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AFFORDABILITY AND ACCESSIBILITY OF URBAN RENEWAL SERVICES: AN EMPIRICAL STUDY OF JNNURM'S IMPACT ON LOW-INCOME POPULATION IN VIJAYAWADA

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Abstract

For low-income communities, urban regeneration initiatives are an essential tool for overcoming the obstacles brought forth by urbanisation. With an emphasis on low-income populations, this research assesses the accessibility and affordability of services offered in Vijayawada under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). The research used a mixed-method strategy, gathering both quantitative data from 326 participants via questionnaires and qualitative information via focus groups. The data was analysed and the program's efficacy was evaluated using statistical methods such t-tests, Chi-square testing, regression analysis, and theme coding. Findings show that low-income families have serious affordability issues; they are unable to afford essential services and housing. The most economically disadvantaged groups are hit the hardest by affordability problems, according to the t-test ($t = 4.35, p = 0.000$) and the Chi-square analysis (Chi-square = 34.56, $p = 0.000$). Both analysis of variance (ANOVA) and chi-square tests (Chi-square = 25.34, $p = 0.001$) reveal statistically significant differences in the availability of housing, water, and sanitation services among regions and socioeconomic categories. Additional obstacles to service delivery and sustainability include systemic hurdles including delays in implementation ($\beta = -0.35, p = 0.002$) and inadequate maintenance (Chi-square = 19.25, $p = 0.005$). Addressing these difficulties requires democratic governance, inclusive urban design, and targeted financial interventions, according to the report. For urban regeneration programs to be successful in the long run, it is recommended that they implement progressive subsidies, allocate resources in a spatially fair manner, and increase community involvement. The results could help policymakers and urban planners improve the equality and efficacy of initiatives like JNNURM by overcoming the affordability and accessibility disparities.

Keywords: JNNURM, Affordability, Accessibility, Urban Renewal, Low-Income Communities

1. Introduction

As a result of the country's fast population expansion and the concentration of economic activity in urban areas, urbanisation has become a major problem in India. Forty percent of India's population is projected to live in cities by 2030, putting a heavy strain on housing, basic services, and urban infrastructure (UN-Habitat, 2020). Inadequate housing, poor sanitation, an unpredictable water supply, and a lack of access to vital services, especially for low-income communities, have been brought to light by this extraordinary urban development. Sustainable urban growth is impeded and socio-economic inequities are widened by these obstacles.



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To tackle these issues caused by urbanisation, the Indian government created the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in 2005. The goal of JNNURM was to modernise cities and ensure that all people, especially those in disadvantaged populations, had equal access to vital services by enhancing urban infrastructure, governance, and service delivery (Ministry of Housing and Urban Affairs [MoHUA], 2005). Basic Services to the Urban Poor (BSUP) was one of several parts of the mission that sought to provide housing and access to essential services for low-income and otherwise disadvantaged neighbourhoods. According to Kamath (2012), JNNURM funded many city-wide initiatives throughout its active tenure with the goals of raising urban living conditions and fostering equitable development.

Delays, cost overruns, and uneven efficacy among cities were some of the implementation issues that JNNURM encountered, despite its lofty objectives. The mission's equality and effectiveness are called into question by ongoing concerns about the cost and accessibility of services for low-income individuals (Ravi, 2022). In places like Vijayawada, where urbanisation has changed socio-economic dynamics quickly, these challenges highlight the need to evaluate JNNURM's effect rigorously. Urban renewal services in Vijayawada that are funded by JNNURM are the subject of this research, which aims to assess their accessibility and affordability for low-income residents. The study aims to provide practical insights to enhance the design and execution of urban regeneration initiatives in India by examining these factors.

1.1 Background and Context

Demand for housing, transportation, water, and sanitation has skyrocketed with India's rapid urbanisation. This demand-supply imbalance often hits the urban poor the hardest, even though they make up a sizable fraction of the population. Research by Bhan (2014) and Kundu (2012) shows that attempts to create fair urban development are hindered by low access to cheap housing and essential amenities, which in turn perpetuate poverty and social isolation.

In light of these difficulties, the Indian government initiated JNNURM, a time-limited program to improve governance frameworks and fix deficiencies in urban infrastructure. In particular, the BSUP section of the mission aimed to help the urban poor by making sure they had access to cheap housing, water, and sanitation. Major investments were made to improve the urban infrastructure and service delivery systems of Vijayawada, an Andhra Pradesh city that is experiencing fast growth, as a result of JNNURM initiatives (Tata Institute of Social Sciences [TISS], 2012).

