International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 04 | April - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

Making Slum Resettlement More Affordable Through Innovative Techniques

Author - Mohini patidar[1] (0809AR202054), Ar. Vaishali Sharma[2]
School of Architecture , IPS Academy , Indore, M.P., India.

Abstract
This research paper delves into the pressing issue of slum resettlement in Indore, India, exploring innovative techniques to make such resettlement more affordable. With rapid urbanization, slums have become a prominent feature of many Indian cities, presenting complex challenges related to housing, infrastructure, and socio-economic development. In this paper, we analysis the existing strategies for slum resettlement in Indore and propose innovative techniques to enhance affordability, sustainability, and community engagement in the resettlement process. Through a combination of qualitative and quantitative research methods, including case studies , existing literature and surveys . we highlight the potential of innovative approaches involves the use of eco-friendly building materials and construction methods to create affordable and environmentally sustainable housing solutions, green infrastructure, Modular construction methods , and public-private partnerships to address the affordability gap in slum resettlement. The findings underscore the importance of holistic, community- centered solutions to improve living conditions and foster inclusive urban development in Indore and beyond. The urgent need for sustainable solutions is underscored by the detrimental effects of slum living on residents health, well-being, and socio-economic prospects. Innovative approaches hold the potential to mitigate these challenges while fostering inclusive urban development.

Keywords : Slum Resettlement , Affordable , Innovative Techniques .

1. INTRODUCTION

The issue of slum resettlement in Indore, India, is a critical urban challenge that demands innovative solutions to enhance affordability and sustainability. With the rapid urbanization witnessed in many Indian cities, the proliferation of slums has become a significant concern, impacting housing, infrastructure, and socio-economic development. This introduction sets the stage for exploring the pressing need for effective and affordable slum resettlement strategies in Indore.

Slums, characterized by inadequate living conditions and lack of basic amenities, pose complex challenges that require comprehensive interventions. The existing strategies for slum resettlement in Indore provide a foundation for understanding the shortcomings and opportunities for improvement in addressing this issue. By delving into case studies, literature reviews, and surveys, this research aims to identify innovative techniques that can revolutionize the affordability and sustainability of slum resettlement initiatives.

Innovative approaches are essential to bridge the affordability gap in slum resettlement projects. Eco-friendly building materials and construction methods offer a sustainable solution to create affordable housing options while minimizing environmental impact. Embracing green infrastructure and modular construction techniques can further enhance the cost-effectiveness and efficiency of resettlement projects in Indore.

Moreover, public-private partnerships play a crucial role in addressing the financial challenges associated with slum resettlement. Collaborative efforts between government bodies, private sector entities, and community stakeholders can unlock resources and expertise to drive impactful change in the affordability and quality of housing solutions for slum dwellers.

The urgency of sustainable solutions is underscored by the adverse effects of slum living on residents' health, well-being, and socio-economic prospects. By prioritizing innovative techniques that prioritize affordability, sustainability, and community engagement, this research aims to pave the way for inclusive urban development in Indore and beyond. The following sections will delve deeper into these innovative approaches to shed light on their potential impact on improving living conditions and fostering holistic urban development.

Stay tuned for detailed insights into how these innovative techniques can transform slum resettlement practices in Indore, offering a pathway towards more affordable, sustainable, and inclusive urban environments.

2. UNDERSTANDING THE CONTEXT OF SLUM RESETTELMENT IN INDORE .

2.1 historical overview

Indore's journey from a small town to a bustling metropolis has been marked by rapid urbanization and demographic shifts, contributing significantly to the proliferation of slums. Several historical.
factors played a crucial role in shaping the landscape of informal settlements in the city:

- **Urbanization trends:** Indore has experienced substantial urbanization over the past few decades, driven by factors such as industrialization, commercialization, and rural-urban migration. As people migrated to the city in search of employment and better opportunities, the demand for affordable housing skyrocketed, leading to the spontaneous growth of slums on the peripheries of urban areas.
- **Migration patterns:** the influx of migrants from rural areas and neighboring states has been a primary driver of slum formation in Indore . Many migrants, unable to afford formal housing, settle in makeshift dwellings on vacant or encroached land, contributing to the expansion of informal settlements.
- **Socio-economic factors:** poverty, unemployment, and income inequality are pervasive issues in Indore , exacerbating the housing crisis and pushing vulnerable populations into slum dwellings. Lack of access to formal credit, inadequate social safety nets, and limited employment opportunities further perpetuate the cycle of poverty and informality in housing.

