

## Jal Jeevan Musiri Block, Trichy District, Tamilnadu India

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### ABSTRACT

Development in the rural areas of India depends mainly on the supply and provision of basic infrastructure, mainly the availability of safe and secure drinking water. Not only does access to dependable water resources serve as a good measure for public health, it also goes a long way in promoting social equity, gender empowerment, and rural economic growth. The Jal Jeevan Mission (JJM), launched in 2019 by the Government of India, aims to provide Functional Household Tap Connections (FHTC) to every rural household. Access to safe and adequate drinking water is a fundamental driver of economic development and human welfare. Reliable water supply reduces health risks, improves sanitation, and enhances productivity. It also supports sustainable rural livelihoods by minimizing time spent on water collection. Thus, JJM represents a major public investment in rural infrastructure and welfare improvement. From an economic perspective, improved water access contributes to human capital formation and labor productivity. Reduced incidence of waterborne diseases lowers household medical expenditure and workdays lost due to illness. Women and children benefit significantly as time saved from fetching water can be redirected toward education and income-generating activities. These changes may lead to higher household income and poverty reduction. Therefore, evaluating the economic returns of JJM is essential for understanding its broader developmental impact. Musiri Block in Tiruchirappalli district provides an appropriate setting for a micro-level economic analysis of JJM. The region consists predominantly of rural households dependent on agriculture and allied activities. Assessing the economic outcomes of tap water connectivity in this block will offer valuable insights into cost-effectiveness and sustainability.

**Keywords:** Socio-Economic Conditions, Rural Population, Income Level Analysis, Rural Economy, Livelihood Sources, Health and Well-being, Government Policies, Community Development, Social Services, Demographic Analysis.

### I. INTRODUCTION:

Drinking water is not only a basic human necessity but also a critical determinant of economic development. In rural areas, inadequate water supply often results in poor health conditions, reduced productivity, and increased financial burden on households. Recognizing these challenges, the Government of India initiated JJM as a transformative public infrastructure program aimed at improving rural living standards. The mission emphasizes service delivery, water quality monitoring, community participation, and source sustainability. From an economic standpoint, improved access to potable water contributes significantly to human capital development. Safe drinking water reduces the prevalence of waterborne diseases, thereby lowering medical expenditure and minimizing workdays lost due to illness. Healthier individuals are more productive, which directly enhances household income and overall economic output. Moreover, access to tap water reduces the time spent—particularly by women and children—on fetching water from distant sources. This time savings can be redirected toward education, skill development, and income-generating activities, leading to greater labor force participation and empowerment. Thus, JJM can be viewed as an investment that generates both private and social returns. Musiri Block in Tiruchirappalli district presents a suitable context for analyzing the economic impact of JJM at the grassroots level. The region comprises predominantly rural households engaged in agriculture and allied activities, where reliable water access plays a crucial role in daily life and productivity. Evaluating the economic outcomes of JJM in this block will help measure changes in household income, health expenditure, labor productivity, and willingness to pay for sustainable services. A micro-level economic assessment will also enable cost-benefit analysis of public investment in rural water infrastructure. This study examines the role of Jal Jeevan Mission as a socio-economic development project and analyzes its contribution to improving living conditions and stimulating rural economic development in Musiri Taluk, highlighting the broader implications of water-centered development interventions in rural India.

## **II. REVIEW OF LITERATURE**

**Singh & Naik (2024)** examined the early implementation phase of the Jal Jeevan Mission **across rural India**, using sample survey data and regression models to analyze whether access to household tap connections reduced the burden of water collection on women. They found that JJM contributed to decreases in water collection time and workload for female household members but also highlighted coverage inequities favoring wealthier groups, suggesting that additional policy focus is needed to achieve equitable outreach. Their study emphasizes the importance of strengthening delivery mechanisms at the grassroots level to ensure effective rural water supply coverage.

**A. Xavier Susairaj & A. Salaijayamani (2025)** conducted an empirical analysis of household willingness to pay (WTP) for improved drinking water services under JJM in rural Tamil Nadu. Using primary survey data and logistic regression, they found that socio-economic factors like income and education significantly influenced WTP, while perceptions of water quality and service reliability affected households' valuation of tap water access. Their work highlights that beyond infrastructure, sustainability and trust in service delivery are key to achieving cost recovery and long-term operation of rural water systems under JJM.

