of arsenicosis, mastery and optimism). Age was not significantly correlated with income, whereas age and duration of arsenicosis were positively correlated (.177, p≈ .00). Duration of arsenicosis was negatively correlated with income (-.189, p≈ .00) and optimism (-.297, p≈ .00). Income was positively correlated with mastery and optimism at significant levels (.307, P≈ .00; .139, P ≈

.00). That means, when income increased mastery and optimism also increased or vice-versa. Mastery was positively correlated with optimism (.372, P≈ .00) that means, when optimism increased mastery increased or vice–versa.

3.3.5 PREDICTORS OF MENTAL HEALTH

To study psychological and socio-environmental factors as the predictors of mental health and perceived stress regression analysis was used. Personality factors (control over the situation or mastery and optimism level), socio-demographic factors (age and income) and environmental or disease related factors (arsenic toxicity and duration of arsenicosis) were considered as the predictors of perceived stress and mental health. Personality resources (mastery, optimism) of the participants were measured using Bengali adapted version of Mastery scale and Life Orientation Test. Socio-environmental information was collected through questionnaire of demographic characteristics and arsenic related information. Regression analysis was used to examine the variables predicting participants' mental health. Findings of the socio-environmental and personality resources that predict mental health are presented in Table 3.3.5.1 and 3.3.5.2.

Table-3.3.5.1 Regression Analysis Predicting Mental Health on Age, Income, Arsenic toxicity and Duration of Arsenicosis.

$R^2 = .677$.

Predictor variables	Coefficients	Standard error	Standard Beta (Bs)	t	Sig	Sr^2
Constant	70.271	2.031		34.592	.000	
Arsenic toxicity	-20.068	.992	-.762	-20.236	.000	.58604
Age	- .0346	.028	-.034	- 1.251	.212	.00369
Income	.00102	.000	.107	3.866	.003	.032585
Duration of Arsenicosis	.287	.155	.067	1.848	.065	.054741

Dependent variable= Mental health

Regression analysis (Table 3.3.5.1) using age, income, arsenic toxicity and duration of arsenicosis as predictors of mental health revealed that arsenic toxicity ((P≈ .00), income (p< .003) and duration of arsenicosis (p<.065) were significant predictors of mental health, but age was not (p<.212). Of these, arsenic toxicity had negative effect on mental health. Sixty eight percent (67.7%) of the mental health was explained by these predictors.

For this data it was observed that the independent variables jointly explained 67.7% of the mental health condition. Next, a stepwise regression procedure (Tabachnick and Fidell, 1989) was used to obtain the individual contribution of any particular variable in presence of other variables. Table 3.3.5.1 shows that arsenic toxicity individually explained 58.60% out of 67.7% of mental health explained by all 4 independent variables. Five percent (5.47 %) explained by duration of arsenicosis, 3.25% was explained by income with a little (.36%) by age. Thus arsenic toxicity was the strongest predictor of mental health.

Table-3.3.5.2 Results of Regression Analysis Predicting Mental Health on Perceived Stress, Mastery and Optimism.

$R^2 = .710$

Predictor variables	Coefficients	Standard error	Standard Beta (Bs)	t	Sig	Sr^2
Constant	23.800	2.508		9.490	.000	
Perceived Stress	-.421	.024	-.619	17.260	.000	.500821
Mastery	.651	0.88	.255	7.410	.000	.16764
Optimism	.628	.192	.099	3.266	.001	.041676

Dependent variable: Mental Health

Regression analysis employing perceived stress, mastery and optimism as predictors of mental health (Table 3.3.5.2), revealed that 71.0% of the mental health condition

was explained by the explanatory variables (perceived stress, mastery and optimism) which was highly significant (P≈ .00). Perceived stress had negative effect on mental health (P≈ .00), while mastery and optimism had positive effect (P≈ .00, P< .01).

From stepwise regression analysis it was obtained that perceived stress explained 50.08% out of total 71.0% of mental health of the participants explained by all 3 personality variables. Mastery explained 16.76% and optimism 4.17% of the mental health condition. That means, perceived stress was the strongest predictor of mental health.

3.3.6 PREDICTORS OF PERCEIVED STRESS

In this section regression analysis was conducted to predict perceived stress. Findings of the regression analysis are presented in Tables 3.3.6.1 and 3.3.6.2.

Table-3.3.6.1 Results of Regression Analysis Predicting Stress on Age, Income, Arsenic toxicity and Duration of Arsenicosis.

$R^2 = .739$

Predictor variables	Coefficients	Standard error	Standard Beta (Bs)	t	Sig	Sr^2
Constant	69.567	2.026		34.334	.000	
Arsenic toxicity	20.375	.989	.774	20.610	.000	.642366
Age	0.02965	.028	.029	1.064	.288	.006086
Income	-0.00057	.000	-.085	-3.128	.002	.036487
Duration of Arsenicosis	.327	.157	.076	2.077	.038	.054069

Dependent variable: Perceived Stress.

To explore the effect of the age, income, arsenic toxicity and duration of arsenicosis on the perceived stress a linear regression model was employed. When the model was fitted a value of R^2 as .739 (≈ .000) was obtained. This indicated that the fit was good as 73.90% of the perceived stress, which was explained by the 4 explanatory variables

(age, income, arsenic toxicity and duration of arsenicosis) and that was highly significant. Arsenic toxicity, income and duration of arsenicosis had significant effect on the perceived stress whereas age had none. Income had negative effect on perceived stress score whereas arsenic toxicity, age and duration of arsenicosis, had the positive effect on the perceived stress. Among these arsenic toxicity was highly significant (P≈ .00), the effect of income and duration of arsenicosis were also significant (P< .02, P< .03), whereas the effect of age was not significant (P < .288).

Stepwise regression analysis showed that arsenic toxicity individually explained 64.24% out of 73.90% perceived stress explained by all 4 independent variables. Four percent (3.65%) of perceived stress was explained by income, 5.41% by duration of arsenicosis and only .61% by age. Thus, arsenic toxicity was the strongest predictor of perceived stress.

Table-3.3.6.2 Results of Regression Analysis Predicting Perceived Stress on Mastery, Optimism and Mental Health.

$R^2 = .681$

Predictor variables	Coefficients	Standard error	Standard Beta (Bs)	t	Sig	Sr^2
Constant	73.444	2.236		32.844	.000	
Mental Health	-1.028	.060	-.704	-17.214	.000	.575168
Mastery	-.417	145	-.112	-2.871	.004	.068656
Optimism	-.770	.301	-.083	-2.554	.011	.037350

Dependent variable: Perceived Stress.

Regression analysis employing mastery, optimism and mental heath as predictors of perceived stress (Table 3.3.6.2) revealed that 68.1% of the perceived stress was explained by the explanatory variables (mental health, mastery and optimism) and that was highly significant (P≈ .00). Mental health, mastery and optimism had negative

effect on perceived stress. Mental health had highly significant negative effect (P≈. 00) on perceived stress followed by mastery (P< .004) and optimism (p< .011).

Stepwise regression analysis showed that mental health explained 57.52% out of 68.1% of perceived stress explained by all 3 personality variables. Mastery explained 6.87% of the perceived stress and optimism only 3.74%. It revealed that mental health was the best predictor of perceived stress.

3.4 COPING WITH STRESS

3.4.1 COPING STRATEGIES BETWEEN AFFECTED AND NON-AFFECTED PARTICIPANTS

To assess and compare the coping strategies of arsenic affected and non-affected participants multivariate anova (Manova) was employed. Comparison of overall coping strategies as well as different strategies (confrontive coping, distancing, self-control, accepting responsibility, seeking social support, escape avoidance, planful problem solving and positive reappraisal) were done. Mean of eight ways of coping was determined. A comparison was also made between female and male participants using t - test analysis.

Ways of coping used by the participants in stressful situation were measured by the Bengali version of ways of coping questionnaires. Manova was employed to assess and compare the eight ways of coping between arsenic affected and non-affected participants. These results are presented in Table 3.4.1.1. Gender differences on 8 ways of coping are presented in table 3.4.1.2.

Table-3.4.1.1 Multivariate Anova.

	CC	DIS	SC	AR	SSS	EA	PPS	PR
Univariate	1	2	3	4	5	6	7	8
M Affected	1.7091	1.8344	2.0711	2.0147	2.9241	1.5745	2.0719	2.5763
M non-affected	1.9787	1.9916	2.2025	2.2258	2.9488	1.5362	2.3183	2.5870
F	59.352	26.446	23.366	41.078	.255	1.471	59.043	.123
P	.000	.000	.000	.000	.614	.226	.000	.726

Multivariate F (8,392) = 16.285, P ≈ .00

Table 3.4.1.1 shows that multivariate F statistic was significant (F (8,392) = 16.29, p ≈ .00) indicating that there was a difference in arsenic affected and non-affected participants in their coping strategies. It was found that affected participants on average used less confrontive coping (1.71), distancing (1.83), self-control (2.07), accepting responsibility (2.01) and planful problem solving (2.07) coping compared to non-affected participants (Cc=1.98, Dis=1.99, Sc=2.20, Ar=2.22, PPs=2.32). However, significant differences were not found on seeking social support, escape avoidance and positive reappraisal coping.

From Table 3.4.1.1 it was evident that most of the coping strategies were used more by the non-affected respondents (CC, DIS, SC, AR, PPS) than the arsenic affected participants.

Table-3.4.1.2 Mean Coping Strategies and t-test Results According to Sex.

	CC	DIS	SC	AR	SSS	EA	PPS	PR
Female	1.7690	1.9052	2.1152	2.0530	2.9537	1.6048	2.1292	2.6383
Male	1.8953	1.9172	2.1528	2.1727	2.921	1.5152	2.2459	2.5347
t	-3.305	-.380	-1.341	-3.495	.647	2.85	-3.42	3.42
P	.001	.70	.18	.001	.518	.005	.001	.001

Table-3.4.1.2 indicates that female participants used more positive reappraisal (2.64), and escape avoidance (1.60) than their male counterparts (Pr=2.53, Ea=1.52). On the other hand male participants used more confrontive coping (1.90), accepting responsibility (2.17) and planful problem solving (2.25) than their female counterparts (Cc=1.77; Ar = 2.05; Pps=2.13).

3.4.2 COPING STRATEGIES AS A FUNCTION OF ARSENIC TOXICITY AND GENDER

To see whether coping strategies varied with arsenic toxicity and sex, a 2 way Manova was performed. The 2×2 Manoa examined whether there were differences on eight coping strategies by arsenic toxicity and sex. Arsenic toxicity was divided into two groups – affected and non-affected and gender was divided into male and female. Findings of this Manova are presented in Table 3.4.2.1

Table 3.4.2.1 Summary of 2 way Anova of Eight Coping of Affected and Non-affected participants of Different Sex.

Source of variation	DV	SS	Df	MS	F	Sig
Arsenic toxicity	Cc	7.118	1	7.118	57.611	.000
	Dis	2.564	1	2.564	27.920	.000
	Sc	1.730	1	1.730	23.784	.000
	Ar	4.159	1	4.159	40.043	.000
	Sss	0.08896	1	0.08896	.377	.540
	Ea	0.08257	1	0.08257	.869	.352
	Pps	5.392	1	5.392	65.003	.000
	Pr	0.06217	1	0.06217	.726	.395
Sex	Cc	1.465	1	1.465	11.855	.001
	Dis	0.06940	1	0.06940	.076	.784
	Sc	.119	1	.119	1.639	.201
	Ar	1.328	1	1.328	12.791	.000
	Sss	.107	1	.107	.454	.501
	Ea	.798	1	.798	8.395	.004
	Pps	1.277	1	1.277	13.259	.000
	Pr	1.101	1	1.101	12.863	.000
Arsenic toxicity×Sex	Cc	.226	1	.226	1.828	.177
	Dis	.266	1	.266	2.894	0.90
	Sc	0.05639	1	0.05639	.775	.379
	Ar	0.07574	1	0.07574	.729	.394
	Sss	.254	1	.254	1.076	.300
	Ea	.615	1	.615	6.468	.011
	Pps	.918	1	.918	9.540	.002
	Pr	1.692	1	1.692	19.765	.000
Error	Cc	48.185	390	.124		
	Dis	35.819	390	0.09184		
	Sc	28.361	390	0.07272		
	Ar	40.505	390	.104		
	Sss	92.061	390	.236		
	Ea	37.079	390	0.09507		
	Pps	37.547	390	0.09627		
	Pr	33.391	390	0.08562		

The findings of Manova showed that the main effect of arsenic toxicity was significant for confrontive coping (F (8,390) = 57.611, p ≈ .00) distancing (F (8,390) = 27.920, p ≈ .00), self-control (F (8,390) = 23.784, p ≈ .00), accepting responsibility (F (8,390) = 40.043, p ≈ .00) and planful problem solving (F (8,390) = 65.003, p ≈ .00), which meant that these 5 coping strategies varied as a function of arsenic toxicity. The main effect of arsenic toxicity was not significant for seeking social support, escape avoidance and positive reappraisal. The main effect of sex for confrontive coping (F = 11.855, p ≈ .001) accepting responsibility (F = 12.791, p ≈ .00), escape avoidance (F = 8.395, p ≈ .004), planful problem solving (F = 13.259, p ≈.00) and positive reappraisal (F = 12.863, p ≈.00) were also significant, whereas, the main effect of sex was not significant for distancing (F = .076, p < .784), self-control (F = 1.639, p <.201) and seeking social support (F = .454, p <.501). That means 5 coping strategies varied as a function of sex.

