



THE CLEAN UP FOUNDATION

AFFORDABLE HOUSING SOLUTION FOR GARBAGE WORKERS.



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List of Abbreviations

AHP	Affordable Housing in Partnership
ARI	Average Relative Index
BLC	Beneficiary Led Construction or Enhancement
BSUP	Basic Services for Urban Poor
CHOICE	Cost Effective Home Ownership in an Improved Contemporary Environment
CIDCO	City and Industrial Development Corporation
CIPET	Central Institute of Plastics Engineering and Technology
CLSS	Credit-Linked Subsidy Scheme
CNAs	Central Nodal Agencies
CPCB	Central Pollution Control Board
CRA	Commonwealth Rent Assistance
DBT	Direct Benefit Transfer
DUs	Dwelling Units
ECH	Economic and Comfortable Housing
EMI	Equated Monthly Instalments
EWS	Economically Weaker Sections
FICCI	Federation of Indian Chambers of Commerce and Industry
GDP	Gross Domestic Product
GST	Goods and Service Tax
HCV	Housing Choice Vouchers
HUDCO	Housing and Urban Development Corporation
IHSDP	Integrated Housing and Slum Development Programme
ISSR	In-Situ Slum Redevelopment
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LIGs	Lower- Income Groups
LIHTC	Low Income Housing Tax Credit
MCGM	Municipal Corporation of Greater Mumbai
MHADA	Maharashtra Housing and Area Development Authority
MHDC	Maharashtra Housing Development Corporation
MMR	Mumbai Metropolitan Region
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
NCR	National Capital Region
NEERI	National Engineering and Environmental Research Institute
NGOs	Non-The governmental Organisations
NHP	National Housing Policy
NRAS	National Rental Affordability Scheme
PLIs	Primary Lending Institutions
PMAY	Pradhan Mantri Awas Yojana

PMAY- R	Pradhan Mantri Awas Yojana - Rural
PMAY- U	Pradhan Mantri Awas Yojana - Urban
RBI	Reserve Bank of India
SBI	State Bank of India
SRA	Slum Rehabilitation Authority
SW	Solid Waste
SWMS	Solid Waste Management Systems
ULB	Urban Local Bodies

Abstract

As a developing country, India has witnessed economic transformation from primary to secondary and tertiary sectors. Industrialization has increased in megacities such as Mumbai, Delhi, Kolkata, and others, because of this transformation. As a result, the number of migrants relocating from rural to urban regions is steadily increasing in pursuit of better job prospects, higher education, and health care. However, this has increased population pressure on scarce urban resources. The shortage of developable land for residential buildings is one of the primary difficulties that these urban amalgamations face. Housing shortages in megacities like Mumbai have resulted in market disequilibrium and market failure. This has resulted in poor housing conditions, homelessness, and other difficulties. Housing issues adversely affect the lower income groups and the economically weaker sections of the society. The purpose of this study is to examine the housing problems encountered by solid waste workers, who are considered as a representative sample of the lower-income group of the society, and to provide recommendations to tackle affordable housing shortage.

This research is based on primary data collected from solid waste workers in Mumbai through survey method, which is analyzed using descriptive tools. It also refers to secondary data collected from the government websites for analyzing the schemes available for affordable housing for lower-income groups. Researchers also attempted to explain utility maximization function for housing consumption of solid waste workers.

From the data analysis, it is observed that housing conditions of solid waste workers are deplorable, structures of the government houses are very old and sanitation facilities are not up to the mark. Only 39 percent of the total sample reside in self-owned homes while others stay in rental or the government provided houses. One of the major problems inhibiting home ownership amongst solid waste workers is financial in nature. In most of the cases, they are not aware of government schemes available to them and how they can avail benefits of these schemes. As a measure, the government should encourage financial literacy along with housing literacy programs for solid waste workers. Additionally, the government should boost the number of affordable housing developments by incentivizing private developers by granting housing tax credits. Improved fiscal and monetary policies, as well as the effective execution of programs aimed at providing affordable housing to lower-income groups including solid waste workers, can help alleviate solid waste workers' housing issues.

Chapter 1: Introduction

The Clean Up foundation, a non-profit organisation founded in 2016 by Sanjana Runwal, strives to improve the lives of garbage workers and rag pickers in Mumbai. For past five years, the Clean Up foundation has been working on improving the lives of garbage workers through various activities such as providing insurance policies to rag pickers, conducting vaccination drives, as well as health and COVID 19 vaccination awareness campaigns for the city's rag-pickers, and so on. While investigating the issues faced by garbage workers and rag pickers in Mumbai, it was discovered that one of the most significant challenges in improving living conditions of garbage workers is poor housing conditions. Solid waste workers find difficulties in seeking affordable housing or obtaining housing ownership. Therefore, this research is aimed at addressing the challenges faced by solid waste workers in finding affordable housing or housing ownership and providing recommendations on improving affordable housing conditions for them.

1.1. Background of the Study

India is rapidly shifting from being an agricultural-based nation to an industrial and services-oriented country. This rapid urbanisation has increased the number of people migrating from rural to urban areas leading to rising population pressure on resources available in urban areas. About 31.2% population is now living in urban areas. Over 377 million urban people are living in 7,935 towns/cities. There are three mega cities in India- Greater Mumbai, Delhi, and Kolkata—having population of more than 20 million, 53 cities have more than 1 million population, and 415 cities having population 100,000 or more (Census, 2011a). Mumbai, being the commercial hub of the country, has attracted a large population due to availability of better employment opportunities, educational and health care facilities, etc. However, land accessible for residential building in Mumbai is restricted owing to limitations such as coastal regulation zones (CRZs)¹. Urban land is a relatively fixed resource - supply of which cannot be increased significantly without capital intensive instruments in urban infrastructure. This has resulted in a demand-supply disequilibrium in the housing market. This demand surpassing supply in housing market has resulted into skyrocketing

¹ CRZ: In 1991, the coastal regions including oceans, bays, creeks, rivers, and backwaters impacted by tides up to 500 metres from the high tide line (HTL) and the land between the low tide line (LTL) and the high tide line were designated as coastal regulatory zones (CRZ). Under the Environment Protection Act 1986, the Ministry of Environment, Forest and Climate Change declared coastal regulatory zones. While the Union Environment Ministry creates the CRZ Rules, state the governments must guarantee that they are implemented through their Coastal Zone Management Authorities. See: ("Coastal Regulation Zone", 2021).

prices of properties making them unaffordable for Lower Income Groups (LIGs) and Economically Weaker Sections of the society (EWS).²

Urbanization and rising population pressure in urban areas have also led to the tremendous rise in waste generation and hence waste management is one of the most difficult and visible environmental problems that urban communities in developing countries face across the world. In India, over 12 million tonnes of inert waste are generated annually from street sweeping and Construction and Demolition (C&D) debris, plastic wastes, commercial and industrial refuses, and e-waste, accounting for almost one-third of total Municipal Solid Waste (MSW) at disposal sites. Municipal Solid Waste Management (MSWM) is administered in India by the Municipal Solid Waste (Management and Handling) Rules, 2000 (MSWR), and MSWR implementation is a critical concern for Urban Local Bodies (ULBs) across the nation. Municipal solid waste management (MSWM), a critical element towards sustainable metropolitan development, comprises segregation, storage, collection, relocation, carry-age, processing, and disposal of solid waste to minimize its adverse impact on environment. Unmanaged MSW becomes a factor for propagation of innumerable ailments. In the developed countries, solid waste management (SWM) belongs to prominent thrust areas for pursuing research and economic and technological advancements have initiated responsiveness of stakeholders towards it. High population growth rates, rapidly varying waste characterization and generation patterns, growing urbanization and industrialization in developing countries are the important reasons for paying attention towards MSWM as more area is required to accommodate waste.

The swiftly growing problem with solid waste (SW) affects urban residents who are exposed to ineffective solid waste management systems (SWMS), as solid waste can pose a serious health hazard to people and public health. In such a scenario, waste management workers play a vital role since they improve the quality and cleanliness of public spaces in urban areas and help prevent the spread of communicable diseases, therefore improving overall public health. They extend the life cycle of landfills by decreasing the amount of waste disposed in them. They are significant economic players who help to long-term growth and sustainable development by providing enormous amounts of valuable materials for recycling that would otherwise go underutilized. Waste workers also protect the environment by making materials available for reuse or to be reprocessed and enabling valuable materials to go back into the global recycling stream. Some of them work in formal sector whereas

² The law of supply and demand is an economic theory that describes how supply and demand interact and how this influences the pricing of products and services. When supply exceeds demand for a commodity or service, prices fall. This is a basic economic premise. Prices tend to rise when demand exceeds supply. See: Kramer, L., & Boyle, M. (2021). How Does the Law of Supply and Demand Affect Prices?

others work as informal garbage workers who are hired on a contract basis. Despite their contribution to sustainable development of society, these individuals working within waste management are often associated with a low social status and a lack of dignity. Historically, the manual scavenging³ work was intrinsically linked to caste system. In caste-based society, it is mainly *Bhangis*⁴ (sub-caste in Dalits) who worked as garbage workers. Even today they are often marginalized from mainstream society. Along with their low socioeconomic status, waste management workers are prone to several health issues including respiratory problems, skin diseases, etc. This adversely affects the average life span of garbage workers. The life expectancy of garbage workers hovers at 39 years, as against an urban life expectancy of 73.5 years in the state.⁵ Not only health issues, Solid-waste employees confront a variety of other problems, including inadequate housing, poor living circumstances, and poor sanitation, to highlight a few. This necessitates investigation into solid waste workers' housing issues as well as solutions to the problem of housing unaffordability. Majority of solid waste workers either reside in the government provided houses or rental houses. This indicates the housing ownership issues faced by them. The major challenges in housing ownership for garbage workers is finding affordable houses.

1.2. Affordable Housing

The term "affordable housing" is ambiguous as it lacks a universal definition. Numerous agencies and industrial bodies have endeavoured to classify it based on various socio-economic factors such as household income, location, price, size of dwelling units, employment opportunities, the government incentives, among others. However, research conducted by the Department of Economic Policy Research, RBI has explained affordable housing as the ability to purchase a house in the given income, low housing expenditure for low-income groups. If the housing expenditure exceeds the income of the low-income-group then it will be unaffordable for them. Housing affordability can be measured by taking the ratio of housing expenditure to housing income. Housing expenditure covers all the costs related to housing including rentals, mortgage repayments, utilities, and maintenance costs; housing income is the total income earned that includes incomes of other family members. Housing units can be classified as affordable if the ratio is less than some cut-off value. Demographic International, an organisation that conducts surveys across countries for affordable housing, considers the price to income ratio below 3 to classify housing units as

³ Manual Scavenging: Manual scavenging refers to the practice of manually cleaning, carrying, disposing or handling in any manner, human excreta from dry latrines and sewers. It often involves using the most basic of tools such as buckets, brooms and baskets. The practice of manual scavenging is linked to India's caste system where so-called lower castes were expected to perform this job. Manual scavengers are amongst the poorest and most disadvantaged communities in India. See: ("Breaking Free: Rehabilitating Manual Scavengers", 2021)

⁴ *Bhangis*- Literally, "broken identity," a pejorative term for individuals from the Dalit caste responsible for manual scavenging. See: ("Cleaning Human Waste", 2021)

⁵ Source: ("People in this Mumbai slum barely make it to age 40", 2021)

affordable.⁶ These housing affordability measures are adopted by the governments and researchers for calculating the ability of economically weaker sections to own their house. Generally, affordable housing is targeted towards a section of society which has an income equivalent or lower than the median income. Ideally, for any individual, the monthly instalment should not exceed more than 30%-40% of gross monthly income and the ratio of house price to annual income should be between 2 to 4.

Previously conducted studies revealed that the low-cost segment particularly caters to the Economically Weaker Section (EWS) and Lower-Income Group (LIG) who find it difficult to own a house in cities where they reside to earn a living. According to the government estimates, there was a shortage of more than 18.78 million homes in the urban areas at the beginning of 2012, of which 96% was in the EWS and LIG segment. According to the Urban affairs ministry, the housing shortage in 2018 was estimated to be 11 million in urban areas, expected to again reach 19 million by 2022. Amidst the rising population and increasing urbanization, the country's total urban housing shortage is projected to be about 38 million by 2030. This ever-increasing shortage of supply in the affordable housing segment is forcing people to live in slums and informal settlements. While the the government tried to incentivize private players by offering tax incentives and access to low-cost capital, initially they depicted limited interest in the affordable segment due to thin margins, high land cost and delay in project approvals. However, amidst the rising demand grappling the Indian residential real estate sector and the the government's rising focus on "Housing for All" by 2022, private players were necessitated to increase participation in the affordable housing segment. Since infrastructure status was accorded to the affordable housing sector and additional benefits in the form of interest subsidies and lower GST rates were granted, the situation seems to have changed in recent years as the positive externalities⁷ of affordable housing –an under consumed and underproduced merit good ⁸– have been increasingly recognised, including better public health due to better living conditions that in turn increases labour productivity, and reduction in social problems. Therefore, this research attempts to tackle the challenges faced by solid waste workers, representative of Lower Income Groups, in affordable housing. Making provision of affordable houses for solid waste workers would enable them to create long-term wealth since possession of an asset will lead to wealth creation. This, in turn, will help them to plan for post-retirement income. This will benefit not only solid waste

⁶ This definition is given in the research article published by the Department of Economic and Policy Research, RBI on affordable housing.

