



## Optimize and expand living and working space through efficient layout, design, and incremental upgradation

### CONTEXT

Lack of adequate living and working space is one of the key challenges for home-based workers, especially for those residing in slums and informal settlements. In Ahmedabad, for example, more than 90% dwelling units in slums are less than 25 sq m in size (Mahila Housing SEWA Trust, 2008, 46). On average, an urban slum dwelling unit size in Dharavi, Mumbai is 12 sq m (Gulankar, 2020), with just 8.3 sq m average per capita space consumption (Ashar, 2016).

44% of slum households in India only have one room (Dr. Chandramouli C., 2011) and the congested area serves both as the family's living space and the workplace. A small house affects the earning capacity of home-based workers since they cannot take bulk orders due to limited storage space. Inadequate and lack of defined work and storage areas for goods also

hampers the quality of finished products. Without clear demarcation of living space and workplace, home-based workers, especially women, are often interrupted with domestic chores during work hours, which go uncompensated. The limited physical space forces them to rearrange and adjust furniture to accommodate their paid and domestic work simultaneously. Home-based workers make do without the required tools and machinery to accommodate their work in their tiny dwelling units, which has a direct bearing on their output and income. This absence of ergonomic considerations also results in occupational health issues such as backaches, elbow aches, leg pains, and eye strain.

In the case of home-based work where women have to work in groups, the work spills out to the outdoor

areas. Women utilize *otla* (front porch) or the streets in front of their houses to gather and work. However, during extreme heat and monsoon, there is a lack of workspace for women working in groups. Vehicular traffic and people's movement in these lanes often cause disruptions in work.

Statistics suggest that up to 42.9% of slum houses have more than three people per room (Ahmad, 2015, 107-122), which adds to the challenges due to the competing needs for space by other family members and their activities. The absence of distinction between living and workspace extends the ill-effects of home-based trade, such as noise, dust, and other harmful elements, to the family members. Badly designed and poor-quality slum homes further add to the workers' insecurity and vulnerability. More than 5 lakh urban slum households in India continue to live in dilapidated conditions (Government of India, 2015, 39). With 40% of slum households living in *kutcha* or *semi-pucca* (temporary/constructed without a permanent roof) houses (Government of India, Ministry of Statistics and Programme Implementation, National Statistical Organisation, 2014, 11), the poor quality of the physical environment continues to be a crucial concern for home-based workers. These homes lack strength and stability owing to the use of poor construction materials, inefficient design, and layout. They are characterized by heat-inducing and leaky roofs with weak wall structures that cannot sustain harsh weather or natural calamities. Hard uneven floors or the absence of flooring, make the work environment inconvenient, bringing in dust, dirt, and

insects and making their homes prone to flooding. During monsoons, damped walls, leaky roofs, and flooding force these women to suspend their livelihood activities for three to four months.

The absence of land tenure and frequent threats of evictions discourages them from investing in home improvement and upgradation. Due to lack of collateral and cleared land titles, they are often categorized as "unbankable" and excluded from formal banking finance. Moreover, these slum households also lack the technical expertise to make more efficient use of the limited space available and struggle to incrementally upgrade homes using affordable, durable, and effective material, and technology for the construction, incorporating the needs of their home-based work.

## MHT'S APPROACH

Of every ten houses constructed in India, seven are constructed by the people themselves, two by the government, and one by the private sector (Mahila Housing SEWA Trust et al., 2018). A majority of the poor prefer to construct and improve their homes incrementally with the help of local contractors and locally sourced materials. Mahila Housing SEWA Trust (MHT), in partnership with design researchers, architects, and product innovators, supports self-constructed, incremental housing by providing financial, technical, and design assistance. They help develop layouts that are simple, cost-effective, structurally safe and can be easily upgraded.

MHT has helped thousands of households improve and upgrade their houses through multiple models of intervention, including linking households to government subsidies for "beneficiary-led construction", extending credit and design advice for incremental housing, and is constantly engaged with in-situ slum up-gradation.

