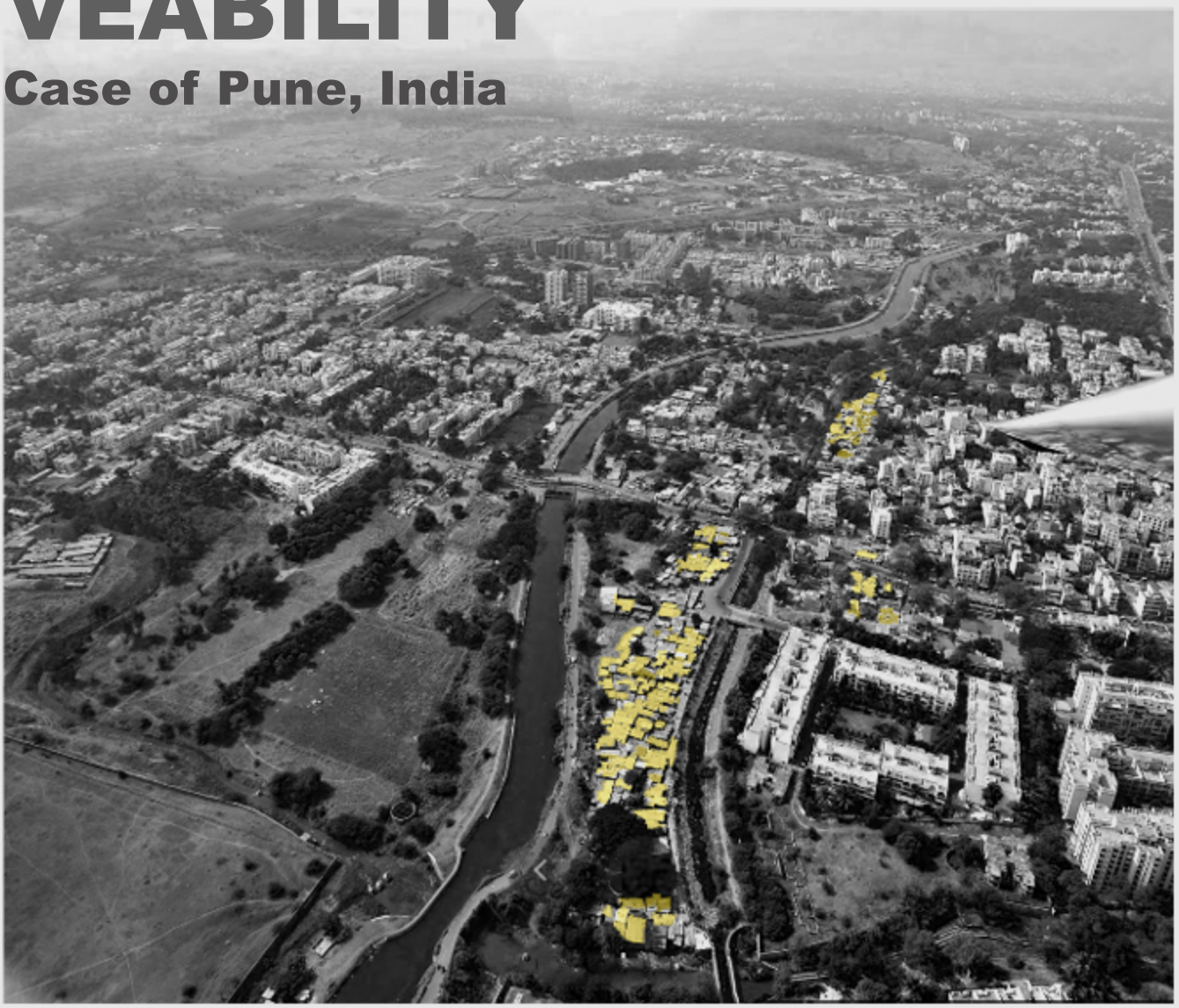
Bauhaus-Universität Weimar

SLUM UPGRADING SCHEMES FOR BETTER LIVEABILITY

Case of Pune, India



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MSc. Integrated Urban Design & Development | **Master's Thesis 2020**

Slum Upgrading Schemes for Better Liveability :Case of Pune, India

Master thesis submitted during Summer Semester 2020
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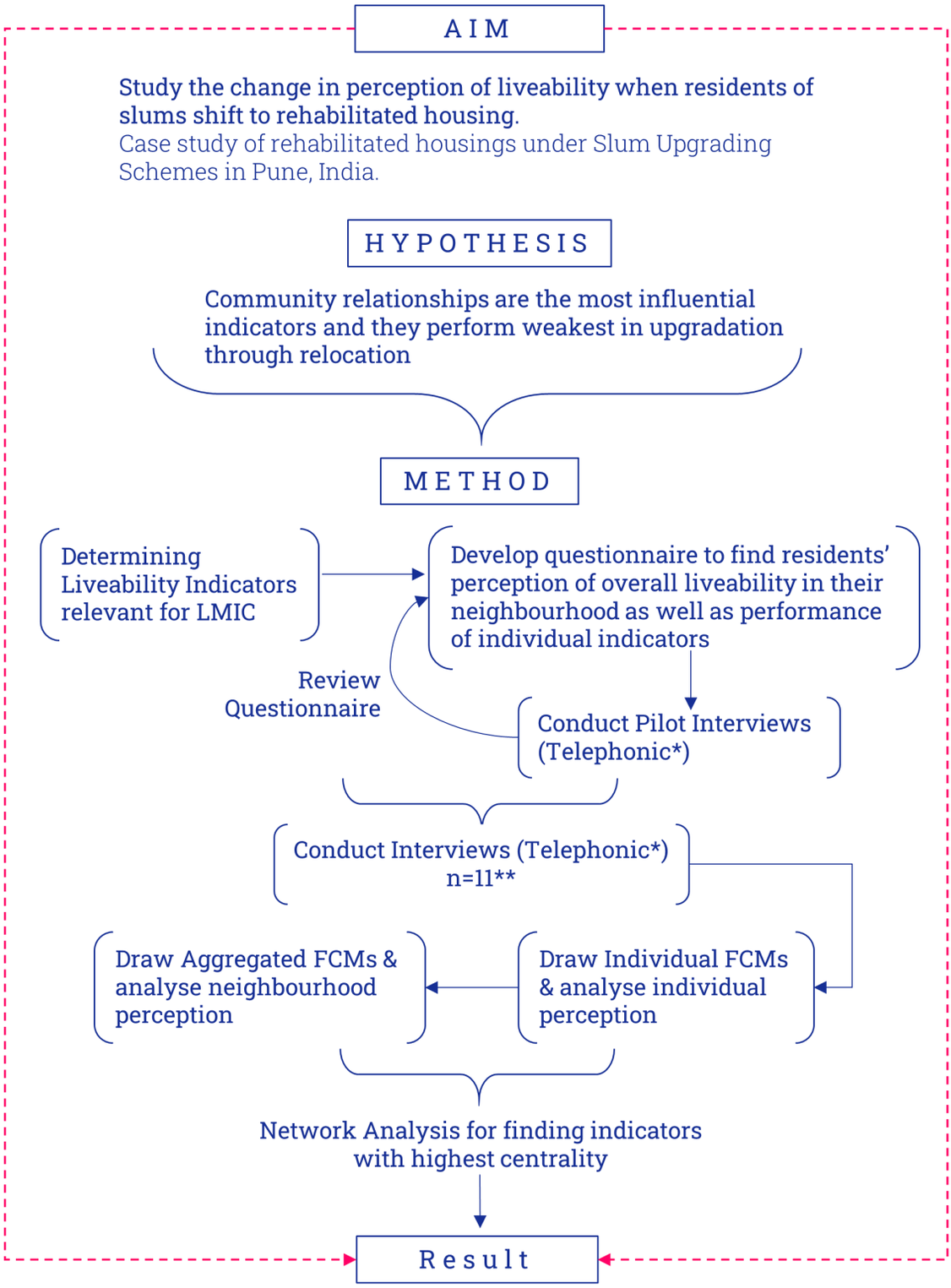
Abstract

Liveability studies are mostly limited to formal settlements, whereas in emerging economies like India, a large proportion of the population lives in informal settlements. Lack of liveability studies for informal settlements often lead to the assumption that ensuring safer housing structure and providing basic services like household-level water, sanitation, and electricity, inevitably leads to an improved living experience. Consequently, slum upgrading schemes rarely consider improvement in liveability as one of the criteria. The research paper addresses this knowledge gap by studying the change in liveability perceptions of residents when they move to upgraded housing. It hypothesises that liveability indicators related to community ties are most influential and despite improvement in housing quality and basic services, community ties are lost when up-gradation is done through relocation or redevelopment to a multi-storey housing. The goal of the study is to develop a method to understand residents' perception of the quality of life and the influence of individual liveability indicators on one another, to find the most central indicator which can work as performance leverage for improving overall liveability. The method developed includes interviewing residents to elicit the causal relationship between each indicator and analysing it through Fuzzy Cognitive Maps to find the most influential (central) indicator. Three residents each from four settlement types were interviewed: Slums with no intervention, Slums in-situ upgraded through retrofitting, Slums Rehabilitated through resettlement in a new location, and Slums upgraded in-situ by redeveloping a multi-storey housing. The result of the analysis highlights the applicability of the method in highlighting areas of improvement which can act as a leverage for a better liveability in the upgraded settlement.

Content List

Acknowledgement ---- 02
Abstract ---- 03
Introduction ---- 07
1.1 Hypothesis and Research Questions ---- 07
Background: Slums, State Response & Liveability ---- 08
2.1 Defining Slums in an Indian Context and a Review of Global Responses to Slum Upgrading ---- 08
2.2 Evolution of Slum Upgrading Policies in India ---- 11
2.3 Liveability and Informal Settlements ---- 12
Liveability Indicators ---- 13
3.1 Physical Dimension ---- 14
3.2 Social Dimension ---- 14
3.3 Functional Dimension ---- 14
3.4 Safety Dimension ---- 15
Methodology ---- 16
4.1 Interviewing Residents and Semi-structured Questionnaire ---- 16
4.2 Pilot Interviews and Reviewing Questionnaire ---- 17
4.3 Fuzzy Cognitive Mapping for Analysing the Interviews ---- 19
4.4 Components of a Fuzzy Cognitive Mapping (FCM) ---- 20
4.5 Steps of Drawing and Analysing of FCM ---- 21
Case of Pune, India ---- 23
5.1 Approach for Making a Slum Free City: Pune (State of Maharashtra) ---- 24
5.1.1 Rehabilitation through Resettlement in a New Location ---- 26
5.1.2 In-situ Up-gradation through Retrofitting ---- 26
5.1.3 In-situ Redevelopment: Upgrading through Shifting to a Multi-storey Housing ---- 28
Liveability Perceptions in the Selected Neighbourhoods ---- 30
6.1 Description of the Finding from Telephonic Interviews ---- 30
6.1.1 Neighbourhood 1: Shinde Vast, Hadapsar: Informal Settlement with No Intervention ---- 30
6.1.2 Neighbourhood 2: Laxmi Nagar, Yerwada: Upgrading by Retrofitting ---- 33
6.1.3 Neighbourhood 3: Kamela, Kondhwa: Transit Housing for SRA ---- 35
6.1.4 Neighbourhood 4: Dattawadi SRA In-situ Multi-storey Housing ---- 37
6.2 Comparing and Discussing Liveability Perceptions in the Four Neighbourhoods ---- 39
6.2.1 Neighbourhood 1: Informal Settlement with No Intervention ---- 39

6.2.2 Neighbourhood 2: Upgrading by Retrofitting----------40
6.2.3 Neighbourhood 3: Transit Housing before In-situ Rehabilitation to Multi-storey Housing-42
6.2.4 Neighbourhood 4: In-situ Redevelopment to Multi-storey Housing----------43
Summary of Findings, Application & Future Scope ----------45
7.1 Summary of Findings ----------45
7.2 Applicability of the Method Developed: Answering the Research Questions----------47
7.3 Testing the Hypothesis----------48
7.4 Limitations of the Study Conducted----------48
7.5 Outlook for Further Research----------49
References----------50
Appendices----------56
Declaration----------70



Develop a method to guide slum upgrading schemes for better liveability by: Understanding residents' perception of quality of life and influence of individual indicators on one another, to find the most central indicator which works as a performance leverage for improving overall liveability.

Figure 1: Thesis Framework

Introduction

With the rising urban population, the share of people living in informal settlements, often called slums, is also increasing proportionately. As of 2018, 23.5 per cent of the total urban population was living in slums (United Nations, 2019). Overcrowded dwellings, no security of tenure, and no access to clean water or formal supply of basic services are some of the key characteristics of a slum settlement. They are more vulnerable to climate change-induced disasters and other manufactured hazards due to their location and infrastructural precariousness. While there are various approaches to uplifting the physical infrastructure, from in-situ rehabilitation to relocation to a formalised settlement, there is a limited study about the post-upgrading liveability, especially in comparison of the various approaches. With most liveability studies limited to formal settlements, there is a knowledge gap in understanding how liveability perceptions vary in developing countries like India, where a large proportion of the population lives in informal settlements like slums. Consequently, it is often assumed that ensuring safer housing structure and providing basic services like household-level water, sanitation, and electricity, inevitably leads to an improved quality of life. Thus, slum upgrading schemes rarely consider improvement in liveability as a separate criterion, but a by-product of upgrading physical infrastructure. The thesis addresses this knowledge gap by studying the change in liveability when the slums are upgraded, by comparing the before and after liveability perceptions of the residents. Four neighbourhoods in the city of Pune, India are considered for the study: Slums with No Intervention, Slums In-situ Upgraded through Retrofitting, Slums Rehabilitated through Resettlement in a New Location, and Slums Upgraded In-situ by Redeveloping to a Multi-storey housing. Following a brief review of slum upgrading policies in India, the thesis takes the stand of defining liveability keeping residents' perception as the focus and establishing Liveability Indicators applicable to the specific case of slums.

1.1 Hypothesis and Research Questions

The thesis hypothesises that when slums are upgraded through relocation, whether into a multi-storey housing within the same area or housing in a different locality, the loss of pre-existing community ties is the central cause reducing the overall liveability experience.

"Community relationships in slums are often found to be much stronger, with a higher level of trust than in affluent suburbs where people don't know each other"(UN-Habitat, 2009, p. 128). Wellman and Wortley (1990, p. 559) cite Pahl (1984) to argue that community ties form the backdrop for informal arrangements crucial for a household's survival, expansion and reproduction. Rehabilitation housing often offers only restricted access to communal spaces which were an integral part of the residents' lives in slums, where these spaces were used for socialising with neighbours (Debnath et al., 2019). This could be one of the causes behind the weakening of community ties post upgrading.

To test this hypothesis, the thesis addresses two key research questions:

1. What are the key indicators which the residents consider most influential for a better living experience in their current neighbourhood?

2. How does the Slum Rehabilitation Scheme define its goal to ensure improved liveability in the upgraded housing?

Background: Slums, State Responses & Liveability

2.1 Defining Slums in an Indian Context and a Review of Global Responses to Slum Upgrading

Slums can be defined as densely populated urban areas, generally informally inhabited by people of low-income groups and characterized by substandard living conditions (UN-Habitat, 2003). These informal settlements have different colloquial names, like *Basti, Jhuggi, Favelas, Shantytown* etc. and each has its unique characteristics. Slums have also come to include the vast informal settlements that are one of the most visible expressions of urban poverty in developing world cities, including squatter settlements and illegal subdivisions (UN-Habitat, 2003). Yet, it is important to distinguish between the meanings of slums and informal settlements. Roy (2014) argues that urban informality is not necessarily restricted to the poor. She further mentions that Indian and other cities around the world are shaped by multiple informalities, including elite informality which could include farmhouses and other commercial development which do not follow the established zoning or building by-laws. Unfortunately, since these encroachments are by the rich, they manage to bypass the law, and get infrastructure, services, and legitimacy, making them different from slums. As such, slums can be considered as a subset of informal settlements. Jenkins (2006) characterises informal settlements to mostly involve a range of rental, squatting and informal entitlements; with tenure which is often irregular and contested rather than strictly illegal (Dovey & King, 2011). Jain et al. (2016)further clarify the situation in India, where although the umbrella term 'informal housing' include 'unauthorised housing', 'notified slums', 'recognised slums', 'identified slums' and 'unidentified slums', these settlement typologies vary significantly when it comes to property rights and legalities. For instance, in 'unauthorised housing', the owner-occupant has freehold or leasehold of the land, with rights to use and transfer their dwelling but one or more required approvals of construction are missing (like conversion of land-use, following building bylaws). While in the case of all types of slums, the common denominator is that the owner-occupant does not have legal ownership of the land on which they build their dwelling, although the rights to be compensated, rehabilitated or process of notice in the case of eviction depend on their recognition by the census and the State Government (Jain et al., 2016). Thus, as also mentioned by Roy (2014), slums in Indian cities cover a dizzying complexity of property and tenure arrangements. This thesis will only consider Notified Slums which is a settlement notified as a slum in the Indian State Government's official gazette under the applicable Slum Act, which makes them eligible for upgrading (Jain et al., 2016). Further, it considers the absence of the following identifying features as a characteristic of slums (UN-Habitat, 2006):

a. Durable housing: A durable house is built on a non-hazardous location and has a structure permanent and adequate to protect its inhabitants from the extremes of climatic conditions, such as rain, heat, cold and humidity.

b. Sufficient living area: Living area for the household members is considered enough if not more than three people share the same room.

c. Access to improved water: Enough water for family use, at an affordable price, available to household members without being subject to extreme effort, especially on the part of women and children.

d. Access to sanitation: A household is considered to have adequate access to sanitation if an

excreta disposal system, either in the form of a private toilet or a public toilet shared with a reasonable number of people, is available to household members.

e. Secure tenure: Secure tenure is the right of all individuals and groups to effective protection against forced evictions. People have secure tenure when there is evidence of documentation that can be used as proof of secure tenure status or when there is either de facto or perceived protection against forced evictions.

As of 2018, the absolute number of people living in slums or informal settlements is 1 billion. Although the proportion of the urban population living in slums worldwide has declined by 20 per cent between 2000 and 2014 (from 28 per cent to 23 per cent), the positive trend recently reversed course, and the proportion grew to 23.5 per cent in 2018 (UNSD, 2019). India had an estimated 26.31 per cent of the urban population living in slums in 2001 (National Buildings Organisation, 2013). In the 2011 Census of India, of the 78.87 million urban households, slum households constituted 17.4 per cent (13.75 million). While, the slums in the 187 towns of the state of Maharashtra accounts for 2.44 million slum households, which is 17.8 per cent of the total slum households in the country (National Buildings Organisation, 2013). The national and state government of India's response has been typical of the historic ways in which governments worldwide responded to the problem of slums. UN-Habitat identifies the seven main ways (UN-Habitat, 2014):

a. Ignoring slums: When the government denies the presence of slums with the belief that slums are temporary and will disappear with expected economic growth.

b. Using slums for political purposes: Where slum dwellers are considered potential vote bank in return of improvements, protection from eviction or the promise of land titles.

c. Eradication, eviction, and displacement: Forced evictions and campaigns of eradication for reasons like large-scale development projects like dam construction or government's urban development plans or even to accommodate global events like Olympic Games. The evictions are carried without providing alternative affordable housing options, causing the formation of new slums elsewhere.

d. Relocation: Slum dwellers are relocated to a new housing outside the city limits and the original slum land is redeveloped. Relocation sites were often on the outskirts of the city increasing the transport time to job opportunities and cost for households Often, the dwellers move back to slums located in central locations and lower housing costs.

e. Public housing: Slum dwellers are rehoused in public housing, but this strategy has been reported to be successful majorly in Singapore and Hong Kong given that both are high-income countries. Developing countries might not have the budget to subsidise both rental and housing purchase for a growing slum population.

f. Sites and services schemes: Often used in combination with relocation, where the eligible household is provided either with a plot with no house, but infrastructure provided or a plot with a core unit (e.g. one room) and toilet, where the dweller is expected to extend the house. The disadvantages of relocation hold even for this method, with added challenges like regulation prohibiting income-generating activities or subletting on residential plots and cost implications of extending the house as per the standards.

g. Upgrading: Slum upgrading is considered financially and socially most appropriate approach.

Slum upgrading is the process of gradually improving, formalizing and incorporating informal settlements into the city by a series of steps which typically involve the following (UN-Habitat, 2014):

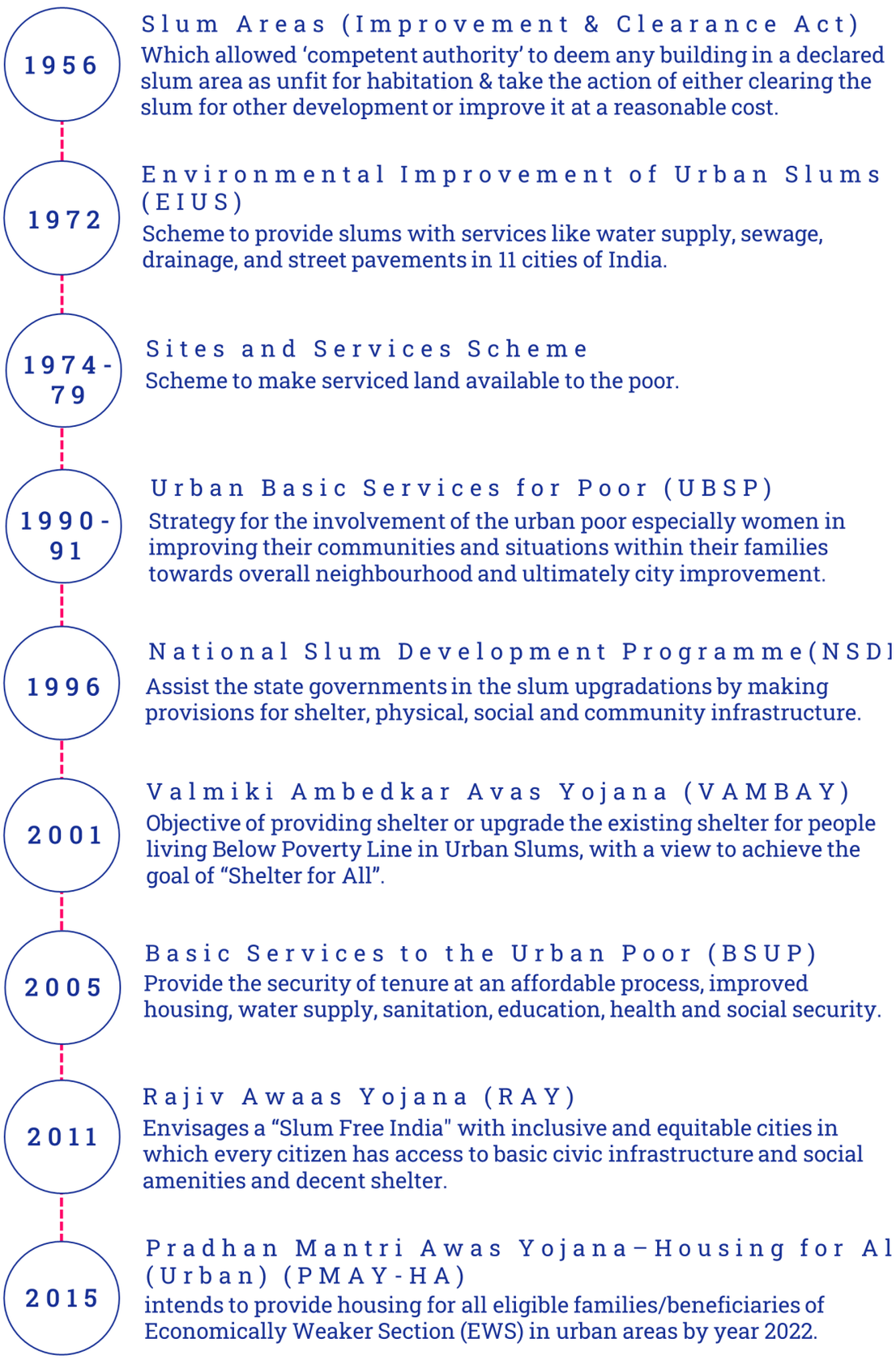


Figure 2: Timeline of Slum upgrading policies at a national level in India (author's own processing based on Section 2.2.)

a. Installation or improvement of basic amenities like safe water supply, sanitation, waste collection, drainage, access to road network and electricity.

b. Regularising tenure security.

c. Housing improvement.

d. Improvement of access to social infrastructure like health care, education.

e. Improvement or introduction of community facilities such as community open space, dispensaries, etc.