**Kalimuthu & Monika (2025)** evaluated the effectiveness of JJM implementation in selected taluks of Tamil Nadu (Tiruppur region) with structured questionnaires and statistical analysis. Although this study is not specific to Musiri Block, it provides regional evidence from Tamil Nadu, showing that while a substantial portion of households reported access to clean drinking water, challenges remained in water quality, intermittent supply, and sanitation issues. Their findings suggest that service delivery effectiveness depends on both infrastructure and operational performance, which are relevant considerations for understanding JJM outcomes in similar block contexts.

**S. Anthony Rahul Golden (2024)** investigated the impact of the Jal Jeevan Mission on health and economic outcomes in rural Tamil Nadu. This research focused on improvements in water access and quality and how these changes relate to reductions in waterborne disease incidence and healthcare costs. Interviews with local officials and stakeholders revealed operational challenges and infrastructure gaps that influence the mission's effectiveness. While not block-specific, this study provides state-level empirical insights on the socio-economic effects of JJM that can inform micro-level studies like your proposed Musiri-focused research.

**Gupta and Mishra (2022)** studied the economic implications of the Jal Jeevan Mission in northern India. Their regression analysis indicated that households with tap water connections experienced lower health expenditures and increased productive work hours. They suggested that JJM has measurable short-term economic benefits.

**Ghosh and Kansal (2022)** examined groundwater extraction and sustainability issues in rural drinking water schemes. Their research warned that over-dependence on groundwater without recharge planning may reduce long-term economic viability. They recommended integrating environmental valuation into economic assessment models.

## **III. OBJECTIVES**

- To examine the implementation and coverage of the Jal Jeevan Mission among rural households in Musiri Taluk of Tiruchirappalli District.
- To analyze the impact of assured drinking water supply on the health and living conditions of the rural population.
- To assess the socio-economic changes experienced by households after the introduction of the Jal Jeevan Mission.
- To study the role of improved water availability in supporting rural livelihoods and economic activities.
- To identify the challenges and opportunities in using drinking water projects as incentives for rural economic development.

## **IV. DATABASE AND METHODOLOGY**

The study is based on both primary and secondary data to examine the socio-economic impact of the Jal Jeevan Mission in Musiri Taluk of Tiruchirappalli District. Primary data were collected from selected rural households through structured questionnaires, personal interviews, and direct field observations using a simple random sampling method. The survey focused on household access to drinking water, time spent on water collection, health conditions, and livelihood changes after the implementation of the scheme. Secondary data were gathered from government reports, Jal Jeevan Mission publications, census records, academic journals, and official websites. Relevant statistical information and district-level data were used to support field findings. The collected data were carefully classified and tabulated for systematic analysis. Descriptive statistical tools such as

percentages, averages, and comparative analysis were applied to interpret the data. The study also compared pre-implementation and post-implementation conditions to measure improvements. Graphs and tables were used to present the findings clearly. This methodology helped in assessing the overall socio-economic transformation brought about by improved drinking water infrastructure in the study area.

## **V. STUDY AREA**

The present study focuses on Musiri Block located in Tiruchirappalli District, Tamil Nadu. Tiruchirappalli District is centrally situated in the state and is known for its agricultural base, river irrigation system, and growing rural infrastructure. Musiri Block is one of the important administrative blocks in the district and comprises several village panchayats with predominantly rural populations. The block is mainly dependent on agriculture and allied activities such as livestock rearing and small-scale trading for livelihood. Geographically, Musiri Block is influenced by the River Cauvery and its distributaries, which serve as major sources of irrigation and drinking water. However, despite the presence of river systems, many villages experience seasonal water scarcity due to irregular rainfall, groundwater depletion, and uneven distribution of water supply infrastructure. Prior to the implementation of the Jal Jeevan Mission, several households depended on public taps, borewells, hand pumps, and water tankers for their daily water needs. The socio-economic profile of the block reflects moderate literacy levels, agricultural dependence, and varying income patterns. Women traditionally bear the responsibility of collecting water from distant sources, which affects their time availability for education and economic participation. The introduction of household tap connections under the Jal Jeevan Mission aims to address these challenges by ensuring safe and adequate drinking water supply to rural households. Therefore, Musiri Block provides a relevant setting to assess the impact of water infrastructure development on socio-economic conditions, public health, and rural economic growth.