Concerns over JNNURM's capacity to guarantee low-income residents' affordability and equal access persist, despite the program's large expenditures. Numerous cities, including Vijayawada, have had the program's influence curbed due to problems including uneven service delivery, inadequate community participation, and delayed implementation (Kamath,



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2012; Ravi, 2022). The efficacy of the mission and the identification of practical suggestions for future urban regeneration projects depend on filling these gaps.

1.2 Problem Statement

People with lower incomes in India have it especially tough when it comes to cheap housing and other basic urban amenities because of the problems caused by urbanisation. Concerns about the accessibility and cost of urban redevelopment services continue, even if programs like the Jawaharlal Nehru National Urban redevelopment Mission (JNNURM) have been put in place to tackle these challenges. Inadequate community involvement, high expenses, and restricted access to financial schemes sometimes erode the intended advantages of these programs for low-income populations (Kamath, 2012).

The actions of JNNURM have greatly benefited Vijayawada, a city in Andhra Pradesh that is experiencing rapid urbanisation. Problems with service delivery and financial accessibility have been brought to light, calling into doubt the program's ability to meet the specific requirements of low-income communities (Ravi, 2022). Although JNNURM has enhanced urban infrastructure in numerous cities, research shows that low-income urbanites still encounter obstacles to fair access, including implementation delays, a lack of stakeholder involvement, and inadequate subsidised funding (Tata Institute of Social Sciences [TISS], 2012).

Urban regeneration initiatives also fail miserably when it comes to ensuring the upkeep and longevity of essential services like water supply, sanitation, and housing. As a result, low-income families face even more difficulties, which further deepens economic disparities and keeps communities mired in poverty and marginalisation (Bhan, 2014). The influence of urban regeneration projects on disadvantaged communities has been limited due to unequal results caused by the absence of a comprehensive mechanism to assure equitable access to inexpensive services (Kundu, 2012).

The essential issue that this research seeks to answer is whether or not the interventions run by JNNURM have adequately catered to the accessibility and affordability requirements of Vijayawada's low-income communities. The study aims to discover systemic inadequacies and provide practical suggestions for improving urban redevelopment initiatives so that they better assist disadvantaged areas by examining these factors.

1.3 Research Objectives

- ❖ To assess the affordability of services provided under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) for low-income populations.



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- ❖ To examine the accessibility of basic services, including housing, water supply, and sanitation, delivered through JNNURM initiatives.
- ❖ To identify barriers to the effective implementation of JNNURM services and propose actionable recommendations for improving service delivery and equity.

Hypotheses of the Study:

- ❖ H1: JNNURM services are not affordable for the majority of low-income populations in Vijayawada.
- ❖ H2: The accessibility to basic services such as housing, water supply, and sanitation under JNNURM is significantly limited for low-income populations.
- ❖ H3: Barriers such as delays in implementation, lack of community engagement, and insufficient financial support significantly affect the effectiveness of JNNURM services.
- ❖ H4: There is a positive relationship between the affordability of JNNURM services and the socio-economic improvement of low-income populations.
- ❖ H5: Addressing barriers in service delivery will significantly improve the affordability and accessibility of JNNURM services.

2. Literature Review

2.1 Urban Renewal and Low-Income Communities

For low-income neighbourhoods in particular, urban regeneration initiatives have proved a lifesaver in the face of the problems brought about by fast urbanisation. Housing quality, urban infrastructure, and community development have been the primary goals of programs in industrialised countries such as the United Kingdom's Neighbourhood Renewal Program and the United States' Urban Development Action Grant. Recognising the significance of include disadvantaged groups in the process of urban development, these programs place an emphasis on community participation and inclusive planning (Smith, 2018). As an example, the Housing Act of 1988 in the UK aimed to restore rundown neighbourhoods and provide low-income people more affordable housing alternatives (Jones & Evans, 2020).

Slum improvement and infrastructure building are common goals of urban redevelopment programs in developing nations. An illustrative case in point is the Favela-Bairro Program in Brazil, which provided sanitation, water, and transportation to formerly informal areas and helped them become official neighbourhoods (Perlman, 2016). Similarly, according to Harrison et al. (2018), the IUDF in South Africa seeks to enhance spatial justice and guarantee that historically disadvantaged populations have inclusive access to urban resources. The worldwide dedication to promoting fair urban development is shown by these projects, but they will only be successful if obstacles such as insufficient funds, poor governance, and sustainability issues are overcome.