Globally, the current direction of slum upgrading post-1990 is informed by the learnings from the first two decades (1970-1990) of slum upgrading programmes. The four key lessons were (UN-Habitat, 2014):

a. A participatory approach is critical with a 'bottom-up' design, working with households and communities so that they can have an input into decisions regarding what levels of service they receive.

b. The success of upgrading intervention depends on considering the long-term costs involved (maintenance) and to design a level of service that is affordable both to the community and the local government.

c. Housing upgrading must be integrated with city level and country policies, programmes, and strategies to achieve synergies with other supporting interventions addressing poverty, vulnerability and promoting economic growth.

d. Upgrading programmes are most effective when led by the municipal authority and implemented at the community level through a broad set of intermediaries including Community-based Organizations (CBOs), NGOs, and UN agencies such as UNICEF and UN-Habitat.

The Indian Government's initial response up to the early 1970s was treating slum settlements as illegal and resorting to demolition and clearance (Government of Maharashtra, n.d).

2.2 Evolution of Slum Upgrading Policies in India

With the federal structure of governance in India, authority, and responsibility to form and implement policies are divided between the central and state government. While on specific subjects both can make legislations, urban development, policy, planning and housing fall under the authority of state governments. The central government can only formulate schemes, model legislation, fund programmes and provide guidelines (Batra, 2009; Kundu et al., 2018). As such, policies related to slum fall under the ambit of state governments with the central government guiding through national schemes outlined in the five-year plans with the first five-year plan beginning in 1951. The first act addressing slums was passed in 1956, the Slum Areas (Improvement & Clearance) Act, which allowed 'competent authority' to deem any building in a declared slum area as unfit for habitation & take the action of either clearing the slum for further development or improve it at a reasonable cost (The Slum Areas (Improvement and Clearance) Act, 1956, 1956). The Environmental Improvement of Urban Slums (EIUS) was launched in the Fourth Plan (1969-1974) and while the Sites and Services Scheme for "making serviced land available to the poor" was launched in the Fifth Plan (1974-79) (Batra, 2009, p. 12), this period also witnessed the demolition of "about 1.5 lakh [150 thousand] slum houses carried out by the DDA [Delhi Development Authority] in Delhi" during the national emergency declared by the then Prime Minister, Indira Gandhi (Batra, 2009, p. 14). This was followed by a similar and more brutal eviction carried under the leadership of Prime Minister Sanjay Gandhi, where 700,000 people were displaced in Delhi alone (Batra, 2009, p. 15; Tiwari, 2015, p. 95). Gnaneshwar V (1995) notes that the issue of urban poverty was addressed in detail in the Seventh Plan (1985-1990), which led to the introduction of the national scheme of Urban Basic Services (UBS) in 1985. This scheme was later merged with EIUS, to form the Urban Basic Services for Poor (UBSP) in 1990-91 (Gnaneshwar V, 1995). UBSP developed a strategy

for the involvement of the urban poor especially women in improving their communities and situations within their families towards the overall neighbourhood and ultimately city improvement (Rajandran, n.d.). This was the first step taken by the government towards community participation for development. In 1996, the National Slum Development Programme (NSDP) was introduced at a national level to assist the state governments in the slum up-gradations by making provisions for shelter, physical, social and community infrastructure (Mohanty & Mohanty, 2005, p. 69). In 2001, a subsidy based scheme called Valmiki Ambedkar Avas Yojana (VAMBAY) was initiated to provide/upgrade shelter to urban slum dwellers (Batra, 2009). In 2005, under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), the scheme of Basic Services to the Urban Poor (BSUP) was launched to provide the security of tenure at an affordable process, improved housing, water supply, sanitation, education, health and social security. (Batra, 2009; De, 2017). The current scheme of Pradhan Mantri Awas Yojana – Housing for All (Urban) (PMAY-HA) which is under implementation in the period 2015-2022 follows the Rajiv Awas Yojana (RAY) launched in 2011. The current scheme aims to address a housing shortage of 20 million, which includes the projected slum households of 18 million at a decadal growth of 34 per cent (Ministry of Housing and Urban Affairs, GoI, n.d.). Figure 2 draws the chronology of slum upgrading policies in India.

2.3 Liveability and Informal Settlements

With the international acceptance of the Sustainable Development Goals (SDGs) in 2015 and the New Urban Agenda (NUA) in 2016, creating 'liveable' cities has become a priority and there has been increasing use of the concept of 'liveability'. However, an explicit definition of the characteristics of liveability is missing (Higgs et al., 2019). Okulicz-Kozaryn (2013) notes that the term has mostly gained popularity with increasing reports on liveability rankings and indices aiming to quantify urban quality (as cited in (Kovacs-Györi et al., 2019). The literature points out that most of these indices predominantly focuses on data, taking a quantitative approach to evaluate performance, based on studies conducted on a city level rather than addressing resident's experiences. Kovacs-Györi et al (2019) explain this by the example of SDG indicator 11.2.1 which describes the "proportion of the population that has convenient access to public transport, by sex, age and persons with disabilities". They argue that we need to first define what "convenient access" means to these different groups (Kovacs-Györi et al., 2019). Similarly, all the 79 liveability indicators prescribed by the Ministry of Urban Development (2017), Govt. of India, are expressed primarily as mathematical equations. For example, under the category Education, one of the indicators of the educational indicator is mentioned as "Percentage of the school-aged population enrolled in schools" (Ministry of Urban Development, 2017). While the percentage is relevant to assess development, such statistical expressions fail to capture the causal effects of the indicators. Further, scale and specificity of the definition of liveability and related studies are also paramount. The interpretation of liveability is more subjective at individual scales, whereas planning actions are carried out on larger scales (Kovacs-Györi et al., 2019). (Leby & Hashim, 2010)) argue that neighbourhoods have always served as an important tool for the planning and analysis of urban areas since the human-built topography of neighbourhoods greatly impact residents social and psychological wellbeing.

Thus, based on these arguments, the following definition of liveability has been adopted:

Quality of life in a certain community, measured by the resident's satisfaction with the residential environments, safety, attractiveness, crime rate, education, and employment opportunities, social cohesion, and inclusion or amount of open space (Higgs et al., 2019; National Research Council, 2002).

Liveability Indicators

A further inquiry into the common indicators for assessing liveability highlighted that most of these indicators are from the perspective of developed nations, with most evidence relating to high-income countries, such as Australia. There is limited guidance about what constitutes a liveable city from a low and middle-income countries (LMIC) perspective (Alderton et al., 2019). Existing liveability frameworks include features such as public transport, affordable housing, and public open space; however, these frameworks may not capture all of the liveability considerations for cities in LMIC contexts. (Alderton et al., 2019). Particularly when a vast number of residents in LMICs still live in informal settlements and access to basic infrastructures like clean drinking water and sanitation are the primary liveability indicators for them. This is in line with targets mentioned in both the SDGs and the NUA. Goal 11 of the SDG, Sustainable Cities and Communities, mentions the targets of ensuring access for all to adequate, safe and affordable housing and basic services and upgrade slums, providing universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities (UN, 2016). While NUA mentions enhancing liveability for all (UNGA, 2017). Yet, liveability analysis of slums or informal settlements, either in their original condition or after they have been upgraded, have not been done.

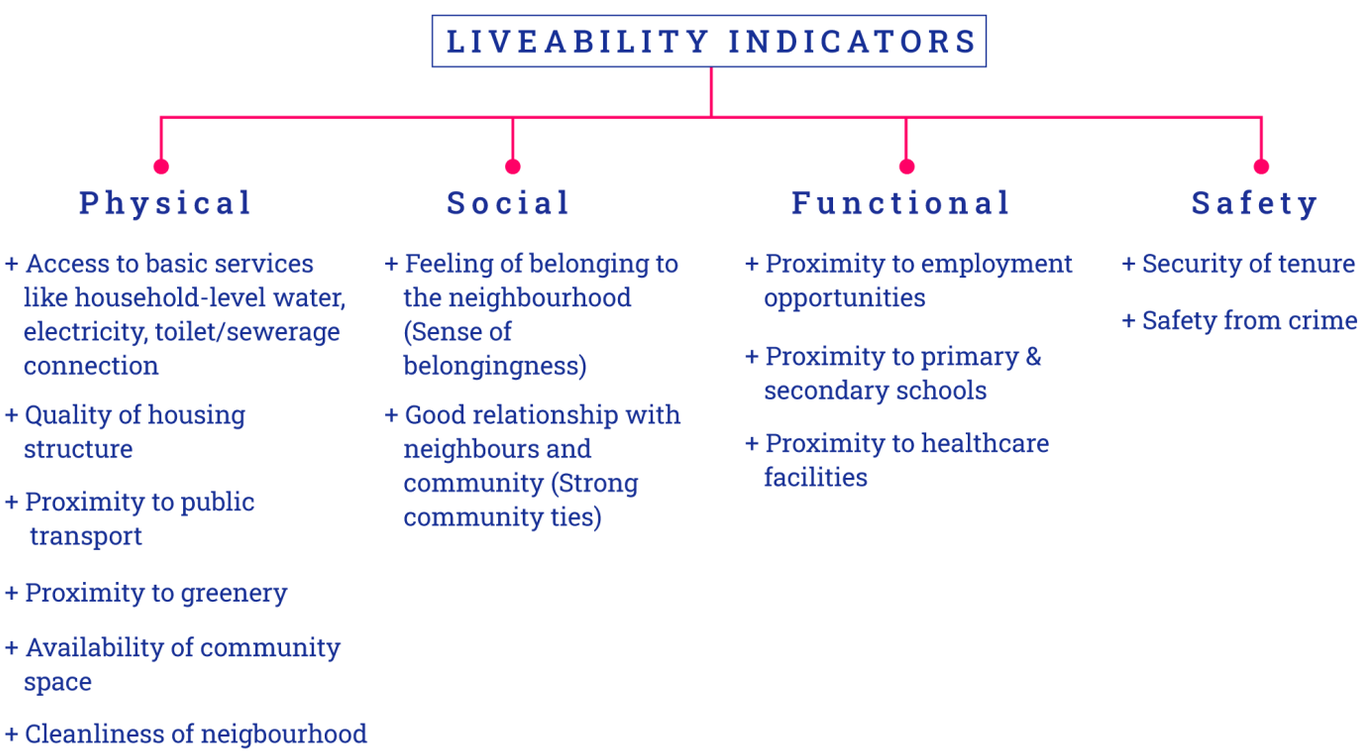


Figure 3: Liveability Indicators for analysing slums and Slum Upgrading Schemes

Hence, there is a need to contextualise liveability indicators for slums and analyse how the upgrading policies affect these indicators.

The study adopts 13 indicators (Figure 3) for analysing slums and Slum Rehabilitation Schemes, based on the current literature on liveability indicators which considers a neighbourhood scale (Leby & Hashim, 2010), through the analysis of residential preference (Kovacs-Györi et al., 2019; Onnom et al., 2018), from an LMIC perspective (Alderton et al., 2019).

The indicators have been classified under four thematic dimensions: Physical, Social, Functional and Safety. Given the complexity and subjectivity of the concept of liveability, it is understood that the list of indicators is not conclusive, however the thematic grouping aims to address the potentially relevant aspects according to the context of informal settlements.

3.1 Physical Dimension

It refers to the resident's immediate environment and how they contribute to fulfilling the fundamental human need for providing shelter. The indicators aim to cover the resident's perception of various aspects of this environment like access to basic infrastructure, public and green space, quality, and maintenance of the infrastructure. This dimension is particularly relevant in the case of slums since the absence of one or more of these indicators is characteristics of slums (UN-Habitat, 2006). Further, up-gradation of the physical infrastructure is one of the primary goals of the rehabilitation schemes under BSUP (Patel, 2013) and hence, it can be assumed that the inhabitants of the rehabilitated settlements will score indicators from the Physical dimension higher. Yet, a recent study by Debnath et al., (2019) highlights that despite the physical improvement, rehabilitated occupants move back to slums, chiefly due to financial distress and built-environment related discomfort. Two reasons mentioned were loss of informal economy established in the existing settlement due to relocation and the design of the rehabilitation housing restricting access to communal spaces. They further argue that this mismatch between the household needs of the rehabilitated dwellers and built environment design often lead to a rebound effect, where the occupants abandon these houses and move back to informal settlements (Debnath et al., 2019). It can be deduced that the indicators of the Physical Dimension could majorly influence the overall liveability, particularly since it seems to have an evident causal relation with the perception of all three dimensions.

3.2 Social Dimension

Social dimension indicates the community ties and social connection of the settlement. (Nijman, 2008) states that slum rehabilitation is an institutional change, where an entire informal built environment is shifted to a formal housing structure. His further research shows that for at least 70% of residents of Dharavi slums, a sense of community is the most valued aspect (Nijman, 2015). Features of the built environment in the rehabilitated housing have a significant influence on the sense of community, often leading to social isolation if the design restricts access to communal spaces, as confirmed by the study conducted by Debnath et al., (2019). They also note that the situation is more pronounced for women, who used to use outdoor open spaces in the slums for social consumption, as they performed most of the household activities outdoor while socialising with neighbours. The study results show that 80% of the respondents are distressed due to the lack of outdoor spaces, daylight availability in the corridors and in between the buildings, insufficient cooking spaces etc, making it difficult for them to socialise even with neighbours (Debnath et al., 2019). This further affects their relationship with neighbours which is one of the indicators contributing to the social dimension.

3.3 Functional Dimension

Functional indicators cover the functionality provided by the resident's environment and is assessed by the proximity and access to services and opportunities. It represents how the physical environment (covered by the indicators under the Physical Dimension) can provide for the inhabitants and how they can use it for bettering their lives (Kovacs-Györi et al., 2019). Holt-Jenson (2001) further mentions that the Functional Dimension consists of indicators implying that the sense of well-being depends on good provision and location of communication systems, shops, kindergartens, shopping centres, clinics, schools and other services (as cited in (Leby & Hashim, 2010)). It implicitly refers to the location of the settlements, which could affect the proximity and hence access to employment opportunities, education, and healthcare. Rehabilitation through relocation is often done in sites which are in city periphery, leading to increased travel time and cost, which often leads to occupants moving back to informal settlements closer to the city centre where most opportunities are located (UN-Habitat, 2014).

3.4 Safety Dimension

Safety covers the neighbourhood's sense of security in terms of both legal status and safety from crime or hazards. It is one of the basic needs, reflected in the fact that everybody wants to live in a crime-free and safe neighbourhood (Leby & Hashim, 2010), while the absence of property rights which can be translated into tenure insecurity is one of the characteristics of slums (Jain et al., 2016). Although rehabilitated occupants have tenure security, weaker sense of community and relationship with neighbours may lead to reduced sense of security as Unger and Wandersman (1986) mention that neighbours can be considered an important resource in preventing crime (as cited in (Farahani, 2016)). Farahani (2016) further mentions that neighbourhoods that have a high degree of social interaction can help in controlling crime informally through surveillance of a neighbour's home and looking out for strangers, often called 'eyes on the street', a phrase popularised by Jane Jacobs (Jacobs, 1992). However, rehabilitated occupants might perceive a higher sense of safety from both natural and man made hazard due to improved physical infrastructure, which follows the standard by-laws and safety norms.

Methodology

The method developed attempts to find how liveability perception changes as slums are upgraded, how the Liveability Indicators (Figure 3) influence each other and detect the indicator(s) which holds the highest influence, by mapping the causal relationship between these indicators.

As mentioned in Section 2.3, the thesis interprets liveability as the quality of life in a certain community, measured by the resident's satisfaction. Consequently, a method is developed which keeps the residents' perception of liveability in their respective neighbourhood as the focus and uses Fuzzy Cognitive mapping to analyse individual perception, experience, and knowledge regarding each of the contributing liveability indicators. The method can be summarised as:

Mapping the network of causal relations of liveability indicators by generating Fuzzy Cognitive Maps (FCM) of residents' perception by interviewing (n=11[1], 3 each from 4 selected neighbourhoods) residents from the four neighbourhoods. The individual FCMs from each neighbourhood are then combined to have four FCMs, which would help in identifying the most central indicators in each case. The central indicators act as levers which can help improve the overall liveability of the neighbourhood.

The method can be divided into six steps:

a. Literature review to select and classify Liveability Indicators which can be applied to a neighbourhood in an informal settlement of a Low and Middle-Income Country (LMIC).

b. Designing a semi-structured questionnaire for interviewing the residents such that it can help in deriving an FCM from the resident's answers.

c. Conducting pilot interviews and review questionnaire.

d. Conducting interviews.

e. Drawing individual FCMs and later combining them to have four FCMs representing the liveability perception of each settlement.

f. Analysing the FCMs.

The selection of Liveability Indicators has been addressed in detail in the previous chapter. The next sections elaborate and justify the consecutive steps and concepts used in the method.

4.1 Interviewing residents and semi-structured questionnaire

An interview can be defined as an exchange where one person, the interviewer, attempts to gather information, opinion or belief from another person(s), i.e., the interviewee(s) (Maccoby E. E., 1954, p. 449). It is a common practice in various fields and can be conducted through face-to-face verbal exchanges, group exchanges, telephonic or via the internet (Mason J., 2012). Young et al. (2018) while citing Fontana A. (2005) mentions that interviewing relies on "an interactive method, where mutual learning occurs between all those involved in the process", making it an active research process where a contextually bound, mutual story is created. Further, interviews are flexible, allowing thorough analysis from comparatively small sample size and place the focus of research on the interviewees' perspective, hence bringing to light issues that the interviewer might not have considered (Young et al., 2018). This is paramount for understanding the liveability of a settlement, which heavily relies on the residents' perception and experiences.

For this thesis, a semi-structured interview will be

1 Only 2 interviewees from Neighbourhood 4 could be contacted

conducted. A semi-structured interview gives the interviewer the flexibility to ask additional questions if a relevant or new line of enquiry emerges while relying on the pre-designed interview guide consisting of standard questions, thus maintaining data quality, and keeping it comparable (Young et al., 2018). Instead of in-person interviews, the interviews will be conducted via telephone, due to the COVID-19 pandemic. While telephonic interviews are widely used in quantitative data collection, they are considered a less attractive alternative to in-person interviews for qualitative data collection (Novick, 2008). The disadvantages include network issues at certain areas, lower response rates, need for shorter interview duration, and absence of non-verbal cues (Novick, 2008). Yet, Hopper (1992) mentions that telephone interviews allow respondents to disclose sensitive information more freely and the absence of visual cues is not a significant setback. However, the semi-quantitative nature of the questionnaire, where the respondents are asked to provide ratings and are designed primarily for decision making concerning priorities (Mwiya, 2014), overcomes the disadvantage of lack of visual cues.

4.2 Pilot Interviews and Reviewing the Questionnaire

Teijlingen and Hundley (2001) while citing Polit and Beck (2010) refer to pilot studies as mini-version of a full-scale study, often termed as a feasibility study and cites Baker (1994) to point out the relevance of pilot studies in pre-testing of a research methodology such as questionnaire or interview schedule. Hassan et al. (2006) further argue that pilot study is one of the most important stages in a research project as it helps in identifying potential problem areas and deficiencies in the research methodology (instrument). It also helps the researcher become familiar with the protocols and check if the instructions are easily understandable by the interviewee. A pilot study helps in resolving the following factors before the main study (Simon & Goes, 2013):

1. Comprehensibility of instructions in the questionnaire.

2. Check the wordings of the survey.

3. Checking the reliability and validity of the results.

4. Efficacy of statistical and analytical processes.

For the pilot interview, four residents from three different neighbourhoods were selected. Three rounds of pilot interview were required to reach an optimum level of confidence regarding the methodology. Although the neighbourhoods are not categorical to the four neighbourhood types selected for the main study, the pilot interviews were instrumental in resolving critical issues. The pilot study was limited to forming individual Fuzzy Cognitive Maps and the grouping of maps was left since the interviewee didn't belong to the same neighbourhood.

From the 3 rounds of pilot interviews conducted with 4 interviewees and after a total of 6 interviews, the following was concluded:

a. Questionnaire format had to be adapted to keep up with the interviewees without losing time in writing/substituting answers. This was essential to keep the interview short, smooth, and avoiding any confusion or distraction.

b. Questions had to be changed to make it more conducive to the aim of the thesis. A choice of most relevant indicators neither had a definitive contribution towards finding weak performing indicators nor were the interviewees convinced about choosing just 5 out of 13 indicators. Further, mapping cause and effect relationships between weak performing indicators were also not effective since it neglected the indicators which were rated 'good' but could still significantly affect other indicators.

c. Indicators which gets inherently improved during upgrading process were left from the mapping since their performance is acknowledged to have improved and hence, a change can't be noted.

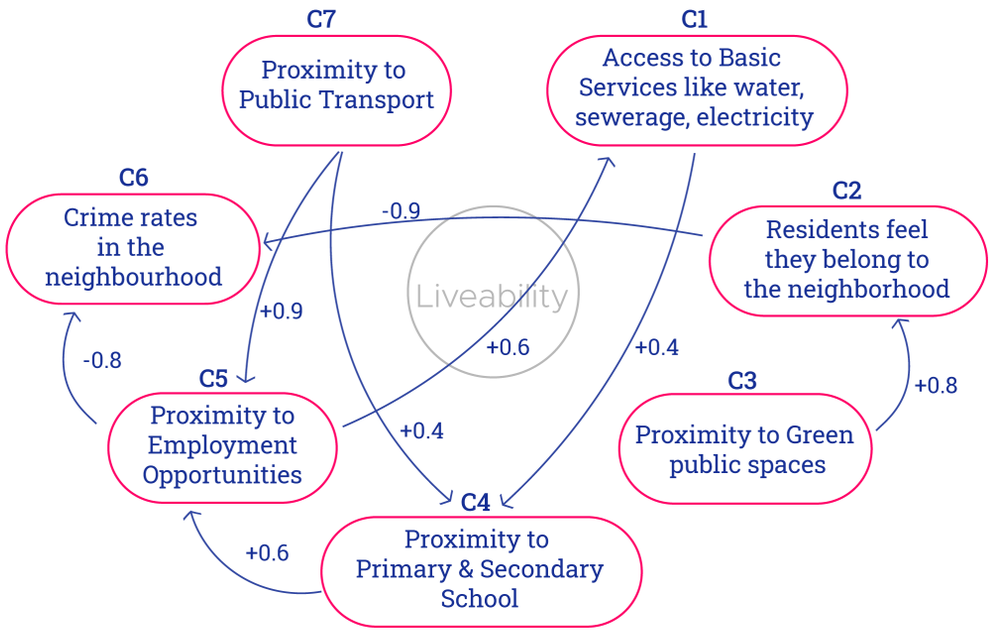


Figure 4: An example of a Fuzzy Cognitive Map describing the causal relation between few liveability indicators (Concepts, denoted by C1, C2... C7). The presence of an arrow between two Concepts indicate a causal relation where the concept at the base of the arrow causes concept at the head of the arrow. The + or – sign along with their values indicate the degree of causation. For example, an increase in access to education opportunities (C4) can cause an increase (+0.6) in access to employment opportunities (C5). Access to employment(C5) has a negative causation (-0.8) on crime rate, which decreases with the increase in employment opportunities. The values, +0.6 and -0.8 show the strength or possibility of causation. Closer the value to 1, regardless of sign, stronger its causation power. Therefore, C4 --> C5 has a relatively weaker causation than C5 --> C6.

A=

	C1	C2	C3	C4	C5	C6	C7
C1: Access to basic services like water, sewerage, electricity	0	0	0	+0.4	0	0	0
C2: Residents feel they belong to the neighborhood	0	0	0	0	0	-0.9	0
C3: Proximity to green public spaces	0	+0.8	0	0	0	0	0
C4: Proximity to Primary & Secondary School	0	0	0	0	+0.6	0	0
C5: Proximity to Employment Opportunities	+0.6	0	0	0	0	-0.8	0
C6: Crime rates in the neighbourhood	0	0	0	0	0	0	0
C7: Proximity to Public Transport	0	0	0	+0.4	+0.9	0	0

Figure 5: Adjacency Matrix for FCM in Fig. 1. For example, C1-C4 = +0.4 is the causal edge value, the causality Concept C1 imparts to C4.

d. The interviewees must be repeatedly reminded of the meaning of the question and its relevance. For example, questions about 'Safety and Security' must remind that it is related to the neighbourhood and not a general sense of 'safety' in the city.

