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Study The Impact of Measuring Water Sector in West Bengal

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Abstract

The West Bengal Drinking Water Sector Improvement Project (WBDWSIP or the project) seeks to provide about 1.65 million people in the arsenic-, fluoride-, and salinity-affected areas of Bankura, North 24 Parganas, South 24 Parganas, and Purba Medinipur districts of West Bengal with safe, sustainable, and inclusive drinking water services in accordance with standards set by the Government of India. West Bengal's drinking water security is strengthened because of this project. The project will build water systems that can withstand the effects of climate change, as well as improve the institutions and capabilities of those who provide water services. Through the 4,800 kilometres of water distribution network, metered connections will be made to homes based on district metering areas. There will be a total of three water purification facilities and one hundred and ten water storage reservoirs, all of which will be wired into a central SCADA-based monitoring system. A state-level body, the Public Health Engineering Department (PHED), will oversee the bulk water delivery facilities, while the respective gramme panchayats will oversee the distribution network and services within the villages. This model is innovative, inclusive, and sustainable, and it has been formally incorporated into the project.

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1.Introduction

In this age of rapid urbanisation and climate change, the problem of ensuring a steady supply of potable water is at the forefront of scientific and political debate. Both industrialised and developing countries face the same sustainability challenge, as they must ensure they have access to sufficient quantities of high-quality water at an affordable price while also addressing the increased need to purify their water supplies. Existing water infrastructure systems in wealthy countries, such as the United States, are outdated; renewals and upgrades to these systems require substantial financial investment. [3] Rapid urbanisation in developing nations like China places a heavy burden on the existing urban water infrastructure. Creating safe, secure, and sustainable drinking water systems to satisfy current and future needs is an interesting and hard subject. Because of this, in October 2011, scholars from Zhejiang University (China), the United States Environmental Protection Agency (USEPA), and the University of Alberta (Canada) convened in Hangzhou, China, for the International Conference on Drinking Water Safety, Security, and Sustainability. The meeting was attended by academics from 18 different nations. Water supply, water security, and growing challenges were among the many topics covered and viewpoints voiced. After

that, in October 2012, a call for papers for this special issue was issued with a deadline for submitting manuscripts. The foundations of sustainable water supply have been more efficient water treatment and improved management of distribution networks, whether through engineering or the management of existing systems. This special issue of research devoted to prospective technologies and novel sciences reports on more effective bromate removal using a nanoparticle zero-valent iron and the optimal operating conditions. Polish researchers report their findings on the occurrence of nitrogen compounds in water systems. [2] For instance, nitrogen in source water can pose problems for drinking water supplies, a concern of increasing importance given persistent nonpoint source and point-source contamination. In order to get rid of various impurities, like chemical oxygen demand (CODMn) and ammonia nitrogen, researchers have studied the effects of a large-scale implementation of catalytic ozonation and an upflow biologically activated carbon reactor. [6]

National Water Resources Policy

Farmers are encouraged to take part in all aspects of irrigation management, from water distribution to tax collection, under a strategy that dates back to 1987 and is seen as the first step towards a national policy. The National Water Policy of 2002 reaffirmed a community-based method of agricultural water management. In order to formally establish the Participatory Irrigation Program [7], the federal government has released a model bill and urged the states to pass new legislation (PIM). To maximise economic and social welfare while minimising environmental damage, the United Nations Conference on Sustainable Development (Rio+20) promotes integrated water resource management (IWRM). [6] Sustainable development goals relating to water are monitored through IWRM, which is connected to national planning programmes. IWRM is regarded as the most effective tactic for mitigating the negative effects of climate and other changes. The potential of IRWM in West Bengal is a tricky matter. While water management is a state responsibility, the provision of water is a federal responsibility. Regional spheres, inter-sectoral interests, and even transboundary concerns all play a role in the nation-wide issues of water resource management and water governance. As [1] we require a unified, all-encompassing national water policy that specifies the roles of the states and the federal government.Avoiding pointless finger-pointing that could compromise water's environmental-economic accounting is a good first step. Post-independence government efforts to improve access to safe drinking water focused mostly on metropolitan centres, while rural areas were generally ignored. The Swajaldhara programme, however, was officially launched on December 25, 2002, with the goal of supplying rural communities with clean water. State governments and implementing agencies in Swajaldhara adhere to the reforms in principle by using a demand-responsive strategy that includes community input. The National Water Mission, which aims to increase water efficiency by 20%, is another government programme.