## Documenting and addressing storage and space optimization challenges

With extremely limited floor space in slum houses, the challenge of storage is two-fold. Firstly, the stored raw materials and finished goods are highly prone to damage due to natural externalities like flooding and infestation of insects and rodents. Secondly, the goods that require storage occupy usable space within the house. This results in reduced space for the family to sit, work and relax.

DILSHAD BANU  
KITE MAKER

Behrampura,  
Ahmedabad



**“I did not have sufficient storage space for my kites. During the peak season, the entire house got occupied by kites. Due to the risk of damaging products, our work was also suspended for three to four months during monsoons.”**

MHT has commissioned the documentation and study of home-based habitats for solving the storage challenges associated with specific trades. The first study, conducted in 2010 in partnership with students from an Australian University, aimed at providing simple solutions for women working as kite-makers, *agarbatti* (incense-stick) rollers, and rag workers. The solutions were centered around optimizing the strength of the wall and the roof for storage and thus saving usable floor space (Box 1). The second study was conducted in 2018 with students from NID specializing in furniture design to assess the storage needs of households involved in the occupation of *pani-puri* (type of Indian street food) making. The proposed interventions included lightweight and movable storage to accommodate the needs of the livelihood.

To demonstrate the applicability of these interventions, MHT assisted one family with upgrading the entire house with desired spatial planning to distinguish and segregate living and work areas (Box 3).

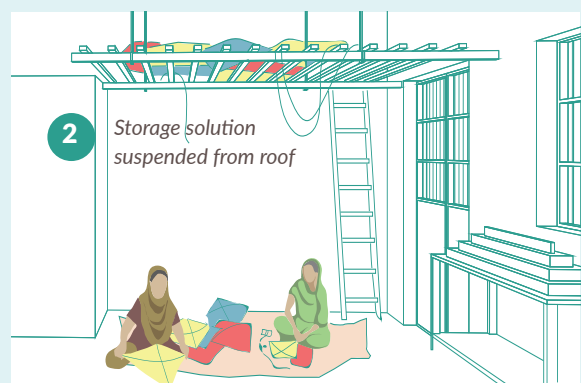
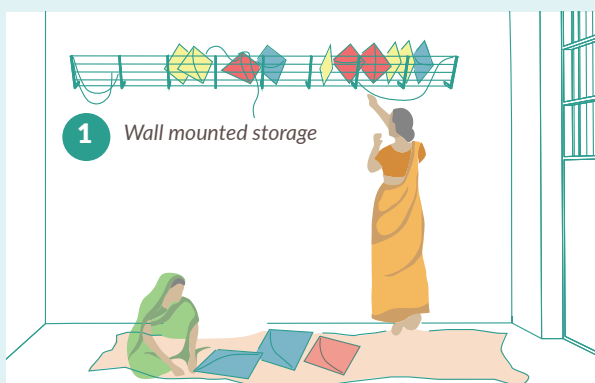
### Providing design support for incremental upgradation

MHT supports and guides households in slum settlements by demonstrating how with constrained land and resources they can gradually augment their living space while improving their lifestyle over time (Box 2). Anecdotal evidence from MHT’s twenty-five years of experience in Ahmedabad suggests that low-income households spend as high as INR 5-7 lakhs (USD 6,730-9,425) over a period of ten years to incrementally upgrade their housing units. But because

#### Box 1

### Addressing storage issues for kite making households Raikhad, Ahmedabad

In the Saiyyed settlement in Raikhad, the majority of households are engaged in kite making. This home-based work requires women to work in groups of five to six. Owing to water leaking into the house and space constraints, women home-based workers are unable to work for three to four months during monsoon. Moreover, due to inadequate storage space, goods are stored in the loft or on the roof. This is undesirable for a product as fragile as a kite. They lose their quality and rigidity when exposed to outdoor moisture. The majority of houses are characterized by GI sheet roofs and a low volume of space, with the roof being as low as 1.8 m from the floor level. They are also characterized by poor indoor ventilation and daylight. This results in unfavorable work environments for women working in groups, and for long hours in a day. For residents living as rental tenants or residing in apartments, they can’t retrofit their work environments for greater space or increased storage. MHT partnered with design students to address the storage inadequacy with three options. The walls are optimized for increased storage by using angle sections screwed to the wall. The angle sections are interwoven with threads to hold kites in places, all the while considering its fragility (illustration 1). Another option proposed hanging J-hooks from the roof to hold crates nailed together. This creates a suspended platform that acts as a loft for storing kites (illustration 2). A third option was worked out using a cane mat or cloth stitched along a stick. With hooks on one end, this assemblage can be folded for storing kites and as partitions when opened.