4.3 Fuzzy Cognitive Mapping for Analysing the Interviews

Winter and Kron (2009) cite Kosko (1995) to argue that bivalent thinking is not adequate for understanding social phenomenon since unlike science [natural] which is black and white, the social realm is grey. Polar characteristics of either true or false is an exception rather than a norm. Therefore, thinking through Fuzzy logic which includes both polar and non-polar characteristics is required (Winter & Kron, 2009). Fuzzy logic uses human-like reasoning for a better representation of the reality by "employing degrees of truth, rather than the true or false (1 or 0) Boolean logic" (Rouse, 2016). This thesis understands liveability as inherently a social phenomenon, which is the outcome of how humans experience their environment and how the degree to which this environment facilitates their daily activities, their social mobility and interaction with one another. As such, it is suitable to use fuzzy logic to analyse liveability. Since the overall liveability of a settlement is influenced by the contributing indicators, it is essential to map the cause and effect relationship of these indicators to identify which indicator(s) acts as performance lever and should be prioritised for better liveability. These cognitive maps can be generated by analysing the knowledge, experience and perception of the residents gathered in the interviews. Thus, a combination of fuzzy logic and cognitive mapping, Fuzzy Cognitive Maps, will be adopted to analyse the residents' interviews.

Fuzzy Cognitive Maps (FCM) are "inference networks for knowledge representation and reasoning" (Papageorgiou & Salmeron, 2013a). It is analogous to the way humans perceive a system (Isak et al., 2009; Papageorgiou & Salmeron, 2013a). It models this network by mapping the cause and effect relations between defined variables (Özesmi & Özesmi, 2004) or concepts which are "verbally described and do not have to be dimensionally defined, such as 'customer preference' " (Yoon B.S & Jetter A.J., 2016). The cause and effect relations show the positive or negative influence of the concepts on each other with verbally assigned weights such as 'strong' or 'weak' (Yoon B.S & Jetter A.J., 2016). The model is appropriate for representing unstructured knowledge since it is not limited by exact values and measurements of the variables (Isak et al., 2009). The possibility of merging sub-maps prepared by different interviewees adds to the utility of using FCM as the primary model of the system being studied (Bottero et al., 2017; Perusich, 2010). Additionally, since each variable has an everyday meaning, the developed map-model is easy to understand, even by a non-technical audience. FCM is a "straightforward way to find which factor should be modified and how" (Papageorgiou & Salmeron, 2013a). This allows discussion among non-technical participants, like residents of the settlements, to understand how the system works, enabling necessary changes at a ground level.

Four major instances can be identified when it is most suitable to use FCM:

a. Where human behaviour and human action can affect the system (Özesmi & Özesmi, 2004). Papageorgiou and Salmeron (2013b) call this the "Explanatory" function of FCM while citing Codara (1998). It describes the use of FCM in "reconstructing the premises behind the behaviour of a given agent" which helps in understanding the rationale behind the agent's [human] decisions, actions, and behaviour. Stakeholders get the flexibility of representing their concerns regarding a system from their perspective, without the need to follow a consensus (Olazabal & Pascual, 2016)

b. Where scientific data is scarce or unreliable due to uncertainty, FCMs are capable of overcoming this by collating quantifiable and

qualitative information obtained from the local or indigenous knowledge of the stakeholders (Özesmi & Özesmi, 2004). This is a "strategic" function of FCMs which attempts at generating a more accurate description of a system (Papageorgiou & Salmeron, 2013b).

c. Where stakeholders from various background and expertise are involved and there is no one right answer (Özesmi & Özesmi, 2004). In such cases, FCM help in reaching a middle ground or a "compromise" (Kokkinos et al., 2018) by bringing together knowledge from different backgrounds, comparing them and simulating different policy options (Özesmi & Özesmi, 2004). It also highlights the "potential and/ or existing conflicts" (Isak et al., 2009). Thus, it is the "reflective" function of FCMs which help decision-makers to consider the overall representation of a given situation, to "ascertain its adequacy" and consider necessary changes (Papageorgiou & Salmeron, 2013b).

d. Where public opinion is desired or mandated (Özesmi & Özesmi, 2004) like participatory design approaches. Given the easy-to-read diagrammatic nature of FCMs, they can be readily discussed and understood in participatory workshops. This further helps in gathering support or identifying dissent.

4.4 Components of a Fuzzy Cognitive Map (FCM)

An FCM has the following components (refer Fig 4) (Bottero et al., 2017; Cambridge Intelligence, 2019; Helfgott et al., 2015; Kosko, 1986; Özesmi & Özesmi, 2004):

a. Concepts/Variables/Nodes:

They represent the drivers/indicators that have influence (causation) on the system into consideration. Can be represented with C_1, C_2 ... C_n. They can be defined contextually and need not have a dimensional definition (Yoon B.S & Jetter A.J., 2016). Liveability Indicators are the concepts in the case of this thesis, as they influence the overall liveability score.

b. Directed Edges:

Arrows with signs (+/-) depicting the relationships between concepts (causality), indicating that a concept causes another concept. A positive correlation '+' between C_1 and C_2 means increasing C_1 increases C_2 and decreasing C_1 decreases C_2. While a negative correlation '-' means increasing C_1 decreases C_2 and decreasing C_1 increases C_2.

c. Weight of Directed Edge:

While the directed edges or arrows with signs show a causal relation between two concepts, the weight (between 0 and 1) shows the degree to which one concept causes another. The stronger the causation, negative or positive, the closer the value is to 1 and the weaker the potential of causation, the closer the value is to 0.

d. Adjacency Matrix:

Mathematical representation of the FCM to analyse the centrality of a concept (Conceptual Centrality) and the role of each component in the network, whether it is Ordinary, Driver/ Transmitter or Receiver.

- An Ordinary Concept is both affected by and influences other concepts.
- A Driver/Transmitter Concept only influences other concepts
- A Receiver Concept is only affected by other concepts.
- Concept Centrality determines the importance of a concept in the overall network. It helps in calculating the contribution of a concept in the FCM by adding the in-arrows (or indegree, i.e., how

much input[2] they receive) and out-arrows (or outdegree, i.e., how much output[3] they give).

Conceptual Centrality of Concept Ci= |Indegree (IDi)|+|Outdegree (ODi)|

The central and important drivers and receivers are potential "starting points" for working towards improving liveability in a neighbourhood (Micha et al., 2020). A high centrality of a concept could indicate higher influence, making it a focal point for intervention by policymakers.

4.5 Steps of drawing and analysing FCM:

a. Drawing of Individual FCM:

1. The Liveability Indicators are the Concepts based on which the FCMs will be drawn. Each interviewee (n=11) will be asked to rate individual indicators. The indicators which are not rated satisfactory will be further considered to check how their performance can be improved by other indicators. This limits the number of causal relationships which is crucial to limit the time taken for each interview. In the case when time is not a constraint, finding a causal relationship between all indicators will be preferred for optimal results.
2. The next step will be to weigh the causation, using rating questions. For example, the thesis employs a scale of 0.3 to 1, where 0.3 means 'very little' influence, 0.6 means 'moderate' influence and 1 means 'high influence'. Since the aim is to find how to improve liveability, only positive causation is considered in this study.
3. The responses gathered from the questionnaire will be then transformed into respective FCMs by the interviewer (author).
4. Finding the Conceptual Centrality for FCMs from each interviewee using Adjacency Matrix.

b. Drawing of Combined FCM: Process of Aggregation

1. The FCMs of interviewees from each neighbourhood are aggregated into one, resulting in 4 neighbourhood level FCMs, which will highlight all the Concepts considered relevant by the interviewees of each neighbourhood. For aggregation, the average weight of each directed edge is considered and a new average adjacency matrix is derived (Nápoles et al., 2013). For ease, aggregation is done through the software FCM Expert (Nápoles et al.)
2. Using a combined Adjacency Matrix, we can find the centralities of each Concept or Liveability Indicator. Higher the centrality, the higher influence it has on the liveability.

2 Input here means how many other concepts cause (influence) a concept

3 Output means how many other concepts are caused by the concept

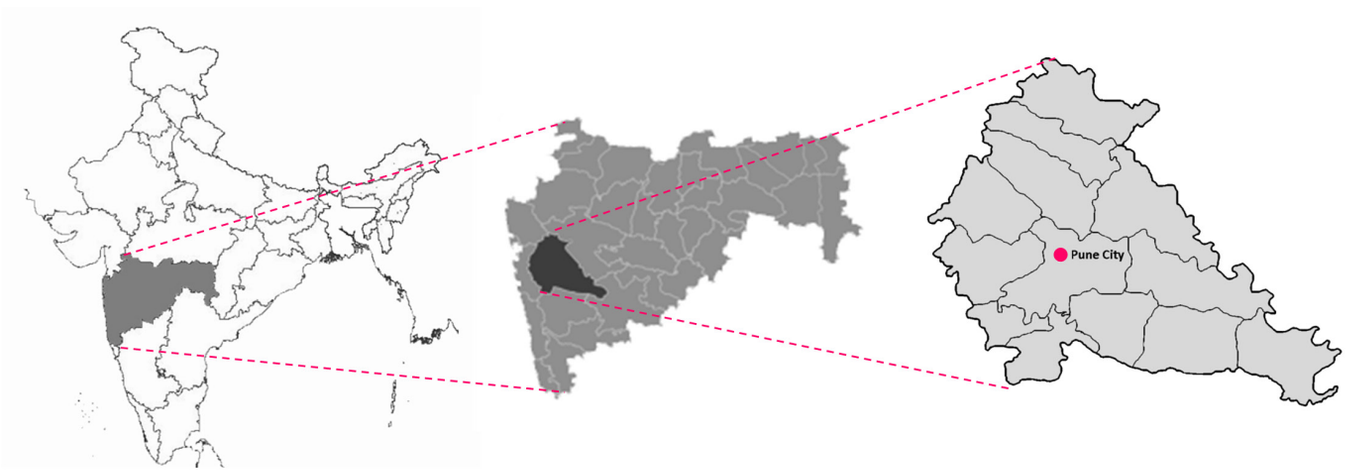


Figure 6: Location of the city of Pune

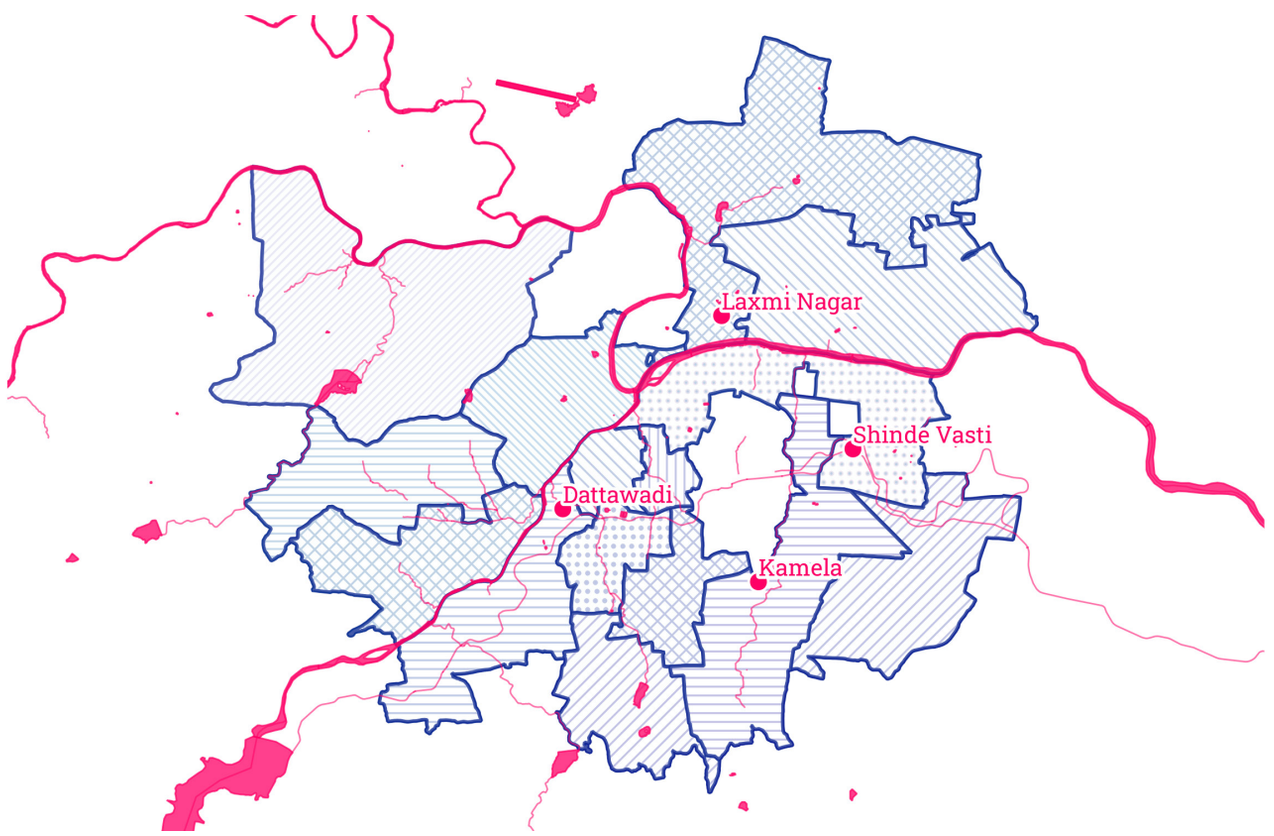


Figure 7: Pune with its 15 administrative wards, with the four neighbourhood to be studied marked: Shinde Vasti, Laxmi Nagar, Kamela and Dattawadi

Case of Pune, India

Pune is a city located in the namesake district of Pune, in the western Indian state of Maharashtra, roughly 150 Km east of Mumbai. It has a hot semi-arid climate type, with an average annual temperature of 25 degree Celsius and an annual rainfall of 763 mm (Climate-Data.Org, n.d.). Pune Municipal Corporation (PMC) was established in 1950 and has 15 administrative wards (Figure 7). It is part of the Pune Metropolitan Region (PMR), which constitutes Pune City under PMC, Pimpri-Chinchwad Municipal Corporation (PCMC), and the Talegeon Dabhade, Lonavla, Alandi municipal council (Krishnamurthy et al., 2016). In 2015, the Pune Metropolitan Region Development Authority (PMRDA) was established as the Planning and Development authority for PMR (Krishnamurthy et al., 2016; PMRDA, n.d.). The thesis focuses only on Pune City, which as per the last census of 2011, has a population of 3.115 million (Census of India, 2011).

Yet, there has been a steep decline in the decadal growth of Pune City, from 50.08% witnessed in 1991-2001 to 22.73% in 2001-2011. This could be because of the emerging industrial city of Pimpri-Chinchwad, which is acting as a counter magnet to the city of Pune (PMC, 2012). Pune itself was developed as a counter magnet of Mumbai, the administrative capital of the state of Maharashtra and the business capital of the country (PMC, 2012), leading to high rates of urbanisation. In 2018, Pune was ranked as the 'Most liveable city' by the national Ministry of Housing and Urban Affairs (ET Bureau, 2018). Major contributors are the booming IT sector, the food processing industry and the widely recognized automotive industry with the presence of large domestic (e.g. Tata Motors, Bajaj Auto) and international (e.g. Volkswagen, Chrysler) companies (Butsch et al., 2017). Pune has also become a nationally leading location for higher education: The University of Pune alone accounts for ca. 300,000 students attending its more than 800 colleges and 30,000 international students come to study in one of the city's nine major universities and many research centres (Krishnamurthy et al., 2016) This has attracted migrants from different parts of the country, looking for education, employment opportunities and better living conditions. Migration is one of the major contributors to the growing population of Pune (Butsch et al., 2017; Krishnamurthy et al., 2016; PMC, 2012). Migrant population has increased from 370,000 in 2001 (14% of the total population) to 660,000 in 2011 (21% of the total population) (PMC, 2012, p. 56).

Further, Pune's economic growth is not equally distributed with an increasing urban disparity. On one hand, the multimillionaire population group quadrupled between 2004 and 2014 (Krishnamurthy et al., 2016) and on the other hand, poor and very poor shares also increased from 24% to 27% in the same period (Deshpande & Palshikar, 2008). The high rate of in-migration and lack of formal access to appropriate housing has led to the development of unauthorized colonies in Pune. The rise in slum population is a strong indicator, from a share of 8 per cent of the total population in 1951, it has raised to approximately 40 per cent in the year 2011, as seen in Figure 8 (Mundhe, 2019). However, data on slum population is often inconsistent, with numbers varying with the source. PMC only has the record of total slum population until 2009 (PMC, n.d.–a).

To cope with the high rate of urbanisation with increasing informal development, lack of adequate infrastructure and other public services, PMC (2012) launched its revised City Development Plan which lays the vision and strategic framework for city development intending to achieve the vision by

2041. It is guided by a shared and collective vision and aimed at delivering sustainable development accompanied with poverty reduction, thereby, helping Pune city, in achieving an environmentally sustainable and self-sufficient status (PMC, 2012, p. 2). The city has received funding for carrying out required planning and infrastructure developments under the Central Government's scheme, Jawaharlal Nehru National Urban Renewal Mission (JNNURM).

It has also been selected to be part of the "100 Smart Cities" initiative by the Central Government. Under the scheme, PMC envisions equal liveability for all its citizen and a slum-free city by creating 7 hundred thousand affordable housing by 2030 (PMC, 2018, p. 20). Despite liveability ranking and visions of equal liveability, there are no recorded studies on how residents of informal housing perceive liveability. Hence, a liveability assessment tool, which identifies and prioritises indicators which need immediate attention for improved liveability is vital.

5.1 Approaches for Making a Slum Free City: Pune (State of Maharashtra)

Until the early 1970s, the state Government of Maharashtra dealt with slums by treating them as illegal and clearing them by demolition and forceful eviction (Government of Maharashtra, n.d). Deemed inhuman, this response was rectified in 1971, bypassing of the Maharashtra Slums Areas (Improvement, Clearance and Redevelopment) Act which tolerated the slum huts as a housing solution and provided civic amenities as environmental improvement works, keeping with the Centre's Scheme of Environmental Improvement of Urban Slums (EIUS). In 1985, with World Bank's assistance, the Slum Up-gradation Programme was launched and in 1995, the Mumbai Slum Rehabilitation Authority (SRA) was created (Government of Maharashtra, n.d).

According to PMC (2020a), the total number of slums in Pune is 564, of which 353 are notified.

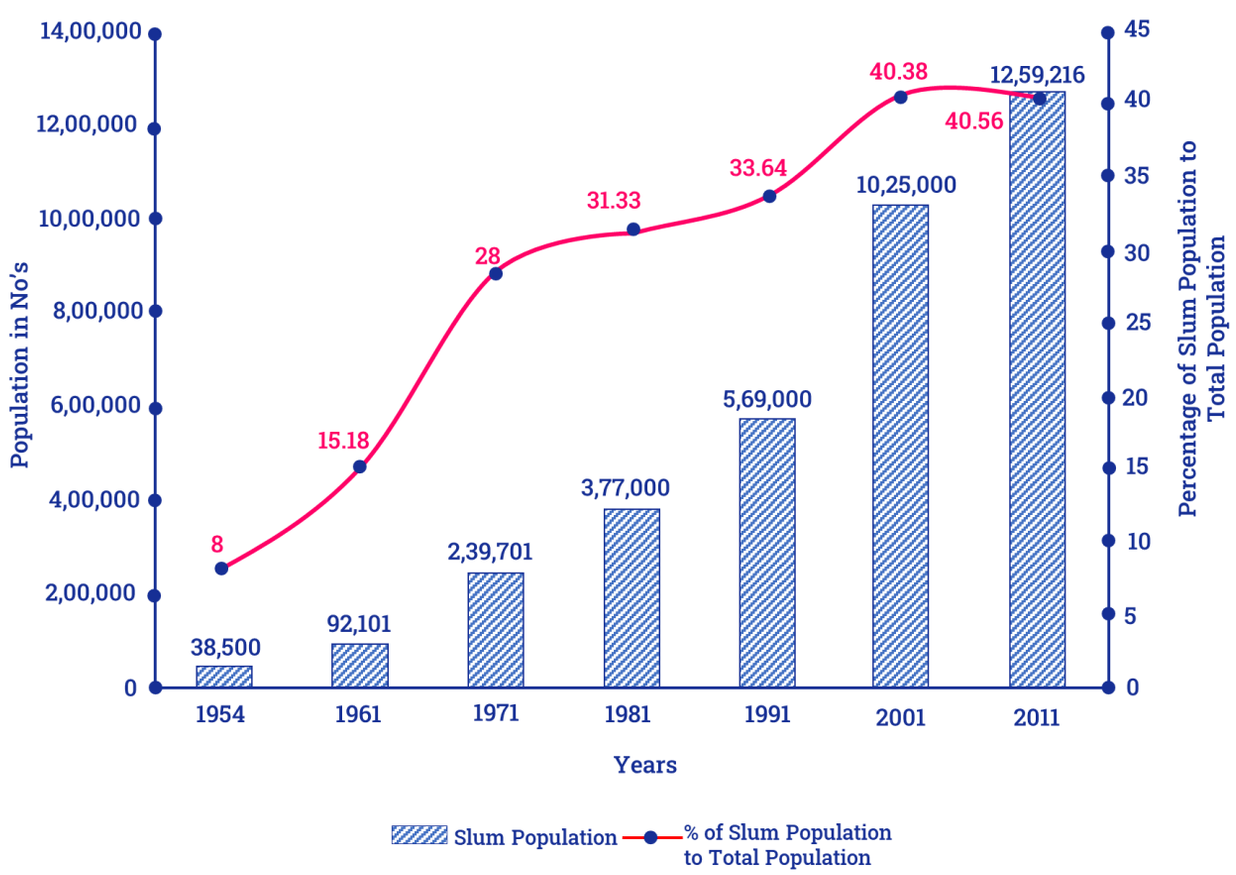


Figure 8: Pune Growth of Slum Population in Pune from 1951 to 2011 (Mundhe, 2019) (redrawn by author)

Further, 434 of these settlements are on private land. For achieving the vision of a slum-free city and providing better living conditions to the inhabitants of current slums, the Pune Slum Rehabilitation Authority was formed in June 2005 under the State Government's direction and is jointly responsible for rehabilitation works in Pimpri-Chinchwad (Shelter Associates, 2007).

The Revising/ Updating City Development Plan (CDP) of Pune City-2041 (2012) states two active central schemes for addressing the challenges of slums in the city of Pune, with the vision of "Slum Free City with Inclusive and affordable Housing for all" (PMC, 2012, p. 89): Basic Services for Urban Poor (BSUP) which is a submission of Jawaharlal Nehru Urban Renewal Mission (JNURM) and Rajiv Awas Yojana (RAY) (also refer section 2.2 and Figure 2). Projects under the BSUP scheme were sanctioned in 2006 and can be classified into two categories (PMC, 2012):

a. Re-location, when slums cannot be rehabilitated in-situ and are required to be relocated on account of unsafe locations, ecological and environmental concerns like their location on the land abutting Nala (canal), riverbed, hill, garden, land reserved for road widening, footpath etc. Multi-storey housing was provided for the relocated slum dwellers.

b. In-situ Incremental Housing, in slum pockets where 60-70% of houses already has pucca (permanent) construction i.e., made of permanent building materials such as concrete, brick etc. Such settlements were provided with infrastructural development and individual houses were retrofitted.