Table 3.4.2.2 Means and Standard deviations of 8 ways of coping.

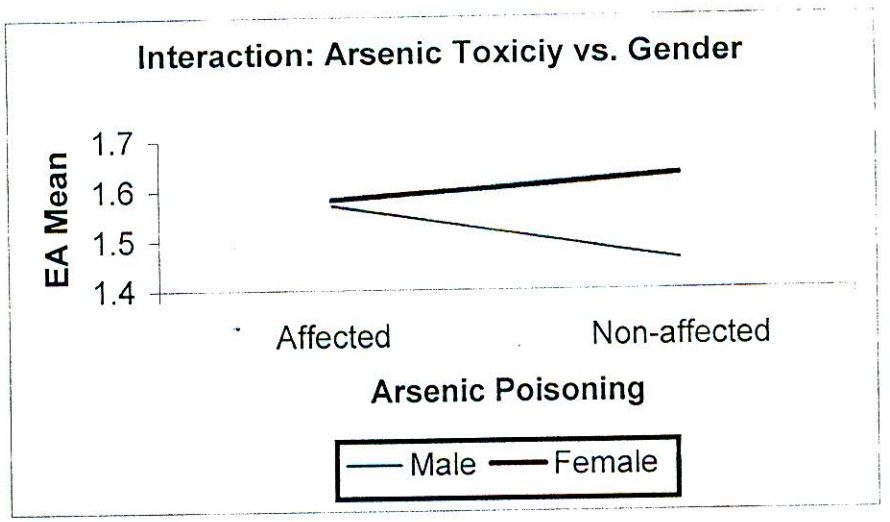
Ways of Coping	Sex	Affected		Non-affected	
		M	SD	M	SD
CC	Female	1.66	.34	1.88	.34
	Male	1.74	.33	2.05	.39
DIS	Female	1.80	.29	2.01	.31
	Male	1.86	.27	1.97	.32
SC	Female	2.04	.28	2.20	.27
	Male	2.10	.24	2.21	.28
AR	Female	1.97	.34	2.15	.36
	Male	2.06	.33	2.29	.25
SSS	Female	2.92	.42	2.99	.50
	Male	2.93	.42	2.91	.58
EA	Female	1.58	.34	1.63	.30
	Male	1.57	.31	1.46	.27
PPS	Female	2.06	.34	2.20	.30
	Male	2.08	.31	2.41	.30
PR	Female	2.56	.27	2.71	.27
	Male	2.59	.26	2.48	.35

Table 3.4.2.1 also indicates that a 2 way interaction effect involving arsenic toxicity and sex was found for escape avoidance (F 1,390 = 6.468, P<.011), planful problem solving (F 1,390 = 9.540, P < .002) and positive reappraisal (F 1,390 = 19.765, P < .00). These interactions are graphically presented in Fig. 3.1. It shows that the difference between affected and non-affected males for Pps was maximum, whereas the difference for Ea and Pr were narrower. Inspection of means presented in Table 3.4.2.2 shows that affected males used less planful problem solving (M = 2.08) and more escape avoidance (M = 1.57) and positive reappraisal (M = 2.59) coping than non-affected males (Pps, M = 2.41; Ea, M = 1.46; Pr, M = 2.48). That means, use of planful problem solving was lower and use of positive reappraisal and escape avoidance were higher for males when arsenic toxicity was involved. The pattern of results depicted in Fig. 3.1. for arsenic affected and non-affected females show that the difference was minimum in case of escape avoidance, whereas the differences for Pps and Pr were wider. It was found from Table 3.4.2.2 that affected females used less planful problem solving (M = 2.06), escape avoidance (M = 1.58) and positive reappraisal (M = 2.56) than their non-affected counterparts (Pps, M = 2.20; Ea, M = 1.63; Pr, M = 2.71). Use of these 3 coping strategies was lower for females when arsenic toxicity was involved.

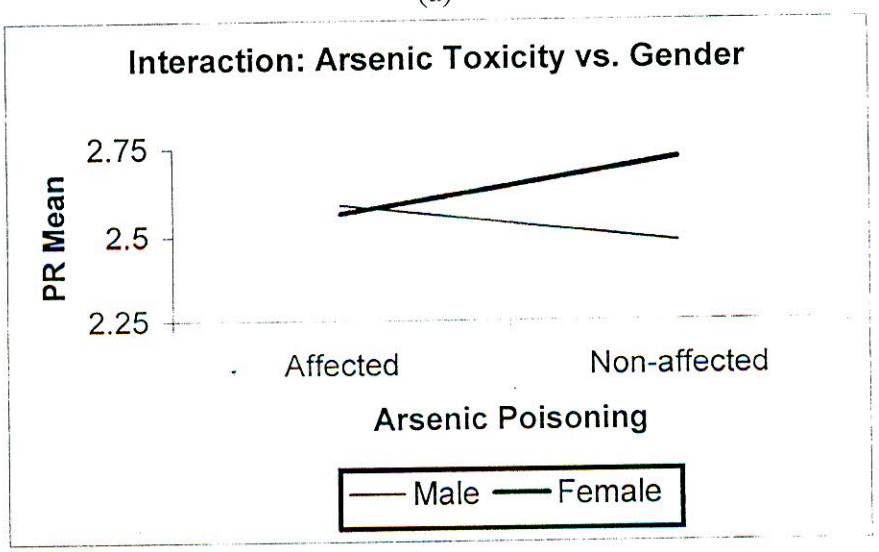
3.5 SUMMARY OF FINDINGS

Situation of Arsenic Victims

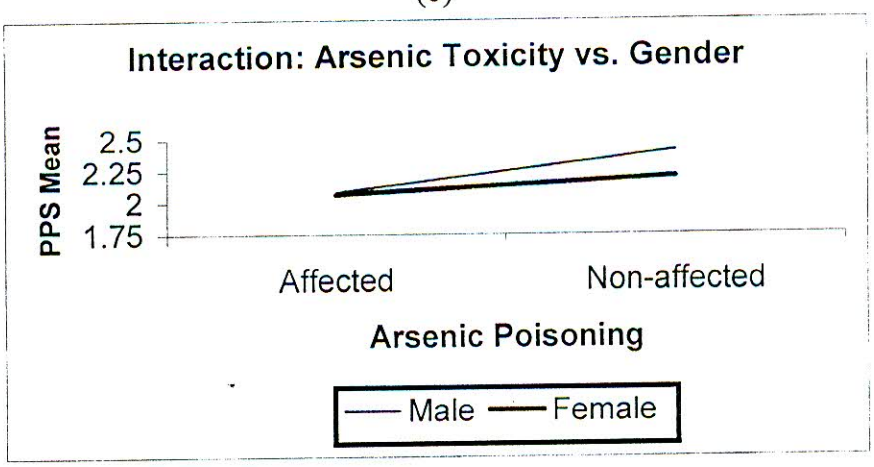
Most of the arsenic victims had been using tube well as their main source of drinking water for 3 to 6 and above years. They perceived arsenic pollution in water as their main problem. It is evident that arsenic victims had been aware of arsenic for only 2 to 3 years mainly through NGO workers. In the study area 1 to 2 members of half (56%) of the affected families and 3 to 4 members of nearly 27.5% families had been



(a)



(b)



(c)

Fig. 3.1 Interaction of Arsenic Toxicity vs. Gender.

suffering from arsenicosis. Forty six percent (46%) of the patients had already developed late stage melanosis or cancer, 42.5% developed melanosis or hypopigmentation and a few of them developed keratosis (11.5%). Results also showed that most of the affected people (79%) were diagnosed by non-medical personnel (NGO health workers); only 17% patients were detected by the doctors. Most of them used allopathic treatment with about 27% did not take any medication. Arsenic victims mainly faced physical problems followed by social problems. It was found that the victims didn't get any help from government and non-government organization.

Psychological Impact

1. Assessment and comparison of mental health and perceived stress between arsenic affected and non-affected participants.

(a) Arsenic affected participants were significantly different from non-affected participants on mental health. Arsenic affected participants had poorer mental health than non-affected participants. However, significant interactions were not found for arsenic toxicity × sex, arsenic toxicity × income, sex × income and arsenic toxicity × sex × income.

(b) Arsenic affected participants were significantly different from non-affected participants on perceived stress. Affected participants were more stressed than non-affected participants. Significant interactions were not found for arsenic toxicity × sex, arsenic toxicity × income, sex × income and arsenic toxicity × sex × income.

2. Gender difference on mental health and perceived stress

(a) Male arsenic affected participants were significantly different from female participants on perceived stress but not in mental health. Females were

more stressed than their male counterparts. Affected females were significantly different from non-affected females both in mental health and perceived stress. Affected females had poorer mental health and higher stress than their male counterparts.

(b) Mental health and perceived stress were not significantly different among low income, lower-middle income and middle-income groups.

3. Correlates of mental health and perceived stress

(a) Age, duration of arsenicosis and perceived stress were negatively correlated with mental health. That means, increase in age, duration of arsenicosis and stress deteriorated mental health or vice-versa. Income, mastery and optimism were positively correlated with mental health. As income increased mental health improved or vice-versa. High mastery and high optimism also improved mental health of the victims.

(b) Mental health, mastery, optimism and income were negatively correlated with perceived stress, but age and duration of arsenicosis were positively correlated with the latter. That means, perception of high stress deteriorated the mental health and decreased mastery and optimism. Similarly higher income decreased perceived stress. On the other hand, increase in age and duration of arsenicosis increased stress level of the victims.

(c) Intercorrelations among the socio-environmental and psychological variables showed that income was positively correlated with mastery and optimism, i.e. increase in income increased mastery and optimism; whereas, income and optimism were negatively correlated with duration of arsenicosis. That means, prolonged duration of arsenicosis decreased the

income and the optimism of the victims. Mastery and optimism were positively correlated, i.e. when mastery increased optimism also increased or vice-versa.

4) Predictors of mental health

(a) Mental health was explained by socio-environmental (age, income, arsenic toxicity and duration of arsenicosis) and psychological (perceived stress, mastery and optimism) factors. Socio-environmental factors explained 67.7% of the mental health. Stepwise regression further revealed that arsenic toxicity individually explained 58.60% of mental health condition. More than five percent (5.47%) was explained by duration of arsenicosis and 3.25% by income. Seventy one percent (71.0%) of the mental health was explained by the psychological factors (perceived stress, mastery and optimism.). Perceived stress had negative effect on mental health, while mastery and optimism had positive effect. Stepwise regression showed that 50.08% of mental health explained by perceived stress, 16.76% by mastery and 4.17% by optimism.

5. Predictors of perceived stress

(a) Perceived stress was also explained by socio-environmental and psychological factors. Socio-environmental factors were explained 73.9% of the perceived stress. From stepwise regression it was found that arsenic toxicity individually contributed 64.24% of perceived stress. Arsenic toxicity, income and duration of arsenicosis had significant effect on perceived stress. Income had negative effect on stress, whereas arsenic toxicity and duration of arsenicosis had positive affect. More than sixty eight percent (68.1%) perceived stress was explained by the psychological

factors. Mental health, mastery and optimism had negative effect on perceived stress. Stepwise regression indicated that 57.52% of perceived stress was explained by mental health.

6. Coping strategies

(a) Arsenic affected participants differed significantly from non-affected participants in using overall coping strategies. On an average, affected participants used less confrontive coping, distancing, self-control, accepting responsibility and planful problems solving ways of coping compared to non-affect participants. However, they were not different in using seeking social support, escape avoidance and positive reappraisal ways of coping.

(b) Mean scores of the 8 ways of coping revealed that affected participants used less coping strategies than the non-affected participants.

(c) Female participants used more positive reappraisal, accepting responsibility and escape avoidance than their male counterparts, whereas male participants used more confrontive coping, planful problem solving and accepting responsibility than their female counterparts. However they were not significantly different in using distancing, self-control and seeking social support.