2.2 Current Challenges and Issues

Despite efforts to address urban poverty and improve living conditions, slum dwellers. In
Indore continue to face numerous challenges.

- **Inadequate Housing**: The majority of slum dwellings in Indore lack basic amenities such as clean water, sanitation facilities, and proper ventilation. Many households live in overcrowded and poorly constructed shelters, exacerbating health risks and compromising overall well-being.
- **Lack of Basic Services**: Slum settlements often lack access to essential services such as healthcare, education, and public transportation. Limited infrastructure and utilities further marginalize residents, hindering their socio-economic mobility and integration into urban life.
- **Vulnerability to Natural Disasters**: Slum dwellers in Indore are highly vulnerable to natural disasters such as floods, landslides, and fires due to their precarious living conditions and inadequate infrastructure. The lack of disaster preparedness and mitigation measures exacerbates the impact of these events, leading to loss of life, property damage, and displacement.
- **Socio-economic marginalization**: Slum residents face socio-economic marginalization and discrimination, limiting their access to employment opportunities, education, and social services. Persistent poverty traps and lack of upward mobility perpetuate cycles of deprivation and exclusion, exacerbating social inequalities within the city.

2.3 Existing Policies and Programs

Various governmental and non-governmental initiatives have been implemented to address
the challenges of slum resettlement in Indore. These include:

- **Slum Redevelopment Projects:** The Indore Municipal Corporation (IMC) has launched several slum redevelopment projects aimed at providing basic infrastructure, housing improvements, and livelihood support to slum dwellers. These projects often involve clearance of informal settlements and relocation of residents to alternative housing sites.
- **Housing Subsidies and Incentives**: The government provides subsidies and incentives for low-income households to access affordable housing through schemes such as Pradhan Mantri Awas Yojana (PMAY) and Mukhya Mantri Aawas Yojana (MMAY). These initiatives aim to promote homeownership among slum dwellers and facilitate their transition to formal housing.
- **Community-Based Organizations (cbos):** Non-governmental organizations and community-based organizations play a crucial role in advocating for the rights of slum dwellers and providing support services such as healthcare, education, and vocational training. These grassroots initiatives focus on community empowerment, capacity building, and social mobilization to address the root causes of urban poverty and marginalization.

3. INNOVATIVE TECHNIQUES FOR AFFORDABLE SLUM RESETTLEMENT

2.1 Use of eco-friendly building materials and construction methods

Incorporating eco-friendly building materials and construction methods is a sustainable approach to slum resettlement that addresses both environmental concerns and affordability. Here's how it works:

- **Natural and recycled materials:** utilizing locally-sourced, natural materials such as bamboo, straw, earth, and recycled materials like reclaimed wood, plastic, and glass reduces the environmental footprint of construction while also lowering costs. These materials are often more affordable than conventional building materials and can be sourced locally, reducing transportation expenses.

Bamboo Mat Board
Bamboo Mat Veneer Composite
Bamboo Corrugated Roofing Sheet
Bamboo Rice Husk Composite
Fly ash polymer Composite
Sandwiched Fly ash Panel
Plantation Timber Door / Window

Fig .1. Eco – Friendly Material

Energy-efficient design: incorporating energy-efficient design principles, such as passive solar heating, natural ventilation, and orientation optimization, reduces the energy consumption of buildings, thereby lowering utility costs for residents. Simple design modifications, such as installing insulated roofs and walls, can significantly improve thermal comfort without increasing construction expenses.

- **Low-cost technologies**: adopting low-cost, appropriate technologies for construction, such as compressed earth blocks, stabilized mud bricks, and ferrocement, reduces the overall construction cost while promoting sustainability. These techniques require minimal machinery and specialized skills, making them accessible to local communities and small-scale builders.
- **Disaster-resistant construction**: building structures that are resilient to natural disasters, such as earthquakes, floods, and storms, ensures the safety and security of residents while minimizing the need for costly repairs and reconstruction in the aftermath of disasters. Incorporating seismic-resistant designs, flood-resistant foundations, and wind-resistant structures enhances the longevity and durability of buildings in slum resettlement projects.
- By embracing eco-friendly building materials and construction methods, slum resettlement projects can achieve cost savings, environmental sustainability, and improved living conditions for residents, laying the foundation for resilient and inclusive urban development.