In 2011, RAY was implemented and under this scheme, state governments were suggested a two-step approach for improving the living conditions in existing slums and preventing the growth of further slums. The former is a Curative Strategy through Up-gradation, Redevelopment or Resettlement while the latter is a Preventive Strategy, which includes providing affordable houses to Economically Weaker Section (EWS) and Lower Income Group

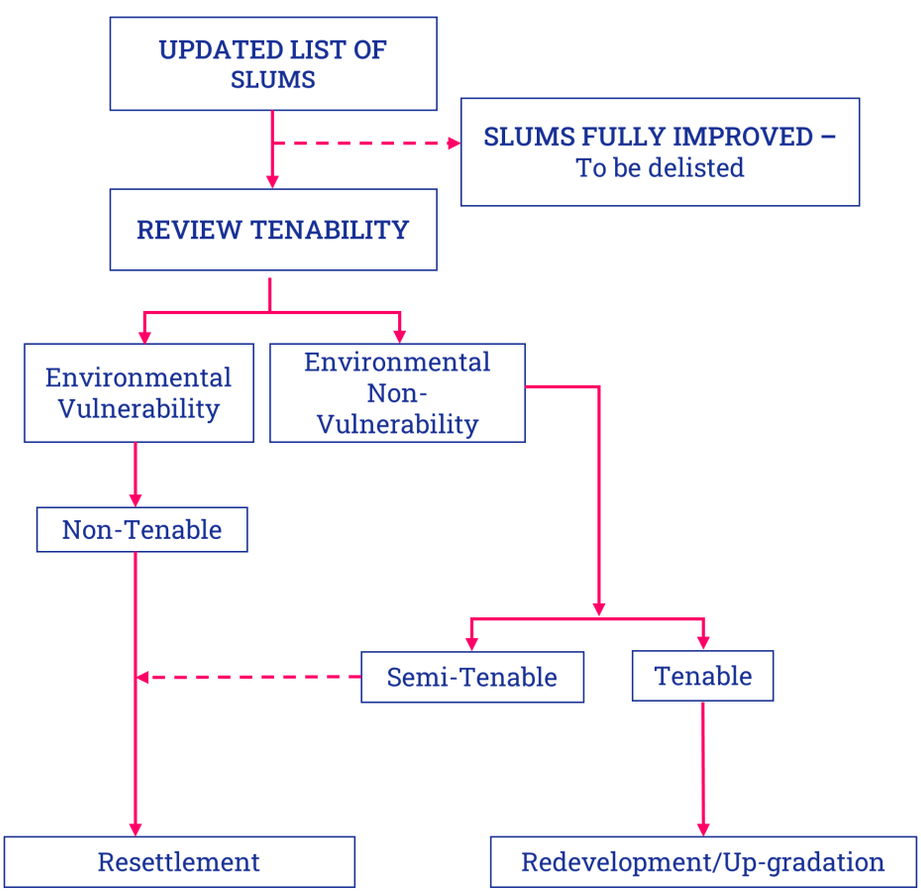


Figure 9: Mode of tackling slums based on tenability analysis as per Rajiv Awas Yojana (PMC, 2012) (redrawn by author)

(LIG), through cross-subsidies and incentives (PMC, 2012, p. 90).

The current ongoing upgrading schemes in Pune city are in continuation of BSUP and integrates the Curative Strategy of RAY, whereas based on the Tenability Analysis of the existing location of a slum pocket (Figure 9), they are either Rehabilitated through Resettlement in a new area, Upgraded in-situ via retrofitting or In-Situ Redevelopment where slum pockets are upgraded through shifting to a multi-storey housing within the same land parcel.

5.1.1 Rehabilitation through Resettlement in a New Location

In case the settlement is located on ecologically fragile land or public land necessary for urban development, the community is relocated to a new area. The programme which goes under the official name of Integrated Slum Rehabilitation Programme is also funded by JNNURM-BSUP scheme (PMC, 2020b). The ongoing relocation projects rehabilitate the occupants to multi-story housings on the land reserved for EWS as per the Development Plan, in Hadapsar and Wajre. Kamgar Putala Resettlement Project is an example of a completed project, where the entire slum settlement of Kamgar Putala had to be relocated to Hadapsar as it was located in the flood plains of Mutha river and was affected by the floods of 1997 (Shelter Associates, 2004). The project followed a participatory approach and is one of the successful examples of community-led resettlement. Cronin and Guthrie (2011) mention that the project exemplifies the advantages of an empowered community supported by an influential local NGO demonstrating a commendable team effort which has tackled the threat of floods. The community took active participation during the construction phase as well, which contributed to a cost-reduction (Shelter Associates, 2004). As per the revised City Development Plan (PMC, 2012), since the relocation of the residents often causes loss of livelihood, rehabilitation should be within a distance of 1.5km and in case the resettlement area is very far from the existing location, it is paramount it is well-connected to the city public transport network (PMC, 2012). The revised City Development Plan for Pune City-2041 (2012, p. 93) further states that this method is the last resort where there is no alternative but to resettle.

5.1.2 In-situ Up-gradation through Retrofitting

In the case where the slum settlement is located in Government or Municipality owned land, the inhabitants were provided with in-situ developed

Figure 10: Kamgar Putala Housing by Shelter Associates (Shelter Associates, 2004)

housing under the In-situ Rehabilitation (Incremental Housing) Scheme for Urban Poor Staying in Slum in the City of Pune (PMC, n.d–b). Apart from being located on a tenable land, the existing settlement must have a good layout with enough open space with roads of appropriate width. This ensures that the housing density is within acceptable limits, avoiding overcrowding. In such cases, up-gradation services include improving access to basic amenities, incremental housing improvements and selective replacement of *kutcha* houses (houses built of temporary materials like tin, mud etc) (PMC, 2012). Most of the slums under this category are located in Yerwada and Talijai (Dhanakwadi Ward) (PMC, n.d–b). Retrofitting of the existing housing is often done with the help of local NGOs and community participation, while the beneficiaries contribute 10-12 per cent of the cost of construction (Shelter Associates, 2007). The new houses are well incorporated within the existing built and social fabric. Individual houses are designed specifically to the infill area available and by consulting the beneficiary (Rawoot, 2014). Upgrading by in-situ retrofitting is considered the preferred option as it avoids disruption of livelihoods and social networks that relocation usually entails, and the BSUP scheme provides support for this type of upgrading (Patel, 2013). Rawoot (2014) explains the process involved in the in-situ up-gradation of Yerwada, which begins with generating a detailed inventory of all houses, noting all the kutcha houses to be upgraded into formalised housing. The upgraded houses sit well within the existing fabric, matching the 2-3 storey neighbourhood building heights. Further, she mentions that all house designs are customised to fit the individual infills and requirement. All units are developed to the minimum mandated size of 25sqm and in case the infill area is too small, few plots are combined to build a multi-family apartment style unit. Besides, the entire neighbourhood is provided tenure security, household-level access to water supply, electricity and municipal sewer connection (Rawoot, 2014).

Figure 11: One of the upgraded neighbourhoods in Yerwada (Rawoot, 2014)

5.1.3 In-situ Redevelopment: Upgrading through Shifting to a Multi-storey Housing within the Same Land Parcel

This approach is considered when the slum is located in a tenable land but the existing densities are above desirable densities, with no proper access to the slum (PMC, 2012). For the redevelopment, the state government incentivises private developer using land as a resource. The developers are given incentives in the form of higher floor space index (FSI) and the transfer of development rights (TDR) that can be utilised in two ways: either selling unutilised FSI within the same land parcel for private development in the open market, called the 'free sales component' or use the TDR to build a new housing project elsewhere in the city (Alam & Mihoko, 2018; Shelter Associates, 2007; SRA, n.d.). These housings are locally known as SRA Housing (Slum Rehabilitation Authority Housing). As per the regulations, each slum pocket developed has a maximum of 2.5 FSI (Floor Space Index), 25 sqm apartment with a kitchen, one bedroom, one multi-purpose room and one bathroom. The maximum tenement density allowed is 1080 tenements/ hectare. The rehabilitation housing must be developed on the same plot occupied by the slum, avoiding relocation of the inhabitants. After resettling the inhabitants of the slum in the developed multi-storey housing, the balance FSI can be sold in the open market by the developer as part of the TDR (PMC, 2012; Shelter Associates, 2007). Further, the scheme states that in case of projects with area more than 10,000 sqm, developers must provide for amenities like kindergarten, society office and welfare centre. During the rehabilitation, the beneficiaries are shifted to temporary Transit Camp. Eligibility of beneficiary is based on the availability of government/semi-government documentation like the acknowledgement of census, Election Voters Card, etc, proving stay in the slum hut/land before or as on 1st January 2000. Further, the family of the beneficiary must be currently staying at the hut (PMC Care, n.d.). These projects primarily address slum settlements which are on private land.

Figure 12: Nanapeth, Pune, SRA Building (Cronin, 2013)

This scheme has received various criticism as the developed multi-storey housing doesn't cater to the social habits of the residents despite the intention of maintaining the livelihoods and social networks by avoiding relocation. For instance, when Cronin (2013, p. 129) interviewed the residents of the Nanapeth SRA Buildings, five years after they shifted to the building, she found that the residents were growing less content and many say they prefer the living conditions in the former slums. She argues, lack of community participation in the design process as well as taking no financial contribution from the beneficiary were the primary causes, leading to lack of sense of ownership and poor maintenance of the buildings by the residents. She further states that the multi-storey buildings do not provide the residents with outside space and public areas where the community can interact and function like they were accustomed to while living in the slum settlements (Cronin, 2013).

These shortcomings in the design of SRA buildings seem to have been addressed in the more recent projects, like the ones developed by Naiknavare Developers in Ramtekdi and Dandekar Bridge. A video produced by the developers (Naiknavare Developers, 2019), featuring various testimonies from the inhabitants, narrates the upliftment in the living conditions of the residents. It further elaborates on the design process considering

the transitional challenges when one shifts from horizontal living to vertical living with active community engagement and the goal of preserving the social fabric. The buildings cater to this by providing large common areas for residents on each alternate floor along with wide corridors (Naiknavare Developers, 2019).

However, a conclusion on the success of such projects can only be made when the housing and testimonies are revisited in a couple of years.

Figure 13: Prathama SRA Housing, Ramtekdi, Pune. The housing provides large common areas for residents to gather (Naiknavare Developers, 2019)

Liveability Perceptions in the Selected Neighbourhoods

6.1 Description of the Findings from Telephonic Interviews

The telephonic semi-structured interviews were based on a questionnaire (see Appendix) which attempted to elicit the following:

a. Interviewees perception about the overall quality of life, to be rated as "Satisfactory", "Can be Improved" or "Unsatisfactory".

b. The second set of questions asked the residents to rate the 13 selected Liveability Indicators, with the same three-point rating as mentioned above. Indicators which gets inherently improved during the upgrading process, like the quality of housing, access to basic amenities and security of tenure were left from the next round of questions and mapping, since their performance is acknowledged to have improved and hence, a change can't be noted.

c. The third set of questions tries to identify the influence of the 10 indicators on indicators which were rated either "Unsatisfactory" or "Can be Improved". Depending on whether the indicators have some influence in improving the not "Satisfactory" indicators, they could be rated from 'Very Little' (influence value=0.3), 'Moderate' (influence value=0.6) and 'A Lot' (influence value=1.0).

A total of 11 interviews were conducted: 3 each from Neighbourhood 1, 2 & 3 and 2 from Neighbourhood 4. On average, the interviews lasted for 25 minutes. The questionnaire filled during the interview was used to draw the Fuzzy Cognitive Maps using two software: Mental Modeler (Gray) and FCM Expert (Nápoles et al.). Further, a basic spatial analysis using Google Earth Satellite Images was done to identify the distribution of schools, employment opportunities, healthcare facilities and parks within a radius of 400m and 800m. The radius was based on the 'walkable catchments' concept (Active Healthy Communities, n.d.) where an area of 400m radius is within 5 minutes walking distance and 800m within 10 minutes.

6.1.1 Neighbourhood 1: Shinde Vast, Hadapsar: Informal Settlement with No Intervention

The first group of 3 interviewees resided in Shinde Vasti, an informal settlement in the Hadapsar ward which has not yet received any infrastructure upgrading intervention from PMC, although efforts towards providing basic amenities are in progress. All three interviewees have been living in Shinde Vasti for more than 20 years and each has incrementally constructed their houses which now have *pucca* construction. Further, while one of the interviewees feared eviction, the other two rated Security of Tenure as satisfactory. Though none of them was completely satisfied with Access to Basic Amenities. Yet, only one out of the three interviewees was dissatisfied with the living quality of their neighbourhood. When asked to rate the level of satisfaction with the neighbourhood living conditions, the interviewee mentioned "*not at all..3-4 meters from my house is a large pothole with stagnated water which breeds mosquitos. The quality of drinking water is poor…there is an open buffalo stable on the only street which takes you to the bus stop and it's so dirty*". The primary cause of dissatisfaction seems to be from lack of cleanliness and poor quality of water. Although the other two interviewees expressed overall satisfaction with their neighbourhood; cleanliness, proximity to public transport, proximity to greenery & availability of community gathering space were

recurrently rated unsatisfactory. It is interesting to observe that although the neighbourhood is located at a walking distance from the Hadapsar Industrial Estate as well as Magarpatta Township, both of which are major employers for the residents of the Shinde Vasti, all three interviewees rated 'Proximity to Employment Opportunities' as dissatisfactory. On further questioning, it was found that the perception of proximity didn't mean spatial 'nearness' but rather ease of traversing the distance and in terms of employment, proximity also means being able to work from home. For example, although there are a bus stop and a primary school in walking distance (Figure 14), the path to either is dirty and hence, is not preferred.

On drawing the Fuzzy Cognitive Maps to find the causal relations between the indicators, it was found that in FCM1 Cleanliness of Neighbourhood (C3) has the highest centrality while in FCM2 & FCM3, Availability of Community Space (C3) has the highest centrality.

Availability of community space played an important role in their perception of employment opportunities, "… if we would have a community space, like a hall, it would give the ladies the space to come together and start some small business". While the interviewees did suggest a physically confined space as a community space, the conversations also indicated the possibility of using streets for social gatherings provided they are clean and green spaces can also double up as community space.

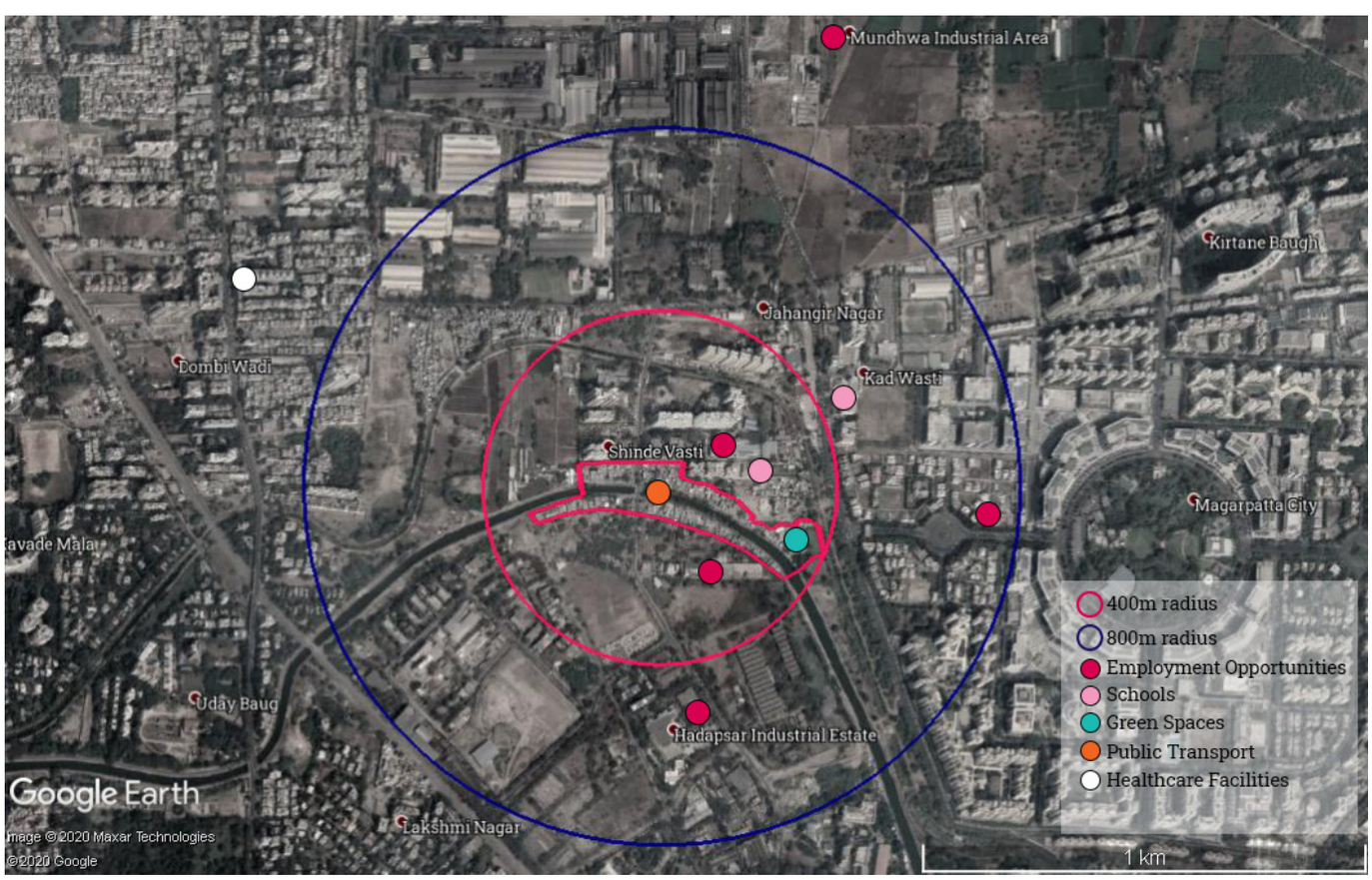


Figure 14: Shinde Vasti Satellite Image (author processing on base map from Google Earth, 2020) , Top: Typical houses in Shirole Vasti, an informal settlement similar to Shinde Vasti (NTNU, n.d.)

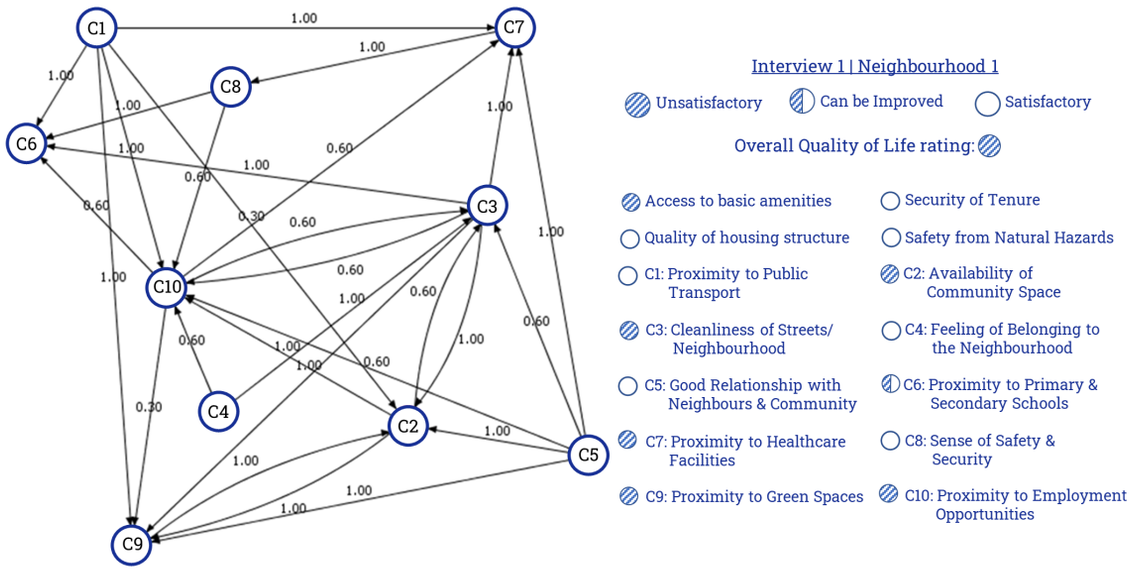


Figure 15: According to the Interviewee 1, Cleaner neighbourhood (C3), would have a strong positive influence on Availability of Community Space (C2), Proximity to Primary & Secondary Schools (C6) & Proximity to Green Spaces (C9). While, an increase in Feeling of Belongingness (C4) can positively influence C3 and lead to cleaner neighbourhood. In this FCM, C3: Cleanliness of Neighbourhood has the highest Centrality.

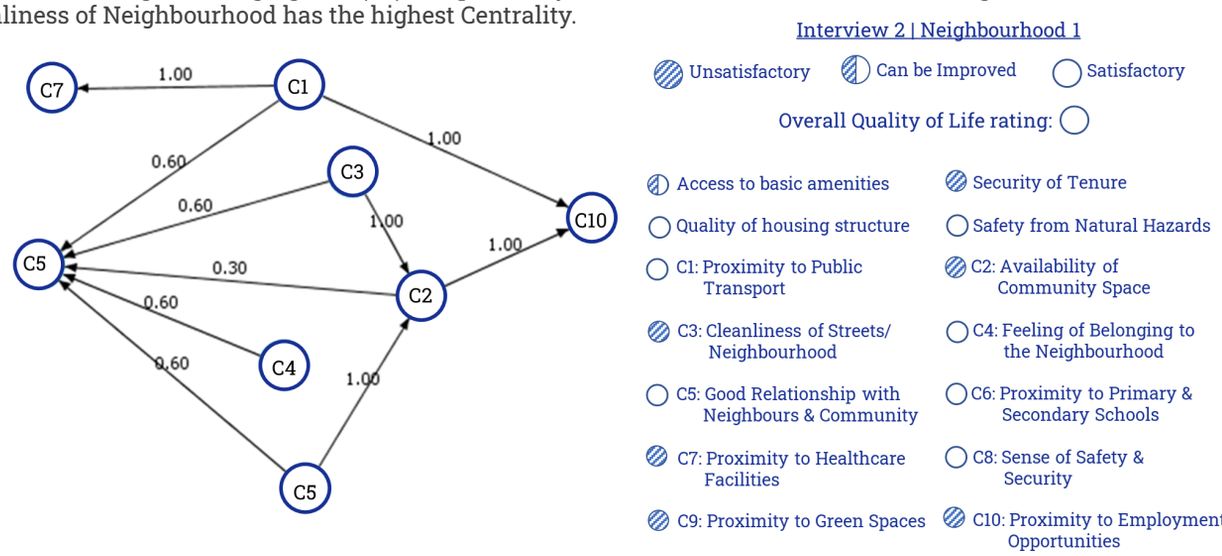


Figure 16: The Interviewee is Satisfied with the quality of life with C2: Availability of Community Space as the most Central Concept. While, C9: Proximity to Green Spaces is primarily a receiver concept with 5 concepts influencing it, indicating the different areas which can be improved to increase Proximity to Green Spaces.

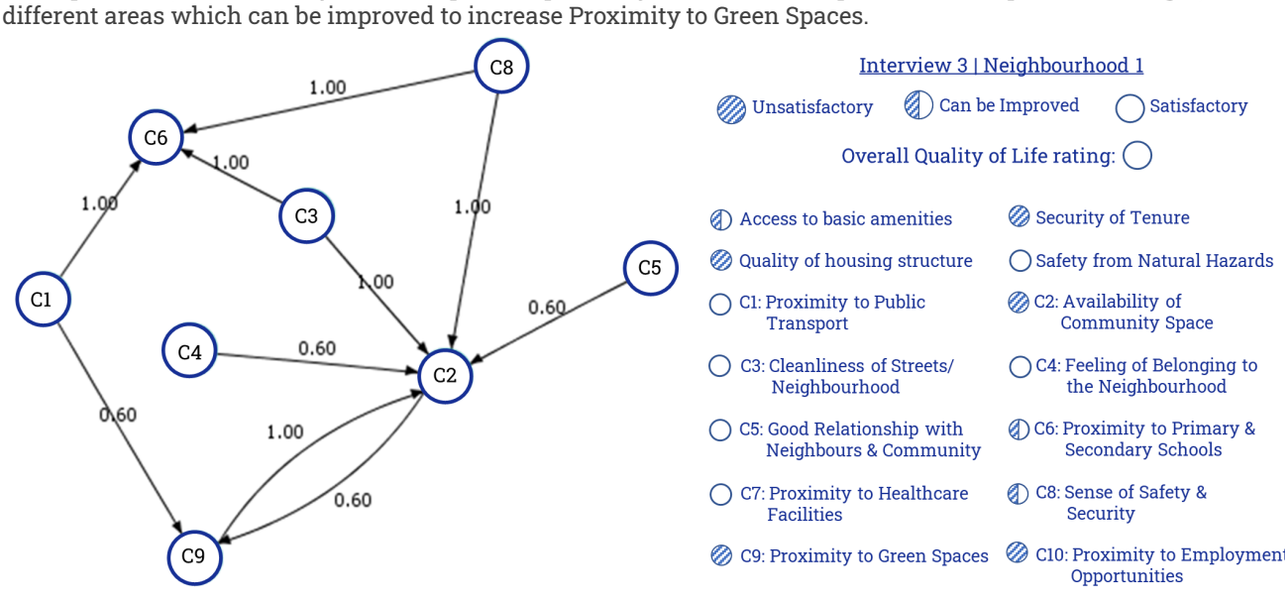


Figure 17: The interviewee was overall satisfied with the quality of life and C2: Availability of Community Space is the most Central Concept. Availability of Community Spaces can be improved by improving Cleanliness and Proximity to Green Spaces. A stronger Sense of Belongingness and higher Sense of Safety & Security also influences Availability of Community Space.