⁷ Positive externalities: A positive externality is a benefit that is enjoyed by a third-party as a result of an economic transaction. While individuals who benefit from positive externalities without paying are considered to be free-riders, it may be in the interests of society to encourage free-riders to consume goods which generate substantial external benefits. See: ("Positive externalities | Economics Online | Economics Online", 2021)

⁸

workers but also the entire city because improved living conditions of solid waste workers will improve their life expectancy along with improved efficiency at work. This will have a positive impact on the efficiency of solid waste management in the city.

1.3. Role of the government in providing affordable housing

The government has taken following measures for providing affordable housing to Lower Income Groups like solid waste workers

- **National Housing Policy (1994)**

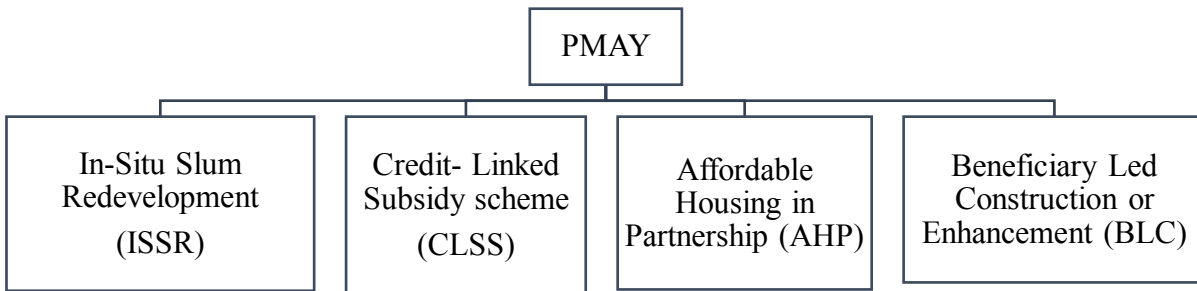
Under National Housing Policy (NHP) introduced in 1994, building centres were established with central assistance through the Housing and Urban Development Corporation (HUDCO). This policy aimed at constructing cost-free housing for scheduled casts, scheduled tribes and free bonded labour below poverty line. During 1997-98, a total of Rs.1144 crore was allocated as an assistance for establishments of affordable housing projects.

- **Jawaharlal Nehru National Urban Renewal Mission (2005)**

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched in 2005 as the Ministry's first flagship programme. Basic Services for Urban Poor (BSUP) and Integrated Housing and Slum Development Programme (IHSDP) aimed at integrating the development of slums through programmes that provided housing, basic services, and other associated civic amenities with the goal of providing utilities to the urban poor. Project costs are split 50:50 for cities with populations greater than 1 million (as of Census 2001), 80:20 for other smaller Mission Cities, and 90:10 for North-Eastern and Special Category States under the BSUP. The whole cost of building Dwelling Units (DUs) and associated infrastructure was divided according to the above-mentioned sharing arrangement with no restrictions. The two components of JNNURM were given the responsibility of pursuing three key pro-poor reforms: (a) allocating 25% of municipal budget to the urban poor for the provision of basic services, including affordable housing; (b) implementation of 7- Point Charter, namely provision of land tenure, affordable housing, water, sanitation, education, health and social security to the poor in a time-bound manner ensuring convergence with other programmes and (c) reservation of 25% of developed land in all housing projects, public or private, critical for slum improvement.⁹

⁹ Source of Information: ("Jawaharlal Nehru National Urban Renewal Mission: Ministry of Housing and Urban Affairs, The government of India", 2021)

- **Pradhan Mantri Awas Yojana (2015)**



The Pradhan Mantri Awas Yojana (PMAY) is an initiative by the Central The government for providing affordable housing to Economically Weaker Sections (EWS) or Lower- Income Groups (LIGs) of the country. This scheme is initiated to achieve the mission “Housing for All” by the year 2020. This programme is divided into two segments: PMAY-U & PMAY-R. Pradhan Mantri Awas Yojana- Urban (PMAY-U) which is a flagship mission of The government of India launched on 25th June 2015. It is aimed at providing housing settlements to the lower income groups residing in the urban areas, metropolitan cities like Mumbai. Since 2015, Rs. 1,48,747.73 crores were invested, and 4,86,039 projects were delivered in the state of Maharashtra. In 2020, The government of Maharashtra has allocated Rs 4,199 crore to the PMAY¹⁰. This mission addressed the problem of disequilibrium in the housing market that caused shortages of houses in Urban areas. PMAY (U) adopted demand-based approach in providing affordable housing and the federal system for implementation the programme.¹¹

I. In-Situ Slum Redevelopment (ISSR)

This component of PMAY focuses on redevelopment of existing slums on private or public lands. Using this existing land as a resource, this scheme aims to provide housing for economically lowers sections of the society. Central the government provides assistance of Rs. 1 lakh per house and it applicable to all the houses built by slum dwellers eligible under the component of ISSR. ¹²After redevelopment, de-notification of slums by State/UT The government is recommended under the guidelines.

¹⁰ ("Demand for Grants 2020-21 Analysis: Housing and Urban Affairs", 2021)

¹¹ PMAY(U) adopts a demand driven approach wherein the Housing shortage is decided based on demand assessment by States/Union Territories. State Level Nodal Agencies (SLNAs), Urban Local Bodies (ULBs)/ Implementing Agencies (IAs), Central Nodal Agencies (CNAs) and Primary Lending Institutions (PLIs) are main stakeholders who play an important role in implementation and success of PMAY(U). See: ("PMAY (U)", 2021)

¹² Source of Information: ("PMAY (U)", 2021)

II. Credit-Linked Subsidy Scheme (CLSS)

Under CLSS component of PMAY, easy institutional credit is provided for purchase of homes with interest subsidy credited upfront to borrower's account through primary lending institutions (PLIs), effectively reducing housing loan and equated monthly instalments. Under this scheme, the government provides interest subsidy of 6.5 percent, 4 percent, 3 percent on loan amounts upto Rs. 6 lakh, 9 lakh, 12 lakh respectively to economically weaker sections (EWS), lower or middle-income groups.¹³ Housing and Urban Development Corporation (HUDCO), National Housing Bank (NHB), and State Bank of India (SBI) have been recognised as Central Nodal Agencies (CNAs) by the Ministry to channel this subsidy to beneficiaries through lending institutions and to track progress.

III. Affordable Housing in Partnership (AHP)

This component of PMAY aims at constructing affordable houses in public-private partnership for which assistance is provided at the rate of Rs. 1.5 Lakh per EWS house. With help of this assistance, up to 35 per cent of houses will be constructed for EWS by private developers. The states/UTs set an upper limit on the sale price of EWS dwellings to make them inexpensive and accessible to the intended recipients. Other advantages offered by the state and cities include their State-share, land at a low cost, stamp duty exemption, and so on.

IV. Beneficiary-Led Construction or Enhancement (BLC)

Under this scheme, central assistance of Rs. 1.5 lakh is provided for construction or enhancement of houses to the EWS/LIG families. The beneficiary's information and building plan are validated by the Urban Local Bodies to determine land ownership and other factors such as economic standing and eligibility. Central Assistance, together with any State/UT/ULB share, is transferred to beneficiaries' bank accounts via Direct Benefit Transfer (DBT) by States/UTs.

The government has taken several measures for providing houses to lower income groups. However, the benefits have not reached the poor sections of the society. Therefore, there is need find alternatives to solve housing issues of LIGs. Thus, this research aims at analysing the housing problems of solid waste workers and providing recommendations for providing affordable houses to them.

¹³ Source of Information: ("PMAY (U)", 2021)

Chapter 2: Theoretical Background

2.1. Review of Literature

Fisher (1970) addressed the housing problem of non-white citizens in the United States. The researchers observed that various privately as well as federally funded research have been conducted in the pursuit of low-cost construction material and system, but this research found that there have been no technological advancements in housing markets for reducing the cost of production. This research is a descriptive analysis that focused on most promising low-cost housing construction systems, modification of land use controls. CHOICE (Cost Effective Home Ownership in an Improved Contemporary Environment) project, etc. The study revealed that the zoning laws and local building codes have imposed both unnecessary as well as undesirable constraints upon the developers. This discourages public private partnership in constructing affordable houses.

This is also applicable to developing countries like India. For instance, Coastal Regulations Zones (CRZ) in Mumbai put limitations on land available for construction of residential buildings. This suggest that affordable housing problems of Lower Income groups can be resolved through removal of restrictions on land occupation.

Karuppannan (2002), reviewed the role of the state, the market, and the non-the governmental organisations (NGOs) in provision of housing for lower income groups. According to the descriptive study, formal housing organisations in both the public and private sectors are neither building quickly enough to satisfy demand, nor are they building affordably enough to serve the poor. Therefore, the informal housing sector like slum development has risen in nearly all Indian cities. The study concludes that inefficient the government policies and poor implementation of measures taken by The government for proving housing to lower sections of the society have resulted into the practice of unauthorized occupation of land for shelter (In Mumbai, 50% of buildings do not have occupation certificate)¹⁴. This research implies that even though the the government has strengthened the housing finance sector over time, the beneficiaries are mostly the middle and higher-income groups; the poor continue to struggle with access to affordable and formal home financing. The public sector has now realized that private agencies should be encouraged to augment their efforts.

Balsubramanian (2015), provided an overview of economics of solid waste in India and issues related to it. Due to unavailability of data, researchers found it difficult to conduct cost-benefit analysis of Municipal Solid Waste (MSW) management policies. Difficulty in decision making, problem of cost planning, unavailability of adequate data, inaccessibility of areas are the major difficulties faced by solid waste management planners in India. Local the governments in India spend between Rs. 500

¹⁴ Source: 50% buildings have no OC, but BMC can't do much. (2021)

and Rs. 1500 per metric tonne of solid garbage, with 60 percent to 70 percent going to collection and 20 percent to 30 percent going to transportation. This indicates inefficiency municipal waste management. An ineffective solid waste management strategy resulted in all forms of contamination, with up to 95% of it being thrown as MSW. Improper solid waste management also causes health and safety concerns, increasing environmental and health expenses across India, and affecting waste workers or scavengers due to constant exposure and frequent injuries.

Similarly, 6500 tonnes of municipal solid waste (MSW) are produced in Mumbai on daily basis.¹⁵ Increasing waste generation increases the efforts of solid waste workers in managing municipal waste. This implies that solid waste workers are continually exposed to dangers that arise from managing solid waste. Therefore, improving their health condition by providing better housing conditions can lead to improved efficiency of work, meaning that the management of Municipal Solid Waste can improve.

Olanrewaju (2016), provided the framework for affordable housing governance¹⁶ for the Nigerian property market and categorised the elements that contribute to housing shortages. Researchers investigated that housing deficit caused a crisis resulting in lower standards, unaffordable housing prices, excessive mortgage payments, etc. These concerns were addressed through proposing improvements in housing governance. To combat difficulties relating to affordable housing, researchers recommended that the government should alter functioning of housing markets, and mortgage and loan distribution rules should be examined. Thus, affordable housing issues can be resolved through improvements in the functioning of the housing market by achieving equilibrium between demand and supply for affordable houses.

Grazia Napoli (2016), addressed the problem of housing affordability through the case study of the territorial system of the Province of Syracuse (Italy) and discovered that the local features of housing problems can be addressed by utilising traditional planning methods or novel social housing techniques involving private stakeholders and the government agencies. The data on wealth distribution in terms of income and real estate market price, income threshold based on Housing Affordability Index¹⁷ was analysed. In this research, it was observed that household incomes are too low to meet housing market prices. However, households can afford public houses and still they are not getting access to it because of various reasons like lack of awareness about the government schemes or credit facilities available to them. Therefore, the researchers suggested that fiscal and

¹⁵ Source: ("MyBMC - Welcome to BMC's Website", 2021)

¹⁶ Housing Governance: In this research paper, housing governance is described as the planning and execution of the government policies and programmes aimed at facilitating affordable housing.