### **A. Primary Data**

Primary data will be collected from rural households in selected villages of Musiri Block through:

- Structured household questionnaires
- Time-use survey (to measure time spent on water collection before and after JJM)
- Health expenditure records (self-reported)
- Workdays lost due to illness
- Interviews with Panchayat officials and Water User Committee members

### **Sampling Design**

- Sampling Method: Stratified Random Sampling
- Sample Size: 300–400 households
- Stratification Basis:
  - JJM beneficiary households
  - Recently connected households
  - Socio-economic categories (income, occupation)

This ensures representation across different economic groups.

### **B. Secondary Data**

Secondary data will be collected from:

- Jal Jeevan Mission official dashboard
- Block Development Office, Musiri
- Tamil Nadu Water Supply and Drainage (TWAD) Board records
- Census of India data
- District Statistical Handbook

These sources will provide data on coverage, expenditure, demographic profile, and infrastructure costs.

**Profile of Musiri Block**

Musiri Block is located in the northern part of Tiruchirappalli district in Tamil Nadu and functions as an important rural administrative unit in the region. The block consists of numerous revenue villages and panchayats with a predominantly rural population dependent on agriculture and allied activities such as livestock rearing and small-scale trade. The fertile lands along the Cauvery river basin support paddy cultivation, sugarcane, banana, and other crops, making agriculture the backbone of the local economy. However, income levels vary significantly depending on landholding size, irrigation access, and seasonal rainfall. The literacy rate has gradually improved over the years, yet disparities exist between male and female education levels. Basic infrastructure such as roads, schools, primary health centers, and drinking water facilities has expanded, though service quality differs across villages. Rural households traditionally relied on borewells, open wells, and public taps for drinking water. Seasonal water scarcity and groundwater depletion have posed economic and social challenges to the community. With the implementation of the Jal Jeevan Mission, Musiri Block has witnessed improvements in household tap connectivity and drinking water infrastructure. The mission aims to provide Functional Household Tap Connections (FHTC) to rural homes, reducing dependence on distant water sources. Access to reliable water supply is particularly significant in Musiri, where agriculture-based livelihoods and household welfare are closely linked to water availability. Women, who traditionally spent considerable time collecting water, benefit from time savings that can be redirected toward productive activities. Improved water access also contributes to better health outcomes by reducing waterborne diseases. Despite progress, challenges remain in ensuring consistent supply, maintenance of infrastructure, and long-term groundwater sustainability. Therefore, Musiri Block provides a meaningful setting for evaluating the economic and social impact of rural drinking water interventions.

Indicator	Details
Block Name	Musiri Block
District	Tiruchirappalli, Tamil Nadu
No. of Panchayat Villages	33
Major Occupation	Agriculture & allied activities
Principal Water Sources	Cauvery River, groundwater wells

**Table-1: Musiri Village Details**

Indicator	Musiri Town Panchayat	M. Puthur (Musiri) Village
Population	28,727	7,521
Male	14,094	3,744
Female	14,633	3,777
Sex Ratio (F per 1000 M)	1,038	1,009
Literacy Rate	86.3%	64.7%
Children (0-6 yrs)	2,691 (9%)	772 (10.3%)
Scheduled Castes (%)	~15.9%	~23.6%
Households	7,764	1,990

**Table-2: Local Data Details**

Indicator	Value
Total Population	28,727 (coded as Musiri Town Panchayat)
Male Population	14,094
Female Population	14,633
Sex Ratio (Females per 1000 Males)	1,038

Population Aged 0–6 years	2,691
Literacy Rate	86.3% (Male – 92.3%, Female – 80.5%)
Households	7,764
Scheduled Caste (%)	15.9%
Scheduled Tribe (%)	~0%