6.1.2 Neighbourhood 2: Laxmi Nagar, Yerwada: Upgrading by retrofitting

The second group of interviewees were from Laxmi Nagar, an informal settlement in Yerwada. The informal settlements of Yerwada are being gradually formalised by giving tenure rights and in-situ upgrading by retrofitting, under the BSUP Scheme. The NGO Maharashtra Social Housing and Action League (MASHAL) has been coordinating and managing these projects in Laxmi Nagar, Yerwada (Biswas, 2011; MASHAL, n.d.). Of the three residents interviewed, two of them were satisfied with the quality of life in their neighbourhood while one of them rated it as 'Okay', indicating a scope of improvement. The major cause of dissatisfaction being the quality of water and frequency of supply, "…the quality of water is really bad, it's almost like the water from the gutters. There are no fixed supply hours… this is a big issue, rest everything is fine".

Dissatisfaction with employment opportunities is recurrent in all three interviews, "for jobs we have to travel 5-10km…"; " there are few jobs close by but depends on what kind of work you do". However, on asking whether there is an option to have their own home-based business, all three agreed that this is quite prevalent.

But the ratings on the rest of the indicators are quite varied, with no discernible pattern.

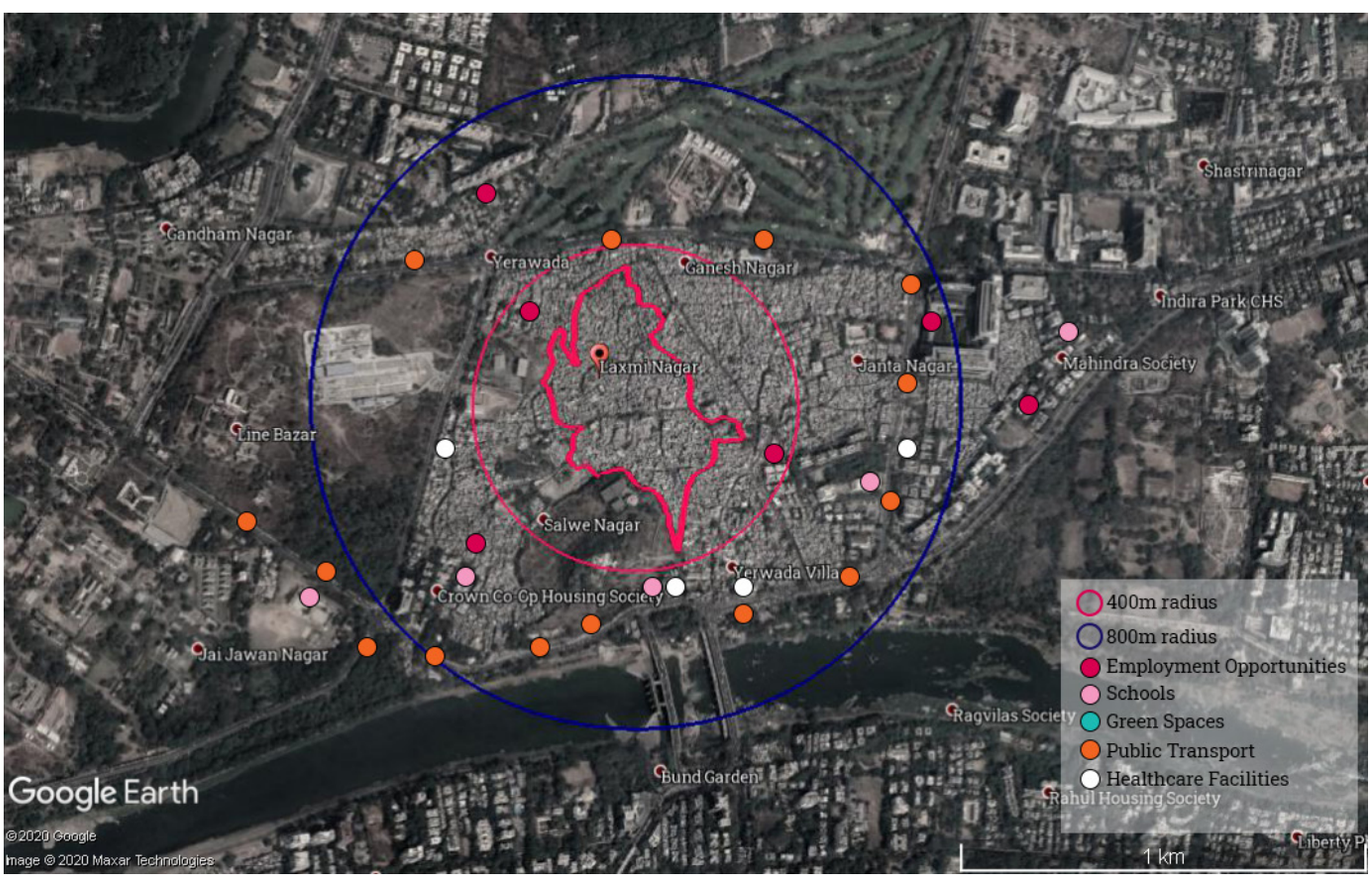


Figure 18: Laxmi Nagar, Yerwada (author processing on base map from Google Earth, 2020)

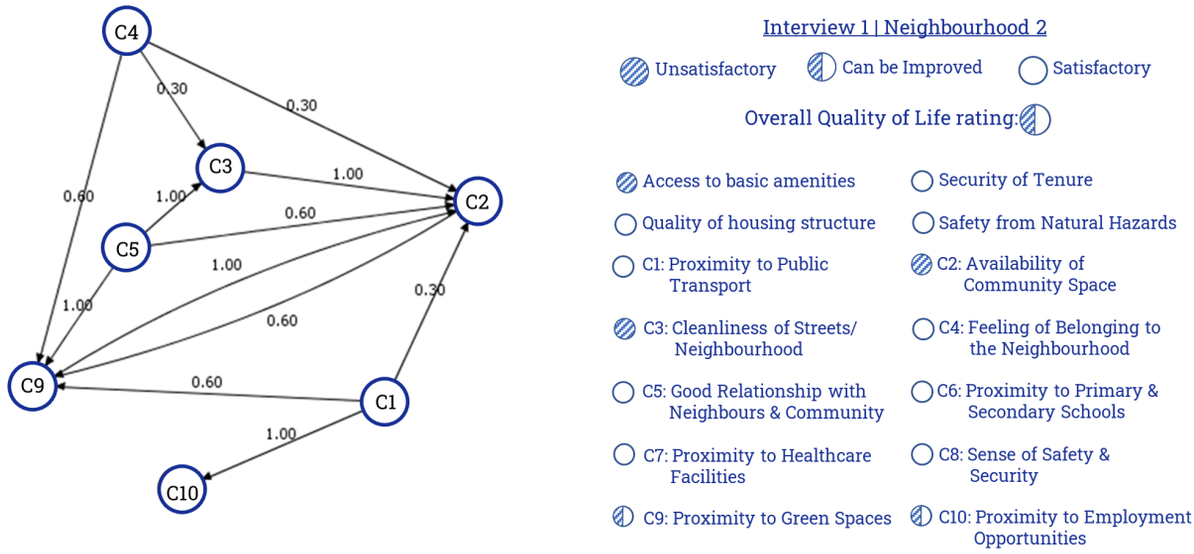


Figure 19: The resident considers that liveability needs to be improved in the neighbourhood. Apart from their major concern with water quality and supply frequency, the FCM shows high centrality of Availability of Community Spaces.

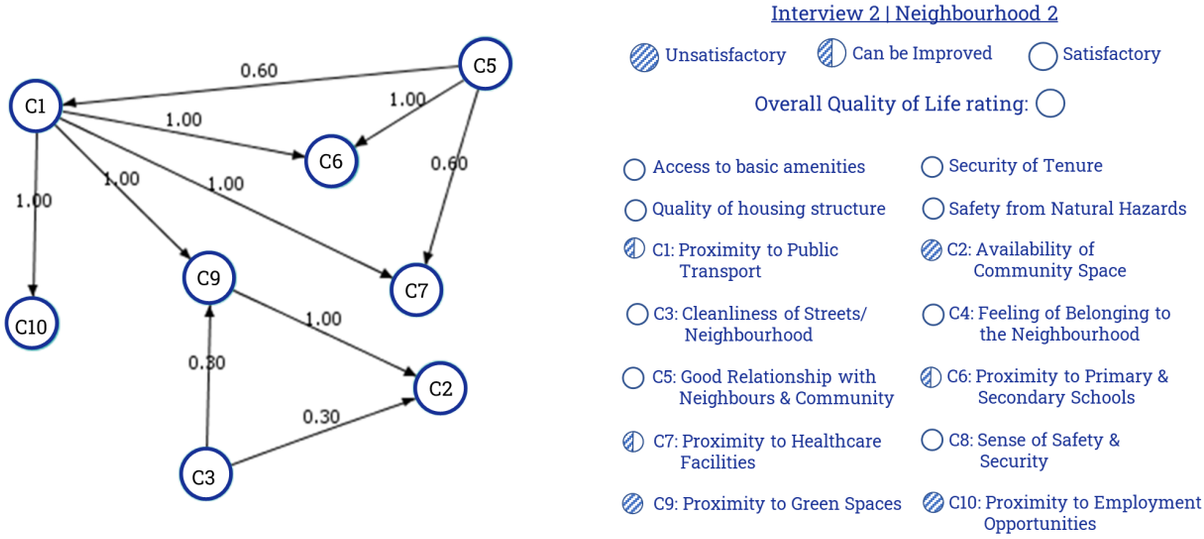


Figure 20: Overall the resident is satisfied with the quality of life and Proximity to Public Transport has the highest Centrality. Improving Proximity to Public Transport which includes more frequent buses, will improved Proximity to Schools, Green Spaces, Healthcare as well as Employment Opportunities

Figure 21: The interviewee was overall satisfied with the quality of life. They mentioned that Proximity to Employment Opportunities can be improved if the frequency of buses is increased and a community hall would give them space to come together to start some small home-based businesses.

6.1.3 Neighbourhood 3: Kamela, Kondhwa. Transit Housing for SRA In-situ Multi-storey Housing

Kamela Slum Rehabilitation Project was initiated in 2017 when around 270 slums were demolished (TNN, 2017) and the occupants were shifted to a transit housing with a rent contract of 4 years. According to the three interviewees who currently reside in the transit housing, the Rehabilitation Housing is nearly complete, and they were supposed to shift to their new houses by August 2020, but due to the onset of COVID-19 pandemic, this has been delayed. The residents were asked questions regarding the quality of life in the transit housing, while one of them was satisfied, the other two mentioned that the conditions are 'okay'. All three mentioned Proximity to Employment Opportunities as the major issue since most of them (interviewees as well as other residents from their neighbourhood) have to travel to Kamela from the transit housing. Although there is a bus stop nearby, the buses are infrequent. Lack of Green Spaces, Availability of Community Spaces and a more recent issue of Cleanliness are other setbacks. The residents seem to be optimistic about the quality of life in the new housing and questions regarding community space and greenery were answered with " we don't have anything like that here, but our new housing has everything".

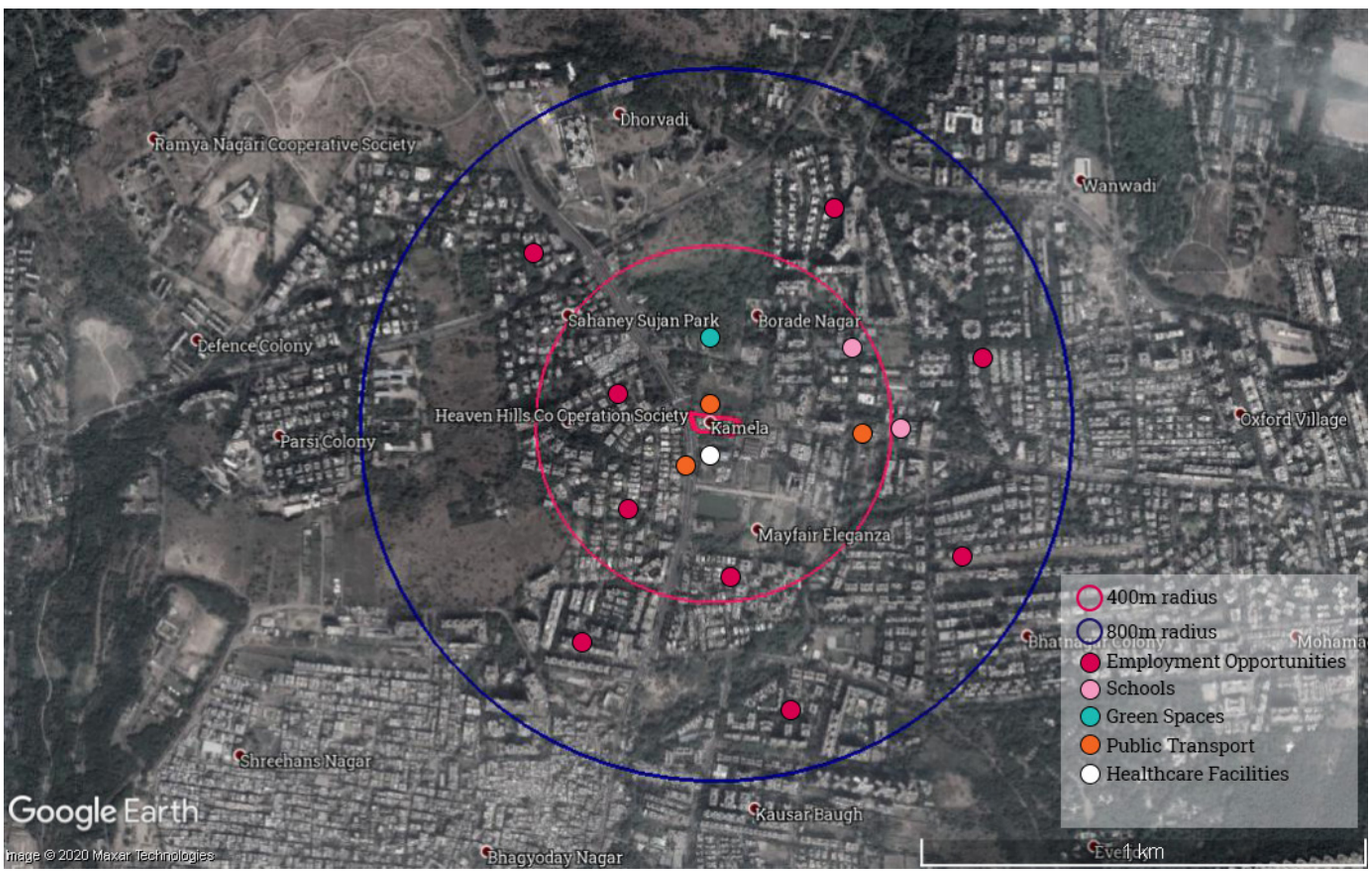


Figure 22: Kamela, Kondhwa Rehabilitation Site (author processing on base map from Google Earth, 2020)

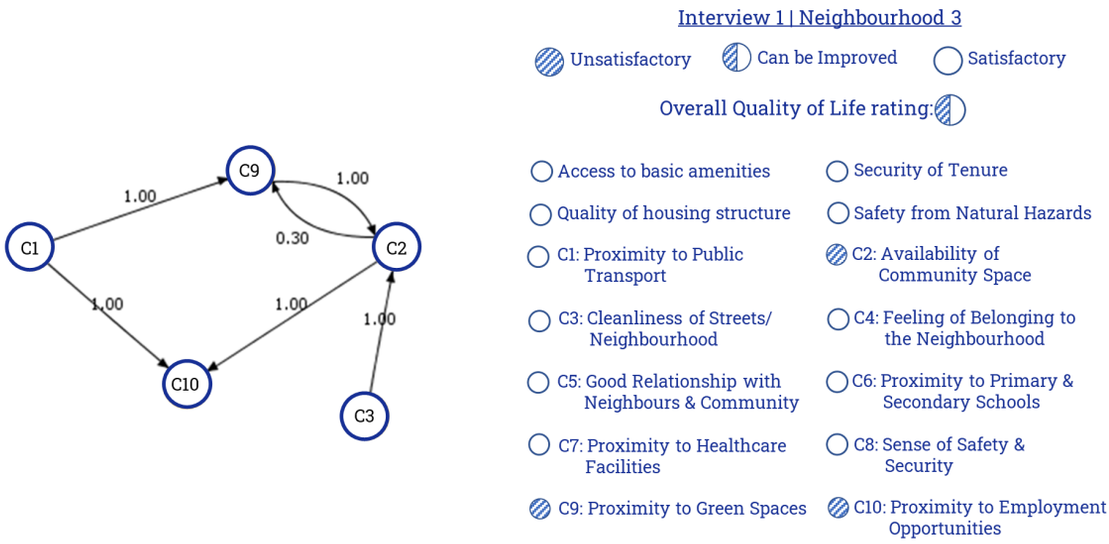


Figure 23: The resident considers the quality of life to be 'okay' and Availability of Community Space seems to hold most influence.

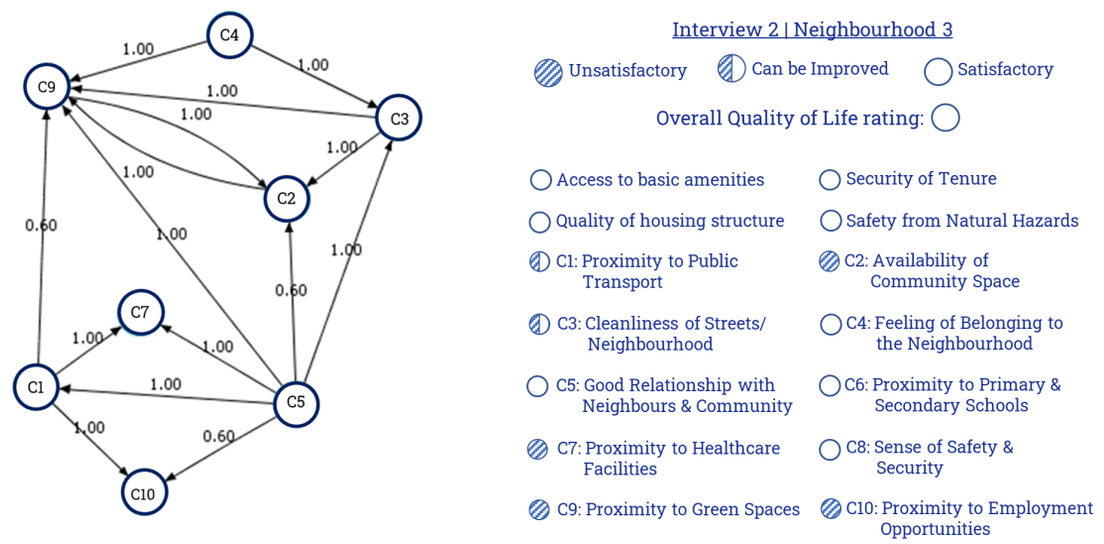


Figure 24: Overall the resident is satisfied with the quality of life. Proximity to Green Spaces (C9) has the highest Centrality (5.6) followed closely by C5: Good Relationship with Neighbours (5.19)

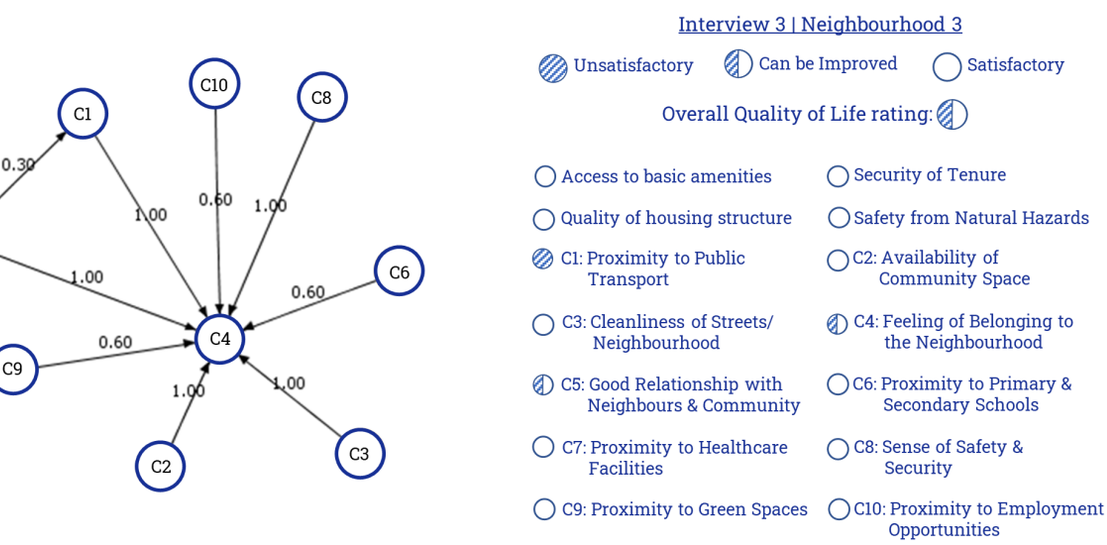


Figure 25: The resident considers the quality of life to be 'okay' and Feeling of Belonging to the Neighbourhood holds the highest influence, although it's a receiver concept and hence, it gets affected by the performance of other indicators rather than influencing the performance of other indicators.

6.1.4 Neighbourhood 4: Dattawadi SRA In-situ Multi-storey Housing

Dattawadi is situated on the banks of Mutha River, which run across the city of Pune. It falls in the Tilak Road administrative ward of Pune. The two residents who agreed for the interview, have been residing in the slum for over 20 years and both were very satisfied with the outcome of the redevelopment. The redevelopment process of Dattawadi slum was initiated in 2012 and the beneficiaries shifted to the redeveloped multi-storey (11 storeys) housing in September 2016. The interviewees were particularly happy about the redevelopment process carried out in a collaboration between SRA, the private developer, and the CBO.

While both the interviewees were satisfied with the current living conditions, they did mention that the Feeling of Belongingness has reduced, and the Relationship with Neighbours/Community can also be improved. Both mentioned that earlier there was a better sense of community since everybody knew each other and people would often sit outside and talk. However, now everybody remains indoor and there is lesser interaction. However, the community hall in the basement is a respite and is used for holding small events.