¹⁷ Housing Affordability Index (HAI): In this research paper, the index for calculating housing affordability is used which is comprised of patterns of local income, patterns of local wealth and income threshold.

administrative housing policies such as loan facilitation, tax reduction, co-financing, cubage expansion, land use modification, national fund, etc can be effective tools in offering affordable housing.

Priyaranjan (2018), presented broad views on affordable housing in India. Researchers used expenditure method or housing cost burden method¹⁸, Median Multiple Indicator¹⁹, and Housing and Transport²⁰ method to measure housing affordability. This study also explored the available schemes or measures taken for affordable housing in other countries like USA, Australia, China. In United States of America, Department of Housing and Urban Development (HUD)²¹ provides fund to Public Housing Agencies that distributes Housing Choice Vouchers (HCV) to provide rental subsidies to the eligible families. Another major initiative taken by the US The government is the Low-Income Housing Tax Credit (LIHTC)²². These programmes are aimed at providing affordable housing to the lower sections of the society. In Australia, The Commonwealth Rent Assistance (CRA)²³ and National Rental Affordability Scheme (NRAS)²⁴ are designed to make rental housing more affordable, and the Housing Authority offers both rental and home ownership options. In China, affordable public rentals are offered under three major programmes viz. Economic and Comfortable Housing (ECH)²⁵ Program, Housing Provident Fund Scheme, Cheap Rental Housing Scheme. These experiences suggested that the common thread in promoting affordable housing across the countries is simulating the market participants and The government policies can be classified as supply side

¹⁸ Expenditure method or housing cost burden method: In this method, the ratio of housing expenditure to household income is used to measure housing affordability. Housing expenditure covers all the costs related to housing including rentals, mortgage repayments, utilities and maintenance costs. See: Priyaranjan, S. A. (2018). Affordable Housing in India.

¹⁹ Median Multiple Indicator: Under this approach, the median house price is divided by median household annual income to derive housing affordability. See: Priyaranjan, S. A. (2018). Affordable Housing in India

²⁰ Housing and Transport method: In this method, transport costs are also included with housing costs to measure affordability. See: Priyaranjan, S. A. (2018). Affordable Housing in India.

²¹ Department of Housing and Urban Development: The Department of Housing and Urban Development oversees programmes that help people find housing and improve their communities. The Department also strives to guarantee that everyone has access to affordable housing. See: ("U.S. Department of Housing and Urban Development | USA Gov", 2021).

²² Low-Income Housing Tax Credit: This programme was established under Tax Reform Act, 1986 that provides tax credits to State and local LIHTC-allocating agencies for the acquisition, rehabilitation, or new construction of rental housing for low-income people. ("Low-Income Housing Tax Credit (LIHTC) | HUD USER", 2021).

²³ Commonwealth Rent Assistance Scheme: Under this scheme, rent assistance provided is a non-taxable income supplement that is paid to qualified renters in the private rental market or in communal housing. Rent Assistance may be available to pensioners, allowees, and those receiving more than the base amount of Family Tax Benefit Part A. See: ("Commonwealth Rent Assistance | Department of Social Services, Australian The government", 2021)

²⁴ The National Rental Affordability Scheme (NRAS or the Scheme), which began in 2008, intends to boost the availability of new and affordable rental housing by offering a yearly cash incentive for up to ten years. This incentive is given to housing providers (referred to as "authorised participants") that provide rental accommodation that is at least 20% less expensive than the market rate. See: ("National Rental Affordability Scheme | Department of Social Services, Australian The government", 2021).

²⁵ Economic and Comfortable Housing (ECH) Program: Under this program, the local the government supplies land to developers at subsidized rates so that the later can sell the housing units to eligible low and middle-income families at discounted prices. See: Priyaranjan, S. A. (2018). Affordable Housing in India.

and demand side interventions. Supply side considers developers and investors which undertake affordable housing projects whereas demand side measures incentives for households to purchase houses at affordable prices.

This research paper also contributed to evaluating India's experience about need for affordable housing and initiative to promote affordable housing. Schemes like National Housing Policy (1994), Rajiv Awas Yojana (2013), Pradhan Mantri Awas Yojana (2015) are urban housing schemes aimed at addressing the problem of housing shortages. Researchers also addressed the issue of rising non-performing assets of housing loans. It is suggested from the study that joint efforts of The government and private sector can help in achieving the target "Housing for All".

Briefly, previously conducted studies revealed that in developing countries, mega cities like Mumbai have shortage of housing units for lower income groups and this caused problems like formation or increase in the number of slums, poor housing conditions, poor waste management systems etc. To tackle these issues, the governments in developing countries like India, framed policies to provide financial assistance to LIGs but the execution of these policies is found to be inefficient in developing housing units for LIGs. Housing projects financed by the the government are accounted to have increased costs during the process of construction which in turn increases the housing prices making them unaffordable to LIGs. These studies recommended that the the government along with the private sector can efficiently carry out projects aimed at constructing low-cost housing units for indigent citizens. It can also be observed that developed countries like the United States of America, Australia have adopted national schemes while incentivizing private sectors in building properties at low-cost. This strategy can be adopted by developing countries like India, Nigeria, etc. for increasing the supply of affordable housing in the country.

2.2. Theoretical Framework

It has been a conflict of decades whether certain goods and services should be provided by the government or private sector. In the development experiences of countries around the world, it has been observed that only the government or only private sector in isolation are not capable of resolving the issues and therefore public private partnership²⁶ is recommended in providing merit goods²⁷. Affordable housing is one such good that needs provision of the government policies which can be implemented in co-ordination with private- real estate companies.

1. The Pure Theory of Local Expenditures

An American economist Charles M. Tiebout, propounded the “The Pure Theory of Local Expenditures” for explaining how framework of federal expenditure policy may not be applicable to local expenditure policies. Therefore, certain goods and services require provision by local the governments in order to make them available for citizens belonging to the particular region. This theory is very much applicable in case of provision of affordable housing for economically weaker sections. As previously mentioned, India has different regions and different climatic conditions and thus policies which are applicable for the country as a whole might not work for one particular region. For instance, the housing patterns in two major cities of India- Bangalore and Mumbai- are different. The population varies in these countries and so does the pressure on resources. In brief, the local the government in Mumbai needs to frame policies for constructing houses for LIGs at affordable rates in way that make optimum use of available resources like land, financial assistance provided by central as well as state the government for building affordable housing units or rental subsidies.²⁸

2. A Multiple Theory of Budget Determination

Richard Musgrave, the public finance economist, established a three branched theory of budget determination. According to the theory, these three branches are (a) service branch (function of providing services to satisfying public wants), distribution branch (function of providing for adjustments in distribution of income) and stabilisation branch (function of contributing to stabilization). The the government can apply these functions in making providing of housing units to economically weaker sections of the country. Considering the demand for housing units, the government can spend more on goods and services necessary for providing affordable housing units

²⁶ Public Private Partnership (PPP): Public-private partnerships involve collaboration between a the government agency and a private-sector company that can be used to finance, build, and operate projects, such as public transportation networks, parks, and convention centres. See: Brock, T. (2021). Public-Private Partnerships Definition.

²⁷ Merit goods: Merit goods are those goods and services that the the government feels that people will under-consume, and which ought to be subsidised or provided free at the point of use so that consumption does not depend primarily on the ability to pay for the good or service. See: ("Explaining Merit Goods | tutor2u", 2021)

²⁸ Source: Tiebout, C. (1956). A Pure Theory of Local Expenditures.

to solid waste workers. Distribution of affordable housing can be a major concern in execution of policies targeted to curb housing problems. However, income distribution function can be efficiently carried out by providing tax-free housing assistance to the eligible families under the government schemes. A part of budget that is allocated to affordable housing projects can be increased while taxes on financial assistance provided for affordable housing can be decreased. These adjustments in budget can be considered under revenue expenditure since these affordable housing projects would result in improved standards of living of solid waste workers. This, in turn, would improve their productivity and efficiency of work. ²⁹

3. A Theory of Urban Housing Markets and Spatial Structure

According to this theory of urban housing markets and spatial structure given by Kain and Quigley, urban households make residential-location and housing-consumption decisions based on a utility-maximizing calculation in which they try to maximise their real incomes. This implies that if the real income of the households increases their expenditure on housing tends to increase. This theory is relevant to the case of solid waste workers, if their income is utilized in way to optimize their utility for other goods, they can spend some part of their income on purchasing housing units. For this, they require financial knowledge of how to utilize their real income. ³⁰

These theories mainly focused on the role of the government in providing affordable housing and also examined how the private sector in coordination with public sector can contribute to reducing demand-supply disequilibrium in housing market. This implies that the inefficiency in housing market can be resolved through increasing the supply of affordable houses.

Affordable houses for solid waste workers will increase the efficiency in utilization of their income. Since a part of salary they get is not efficiently allotted to housing expenditure, solid waste workers find it difficult to purchase house in the given income. Therefore, this research also attempted to derive a function for maximizing the utility of solid waste workers so that they can channelize some portion of their income to invest in housing assets.

Utility maximization function:

The utility maximisation function can be used in housing market to measure the utility derived from consumption of housing units. ³¹ In this research, the utility maximisation function is used to examine utility derived from consumption of housing as well as goods other than housing from the given

²⁹ Source: Musgrave, R. (1956). A Multiple Theory of Budget Determination.

³⁰ Source: Quigley, J. F. (1975). A Theory of Urban Housing Markets and Spatial Structure

³¹ See: ("Housing in consumer's theory", 2013)

income spent by solid waste workers. In economics, such utility maximisation functions ³²are optimised using Lagrange multiplier³³.

Utility maximization function for solid waste workers:

$$U_h(x, y) = \min(x, y)$$

$$\text{Subject to } p_1x + p_2y \leq I$$

$U(x, y)$: Utility derived from income spent on housing consumption and consumption of goods other than housing.

p_1x : the amount of income spent on housing consumption.

x : quantity of good X (housing) consumed.

p_1 : Housing expenditure that includes rentals, mortgage repayments, utilities and maintenance costs.

p_2y : the amount of income spent on consumption of goods other than housing.

y : quantity of good Y (goods other than housing) consumed.

p_1 : Expenditure other than housing like household kitchen expenses, children's expenses, medical expenses and other personal expenses.

$$p_1x + p_2y \leq I$$

This equation represents the budget constraint in expenditure on housing as well as other goods consumed. It shows that the expenditure on housing and other expenses should be less than income in order to maximise the utility derived from income spent on consumption of goods X & Y. This utility function can be employed in calculating the part of income that is to be spent on housing units.

Lagrange multiplier can be used to solve utility maximisation problem mentioned above as following:

$$L(x, y, \lambda) = x + y - \lambda(p_1x + p_2y - I)$$

Suppose the utility function for solid waste workers is

$$U_h = x^2 + y^2$$

³² Utility maximisation function: The function that aims at maximising the utility derived from a bundle of goods is known as utility maximisation function in economics. See: Board, S. (2009). Utility Maximisation Problem

³³ Lagrange multiplier: It is used to optimise utility maximisation function in economics, subject to given constraints. See: Creedy, J. (1980). The Early Use of Lagrange Multipliers in Economics.

Subject to $20x_1+40y_1= 25000$

$20x_1+40y_1= 25000$: this equation represents the budget constraints for solid waste workers. The fixed income, as observed in primary data, is considered as Rs. 25000.

