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Implementation of Water Safety Plan Considering Climatic Disaster Risk Reduction in Bangladesh: A Study on Patuakhali Pourashava Water Supply System

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Abstract

Disaster extreme events and its variability have been posing a substantial threat to the water supply system considering the physical, chemical and biological hazards. The aim of this research is to find out the major disaster risks which have subsequent impacts on water supply system. To attain the research objectives both qualitative and quantitative data were collected through household level questionnaire survey, visual observation, literature review, key informants interview (KII), sanitary inspection and laboratory analysis for water quality testing. The study was conducted among 100 households of Patuakhali Pourashava. Water samples were collected from randomly selected households and pumping stations from different wards of the study area. About 54 percent of the respondents marked that increase of temperature, excessive rainfall and frequent storms are common disaster risks in the study area and around 67 percent of them mentioned that these disasters have impacts on water supply system. Erratic heavy rainfalls, cyclones and sometimes inundation due to river floods the user connection for few hours or number of days which allows the contaminated water to entry into the pipeline when there is no pressure. The study reveals that almost 89 percent of Pourashava dwellers do not trust on the quality of water that they get from supply system, so they do not use supply water for drinking. Nearly 11 percent of the dwellers drink supply water as they think the supplied water is not contaminated. About 39 percent of the respondents mentioned that the technology has been becoming non-functional and the water quality is degrading during pre-monsoon period and water does not meet the demand in some parts of the supply system. Therefore, this particular research will provide a condensed view for implementing of water safety plan for disaster risk reduction (DRR) in safe drinking water management considering resilience.

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1. Introduction

Providing good and safe drinking-water is world-wide considered to be a fundamental issue for public health protection, and must be the primary objective of water supply systems [1]. Access to safe drinking-water is a basic need and is one of the most important contributors of public health. According to the WHO and UNICEF report, one-sixth of humanity lack access to any form of safe and improved water supply within 1 kilometer of their home and one-fifth of humanity lack access to any form of adequate and improved excreta disposal [2]. Endemic and epidemic disease derived from unsafe water supply affects all nations. Outbreaks of waterborne disease continue to occur in both developed and developing countries, leading to loss of life, disease and economic burden for individuals and communities [3]. In recent decades, the climate change issues added a burden pressure for safe drinking water supply in Bangladesh. The impact of climate variability and climate extreme events are noticeable in water resource sector in Bangladesh with a variable degree considering the geography. The country has already been experiencing too little water in dry season, too much water during monsoon, wrong time type of water and wrong type time of water [4]. Such changing pattern of distribution of water seriously affects the livelihood of the people which encompasses from agricultural productivity to drinking water supply and personal hygiene. In addition, climate extreme events like flood, drought, sea level rise, storm, tidal surges etc. has been making those situations worse. Safe drinking water consumption is the pre-requisite for maintaining sound health [5]. The magnitude of the impact of climate variability and change on the safe water supply system differs with respect to the geography, technology type, environmental settings and people's health vulnerabilities (like water washed/born/ related diseases). Proper improvement and implementation of water safety plan can minimize such risks including the future risks considering the climate change, its variability and climate extreme events and thus ensuring the drinking water safety and security.

2. Methodology

Patuakhali Pourashava water supply system was selected considering the geography for the implementation of water safety plan. The Patuakhali Pourashava water supply system has around 4492 users. The user list was collected from the Pourashava and users were selected which were proportionally distributed in each ward. The sample size for this research was 100.The study was done with the close accordance of objectives. Both quantitative and qualitative data were used to complete the study. The researcher was conducted household survey, visual observation, sanitary inspection and Key Informant Interviews (KII) with pertinent stakeholders to gather in depth knowledge and information about the water safety plan, their problems in implementation process of the area under study, and how to make the water safety plan program more effective tool for safe drinking water management considering climatic risks. Household survey method was used to collect primary data directly from the Pourashava water supply users who were directly related with implementation process and this helped to get information which was very much helpful in the study. The survey questionnaire was prepared in a peer-review process so that it consistent with the subject and local issues. Sanitary inspection method was used to identify the hazardous events risk and their impacts on water supply system. Both source and household's storage water samples were testing for the physical, chemical and microbial quality analysis. A total of nine water samples, one from each ward were collected for microbiological (FC) quality analysis. The water samples were collected from the nearest water supply users of the distribution line in any ward, middle and the farthest. The source water was checked for FC, pH, Salinity, Arsenic, Iron, Manganese. E. coli bacteria were testing by expert professional of Department of Public Health Engineering. Physical parameters were tested by HACH potable kit boxes. All the testing was conducted in the field. For the assessment of identified risks (Risk=Likelihood x Severity) equation was used. The study also used content analysis. This included collecting related information and data from all relevant government documents, important office documents and books, published and unpublished research works available, online articles etc. Cross-check interviews were conducted with Pourashava water supply engineer, relevant governmental and non-governmental organization officers, local community people for the cross validation of data. Where information was found to be contradictory, further assessment was carried out.