Further, although currently, they don't have access to any dedicated green space, the CBO has approached the developer and they are planning to convert a part of the parking area provided into

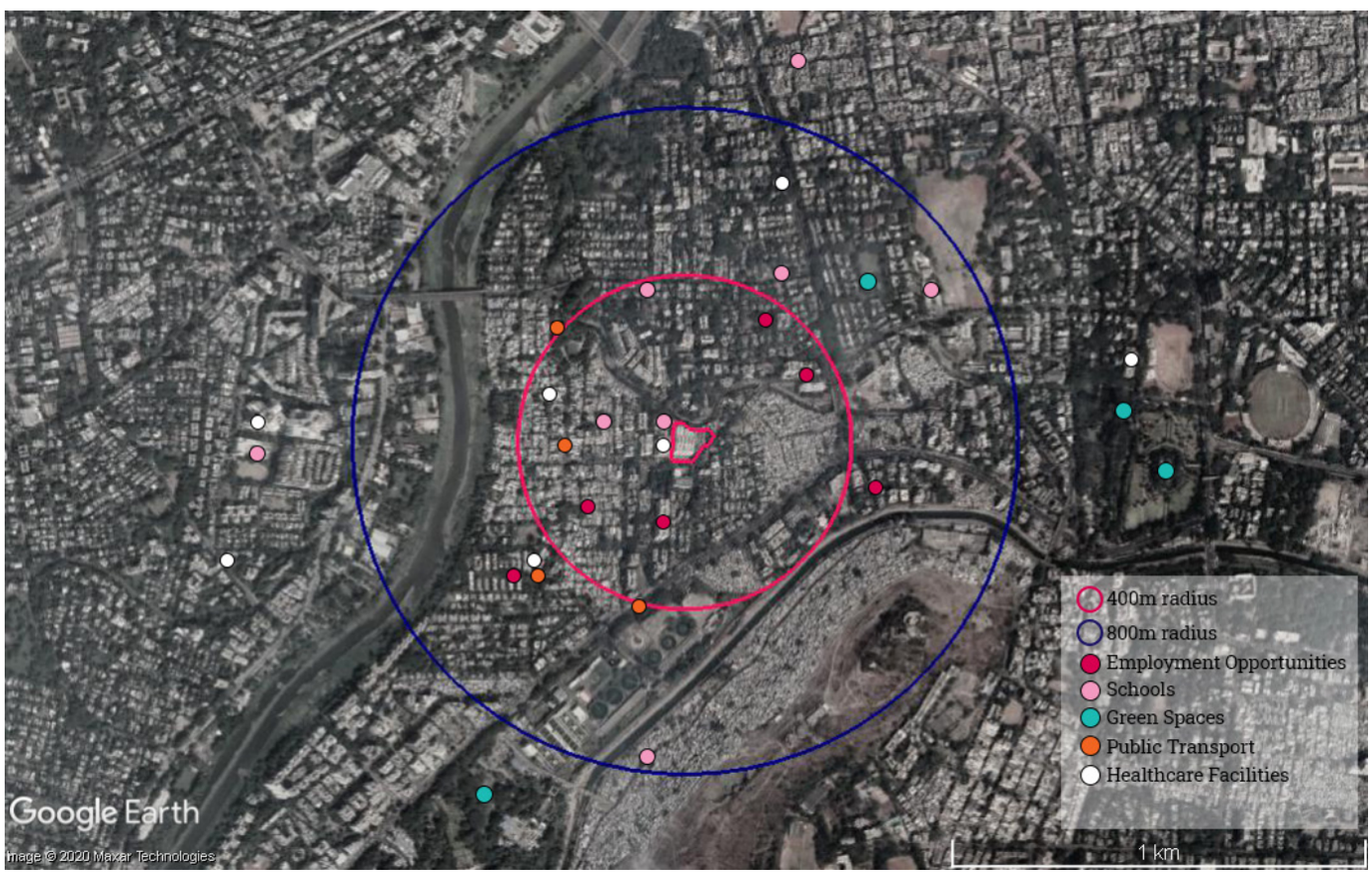


Figure 26: Dattawadi SRA Project Site (author processing on base map from Google Earth, 2020), Top: Ground Floor Shops allocated to the residents owning home run business, example from Dandekar Bridge SRA Project

additional community space and a garden. Besides, under the scheme, beneficiaries who previously had home-run businesses were allotted shop-space on the ground floor. For maintenance of the buildings and the infrastructure provided, an additional fixed deposit of INR 40,000 (~450 Euro) per family was allocated in a government bank. The CBO takes care of this account and oversees maintenance and any grievances. Both the interviewees mentioned that there is a bus-stop within 5-min walking distance (400m radius), but the frequency and network of buses are not good. One of the interviewees explained the situation by mentioning a rise in two-wheeler ownership in this location and that very few people use public transport. "...most of the people use their motorcycles and it is not feasible to run buses when nobody uses them. How would the municipality pay for the diesel if nobody uses the buses?".

The FCM drawn from Interviewee1 doesn't have a central indicator as only three indicators were identified by the interviewee as to have any influence. In the case of Interviewee 2, C4: Feeling of Belongingness and C5: Good Relationship with the Neighbours/Community has the highest centrality.

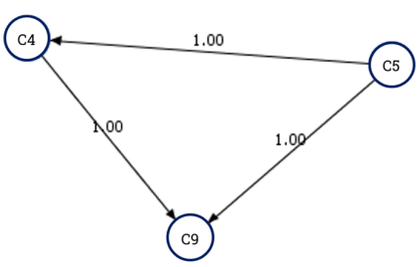


Figure 27: Overall the resident is satisfied with the quality of life, although the FCM was inconclusive, with equal weight given to all three identified concepts.

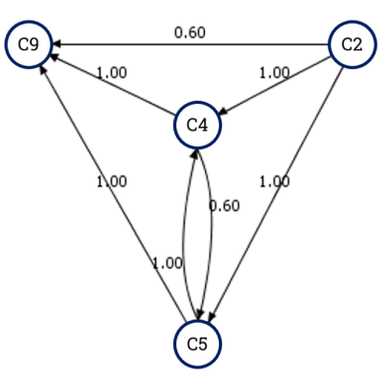


Figure 28: The resident considers the quality of life to be 'Satisfactory'. C5: Good Relationship with Neighbours & Community and C4: Feeling of Belonging to the Neighbourhood holds the highest influence. C2: Access to Community Space, is a driver concept and has high influence on both C4 & C5.

6.2 Comparing and Discussing Liveability Perceptions in the Four Neighbourhoods

To understand how liveability perceptions of the residents change in various upgrading schemes, the individual FCMs from the interviewees were aggregated (Using FCM Expert. Also refer 4.5) to get three FCMs representing the collective perception of each neighbourhood regarding the positive causal relationship between the indicators.

It was found that Availability of Community Space is the most central concept in Neighbourhood 1, Proximity to Public Transport in Neighbourhood 2 and Feeling of Belonging to the Neighbourhood in Neighbourhood 3. The overall quality of life, based on the ratings given by the interviewees, was only slightly higher in Neighbourhood 2 & 3 as compared to Neighbourhood 1. The following sections discuss each aggregated FCM from the three neighbourhood to understand the causal relationship between the indicators.

6.2.1 Neighbourhood 1: Informal Settlement with No Intervention

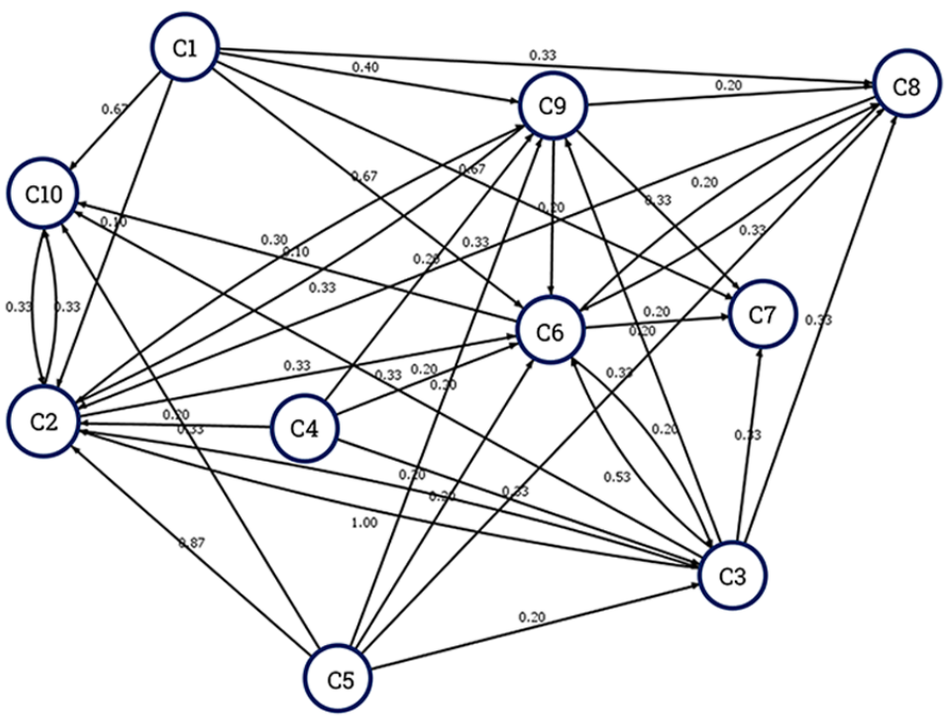
The outcome of Availability of Community Space as the most central indicator followed closely by Cleanliness of Neighbourhood, is backed by narratives during the interviews. The interviewees expressed how a community space, in the form of a community hall, can not only provide space for celebrations but also allow the community members to come together to start some small business. They also suggested that there is a small parcel of open spaces here and there, but they are currently littered and unsuitable for any activity. The FCM also indicate a strong influence of C5: Good Relationship with Neighbours & Community on Availability of Community Space. Interviews revealed that although the residents have a strong sense of belongingness and good relationships within the community, lack of organisation within the community often leads to passivity in taking actions for improvement. They often depend on an external party to intervene for any improvement. Ashton (2004) claims that this dependency culture is a threat in the absence of effective community organisation which is the basis for community governance and control. The interview revealed a lack of collective agency, which is critical in urban poverty reduction, improvement in infrastructure and delivery of services from the municipalities (Kuldeep Singh, 2016). The municipality and NGOs involved in upgrading must begin with capacity building within the community, to help them form a Community Based Organisation (CBO). A partnership between the government and the CBO could lead to the fast-tracked yet holistic development of such informal settlements. Kuldeep Singh (2016) states that as CBOs are formed from residents of slums and represent them within a specific locality, they are well versed with factors like gender, ethnicity, caste, religion etc which helps in traversing the nitty-gritty of inter-community social balances and act as a bridge to collaborate between Municipalities/ NGOs and the residents. Rajiv Awas Yojana (RAY) mentions the pivotal role of CBOs, describing them as ‘slum dweller associations’ in the preparation of Slum Free City Plan of Action. According to the guidelines, an inclusive and participatory base is imperative to ‘build stake and ownership of people contributing to their empowerment’ (MoHUA, 2013, p. 1).

The interviews also contradicted the assumption that ‘Security of Tenure’ would be one of the major issues, and all three interviews were carefree about any possibility of eviction. Although as mentioned before, for the sake of a balanced comparison, Access to Basic Amenities, Quality of Housing and Security of Tenure were not included in the FCMs, the interviews revealed that the neighbourhood of Shinde Vasti is performing well in these indicators. The residents have issues with water quality and supply duration, mentioning that repeated complaints to the municipality didn’t yield any action. Again, the complaints were made on an individual level and seem to lack solidarity. The quality of houses depended on individual capacity, where two of the three interviewees improved their

houses and seem to be satisfied with the current condition. As for safety from natural hazards considering the past flooding events in Pune and the location of Shinde Vasti along a canal, the interviewees mentioned that a canal bank retaining wall is being constructed.

6.2.2 Neighbourhood 2: Upgrading by in-situ retrofitting

From the interviews, it can be concluded that the residents are fairly satisfied with their living conditions, especially after the improvements in the built quality of their houses under the BSUP Scheme. However, water quality, supply duration and timing are an issue, which highlights that although the infrastructure is improved, service and maintenance is still an issue. The aggregated FCMs highlighted that Proximity to Public Transport and Green Spaces are the most central indicator, improving which will have a positive influence on the entire network. A Google Map analysis shows that there are many bus stops around the



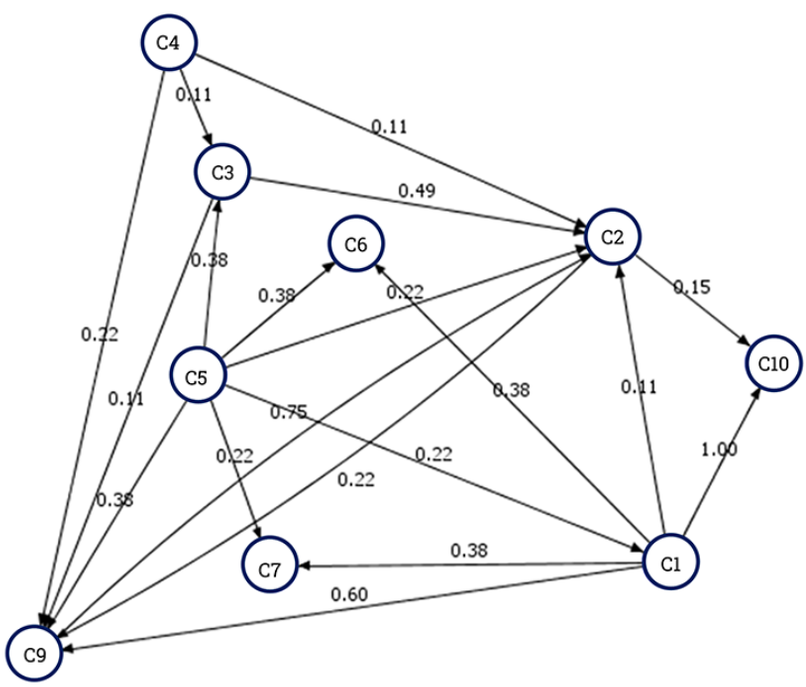
Neighbourhood 1: Informal Settlement with No Intervention

Component	Indegree	Outdegree	Centrality	Type
C2: Availability of Community Space	3.1666666660000002	1.1666666660000002	4.3333333320000005	ordinary
C3: Cleanliness of Streets/Neighbourhood	0.933333333	2.7333333320000004	3.666666665	ordinary
C6: Proximity to Primary & Secondary Schools	2.466666666	0.7000000000000001	3.1666666660000002	ordinary
C1: Proximity to Public Transport	0	2.8333333339999998	2.8333333339999998	driver
C9: Proximity to Green Spaces	1.2999999999999998	1.0666666660000002	2.366666666	ordinary
C5: Good Relationship with Neighbours & Community	0	2.133333333	2.133333333	driver
C10: Proximity to Employment Opportunities	1.7666666660000003	0.333333333	2.0999999990000005	ordinary
C8: Sense of Safety & Security	1.399999999	0.666666666	2.066666665	ordinary
C7: Proximity to Healthcare Facilities	1.5333333329999999	0	1.5333333329999999	receiver
C4: Feeling of Belonging to the Neighbourhood	0	0.933333333	0.933333333	driver

Figure 29: Aggregated FCM Neighbourhood 1. C2: Availability of Community Space has the Highest Centrality.

neighbourhood and C1: Proximity to Public Transport, was rated satisfactory by two out of three interviewees, the frequency of buses was not satisfactory. It is evident from the FCM that improving C1 directly improves C9, Proximity to Green Spaces. The residents expressed their dissatisfaction with not having a park/public garden in the vicinity, especially since they could see the park doubling up as a community space. However, they were willing to travel to a park if they would have frequent bus connections.

Upgrading by retrofitting is a scheme which is globally applauded for not uprooting the residents and thereby maintaining their existing livelihood and social network, but mere physical upgrading is not enough. Upgrading must represent a shift in the attitude of the local government, recognising the rights of the inhabitants to the same network of infrastructure and services enjoyed by the planned housing developments (Patel, 2013). Given the socio-economic background of the residents, a well-functioning public transport network is essential for the residents to make the most of what the city provides. Upgrading



Neighbourhood 2: Upgrading by in-situ retrofitting

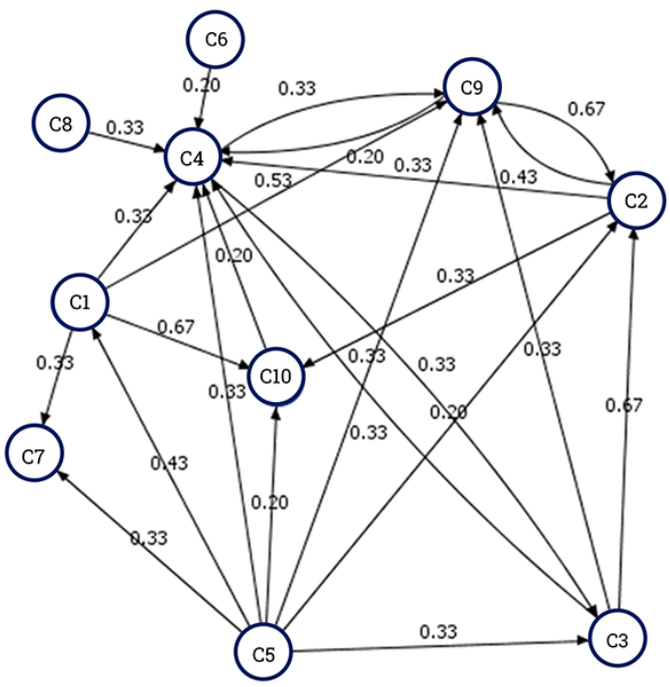
Component	Indegree	Outdegree	Centrality	Type
C1: Proximity to Public Transport	0.22499999999999998	2.4625000000000004	2.6875000000000004	ordinary
C9: Proximity to Green Spaces	1.5375	0.75	2.2875	ordinary
C2: Availability of Community Space	1.6875	0.375	2.0625	ordinary
C5: Good Relationship with Neighbours & Community	0	1.7999999999999998	1.7999999999999998	driver
C10: Proximity to Employment Opportunities	1.15	0	1.15	receiver
C3: Cleanliness of Streets/Neighbourhood	0.4875	0.6000000000000001	1.0875000000000001	ordinary
C6: Proximity to Primary & Secondary Schools	0.75	0	0.75	receiver

Figure 30: Aggregated FCM Neighbourhood 2. C1: Proximity to Public Transport & C9: Proximity to Green Space has the highest centrality, while C5: Good Relationship with Neighbours & Community is a Driver Concept, having strong influence on the network

schemes must also develop infrastructure which pushes socio-economic up-gradation. For example, one of the interviewees mentioned that they would like a public library in place of the existing public toilet since now they have access to toilets in individual houses. Helping the residents form a Community Based Organisation (CBO) seem to be a way forward in this case as well. The CBOs can identify and prioritise various social infrastructures required along with supervising the maintenance of the existing infrastructure.

6.2.3 Neighbourhood 3: Transit Housing Before In-situ Rehabilitation to Multi-storey Housing

A transit housing is a temporary living arrangement when the entire slum is cleared, and a multi-storey rehabilitation housing is built from scratch. In the case of Kamela, the transit housing was also provided by the builder and the occupants had a contract for four years. Since transit housing arrangements are



Neighbourhood 3: Transit Housing (relocated temporarily) for SRA in-situ Multi-Storey Housing

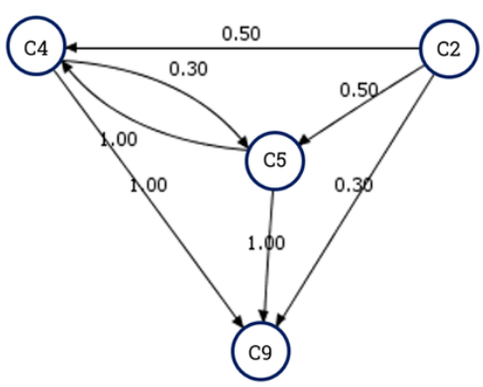
Component	Indegree	Outdegree	Centrality	Type
C4: Feeling of Belonging to the Neighbourhood	2.2666666650000002	0.666666666	2.933333331	ordinary
C9: Proximity to Green Spaces	1.966666665	0.8666666670000001	2.833333332	ordinary
C2: Availability of Community Space	1.533333334	1.099999999	2.633333333	ordinary
C1: Proximity to Public Transport	0.433333333	1.866666666	2.2999999989999997	ordinary
C5: Good Relationship with Neighbours & Community	0	2.166666665	2.166666665	driver
C3: Cleanliness of Streets/Neighbourhood	0.666666666	1.3333333330000001	1.9999999990000001	ordinary
C10: Proximity to Employment Opportunities	1.2	0.2	1.4	ordinary
C7: Proximity to Healthcare Facilities	0.666666666	0	0.666666666	receiver
C8: Sense of Safety & Security	0	0.333333333	0.333333333	driver

Figure 31: Aggregated FCM Neighbourhood 3. C4: Feeling of Belonging to the Neighbourhood holds the highest influence.

located at a different site, they provide conditions similar to rehabilitation by relocation. Two out of three interviewees rated the quality of life in the transit housing as less than satisfactory, although all three were satisfied with housing quality and access to basic amenities. The recurrent complaints were regarding C10: Proximity to Employment Opportunities, since most of them have their employments near the erstwhile slum neighbourhood, followed by non-availability of community space (C2). The collective FCM shows that C4: Feeling of Belonging to the Neighbourhood has the highest centrality, although, on an individual level, the rating for C4 and C5: Good Relationship with Neighbours & Community was rated satisfactory. Due to the temporary nature of the housing along with the change in next-door neighbours, it might be that the interviewees did not give importance to the questions regarding the feeling of belongingness or relationship with neighbours. It will be interesting to see how C4 performs in case of permanent relocation. Yet, the high centrality of C4 highlights its importance in the network and it is affected by the performance of eight out of ten concepts.

6.2.4 Neighbourhood 4: In-Situ Redevelopment to Multi-Storey Housing

The aggregated FCM shows that C4: Feeling of Belongingness and C5: Good Relationship with the Neighbours/Community has the highest centrality. This reflects the pressing concern of both the interviewees. A closer look shows that C2: Access to Community Space is a driver indicator, which can have influence C4 & C5 to increase the overall liveability. Despite the provision of a Community Hall, as often desired by interviewees from Neighbourhood 1, 2 and 3, community space in the form of streets has a latent social value, which was lost in the transition from horizontal to vertical living. The importance of distributed community space can be witnessed in the comment one of the interviewees made, "… earlier everyone had their street, wide or narrow and we all kept our doors open during the day. Now all the apartment doors always remain closed. Earlier if any mishap would happen, everyone would come running.



Neighbourhood 4: In-Situ Redevelopment to Multi-Storey Housing

Component	Indegree	Outdegree	Centrality	Type
C5: Good Relationship with Neighbours & Community	0.8	2	2.8	ordinary
C4: Feeling of Belonging to the Neighbourhood	1.5	1.3	2.8	ordinary
C9: Proximity to Green Spaces	2.3	0	2.3	receiver
C2: Availability of Community Space	0	1.3	1.3	driver

Figure 32: Aggregated FCM Neighbourhood 4. C4: Feeling of Belonging to the Neighbourhood and C5: Good Relationship with Neighbours & Community, are the central concepts.

Now nobody cares and keep to their businesses". This is one of the key challenges multi-storey slum rehabilitation projects face where the vertical housing can't accommodate the social habits well-adjusted to outdoor spaces (Debnath et al., 2019; Kshetrimayum et al., 2020; Shobirin et al., 2018). While CBOs and NGOs can play an active role in helping the transition from horizontal living to vertical living, the architectural design of the housings must consider the social habits to keep the community ties intact.

However, Dattawadi Redevelopment Project seems to have made significant progress by the active inclusion of CBOs in the management of the project. Both interviewees were proud of their well-maintained housing comparing it with other poorly maintained SRA projects. It was also evident that the CBO was active in taking up any complaints of the residents and discussing it with SRA or PMC. Further, they both were satisfied with the shifting process, which included free transit housing, monthly travel expense, the option of shifting to rental flats near the erstwhile slum etc. According to one of the interviewees, the beneficiaries were shifted to one of the transit camps provided by the Municipality, where they were given a temporary 1RK (1 room-kitchen-bathroom) apartment which had all the basic amenities and they had a free rental contract for 4 years. The beneficiaries only had to pay for the electricity and water they consumed for their apartment. In case a beneficiary didn't want to relocate to one of the transit camps, the Municipality also gave the option of shifting to a 1RK (1 room-kitchen-bathroom) rental apartment near the erstwhile slum, where the Municipality will pay the monthly rent. In case of relocation, the Municipality also bore the monthly travel expenses (around INR 1500 or ~17 Euro) to their place of employment.

This indeed is commendable.

Summary of findings, Application & Future scope

This study forwards a novel method to assess liveability perceptions in slums and neighbourhoods which were upgraded under the three ongoing schemes (5.1), to identify key indicators with the highest influence on liveability which can act as positive performance leverage. The need was identified based on the dearth of liveability studies for informal settlements and how they affect slum upgrading schemes. Hence, a resident centric liveability analysis method was developed which consisted two parts: first was the development of a questionnaire based on relevant Liveability Indicators and conducting the interviews to find how they rated the overall quality of life in their neighbourhood along with individual indicators and their effect on each other. The second was to draw FCMs for individual interviewees as well as aggregating FCMs for neighbourhood level FCM. The following sections summarise the finding from the interview and the FCMs, followed by the applicability of the method developed and the final statement on the hypothesis.

7.1 Summary of findings

Three schemes addressing existing slums in Pune, India were studied: in-situ up-gradation where the density of existing slum hutments is considered acceptable and up-gradation is done through improving infrastructure, access to services and quality of housing (Neighbourhood 2); resettlement in case the slums are on non-tenable land (Neighbourhood 3); and in-situ redevelopment to a multi-storey housing (Neighbourhood 4) when the existing fabric of slum hutments is above desirable densities, with no proper road-access, open-spaces etc (MoHUA, n.d.; PMC, 2012). One neighbourhood under each scheme was selected and three residents from each neighbourhood were interviewed. Since no contact was found from the resettled (relocated) neighbourhood, this category was replaced by interviewing residents from a transit camp, owing to their similar characteristics with resettled neighbourhoods. In addition, three residents from a slum neighbourhood with no intervention so far (Neighbourhood 1) were also identified. The following summarises the findings:

1. Two out of three interviewees from Neighbourhood 1 rated the overall quality of life in their neighbourhood as satisfactory and one interviewee rated the quality of life as unsatisfactory. Lack of cleanliness, quality of water, proximity to public transport, proximity to greenery & availability of community gathering space were recurrently rated unsatisfactory. The aggregated FCM for Neighbourhood 1 showed that Availability of Community Space is the most central concept.