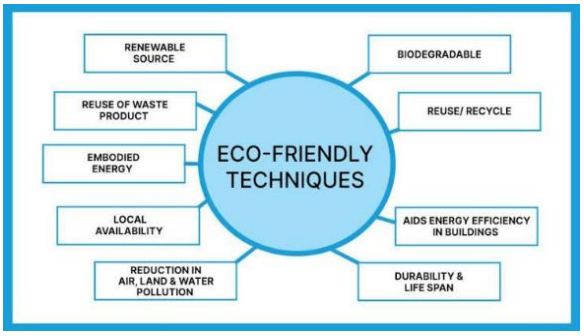


Fig.2. Eco – Friendly Techniques

2.2 green infrastructure and sustainable housing

Green infrastructure and sustainable housing practices offer holistic solutions to slum resettlement challenges by integrating ecological principles with urban development. Here's how these techniques contribute to affordable and sustainable slum resettlement:

- **Vegetation and green spaces:** incorporating vegetation and green spaces within slum resettlement areas enhances biodiversity, improves air quality, and mitigates urban heat island effects. Community gardens, green roofs, and public parks provide recreational spaces for residents while promoting environmental sustainability.
- **Rainwater harvesting and sustainable drainage systems**: implementing rainwater harvesting systems and sustainable drainage solutions reduces reliance on centralized water supply systems and mitigates the risk of flooding in slum resettlement areas. Simple technologies such as rain barrels, permeable pavements, and swales

capture and store rainwater for domestic use and irrigation, reducing water bills for residents.

- **Energy-efficient infrastructure**: installing energy-efficient street lighting, renewable energy systems (such as solar panels), and efficient waste management facilities reduces energy consumption and greenhouse gas emissions in slum resettlement projects. By investing in renewable energy and energy-saving technologies, developers can lower utility costs for residents and promote environmental stewardship.
- **Natural disaster resilience**: designing housing units and infrastructure to withstand natural disasters, such as earthquakes, floods, and cyclones, minimizes the risk of damage and displacement during extreme events. Incorporating resilient building materials, elevated foundations, and early warning systems enhances the safety and security of residents in slum resettlement areas.
- By prioritizing green infrastructure and sustainable housing practices in slum resettlement projects, cities like Indore can create healthier, more resilient, and environmentally sustainable communities that benefit both current and future generations.

2.3 modular construction methods

Modular construction methods offer a cost-effective and efficient solution to slum resettlement by streamlining the construction process and reducing material waste. Here's how modular construction methods contribute to affordable housing:

- **Factory-built modules**: modular construction involves prefabricating building components, such as walls, floors, and roof panels, in a factory-controlled environment before transporting them to the construction site for assembly. This off-site fabrication minimizes construction time, labor costs, and material waste, resulting in faster project delivery and lower overall construction expense

In walls : Fly ash sand lime brick
Solid concrete and stone block
Non erodable mud plaster

Fig.3.  Modules For Walls

In Roof and Floor : Precast RC Planks.
Prefabricated Brick Panels
Precast RB Curved Panels.
Precast RC Channel Roofing
Precast Hollow Slabs
Precast Concrete Panels
Trapezon Panel Roofing
Unreinforced Pyramidal Brick Roof

Fig.4. Modular Panel For Roof and Floor

- **Flexibility and adaptability**: modular construction offers flexibility in design and customization, allowing developers to adapt housing layouts and configurations to meet the diverse needs of slum dwellers. Modular units can be easily expanded, reconfigured, or relocated as housing demand evolves over time, providing residents with greater flexibility and choice in their living arrangements.
- **Quality control and durability**: factory-controlled production environments ensure consistent quality control and adherence to building standards, resulting in durable and resilient housing units. Modular construction methods utilize high-quality materials and precision engineering techniques to deliver structurally sound buildings that withstand environmental stresses and natural disasters.

2.4 public-private partnerships (ppps) in housing development

Public-private partnerships (ppps) offer a collaborative approach to slum resettlement that harnesses the strengths and resources of both government and private sector stakeholders. Here's how ppps can facilitate affordable housing development:

- **Resource mobilization**: ppps leverage private sector investment and expertise to supplement government funding and resources for

slum resettlement projects. Private developers contribute financial capital, technical know-how, and innovative solutions, while governments provide land, regulatory support, and social infrastructure.