Demand for Coordinated Strategy

In the Gram Panchayats, water distribution to individual homes cannot be viewed in a vacuum. Sanitation and the water cycle go hand in hand. Specifically for the Gram

Panchayats, this section examines the challenges and procedures of water and sanitation safety planning, which involves merging water safety planning with sanitation safety planning and employing a framework similar to that used in water safety planning. [5] By 2021, the state of West Bengal is expected to have developed water and sanitation safety planning guidelines as well as sample water and sanitation safety plans (WSSPs) for the project Gram Panchayats in each of the districts included in the West Bengal Drinking Water Sector Improvement Project (WBDWSIP). Sanitation and personal cleanliness are fundamental to any respectable way of life. The sanitation situation in the villages where the trial initiatives are being implemented is, unfortunately, dismal. Assuming daily water use averages 70 litres per person, if the villagers don't start using rain barrels and soaking pits to collect their grey water, there could be serious drainage issues. There is a risk of an increase in vector-borne diseases, the formation of cesspools, and the destruction of village roadways.

Planning Difficulties for Water and Sanitation Safety

A complete WSSP is difficult to establish and implement because of the demographic and socioeconomic features, as well as the institutional and physical capabilities, of the rural water supply and sanitation service sector. The following are among the most pressing limitations and worries: [8]

scarce resources for gathering information.

In rural locations, it can be difficult to get your hands on even the most fundamental information regarding catchment and source water quality, as well as the many moving parts of water transfer, distribution, storage, and home handling. Without consistent data and information from sanitary inspections, it is difficult to assess the hazards of chemical and microbiological contamination throughout the system, from the catchment to the consumers' end.

Unsanitary conditions.

Increased risks of faecal contamination of the system can be found in rural regions due to the poor state of rural sanitation, which includes facilities for human excreta disposal, drainage, and solid waste management.

Inadequate familiarity with municipal water distribution systems.

Many details about the piped water supply system and its management may be unavailable due to a lack of cultural knowledge in community water supply management, poor record keeping, or a lack of post-construction documentation in most village-level organisations in rural areas.[9]

It's also not the norm for residents to have access to this much treated water in their homes. Waste management and the prevention of contamination of the surrounding environment may require the installation of additional amenities, such as a sewage system and showering areas, within the grounds.

Equipment and trained workers are in short supply.

In rural locations, it might be difficult to gain access to resources and infrastructure, including laboratories, skilled personnel, and technical know-how. These issues call for the WSSP to do things like increase its own capabilities and raise funds. [7]

2.Materials And Methods

Study area

The West Bengal Drinking Water Sector Improvement Project (WBDWSIP or the project) seeks to provide about 1.65 million people in the arsenic-, fluoride-, and salinity-affected areas of Bankura, North 24 Parganas, South 24 Parganas, and Purba Medinipur districts of West Bengal with safe, sustainable, and inclusive drinking water services in accordance with standards set by the Government of India. Throughout the three project districts of Bankura, Purba Medinipur, and the North (and South) 24 Parganas, 2,013 homes were surveyed as part of the baseline study.

Study design

According to the project's implementation strategy, a matched difference-in-difference approach will be utilised to assess the project's impact. Households in both the project villages and the matched control villages will need to be surveyed at the beginning and end of the process. Pre-intervention characteristics will be used for a two-stage matching process, first at the block and/or gramme panchayat level and then at the household level. Households in project and non-project gramme panchayats will be matched based on their baseline characteristics at estimation as well as matching at the block and/or gramme panchayat level during sampling.