(d) Two-by-two (2×2) multivariate anova showed that confrontive coping, distancing, self-control, accepting responsibility and planful problem solving – these 5 ways of coping varied as a function of arsenic toxicity. Arsenic affected patients used these ways of coping less than non-affected participants. It was also found that confrontive coping, accepting responsibility, escape avoidance, planful problems solving and positive

reappraisal also varied with sex. Females used more escape avoidance and positive reappraisal than males. They used less confrontive coping, accepting responsibility and planful problem solving than males.

Interaction effect involving arsenic toxicity and sex was found for escape avoidance, planful problem solving and positive reappraisal coping. Use of escape avoidance, positive reappraisal and planful problem solving were lower for females when arsenic toxicity involved. Use of planful problem solving was lower and escape avoidance and positive reappraisal were higher for males when arsenic toxicity involved.

3.6 STRESS-COPING-MENTAL HEALTH MODEL FOR ARSENIC VICTIMS

On the basis of the findings of the present study a stress-coping-mental health model is formulated (Fig. 3.2). This model consists of three parts:

1) Panel I describes the environmental stressor. In this study environmental stressor is the stressful events of arsenic toxicity (arsenicosis disease). This model starts from this point. It will then go through panel II (the moderators) to generate panel III (stress-coping-mental health), which is the topic of this study.

2) Panel II describes the moderators of stressor – the disease related events (i.e. duration of arsenicosis), socio-demographic factors (i.e. age, income and gender) (disease related and socio-demographic factors are collectively termed as socio-environmental factors) and psychological factors (i.e. mastery and optimism) act as moderators of stress and mental health of the arsenic victims. As arsenic victims start showing physical manifestations in the form of arsenicosis symptoms, duration of the disease, income, gender as well as their ability of mastery and level of dispositional optimism impact on their stress appraisal-coping and mental health. Increase in age and prolonged duration of arsenicosis increases perception of stress and deteriorates

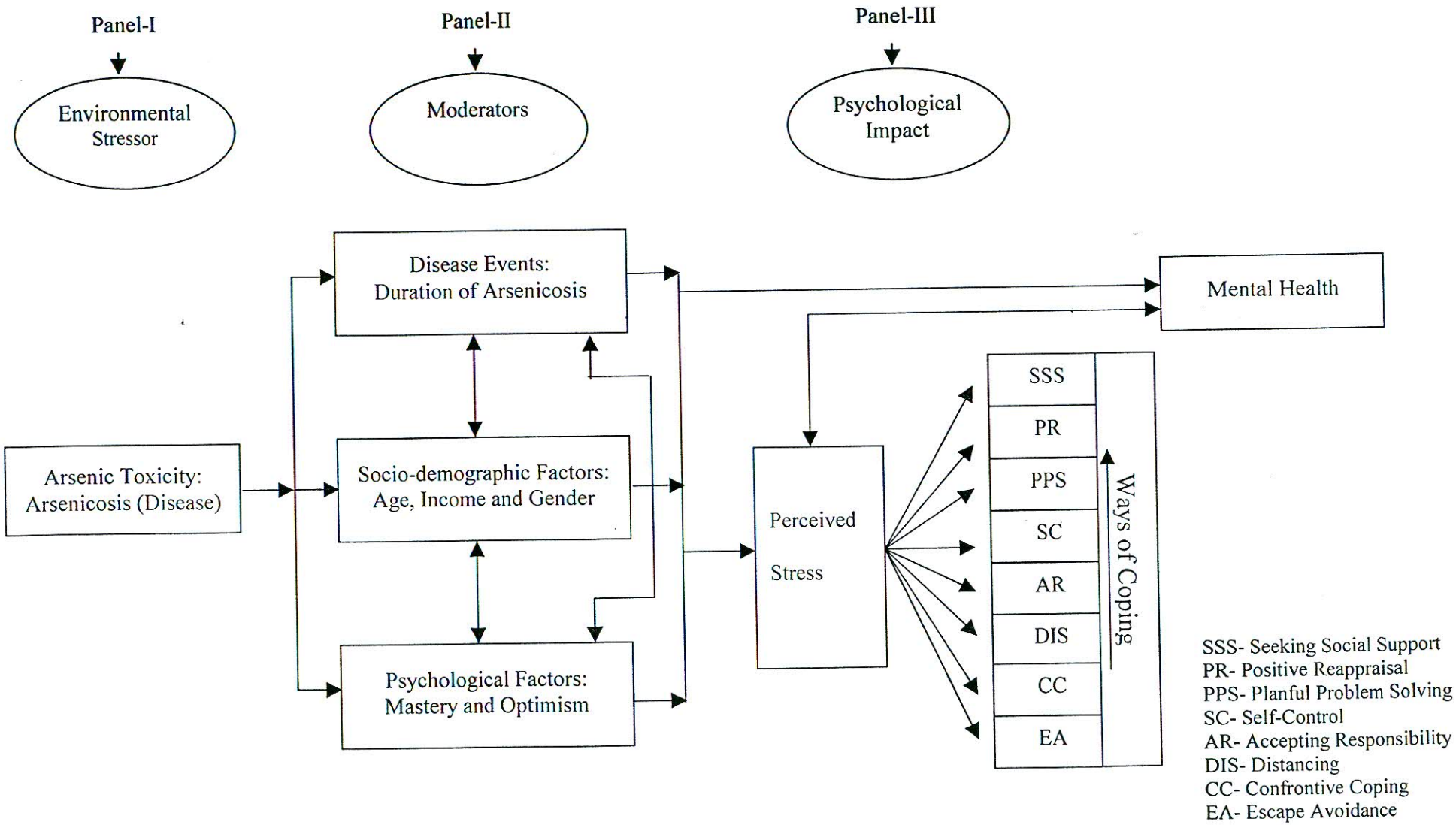


Fig. 3.2 Stress-Coping-Mental Health Model for Arsenic Victims

mental health. However experience of elevated stress itself deteriorates mental health. High mastery, high optimism and high income improve mental health of the victims.

3) Panel III describes the resulting impact of arsenic toxicity on the victims. Arsenic toxicity produces stress on the victims as well as deteriorates their mental health or psychological well-being. To encounter with these stressful events of arsenicosis arsenic affected people have to use different coping strategies. Out of eight coping strategies shown in the model arsenic victims use seeking social support, positive reappraisal, planful problem solving, self-control, accepting responsibility, distancing, confrontive coping and escape avoidance respectively (depicted in ascending sequence). The moderators of panel II act as predictors of mental health and perceived stress. Socio-environmental factors (disease related and socio-demographic) and psychological factors explain mental health in which arsenic toxicity and perceived stress predict more of the mental health condition. Socio environmental factors mainly act as predictors of perceived stress; psychological factors also explain the perceived stress level but it is lesser than that of the socio-environmental factors. Arsenic toxicity acts as most important moderator of perceived stress also. It predicts maximum level of perceived stress and mental health condition; it explains perceived stress level to the countable amount. A combination of all these socio-environmental factors as well as the psychological factors act as significant predictors of the perceived stress and mental health. These contribute in shaping perceived stress, coping and mental health.

Thus, stress producing multidirectional path of socio-environmental and psychological factors not only impact on stress appraisal and coping process rather it affect on the mental health of the victims as well.

CHAPTER 4

DISCUSSION

The primary purpose of this research was to investigate the psychological impact of arsenicosis. This study explored perceived stress level, coping strategies and mental health condition of arsenic victims, and finally formulated a stress–coping–mental health model of the arsenicosis patient. The detailed condition of the arsenic victims in terms of source of water, history of arsenic poisoning, symptoms, duration of arsenicosis, type of medication used, social isolation, government and non government assistance etc. was ascertained.

The study revealed that most of the participants were from middle and lower income groups of young adult age (15-29 yrs). They all perceived tubewell water as the cause of arsenicosis. Most of the arsenic affected participants had been using present tubewell water for 3 to 6 years. Literature on arsenic toxicity showed that low level arsenic poisoning has a typical latency period of about 10 years from the first exposure to the development of skin lesions, particularly keratosis, and more than 20 years for skin cancer (Smith et. al. 2000). Arsenicosis patients of Bangladesh had been using arsenic contaminated water for more than 10 years, which meant that many of the inhabitants were still in latency period of manifestation of arsenicosis.

It is reported by Lazarus and Folkman (1984) that unexpected or novel experience creates stress on individual. The study showed that most of the arsenic affected people had been aware of arsenic for only 2 to 3 years some, even less i.e. 1 to 2 years. Before Knowing the presence of arsenic in drinking water they had already been suffering from arsenic toxicity. Therefore, the sudden knowledge about arsenic toxicity and arsenicosis wàs really a novel or unexpected experience for them that may generate stress on them. Results further reported that, nearly in every family 1 to

2 members had been affected, more alarmingly some families had even exceeded this number.

According to Leventhal's (1983) theory, threat valance (inherent stressfulness of a situation) of chronic disease is responsible for producing different negative emotions and reassessment about the self in relation to its contextual features. The findings of this study reported that a substantial number of the arsenicosis patients (46%) were getting third stage of arsenicosis i.e. they had got late stage melanosis or cancer with nearly equal number patients (42.5%) suffering from initial stage of arsenicosis (Hypopigmentation). Initial and end stage of any illness give rise to more stress on the patients. Persisting illness exposure makes patients psychologically and physically down (Selye, 1956). Cassileth et. al. (1984) reported that patients in the initial and end stage of disease expressed higher level of stress and lower level of well-being than comparable healthy subjects. Therefore, arsenicosis patients may be in a threatened position of stress encounter. Medical interventions were not adequate for arsenicosis patients. Arsenicosis were mostly detected by the non-medical NGO workers rather than practicing doctors and hence the diagnosis of arsenicosis were subjected to uncertainties. Diagnostic uncertainties threaten the sense of security and future predictability (Musulin et. al. 1994). Moreover, they did not get any services for remedial or preventive care. They faced physical problems; a few of them felt social problems and social isolation too. These feelings led them to avoid social interaction that may have negatively impacted on the psychological well-being of the patients. Consistent with the present result negative social impacts of illness was also shown in Fitchen (1988), Wright (1988).

A major finding of this study was that arsenic affected participants differed from non-affected participants in perceived stress. Affected patients had high perceived stress

level than the non-affected participants. This finding supported the study of Cohen and Williamson (1988). They found that the poorer the respondents felt about their health the more they perceived stress. There was an association between illness and elevated stress. Both frequency of physical illness and symptoms of physical illness were positively related to reports of stress.

No significant interactions were found for perceived stress for arsenic toxicity×gender, arsenic toxicity × income, gender × income, arsenic toxicity × gender × income. This indicated that the effect of arsenic toxicity on perceived stress did not vary significantly as a function of gender and income. In other words, all arsenic affected people, rich or poor, male or female, were equally stressed.

The present study was conducted in light of Lazarus and Folkman's Transactional Theory of Stress. Decades of research show that individuals' cognitive interpretation styles (Davis et. al. 1995; Peterson and Seligman, 1987; Taylor, 1983), coping patterns (Folkman et. al. 1986; Lazarus and Folkman, 1984a; Zeidner and Hammer, 1992) and personality factors (Bolger, 1990; Kobasa et. al. 1982; Mullen and Suls, 1982) can mediate the ways in which the stressful life events will be experienced. Lazarus and Folkman's theoretical model emphasizes that people's perceived stress is determined by both person and situational factors and the selection of coping strategies are determined not only by stable characteristics of the individual but also by situational characteristics. Psychological and socio-environmental factors came together to influence the stress and mental health of the arsenic victims. Personality factors such as, control, optimism, etc. and socio-demographical and disease related or environmental factors such as, age, income, gender, arsenic toxicity, duration of arsenicosis had impact on the magnitude of stress, selection of coping strategies and

mental health of the participants. Thus, the present study considered personality (mastery and optimism) and socio-environmental factors (socio-demographic and disease related factors) to fully understand the stress, coping and mental health of the participants. This study was an attempt to know how these psychological and socio-environmental factors were associated with mental health and perceived stress. It was observed that mental health, mastery, optimism and income were negatively correlated with perceived stress, whereas age and prolonged duration of arsenicosis were positively correlated with the latter. That means, high stress deteriorated the mental health, mastery and optimism or vice-versa. But increase in age and prolonged sufferings from arsenicosis gave rise to elevated stress in the victims.