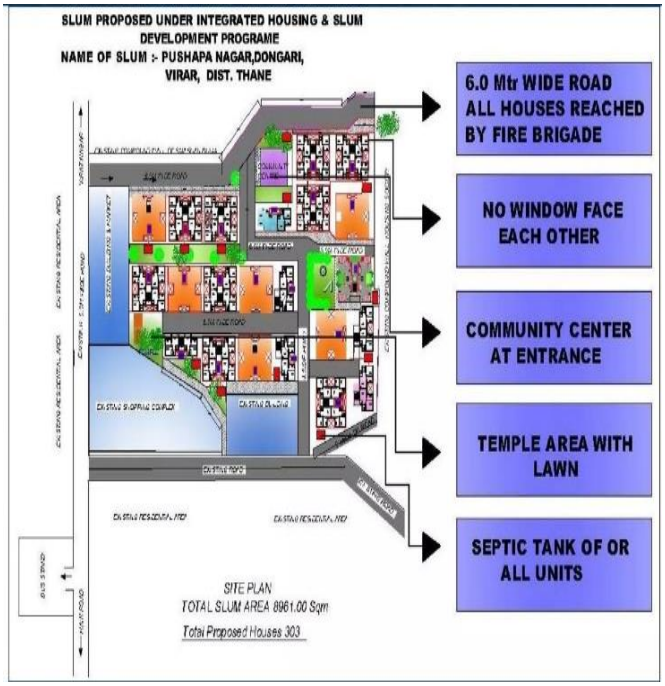
- **Risk sharing**: ppps distribute project risks and responsibilities between public and private partners, mitigating financial and operational risks associated with housing development. Private developers assume the risks associated with construction, marketing, and sales, while governments provide regulatory oversight, land tenure security, and social welfare support for residents.
- **Innovative financing mechanisms**: ppps facilitate access to innovative financing mechanisms, such as debt financing, equity investments, and subsidy schemes, to fund slum resettlement projects. Private sector investors, including commercial banks, institutional investors, and impact investors, provide capital at competitive rates, enabling governments to stretch limited public budgets and accelerate project delivery.
- **Efficient project delivery**: ppps streamline project delivery through streamlined decision-making processes, efficient resource allocation, and performance-based incentives. Private developers leverage their expertise in project management,

construction technology, and market research to expedite the planning, design, and implementation of slum resettlement projects, ensuring timely delivery and cost-effective outcomes.

4. CASE STUDIES

4.1 case study 1 : Integrated housing and slum redevelopment project at Virar , Thane , Maharashtra , India.

A). Prevailing scenario : Mismatch between demand



and supply of sites and services Disparity between high land costs , cost of construction and lower incomes leading to non sustainable situation, Lack of equitable supply of land, shelter and services at affordable prices, Environmental paradigms neglected while design and planning, Depletion of resources in construction and negligence of ecology in design, Lack of application of cost effectiveness and energy efficiency in construction.

Fig. 5. Prevailing scenario of Vihar Thane

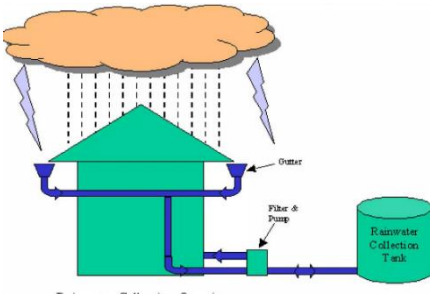
B). Project benefit to the slum dwellers :

- Housing

- Provision of individual toilet drainage .
- Water supply arrangement
- Roof top rain harvesting
- Electric connection
- Community centre
- Employment opportunities during project development

C). Cost effective technology, materials ,earthquake resistance technology.

- Fly Ash , lime and gypsum mixed bricks
- Precast ferro cement jali in place of steel wooden window
- Precast RCC door frame
- Precast ferro cement chhajjas cum lintel