Data collection:

Prior to the start of the study, a household survey was developed for both the treatment and comparison houses to gather data on indicators of interest for the future effect evaluation. Demographics, levels of education and health, participation in paid or unpaid household or community activities, participation in the labour market, access to clean water and sanitary facilities, financial resources, housing quality, and ownership of material assets were all taken into account in the development of the survey questionnaire. An organisation based in the area was hired specifically to carry out the survey. The fieldwork for the survey occurred from January through August of this year. Two teams, working simultaneously within the same block, took part in a tablet-based survey to meet the deadline. In order to minimise the possibility of mistakes being made in the field, each surveyor received hands-on instruction in the use of tablets for field surveying. Members of the Gram Panchayats responsible for the surveyed villages accompanied the survey teams.

3.Results

Table 1. Distribution of Sample by Districts and Gram Panchayats

Districts	Project		Non project		total	
	Gram panchayats	Households	Gram panchayats	Households	Gram panchayats	Households
North (and south)24 parganas	11	438	11	424	22	862
Bankura	5	150	5	155	10	305
Purba medinipur	12	420	13	426	25	846
Total	28	1008	29	1005	57	2013

Table 2. Educational level of the respondents

Education level	Percentage
Class 10	31
Class 12	21
illiterate	28

4.Discussions

A prospective effect evaluation strategy, which factored in the actual implementation of the project, served as the basis for the sample plan. In order to achieve reliable results, the survey data were conceptually grounded in a theory of change. It discusses the project's context as well as intermediate and ultimate indications of its impact. A summary of the primary findings from the data collection process is provided here. [10] Water source-related health hazards, such as arsenic poisoning, fluorosis, and salinity-related annoyances and diseases, and a lack of piped water supply played a role in the selection of project regions. Improving the institutional and operational capability of local bodies (in this case, gramme panchayats) in administering the water system is critical to the preservation of water assets and services across the state and in the project regions. Due to limited funding, not all potential building sites in a given project district are chosen. Furthermore, there is no stratification of neighbourhoods based on income (e.g., poverty). [13] However, each project block has a similar block in the same district that can be used as a comparison block when calculating impacts. In addition, villages for both the treatment and control groups were chosen at

random from blocks designated as either the treatment or the control group. When data from the 2015–2016 National Family Health Survey (NFHS-4) for West Bengal were available, they were used as a comparison for the survey's output indicators. While the NFHS-4 is a state wide survey and the survey only covers individual districts, both were determined to be equivalent. The survey found that among the sample houses, 43% got their drinking water from a tube well or borehole, 34% got it from a public hand pump, and 13% got it from their own hand pump. [12] When comparing project and non-project areas, those living in the former have a lower percentage of residents using public handpumps (28% versus 41%) and a higher percentage of residents using tube wells or bore holes (46% versus 40%) and bottled water (6% versus 2%) than those living in the latter. Water availability for human use (such as handwashing, drinking, bathroom usage, and cooking) is lower in project regions compared to non-project areas, with availability averaging 40 to 44 hours per week for those having public water supply sources. In project regions, just 4 percent of homes utilise motorised pumps, while 8 percent do so in non-project areas.

5.Conclusions

The theory of change informs the content of the baseline survey questionnaire, which aims to capture the most important intermediate and ultimate results of a water project. This report serves as a baseline study, with a primary focus on comparing and contrasting the treatment and control areas in order to better understand the project's final impact. In order to have a more complete picture of what happens on the ground, the evaluation of the project after it's completed should take into account different methodologies and data-generating methods. [14] Secondary data, such as the National Sample Survey and the NFHS, should be extensively used to back up and validate survey data for use in post-implementation effect assessments. The quantitative portion of the project's completion review would also benefit from the incorporation of qualitative approaches and social analysis. Involving a public health expert is crucial because their knowledge of public health issues in relation to water quality and sanitation can help shape the project's goals and guiding principles. As part of the post-project impact assessment and the qualitative parts of the evaluation survey, the public health expert could offer their expertise. The social aspects of the study, such as how project interventions have improved the lives of people across socioeconomic lines, should be reflected in the stories of effect included in the final report of the project's impact assessment. [15]

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