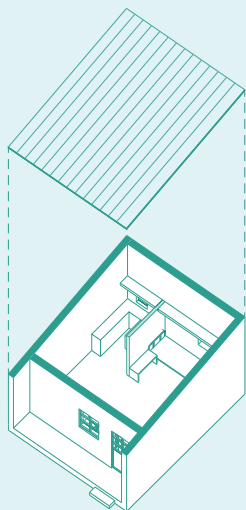
## Design guidelines for incremental upgradation

### Jadiba Nagar, Ahmedabad

Many slums in Ahmedabad are on private land where residents have purchased individual plots through informal transactions. Jadiba Nagar is one such community where the owner illegally subdivided the land and sold it to the poor in the informal grey-market. Most households here possess sale agreements registered on official stamp paper. Though these households are not recognized as legal owners, they still enjoy a relatively high security of tenure. After the Parivartan Slum Upgradation Program (SNP) which improved services in the community, many households have invested in upgrading and expanding their houses incrementally over years. Some households have invested as high as INR 5 Lakhs (USD 6,730) on incremental improvements over a period of ten to fifteen years. However these improvements are often done without taking into consideration future needs and future costs, thus compromising on long term gains.

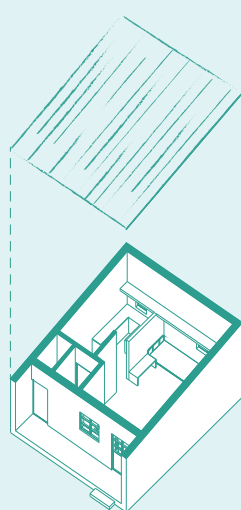
In 2018, MHT partnered with GroundWork Architecture to study the typical process of incrementation and develop design guidelines for expanding and adding floor space in a way that it contributes to efficient space utilization, light, ventilation and utilities and services. Maximum house sizes in Jadiba Nagar are between 3.6 m to 5 m wide and 7 m deep. The footprint ranges from 25 sq m to 35 sq m in size. The guidelines applicable for any house with a width of 3.6 m or more were developed to support households in making financially sound and informed design decisions based on their affordability, future requirements and lifestyle.

### Typical process of upgradation



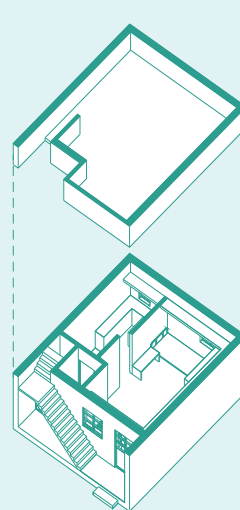
#### STAGE 1

Most households start with a single room of 30-35 sq m with basic brick walls and a temporary roof.



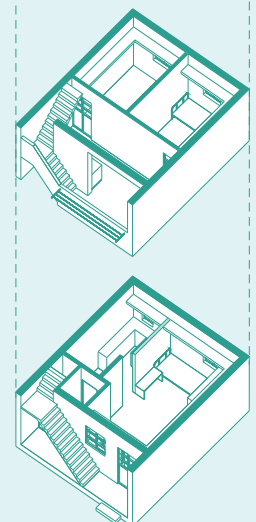
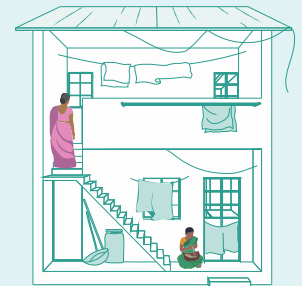
#### STAGE 2

Adding toilets is the next increment. The roof has to be replaced every two years.