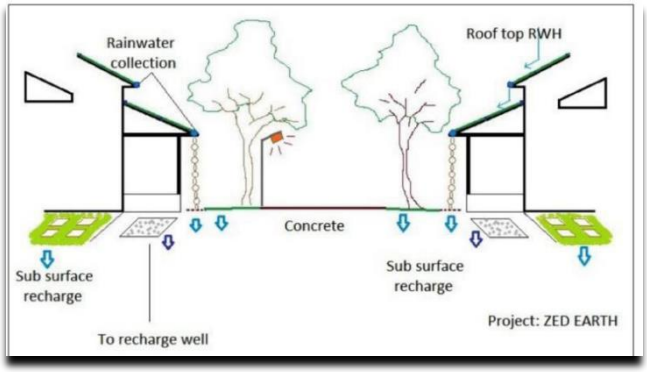


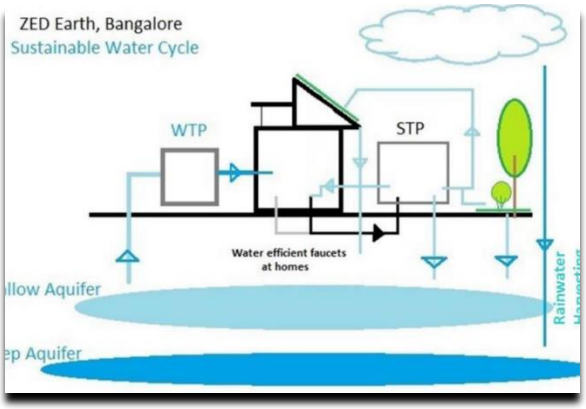
4.2 case study 2: integration of green infrastructure in affordable housing developments

Example: Affordable Green Homes Project, Bangalore, India :The Affordable Green Homes Project in Bangalore, India, showcases the integration of green infrastructure into affordable housing developments to create healthier, more sustainable, and climate-resilient communities. The project aims to provide low-cost housing solutions that prioritize environmental sustainability, energy efficiency, and resource conservation.

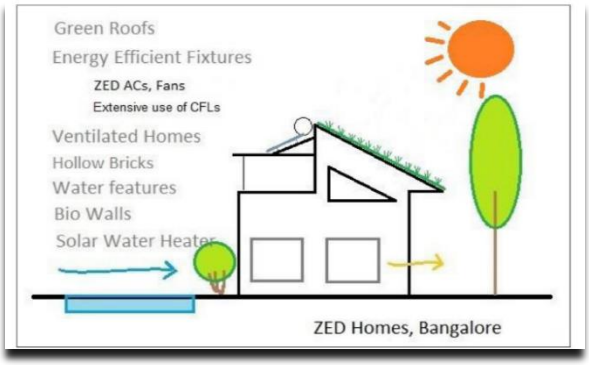
Key features of the project include:

- **Green Building Design** : Affordable housing units are designed using green building principles to minimize environmental impact, reduce energy consumption, and enhance occupant comfort. Passive solar design, energy-efficient appliances, and natural ventilation systems are incorporated to optimize energy performance and reduce utility costs for residents.
- **Green Space Biodiversity** : The housing development includes the creation of green spaces, parks, and community gardens to enhance biodiversity, promote urban greening, and improve air quality. Native vegetation, rain gardens, and bio-retention areas are integrated into the site design to manage stormwater runoff, reduce flood risks, and mitigate heat island effects.
- **Water Conservation and Recycling**: The project incorporates water-efficient fixtures, rainwater harvesting systems, and greywater recycling technologies to minimize water consumption and promote water reuse. Water-saving measures such as low-flow toilets, water-efficient landscaping, and drip irrigation systems are implemented to conserve precious freshwater resources and reduce pressure on municipal water supplies.
- **Renewable Energy Integration** : Affordable housing units are equipped with solar panels or solar water heaters to generate clean, renewable energy for lighting, heating, and hot water supply. On-site renewable energy generation helps reduce greenhouse gas emissions, mitigate climate change, and enhance energy security for residents.
- **Community Engagement and Education** : Residents are actively engaged in green living initiatives through community education programs, workshops, and awareness campaigns. Training sessions on sustainable living practices, waste management, and environmental stewardship empower residents to adopt eco-friendly behaviors and contribute to the sustainability of their community.





Zero Energy Development (ZED) is an eco friendly housing development initiative of Biodiversity Conservation India Pvt. Ltd. (BCIL). The ZED housing projects focus on providing all amenities and services to residents with minimal ecological footprint. Their housing projects (ZED Earth, ZED Woods, ZED Collectives and T ZED) in Bangalore are sustainable developments which also have resilient features. The sustainable elements in water and energy use also make ZED homes resilient to climate change.



Earth	Projects avoid using bricks, as it uses precious top soil and baked at 400°C.
Energy	ZED's zero energy work strategies are sensitive to 'embodied energy[2] and 'active energy' use on consumption.
Water	ZED homes help residents manage their own water and wastewater. It reduces fresh water demand by as much as 70%.
Waste	Solid waste, wet waste, chemical waste, recyclable waste and every type of waste generated by residents is managed within the residential development itself.
Air	Focus on passive and active cooling systems that are energy-efficient and ozone-friendly.
Biomass	Emphasis is on native plant species. It helps in cooling the ambient air, providing shade and absorbing toxic emissions. Native species are well adapt to the local climate.