Using Lagrange multiplier,

$$L(x_1, y_1, \lambda) = x_1^2 + y_1^2 - \lambda (20x_1 + 40y_1 - 25000)$$

λ : rate of change of the solution to the constrained maximization problem as the constraint varies.

$$\frac{dL}{dx_1} = 2x_1 - 20\lambda = 0$$

$\frac{dL}{dx}$: Rate of change in utility function due to the quantity of good X consumed, that is, housing consumption.

$$\frac{dL}{dy} = 2y_1 - 40\lambda = 0$$

$\frac{dL}{dy}$: Rate of change in utility function of solid waste workers due to the quantity of goods consumed other than housing.

$$\frac{dL}{d\lambda} = -20x_1 - 40y_1 + 25000 = 0$$

Solving above equations, we get

$$x_1 = 250, y_1 = 500$$

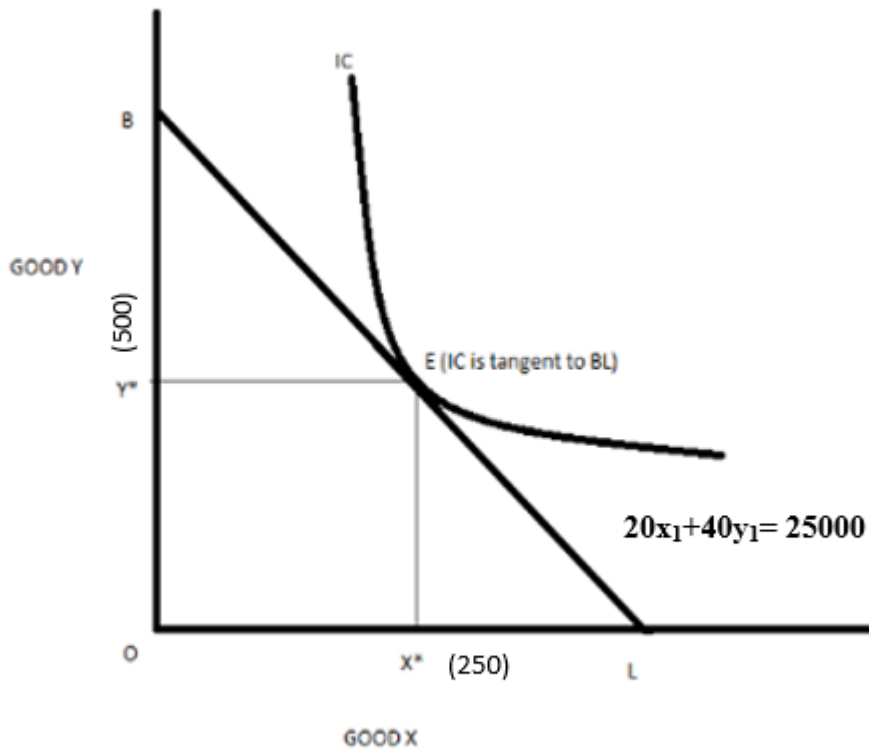
The amount of income spent on housing consumption = $20x_1 = 20 \times 250 =$ Rs. 5000

The amount spent of income on consumption of other goods = $40y_1 = 40 \times 500 =$ Rs. 20000

Thus, utility function for solid waste workers can be maximised using Lagrange multiplier and if the amount spent on consumption of goods other than housing is known the amount to be spent on consumption of housing can be calculated, given the budget constraints. This would help solid waste workers in managing their housing expenditure given the budget constraints.

This can be well explained through the following diagram:

Fig 4.9: Indifference curve and Budget line for solid waste workers.



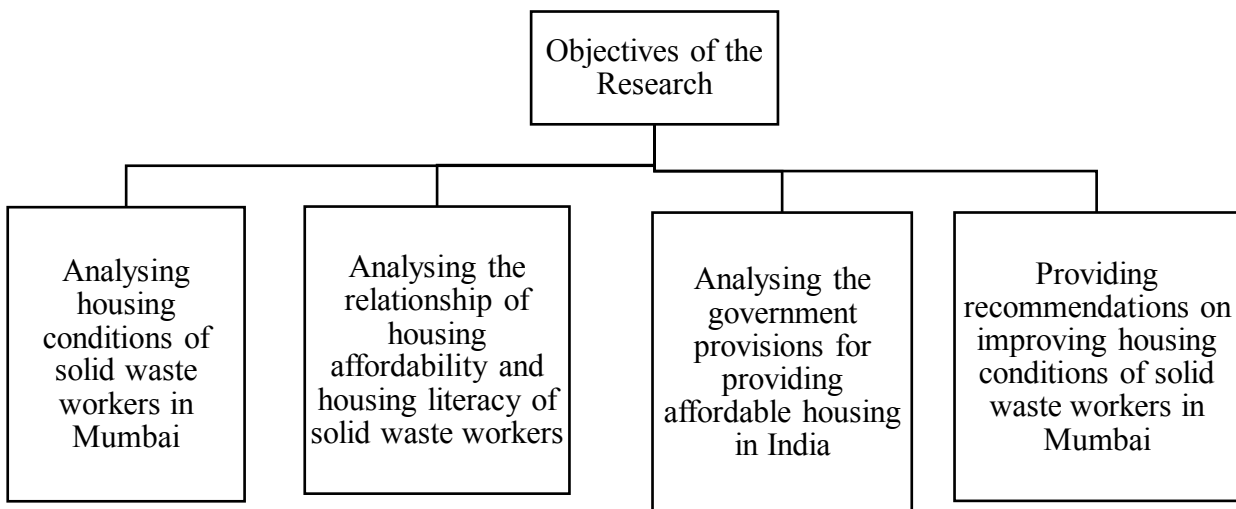
Source: Primary Survey, 2021

Fig 4.9 depicts the indifference curve and budget line for solid waste workers. X-axis represents the quantity of good X (Housing) whereas Y-axis represents quantity of good Y (Goods other than housing) consumed by solid waste worker. If a solid waste workers consume 500 units of good Y and 250 units of good X then, he spends Rs. 5,000 on housing expenditure and Rs. 20,000 on other expenditure. BL is the budget line that depicts the budget constraint for solid waste workers. Their fixed monthly income is considered as Rs. 25,000. The equilibrium point E, represents the optimum allocation of income between two goods X and Y.

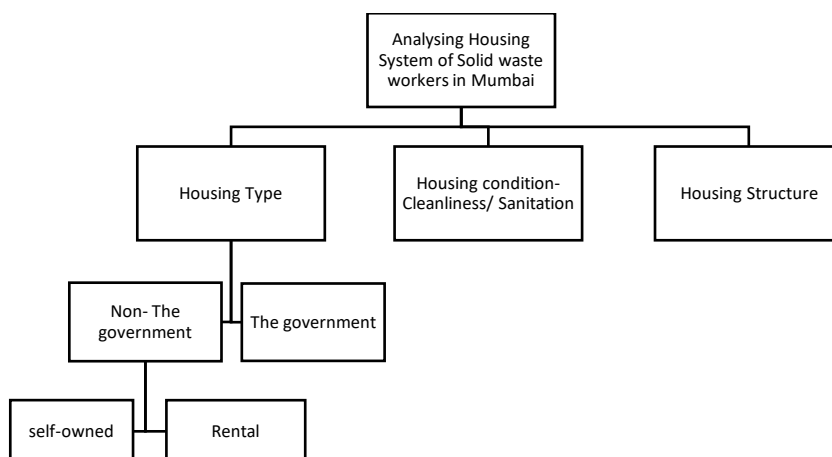
In short, solid waste workers can maximise their utility derived from income by allocating an appropriate proportion of their income to housing expenditure, and aforementioned utility maximization function can help them in estimating the proportion of income they can spend on housing expenditure.

2.3. Conceptual Framework

As mentioned earlier, this research is conducted with the primary objective of analysing the housing conditions of solid waste workers. Since solid waste workers are representative group of lower income groups, this study also aimed at analysing the government schemes aimed at providing affordable houses to lower- income groups. While analysing the housing conditions, researchers also studied the challenges faced by solid waste workers in purchasing houses, and to study the reasons of housing unaffordability the relationship between housing affordability and housing literacy of solid waste workers is analysed.



Since this research is aimed at analysing the housing conditions of solid waste workers, certain set questions were considered like whether they reside in the government or non- the government houses, if they stay in non-the government houses, then how many of them own houses and how many of them stay in rental houses. All these questions are answered in the analysis section (chapter 3).



The housing system of solid waste workers is well explained in the following chapter (chapter 3) with the help of primary data collected during the survey.

Chapter 3: Primary and Secondary Research

3.1. Research Gap

Though waste management workers play a vital role in maintaining hygiene and sanitation of the society, very limited research to study the living standards of the waste management workers has been conducted in India, and scarcely any research has been conducted in the metropolitan city of Mumbai. Mumbai, being the commercial capital of India, has seen tremendous rise in population, industrialization, and in turn, municipal solid waste generation. But issues related to municipal solid waste management, waste management workers' health and sanitation as well as their housing conditions, are severely overlooked. Therefore, the sole objective of this study is to address the housing issues faced by solid waste workers in Mumbai.

3.2. Research Questions

- What are the living circumstances for waste management personnel, and what are the housing issues they face?
- What role does the the government play in addressing the housing issues faced by garbage workers?
- How can this home ownership issue faced by waste management personnel be resolved?

3.3. Research Objectives

- To study housing conditions of waste management workers in Mumbai and to address problem of housing ownership.
- To examine the impact of providing affordable houses to solid waste workers on sustainable development.
- To provide recommendations on strategy for affordable housing for waste management workers.

3.4. Methodology of data collection

This research is based on the primary data collected by CleanUp foundation using survey method. Solid waste workers from different wards in Mumbai were interviewed and their housing conditions were examined through extensive survey. This study also considered secondary data collected from the government websites as well as journal articles. The the government schemes for affordable housing are analysed based on secondary data. The descriptive analysis and data visualization through graphs are used to answer the research questions. After analysing the primary and secondary data, recommendations are provided on improving affordable housing scenario in Mumbai.



Source: Primary Survey Conducted by CleanUp Foundation, 2021

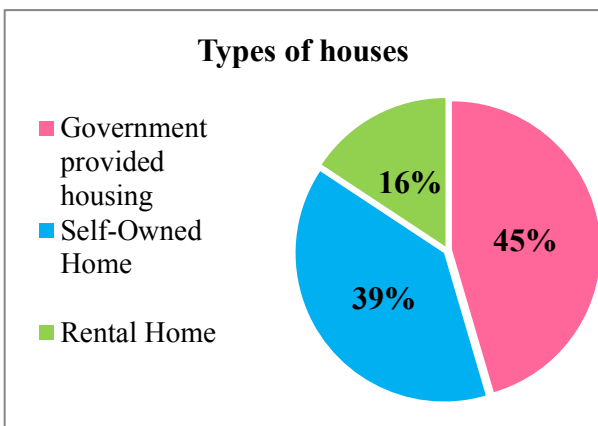
3.5.Housing Problems of Solid Waste mangers in Mumbai: Data Analysis

As mentioned earlier, one of the major challenges faced by solid waste workers is housing ownership. This research addressed these challenges through collection of primary data. Solid waste workers in Mumbai were surveyed (121 with first questionnaire and 35 with another questionnaire). They were asked questions in a way to understand their current status of housing ownership and challenges faced by them in owning a house. The data collected is analysed and visualised in the form of pie charts, bar graphs, etc.

a) Analysis of housing challenges faced by Solid waste workers.

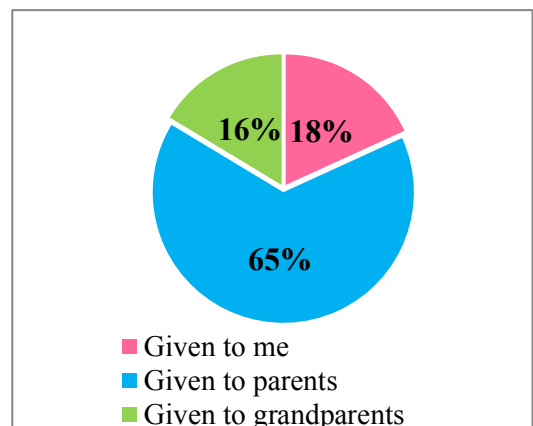
The following chart provides data on the type of houses solid waste workers live in. Since they work in the formal sector, they are eligible for allowances from the the government. The government of India provides housing allowances to the government employees.

Fig 4.1: Types of houses of solid waste workers



Source: Primary Survey, 2021.

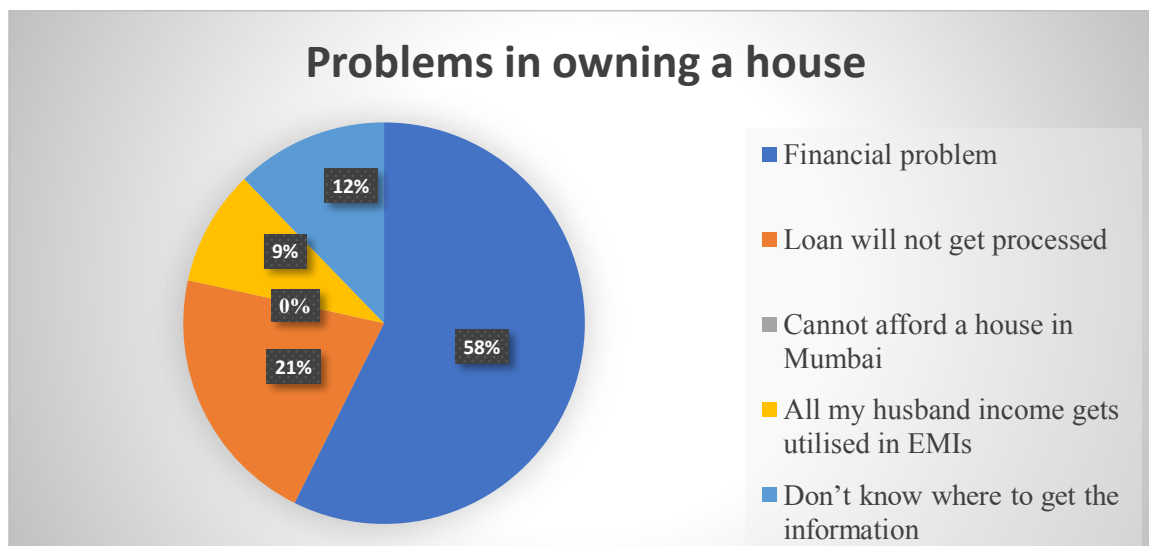
Fig 4.2: The government housing



Source: Primary Survey, 2021.