The patient with better mental health, high optimism and high mastery perceived less stress. At the same time, high income also decreased the magnitude of perceived stress. From these findings it is clear that people who have access to resources to achieve their ends are more likely to believe they are capable of changing their environment and actively overcome the stressful events of arsenicosis. It is also supported by the study of Cohen and Willamson (1988). People, having more control and optimism, as well as better mental health, could manage the magnitude of stressfulness even when exposed to threatening life experience of arsenicosis and perceived higher stress. The inability to control or avoid danger can be more stressful than danger itself. The development of learned helplessness apparently depends on how people interpret their lack of control (Abramson et. al. 1978). People are in danger of becoming helpless only when they see their lack of control due to causes that are permanent (so that no change can be expected), internal (the result of deficiencies within themselves), and global (applicable to many years of their lives). Contextual feature of arsenicosis had similar impact. It was also evident from the

present study that prolonged duration of arsenicosis sufferings increased the magnitude of stress. The results further revealed that there was positive association between age and perceived stress suggesting that perception of stress tended to be heightened as age increased.

As discussed earlier, psychological and socio-environmental factors acted as the moderators of stress. The present study revealed that 73.90% of the perceived stress was explained by the socio-environmental factors i.e. age, income, arsenic toxicity and duration of arsenicosis. When considering individual contribution of these variables it was found that arsenic toxicity individually explained 64.24% of perceived stress suggesting that arsenic toxicity was the main predictor of perceived stress. Little amount of stress was explained by income, age and duration of arsenicosis. The illness context alone produced high stress on arsenicosis patients proving that arsenicosis created stress on the victims. Psychological factors (mental health, mastery, optimism) explained 68.1% of the perceived stress in which mental health individually explained 57.52% of perceived stress meaning that mental health was the best predictor of perceived stress.

In course of the present study, a number of important aspects regarding mental health came out. Differences in mental health were found between affected and non-affected participants. Arsenic affected persons had poorer mental health than non-affected ones'. A number of research findings support the results (Cohen and Willamson, 1988; Stone et. al. 1987). Suffering from chronic or acute illness is very damaging to the well-being or mental health of the victims (Devins, 1994). It threatens the health and safety of the victims and affects vocational, social and personal activities as well as general activities of daily living, which deteriorates victims' quality of life and threatens their subjective well-being and mental health. Diener (2000) showed that,

though the effect was short lived, disease decreased subjective well-being. With the presence of biological sufferings chronic illness involves overwhelming burden of uncertainty, dependency, disability, pain, worry, stress and emotional distress. These negative emotions precipitate the onset of psychological problems and damage the well-being or mental health. Moos (1977) found that patients were often in a state of crisis marked by physical, social and psychological disequilibrium. There are association between stress and the development of generalized anxiety disorder (Bazerl et. al. 1991), panic disorder (Faravelli and Pallanti, 1989), and mood disorder or depression (Kendler et at., 1995; Moody et. al. 1990). Schizophrenia also triggers by stressful experience (Zubin, 1986). When there is low subjective well-being and high stress, highest level of depression arises (Triandis, 2000). It can lead to an ineffective immune system, and hence, to more physical illness (Cohen et. al. 1997; Stone et. al. 1987). The findings of the present study were consistent with all this research observations. It was also supported by the previous study on mental health of the arsenic victims by Keya (2004), which showed that there existed significant difference in mental health between arsenic affected and non-affected participants. It was also observed that when duration of arsenicosis increased the mental health deteriorated or vice-versa. Arsenic toxicity and duration of arsenicosis were also found as predictors of mental health.

The results further indicated that the effect of arsenic toxicity on mental health did not vary significantly as a function of gender and income. It may be underscored that effects of gender and income were non countable in presence of overwhelming effects of arsenic toxicity. That is why, the interaction effect was not significant.

The results of the present study can also be explained in the light of existing theories of psychological well-being. According to self-determination theory, gratification of

three needs (autonomy, competency and relatedness) is essential for psychological well-being. Those who have been suffering from arsenicosis lose their autonomy and competency because of different physical difficulties. It was cited earlier that arsenicosis created skin lesions, skin hardens and nodules, gangrine, cardivasular problems, liver and neurological problems etc. It impinged almost all organ system of human body whose ultimate consequence was cancer. These adverse health effects limit the victims' ability to work, which may lead them to economically and physically dependent on others for their survival. It also limits their free movements and competent role in family and society. Moreover, the stigma that skin lesions may be contagious isolated them from their social networks, which is deleterious for mental health. Multidimensional theory of psychological well-being suggests that self-acceptance, purpose in life, positive relations with others, environmental mastery and autonomy are the primary features of positive mental health. Arsenicosis blocked the victims to pursue purpose in life, worthy relations with others, decreased the environmental mastery as well as autonomy. They failed to attain their life goals because of jobloss, family dissolution, social isolation, social disintegration etc., which, according to goal-approach theory can be threatening for the mental health of the victims.

The present study further revealed that age, duration of arsenicosis, perceived stress were negatively correlated with mental health. A number of research findings confirmed that with the increase in age mental health of the individual is deteriorated (e.g. Diener and Suh, 1998; Lucus and Gohm, 2000). Diener and Suh (1998) observed that our subjective well-being tended to worsen as we aged. When patients suffered from chronic disease, longer period of sufferings damaged their psychological well-being and accentuated many negative affect on them.

Recent studies suggest that there is a strong link between stress and the onset of psychological symptoms (Blair, 1983; Johnson and Roberts, 1995). The present study found the negative relationship between perceived stress and mental health. The individual who perceived high stress showed poorer mental health. It is evident from another study that levels of perceived stress are positively correlated with dissatisfaction (Cohen and Willamson, 1988).

The present study also indicated that income, mastery and optimism were positively correlated with the mental health. If individual felt confident that he/she could exert control to manage the taxing experiences of stress (arsenicosis), his/her mental health situation was not threatened or damaged. At the same time, if individuals were dispositionally high in optimism, illness could not undermine their health condition somehow they were better adjusted.

The impact of any stressor is mitigated by the material resources. Persons most at risk are those lacking socio-economic support. Most of the arsenicosis patients were facing biological, social and psychological problems. They had lost their job due to fatigue, lethargy and social stigma. Loss of economic stability fosters strong feeling of dissatisfaction, pessimism and demoralization (Fuller et. al. 1996; Kettel, 1996). Consistent with those findings it was found from the present study that when people's income increased their mental health condition improved or vice versa. Recent evidence suggests that higher SES is associated with more positive mood and cognition (e.g. Barefoot et. al. 1991; House et. al. 1994; Ross and Wu 1995).

A number of socio-environmental and personality factors may impact on mental health of the individual. It was interesting to find in this work that although socio-environmental factors contributed considerably, psychological factors contributed

even more on mental health. Similar with these finding, Costa and McCrae (1980; 1989), Costa et. al. (1987) and Diener et. al. (1995) showed well-being was preliminary determined by enduring individual characteristics rather than by external life circumstances.

A major finding of this study was that socio-environmental factors i.e. arsenic toxicity, age, income and duration of arsenicosis variables explained 68% of the mental health, in which 58.60% was explained by arsenic toxicity (individually) suggesting that arsenic toxicity was the best predictor of mental health. Psychological factors i.e. mastery, optimism and perceived stress acted as predictors of mental health. Most (71%) of the mental health was explained by these factors, in which perceived stress individually explained 50.08% of mental health condition indicating perceived stress as the most important predictor of mental health. Mastery had a sizeable contribution too. Consistent with the present findings Stone et. al. (1987); Wiebe and McCallum (1986); Cohen et. al. (1997); Cohen (1988) demonstrated that stress may have affected the physical and psychological functioning of the individual and led to maladaptive behaviors as well as physical and mental ill health.

Regarding gender differences, it was found that gender differences existed in perceived stress but not in mental health for all participants. Females (both affected and non- affected) were more stressed than their male counterparts. Whereas, for the affected participants, gender differences existed both in perceived stress and in mental health. These results were congruent with the findings of Cohen and Willamson (1988). They observed that stress level were higher for females than for males. In our cultural context, women are in more vulnerable and marginalized position, they experience less power in their relationship and lack of control over decision making. Moreover, illness (arsenicosis) itself impacts on the female more negatively. The

Harvard Public Review (1999) highlighted a case of arsenicosis patient in Bangladesh suffering from skin lesions whose children were unwilling to eat foods she served and whose husband eventually divorced her. Many young women were being compelled to stay unmarried (DCH, 1997) and wives had been sent back to their fathers' house. Social dimension of arsenicosis is devastating by itself. In addition, gender relations pose even higher threats to the security and well-being of the female victims.

As previously reported (p. 114), the present study found that affected females were more stressed and poorer in mental health than their male counterparts. Huque (2004) working with healthy samples found males had higher psychological well-being than females. The present finding was interpreted in light of Brody and Hall (1993) and Nolen et. al. (1999). They found that women tended to experience higher levels of unpleasant affect than men. In other words, they experienced greater intensity of both pleasant and unpleasant emotions than males but there were no differences in frequency of emotional experience (Fujita et. al. 1991). In case of arsenicosis, it was more threatening for the females creating more stress and poorer mental health, which agrees quite well with broad sociological findings (e.g. Bari, 1992). The bias against women and strong male preference makes women worse of in almost every measure of deprivation including illness, hunger and illiteracy (Bari, 1992).

Mental health and perceived stress were not different among three income categories of participants. Mental health of the middle income group was better than lower-middle income and lower income groups, but not at significant level. However, quite conversely many research showed that income is related with the subjective well-being (e.g. Cohen et. al. 1999; Adler 1994). It can be argued that the present survey included samples from lower-middle and lower income categories. Therefore, their

income discrepancy was actually negligible and it did not act as an important source of variation in mental health and perceived stress.

Arsenicosis patients adopted different coping strategies with the intention of somehow reducing the effects of stress. Previous research suggested that different situation called forth the different coping strategies. In the present study 8 ways of coping were considered, i.e. confrontive coping, planful problem solving, distancing, self-control, accepting responsibility, seeking social support, escape-avoidance and positive reappraisal. Arsenicosis patients used these ways of coping to protect themselves from stressful episode of illness.

The present study explored different coping strategies used by the arsenic victims in managing the taxing experiences of arsenicosis. Eight different coping strategies were considered and how affected people differed from non-affected ones in using these strategies were examined. The findings showed that affected participants were significantly different from non-affected ones' in using coping strategies. Arsenic affected people used less amount of ways of coping than the non-affected people. It can be said that arsenic toxicity diminished the ability of effective coping. Affected people used significantly less confrontive coping, distancing, self-control, accepting responsibility and planful problem solving ways of coping. However, the use of seeking social support, escape avoidance and positive reappraisal coping were not significantly different.

Mean coping score of the participants indicated that out of 8 coping strategies affected participants used more seeking social support followed by positive reappraisal, planful problem solving, self-control, accepting responsibility, distancing, confrontive coping and escape avoidance. They mostly used seeking social support and positive reappraisal and least used confrontive coping and escape avoidance. Consistent with

previous findings of Mattlin et. al. (1990), Folkman et. al. (1986) suggested the importance of social support and reappraisal. Using seeking social support, people reappraise the events in a positive manner that promotes adjustment.

These coping styles of arsenic victims may be interpreted in the light of previous illness coping research as well as our socio-cultural context. In Bangladesh, middle and lower class people are always struggling with survival and livelihood. Poverty, landlessness, unemployment, social inequality, different natural disasters, uncertainty etc. were common features of their life; arsenic toxicity added an extra burden to them. Naturally, they have hardened facing the ceaseless challenges of life. The people of Bangladesh are familiar with natural disasters such as, floods, river erosion, storms, droughts etc. Through their intimate relationship with nature, people have had to cope with natural disasters and come to accept them. That is why, they have become uniquely adapted to cope with such threats. It was evident from the results that the ability of coping deteriorated, resulting in less use of all coping strategies for arsenic affected patients. Faced with arsenicosis, they are being confronted to minimize the stressfulness, accepted the responsibility to manage these events and made plan to overcome the situation. At the same time they used distancing and self-control strategies to protect their emotional state of mind. They frequently used positive reappraisal, and seeking social support in encountering arsenicosis. This result was consistent with the finding of Mattlin et. al. (1990). Mattlin showed that social support is reported more frequently by people coping with illness than with other kinds of stress. Folkman et. al. (1986) also found the high use of social support in illness situation. Social supports play in protecting people from the pathogenic effects of stress. It is that resource which is provided by others (Cohen and Syme, 1985). Supports helps to reduce uncertainty about the future by facilitating reappraisal

(Wethington and Kessler, 1991) and reappraisal, in turn, promotes active coping by increasing the perception that situations are amenable to change (Taylor, 1983). Veroff et. al. (1981) noted that when people were confronted with illness and death, they may avoid feelings of helplessness and depression if they believe that fate was in the hands of God. Religion also facilitates positive reappraisal. However, the present study further showed that use of social support for affected people was not significantly different from non-affected people. All the participants frequently used social support as their coping measure. This finding was consistent with the study of Huque (2004) in Bangladesh. Huque (ibid) studied on urban and rural people of Bangladesh and found they mostly adopted social support coping strategies in interpersonal stress situation.