ZED homes is one example of sustainable urban development that is network free for water and wastewater.

In a city that is able to supply water for a few hours and only on alternate days, the design features of ZED developments need to be emulated, at least in all new developments.

Energy efficiency is another feature that can be emulated both is existing and new developments. Since Bangalore is urbanising rapidly (as are other major cities in India), it is necessary for new housing developments to be less ofa burden on the existing city networks and at the same time be climate resilient.

5 .CONCLUSION

In conclusion, this research paper has addressed the critical issue of slum resettlement in Indore, India, and proposed innovative techniques to make such resettlement more affordable, sustainable, and community-centered. As urbanization continues at a rapid pace, slums have emerged as a significant challenge in many Indian cities, presenting multifaceted issues related to housing, infrastructure, and socio-economic development.Through a comprehensive analysis of existing strategies and the introduction of innovative approaches, this paper has sought to bridge the affordability gap in slum resettlement. By leveraging eco-friendly building materials, green infrastructure, modular construction methods, and public-private partnerships, the potential to enhance affordability and sustainability in slum resettlement endeavors has been underscored .The findings of this research highlight the importance of holistic, community-centered solutions in improving living conditions and fostering inclusive urban development. It is evident that the urgent need for sustainable solutions is paramount, given the detrimental effects of slum living on residents' health, well-being, and socio-economic prospects. Innovative approaches offer promise in mitigating these challenges while promoting inclusive urban development. Furthermore, the importance of public-private partnerships cannot be overstated. Collaboration between government agencies, non-profit organizations, private sector entities, and community groups can pool resources, expertise, and networks to maximize the impact of slum resettlement initiatives. This collaborative approach is essential for addressing the complex and interconnected challenges associated with slum redevelopment.

Looking ahead, it is imperative for policymakers, urban planners, and stakeholders to prioritize the

implementation of these innovative techniques. By embracing affordability, sustainability, and community engagement, cities like Indore can lead the way in achieving inclusive and resilient urban development .In conclusion, the findings of this research underscore the transformative potential of innovative approaches making slum resettlement more affordable and sustainable. By addressing the affordability gap and fostering community engagement, we can create a more equitable and prosperous future for all residents, not only in Indore but also in cities across India and beyond

6.REFERENCES :

ResearchGate. "Review of Slum Rehabilitation Projects in India."
Academia.edu. "Rehabilitation of Slum: An Innovative Approach to Urban Development."
ResearchGate. "Impoverishment Assessment of Slum Dwellers After Off-Site and On-Site Resettlement: A Case of Indore."
T. Ferlito, I. Musonda, M.M. Tjeba, A. Onososen, Systematic literature review on sustainable construction strategies for the development of affordable housing, in: Proceedings of the Twelfth International Conference on Construction in the 21st Century (CITC-12 Amman. Jordan)| May 16-19, 2022, pp. 195-203
https://www.ijraset.com/research-paper/planning-of-affordable-housing-for-slum-rehabilitation
https://www.ijres.org/papers/Volume-11/Issue-5/1105434436.pdf
https://questionofcities.org/mumbai-the-way-forward-from-slums-to-affordable-housing/
https://www.sciencedirect.com/science/article/abs/pii/S2352710217300062
https://www.ijraset.com/research-paper/planning-of-affordable-housing-for-slum-rehabilitatioN
Aakar Architects. (2019). Affordable Housing Strategies in India.
ActionAid India. (2018). Urban Poverty and Slum Upgradation in India: Challenges and Opportunities.
Agarwal, P. (2016). Slum Resettlement and Rehabilitation in Indore: A Case Study.
Banerjee, P., & Bhattacharyya, S. (2020). Affordable Housing Strategies for Urban Poor in Indore.
Chatterjee, S., & Bhowmik, S. (2018). Sustainable Urban Development through Affordable Housing: Insights from Indore.
Chakraborty, S., & Dharmadhikari, M. (2018). Community Participation in Slum Resettlement: Experiences from India. International Journal of Community Well-Being, 1(2), 141-156.
Chakraborty, S., & Dharmadhikari, M. (2018). Community Participation in Slum Resettlement: Experiences from India. International Journal of Community Well-Being, 1(2), 141-156
Urban Development Department, Government of Madhya Pradesh. (2020). Slum Resettlement Master Plan for Indore..