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2.2 JNNURM in the Indian Context

In 2005, India's Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was established to promote sustainable development and tackle urban issues. A number of JNNURM programs, such as Integrated Housing and Slum Development Program (IHSDP) and Basic Services to the Urban Poor (BSUP) (Ministry of Housing and Urban Affairs [MoHUA], 2005), aimed to improve urban infrastructure, governance, and service delivery, with a particular focus on meeting the needs of urban poor people. Affordable housing, sanitation, and water access for low-income communities were the primary goals of the mission, which also sought to improve city administration (Kamath, 2012).

Delays, cost overruns, and uneven results among cities were among the implementation obstacles that JNNURM encountered, despite its lofty objectives. For example, according to the Tata Institute of Social Sciences [TISS] (2012), certain cities, like Ahmedabad, were able to effectively execute JNNURM housing projects on a big scale, while others, like Kolkata, had problems with land acquisition and community involvement, which caused the programs to stall. It has also been widely reported that low-income groups are concerned about the program's capacity to guarantee affordability and inclusion. While JNNURM did increase access to essential services, research shows that disadvantaged populations were frequently left out due to maintenance gaps and unequal allocation of resources (Ravi, 2022; Kundu, 2012).

After its 2014 conclusion, other projects including AMRUT (Atal Mission for Rejuvenation and Urban Transformation) and the Smart Cities Mission took over, both of which aim to use technology to improve cities. Urban renewal initiatives, especially those targeting low-income neighbourhoods, must take into account complex factors such as cost, accessibility, and inclusion; this is shown by the JNNURM legacy.

2.2 Affordability and Accessibility in Urban Governance

All socio-economic groups, particularly disadvantaged ones, should have access to essential services, and this idea is typically seen through the prism of inclusion and fairness when discussing affordability in urban government. In his capacity approach, Sen (1999) argues that affordable resources should be available to all people, regardless of their financial situation, and that this means more than just being able to pay for them; it also means having the chance to live a decent life. When assessing the affordability of housing, water, and sanitation services for low-income groups, this viewpoint is often used in urban research.

To evaluate affordability, another applicable framework is the willingness-to-pay (WTP) model, which determines the maximum price that people or families are prepared to pay for essential services (Lall et al., 2006). It is easier for urban planners to strike a balance between service providers' capacity to recoup costs and recipients' ability to finance using this



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approach. One argument against this method is that it fails to take into account inequalities in access and structural inequality, which might restrict affordability regardless of the availability of funds (Koppenjan & Enserink, 2009).

2.2.1 Theoretical Perspectives on Accessibility

How easily people can get their hands on basic services is what we mean when we talk about accessibility in urban planning. It is a complex idea that includes not only financial but also social and physical accessibility (Pirie, 1979). Central Place Theory gives a geographical viewpoint, advocating that urban services should be arranged physically to reduce the distance and time necessary for access (Christaller, 1933). In order to guarantee that low-income and peripheral communities have equal access to metropolitan resources, this approach stresses the significance of location.

To improve accessibility, it is important for stakeholders to work together, according to the network governance framework, another prominent viewpoint. According to this model, public, commercial, and non-profit organisations may work together to make better decisions that will expand access to and quality of urban services (Klijn & Koppenjan, 2016). But getting everyone to work together like this isn't easy; power imbalances and institutional divisions get in the way of fair service delivery.

2.3 Affordability and Accessibility in Practice

In urban government, affordability and accessibility are mutually reliant. Even if services are economical, inadequate geographical distribution or insufficient infrastructure may make them unavailable to marginalised groups. Research on urban governance in developing nations indicates that affordability and accessibility are often undermined by inefficiencies in service delivery systems, restricted community engagement, and insufficient resource allocation (Bhan, 2014; Kamath, 2012). To tackle these difficulties, it is essential to include affordability and accessibility into policy frameworks, ensuring that urban regeneration efforts, such as JNNURM in India, fulfil their stated goals.

2.4 Gap in Existing Research

There has been a lot written on the socio-economic effects of urban renewal initiatives, but there is still a lot we don't know about how urban governance affects issues of affordability and accessibility. Researchers have shown that urban renewal programs like Brazil's Favela-Bairro Program and South Africa's IUDF can have a profound impact on low-income communities, but they haven't looked at how these programs deal with the problems of affordability and accessibility in fast-urbanizing countries like India. In India, initiatives like the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) have been thoroughly assessed for the improvements they've brought to city planning and administration (Kamath, 2012). But studies looking at how well these programs work to guarantee low-income people can get the treatments they need at reasonable prices are few. To far, most research on JNNURM has concentrated on its



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quantitative outcomes, such the total number of homes built or the total number of kilometres of road, while ignoring its qualitative components, such as equity, user happiness, and long-term sustainability (Ravi, 2022; Kundu, 2012).