Folkman et. al. (1986) found that where the subject needed more information, self-control acted as problem focused coping. In encounters where the subjects has to hold back, self-control is accompanied by confrontive coping and escape avoidance, in this way self-control can keep matters in their own hands. Consistent with this, arsenicosis patients used self-control, escape avoidance, confrontive coping and seeking social support. It may help the victims to get more information and they tried to keep the situation in their own hands.

Confrontive coping and escape avoidance were least used by the arsenic victims in encountering the stressful outcome of arsenicosis. Physical ability or hardiness is the important determining factor of coping (Lazarus and Folkman, 1984). Introductory discussion about arsenicosis provided the information that arsenicosis sufferings not only impacted physically it affected socially and psychologically on the victims. In the arsenic victims the ability to confront decreased in their negative physiological states.

Billings and Moos (1981) found that avoidance was most common among respondents coping with an illness which was consistent with the finding of chronic patients that people who appraise their most stressful situation as harmful to health are more likely to use escape avoidance strategies (Folkman et. al. 1986; Mattlin et. al. 1990). The present study, however, did not support those findings. In this study arsenicosis patients used less escape avoidance coping than non-affected participants. In our socio-cultural background people always keep struggling and facing various challenges in their daily survival. Perhaps, that is why, they are less driven by the defensive action. There were no difference in using seeking social support and positive reappraisal and escape avoidance between the affected and non-affected patients. There are only a few contemporary studies on coping in the socio-cultural context of Bangladesh. These findings suggest further culture specific research on coping mechanisms on Bangladeshi people. Furthermore the relationship between coping strategies and mental health is yet to be found out.

In the present study, effect of gender was found significant for confrontive coping, planful problem solving, accepting responsibility, positive reappraisal and escape avoidance. Males used more confrontive coping, planful problems solving, accepting responsibility strategies than their female counterparts and females used more escape avoidance, positive reappraisal coping. Previous research demonstrated that males used more confrontive coping than females (Huque, 2004). The finding that females used more positive reappraisal is consistent with Huque (2004). She found that females used more religion, acceptance and self-criticism coping.

Two-way interaction involving arsenic toxicity and gender revealed that planful problem solving, positive reappraisal and escape avoidance varied as the function of arsenic toxicity and gender. Affected males used less planful problem solving and

more escape avoidance and positive reappraisal coping than non-affected males. The difference was maximum for planful problem solving. Sufferings from arsenic toxicity lowered males' ability to overcome the situation planfully, they used defensive measures to protect themselves from stressful experiences. This result was explained by Folkman et. al. (1986). He cited that in changeable encounters subjects used coping strategies that kept them focused on the situation they confronted, did planful problem solving, accepted responsibility and selectively attended to the positive aspects of the encounter. In contrast, when subjects appraised encounters as having to be accepted, they turned to distancing and escape-avoidance, which are forms of coping that allow the person to focus on the troubling situation. It was also found that affected females used less planful problem solving, escape avoidance and positive reappraisal than their male counterparts, here the difference was minimum for escape avoidance. That means, when females were affected by arsenicosis tended to lose their ability to use escape avoidance, positive reappraisal and planful problem solving coping.

In the light of the Perrez and Reichert's model (1992), the findings of the present study revealed that arsenicosis created inherent stressfulness, it was the situation, where affected people had to do nothing to recover from this stressful events, as they had no alternative source of water, they did not have control over the situation (presence of arsenic in drinking water). At the same time, the out look of changing the arsenic toxicity in drinking water was still grim, few comprehensive mitigation program had been under taken or alternative source of safe water had been established yet. Moreover, majority of the affected people were not aware about arsenic toxicity in drinking water, latent period of toxic arsenic in the human body or arsenicosis, its devastating and damaging outcomes etc. Insufficient information distorted the real

situation; they could not take precautionary measures. Thus, cognitive dimension of the arsenicosis disease related to environments may have accentuated the stress level as well deteriorated the mental health of the victims.

Common sense model (Leventhal and Nerenz, 1983) perspective of stress-coping-illness highlighted the situationally oriented commonsense of the victims. Chronic arsenicosis with its painful dermatological or other symptoms, low controllability, inadequate medical interventions have profound impact on the affected people.

It is evident that the consequence of arsenicosis is fatal. This situational feature of the arsenic victims led to develop psychological impact such as stress, anxiety, worry, hopelessness etc. That means, arsenicosis was very threatening for the psychological well-being of the victims. Disease related situational events (valance, controllability, causes, consequence) acted to shape their coping strategies.

Finally, the findings of the present study may be explained by the extended theory of stress-coping-illness (Maes et. al. 1996). According to their model other important life events contribute to the appraisal of disease related events. Persons' disease related events such as duration of arsenicosis, socio-environmental factors such as, age, gender and income and psychological factors such as perceived control (mastery) and optimism were considered to fully understand stress and coping process. It was found from the present study that these socio-environmental and psychological factors contributed considerably towards stress and psychological well-being. Disease related events are termed in Maes et. al. model as external resource and demographic factors are termed as internal resource of the victims. These recourses act in shaping coping behavior as well as their psychological, social and physical well-being. Duration of arsenicosis, treatment facilities and demographic characteristics of the victims can impact the appraisal of demands and goals of the victims. Contemporary researchers

showed that many arsenicosis patients were faced by discrimination, job loss, divorce, dessertion or separation. Moreover, they lost their assets and money. In this way, their goal and expectancy of life were inhibited, generating high stress. At the same time their mental health may have been in vulnerable state. Experience of arsenicosis was not a favorable event to invest their efforts to overcome the situation and attain their goals. When confronted with arsenicosis, they lost their ability to attain their goals of life, which led to self-destruction. According to the Maes et. al. theory goal demand appraisal gave rise to stress in the arsenic victims enabling them to use their resource to exert coping strategies to encounter the stressful events of arsenicosis. Personality variables are not explained in the Maes et. al. model of stress-coping-illness, though it is the extension of Lazarus model. Lazarus emphasizes the person and environment transaction and explains the role of personality and situational factors in stress appraisal process.

Combining all these theories with the results this study attempted to explain the arsenicosis disease and its psychological impact. This study measured the perceived stressfulness of the affected victims, identified their coping strategies as well as assessed their mental health status; finally formulated a stress-coping-mental health model for the arsenic victims.

Based on overall findings, this conceptual idealization (stress-coping-mental health model) consisted of interrelated 3 panels. Panel. I started with environmental stressor-arsenic toxicity. It will go through panel. II, which consisted of the psychological and socio-environmental moderators of stress appraisal. The role of different factors, such as duration of arsenic toxicity, age, income, mastery, optimism as well as their association with stress and mental health were included. These factors may have impacted on perceived stress and mental health. Panel. III, which, in turn, connected

with panel II in a series, composed of psychological impact on the victims. Arsenic toxicity produced stress and influenced on the mental health of the victims through the moderators. Encountering the stressful experience they used 8 different coping strategies – seeking social support, positive reappraisal, planful problems solving, self-control, accepting responsibility, distancing, confrontive coping and escape avoidance in order of descending use.

The psychological impact on arsenic victims as shown by this research call for interventions in order to enable them to effectively cope with the stressful encounter of arsenicosis and to protect their mental health. In this respect, supplying safe drinking water is of utmost importance. Anstiss et. al. (2001) working in Chapainawabganj, Bangladesh observed evidence of positive health effects of those patients who had been consuming arsenic safe water for less than 2 years. At the same time, improvement of economic status and psychological intervention and counseling are also urgently needed.

CHAPTER 5
SUMMARY AND CONCLUSION

The present study was designed to investigate perceived stress, coping strategies and mental health of the arsenic victims in Bangladesh and formulated a stress-coping-mental health model for them. A total of 394 participants (200 arsenic affected and 194 non-affected) were randomly selected from the 4 arsenic hotspots areas of Bangladesh using probability proportional to size method. Questionnaire for demography and arsenic related information, Perceived stress questionnaire, Ways of coping questionnaire, General health questionnaire, Mastery scale and Life orientation test were used for this study.

Perceived stress questionnaire (PSQ) consisted of 20 items, was developed for the present study to measure participants' perceived stress. Considering physiological, emotional and cognitive expression in the stressful situation, 40 items were selected and applied to 90 respondents for testing. It was factor analyzed and Cronbach alpha was determined, and finally an internally reliable measure of perceived stress was constructed for the Bangladesh context. Estimate of internal consistency of PSQ was acceptable (coefficient α = .77). Questionnaire for demography and arsenic related information was constructed. Ways of coping questionnaire, Mastery scale and Life orientation test were translated and adapted in Bengali with acceptable reliability.

At the beginning, a situation analysis of arsenic victims in Bangladesh was carried out. Then psychological impact of arsenic toxicity was examined in detail.

The present study explored the stressful experiences and mental health status of the arsenic victims using 2×2×3 analysis of variance with two levels of arsenic toxicity (arsenic affected, non-affected), two levels of sex (female-male) and three levels of income (low-income, lower-middle, and middle-income). The results showed that

arsenic affected people were more stressed and poorer in mental health than non-affected people.

From gender perspective, it was found that female participants were more stressed than males in perceived stress but they were not different in mental health. In case of affected participants alone, females had higher stress and poorer mental health than their male counterparts. There were no differences among three income groups on perceived stress and mental health. It was noteworthy that there existed no interactive effects of arsenic toxicity × sex × income. Perceived stress and mental health did not vary as functions of arsenic toxicity, sex and income.

Further, to assess the socio-environmental and personality factors in perceived stress and mental health correlation and regression were employed. It was found that increase in age, prolonged duration of arsenicosis and elevated stress deteriorated mental health, whereas, increase in income, feeling of high mastery and high optimism improved mental health of the victims. As age increased and duration of arsenicosis prolonged, peoples experienced more stress. Higher income, feeling of more control or mastery, high optimism and better mental health status decreased the perceived stress level.

Socio-environmental and personality factors act as the moderators of stress, as well as influence the psychological well-being. The present study separately identified the impact of socio-environmental and psychological factors employing regression. Using step-wise regression, which socio-environmental and psychological factors were the best predictors of perceived stress and mental health – were also identified.

Mental health was explained more by psychological factors than socio-environmental factors. Perceived stress was explained more by socio-environmental factors than psychological factors. Findings of this study confirmed that arsenic toxicity was the

strongest predictor of perceived stress. At the same time, mental health was the strongest predictor of perceived stress. Another major findings revealed that arsenic toxicity and perceived stress acted as the important predictors of mental health. To ascertain which was the more efficacious personality characteristics (mastery, optimism), and socio-environmental factors (age, income, duration of arsenicosis) for perceived stress and mental health it was found that mastery and optimism had some effects on mental health, whereas these factors had very little effects on perceived stress. Age, income, duration of arsenicosis had very low separate effects on mental health and perceived stress.

Another important finding of the study showed that arsenicosis patients were significantly different from non-affect patients in using all 8 ways of coping: confrontive coping, planful problem solving, distancing, self-control, accepting responsibility, seeking social support, escape-avoidance and positive reappraisal. Arsenic victims used lesser amount of all this coping measures. This demonstrated that arsenic toxicity (arsenicosis) diminished the ability of effective coping. It was also observed that arsenic victims mostly used seeking social support and positive reappraisal, followed by planful problem solving, self-control and accepting responsibility whereas least used distancing, confrontive coping and escape avoidance. Compared to non-affected participants, affected people significantly used less confrontive coping, distancing, self-control, accepting responsibility and planful problem solving. Use of social support, escape avoidance and positive reappraisal were not different between affected and non-affected groups. It was interesting to point out that, planful problem solving, positive reappraisal and escape avoidance varied as a function of gender and arsenic toxicity. Use of planful problem solving was lower whereas escape avoidance and positive reappraisal were higher for affected

males when arsenic toxicity was involved. On the other hand, use of these 3 strategies was lower for the affected females when arsenic toxicity was involved.

The overall findings of the present study were conceptualized in a stress-coping-mental health model, which consisted of 3 interrelated panels representing environmental stressor (arsenic toxicity), moderators of stressor (psychological and socio-environmental factors) and psychological impacts (stress-coping-mental health) on the victims.