2. In Neighbourhood 2, two out of three interviewees rated the overall quality of life in their neighbourhood as satisfactory and one interviewee rated the quality of life as okay. Despite the improvements in the service infrastructure and built quality of the houses, service and maintenance remains an issue. The aggregated FCM highlights Proximity to Public Transport and Green Spaces as the most central indicators.

3. In Neighbourhood 3, a transit housing camp for residents of Kamela slum, two out of three interviewees rated the overall quality of life as okay. The recurrent complaints were regarding Proximity to Employment Opportunities due to dislocation followed by non-Availability of community space. The aggregated FCM shows that Feeling of Belonging to the Neighbourhood has the highest centrality.

4. Only two interviewees responded from

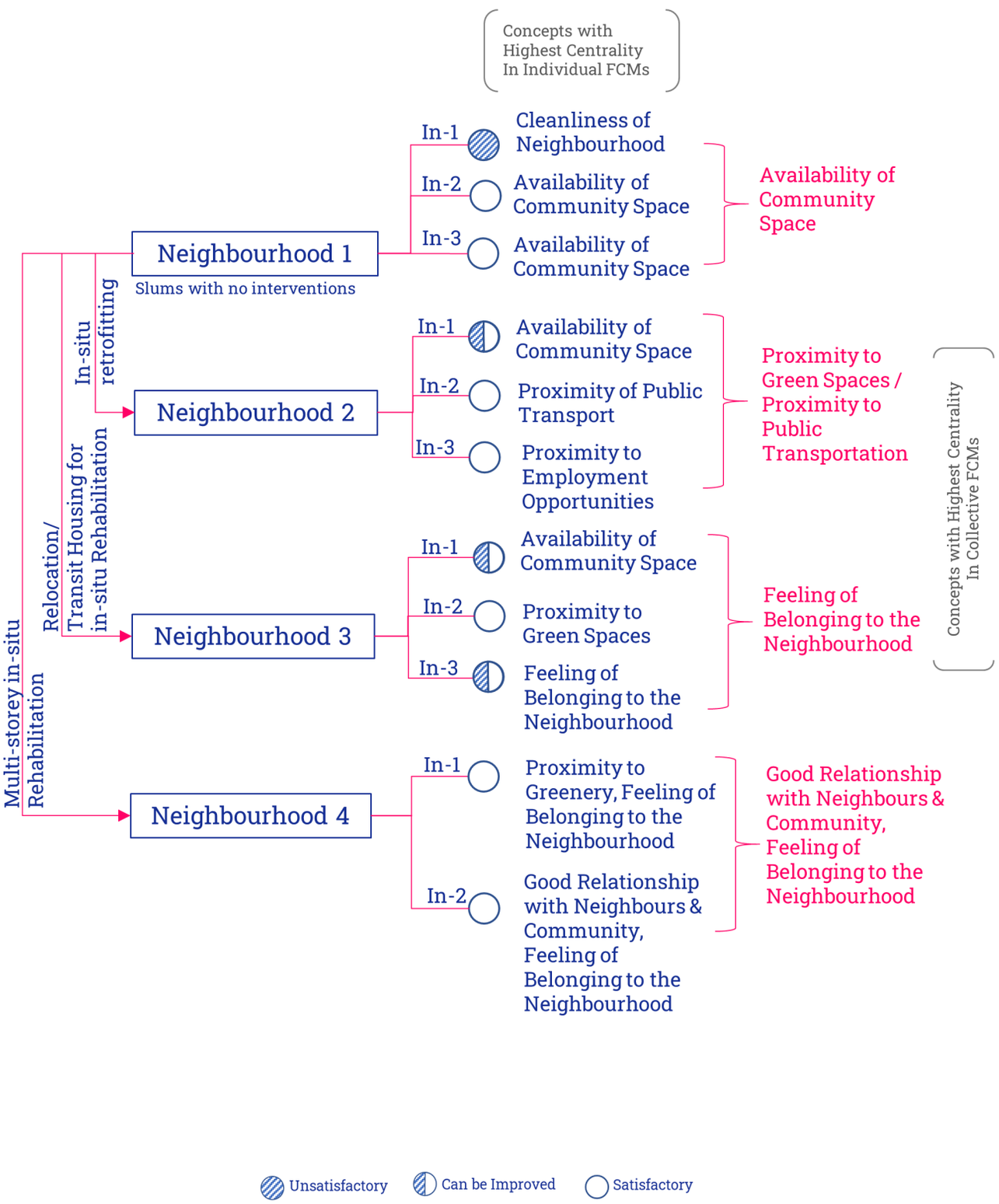


Figure 33: Summary of most central indicators from individual as well as aggregated FCMs.

Neighbourhood 4 and both were satisfied with the overall quality of life. While they were satisfied with the performance of physical infrastructure as well provisions made for social infrastructure like community halls, they suggested a drop in 'Sense of Belongingness' and 'Relationship with Neighbours/ Community'. The combined FCM also shows the same with the highest centrality, with Access to Community Space as a driver indicator.

5. The interviews also revealed that despite being from the same neighbourhood, perceptions of liveability can be varied, if not polar. In some cases, like that of Neighbourhood 1 & 2, the variation can be attributed to the spatially dispersed nature of the neighbourhood. While in general, the perception could also vary due to individual expectations, which has not been covered in this study.

The following section elaborates on the applicability of the method during the initial phase of approving the plans of any slum upgrading scheme, by answering the research questions posed at the beginning of the study.

7.2 Applicability of the Method Developed: Answering the Research Questions

a. What are the key indicators which the residents consider most influential for a better living experience in their current neighbourhood?

The aggregated FCMs from the four neighbourhoods identifies Availability of Community Space, Proximity to Green Spaces, Proximity to Public Transportation and Feeling of Belongingness as the key (central) indicators. It can be deduced that the indicators from the Social Dimensions are most influential, followed by the indicators from the Functional Dimension (refer Figure 3). This is also backed by literature (Alam & Mihoko, 2018; Cronin, 2013; Debnath et al., 2019; Kshetrimayum et al., 2020).

While infrastructure up-gradation, whether in the form of built-quality of houses, improving access to basic services like water, electricity, sewerage connection, etc are a given in any slum upgrading scheme, improvement in liveability is often not considered. At best, it is assumed to be a by-product of the infrastructural improvements. While improved infrastructure has a major contribution to liveability, it only covers the Physical and to an extent, the Safety dimension of liveability (refer to Chapter 3 on Liveability Indicators). For the overall improvement in liveability, slum upgrading schemes must consider the Social and Functional Dimension.

While the key indicators are specific to each neighbourhood but the method of drawing out these indicators is common throughout all schemes. Integrating the method in the SWOT (Strength-Weakness-Opportunity-Threat) analysis, commonly done at the beginning of the design phase, would help in prioritising actionable points while considering the outcome as improved liveability from the residents' perception.

b. How does the Slum Rehabilitation Scheme define its goal to ensure improved liveability in the upgraded housing?

Upon reviewing the current central scheme of BSUP & RAY (MoHUA, n.d., 2013; PMC, 2012) guiding and funding the various SRS projects in Pune (refer section 5.1), it can be concluded that the vision and intention stated for a 'Slum-free India' are coherent with the four-key lessons mentioned in *A Practical Guide to Designing, Planning, and Executing Citywide Slum Upgrading Programmes* (UN-Habitat, 2014) (refer 2.1). However, despite an emphasis on a 'bottom-up' approach and participatory design with the help of Community-Based Organisations (CBOs) and NGOs, the process lack a liveability assessment. At the outset, adopting liveability indicators suitable for the context and keeping the residents' perception in the centre of the assessment is a must. Integrating the method developed in this study will ensure that the performance leverages for improved liveability are identified by surveying a representative group from the neighbourhood to be upgraded and analysing the causal relationship between indicators.

Subsequently, Slum Rehabilitation Schemes must

define its goal considering rehabilitation/ upgradation as a series of incremental strategies, rather than a one-off infrastructure development project. Following recommendation can be adopted for improved liveability outcomes of slum upgrading schemes:

1. Establishing awareness campaign to ensure a smooth transition from horizontal living to the vertical living. Enabling partnership between Community-Based Organisations (CBOs) and NGOs could ensure a wider spread of the campaign.

2. Built-environment design must consider the social habits of the neighbourhood. Providing a single large community space might not be the best solution considering usage of outdoor spaces for everyday activities like cutting vegetables, home-based micro-scale businesses etc. Debnath et al. (2019) provide a detailed description of various outdoor activities the residents are used to, which they have to forego after shifting to multi-storey housing leading to dissatisfaction.

3. Developing strategy for comprehensive integration of the rehabilitated neighbourhoods to the formal city fabric, safeguarding access to the various functional attributes of liveability, like proximity and access to public transport, education, healthcare. The interviews highlighted that despite the physical nearness of these amenities, access is often restricted. For example, a bus stop might be in proximity but the poor frequency of buses as well as limited route options reduces its functionality.

4. Mandating Post-Occupancy Evaluation (POE) to ensure the workability of completed projects as well as gathering feedback for improvement. The POE must assess improvement or reduction in liveability perception. Again, the method developed in this study can be adopted for POEs.

7.3 Testing the hypothesis

The thesis hypothesised that when slums are upgraded through relocation, whether into a multi-storey housing within the same area as in Neighbourhood 4 or housing in a different locality, similar to Neighbourhood 3, the loss of pre-existing community ties is the central cause reducing the overall liveability experience.

Although the interviewees from Neighbourhood 4 mentioned a decrease in Sense of Belongingness or Good Relationship with Neighbours/Community and the indicators related to community ties were central in 3 out of 4 aggregated FCMs, yet there was no definite indication of loss of existing community ties when slums are shifted in-situ to multi-storey housing or when they move to a different locality. Nor could the study report a reduced liveability experience after shifting to the new housings. The 5 interviewees from Neighbourhood 3 and 4, who have been living in their respective neighbourhoods for 3-4 years, reported that they perceive an improved liveability in the new housing. This is contrary to the various findings (Alam & Mihoko, 2018; Cronin, 2013; Debnath et al., 2019; Kshetrimayum et al., 2020; Zhang, 2016) which argue that residents are dissatisfied with their new housing, especially after residing there for few years, and many say they prefer their previous living conditions. One possible explanation is that the current schemes of upgrading have learnt from the past drawbacks, and the more recent projects strive to be more participatory, considerate of the social habits of the residents, and thoughtful of the transitional impediments when residents have to shift from a horizontal living to vertical living. These values are mandated in the *Revising/ Updating City Development Plan (CDP) of Pune City-2041* (PMC, 2012).

7.4 Limitations of the study conducted

The following limitations also add to the explanation for the paradoxical and somewhat ambiguous results:

a. The telephonic nature of the interviews inhibits the interviewee from responding with assurance, often in the apprehension of the intention of the interviewee. While the initial plan was to conduct in-person interviews, the onset of the COVID-19

pandemic rendered telephonic interviews as the only viable option.

b. Telephonic interviews come with the disadvantage of the limited time the respondent is willing to dedicate and the frequent distractions. To make the best out of the interviews despite these limitations, the thesis is limited to the study of causal relationships of non-satisfactory indicators with the other indicators, rather than attempting to elicit causal relationships between all indicators despite their performance.

b. The number of interviews conducted in this study is not representative either of the rehabilitated population or the variation in projects within one scheme. For example, SRA's multi-storey redevelopment has progressed over the years. While studies based on initial projects like SRA Nanapeth (Cronin, 2013)reported significant dissatisfaction amongst the residents, more recent projects like the Dattwadi Redevelopment Project (Neighbourhood 4) or the Prathama Housing described in Section 5.1.3 show higher perceived liveability amongst residents. Such variation within one scheme was beyond the scope of the study within the time allotted.

c. Drawing correlations between liveability perceptions and socio-demographic tendencies were out of the scope of the study.

Despite the limitations, the ratings gathered from the interviews (see Appendix) and the corresponding FCMs helped test the application of the methodology developed for understanding liveability perceptions and identifying key indicators which play a central role in the overall liveability of the neighbourhood.

7.5 Outlook for further research

Notwithstanding the limitations, the study shows many potential avenues for furthering the applicability of the research and the method developed. Following are a few recommendations:

1. Conducting workshops with field experts like NGOs, CBOs and local municipality, stakeholders and academics to decide on the most suitable liveability indicators, from a resident's perception and limited to neighbourhood scale. These indicators should be an integral part of assessing the liveability perception before upgrading and post-occupancy.

2. Further, post-occupancy liveability assessments should be repeated a few years after the beneficiaries shift, to check if the initial higher liveability perception post shifting from a slum to housing with tenure security, basic amenities and better built-quality is still valid. This could test the importance of community ties when compared to improvement in Physical Attributes and how far do such improvements go before a decrease in community ties start to weigh in.

3. Applicability of the method can be increased by developing a mobile app-based survey where the residents can rate the performance of various indicators in the first phase, followed by a more detailed interview to elicit causal relationships between these indicators.

References

Active Healthy Communities. (n.d.). *PedShed analysis - Active Healthy Communities*. Retrieved August 4, 2020, from http://www.activehealthycommunities.com.au/plan/gis-analysis/walking-cycling-pedshed-analysis/

Alam, S.S.B., & Mihoko, M. (2018). Dwellers' Satisfaction on Slum Rehabilitation Scheme and its Affecting Factors in Mumbai, India. *Urban and Regional Planning Review*, *5*, 67–86. https://www.semanticscholar.org/paper/Dwellers'-Satisfaction-on-Slum-Rehabilitation-and-Alam-Matsuyuki/f28f2145cbfb6349814adf0492a50e364b5bc8db

Alderton, A., Davern, M., Nitvimol, K., Butterworth, I., Higgs, C., Ryan, E., & Badland, H. (2019). What is the meaning of urban liveability for a city in a low-to-middle-income country? Contextualising liveability for Bangkok, Thailand. *Globalization and Health*, *15*(1), 51. https://doi.org/10.1186/s12992-019-0484-8

Ashton, J. R. (2004). Slum improvement needs community organisation. *Journal of Epidemiology & Community Health*, *58*(3), 168. https://jech.bmj.com/content/58/3/168

Baker, T. (1994). *Doing social research* (2. ed.). McGraw-Hill.

Batra, L. (2009). *A review of urbanisation and urban policy in post-independent India*. *Working Paper Series: CSLG/WP/12*. Jawaharlal Nehru University. http://www.jnu.ac.in/sites/default/files/u63/12-a%20review%20of%20urban%20%28lalit%20batra%29.pdf

Biswas, P. S. (2011). Yerawada slum project in Pune not for profit: NGO. *DNA-Daily News and Analysis*. https://www.dnaindia.com/mumbai/report-yerawada-slum-project-in-pune-not-for-profit-ngo-1526299

Bottero, M., Datola, G., & Monaco, R. (2017). Exploring the Resilience of Urban Systems Using Fuzzy Cognitive Maps. In O. Gervasi, B. Murgante, S. Misra, G. Borruso, C. M. Torre, A. M. A. C. Rocha, . . . A. Cuzzocrea (Eds.), *LNCS sublibrary. SL 1, Theoretical computer science and general issues: Vol. 10406. Computational science and its applications -- ICCSA 2017: 17th International Conference, Trieste, Italy, July 3-6, 2017, Proceedings. Part III / Osvaldo Gervasi, Beniamino Murgante, Sanjay Misra, Giuseppe Borruso, Carmelo M. Torre, Ana Maria A.C. Rocha, David Taniar, Bernady O. Apduhan, Elena Stankova, Alfredo Cuzzocrea (eds.)* (Vol. 3, pp. 338–353). Springer.

Butsch, C., Kumar, S., Wagner, P., Kroll, M., Kantakumar, L., Bharucha, E., Schneider, K., & Kraas, F. (2017). Growing 'Smart'? Urbanization Processes in the Pune Urban Agglomeration. *Sustainability*, *9*(12), 2335. https://doi.org/10.3390/su9122335

Cambridge Intelligence. (2019). *Social Network Analysis and Visualization: White Paper*. Cambridge. Cambridge Intelligence. https://cambridge-intelligence.com/wp-content/uploads/2019/10/White-paper-visualizing-social-networks.pdf

Census of India. (2011). *Pune City Population Census 2011-2020 | Maharashtra*. https://www.census2011.co.in/census/city/375-pune.html

Climate-Data.Org. (n.d.). *Pune climate: Average Temperature, weather by month, Pune weather averages*. Retrieved February 7, 2020, from https://en.climate-data.org/asia/india/maharashtra/pune-31/

Cronin, V. (2013). A Sustainability Evaluation of Slum Rehabilitation Authority Housing Development

at Nanapeth, Pune, India. *Environment and Urbanization ASIA*, *4*(1), 121–134. https://doi.org/10.1177/0975425313477567

Cronin, V., & Guthrie, P. (2011). Community-led resettlement: From a flood-affected slum to a new society in Pune, India. *Environmental Hazards*, *10*(3-4), 310–326. https://doi.org/10.1080/17477891.2011.594495

De, I. (2017). Slum improvement in India: determinants and approaches. *Housing Studies*, *32*(7), 990–1013. https://doi.org/10.1080/02673037.2017.1291915

Debnath, R., Bardhan, R., & Sunikka-Blank, M. (2019). Discomfort and distress in slum rehabilitation: Investigating a rebound phenomenon using a backcasting approach. *Habitat International*, *87*, 75–90. https://doi.org/10.1016/j.habitatint.2019.03.010

Deshpande, R., & Palshikar, S. (2008). Occupational Mobility: How Much Does Caste Matter? *Economic and Political Weekly*, *43*(34), 61–70. www.jstor.org/stable/40277879

Dovey, K., & King, R. (2011). Forms of Informality: Morphology and Visibility of Informal Settlements. *Built Environment (1978-)*, *37*(1), 11–29. www.jstor.org/stable/23289768

ET Bureau (2018, August 14). Pune most livable followed by Navi Mumbai, Rampur in UP is the worst. *The Economic Times*. https://economictimes.indiatimes.com/news/politics-and-nation/pune-most-livable-followed-by-navi-mumbai-rampur-in-up-is-the-worst/articleshow/65387097.cms

Farahani, L.M. (2016). The Value of the Sense of Community and Neighbouring. *Housing, Theory and Society*, *33*(3), 357–376. https://doi.org/10.1080/14036096.2016.1155480

Fontana A. (2005). *The sage handbook of qualitative research.*

Gnaneshwar V (1995). Urban policies in India: Paradoxes and Predicaments. *Habitat International*, *19*(3), 293–316. https://www.sciencedirect.com/science/article/pii/019739759400076E

The Slum Areas (Improvement and Clearance) Act, 1956, Ministry of Law & Justice, Government of India (1956). http://legislative.gov.in/sites/default/files/A1956-96.pdf

Government of Maharashtra. (n.d). *Department History : Slum Rehabilitation Authority (SRA)*. Retrieved 01-Mar-20, from https://sra.gov.in/page/innerpage/department-history.php

Gray, S [Steven]. *Mental Modeler* [Computer software]. http://www.mentalmodeler.org/

Hassan, Z. A., Schattner, P., & Mazza, D. (2006). Doing A Pilot Study: Why Is It Essential? *Malaysian Family Physician : The Official Journal of the Academy of Family Physicians of Malaysia*, *1*(2-3), 70–73.

Helfgott, A., Lord, S., Bean, N., Wildenberg, M [Martin], Gray, S [Steven], Gray, S [Stefan], Vervoort, J., Kok, K., & Ingram, J. (2015). Clarifying Fuzziness: Fuzzy Cognitive Maps, Neural Networks and System Dynamics Models in Participatory Social and Environmental Decision-aiding Processes. http://www.transmango.eu/userfiles/working%20paper%20fuzzy%20cognitive%20maps.pdf

Higgs, C., Badland, H., Simons, K., Knibbs, L. D., & Giles-Corti, B. (2019). The Urban Liveability Index: Developing a policy-relevant urban liveability composite measure and evaluating associations with transport mode choice. *International Journal of Health Geographics*, *18*(1), 1–25. https://doi.org/10.1186/s12942-019-0178-8

Hopper. (1992). *Conversation.*

Isak, K.G.Q., Wildenberg, M [M.], Adames0cu, C.M., Skov, F., Blust, G. de, & Varjopuro R. (2009). *Manual for applying Fuzzy Cognitive Mapping - experiences from ALTER-Net* (WPR6-2009-02). ALTERNet. http://www.alter-net.info/files/outputs/report-4-r6-d2-fcm-manual

Jacobs, J. (1992). *The death and life of great American cities* (Vintage Books ed.). Vintage Books.

Jain, V., Chennuri, S., & Karamchandani, A. (2016). *Informal Housing, Inadequate Property Rights: Understanding the Needs of India's Informal Housing Dwellers*.

Kokkinos, K., Lakioti, E., Papageorgiou, E., Moustakas, K., & Karayannis, V. (2018). Fuzzy Cognitive Map-Based Modeling of Social Acceptance to Overcome Uncertainties in Establishing Waste Biorefinery Facilities. *Frontiers in Energy Research*, *6*, Article 112, 142. https://doi.org/10.3389/fenrg.2018.00112

Kosko, B. (1986). Fuzzy Cognitive Maps. *International Journal of Man-Machine Studies*, *24*(1), 65–75. https://doi.org/10.1016/S0020-7373(86)80040-2

Kovacs-Györi, A., Cabrera-Barona, P., Resch, B., Mehaffy, M., & Blaschke, T. (2019). Assessing and Representing Livability through the Analysis of Residential Preference. *Sustainability*, *11*(18), 4934. https://doi.org/10.3390/su11184934

Krishnamurthy, R., Mishra, R., & Desouza, K. C. (2016). City profile: Pune, India. *Cities*, *53*, 98–109. https://doi.org/10.1016/j.cities.2016.01.011

Kshetrimayum, B., Bardhan, R., & Kubota, T. (2020). Factors Affecting Residential Satisfaction in Slum Rehabilitation Housing in Mumbai. *Sustainability*, *12*(6), 2344. https://doi.org/10.3390/su12062344

Kuldeep Singh (2016). Strengthening community-based organizations for Slum Development. *International Journal for Research Publication & Seminar*, *7*(1). https://www.academia.edu/32835021/Strengthening_community-based_organizations_for_slum_Development

Kundu, D., Pandey, A., & Sharma, P. (2018). *India: National Urban Policies and City Profiles for Delhi and Madurai*. National Institute of Urban Affairs. http://www.centreforsustainablecities.ac.uk/wp-content/uploads/2018/10/Research-Report-India-National-Urban-Policies-and-City-Profiles-for-Delhi-and-Madurai-FINAL.pdf

Leby, L.J., & Hashim, H.A. (2010). Liveability Dimensions and Attributes: Their Relative Importance in the Eyes of Neighbourhoods Residents. *Journal of Construction in Developing Countries*, *15*(1), 67–91. http://web.usm.my/jcdc/vol15_1_2010/JCDC%20Vol%2015(1)%20ART%204%20(67-91).pdf

Maccoby E. E. (1954). *Handbook of social psychology.*

MASHAL. (n.d.). *Housing: InSitu Upgradation*. Retrieved 7/21/2020, from https://mashal.org.in/housing-2/

Mason J. (2012). *Qualitative researching.*

Micha, E., Fenton, O., Daly, K., Kakonyi, G., Ezzati, G., Moloney, T., & Thornton, S. (2020). The Complex Pathway towards Farm-Level Sustainable Intensification: An Exploratory Network Analysis of Stakeholders' Knowledge and Perception. *Sustainability*, *12*(7), 2578. https://doi.org/10.3390/su12072578

Ministry of Housing and Urban Affairs, GoI. (n.d.). *Pradhan Mantri Awas Yojana*. Retrieved 5/14/2020, from http://mohua.gov.in/cms/pradhan-mantri-awas-yojana.php

Ministry of Urban Development. (2017). *Liveability Standards in Cities*. Government of India. https://smartnet.niua.org/content/b0ceb13f-2559-4be1-86dc-8daa290d4fed

Mohanty, L. N. P., & Mohanty, S. (2005). *Slum in India*. A.P.H. Publishing. https://books.google.de/books?id=y9MJIC7AkhMC

MoHUA. (n.d.). *Guidelines for preparation of Slum-free City Plan of Action: 2013-2022.* Ministry of Housing & Urban Poverty Alleviation, GoI. http://mohua.gov.in/upload/uploadfiles/files/3RAYGuidelinesSFCP.pdf

MoHUA. (2013). *Rajiv Awas Yojana (RAY): Scheme Guidelines 2013-2022 & Training Model in Ray.* Ministry of Housing & Urban Poverty Alleviation, GoI.