Furthermore, although affordability is generally studied via financial indicators, such as cost recovery and subsidies, the research insufficiently analyses how these financial processes effect the everyday lives of the urban poor. Researchers seldom ask low-income populations whether they can afford services without sacrificing other necessities like food or education (Bhan, 2014). Equally unexplored in the Indian context is the accessibility dimension, especially geographical accessibility and inclusivity in planning processes. When studying the barriers to accessing critical services, researchers often fail to account for the role that variables like geographical inequalities, gaps in infrastructure, and sociopolitical dynamics play. Lack of mixed-method studies that integrate qualitative insights (e.g., community perceptions, satisfaction levels) with quantitative metrics (e.g., cost-effectiveness, accessibility scores) is another important gap. According to Tata Institute of Social Sciences [TISS] (2012), the current body of literature does not adequately address the complex interplay between accessibility, affordability, and governance issues since it is too focused on quantitative data or qualitative case studies.

Also, there hasn't been much research on how the Basic Services to he Urban Poor (BSUP) component of JNNURM deals with systemic obstacles like corruption, delays, and a lack of community involvement, even though its goal is to fix housing and infrastructure issues. Evaluations typically fail to evaluate how such restrictions disproportionately impact disadvantaged groups, including women, minorities, and informal workers (Kamath, 2012). A further aggravating factor in the research gap is the fact that JNNURM's results vary by region. In order to understand how localised elements impact the success or failure of urban redevelopment projects, there has been a lack of detailed research on cities with distinct socio-economic and topographical settings, such as Vijayawada. Finding best practices or scalable solutions is made more difficult by the lack of comparative evaluations across cities or states. Finally, research on the durability of JNNURM's effects over the long run is lacking. Project completion rates and other short-term outcomes have been extensively studied, but how well these services are maintained and whether they improve the quality of life for urban poor people over the long run have received less attention.

2.5 Need for the Study

Within the scope of this study, the operations of JNNURM in Vijayawada are investigated with regard to the dual criteria of cost and accessibility. The research aims to reconcile policy purpose with practical reality by using a mixed-method approach to examine systemic impediments and beneficiary perceptions. In order to ensure that future efforts are inclusive, sustainable, and beneficial for low-income neighbourhoods, it will give insights that can be put into action to enhance urban renewal programs and promote equitable urban governance.



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3. Research Methodology

3.1 Study Area: Vijayawada

This research focusses on Vijayawada, an urbanising city in Andhra Pradesh, India. There has been massive urbanisation and economic development in Vijayawada, which has earned it the nickname "Business Capital of Andhra Pradesh," throughout the last few decades. On the other hand, significant socio-economic inequities, especially among low-income groups, have resulted from this rapid urbanisation. Inadequate access to fundamental amenities including housing, water supply, sanitation, and healthcare disproportionately affects these groups, many of whom live in informal settlements.

Day labourers, those working in the informal economy, and small-scale vendors make up the bulk of the city's low-income neighbourhoods. A large percentage of the urban poor reside in informal settlements or places without proper infrastructure, as reported by the Vijayawada Municipal Corporation (VMC). There are still widespread problems with cost, accessibility, and service quality, even though many people rely on public programs like JNNURM for housing and other services. poor incomes, poor educational attainment, and insufficient health and sanitation facilities define the socio-economic situations in these areas.

3.2 Research Design

The availability and affordability of services offered by the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) to low-income residents of Vijayawada are examined in this study using a mixed-method research strategy that combines quantitative and qualitative techniques. The study goals are well addressed by the mixed-method technique, which captures both quantifiable results and contextual insights for a comprehensive analysis.

The quantitative part of the research involves gathering numerical data from 326 participants from low-income areas of Vijayawada using standardised questionnaires. The survey was created to collect information on important metrics such family income, housing and basic service spending, satisfaction with JNNURM programs, and availability of water, sanitation, and transportation. This data allows us to analyse the cost and accessibility of JNNURM services in a systematic way by detecting trends, patterns, and significant correlations between variables.

To round out the quantitative research, the qualitative part digs further into the real-life experiences of stakeholders and recipients. Members of the community were surveyed via focus group discussions (FGDs) to learn about their thoughts, feelings, and suggestions on how JNNURM programs may be improved. Invaluable yet discussed topics were perceived benefit sustainability, obstacles to service access, and diversity in planning procedures. Furthermore, critical viewpoints on systemic difficulties and implementation procedures were provided via in-depth interviews with important stakeholders, such as community leaders, lawmakers, and officials from urban local bodies.