Arsenicosis patients of Bangladesh had been facing a threatening challenge of stress encounter. They experienced high stress and lower state of mental health. Excessive stress and poor mental health negatively impact on the victims. It may have already produced the onset of mental disorder and damaged the immune system as well. The present study only examined the perceived stress, mental health status and coping measures. Its devastating impacts, precipitating role in creating depression and other psychological symptoms or maladjustment were not examined. This work emphasized the necessity of further extended studies on this issue.

The unique pattern of coping strategies used by the arsenicosis patients, were also explored in the study. In Bangladesh, a few research have been done on stress coping. The traditional nature of coping in this cultural context has not yet been examined which calls for detailed culture specific investigations. Maladaptive or adaptive role of these coping measures was not studied that needed further investigation.

Improvement of economic status, control or mastery over the situation, positive out look about the future or high optimism, favorable social environment and safe drinking water can enhance mental health of the victims. Therefore, psychological counseling is recommended for maintaining sound mental health of the arsenic victims.

This research has shown that arsenic pollution in drinking water cannot only be viewed in terms of extreme physical process and medical perspective. Rather, it should be seen with psychological and social perspectives too. Its devastating and threatening impact made people vulnerable. The present research confirmed the elevated stress and deteriorated mental health status of the arsenic victims. This clearly has important policy implications.

Specific policies and programs should be taken and implemented addressing psychological aspects. Unfortunately, more than a decade after the first detection of arsenic patients, even a coherent policy on arsenic prevention and mitigation have not been developed yet, let alone a policy on Psychological health of the arsenic victims. The research clearly showed the importance of psychological consequences of arsenicosis and the need for addressing psychological intervention for protecting them from life threatening illness – arsenicosis induced through unsafe toxic drinking water.

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Appendix A

Factor analysis of the perceived stress questionnaire

		P. of variance	α
Factor 1		7.45	.74
2	How often have you felt perplexed in last few days? (5)		
3	How often have you felt uncertain in last few days? (5)		
4	How often have you felt stressed in last few days? (1)		
7	How often have you felt numb in occurrence of events in last few days? (6)		
Factor 2		6.39	.64
1.	How often have you felt nervous in last few days? (2)		
6	How often have you felt depressed in last few days? (13)		
10	How often have you been engrossed in repetitive thinking in last few days (18)		
Factor 3		5.36	.75
31	How often have your cold been aggravated in last few days (19)		
32	How often have your blood pressure been aggravated in last few days (19)		
36	How often have your diabetes been aggravated in last few days (19)		
Factor 4		5.30	.58
9	How often have you quarreled with the family members and neighbors in last few days? (4)		
11	How often have you felt that you are unable to control the important things in your life in last few days? (3)		
13	How often have you been angered because of things that were outside of your control? (16)		
Factor 5		5.29	×
14	How often have you completed any work after starting in last few days? (7)		

Factor 7		5.05	.62
22	How often have you felt confident about your ability to handle the problems of your personal problems in last few days? (10)		
23	How often have you tried your best to overcome the problems of your life in last few days? (11)		
Factor 8		5.01	.67
34	How often have you been suffered from chronic pains (in back/neck/waist) in last few days? (17)		
39	How have you felt very weak in last few days? (20)		
Factor 9		4.94	.65
21	How often have you been able to control irritations of your life in last few days? (9)		
26	How often have you easily adapt to the problems of your life in last few days? (12)		
Factor 10		4.62	.70
24	How often have you tried to avoided difficult problems of your life in last few days? (14)		
30	How often have you been suffered from diseases (cold, diarrhea etc) in last few days? (15)		

Total alpha = .7652, F = 34.1510, P ≈ .00

Appendix B

Questionnaire for Demography and Arsenic Information

1. Zilla----------Upazilla----------Union----------Village----------
   Name----------Marital status: Married/Unmarried / Divorced /widow/widower
   Female/ Male---------Age-----Occupation----------Income-------no of family members---

2. How long have you been living in this village?----------

3. What is the main problem of your village?----------

4. What is the main source of for drinking/ cooking water in your village?
   a) Drinking / Cooking water: ☐ river/ Pond/ ditch ☐ tube-well/ supply water/well
   b) Household use: ☐ river/ Pond/ ditch ☐ tube-well/ supply water/well
5. a) How long have you been using the present source of water?
   ☐ 1 -2 year ☐ 3 – 6 years ☐ above 6 years
6. What is the previous source of water?
   ☐ Same source ☐ another source, example:

7. a) Do you know what Arsenic is?
   b) Do you know about arsenic pollution in drinking water?
   c) If you know, how do you come to know and when?
   ☐ People ☐ NGO worker ☐ Village development worker
   ☐ 1 – 2 years ☐ 2 – 3 years ☐ 4-5 years
8. Do you ever have your tube well water tested? ☐ Yes ☐ No
   If yes, when and what are the results
   ☐ 1-2 years----------milligram ☐ 2-4 years back----------milligram.

9. a) Have you been using the water contaminated water till now? ☐ Yes ☐ No
   b) If yes, why?
   ☐ No alternatives ☐ Every tube well is contaminated
c) Do you still use the tubewell water for drinking/cooking even after knowing that it is contaminated?

10. Do you have any Arsenicosis patient in your family?
    Yes ☐ No ☐ ☐ How many
    If yes, what are is his/ her symptoms?
    ☐ Lesions in hand / leg / body ☐ Other symptoms
    a) Who has identified the symptoms and when?
    ☐ Health worker ☐ relatives ☐ doctor
    ☐ 1-2 years back ☐ 2-4 years back ☐ 5 years back
    b) What type of treatment have you been taking?
    ☐ Allopathic ☐ Homeopathic ☐ Herbal doctor ☐ No treatment
11. How do you thing people get this disease?
    ☐ Drinking / Cooking water ☐ Working in the field ☐ tube-well
    ☐ Pond water ☐ deep tubewell water.

12. Have you got arsenicosis?
    ☐ How long have you been suffering from arsenicosis?
    ☐ What is your symptom?

13. Have you been ostracized because of arsenicosis? (Fearing it being Contagious) yes / no.

14. What are the problems people face when they get arsenicosis? (1) Physical (2) Psychological

15. Have you got any help in this regard? Yes / No ☐ Government sector
    ☐ Non-government sector

Sample No. .....

Appendix C

Affected ☐
Healthy ☐

আর্সেনিক দূষণ ও ব্যক্তিগত তথ্য সম্পর্কিত প্রশ্নমালা

১. জেলা ঃ ..... উপজেলা ঃ ..... ইউনিয়ন ঃ ..... গ্রাম ঃ .....
উত্তরদাতার নাম ঃ ..... বৈবাহিক অবস্থা ঃ বিবাহিত/অবিবাহিত/স্বামী পরিত্যাক্তা/বিধবা/বিপত্নীক
স্ত্রী/পুরুষ ঃ ..... বয়স ঃ ..... পেশা ঃ ..... মাসিক আয় ঃ ..... পরিবারের লোকসংখ্যা ঃ .....

২. আপনি এই গ্রামে কতদিন ধরে বাস করছেন ঃ .....

৩. আপনার গ্রামে যে সকল সমস্যাগুলি আছে তার মধ্যে কোনটি প্রধান সমস্যা বলে আপনি মনে করেন ঃ .....
.....

৪. আপনার গ্রামে খাওয়া/রান্নার ও অন্যান্য গৃহস্থালী কাজে ব্যবহৃত পানির প্রধান উৎস কি?
(ক) খাওয়ার/রান্নার পানি ঃ ☐ নদী/পুকুর/ডোবা ☐ টিউবওয়েল/সাপ্লাই পানি/কুয়া
(খ) গৃহস্থালী কাজে ব্যবহৃত পানি ঃ ☐ নদী/পুকুর/ডোবা ☐ টিউবওয়েল/সাপ্লাই পানি/কুয়া

৫. (ক) আপনি বর্তমান উৎস থেকে কতদিন পানি ব্যবহার করছেন?
☐ ১-২ বছর ☐ ৩-৬ বছর ☐ ৬ বছরের উর্দ্ধে
(খ) ইতিপূর্বে আপনি কোথা থেকে পানি সংগ্রহ করতেন?
☐ একই উৎস থেকে ☐ ভিন্ন উৎস থেকে, যেমন ঃ .....

৬. আপনার বাড়ির টিউবওয়েলটি কতদিন যাবৎ পোতা হয়েছে?
☐ ১ বছর ☐ ২-৪ বছর ☐ ৪ বছরের বেশী

৭. (ক) আর্সেনিক কি বলতে পারেন ঃ ☐ হ্যাঁ ☐ না
(খ) খাওয়ার পানিতে আর্সেনিক দূষণের কথা শুনেছেন ঃ ☐ হ্যাঁ ☐ না
(গ) শুনে থাকলে কিভাবে ও কবে শুনেছেন?
☐ লোক মারফত; ☐ স্বাস্থ্য কর্মীদের মারফত; ☐ গ্রাম্য উন্নয়ন কর্মীদের মারফত;
☐ ১-২ বছর আগে ☐ ২-৩ বছর আগে ☐ ৪-৫ বছর আগে

৮. আপনি কি আপনার টিউবওয়েলের পানি কখনও আর্সেনিক পরীক্ষা করিয়েছেন ঃ ☐ হ্যাঁ ☐ না
এবং তা করিয়ে থাকলে কবে ও কি ফলাফল ঃ ☐ ১-২ বছর আগে, ... মিলিগ্রাম ☐ ২-৪ বছর আগে ..... মিলিগ্রাম

৯. (ক) কলের পানি আর্সেনিক দুষিত হয়ে থাকলে আপনি কি এখনও সেই পানি রান্না/খাওয়ার জন্য ব্যাবহার করেন ঃ
☐ হ্যাঁ ☐ না
(খ) উত্তর হ্যাঁ হলে কেন?
☐ আর কোন বিকল্প নেই ☐ সব কলের পানিতেই আর্সনিক রয়েছে তাই ☐ কোন ক্ষতির আশাংকা নেই মনে করি
উত্তর না হলে আপনি কোথা থেকে বিশুদ্ধ পানি সরবরাহ করে থাকেন?
☐ স্থানীয় অন্য টিউবয়েল থেকে ☐ পার্শ্ববর্তী গ্রাম থেকে ☐ সাপ্লাই পানি থেকে ☐ গ্রাম্য পুকুরের পানি ফুটিয়ে নেই

১০. আপনার পরিবারে কি কোন আর্সনিক আক্রন্ত ব্যক্তি আছেন ঃ ☐ হ্যাঁ ☐ না কতজন?
উত্তর হ্যাঁ হলে, তার রোগের লক্ষণ কি কি?
☐ হাতে/পায়ে/শরীরে ক্ষত ঘা ☐ অন্যান্য উপসর্গ .....
(ক) এবং কবে কে এই উপসর্গ নির্ণয় করেন?
☐ স্বাস্থ্যকর্মী ☐ আরীয় স্বজন ☐ ডাক্তার
☐ ১-২ বছর আগে ☐ ২-৪ বছর আগে ☐ ৫ বছর আগে
কি ধরনের চিকিৎসা গ্রহণ করেন?
☐ এ্যালোপথিক ☐ হোমিও প্যাথিক ☐ গ্রাম্য কবিরাজী ☐ কোন চিকিৎসা নেই

১১. আপনার মতে কি ভাবে এই রোগ হয়েছে বলে মনে হয়?
☐ খাওয়ার/রান্নার পানি থেকে ☐ মাঠে কাজ করতে গিয়ে ☐ টিউবয়েলের পানি থেকে
☐ পুকুরের পানি থেকে ☐ সেচের পানি থেকে

১২. আপনি কি আর্সেনিক আক্রান্ত? ☐ কত দিন ধরে আক্রান্ত? .....
☐ উপসর্গ কি? .....