Fig 4.1 depicts that 45 percent of the total sample stay in the houses provided by the the government while others receive significant housing assistance from the the government, 39 percent of them own their home. However, 16 percent workers stay in rental houses though they are eligible for residing in the houses provided by the the government. Fig 4.2 shows that those who stay in the government houses, 16 percent of them have got their houses from their grandparents, 85 percent of them have got it from their parent. This implies that 81 percent of solid waste workers stay in the the government houses which were given to their parents or grandparents whereas only 18 percent of the present workers are given accommodation by the the government. From the above data, it can be observed that there is significant lack of housing ownership by the solid waste workers. This is due to various problems faced by them. Survey recognized the following major challenges faced by waste management workers in owning a house.

Fig 4.3: Problems faced by solid waste workers in owning a house.



Source: Primary Survey, 2021.

Fig 4.3 represents the factors contributing to lack of housing ownerships by solid waste mangers. 58 percent of the problem is caused by financial issues. Lack of financial awareness, improper budget management leads poor utilization of income earned by the workers. Most of them are found to have no fund remaining to spend on housing expenditures like home loans. If this financial illiteracy continues to be there, solid waste workers will not be to purchase houses even though they get financial assistance. This implies that only providing financial assistance is not enough, financial literacy programmes are needed for making them aware about their financial growth. 21 percent of the workers responded that they find it difficult to get their loans processed. This can be due to the lack of awareness about the process for applying for and getting sanctioned home loans. 9 percent of

the sample revealed that major part of their income goes for EMI paid for personal loans while 12 percent of the total sample responded that they do not know where to get the information.

b) Analysis of housing conditions and housing structure of solid waste workers.

Researcher also collected data on housing conditions as well as structure of the houses of solid waste workers. The following data explain why there is need to examine the housing conditions and to improve the living standards of solid waste workers.

Table 4.1 Home condition – Cleanliness/Hygiene

Description	Very Good	Good	Neutral	Bad	Very Bad	Average Score
Score out of 5	5	4	3	2	1	
Overall (n =121)	23%	10%	13%	44%	10%	4.04
The government Housing (n = 55)	10%	6%	12%	48%	26%	4.2
Non-The government Housing (n= 66)	14%	30%	51%	5%	-	3.92

Source- Primary Survey, 2021.

From table 4.1, it can be observed that the majority of the workers responded for their houses are in a pathetic condition. The data shows that 44 percent of the total sample responded that the housing conditions are bad. 48 percent of the the government houses are in bad condition whereas 51 percent of the solid waste workers residing in non-the government housing responded that the housing condition are poor. During the survey it was also observed that their standards of living are very low. It can be also observed that the average score of housing condition of the government housing (4.2) > the average score of housing condition of non- the government housing (3.92). This implies that the cleanliness and sanitation is relatively better in the government housing than non-the government housing.

Table 4.2 Home condition – Structure

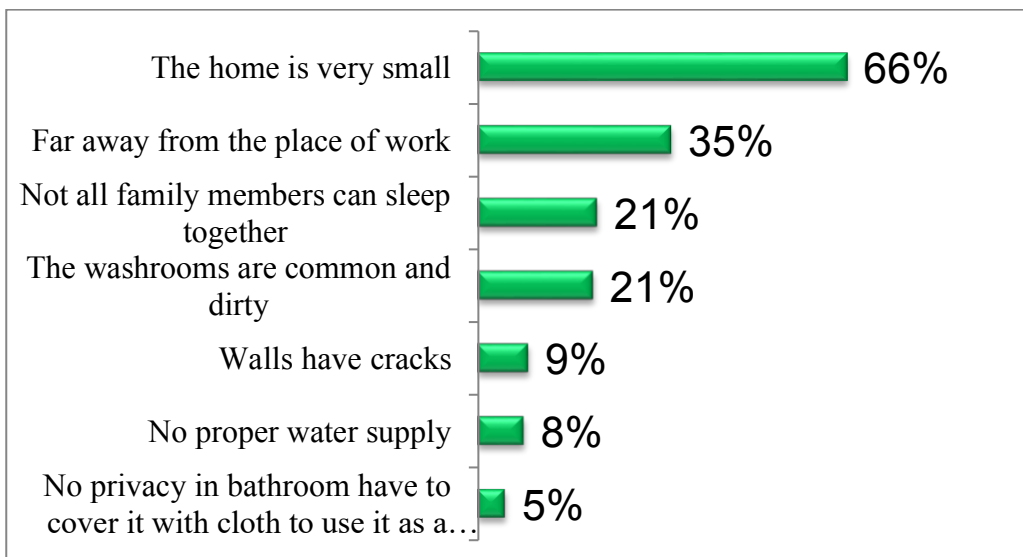
Description	Very Good Condition	Good Condition	Neutral	Poor Condition	Very Poor	Average Score
Score out of 5	5	4	3	2	1	
Overall (n =121)	20%	10%	10%	7%	53%	3.96

The government Housing (n = 55)	15%	15%	16%	11%	43%	3.76
Non-The government Housing (n= 66)	24%	22%	5%	3%	46%	4.14

Source: Primary Survey, 2021.

Table 4.2 shows that most of the workers responded for their housing structure is very poor. 53 percent of the total sample responded that the housing structure is in a very bad condition. While conducting the survey, it observed that houses provided by the the government are very old and structure of non-the government houses was found to be relatively better than the government houses. It can be observed that the average score of housing structure of non-the government housing (4.14) > the average score of housing condition of the government housing (3.76). This implies that the structure of the non-the government houses is relatively the government houses.

Fig 4.4 Problem areas at home – The government & Non- government Housing



Source: Primary Survey, 2021.

The above chart represents the problems faces by solid waste workers in their houses. 66 percent of them said that houses are very small and therefore all the family members cannot sleep together in 21 percent of the houses. 35 percent of the sample stay far away from the place of work. This implies that solid waste workers need to travel long distance to reach the workplace. 21 percent responded that the common washrooms they use are very dirty and 5 percent of the sample said that there is no privacy in bathroom because cloth is used as door to cover the bathroom. The poor housing conditions can be seen as their walls have cracks. Also, they are facing issues in getting basic

necessities of life like water. 8 percent of the sample said that there is no proper water supply. Thus, these issues faced by solid waste workers needs to be addressed through framing appropriate policies and efficiently executing them.

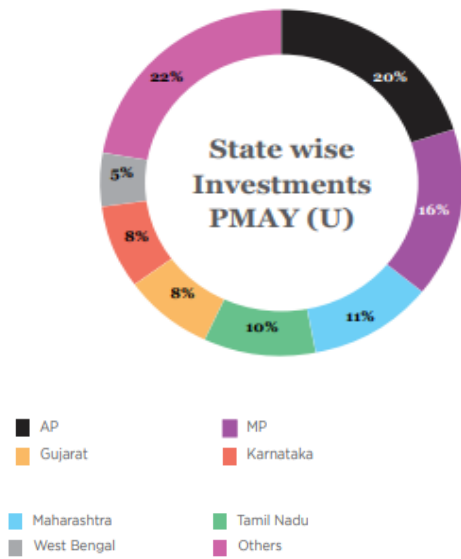
c) Analysis of affordable housing scenario in Maharashtra

This section of the chapter contains the analysis of secondary data collected on the government schemes available in Maharashtra, contribution of central the government schemes to affordable housing projects in Maharashtra. It also examines the performance of these schemes in Maharashtra, specifically in Mumbai.

Investments coming into Maharashtra for Affordable Housing:

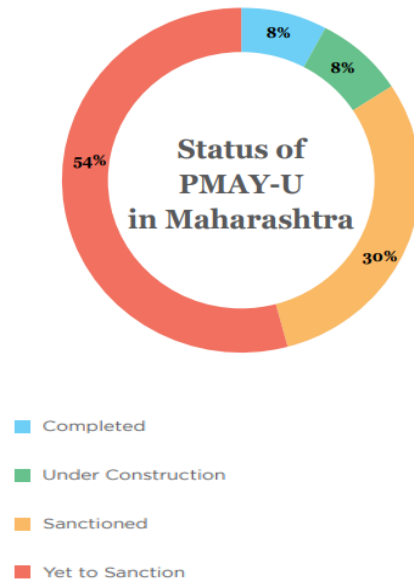
PMAY has been one of the top listed and prioritized initiatives of the The government of India. The objective of the initiative is to ensure that every family has a pucca house (dwellings that are designed to be solid and permanent) with water connection, toilet facilities, 24X7 electricity supply, by the time the nation completes 75 years of independence. The mission has come to effect since mid-2015 and it will be implemented up to early 2022. Similarly, Maharashtra has also launched multiple PMAY projects in urban and rural parts of the state. The estimated urban housing shortage of India is 18.78 million houses of which Maharashtra targets to develop 1.94 million housing units by 2022. Maharashtra Housing Development Corporation (MHDC) has taken up the initiative to construct these dwelling units. To ensure timely completion, new policies have been formulated to encourage private participation and joint ventures. Capital support will be extended from MHADA (Maharashtra Housing and Area Development Authority), SRA (Slum Rehabilitation Authority), CIDCO (City and Industrial Development Corporation) and financial grants from State and Centre will also be granted to complete the planned target. MHADA is expected to setup INR 7,000 Cr shelter fund to support affordable housing. With financial and policy support coming from central and local the government, affordable housing projects in the state are looking for private participation to reach its target. This can be observed from the following figures.

Fig 4.5: State wise Investments PMAY-U



Source: Ministry of Housing & Urban Poverty Alleviation, 2017.

Fig 4.6: Status of PMAY-U in Maharashtra

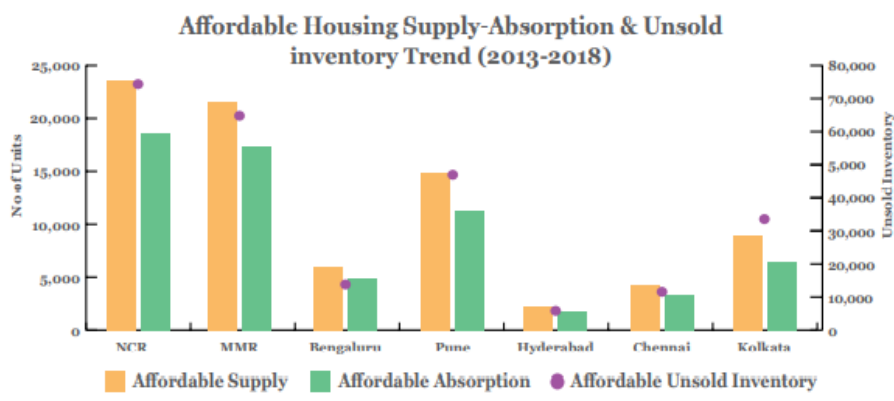


Source: MOHUA & PMAY (U)

Affordable Supply, Absorption and Unsold inventory Trends

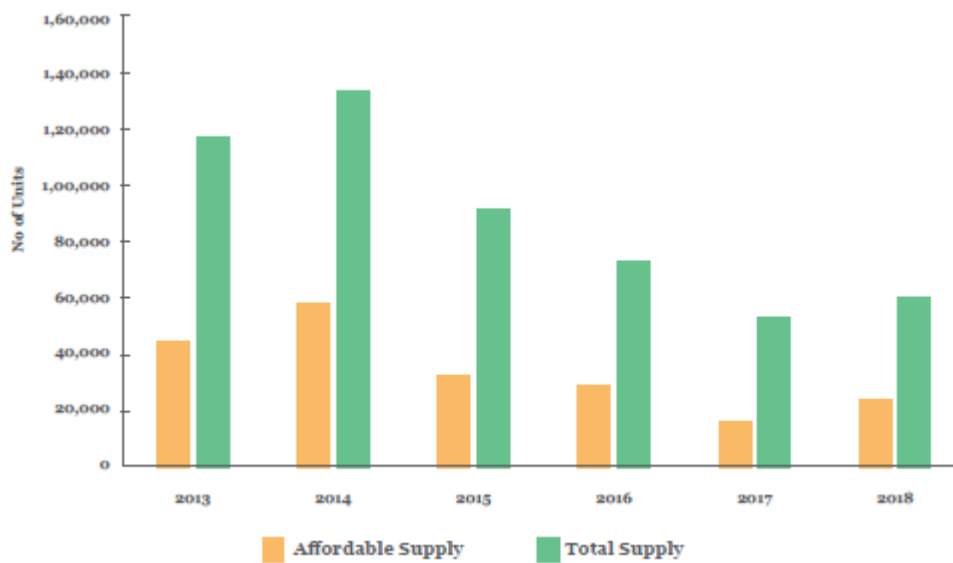
Total supply of affordable housing across the top 7 cities between 2013 to 2018 was around 7.65 lakh units while total absorption is estimated to be 5.95 lakh units. NCR, MMR, and Pune account for the top three active markets in terms of supply and absorption owing to the high rate of urbanization and industrial developments. Note: Unsold Inventory as of December 2018

Fig 4.7. Affordable Housing Supply



Source: ANROCK Research

Fig 4.8. New Launch Supply vs Affordable Supply



Source: ANAROCK research

Mumbai has continually offered affordable housing units to the Indian real estate market, primarily due to the city's expansion towards the peripheral suburbs. Constant upgrade of physical and social infrastructure has also improved connectivity to the locations where affordable housing supply is dominant. The share of affordable housing in MMR has increased from 30% in 2017 to 40% in 2018. This indicates that the developers have focussed on this segment to tap the appropriate market. Nearly 80% of the supply in Peripheral Central Suburbs and Peripheral Western Suburbs are in the affordable housing segment during 2013 to 2018 as a result of PMAY. However, the significant improvement in the living conditions of lower income groups, specifically solid waste workers in Mumbai, has not been observed. It can be seen from the analysis that though the secondary data shows the increase in affordable housing projects, significant changes in the housing affordability conditions of the solid waste workers have not been observed.