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Triangulation, made possible by the mixed-method design, verifies and enhances the results obtained from quantitative data. Example: qualitative data shows how sociopolitical and infrastructure hurdles affect accessibility and affordability, but statistical analysis show trends in these areas. By using a comprehensive approach, we may bridge the gap between policy goals and actual implementation by gaining a detailed grasp of the research topic.

Using a mixed-method research strategy, this study measures the effects of JNNURM programs and identifies the structural and environmental elements that have an effect on the experiences of program recipients. Policymakers and urban planners may benefit from this all-encompassing method, which lays out a strategy to make urban regeneration initiatives more successful.

3.3 Data Collection Methods

This study's data gathering approach employs both direct and secondary sources to provide a thorough knowledge of the cost and accessibility of JNNURM services in Vijayawada. This amalgamation of data sources enables a comprehensive study, including both real-time viewpoints and contextual understanding.

3.3.1 Primary Data

The principal data for this research was gathered using structured questionnaires, focus group discussions (FGDs), and in-depth interviews. Structured questionnaires were sent to a sample of 326 respondents from low-income neighbourhoods in Vijayawada. The surveys were created to collect quantitative data on critical factors, including family income, housing and service expenditures, satisfaction with JNNURM programs, and the accessibility of necessary services like as water supply and sanitation. The use of standardised questionnaires guaranteed uniformity in data gathering and enabled statistical analysis to discern patterns, correlations, and inequalities in service delivery. Alongside the surveys, focus group talks were held with community members to get qualitative insights into their experiences and perspectives. The focus group discussions provide a venue for beneficiaries to address issues with cost, accessibility, and inclusion in planning procedures. These talks facilitated the examination of non-quantifiable elements, such as cultural and societal impediments, that affect the efficacy of JNNURM efforts. Additionally, comprehensive interviews were conducted with stakeholders, such as municipal authorities, urban planners, and community leaders. The interviews provided essential insights into the systemic problems and governance concerns related to the implementation of JNNURM services.

3.3.2 Secondary Data

The secondary data for this study was obtained from governmental papers, policy documents, and previous research projects. Official records, including JNNURM progress reports, assessment summaries, and project instructions issued by the Ministry of Housing and Urban Affairs (MoHUA), provide a contextual foundation for the study. These reports provided essential information on the aims, scope, and results of JNNURM programs. Furthermore, policy papers were



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examined to comprehend the proposed frameworks for affordability and accessibility inside JNNURM. In addition to the official statistics, previous academic studies and case reports were examined to identify deficiencies in the current literature and to compare them with comparable urban rejuvenation initiatives in India and worldwide. These secondary sources provided context for the core data results, facilitating a more profound comprehension of the systemic obstacles and prospects for improving urban government and service delivery.

This research employs a comprehensive methodology by merging primary and secondary data to assess the effects of JNNURM services on low-income communities in Vijayawada. This thorough process enables evidence-based findings and practical solutions that tackle both urgent and systemic concerns.

3.4 Sampling Framework

Data obtained will be typical of Vijayawada's low-income people, especially those affected by JNNURM programs, according to the study's sample approach. With the goal of attaining statistical significance and guaranteeing reliability in assessing the accessibility and cost of urban renewal services, the sample comprises 326 respondents. The researchers used a stratified random sampling method to choose the participants. To guarantee that all members of a community are fairly represented, this technique stratifies the population according to predetermined criteria. Income, housing, location, and accessibility to essential services were some of the stratification criteria used in this research. To ensure that the sample fairly represents socioeconomic and geographical variances, these criteria were used to capture the variability of Vijayawada's low-income residents.

To reduce the possibility of selection bias and provide every member of the population an equal opportunity to participate in the research, respondents were chosen at random within each stratum after stratification. By using this method, we may better comprehend the similarities and differences in the experiences of various subgroups of the urban poor, which in turn increases the results' generalisability. For this study, we used statistical factors like confidence level and margin of error to decide on a sample size of 326 respondents, which should provide reliable and accurate results. The size also takes into account practical considerations like time, resources, and respondent accessibility while yet allowing for thorough analysis. This sampling methodology offers a comprehensive picture of how affordability and accessibility concerns develop across various strata by focussing on low-income areas in Vijayawada. The study's inclusion of families from various income and housing status brackets as well as neighbourhoods with varying topographies is guaranteed by the use of a stratified random sampling technique. Improving the efficiency and equality of urban redevelopment projects like JNNURM requires a thorough methodology for identifying systemic flaws and creating practical suggestions.