#### STAGE 3

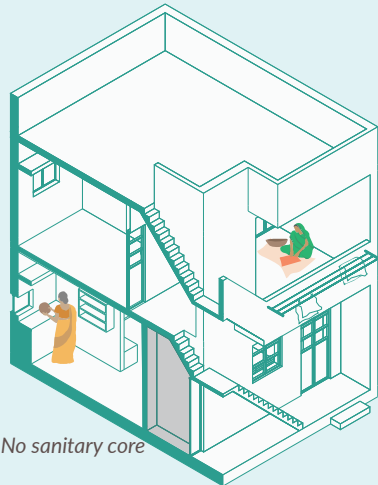
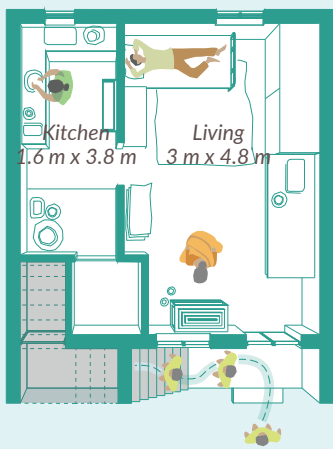
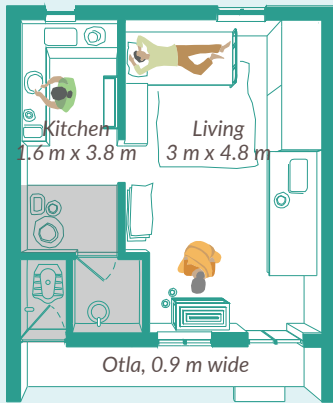
A concrete roof is a major investment. The staircase is cast at the same time.



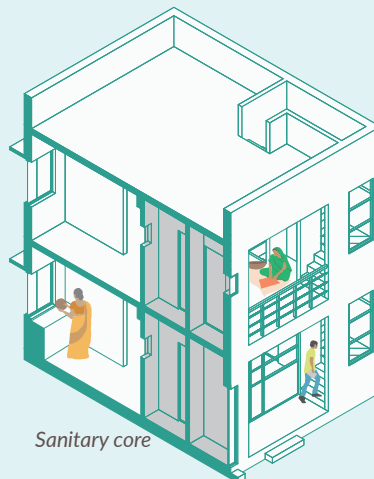
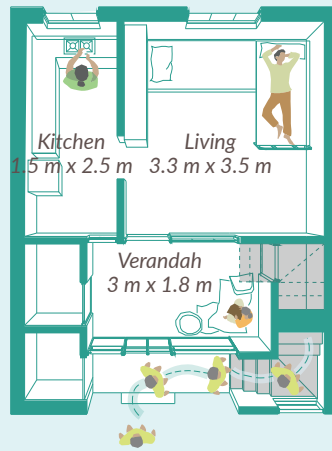
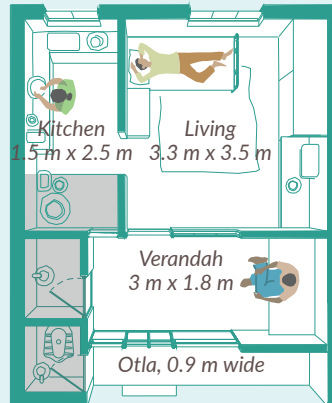
#### STAGE 4

One floor is added above the concrete roof. The roof is kept temporary until the household can afford another big investment.