Chapter 4: Findings, Recommendations, and conclusion

4.1 Findings:

In a survey of 121 solid waste employees, 61 percent reside in rented or the government-provided housing, while only 39 percent own their homes. This indicates that most of the solid waste employees do not own a home, and the housing aid to those who do not have the government provided housing get is insufficient to pay their housing costs. The the government-provided housing is old, and the structure has deteriorated. In non-the government housing, there are no adequate sanitary facilities as far as sanitation is concerned. Houses are too small to accommodate all family members, families use shared washrooms that are filthy, walls contain cracks that are hazardous to occupants, there is no adequate water supply, and bathrooms are not private since they are covered with cloth. Workers also encounter challenges such as commuting to workplace since they live a long distance from the job.

Previously mentioned housing conditions state that solid waste workers are unable to purchase their own homes in clean and sanitary areas due to a variety of factors including financial difficulties, a lack of knowledge about available the government programmes, the prevailing interest rate on home loans, and the procedure for obtaining housing assistance or other facilities, lack of adequate information (asymmetric information) regarding how to get loans processed, etc. It is also observed, form the data collected, that hardly any solid waste worker has taken a home loan (only 2 percent of the sample) whereas majority of them have taken personal loans (81 percent of the sample). Also, they are unable to save a part of their income which can be channelised into housing expenditure. This implies that lack of housing literacy results in lack of housing expenditure. Housing literacy is measured through evaluating the awareness about the government schemes like PMAY, state the government schemes, assistance provided by MCGM, on-going interest loans on home loans. It was found that housing literacy is very low among solid waste workers that can be the one of the reasons behind lack of housing ownership.

Researchers also analysed the government initiatives such as the National Housing Policy (1994), the Jawaharlal Nehru National Urban Renewal Mission (2005), and the Pradhan Mantri Awas Yojana- Urban (2015). In the past few years, the availability of affordable housing in the Mumbai Metropolitan Region has risen. The main data gathered, on the other hand, produced contradictory outcomes. Though there is an increase in the overall supply of affordable housing, the advantages have not reached the lower income groups. Despite the the government's expanded supply of affordable housing, the problem of affordable housing for solid waste employees persists, as mentioned previously.

4.2. Recommendations:

(A) Supply Side Recommendations

The government plays a vital role in developing affordable housing provisions for lower income groups. The government can improve housing conditions of solid waste workers through framing appropriate expenditure and taxation policies, literacy programmes aimed at improving housing literacy, policies aimed at incentivising private sector for constructing affordable housing projects as well as use of advance technology in improving housing literacy as well as housing conditions of solid waste workers. Fiscal policies comprising of expenditure on housing assistance, affordable housing schemes, taxation policies, developmental as well as social expenditure, etc. Monetary policies for improving housing conditions of lower-income- groups can include inflation targeting that affects purchasing power of the citizens, interest rate policies, home loans and other financial assistance, etc. Welfare polices include welfare programmes like financial or housing literacy programmes.

Since the the government schemes have not shown significant improvements in the housing conditions of solid waste workers, it can be recommended that there is a scope for improvements in fiscal federalism ³⁴as far as affordable housing provisions are concerned. The housing assistance under PMAY is provided by the central the government to the state the government and the state the government further transfers it to the local the government. Provisions made for implementation of such policies differ at each level of fiscal federalism. The process from policy framing to its implementation, from the plan of housing project to its implementation is time consuming and therefore till this housing assistance reach to the beneficiary, the cost of construction increases, and this leads to a rise in housing prices. Therefore, houses which are built for LIGs become unaffordable for them and these houses land in the hands of middle or higher-income groups. Hence there is a need to plan projects appropriately so that contingent costs would not rise above expected levels.

1. Public-Private Partnership

It has been observed through the secondary data collected on affordable housing supply in Maharashtra that though the central and state the governments have propounded schemes for providing affordable housing to Lower Income Groups under PMAY, the benefits have not reached the eligible population like solid waste workers who continue to live in deplorable conditions. This implies that the execution of the government policies is very poor. Inefficiency in providing

³⁴ Fiscal federalism: Fiscal federalism is part of broader public finance discipline. The term was introduced by the German-born American economist Richard Musgrave in 1959. Fiscal federalism deals with the division of the governmental functions and financial relations among levels of the government. See: ("Fiscal federalism | public finance", 2021).

affordable housing to solid waste workers can be improved through public private partnership. Thus, incentivizing private sector by providing credit facilities and tax exemption on fundraising for affordable housing projects would contribute to tackling the shortage of supply in housing market. The government can also promote schemes like The government-Land Based Subsidised Housing (GLSH)³⁵ which incentivize private developers in constructing houses at lower costs.

1.1. Tax Incentives for Private Developers:

Optimization of taxes levied on affordable housing projects through the execution of schemes like Low Income Housing Tax Credit (LIHTC)³⁶ would encourage real estate developers to invest more in affordable housing projects. Public-private partnerships often involve concessions of tax or other operating revenue, protection from liability, or partial ownership rights over nominally public services and property to private sector, for-profit entities. Thus, providing tax incentives to private developers would reduce the cost of constructing houses that, in turn, would result in minimizing the prices of houses. Such policies can increase the number of affordable houses. Thus, affordable housing projects for lower income groups can be developed through Public Private Partnership in providing houses constructed at low-cost EMI or low constructing cost.

2. Unlimited Floor Space Index (FSI)

Floor Space Index (FSI) which is also popularly known as Floor Area Ratio is the ratio of floor area to the area of the land on which floors are built.³⁷ This ratio is used to calculate the number of floors that can be built in given plot of a land. In Mumbai, for residential development, the FSI is uniform over entire zone irrespective of plot size and building activity. The FSI varies from 0.5 in the suburbs to 1.33 in the Island city as per the FSI guidelines.³⁸ This is very low as compared to other metropolitan cities in the world. FSI in Mumbai is 1.33, while in London it is 5.5., in Singapore it is 25, in New York it is 15, in San Francisco it is 9 and in Hong Kong it is 15. Lower FSI in Mumbai decrease the amount of living space in the city. This causes rise in development of informal dwellings like slums in urban areas where the cost living is very high due to shortage of supply in the housing market. Thus, the restriction on FSI should be removed and unlimited FSI should be given for

³⁵ Under The government- Land Based Subsidized Housing (GLSH) scheme, The government provides land to private developers selected on basis of lower bid submitted by interested developer. Private developer will be responsible for designing, planning, execution, funding and handover of the project and the government pay the bid amount to private developer for construction of the units. The government then allocates units to beneficiaries. See:

³⁶ Low Income Housing Tax Credit (LIHTC): This programme was established under Tax Reform Act, 1986 that provides tax credits to State and local LIHTC-allocating agencies for the acquisition, rehabilitation, or new construction of rental housing for low-income people. ("Low-Income Housing Tax Credit (LIHTC) | HUD USER", 2021).

³⁷ FSI: One of the most common land-use regulations cities enforce is restriction on the Floor Space Index (FSI), also known as the Floor Area Ratio (FAR). FSI rules are implemented to limit the amount of floor area that can be built on a given plot of land. See: (India Infrastructure Report, IDFC, 2018).

³⁸ Source: <https://www.thehindu.com/real-estate/tns-latest-fsi-guidelines/article25453685.ece>

construction of affordable houses. This would encourage the developers to build more houses in given plot of a land.

3. Tax exemption on Interest

Higher interest rates on home loans are one of the important reasons behind housing unaffordability. (e.g., 6.75% in SBI with 0.35% processing charge, 6.75% in Bank of Baroda with processing fees of Rs. 8,500 – Rs. 25,000, 6.90% in Canara Bank with processing fees of Rs. 1,500- Rs. 10,000).³⁹ These higher amounts of interest rates paid on home loans along with enormous amounts of processing fees discourage Lower Income Groups like solid waste workers to apply for home loans. Therefore, the the government should have fiscal policies targeted at providing tax exemption on interest paid on home loans by solid waste workers. Not only interest rates but reducing the processing fees would also encourage solid waste workers to invest in housing assets. The government should also remove the ceiling on the amount of home loans (6 lakh, 9 lakh, 12 lakh as mentioned in PMAY) that is given to the solid waste workers so that they can take home loans without obstacles. Tax exemption from home loans, reducing processing charges on home loans and abolition of ceilings on home loan will reduce the costs involved in housing expenditure. Housing expenditure is one the variables used in measuring housing affordability (as mentioned by DEPR, RBI). Thus, reduction in housing expenditure would increase the housing affordability for solid waste workers.

4. Abolition for Coastal Regulation Zones (CRZ)

Coastal Regulation Zones, as previously noted, contribute to the scarcity of land accessible for residential building in Mumbai. The civic property department has identified 3.7 lakh square metres of land within the CRZ that could have generated revenue of Rs. 60 crores in the form of tax if these sites are given approval for development by the the government.⁴⁰ Thus, utilizing the coastal region for establishing affordable houses will be a win-win situation for public as well as private sector. The government can generate revenue through optimal taxation whereas private developers can earn profits from developing affordable housing projects. There are third party benefits involved in removing restrictions on usage of coastal zones since affordable housing will benefit lower income groups like solid waste workers. Thus, abolition of CRZ law can benefit the government, private developers as well as lower income groups.

³⁹ See: ("Home Loan Interest Rates - Compare Today's Lowest Rate Jul 2021", 2021)

⁴⁰ See: ("Areas under CRZ can earn close to 60Cr in tax, if they get clearance: Civic study | Navi Mumbai News - Times of India", 2021)

5. Land Reclamation

Land reclamation of coastal region should be allowed so that the areas for constructing affordable houses can be increased. As seen previously, shortage of land is the major concern in building affordable houses for lower income groups. Thus, it is necessary to remove restriction on reclamation of land. Mumbai Transformation Support Unit (MTSU) report admits that reclamations have invited popular criticism and controversies over the years, as the mega-metropolis continued to develop in an unplanned and unrestrained manner.⁴¹ However, systematic planning of houses along with appropriate sewage treatment plants would resolve the issues involved in constructing houses on land reclamation in coastal region.

6. Utilization of saltpan land

The use of salt pan lands ⁴²as a resource for developing affordable housing is another reproductive strategy. The salt pans in Mumbai, which cover 1,781 acres (721 hectares) and are estimated to be worth approximately Rs. 53,000 crores are almost double the size of Mumbai's main commercial area, Bandra-Kurla Complex (BKC), which covers 914 acres. Utilization of such a huge area for affordable housing developments will alleviate Mumbai's land shortage problem.

7. Rent-to-own Scheme

The Rent-to-own scheme is self-financing since it does not require additional the government grants but development loans. This scheme works like options contract where tenants will agree to buy house at a specific price in future (after 3-4 years) and cost will be paid in instalments. Such strategy would serve the purpose of providing affordable houses to solid waste workers.