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3.5 Data Analysis Tools

In order to assess how low-income people in Vijayawada can pay and get to JNNURM services, this research uses both quantitative and qualitative methods of data analysis. Descriptive statistics are a kind of quantitative instrument that allows us to see patterns and trends in important variables like family income, satisfaction levels, and access to essential services. To look at how things like socio-economic status and service accessibility are related, we use chi-square tests; to see how things like implementation delays and affordability affect beneficiary happiness and quality of life, we utilise regression analysis. Using thematic coding, we examine qualitative data from stakeholder interviews and focus groups to find commonalities and differences in service delivery, cost, and accessibility. By providing a mixed-method approach, these tools support the study's goals of validating and enhancing quantitative findings with qualitative insights. This leads to a more nuanced understanding of systemic challenges and practical recommendations for improving urban renewal programs like JNNURM.

4. Results and Discussion

Objective 1: To assess the affordability of JNNURM services

Variable	Mean	Std. Deviation	Statistical Test	Test Statistic	p-value	Key Insight
Affordability Score	2.9	0.8	t-test	4.35	0.000	Moderate affordability challenges noted.
Income Level vs Affordability	N/A	N/A	Chi-square	34.56	0.000	Significant disparities by income level.

Critical insights into the difficulties low-income communities have in obtaining JNNURM services are provided by an examination of their affordability:

The average affordability score for recipients was 2.9 (standard deviation = 0.8) on a 5-point scale, indicating that they have modest issues with affordability. A statistically significant departure from the affordability standard is shown by the t-test findings ($t = 4.35, p = 0.000$), which emphasise that many families find the cost of JNNURM services to be onerous. This highlights the need of implementing targeted financial measures, such higher subsidies or more accommodating payment plans, to ensure that economically disadvantaged people can receive these services.

The findings of the Chi-square test show that there are considerable discrepancies in affordability depending on income levels ($\text{Chi-square} = 34.56, p = 0.000$). Current financial mechanisms under JNNURM do not sufficiently meet the demands of the poorest recipients, since lower-income families have disproportionate financial hardships compared to their higher-income counterparts. This research shows how critical it is to address the economic and social needs of low-income communities via innovative financing programs.



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Important Takeaways: The findings show that low-income groups still face a major obstacle in terms of cost, even if JNNURM has made it easier to receive vital services. We need inclusive policies that put the financial needs of marginalised people first, since there are statistically large differences in affordability across income levels. To guarantee that the program attains its objective of fair urban development, it is crucial to address these problems.

Objective 2: To examine accessibility to basic services like housing, water, and sanitation

Variable	Mean	Std. Deviation	Statistical Test	Test Statistic	p-value	Key Insight
Accessibility Score	3.2	0.9	ANOVA	6.25	0.002	Geographic disparities in accessibility noted.
Socio-Economic Group vs Accessibility	N/A	N/A	Chi-square	25.34	0.001	Disparities across socio-economic groups.

Important information on the availability of housing, water, and sanitation under JNNURM is gleaned from the findings:

With an average score of 3.2 (standard deviation = 0.9) out of 5 possible points, beneficiaries have modest access to essential services. There are substantial regional differences in the availability of services, according to the analysis of variance (F = 6.25, p = 0.002). This indicates that housing, water, and sanitation services are more difficult to get in certain locations than in others, especially in distant and underserved neighbourhoods. Disparities like this show how important it is to distribute services fairly in terms of space if we want everyone to feel welcome.

Differences in accessibility across socioeconomic classes are statistically significant, according to the Chi-square test (Chi-square = 25.34, p = 0.001). When compared to more affluent groups, marginalised communities, such as those with lower incomes and those who work in the informal economy, report much less access to basic services. This discovery highlights the existence of systematic disparities in the provision of services, which may be influenced by biases in administration or social politics.

There are large geographical and socioeconomic gaps in the data showing that essential services under JNNURM are not evenly accessible. Access to these services is more difficult for marginalised communities and locations on the program's periphery, which runs counter to its intended purpose of promoting equitable urban growth. Targeted actions are necessary to address these gaps; for example, neglected areas should have infrastructure development prioritised, and disadvantaged groups should be actively included in decision-making processes via inclusive governance practices. By taking these steps, the accessibility and overall effect of JNNURM projects may be greatly improved.



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Objective 3: To identify barriers and provide actionable recommendations

Barrier	Frequency (%)	Statistical Test	Test Statistic	p-value	Key Insight
Implementation Delays	50%	Regression	$\beta = -0.35$	0.002	Delays negatively impact affordability.
Poor Maintenance	60%	Chi-square	19.25	0.005	Maintenance is a significant challenge.
Lack of Inclusivity	45%	Chi-square	28.12	0.001	Limited community engagement hinders effectiveness.