১৩. আর্সেনিক আক্রান্ত হওয়ার কারণে একঘরে হয়েছেন (ছোঁয়চে মনে করে) - হ্যাঁ/না

১৪. আর্সেনিক আক্রান্ত হওয়ার ফলে কি সমস্যা হয় - ☐ শারীরিক ☐ সামাজিক

১৫. এ বিষয়ে কোন সাহায্য সহযোগিতা পেয়েছেন কি? হ্যা / না ☐ বেসরকারী ☐ সরকারী

Appendix D

Self-report questionnaire 1 (PSQ)

I will ask you about your feelings and thoughts during last few days. I wll read out each question having 5 choices of answer. Please pick one of them that is applicable to you. There is no right or wrong answer. Please express your own feelings. Indicate your opinion in the following ways:

0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, 4 = Very Often

1. How often have you felt stressed in last few days (one month)?
2. How often have you felt nervous in last few days?
3. How often have you felt that you are unable to control the important things in your life in last few days?
4. How often have you quarreled with the family members and neighbors in last few days?
5. How often have you felt perplexed and uncertain in last few days?
6. How often have you felt numb in occurrence of events in last few days?
7. How often have you completed any work after starting in last few days?
8. How often have you repeatedly thought in your mind about the stressful events of your life in last few days?
9. How often have you been able to control irritations of your life in last few days?
10. How often have you felt confident about your ability to handle the problems of your personal problems in last few days?
11. How often have you tried your best to overcome the problems of your life in last few days?
12. How often have you easily adapt to the problems of your life in last few days?
13. How often have you felt depressed in last few days?
14. How often have you.tried to avoid difficult problems of your life in last few days?
15. How often have you been suffered from diseases (cold, diarrhea etc) in last few days?
16. How often have you been angered because of things that were outside of your control?
17. How often have you been suffered from chronic pains (in back/neck/waist) in last few days?
18. How often have you been engrossed in repetitive thinking in last few days?
19. How often have your cold / blood pressure / diabetes been aggravated in last few days?
20. How have you felt very weak in last few days?

Appendix E

আত্মবিবরণী প্রশ্নমালা ১ (PSQ)

গতমাসে আপনার অনুভূতি ও চিন্তা সম্পর্কিত কিছু প্রশ্ন করব। প্রতিটি প্রশ্ন আমি আপনাকে পড়ে শোনাব। প্রতিটি প্রশ্নের জন্য পাঁচটি (৫টি) করে জবাব দেয়া আছে। যেটি আপনার জন্য প্রযোজ্য মনে হবে সেভাবে জবাব দিন। এখানে ভুল বা সঠিক জবাব নেই। আপনার নিজস্ব অনুভূতিই ব্যক্ত করুন। আপনার মতামত এভাবে প্রকাশ করুন -

০ = কখনই না
১ = প্রায় কখনোই না/বেশিরভাগ সময় না
২ = মাঝে মাঝে
৩ = প্রায়ই/বেশিরভাগ সময়
৪ = খুব বেশী

১. গত কিছু দিন ধরে (মাসখানেক) কতটা মানসিক চাপের মধ্যে থেকেছেন?
২. গত কিছু দিন একটুতেই কতটা ঘাবড়ে গেছেন বা নার্ভাস বোধ করেছেন?
৩. গত কিছু দিন ধরে আপনার জীবনের গুরুত্বপূর্ণ বিষয়গুলো নিয়ন্ত্রন করতে আপনি কতটা ব্যর্থ হয়েছেন বলে আপনার মনে হয়?
৪. গত কিছু দিন ধরে পাড়াপড়শী, পরিবারের লোকজনের সাথে কতটা ঝগড়া বিবাদ লেগে থেকেছ?
৫. গত কিছু দিন ধরে আপনি কতটা অনিশ্চিয়তার মধ্যে থেকেছেন ও বিচলিত বোধ করেছেন?
৬. গত কিছু দিন ধরে কতটা এমন আকস্মিক কিছু ঘটনা ঘটেছে যাতে আপনি হতবাক হয়ে গিয়েছিলেন?
৭. গত কিছু দিন ধরে খুব মন দিয়ে কাজ করে কাজটি শেষ করতে পেরেছেন বলে কতটা মনে করেন?
৮. গত কিছু দিন ধরে আপনার জীবনের পীড়নকর (কষ্টকর) ঘটনাগুলো প্রতি নিয়ত মনের মধ্যে কতটা ঘুরপাক খেয়েছে?
৯. গত কিছু দিন ধরে আপনার জীবনের বিরক্তিকর বিষয়গুলো কতটা নিয়ন্ত্রন করতে পেরেছেন?
১০. গত কিছু দিন ধরে আপনার ব্যক্তিগত সমস্যা সামাল দেয়ার ব্যাপারে কতটা আত্মবিশ্বাসী ছিলেন?
১১. গত কিছু দিন ধরে আপনি কোন সমস্যায় পড়লে তা মোকাবেলার জন্য কতটা আপ্রান চেষ্টা করেছেন?
১২. গত কিছু দিন ধরে আপনার সমস্যাগুলো সহজ ভাবে মেনে নিতে চেষ্টা করেছেন কতটা?
১৩. গত কিছু দিন ধরে কতটা বিমর্ষ (মনখারাপ) থেকেছেন?
১৪. গত কিছু দিন ধরে কোন কঠিন সমস্যায় পড়লে তা এড়িয়ে যেতে চেয়েছেন কতটা?
১৫. গত কিছু দিন ধরে অসুখ-বিসুখ (সর্দি, পেটের অসুখ প্রভৃতি) কতটা ভুগেছেন?
১৬. গত কিছু দিন ধরে যা কিছু ঘটেছে তা আপনার নিয়ন্ত্রনের বাইরে ভেবে আপনি কতটা রাগান্বিত হয়েছেন?
১৭. গত কিছু দিন ধরে পিঠে, ঘাড়ে, কোমরে ব্যাথায় (ক্রনিক) কতটা ভুগেছেন?
১৮. গত কিছু দিন ধরে সবসময়·মনে মনে একই চিন্তায় কতটা আছন্ন থেকেছেন?
১৯. গত কিছু দিন ধরে সর্দি / উচ্চরক্তচাপ / ডায়বেটিস বেড়েছে কতটা?
২০. গত কিছু দিন ধরে কতটা দুর্বলতাবোধ করেছেন?

Appendix F

Self-report questionnaire 2 (WCQ)

I will ask you some questions about how do you cope with the problems and sufferings of your life. There are different solutions for different situations. What are your reactions when you encounter difficult situation in your life. I will read out some questions about your coping strategies, please indicate your opinion in the following ways:

0 = does not apply and or not used, 1 = used some what, 2 = used quite a bit, 3 = used a great deal.

1. Just concentrated on what I had to do next-the next step.
2. I did something, which I didn't think would work, but at least I was doing something.
3. Tried to get the person responsible to change his or her mind.
4. Talked to someone to find out more about the situation.
5. Criticized or lectured myself.
6. Tried not to burn my bridges, but leave things open somewhat.
7. Hoped a miracle would happen.
8. Went along with fate: some times I just have bad luck.
9. Went on as if nothing had happened.
10. I tried to keep my feelings to myself.
11. Looked for the silver lining, so to speak: tried to look on the bright side of things.
12. Slept more than usual.
13. Expressed anger to the persons (s) who caused the problem.
14. Accepted sympathy and understanding from someone.
15. I was inspired to do something creative.
16. Tried to forget the whole thing.
17. I got professional help.
18. Changed or grew as a person in good way.
19. I apologized or did something to make up.
20. I made a plan of action and followed it.
21. I let my feelings out somehow.
22. Realized I brought the problem on myself.
23. I came out of the experience better than when I went in.

24. Talked to someone who could do something concrete about the problem.
25. Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, and so forth.
26. Took a big chance or did something very risky.
27. I tried not to act too hastily or follow my first hunch.
28. Found new faith.
29. Rediscovered what is important in life.
30. Changed something so things would turn out all right.
31. Avoided being with people in general.
32. Didn't let it get to me: refused to think about it too much.
33. I asked a relative or friend I respected for advice.
34. Kept others from knowing how bad things were.
35. Made light of the situation; refused to get too serious about it.
36. Talked to someone about how I was feeling.
37. Stood my ground and fought for what I wanted.
38. Took it out on other people.
39. Drew on my past experiences; I was in a similar position before.
40. I knew what had to be done, so I doubled my efforts to make things work.
41. Refused to believe that it had happened.
42. I made a promise to myself that things would be different next time.
43. Came up with a couple of different solutions to the problem.
44. I tried to my feelings from interfering with other things too much.
45. I changed something about myself.
46. Wished that the situation would go away or somehow be over with.
47. Had fantasies about how things might turn out.
48. I prayed.
49. I went over in my mind what I would say or do.
50. I thought about how a person I would admire would handle the situation and used that as model.

Appendix G

আত্মবিবরণী প্রশ্নমালা ২ (WCQ)

আপনি কিভাবে জীবনের সমস্যা ও কষ্টের মোকাবেলা করেন সে বিষয়ে কিছু প্রশ্ন করব। ভিন্ন ভিন্ন পরিস্থিতি ও সমস্যার সমাধানও ভিন্ন হয়ে থাকে। আমি জানতে চাই কঠিন পরিস্থিতিতে আপনার প্রতিক্রিয়া সাধারণত কিধরনের হয়ে থাকে।

কঠিন পরিস্থিতি অথবা সমস্যার সম্মুখীন হলে আপনি কি করেন সে বিষয়ে আমি কিছু বক্তব্য আপনাকে পড়ে শোনাব। প্রতিটি বক্তব্য সম্পর্কে আপনার মতামত এভাবে প্রকাশ করুন -

কখনও এরকম করিনা	.....	০
মাঝে মাঝে এরকম করি	.....	১
বেশ কিছু বার এরকম করি	.....	২
অনেকবার এরকম করি	.....	৩

এই প্রশ্নগুলোর কোন সঠিক বা ভুল জবাব নেই। তাই অনুগ্রহ করে একটু চিন্তা করে উত্তর দিন যাতে উত্তরটি আপনাকে সঠিকভাবে তুলে ধরে।

১. পরবর্তীতে কি করা উচিৎ তার উপরে আপনি পূর্ণ মনোযোগ দেন।
২. কোন লাভ হবেনা জেনেও আপনি কিছু একটা করেন এই ভেবে যে, অন্তত: পক্ষে কিছু তো আপনি করছেন।
৩. যে সমস্যা সৃষ্টি করছে তার মনোভাব পরিবর্তনের চেষ্টা করেন।
৪. পরিস্থিতি সম্বন্ধে আরো জানার জন্য অন্যকারো সাথে আলাপ করেন।
৫. আত্মসমালোচনা করেন বা নিজেকেই নিজে জ্ঞান দেন।
৬. সমস্যার সমাধান নাই করতে পারেন ভবিষ্যতে যাতে সমাধান করতে পারেন সেই পথ খোলা রাখেন।
৭. অলৌকিক কিছু ঘটবে আশা করেন।
৮. আপনি নিয়তির উপর সব ছেড়ে দেন কারণ মাঝে মাঝে মানুষের ভাগ্য খারাপ হয়।
৯. আপনার কাজকর্ম করে চলেন যেন কিছুই ঘটেনি।
১০. আপনার অনুভূতিগুলো/কষ্টগুলো আপনি নিজের ভেতরেই রাখতে চেষ্টা করেন।
১১. যা ঘটেছে তার মাঝে আপনি ভাল কিছু খোঁজেন।
১২. আপনি স্বাভাবিকের তুলনায় বেশী ঘুমান।
১৩. যে সমস্যা সৃষ্টি করেছে তার উপর রাগ দেখান।
১৪. আপনি অন্যর সহানুভূতি গ্রহণ করেন।
১৫. আপনি সৃজনশীল কিছু করার জন্য উৎসাহিত হন।
১৬. আপনি পুরো ঘটনাটাই ভুলে যেতে চেষ্টা করেন।
১৭. আপনি সহায়তা পাওয়ার জন্য কোন ব্যক্তি বা সংস্থার কাছে যান।
১৮. ব্যক্তি হিসাবে আপনার ভালর দিকে পরিবর্তন হয়।
১৯. আপনি ক্ষমা চান এবং ক্ষতিপূরণ হয় এমন কিছু করেন।
২০. আপনার কর্মপরিকল্পনা তৈরী কওে তা অনুসরণ করেন।
২১. আপনার অনুভূতি/কষ্টগুলো কোথাও প্রকাশ করেন।
২২. আপনি নিজেই সমস্যা ডেকে এনেছেন তা বুঝতে পারেন।
২৩. ঘটনার ভেতরে থাকার চাইতে ঘটনা থেকে বের হয়ে আসলে আপনার অভিজ্ঞতা

(ঘটনা সম্পর্কে) আরো ভাল হয়।

২৪. আপনি এমন কারো সাথে কথা বলেন যিনি এই সমস্যা সম্পর্কে নির্দিষ্ট কিছু করতে পারেন।

২৫. আপনি অন্যকিছু করে ভাল লাগাতে চেষ্টা করেন। (যেমন- খাওয়া, ধূমপান, যোগব্যায়াম, সেলাই ইত্যাদি)

২৬. আপনি বিপদ থেকে উদ্ধারের জন্য খুব বড় ধরনের ঝুঁকি নেন।

২৭. আপনি সমস্যায় পড়লে খুব তাড়াহুড়ো করে (প্রথমেই যা মনে হল) কোন সিদ্ধান্ত নেন না।