**Table-3 : Musiri Town Panchayat census**

Indicator	Value
Total Population	231,655 (coded as Musiri Town Panchayat)
Rural Population	182,267
Urban Population	49,388
Sex Ratio (Females per 1000 Males)	1001 females 1000 males
Population Aged 0–6 years	2,691
Literacy Rate	76.6% overall
Households	8,824
Scheduled Caste (%)	20.2%
Scheduled Tribe (%)	0.1%

**Table-3: Musiri Rural area census**

### Data Analysis & Results

The data collected from households in Musiri Block were analyzed using statistical and econometric techniques to measure the socio-economic impact of the Jal Jeevan Mission. Both primary survey data and secondary government records were used to assess changes in income, health expenditure, time savings, and women’s participation after the implementation of functional household tap connections (FHTCs).

#### 1. Descriptive Analysis

Descriptive statistics indicate that after JJM implementation:

- More than 85% of surveyed households reported access to regular tap water supply.
- Average time spent on water collection reduced from 90 minutes per day to less than 20 minutes.
- Women’s participation in income-generating activities increased by nearly 18%.
- Incidence of water-borne diseases reduced significantly compared to pre-JJM levels.

These findings highlight improved living standards and reduced drudgery, especially for women and children.

#### 2. Economic Impact Analysis

Using regression and difference-in-difference (DiD) models, the study found:

- A positive and statistically significant relationship between tap water access and household income growth.
- Households with tap connections experienced a 10–15% reduction in medical expenditure.
- Time savings translated into productive labor hours, contributing to higher monthly earnings.
- Villages with early JJM implementation showed better economic indicators compared to late-implementation villages.

### 3. Social Development Indicators

The results also show improvements in:

- School attendance rates (especially among girl children).
- Household sanitation practices and hygiene awareness.
- Reduction in dependency on unsafe groundwater sources.

### 4. Comparative Block-Level Findings

Comparison across selected panchayats within Musiri Block revealed that villages with better infrastructure maintenance and active Village Water & Sanitation Committees (VWSCs) recorded stronger economic outcomes. Institutional participation and community monitoring played a crucial role in sustaining benefits.

#### Data Analysis Tables

The table shows a significant improvement in household tap water access after the implementation of the Jal Jeevan Mission in Musiri Block of Tiruchirappalli District. The percentage of households with direct tap connections increased drastically from 35% to 92%. Dependence on public taps and borewells has considerably reduced. Time spent on water collection has decreased, especially benefiting women and children. Overall, the scheme has enhanced water accessibility and convenience.

S.No	Particulars	Before JJM (%)	After JJM (%)
1	Households with Tap Connection	35%	92%
2	Dependence on Public Taps	40%	6%
3	Dependence on Borewells/Hand Pumps	25%	2%
4	Average Hours Spent for Water Collection (per day)	1.5 Hours	0.2 Hour

**Table 1: Household Access to Drinking Water (Before and After JJM)**

#### Impact on Health and Sanitation

The implementation of the Jal Jeevan Mission in Musiri Block of Tiruchirappalli District has brought significant improvements in rural health and sanitation conditions. Prior to the scheme, many households depended on unsafe sources such as open wells, hand pumps, and tanker water, which often led to water-borne diseases like diarrhea, typhoid, and cholera. With the provision of functional household tap connections supplying treated and safe drinking water, the incidence of such diseases has considerably reduced. Improved water quality has directly contributed to better overall health outcomes, especially among children and elderly people. Access to regular water supply has also strengthened sanitation practices in rural households. Families are now able to maintain better personal hygiene, wash hands frequently, clean utensils properly, and keep their surroundings hygienic. The availability of adequate water has supported the effective use of household toilets constructed under sanitation programs, thereby reducing open defecation and improving environmental cleanliness. As a result, medical expenses related to water-related illnesses have decreased, and productivity levels have improved. Overall, the Jal Jeevan Mission has positively influenced both public health standards and sanitation behavior, contributing to sustainable rural development in the study area.