8. No GST on cost of construction

Goods and service tax on factors of production used in affordable housing projects would reduce the cost of construction. For instance, GST rate for sand and stone used in construction is 5%, GST on cement is 28%, GST on iron and steel used for construction is 18%, marble and granite blocks is 12% and so on.⁴³ These multiple layers of taxation increase the cost of final output in housing market and therefore it is necessary to remove GST on raw material used for construction. Removing GST would be a prudent tactic in developing affordable house for solid waste workers.

⁴¹ See: (haphazard-land-reclamation-fuelled-Mumbai's-maximum—dreams, 2021)

⁴² Salt pan lands are naturally forming expanse covered with salt, and other mineral. It occurs due to the evaporation of water in water resources. See: (99acres, 2021)

⁴³ Source: ("GST rate for building materials and construction in India", 2021)

9. Allocation of Green Development Fund

Since affordable housing for solid waste workers will help in improving their living conditions as well as increase their efficiency in waste management, thereby contributing to the sustainable development of the country. Thus, the green development fund, aimed at reducing environmental cost, should be used for constructing affordable houses for solid waste workers.

10. Monetary Measures

As mentioned earlier, inflation targeting, which impacts purchasing power of the people, interest rate policies, home loans and other financial aid are all examples of monetary policies that might help lower-income households improve their housing conditions. Monetary policies aimed at inflation targeting and price stabilization in housing market would enable lower income groups to channelise a part of their income into housing assets. Other recommendation mentioned below can help in improving affordable housing scenario of solid waste workers.

RBI can frame monetary policies in a way to provide financial assistance to affordable housing projects like it provides credit facilities to agriculture sector. RBI provides short-term, medium term and long-term credit facilities to agriculture sector similarly it can provide credit facilities for affordable housing projects to households as well as firms. Loan at subsidised rate, lower interest on home loans, low cost EMIs on home loans, easier process of applying for loans, short duration in getting loans processed, such initiatives would incentivise lower income groups to take home loans and buy houses at affordable rates.

(B) Demand Side Recommendations

Welfare programmes include financial literacy programmes, housing literacy programmes. Financial literacy programmes should be aimed at addressing and solving financial problems faced by solid waste workers in buying affordable houses like financial assistance, awareness about prevailing interest rates, etc. whereas housing literacy programmes should be aimed at addressing all those challenges encountered in buying affordable houses like procedure of buying affordable house, decision making after collecting adequate information on affordable housing etc. Also, the government should take initiative to make the process of applying for the the government schemes easier so that more and more of LIGs can get access to affordable houses.

1. Financial Literacy Programmes:

Researchers observed that the major problems faced by solid waste workers in owning a house are financial issues and therefore improving financial literacy would enable them to manage their housing expenditure efficiently. Financial education would help solid waste managers in handling their budget, keeping track of their income and expenditure, and channelizing their savings into investments. Investment in physical assets as well as financial assets would help them in diversifying their investments. Promoting financial literacy has implications at individual as well as aggregate level. Increasing financial awareness among lower income sections of the society would enable the governments in tackling various problems like non-performing housing loans, unaffordable housing, or homelessness of poor sections of the economy, etc. Therefore, the government needs to set up a separate body for promoting financial literacy programmes among LIGs. Weekly, monthly, quarterly programmes would increase financial literacy among solid waste workers. The government can also encourage non-the governmental organisation in conducting financial literacy programmes.

Framing literacy programmes would not be enough, the the government should also focus on the efficient execution of these policies by regular inspection of these programmes. The the government should follow a proper procedure such as framing location-wise programmes, different programs for different section. For instance, different literacy programmes for different age groups or different educational qualifications. After implementation the government should conduct regular surveys for testing the improvements in literacy levels of enrolled candidates. This can help in ensuring that the financial literacy programmes are implemented properly.

2. Housing Literacy Programmes:

Housing Literacy can be considered as knowledge about managing housing expenditure, a part of income to be allotted to housing expenditure, where to buy house (location), how to buy house, awareness about procedure for buying house, how to apply for home loans or financial assistance for purchasing a property. Increasing financial literacy would also help in improving housing literacy which is comprised of awareness about existing the government schemes for purchasing affordable houses. The the government should take an initiative to increase housing literacy through developing housing literacy programmes aimed at educating lower income groups on affordable housing. Under such programmes, solid waste workers can be educated on how to decide location for purchasing affordable houses, how to manage housing expenditure, how to calculate costs involved in buying house, how to approach appropriate real estate developers, how to get home loans processed etc.

3. Use of Advanced Technology:

As mentioned earlier, the government spending on technological advancements regarding housing market is necessary. Under such provisions, easy to use software, mobile apps like Arogya Setu for instance, “*Griha Setu*” (*Griha* means home and *setu* means bridge) can be developed. Such kind of software can help bridge the gap between the the government and low-income people. It would make the government programmes more accessible to solid waste workers. It would also assist the governments in keeping track of whether LIGs are making use of housing provisions made available to them. Accessible and easy to understand financial calculators could be included in such applications, which may help with EMI calculations and also serve as a budget manager and expense tracker for solid waste workers.

4.3. Conclusion

Due to rapid urbanisation, rising population has produced disequilibrium in housing market. This substantially affects the lower income groups and exacerbated the problem of housing unaffordability. Therefore, this study focused on the housing problems of solid waste workers. During the survey, it was discovered that a major obstacle to solid waste workers acquiring homes is a lack of financial knowledge and housing literacy. Housing problems of solid waste workers can be resolved with government action and the cooperation of the private sector. Demand for houses can be encouraged by reducing the price paid by consumers from lower income groups. For instance, subsidising housing prices will encourage more solid waste workers to purchase houses. The welfare loss caused by underconsumption is the rationale behind the necessary government intervention in the affordable housing market. It can be observed that, despite an increase in the supply of affordable housing, the advantages have not reached solid waste workers. This implies that resource allocation is inefficient, necessitating government intervention through fiscal stimulus⁴⁴, subsidised home loans, tax credits to private investors, price ceilings on houses provided to lower income groups, financial literacy campaigns for solid waste workers, credit facilities for solid waste workers, and lower interest rates on home loans. Therefore, appropriate measures and effective execution of those measures can help in solving housing issues of solid waste workers.

Briefly, affordable housing for solid waste workers will contribute to welfare of the society by uplifting poor sections as well as sustainable development of the city through improved efficiency of solid waste workers in managing municipal solid waste.

⁴⁴ Fiscal Stimulus: Fiscal stimulus refers to government policies that reduce taxes or regulations while also increasing government spending to boost economic activity. See: ("Effects of Fiscal Stimulus in Structural Models", 2021)

Bibliography

- Abdul Lateef Olanrewaju, P. A. (2016). A framework for affordable housing governance for the Nigerian property market. *Procedia Engineering*, 307-314. doi:10.1016/j.proeng.2016.11.624
- Balsubramanian, M. (2015). Economics of Solid Waste in India. *Economics and Political Weekly*, 50, 17-20
- Bloom, D. N. (1995, August). The Economics of Municipal Solid Waste. *Oxford Journal*, 10, 113-150. Retrieved from <https://www.jstor.org/stable/3986579>
- Board, S. (2009). Utility Maximisation Problem. Retrieved 22 July 2021, from http://www.econ.ucla.edu/sboard/teaching/econ11_09/econ11_09_lecture3.pdf
- Breusch, T., & Pagan, A. (1980). The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics. *The Review of Economic Studies*, 47(1), 239-253. doi:10.2307/2297111
- Brock, T. (2021). Public-Private Partnerships Definition. Retrieved 22 July 2021, from <https://www.investopedia.com/terms/p/public-private-partnerships.asp>
- Buchanan, J. (1965). An Economic Theory of Clubs. *Economica*, 32(125), new series, 1-14. doi:10.2307/2552442
- Creedy, J. (1980). The Early Use of Lagrange Multipliers in Economics. *The Economic Journal*, 90(358), 371-376. doi:10.2307/2231795
- Demand for Grants 2020-21 Analysis: Housing and Urban Affairs. (2021). Retrieved 15 July 2021, from <https://prsindia.org/budgets/parliament/demand-for-grants-2020-21-analysis-housing-and-urban-affairs>
- Delmendo, L. (2021). COVID-19 pandemic adds pain to India's already weak housing market. Retrieved 13 July 2021, from <https://www.globalpropertyguide.com/Asia/India/Price-History>
- Effects of Fiscal Stimulus in Structural Models. (2021). Retrieved 21 July 2021, from <https://www.imf.org/external/pubs/ft/wp/2010/wp1073.pdf>
- Explaining Merit Goods | tutor2u. (2021). Retrieved 22 July 2021, from <https://www.tutor2u.net/economics/reference/merit-goods>
- Fiscal federalism | public finance. (2021). Retrieved 21 July 2021, from <https://www.britannica.com/topic/fiscal-federalism>

- Grazia Napoli, M. R. (2016). Housing Affordability and Income- Threshold in Social Housing Policy. *Procedia- Social and Behavioural Sciences*. doi: 10.1016/j.sbspro.2016.05.345
- Jawaharlal Nehru National Urban Renewal Mission: Ministry of Housing and Urban Affairs, The government of India. (2021). Retrieved 15 July 2021, from <http://mohua.gov.in/cms/jawaharlal-nehru-national-urban-renewal-mission.php>
- Karuppanan, A. S. (2002). Role of State and Market in Housing Delivery for Low-Income Groups in India. *Journal of Housing and the Built Environment*, 17 , 69-88. Retrieved July 10, 2021
- Low-Income Housing Tax Credit (LIHTC) | HUD USER. (2021). Retrieved 14 July 2021, from <https://www.huduser.gov/portal/datasets/lihtc.html>
- Musgrave, R. (1956). A Multiple Theory of Budget Determination. *FinanzArchiv / Public Finance Analysis*, 17(3), 333-343. Retrieved July 16, 2021, from <http://www.jstor.org/stable/40909134>.
- National Rental Affordability Scheme | Department of Social Services, Australian The government. (2021). Retrieved 14 July 2021, from <https://www.dss.gov.au/our-responsibilities/housing-support/programmes-services/national-rental-affordability-scheme>
- Positive externalities | Economics Online | Economics Online. (2021). Retrieved 21 July 2021, from https://www.economicsonline.co.uk/Market_failures/Positive_externalities.html
- period of gestation. (2021). Retrieved 20 July 2021, from <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803100317649>
- Pettinger, T. (2021). External benefits in housing market - Economics Help. Retrieved 21 July 2021, from <https://www.economicshelp.org/blog/9207/housing/external-benefits-housing-market/>
- PMAY (U). (2021). Retrieved 15 July 2021, from <https://pmay-urban.gov.in/about> <http://mohua.gov.in/cms/jawaharlal-nehru-national-urban-renewal-mission.php>
- Priyaranjan, S. A. (2018). Affordable Housing in India. *The Structural Issues Division of the Department of Economic and Policy Research, Researve Bank of India*.
- Quigley, J. F. (1975). A Theory of Urban Housing Markets and Spatial Structure. *National Bureau of Economic Research*, 9-55. Retrieved from <http://www.nber.org/chapters/c3712>
- Tiebout, C. (1956). A Pure Theory of Local Expenditures. *Journal of Political Economy*, 64(5), 416-424. Retrieved July 16, 2021, from <http://www.jstor.org/stable/1826343>.