## Observed



## Recommended



1

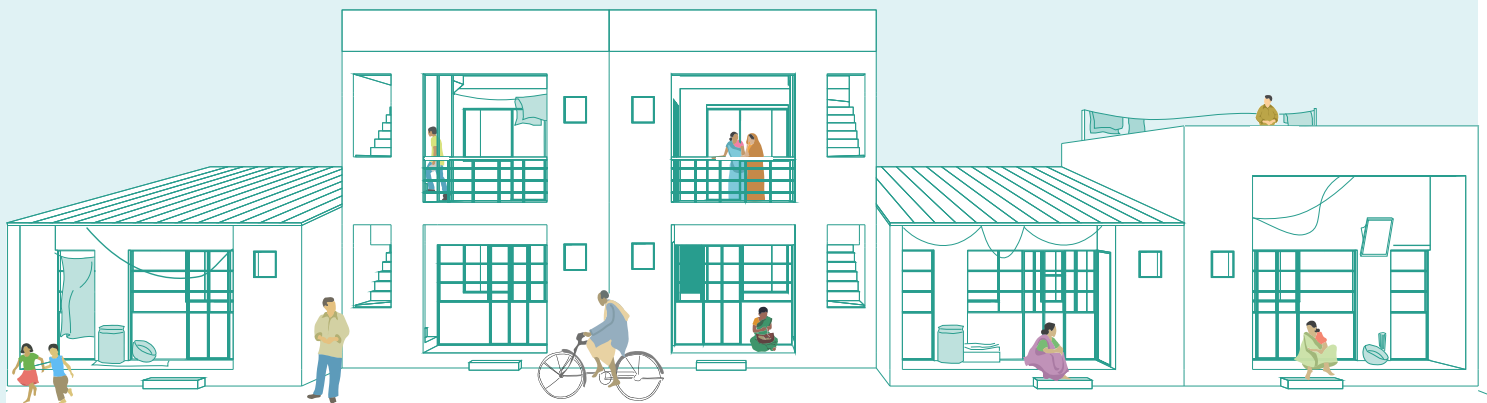
Orient utilities (toilet, bathroom and wash) along side wall to maximize natural light into the house. Placing toilet closer to the street allows for better ventilation. Opt for a RCC frame structure to enable ease in future construction.

2

When adding a concrete roof and staircase, position it opposite the toilet. It should be accessible from outside the house. At this stage structural provisions for additional floors should also be made. This will save much time and cost during later stages.

3

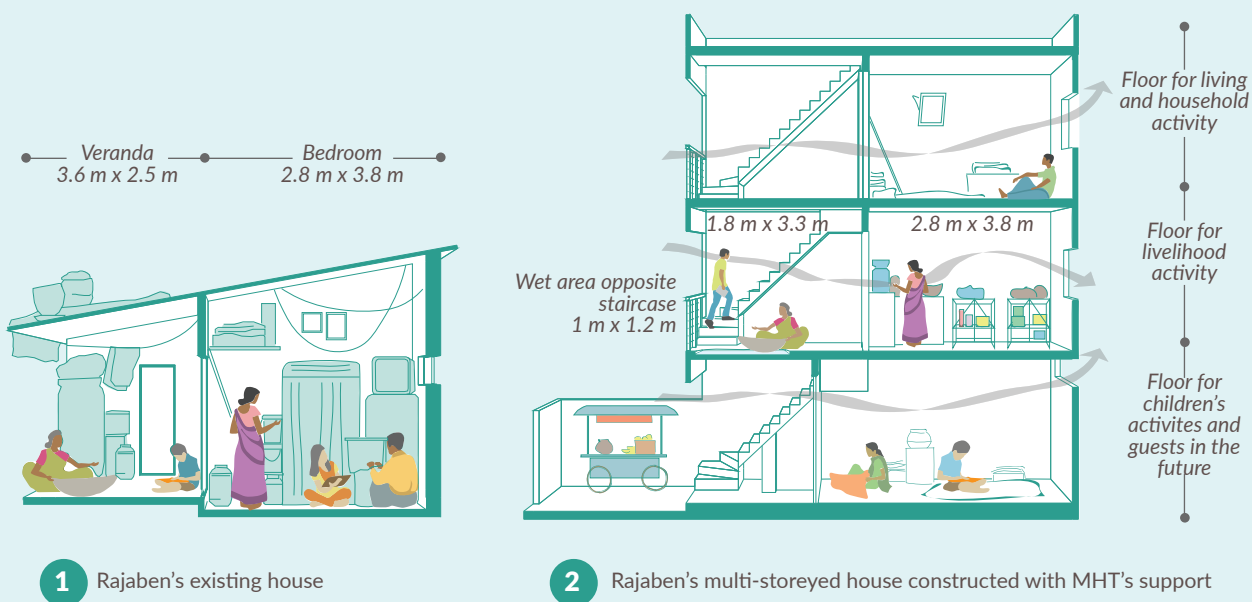
Locating staircase separate from the toilet allows for addition of utilities on the subsequent floors without adding significantly to the plumbing cost. This also allows for renting out the floor for additional income.