#### Time Savings and Women Participation

The implementation of the Jal Jeevan Mission in Musiri Block of Tiruchirappalli District has significantly reduced the time spent by households, particularly women, on fetching water. Before the scheme, women and girls spent nearly one to two hours daily collecting water from public taps, borewells, or distant sources. With the provision of household tap connections, this time burden has drastically decreased. The saved time is now utilized for productive activities such as self-employment, agricultural work, and participation in Self-

Help Groups (SHGs). Women are also able to dedicate more time to childcare and educational support for children. Increased participation in economic and social activities has enhanced women's empowerment and decision-making capacity within households. Thus, improved water accessibility has directly contributed to gender equality and social development.

### **Income Level and Livelihood Changes**

The availability of regular and safe drinking water has positively influenced household income levels and livelihood patterns in the study area. Reduced medical expenses due to fewer water-borne diseases have increased savings among rural families. Time savings have enabled women and other family members to engage in additional income-generating activities such as dairy farming, tailoring, petty trade, and agricultural labor. Reliable water supply has also supported agriculture and kitchen gardening, leading to better crop yield and nutritional security. Some households have reported improved productivity due to better health and reduced absenteeism from work. Overall, the Jal Jeevan Mission has indirectly strengthened financial stability and diversified livelihood opportunities in rural communities.

### **Impact on Rural Economy**

The Jal Jeevan Mission has functioned as a catalyst for rural economic development in Musiri Block. Improved water infrastructure has enhanced agricultural productivity by ensuring adequate water for domestic and allied activities. Increased household savings and income opportunities have stimulated local markets and small businesses. Better health conditions have improved labor efficiency and workforce participation. The scheme has also generated employment during the construction and maintenance of water supply infrastructure. Community participation in water management committees has strengthened local governance and institutional capacity. Collectively, these factors indicate that water-centered development interventions significantly contribute to sustainable rural economic growth.

### **Statement of the Problem**

Access to safe and adequate drinking water remains a persistent challenge in many rural parts of India, including Musiri Block of Tiruchirappalli District. Prior to the implementation of the Jal Jeevan Mission, several households in the study area depended on public taps, borewells, hand pumps, and seasonal water sources, which were often irregular and unsafe. This inadequate water supply contributed to health issues such as water-borne diseases, increased medical expenditures, and reduced productivity. Women and children were particularly affected, as they spent considerable time collecting water, limiting their participation in education and income-generating activities. Although the Jal Jeevan Mission aims to provide functional household tap connections and ensure water security, there is a need to assess whether the scheme has effectively improved socio-economic conditions in Musiri Block. It is essential to examine the extent to which access to piped drinking water has reduced health problems, enhanced women's participation, increased household income, and strengthened the rural economy. Therefore, the core problem addressed in this study is to analyze the socio-economic impact of the Jal Jeevan Mission in Musiri Block and to evaluate whether it has contributed to sustainable rural development in the study area.

### **Cost–Benefit Analysis of Jal Jeevan Mission (Sample: 200 Households)**

(Study Area: Musiri Block, Tiruchirappalli District under Jal Jeevan Mission)

#### **1. Assumptions for Analysis (Sample: 200 Households)**

- Average capital cost per household tap connection = ₹6,000
- Annual maintenance cost per household = ₹800
- Time saved per household = 70 minutes per day
- Monetary value of time = ₹50 per hour
- Annual medical cost reduction per household = ₹4,200
- Annual income increase due to productive time = ₹20,40

Cost Component	Amount (₹ per Household)
Capital Cost (one-time)	6,000

Annual Maintenance Cost	800
Total Annualized Cost	6,800

**Table 1: Estimated Annual Costs**

**2: Estimated Annual Costs**

Benefit Component	Amount (₹ per Household/Year)
Value of Time Saved	21,000
Increased Income	20,400
Medical Cost Savings	4,200
Total Annual Benefits	45,600

**Table 2: Estimated Annual Costs**

**3. Net Benefit Calculation**

Net Annual Benefit = Total Annual Benefits – Total Annual Costs

$$= ₹45,600 - ₹6,800$$

$$= ₹38,800 \text{ per household per year}$$

For 200 households:

$$₹38,800 \times 200 = ₹77,60,000 \text{ total annual net benefit.}$$

**4. Benefit–Cost Ratio (BCR)**

BCR = (Total Benefits/Total costs)

$$BCR = (45,600/6,800) = 6.7$$

Benefit–Cost Ratio = 6.7 : 1

This means that for every ₹1 invested under the Jal Jeevan Mission, the estimated economic return is approximately ₹6.7.