২৮. আল্লাহর উপর নতুন করে বিশ্বাস স্থাপিত হয়।

২৯. জীবনে কি কি গুরুত্বপূর্ণ তা পূনরায় আবিস্কার করেন।

৩০. আপনি এমন কিছু পাল্টান যাতে সবকিছু ঠিক হয়ে যায়।

৩১. আপনি মানুষের সাথে মেলামেশা এড়িয়ে চলেন।

৩২. সমস্যায় নিজেকে কাবু হতে দেন না, তাই নিয়ে অত্যাধিক চিন্তা করতে অস্বীকার করেন।

৩৩. আপনি যাকে সম্মান করেন এমন কোন আত্মীয় বন্ধুর উপদেশ চান।

৩৪. কত খারাপ লাগে তা অন্যদের কখনো বুঝতে দেননা।

৩৫. আপনি সমস্যাকে হালকাভাবে নেন, বেশী গুরুত্ব দিতে অস্বীকার করেন।

৩৬. আপনার অনুভূতি সম্পর্কে কারো সাথে কথা বলেন।

৩৭. নিজ সিদ্ধান্তে অটল থাকেন এবং আপনি যা চান তার জন্য লড়াই করেন।

৩৮. আপনি অন্যদের দোষারোপ করেন।

৩৯. একইরকম পরিস্থিতির পুরোন অভিজ্ঞতাকে কাজে লাগান।

৪০. কি করতে হবে তা আপনি জানেন এবং সুষ্টভাবে সেকাজ করার জন্য আপনার প্রচেষ্টা দ্বিগুন করেন।

৪১. সত্যিই যে ঘটনা ঘটেছে আপনি তা বিশ্বাস করতে চান না।

৪২. ভবিষ্যতে এরকম ঘটনা আর ঘটবেনা নিজের কাছে নিজেই তা প্রতিজ্ঞা করেন।

৪৩. সমস্যার একাধিক সমাধান খুঁজে বের করেন।

৪৪. সমস্যার অনুভূতিগুলো যাতে আপনার অন্যান্য কাজকর্মে বাধা না দেয় সে চেষ্টা করেন।

৪৫. আপনি নিজেকে কিছুটা পরিবর্তন করেন।

৪৬. আপনি মনে করেন সব ঠিক হয়ে যাবে।

৪৭. সমস্যা মিটে গেছে এরকম দিবাস্বপ্ন দেখেন।

৪৮. আপনি আল্লাহর কাছে প্রার্থনা করেন।

৪৯. আপনি কি বলবেন বা করবেন মনে মনে তা ভাবেন।

৫০. অপরে এ পরিস্থিতি কিভাবে মোকাবেলা করে আপনি তা ভাবতে থাকেন এবং তাকে অনুকরণ করেন।

Appendix H
Self-report questionnaire 3 (GHQ)

Have Recently ....

(1) been able to concentrate on whatever you to doing?

(2) lost much sleep over worry?

(3) felt that you are playing a useful part in things?

(4) felt capable of making decisions about things?

(5) felt constantly under strain?

(6) felt you couldn't over come your difficulties?

(7) been able to enjoy your normal day-to day activities?

(8) been able to face up to your problems?

(9) been feeling unhappy and depressed?

(10) been losing confidence in yourself?

(11) been thinking of yourself as a worthless person?

(12) been feeling reasonably happy all things considered?

Appendix I

আত্মবিবরণী প্রশ্নমালা ৩ (GHQ)

এই প্রশ্নমালায় আপনার অনুভূতি সম্পর্কিত কিছু প্রশ্ন রয়েছে। প্রশ্নগুলির জবাব এভাবে দিন-

০ = মোটেই না, ১ = কিছুটা, ২ = বেশ খানিকটা, ৩ = খুব বেশী

১. ইদানিং আপনি যা করছেন তাতে কি মনোনিবেশ করতে পারছেন?

২. অত্যন্ত দুশ্চিন্তায় আজকাল আপনার ঘুমে ব্যাঘাত ঘটে?

৩. আপনি আজকাল প্রয়োজনীয় কাজে মনোযোগ দিতে পারেন কি?

৪. আপনি কি বর্তমানে কোনকিছু সম্পর্কে সিদ্ধান্ত গ্রহণে সমর্থ?

৫. আপনি কি ইদানিং সবসময় পীড়ন অনুভব করেন?

৬. অধুনা/সাম্প্রতিক সময়ে আপনি কি আপনার অসুবিধাগুলো দূর করতে সক্ষম হচ্ছেন?

৭. সাম্প্রতিকালে আপনি কি আপনার দৈনন্দিন কার্যসূচী উপভোগ করতে সক্ষম হন? (আপনার কাজ করতে ভালো লাগে কি?)

৮. আপনি কি ইদানিং আপনার সমস্যাগুলোর মোকাবেলা করতে সক্ষম হন?

৯. অধুনা/সাম্প্রতিক সময়ে আপনি কি অসুখী ও বিমর্ষ বোধ করেন?

১০. বর্তমানে আপনি কি আত্ম-বিশ্বাস হারিয়ে ফেলেছেন বলে মনে করেন?

১১. ইদানিং আপনি নিজেকে একজন অপদার্থ (অযোগ্য) ব্যক্তি হিসেবে গণ্য করেন?

১২. অধুনা/সাম্প্রতিক সময়ে আপনি কি নিজেকে সবদিক বিবেচনায় সুখী মনে করেন?

Appendix J

Self-report questionnaire 4 (MS)

There are some statements about the extent of your own control on the events of your life. How strongly do you agree or disagree please express your opinion that in the following ways:

1 = Strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree.

1. I have little control over the things that happen to me.
2. There is really no way I can solve some of the problems I have.
3. There is little I can do to change many of the important things in my life.
4. I often feel helpless in dealing with the problems of life.
5. Sometimes I feel that I'm being pushed around in life.
6. What happens to me in the future mostly depends on me.
7. I can do just about anything I really set my mind to go.

Appendix K

আত্মবিবরণী প্রশ্নমালা ৪ (MS)

এই প্রশ্নমালায় আপনার জীবনের ঘটনাবলীর উপর আপনার কতটা নিয়ন্ত্রণ আছে সে সম্পর্কে কিছু বক্তব্য রয়েছে। এই বক্তব্যগুলির সাথে আপনি কতটা সম্মত বা অসম্মত তা এভাবে প্রকাশ করুন-

১ = সম্পূর্ণভাবে একমত, ২ = একমত, ৩ = একমত নই, ৪ = কখনই একমত নই

১. আপনার জীবনে যা কিছু ঘটে তার উপর আপনার খুব কমই নিয়ন্ত্রণ আছে।

২. আপনার কিছু সমস্যা আছে সত্যিকার অর্থেই যার সমাধান আপনি করতে পারেনা।

৩. আপনার জীবনের বেশ কিছু গুরুত্বপূর্ণ বিষয় পরিবর্তনে আপনার করবার কিছুই নেই।

৪. আপনার জীবনের সমস্যাগুলো মোকাবেলায় আপনি প্রায়ই অসহায় বোধ করেন।

৫. কখনো কখনো মনে হয় আপনার জীবনে অনেক কিছুই করতে আপনি বাধ্য হচ্ছেন।

৬. ভবিষ্যতে আপনার কি ঘটবে তার বেশীর ভাগই আপনার নিজের উপর নির্ভর করছে।

৭. আপনি যা করবেন বলে ঠিক করেন তাই আপনি করতে পারেন।

Appendix L

Self-report questionnaire 5 (LOT)

There are some statements in this questionnaire, please indicate the answers in 'true' or 'false' response.

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I always look on the bright side or things.
5. I`m always optimistic about future.
6. I enjoy my friends a lot.
7. It's important for me to keep busy.
8. I hardly ever expect things to go my way.
9. Things never work out the way I want them to.
10. I don't get upset too easily.
11. I believe in idea that every cloud has a silver lining.
12. I rarely count on good things happening to me.

Appendix M

আত্মবিবরণী প্রশ্নমালা ৫ (LOT)

এই প্রশ্নমালায় কতগুলি বক্তব্য রয়েছে, বক্তব্যগুলির জবাব আপনার ক্ষেত্রে সত্য অথবা মিথ্যা এভাবে চিহ্নিত করুন।

১. অনিশ্চয়তার মধ্যে পড়লে (যখন বুঝতে পারছেননা ভাল কি মন্দ হবে) আপনি সবচাইতে ভালটি ঘটবে বলেই প্রত্যাশা করেন।

২. আপনি খুব সহজেই আরাম (স্বাছন্দ্য) বোধ করতে পারেন।

৩. কোন কিছু খারাপ ঘটতে থাকলে তা ঘটতেই থাকে।

৪. আপনি সবসময় ঘটনার ভাল দিকটি দেখেন।

৫. আপনি আপনার ভবিষ্যৎ নিয়ে সবসময় আশাবাদী।

৬. আপনি আপনার বন্ধুদের সাহাচর্য্য খুবই উপভোগ করেন।

৭. নিজেকে ব্যস্ত রাখা আপনার জন্য খুবই গুরুত্বপূর্ণ।

৮. আপনার ইচ্ছামতই সব কিছুই হবে তা আপনি খুব কমই প্রত্যাশা করেন।

৯. আপনি যেভাবে চান সেভাবে কোন কাজই হয় না।

১০. আপনি খুব সহজেই বিচলিত হয়ে পড়েন না।

১১. 'মেঘের পরেই সূর্য আছে' - আপনি তা বিশ্বাস করেন।

১২. আপনার ভাল কিছু হবে তা আপনি খুব কম আশা করেন।

Appendix N
Answer Sheet

Self-report questionnaire 2

	0	1	2	3
	does not apply	used some what	used quite a bit	used a great deal
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				
31.				
32.				
33.				
34.				
35.				
36.				
37.				
38.				
39.				
40.				
41.				
42.				
43.				
44.				
45.				
46.				
47.				
48.				
49.				
50.				

Total:

Self-report questionnaire 1

	0	1	2	3	4
	Never	Almost Never	Sometimes	fairly often	Very often
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

Total:

Self-report questionnaire 3

	0	1	2	3
	Not at all	Some Wh at	To a conside rable extent	To a great exten t
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

Total:

Self-report questionnaire 5

	0=No	1=Yes
1.		
2.	*	
3.		
4.		
5.		
6.	*	
7.	*	
8.		
9.		
10.		
11.		
12.		

Total:

Self-report questionnaire 4

	1	2	3	4
	Strongly agree	Agree	Disagree	Strongly Disagree
1.				
2.				
3.				
4.				
5.				
6.				
7.				

Total:

Appendix O
উত্তরপত্র

আত্মবিবরণী প্রশ্নমালা ১

	০	১	২	৩	৪
	কখনই না	বেশীর ভাগ সময় না	মাঝে মাঝে	প্রায়ই	খুব বেশী
১.					
২.					
৩.					
৪.					
৫.					
৬.					
৭.					
৮.					
৯.					
১০.					
১১.					
১২.					
১৩.					
১৪.					
১৫.					
১৬.					
১৭.					
১৮.					
১৯.					
২০.					

Total:

আত্মবিবরণী প্রশ্নমালা ২

	০	১	২	৩
	কখনই করি না	মাঝে মাঝে করি	বেশ কিছুবার করি	অনেকবার করি
১.				
২.				
৩.				
৪.				
৫.				
৬.				
৭.				
৮.				
৯.				
১০.				
১১.				
১২.				
১৩.				
১৪.				
১৫.				
১৬.				
১৭.				
১৮.				
১৯.				
২০.				
২১.				
২২.				
২৩.				
২৪.				
২৫.				
২৬.				
২৭.				
২৮.				
২৯.				
৩০.				
৩১.				
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৪৫.				
৪৬.				
৪৭.				
৪৮.				
৪৯.				
৫০.				

Total:

আত্মবিবরণী প্রশ্নমালা ৩

	০	১	২	৩
	মোটেই না	কিছুটা	বেশ খানিকটা	খুব বেশী
১.				
২.				
৩.				
৪.				
৫.				
৬.				
৭.				
৮.				
৯.				
১০.				
১১.				
১২.				

Total:

আত্মবিবরণী প্রশ্নমালা ৪

	১	২	৩	৪
	সম্পূর্ণভাবে একমত	একমত	একমত নই	কখনই একমত নই
১.				
২.				
৩.				
৪.				
৫.				
৬.				
৭.				

Total:

আত্মবিবরণী প্রশ্নমালা ৫

	০=না	১=হ্যাঁ
১.		
২.	*	
৩.		
৪.		
৫.		
৬.	*	
৭.	*	
৮.		
৯.		
১০.		
১১.		
১২.		

Total:

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