## Spatial planning and storage design support for a household engaged in *pani-puri* making Rajaben's house, Ahmedabad

Rajaben has run a *pani-puri* (Indian street food) business in Rajiv Nagar, Ahmedabad for the last twenty five years. She lives with her husband and five children, who help her with her livelihood. She and her family work for more than twelve hours a day, exposing themselves to high heat stress and an inconvenient spatial environment. In her previous house, the utility area and kitchen were the same, posing a challenge with hygiene and making the family prone to infection due to sanitation issues. Moreover, there was limited space demarcated for storage. MHT redesigned and reconstructed Rajaben's house as a pilot demonstration under a grant from the Selco Foundation. The intervention focused on building a physical environment that resonates with the livelihood needs of the family. The proposed structure with ground and additional two floors provides separate living and workspaces on different levels. The building is set back from the access way by an open space that can be used for outdoor activities. The ground floor has a single room that the kids use for stitching, decoration, and craft work. The first floor contains a kitchen and a veranda space. This floor is dedicated to the livelihood activity, *pani-puri* making. It is supported with customized furniture that is lightweight, ergonomic, movable, and water-resistant. The first floor provides respite from the nuisance on the adjacent road and a desired sense of privacy. The second floor is primarily used as the living space, with an attached bath and veranda. On the first and second floor, openings are provided on the front and rear walls to aid cross-ventilation. The front walls are constructed with Compressed Agricultural Fiberboard (CAF) as a sustainable alternative to dry wall construction. In these upgradation projects, MHT also brings its unique ability to leverage knowledge of proposed planning interventions by the State, while extending technical and design assistance to its beneficiaries. For instance, in this project, MHT advised the family to build their house set back to accommodate the provision of future road expansion.

The spatial configuration of the house was developed in close consultation with the family, over multiple iterations and layout alterations, before and during construction. This added significantly to the time and cost and some key aspects were compromised. For instance, there is no demarcated sanitation core, which makes water supply services inefficient and future expansion difficult. This pilot underscored the difficult task of customized recommendations and highlighted the importance of templated, scalable guidelines for incremental upgradation in slums.



of a lack of design knowledge and technical assistance, the construction is ad hoc, often compromising on space utilization, energy efficiency, and access to natural light and ventilation. More importantly, in doing these incremental expansions, households lose out on long-term gains since future needs are not taken into consideration. MHT partnered with architects to study the typical process of incremental upgradation in slum settlements in Ahmedabad and develop design guidelines and associated costing that can assist the poor to improve their homes while recognizing future needs. The study pointed out that with minimum design guidance like fixing location of staircases and service cores, households can easily make vertical additions to their houses incrementally over years with minimal cost and efforts (Box 2). MHT aims to templatize these design guidelines and make them available in local languages. Having access to common layouts and standards would enable households to plan their future increments and get clarity on potential costs and options to suit their current budgets in relation to their needs. MHT is also working on training women community leaders to provide basic design support based on these templatized solutions, targeting households in slum communities who approach MHT to avail loans for incremental upgrades.