The findings show where there are obstacles to implementing JNNURM services well and where there are areas that need to be addressed:

Implementation Delays: A substantial negative effect on affordability ($\beta = -0.35, p = 0.002$) is shown by regression analysis. Beneficiaries often incur more expenditures as a result of project delays, both immediately (such as increased out-of-pocket spending) and indirectly (such as longer housing instability). This research highlights the need of better project management and more efficient administrative procedures in order to alleviate financial constraints caused by delays for low-income communities.

Inadequate Maintenance: 60% of respondents are unhappy with the maintenance of their home, water supply, and sanitation services, according to the Chi-square test (Chi-square = 19.25, $p = 0.005$), which shows that inadequate maintenance is a serious problem. The advantages of JNNURM investments are diminished when infrastructure is not properly maintained, which compromises its long-term functioning. To successfully address this problem, we need committed financing, regular maintenance schedules, and community-led efforts. A significant issue that has been discovered is the absence of community involvement in the planning and implementation phases. This was confirmed by the Chi-square test, which yielded a result of 28.12 with a p-value of 0.001. This obstacle stops the program from meeting the unique requirements of oppressed groups, as 45 percent of respondents pointed out the lack of inclusion. Beneficiaries' interests and difficulties may be better addressed if they are more actively involved in decision-making processes.

Major Takeaways: Findings show that delays in implementation, poor maintenance, and low community engagement are systemic obstacles that reduce the efficacy of JNNURM programs. The cost and accessibility of services are greatly impacted by these restrictions, especially for groups with lower incomes. Adopting participatory governance frameworks, establishing effective project management systems, and allocating dedicated resources for infrastructure upkeep are crucial to tackle these issues. Efficiency, equality, and the program's long-term effect will all be improved with these approaches.



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Hypothesis Result Table:

Hypothesis	Variable	Statistical Test	Test Statistic	p-value	Decision	Key Insight
H1: JNNURM services are not affordable for low-income populations.	Affordability Score	t-test	4.35	0.000	Accepted	JNNURM services pose affordability challenges for low-income households.
	Income Level vs Affordability	Chi-square	34.56	0.000	Accepted	Affordability issues disproportionately affect the poorest segments.
H2: Accessibility to basic services under JNNURM is significantly limited.	Accessibility Score	ANOVA	6.25	0.002	Accepted	Significant disparities in accessibility by geographic location.
	Socio-Economic Group vs Accessibility	Chi-square	25.34	0.001	Accepted	Accessibility to services varies significantly among socio-economic groups.
H3: Barriers in service delivery negatively impact affordability and accessibility.	Implementation Delays	Regression	$\beta = -0.35$	0.002	Accepted	Delays significantly reduce both affordability and accessibility.
	Poor Maintenance	Chi-square	19.25	0.005	Accepted	Maintenance gaps have a significant negative impact on service quality.
H4: Addressing barriers will improve the quality of life for low-income populations.	Improved Service Access	Regression	$\beta = 0.45$	0.000	Accepted	Better accessibility positively correlates with improved quality of life for beneficiaries.

Critical insights into the difficulties and potential benefits of JNNURM services for low-income communities in Vijayawada are provided by the findings of the hypothesis testing. The results of the t-test ($t = 4.35, p = 0.000$) and the Chi-square analysis ($\text{Chi-square} = 34.56, p = 0.000$) support the hypothesis that JNNURM services provide substantial cost issues. These findings highlight the severity of affordability problems for low-income families and call for specific financial solutions to help those most in need, such as higher subsidies or income-adjusted payment systems.

According to the results of Hypothesis 2, there are large gaps in the availability of essential services. Regional and socioeconomic disparities in housing, water supply, and sanitation are highlighted by the analysis of variance ($F = 6.25, p = 0.002$) and chi-square test results ($\text{Chi-square} = 25.34, p = 0.001$). These inequalities highlight the need of fair resource allocation and geographically inclusive urban design in providing disadvantaged areas with the resources they need to thrive.



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Systemic impediments have a detrimental effect on service delivery, as shown by Hypothesis H3. Both cost and accessibility are considerably diminished as a result of implementation delays, according to regression analysis ($\beta = -0.35$, $p = 0.002$). Similarly, the Chi-square test (Chi-square = 19.25, $p = 0.005$) clearly shows that inadequate maintenance greatly reduces the quality and longevity of services. Based on these results, it is clear that improved project management, maintenance resources that are specifically allocated to the system, and community-led activities are crucial for achieving better service outcomes.

Lastly, with regards to H4, the regression findings show that there is a favourable relationship between the quality of life of beneficiaries and enhanced service accessibility ($\beta = 0.45$, $p = 0.000$). This proves that low-income communities may benefit from focused interventions that improve their socioeconomic status. The total impact of JNNURM projects may be greatly enhanced by addressing cost and accessibility constraints and implementing participatory governance techniques. This will ensure that the needs of the most marginalised communities are met efficiently and sustainably.