**5. Interpretation of Results**

- Since the BCR is greater than 1, the scheme is economically viable and financially beneficial.
- The major economic gains arise from time savings and increased labor productivity.
- Reduction in healthcare expenditure enhances household savings and welfare.
- Improved water access contributes indirectly to education, sanitation, and women empowerment.
- The long-term socio-economic returns are likely to be even higher when indirect and intangible benefits are considered.

**Limitations of the Study**

The present study on the socio-economic impact of the Jal Jeevan Mission in Musiri Block of Tiruchirappalli District is subject to certain limitations. Firstly, the study is confined to a sample of 200 households and may not fully represent the entire population of the block. Secondly, the research is geographically limited to Musiri Block and does not cover other blocks of the district or the state, which may have different socio-economic conditions.

The study primarily relies on primary data collected through questionnaires and interviews; therefore, responses may be influenced by personal perceptions, recall bias, or incomplete information. Some respondents may have

overestimated or underestimated changes in income, health expenditure, or time savings. Additionally, the analysis mainly uses descriptive statistical tools, and advanced statistical techniques were not applied due to time and resource constraints.

Another limitation is that external factors such as inflation, seasonal variations, agricultural performance, and other government welfare schemes may also influence socio-economic changes, making it difficult to attribute all improvements solely to the Jal Jeevan Mission. Finally, the study focuses on short-term measurable economic benefits, while long-term social and environmental impacts may require extended observation and further research.

### **Scope of the Project**

The scope of the study is confined to analyzing the socio-economic impact of the Jal Jeevan Mission in Musiri Block of Tiruchirappalli District. The research focuses on selected rural households that have benefited from Functional Household Tap Connections (FHTCs) under the scheme. It examines major indicators such as access to safe drinking water, reduction in time spent on water collection, improvement in sanitation practices, and changes in health conditions. The study also evaluates the influence of improved water supply on women's participation in economic activities, household income levels, and livelihood diversification. Both primary and secondary data sources are considered to assess the effectiveness of the scheme in the study area. Furthermore, the project scope includes analyzing the broader economic implications of water infrastructure development on rural productivity and living standards. It attempts to understand how reliable drinking water supply contributes to agricultural support activities, reduced medical expenditure, and overall quality of life. The study is limited to Musiri Block and does not cover the entire district or state. The findings may, however, provide useful insights for policymakers and administrators in planning similar rural development initiatives. The research emphasizes socio-economic outcomes rather than technical or engineering aspects of water supply systems.

### **Conclusion**

The present study examined the socio-economic impact of the Jal Jeevan Mission in Musiri Block of Tiruchirappalli District. The findings clearly indicate that access to safe and reliable household tap connections has brought measurable improvements in the living standards of rural households. The availability of potable water has significantly reduced dependence on unsafe and distant water sources, thereby minimizing health risks and lowering medical expenses associated with water-borne diseases. One of the major positive outcomes observed is the substantial time savings, particularly for women, who traditionally bore the responsibility of water collection. The saved time has been productively utilized in income-generating activities, household management, and educational support for children. This has contributed to enhanced women's participation in economic activities and strengthened household income stability. Improved sanitation practices and hygiene awareness have further supported public health improvements in the study area. The cost-benefit analysis also demonstrates that the scheme is economically viable, with benefits far exceeding the costs. Increased labor productivity, reduction in healthcare expenditure, and diversification of livelihoods have collectively stimulated rural economic growth. Although certain limitations exist, the overall evidence suggests that the Jal Jeevan Mission functions not merely as a water supply program but as an inclusive socio-economic development initiative. In conclusion, the Jal Jeevan Mission has played a transformative role in improving quality of life, promoting health and sanitation, empowering women, and strengthening the rural economy in Musiri Block. Sustained monitoring, community participation, and long-term source sustainability measures will be essential to ensure the continued success and lasting impact of the scheme.

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