**“I purchased a single room in Vishwas Nagar Chali for INR 40,000 (USD 538) in 1997. It had a temporary roof and no toilet. Over last twenty years I took loans from MHT to upgrade my house and paid them back on time. I have added partition walls, a permanent roof. I also installed a solar rooftop system. Today I have my dream house and I am proud of it.”**

## Extending collateralized housing loans to low income households

Access to housing finance is key to improving the living and working conditions of home-based workers. Despite the housing shortage of 187.8 lakhs (18.78 million) units (Ministry of Housing and Urban Poverty Alleviation, GOI, 2012-2017) prominent within the EWS (Economically Weaker Sections) and LIG (Lower Income Groups), this segment is almost excluded from formal housing finance. According to the data of the National Housing Bank, more than 75% of the loans disbursed by Housing Finance Companies (HFCs) and Formal Banking Institutions are above INR 10 Lakhs (USD 13,460), reaching only the middle- and higher-income groups. The fundamental reason behind this gap is the inability of households living in “informal” settlements to leverage the value of their land and housing assets and use it as a collateral. Even with steady incomes, the inability to produce documentation for identification, income and property ownership keeps them out of the formal financial system. Lending institutions are unable to assess the risk associated with such assets, because of which several million housing borrowers cannot be addressed by the private sector. Microfinance Institutions (MFIs) that provide micro-loans to the poor have emerged in the last few years, but they offer very small loans (less than INR 1.5 lakhs/ USD 2,020) that are not suitable or customizable for the purpose of housing improvements.

By bridging this gap between HFCs and MFIs, MHT plays a crucial role as an incubator and advisor on issues of housing and infrastructure finance for the poor. MHT has devised a model to assess credit worthiness of households with informal land arrangements and informal incomes. It is based on checking the informal borrowers’ capacity and willingness to repay. More importantly, it requires screening the underlying asset’s compliance with the land management system and urban planning regimes to determine the property’s suitability for serving as collateral even though it is not fully formal. If the borrower is deemed credit-worthy, MHT emulates a mortgage through an advanced power of attorney. Having the security established, the benefits of investing in such households seem more lucrative, outweighing the risks from lack of title deed and making the credit institutionally viable (especially in loan bracket of INR 1 to 5 Lakhs/ USD 1,345 to 6,730). Throughout the process, MHT also provides hand-holding support to make the poor financially literate so

as to enable access to different banking services, also giving technical guidance for construction and assisting in budget management. These optional interventions create a long-lasting social impact in the community. MHT, through its credit cooperatives, has extended loans to thousands of households and supported them in making housing improvements. Not a single housing loan has gone into default.

## LEARNING AND DIRECTION OF FURTHER ADVOCACY

1) Liquidity constraint is one of the most important constraints impeding low-income households, especially for informal sector workers to upgrade their living and working conditions. MHT's approach of collateralized housing loans for semi-formal properties with high tenure security serves as a case study in making market-based housing finance solutions accessible to more urban households (Nohn & Brahmhatt, 2014). This innovative approach combined with MHT's advocacy efforts with government authorities and formal institutions can create an enabling regulatory environment that will encourage the poor to access formal housing finance and invest in home upgrades.

2) The Pradhan Mantri Aawas Yojna (PMAY), Government of India's flagship housing program, offers financial support to urban poor households to upgrade their existing houses under two verticals: 1) Beneficiary Led Construction (BLC) and 2) Credit Linked Subsidy Scheme (CLSS). However, only those households that have full legal rights to their properties can access subsidies under these two demand-led verticals. This leaves out a large segment, particularly the most vulnerable households, out of the ambit of the program. Local governments should consider alternative documentation to establish land rights as an interim arrangement (Briefs PE3 and CP1).

3) While the involvement of professional architects, engineers, and planners is necessary to find pragmatic yet affordable solutions to addressing challenges of space, they should acknowledge that the poor often cannot afford the costs of conforming to middle- and high-income standards and norms. Housing in low-income communities must be seen as a continuous incremental process. Customized houses built and delivered at one moment in time are an impediment in extending helpful measures to low income households

at a large scale. To be efficient and affordable, the basic technical design advice should be replicable for multiple houses. Households can build on it as their requirements evolve over the years.

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