- U.S. Department of Housing and Urban Development | USA Gov. (2021). Retrieved 14 July 2021, from <https://www.usa.gov/federal-agencies/u-s-department-of-housing-and-urban-development>
- <https://www.economicshelp.org/blog/9207/housing/external-benefits-housing-market/>
- period of gestation. (2021). Retrieved 20 July 2021, from <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803100317649>
- Cleaning Human Waste. (2021). Retrieved 29 July 2021, from <https://www.hrw.org/report/2014/08/25/cleaning-human-waste/manual-scavenging-caste-and-discrimination-india>
- Coastal Regulation Zone. (2021). Retrieved 29 July 2021, from <https://www.drishtias.com/to-the-points/paper3/coastal-regulation-zone-1>
- Kramer, L., & Boyle, M. (2021). How Does the Law of Supply and Demand Affect Prices?. Retrieved 29 July 2021, from <https://www.investopedia.com/ask/answers/033115/how-does-law-supply-and-demand-affect-prices.asp>
- People in this Mumbai slum barely make it to age 40. (2021). Retrieved 29 July 2021, from <https://india.mongabay.com/2019/04/people-in-this-mumbai-slum-barely-make-it-to-age-40/>
- MyBMC - Welcome to BMC's Website. (2021). Retrieved 29 July 2021, from [https://portal.mcgm.gov.in/irj/portal/anonymous/qlcleanover#:~:text=The%20financial%20and%20commercial%20capital,\(C%26D\)%20waste%20per%20day.](https://portal.mcgm.gov.in/irj/portal/anonymous/qlcleanover#:~:text=The%20financial%20and%20commercial%20capital,(C%26D)%20waste%20per%20day.)
- Sell, B., Views, N., 2019, B., Glossary, A., 2017, B., & Proptiger, A. et al. (2021). World's Major Cities Have Known For Their Tallest Skyscrapers. Retrieved 30 July 2021, from <https://www.proptiger.com/guide/post/high-mighty-why-some-cities-are-known-for-their-skyscrapers>
- Areas under CRZ can earn close to 60Cr in tax, if they get clearance: Civic study | Navi Mumbai News - Times of India. (2021). Retrieved 30 July 2021, from <https://timesofindia.indiatimes.com/city/navi-mumbai/areas-under-crz-can-earn-close-to-60cr-in-tax-if-they-get-clearance-civic-study/articleshow/51171829.cms>
- GST rate for building materials and construction in India. (2021). Retrieved 30 July 2021, from <https://www.indiafilings.com/learn/gst-rate-for-building-materials/>
- Home Loan Interest Rates - Compare Today's Lowest Rate Jul 2021. (2021). Retrieved 30 July 2021, from <https://www.bankbazaar.com/home-loan-interest-rate.html>
- Cleaning Human Waste. (2021). Retrieved 29 July 2021, from <https://www.hrw.org/report/2014/08/25/cleaning-human-waste/manual-scavenging-caste-and-discrimination-india>

Annexures

Annexure I- Tables

Table 4.1 Home condition – Cleanliness/Hygiene

Description	Very Good	Good	Neutral	Bad	Very Bad	Average Score
Score out of 5	5	4	3	2	1	
Overall (n =121)	23%	64%	9%	3%	1%	4.04
The government Housing (n = 55)	35%	56%	5%	2%	2%	4.2
Non-The government Housing (n= 66)	14%	70%	12%	5%	-	3.92

Source- Primary Survey, 2021.

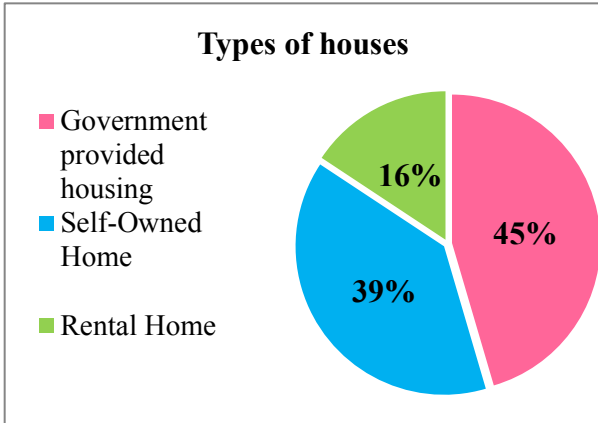
Table 4.2 Home condition – Structure

Description	Very Good Condition	Good Condition	Neutral	Poor Condition	Very Poor	Average Score
Score out of 5	5	4	3	2	1	
Overall (n =121)	20%	63%	10%	7%	-	3.96
The government Housing (n = 55)	15%	58%	16%	11%	-	3.76
Non-The government Housing (n= 66)	24%	68%	5%	3%	-	4.14

Source: Primary Survey, 2021.

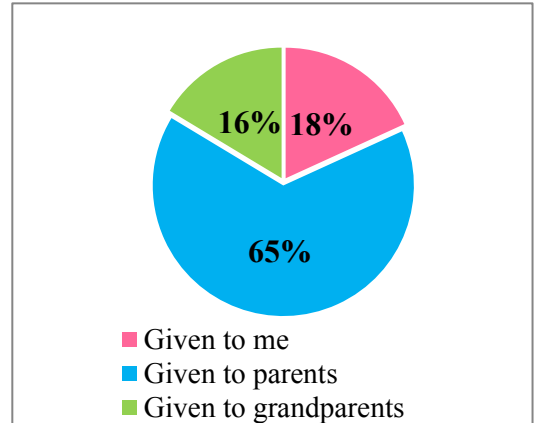
Annexure II- Figures

Fig 4.1: Types of houses of solid waste workers



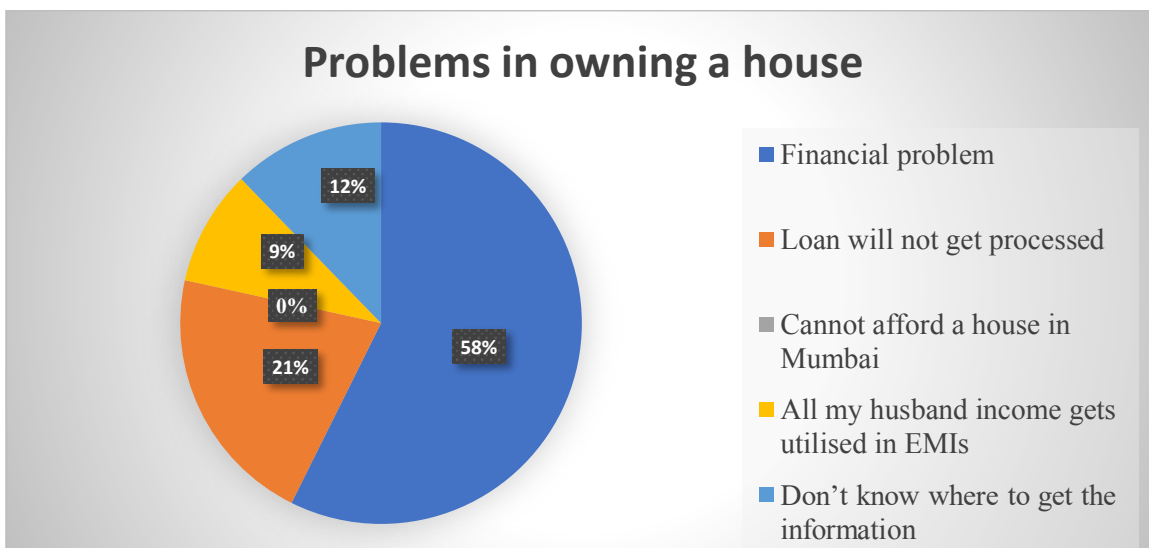
Source: Primary Survey, 2021.

Fig 4.2: The government housing



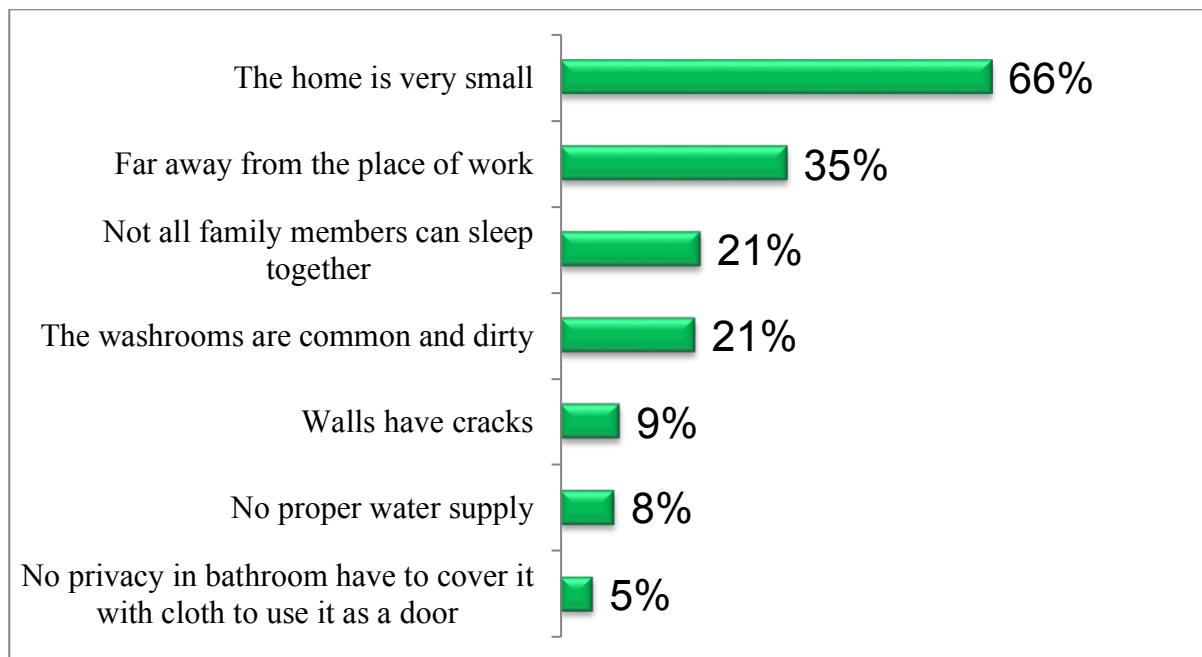
Source: Primary Survey, 2021.

Fig 4.3: Problems faced by solid waste workers in owning a house.



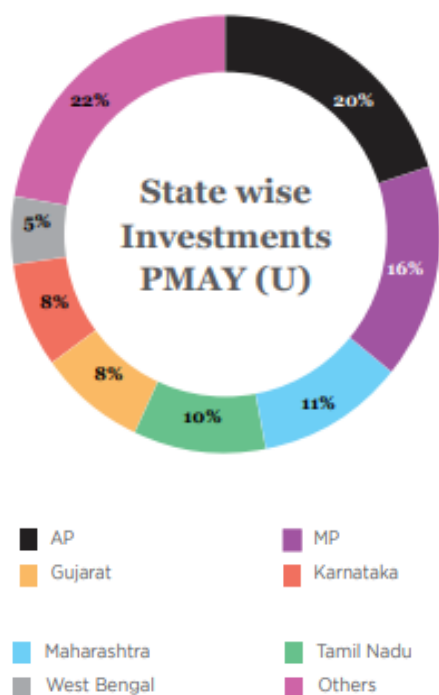
Source: Primary Survey, 2021.

Fig 4.4 Problem areas at home – The government & Non-The government Housing



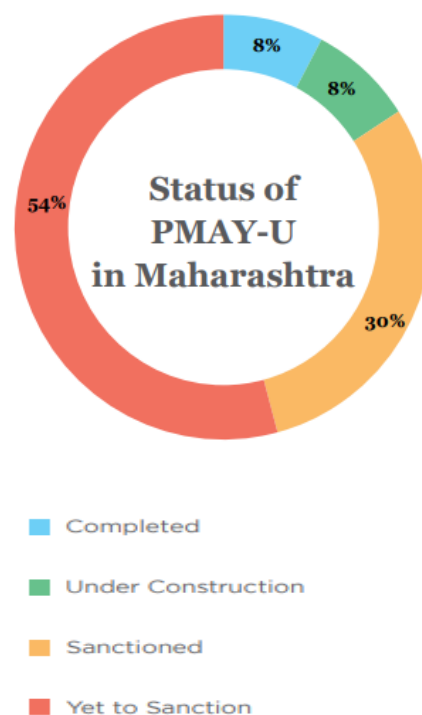
Source: Primary Survey, 2021.

Fig 4.5: State wise Investments PMAY-U



Source: Ministry of Housing & Urban Poverty Alleviation, 2017.

Fig 4.6: Status of PMAY-U in Maharashtra



Source: MOHUA & PMAY (U)



**MINISTER
HOUSING**

MAHARASHTRA STATE
Mantralaya, Mumbai 400 032
www.maharashtra.gov.in

Date :

LETTER OF APPRECIATION

It gives me great pleasure to congratulate Sanjana Runwal, a 17 year old student from Dhirubhai Ambani International School, Mumbai, for having successfully completed a research project on providing affordable housing to the garbage workers of the city. This is a critical yet often overlooked segment of the society and it is highly commendable that a teenager has taken the effort to address such serious issues and suggest solutions for the same.

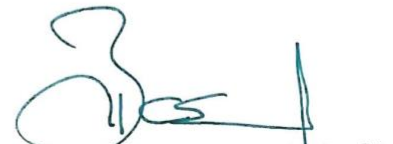
Sanjana was extremely passionate about this research and her desire to help the garbage workers was evident throughout this project. The fact that she could actually carry out primary research at field level is worthy of appreciation. Her dedication towards the cause was visible throughout the project. While overcoming hurdles like the lack of availability of secondary research on this segment (garbage workers and ragpickers), Sanjana demonstrated the ability to find creative solutions.

Sanjana has done a significant amount of social welfare work at a very young age for the garbage workers and ragpickers of the city. It was my pleasure to be associated with her for this project.

As the cabinet minister of Housing in Maharashtra State, we found her research useful and her recommendations are being taken into consideration by the state.

I wish her success in all future endeavours and hope that she continues to bring about a positive change in the world.

With Warm Regards,



(Dr. Jitendra Awhad)