5. Conclusion

5.1 Summary of Findings

The accessibility and cost of JNNURM services for low-income persons in Vijayawada are thoroughly examined in this research. Many low-income families still struggle to fund JNNURM, even though the program has improved basic services like housing, water supply, and sanitation. Many recipients are unable to satisfy the financial criteria without cutting up on other basics, according to the research. Though somewhat accomplished, accessibility is not uniform across regions or socioeconomic categories, with disadvantaged people encountering disproportionately high hurdles. The efficacy of the program is further diminished by important structural challenges, such as inadequate maintenance, delays in implementation, and a lack of community participation. These difficulties bring to light serious loopholes in the implementation of policies and the need for focused interventions to guarantee that everyone benefits equally.

5.2 Implications

Politicians, city planners, and anyone with a stake in urban revitalisation projects should take note of the study's conclusions. Affordability may be improved by creating interest-free loans specifically for low-income borrowers, as well as more flexible financial programs. More accessible design, more fair allocation of resources, and better infrastructure in outlying regions are all necessary to improve accessibility. The study's highlighted hurdles highlight the significance of participatory government, which places a priority on community interaction throughout the planning and implementation processes. Overall program efficacy and beneficiary satisfaction may be enhanced by incorporating performance-based monitoring tools, which can promote accountability and guarantee timely delivery of services.



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5.3 Future Research Directions

In order to better understand regional best practices and common difficulties, future studies may broaden the geographic scope to include more than one city. This will allow for comparison analysis to be conducted. The long-term viability of urban redevelopment projects like JNNURM may be better understood via longitudinal studies that monitor its effects over time. Digital platforms for beneficiary input and service delivery are only one example of how technology is changing urban government. By investigating this trend, we might find new ways to tackle problems like affordability and accessibility. To further guarantee inclusion in urban planning and policymaking, future studies should concentrate on under-represented groups, such as women, minorities, and employees in the informal sector. To tackle new problems like climate resilience and resource efficiency, it is essential to include environmental sustainability measures in urban renewal assessments.

6. Recommendations

6.1 Policy Recommendations

Policymakers should implement comprehensive and targeted funding solutions to make JNNURM services more affordable and accessible to low-income communities. To help the lowest-income families out financially while yet ensuring cost recovery for the long-term, progressive subsidies depending on income levels may be implemented. Housing and basic infrastructure projects may benefit greatly from the creation of financing programs that are either interest-free or have very low interest rates. This would allow recipients to satisfy their requirements without having to worry about their finances. Project progress, implementation delays, and effective resource allocation may all be better tracked if lawmakers establish performance-based monitoring mechanisms. The demands and goals of under-represented groups should be taken into account throughout the design and implementation stages of urban renewal projects by include stakeholder engagement procedures. To maximise their effectiveness, urban regeneration programs should be in sync with both domestic development objectives and international sustainability benchmarks.

6.2 Strategies for Accessibility

Space fairness and community-driven solutions are key to making essential services more accessible. In order to prioritise infrastructure development in underserved regions, urban planners should use data-driven decision-making and spatial mapping. It is essential for fair development to prioritise the provision of peripheral and informal communities with enough housing, water, sanitation, and transportation. Reducing physical and logistical obstacles to accessibility may be achieved by creating service hubs in underserved communities. These hubs will provide simple access to many services. By combining public and private sector knowledge and resources, public-private partnerships (PPPs) are a great way to fill up infrastructure shortages and improve service delivery. Community advisory councils and other forms of



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participatory government allow beneficiaries to have a say in policymaking, which is crucial for meeting their specific needs and preferences.

6.3 Sustainability Considerations

Integrating sustainability principles is crucial for urban redevelopment efforts like JNNURM to succeed in the long run. Building critical infrastructure maintenance and management frameworks safeguards investments and keeps them operational over time. To keep infrastructure from deteriorating, it is essential to set aside specific funds for routine maintenance and repair. It is imperative that urban planners prioritise ecologically responsible practices, such as the use of renewable energy sources, rainwater collection systems, and trash management technology. It is especially important to build infrastructure in sensitive metropolitan areas that can endure climate change and natural catastrophes. One way to encourage a feeling of duty and ownership is to support community-led repair programs that allow recipients to take part in fixing up their own neighbourhood. Finally, sustainability audits should be conducted on a regular basis to track how well services are working over the long term and adjust strategy accordingly to meet changing urban demands.

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