Mundhe, N. (2019). IDENTIFYING AND MAPPING OF SLUMS IN PUNE CITY USING GEOSPATIAL

TECHNIQUES. *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XLII-5/W3*, 57–63. https://doi.org/10.5194/isprs-archives-XLII-5-W3-57-2019

Mwiya, S. (2014). An Overview of Semi-Quantitative, Qualitative and Knowledge-Based. *Communs Geol. Surv. Namibia*, *13*, 1–8.

Naiknavare Developers. (2019). *Prioritising Slum Redevelopment* [YouTube]. https://www.youtube.com/watch?v=3oPBKmIgjvo

Nápoles, G [G.], Espinosa, M. L., Grau, I [I.], & Vanhoo, K. *FCM Expert* [Computer software].

Nápoles, G [Gonzalo], Grau, I [Isel], León, M., & Grau, R. (2013). Modelling, Aggregation and Simulation of a Dynamic Biological System through Fuzzy Cognitive Maps. In I. Batyrshin & M. González Mendoza (Eds.), *LNCS sublibrary. SL 7, Artificial intelligence: 7629-7630. Lecture notes in artificial intelligence, Advances in artificial [and computational] intelligence: 11th Mexican International Conference on Artificial Intelligence, MICAI 2012, San Luis Potosí, Mexico, October 27-November 4, 2012. Revised selected papers / Ildar Batyrshin, Miguel Gonzáez Mendoza (eds.)* (pp. 188–199). Springer.

National Buildings Organisation, G. (2013). *State of Slums in India: A Statistical Compendium 2013.*

National Research Council. (2002). *Community and Quality of Life*. National Academies Press. https://doi.org/10.17226/10262

Nijman, J. (2008). Against the odds: Slum rehabilitation in neoliberal Mumbai. *Cities*, *25*(2), 73–85. https://doi.org/10.1016/j.cities.2008.01.003

Novick, G. (2008). Is there a bias against telephone interviews in qualitative research? *Research in Nursing & Health*, *31*(4), 391–398. https://doi.org/10.1002/nur.20259

Olazabal, M., & Pascual, U. (2016). Use of fuzzy cognitive maps to study urban resilience and transformation. *Environmental Innovation and Societal Transitions*, *18*, 18–40. https://doi.org/10.1016/j.eist.2015.06.006

Onnom, W., Tripathi, N., Nitivattananon, V., & Ninsawat, S. (2018). Development of a Liveable City Index (LCI) Using Multi Criteria Geospatial Modelling for Medium Class Cities in Developing Countries. *Sustainability*, *10*(2), 520. https://doi.org/10.3390/su10020520

Özesmi, U., & Özesmi, S. L. (2004). Ecological models based on people's knowledge: a multi-step fuzzy cognitive mapping approach. *Ecological Modelling*, *176*(1-2), 43–64. https://doi.org/10.1016/j.ecolmodel.2003.10.027

Pahl, R. E. (1984). *Divisions of labour*. Blackwell.

Papageorgiou, E., & Salmeron, J. (2013a). A Review of Fuzzy Cognitive Map research at the last decade. *IEEE Transactions on Fuzzy Systems*. https://www.researchgate.net/publication/232707632_A_Review_of_Fuzzy_Cognitive_Map_research_at_the_last_decade

Papageorgiou, E., & Salmeron, J. (2013b). A Review of Fuzzy Cognitive Map research at the last decade. *IEEE Transactions on Fuzzy Systems*.

Patel, S. (2013). Upgrade, rehouse or resettle? An assessment of the Indian government's Basic Services for the Urban Poor (BSUP) programme. *Environment and Urbanization*, *25*(1), 177–188. https://doi.org/10.1177/0956247812473731

Perusich, K. (Ed.). (2010). *Cognitive Maps*. IntechOpen. https://www.intechopen.com/books/cognitive-maps/system-diagnosis-using-fuzzy-cognitive-maps

PMC. (n.d.–a). *PMC Open Data Store: Slum population 2009*. Retrieved August 2, 2020, from http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=29&dsId=98&search=slum

PMC. (n.d–b). *Slum Rehabilitation Work under BSUP-JNNURM*. Retrieved 5/18/2020, from https://pmc.gov.in/en/slum-rehabilitation-work-under-bsup-jnnurm

PMC. (2012). *Revising/ Updating City Development Plan (CDP) of Pune City-2041: Under JNNURM.* Pune Municipal Corporation. https://pmc.gov.in/informpdf/CDP/1_CDP_Intro.pdf

PMC. (2018). *Pune Towards Smart City: Pune Smart City – Vision Document Volume-II.* Pune Municipal Corporation. https://smartnet.niua.org/sites/default/files/resources/pune_towards_smart_city-_vision.pdf

PMC. (2020a). *Deputy Commissioner Slum Eradication and Rehabilitation.* Pune Municipal Corporation. https://www.pmc.gov.in/en/slum

PMC. (2020b). *Slum Rehabilitation Work under BSUP-JNNURM.* Pune Municipal Corporation. https://www.pmc.gov.in/en/slum-rehabilitation-work-under-bsup-jnnurm

PMC Care. (n.d.). *Slum*. Retrieved December 7, 2020, from http://115.124.97.169:8080/FAQDepartment/DepartmentDetails/22?language=EN

PMRDA. (n.d.). *Pune Metropolitan Region Development Authority - PMRDA*. Retrieved August 2, 2020, from http://www.pmrda.gov.in/background.html

Polit, D. F., & Beck, C. T. (2010). *Essentials of nursing research: Appraising evidence for nursing practice / Denise F. Polit, Cheryl Tatano Beck* (7th ed.). Lippincott Williams & Wilkins.

Rajandran, M. (n.d.). *Poverty Alleviation through Community Participation - UBSP India*. Retrieved August 2, 2020, from https://www.citizenshandbook.org/unesco/most/asia12.html

Rawoot, S. (2014). *Yerwada In-situ Slum Up Gradation - Pune, Maharashtra, India: BSUP Case Study.* Resilient Cities Housing Initiative. https://static1.squarespace.com/static/5787b70d29687fd4e14dff41/t/595030a9bebafb6d31846d3a/1498427565256/BSUPCaseStudy.pdf

Rouse, M. (2016). Fuzzy Logic. *TechTarget*. https://searchenterpriseai.techtarget.com/definition/fuzzy-logic

Roy, A. (2014). Slum-free cities of the Asian century: Postcolonial government and the project of inclusive growth. *Singapore Journal of Tropical Geography*, *35*(1), 136–150. https://doi.org/10.1111/sjtg.12047

Shelter Associates. (2004). *The Kamgar Putla Story: A Community's Struggle from a Slum to a Society.* Shelter Associates. http://shelter-associates.org/downloads/Kamgar%20Putala/Kamgar%20Putala_46.pdf

Shelter Associates. (2007). *Study on Comprehensive Rehabilitation Strategies for the Urban Poor in Pune City* (Research No. 148). Pune. Shelter Associates. http://www.shelter-associates.org/downloads/Research/Research_148.pdf

Shobirin, A., Ramadhanty, A. H., & Hardiana, A. (2018). Multifunctional spaces in slum settlements and their relation to activity pattern case study of Kampung Sangkrah, Surakarta. In *AIP Conference Proceedings* (p. 30072). Author(s). https://doi.org/10.1063/1.5024131

Simon, M. K., & Goes, J. (2013). *Dissertation and scholarly research: Recipes for success*. Dissertation Success, LLC. https://doi.org/10.13140/RG.2.1.5089.0960

SRA. (n.d.). *Slum Rehabilitation Authority (SRA), Mumbai*. Retrieved December 7, 2020, from https://sra.gov.in/page/innerpage/about-us.php

Teijlingen, E.R.V., & Hundley, V. (2001). The importance of pilot studies. *Social Research Update*(35).

Tiwari, P. (2015). *India's reluctant urbanization: Thinking beyond / Piyush Tiwari [and five others]*. Palgrave

Macmillan. https://books.google.de/books?id=1FemCwAAQBAJ

TNN (2017). 272 slum structures pulled down. *Times of India*. https://timesofindia.indiatimes.com/city/pune/272-slum-structures-pulled-down/articleshow/58287429.cms

UN. (2016). *Final list of proposed Sustainable Development Goal indicators: Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicator.* United Nations. https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf

UNGA (Ed.) (2017). *New Urban Agenda*. United Nations. http://habitat3.org/wp-content/uploads/NUA-English.pdf

UN-Habitat. (2003). *The challenge of slums: Global report on human settlements, 2003*. Earthscan Publications.

UN-Habitat. (2006). *The State of the World Cities: 30 years of shaping the Habitat Agenda* ([Nachdr.]). *The state of the world's cities report: 2006/2007; 3*. Earthscan. https://sustainabledevelopment.un.org/content/documents/11292101_alt.pdf

UN-Habitat. (2009). *Planning sustainable cities: Global report on human settlements 2009*. *GLOBAL REPORT ON HUMAN SETTLEMENTS: Vol. 2009*. Earthscan. https://books.google.de/books?id=y7IoDAAAQBAJ

UN-Habitat. (2014). *A Practical Guide to Designing, Planning, and Executing Citywide Slum Upgrading Programmes*. United Nations Human Settlements Programme (UN-Habitat).

UNSD. (2019). *SDG Report 2019: 11 Sustainable Cities and Communities.* United Nations Statistics Division. https://unstats.un.org/sdgs/report/2019/goal-11/

Wellman, B., & Wortley, S. (1990). Different Strokes from Different Folks: Community Ties and Social Support. *American Journal of Sociology*, *96*(3), 558–588. www.jstor.org/stable/2781064

Winter, L., & Kron, T. (2009). Fuzzy Thinking in Sociology. In J. Kacprzyk & R. Seising (Eds.), *Studies in Fuzziness and Soft Computing. Views on Fuzzy Sets and Systems from Different Perspectives* (Vol. 243, pp. 301–320). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-93802-6_14

Yoon B.S, & Jetter A.J. (2016). Comparative Analysis for Fuzzy Cognitive Mapping. *2016 Proceedings of PICMET '16: Technology Management for Social Innovation*, 1897–1908. http://www.picmet.org/db/member/proceedings/2016/data/polopoly_fs/1.3251139.1472157193!/fileserver/file/680734/filename/16R0392.pdf

Young, J. C., Rose, D. C., Mumby, H. S., Benitez-Capistros, F., Derrick, C. J., Finch, T., Garcia, C., Home, C., Marwaha, E., Morgans, C., Parkinson, S., Shah, J., Wilson, K. A., & Mukherjee, N. (2018). A methodological guide to using and reporting on interviews in conservation science research. *Methods in Ecology and Evolution*, *9*(1), 10–19. https://doi.org/10.1111/2041-210X.12828

Zhang, Y. (2016). *Building a Slum-Free Mumbai*. https://www.wilsoncenter.org/article/building-slum-free-mumbai

Appendix 1

Appendix 1-Ratings from Interviewee 1 Neighbourhood 1

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	■ बिल्कुल नहीं,	☐ , थोड़ा सा	☐ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☑	☐	☐
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	☐	■
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	☐	■	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☑	☐	☐
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	■	☐	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	■	☐
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	■	☐	☐
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	■	☐
5. Regular waste collection	☐	☐	■	☐
6. A feeling of belonging to the neighbourhood	☐	☐	☐	■
7. A good relationship with neighbours and community	☐	☐	■	☐
8. Proximity to employment opportunities	■	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सा does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☑	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	■	☐
5. Regular waste collection	☐	☐	■	☐
7. A good relationship with neighbours and community	☐	☐	■	☐
8. Proximity to employment opportunities	☐	☐	☐	■
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	■	☐	☐
6. A feeling of belonging to the neighbourhood	☐	☐	■	☐
5. Regular waste collection	☐	☐	■	☐
7. A good relationship with neighbours and community	☐	■	☐	☐
8. Proximity to employment opportunities	☐	■	☐	☐
9. Proximity to primary & secondary schools	☐	☐	☐	■
10. Proximity to healthcare facilities	☐	☐	☐	■
11. Sense of safety and security	☐	☐	☐	■
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐

Appendix 1a

Appendix 1-Ratings from Interviewee 1 Neighbourhood 1

3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☑	☐
4. Cleanliness of streets	☐	☑	☐	☐
5. Regular waste collection	☐	☑	☐	☐
6. A feeling of belonging to the neighbourhood	☐	☑	☐	☐
7. A good relationship with neighbours and community	☐	☑	☐	☐
9. Proximity to primary & secondary schools	☐	☐	☐	☑
10. Proximity to healthcare facilities	☐	☐	☐	☑
11. Sense of safety and security	☐	☑	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves				
Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	☑	☐
4. Cleanliness of streets	☐	☐	☑	☐
6. A feeling of belonging to the neighbourhood	☐	☐	☐	☑
8. Proximity to employment opportunities	☐	☑	☐	☐
10. Proximity to healthcare facilities	☐	☐	☐	☑
11. Sense of safety and security	☐	☐	☑	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves				
Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	☑	☐
4. Cleanliness of streets	☐	☐	☑	☐
6. A good relationship with neighbours and community	☐	☐	☑	☐
7. Proximity to employment opportunities	☐	☑	☐	☐
10. Sense of safety and security	☐	☐	☑	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Appendix 2

Appendix 2: Ratings from Interviewee 2 Neighbourhood 1

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	☐ , थोड़ा सा	■ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	■	☐
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	☐	■
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	■	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	■	☐	☐
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	☑	☐	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☑	☐	☐
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☑	☐	☐
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	■	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	■	☐	☐	☐
4. Cleanliness of streets	☐	■	☐	☐
5. Regular waste collection	☐	☐	☐	☐
6. A feeling of belonging to the neighbourhood	☐	■	☐	☐
7. A good relationship with neighbours and community	☐	■	☐	☐
8. Proximity to employment opportunities	☐	☐	☐	☐
9. Proximity to primary & secondary schools	☐	☐	☐	☐
10. Proximity to healthcare facilities	☐	☐	☐	☐
11. Sense of safety and security	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves में सुधार Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ल में एसा स does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	■	☐
5. Regular waste collection	☐	☐	☐	☐
6. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
7. A good relationship with neighbours and community	☐	☐	■	☐
8. Proximity to employment opportunities	☐	☐	☐	☐
9. Proximity to primary & secondary schools	☐	☐	☐	☐
10. Proximity to healthcare facilities	☐	☐	☐	☐
11. Sense of safety and security	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves में सुधार Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी) does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. Regular waste collection	☐	☐	☐	☐
6. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
7. A good relationship with neighbours and community	☐	☐	☐	☐
8. Proximity to employment opportunities	☐	☐	☐	☐
9. Proximity to primary & secondary schools	☐	☐	☐	☐
10. Proximity to healthcare facilities	☐	☐	☐	☐
11. Sense of safety and security	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves में सुधार Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. Regular waste collection	☐	☐	☐	☐
6. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
7. A good relationship with neighbours and community	☐	☐	☐	☐
8. Proximity to employment opportunities	☐	☐	☐	☐
9. Proximity to primary & secondary schools	☐	☐	☐	☐
10. Proximity to healthcare facilities	☐	☐	☐	☐
11. Sense of safety and security	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves में सुधार

Appendix 3

Appendix 3: Ratings from Interviewee 3 Neighbourhood 1

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	☐ , थोड़ा सा	■ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	■	☐
	Quality of housing structure घर की बनावट की हालत	■	☐	☐
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	☐	■
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	■	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	■	☐	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	■	☐
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	■	☐
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	■	☐	☑
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार				
Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	■	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	■	☐	☐
4. Cleanliness of streets	☐	☐	☐	■
11. Sense of safety and security	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves				
Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	■	☐
11. Sense of safety and security	☐	☐	■	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves				
Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सा	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
2. Proximity to greenery like public parks, gardens	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	■	☐
6. A feeling of belonging to the neighbourhood	☐	■	☐	☐
7. A good relationship with neighbours and community	☐	■	☐	☐
11. Sense of safety and security	☐	☐	■	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves				
Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	■	☐

Appendix 3a

Appendix 3: Ratings from Interviewee 3 Neighbourhood 1

Of the following, what do you think improves				
Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
7. A good relationship with neighbours and community	☐	■	☐	☐
11. Sense of safety and security	☐	■	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Of the following, what do you think improves				
Sense of safety and security सुरक्षा और सलामती की भावना	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
6. A feeling of belonging to the neighbourhood	☐	■	☐	☐
7. A good relationship with neighbours and community	☐	■	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Appendix 4

Appendix 4: Ratings from Interviewee 1 Neighbourhood 2

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	■ , थोड़ा सा	☐ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	■	☐	☐
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	☐	■
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	☐	■	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	■	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	■	☐	☐
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	☐	■	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	☐
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	☐

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीच से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	■	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	■	☐	☐
4. Cleanliness of streets	☐	☐	☐	■
5. A feeling of belonging to the neighbourhood	☐	■	☐	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	■
8. Proximity to primary & secondary schools	☐	☐	☐	■
9. Proximity to healthcare facilities	☐	☐	☐	■
10. Sense of safety and security	☐	☐	☐	■

Of the following, what do you think improves में सुधार Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी स does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	■	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	■	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	■
8. Proximity to primary & secondary schools	☐	☐	☐	■
9. Proximity to healthcare facilities	☐	☐	☐	■
10. Sense of safety and security	☐	☐	☐	■

Of the following, what do you think improves में सुधार Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	■
2. Proximity to greenery like public parks, gardens	☐	☐	☐	■
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	■
4. Cleanliness of streets	☐	☐	☐	■
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	■
8. Proximity to primary & secondary schools	☐	☐	☐	■
9. Proximity to healthcare facilities	☐	☐	☐	■
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Appendix 5

Appendix 5: Ratings from Interviewee 2 Neighbourhood 2

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	■ , थोड़ा सा	☐ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	■	☐
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	■	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	■	☐	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	■	☐
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	■	☐
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	■	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सा does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	■	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Appendix 6

Appendix 6: Ratings from Interviewee 3 Neighbourhood 2

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	☐ , थोड़ा सा	■ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	■	☐
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	☐	☐	■
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	☐	☐	■
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	☐	■	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	☐	■
2. Proximity to greenery like public parks, gardens	☐	☐	☐	■
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	■
4. Cleanliness of streets	☐	☐	☐	■
5. A feeling of belonging to the neighbourhood	☐	☐	☐	■
6. A good relationship with neighbours and community	☐	☐	☐	■
7. Proximity to employment opportunities	☐	☐	☐	■
8. Proximity to primary & secondary schools	☐	☐	☐	■
9. Proximity to healthcare facilities	☐	☐	☐	■
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	thoda	lagbhag	bahut jyada	bikul na
does improving this____ affects	very little (+)	a bit (++)	a lot (+++)	
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	■	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security	☐	☐	☐	☐

Appendix 7

Appendix 7: Ratings from Interviewee 1 Neighbourhood 3

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	■ , थोड़ा सा	☐ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	☐	■
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	■	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	■	☐	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	■	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सा does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	■	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Appendix 8

Appendix 8: Ratings from Interviewee 2 Neighbourhood 3

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	☐ , थोड़ा सा	■ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	■	☐
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	■	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	■	☐
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	☐	■
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	☐	■
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	■	☐	☐
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	■	☐	☐
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	■	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	■	☐
5. A feeling of belonging to the neighbourhood	☐	☐	■	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सा does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	■	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	■	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	■	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na

Appendix 8a

Appendix 8: Ratings from Interviewee 2 Neighbourhood 3

Of the following, what do you think improves में सुधार Cleanliness of streets/neighbourhood (मुहल्ले कां साफ़-सफाई) does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	■	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी) does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	■	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to healthcare facilities अस्पताल से नज़दीकी ओर पहुंच does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Appendix 9

Appendix 9: Ratings from Interviewee 3 Neighbourhood 3

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	■ , थोड़ा सा	☐ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	■	☐	☐
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	☐	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	☐	☐	☐
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	■	☐
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	■	☐
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	☐	☐	■
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	■	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना) does improving this___ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	■	☐
2. Proximity to greenery like public parks, gardens	☐	■	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	■	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	■	☐	☐
9. Proximity to healthcare facilities	☐	■	☐	☐
10. Sense of safety and security	☐	☐	■	☐

Appendix 10

Appendix 10: Ratings from Interviewee 1 Neighbourhood 4

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	☐ , थोड़ा सा	■ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	■	☐
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	☐	■	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	☐	☐	■
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	■	☐
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	■	☐
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	☐	☐	■
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	■	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	☐	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Appendix 11

Appendix 11: Ratings from Interviewee 2 Neighbourhood 4

		not at all	a bit	a lot
1	How much do you like your neighbourhood? आप अपने गली- मुहल्ले को कितना पसंद करते है?	☐ बिल्कुल नहीं,	☐ , थोड़ा सा	■ बहुत ज्यादा
2	How would you rate the following in your neighbourhood? आप अपने गली-मुहल्ले में इन चीजों को कैसे रेट करेंगे? संतुष्ट	bad	okay	good
	Access to basic amenities like household level tap water, electricity, toilet/sewerage घर में नलके का पानी, बिजली, लेट्रिन/ गंदे पानी की नाली ,	☐	☐	■
	Quality of housing structure घर की बनावट की हालत	☐	☐	■
	Proximity to public transport like bus stop, बस स्टॉप से नज़दीकी	☐	☐	■
	Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी	■	☐	☐
	Access to community spaces where you can gather with your neighbours and friends/relatives मुहल्ले में ऐसी सामुदायिक जगहों तक पहुँच जहाँ आप अपने पड़ोसियों, रिश्तेदारों और दोस्तों से बात और मुलाकात करें?	☐	☐	■
	Cleanliness of streets/neighbourhood (मुहल्ले की साफ़-सफाई)	☐	☐	■
	A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना)	☐	■	☐
	A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध)	☐	■	☐
	Proximity to employment opportunities (रोज़गार/नौकरी के अवसरों से नज़दीकी)	☐	☐	■
	Proximity to primary & secondary schools प्राथमिक और माध्यमिक स्कूलों से नज़दीकी और पहुँच	☐	☐	■
	Proximity to healthcare facilities अस्पताल से नज़दीकी और पहुँच	☐	☐	■
	Sense of safety and security सुरक्षा और सलामती की भावना	☐	☐	■
	Security of tenure घर/मकान में रहने की सुरक्षा(निकाले जाने के डर से)	☐	☐	■
	Safety from natural and manmade hazards प्राकृतिक आपदा flood	☐	☐	■

Of the following, what do you think improves में सुधार Proximity to greenery like public parks, gardens पार्क, बगीचे से नजदीकी does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	■	☐	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	■	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार A feeling of belonging to the neighbourhood (मुहल्ले अपनेपन की भावना) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	☐	■	☐
6. A good relationship with neighbours and community	☐	☐	■	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Of the following, what do you think improves में सुधार A good relationship with neighbours and community (पड़ोसियों और समाज के लोगों से अच्छे सम्बन्ध) does improving this____ affects	thoda very little (+)	lagbhag a bit (++)	bahut jyada a lot (+++)	bikul na
1. Proximity to public transport like bus stop	☐	☐	☐	☐
2. Proximity to greenery like public parks, gardens	☐	☐	☐	☐
3. Access to community spaces where you can gather with your neighbours and friends/relatives	☐	☐	■	☐
4. Cleanliness of streets	☐	☐	☐	☐
5. A feeling of belonging to the neighbourhood	☐	■	☐	☐
6. A good relationship with neighbours and community	☐	☐	☐	☐
7. Proximity to employment opportunities	☐	☐	☐	☐
8. Proximity to primary & secondary schools	☐	☐	☐	☐
9. Proximity to healthcare facilities	☐	☐	☐	☐
10. Sense of safety and security				

Statutory Declaration

Schriftliche eidesstattliche Versicherung für eine Einzelarbeit
Statutory Declaration for an individual work

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Leipzig, 10th August 2020 ..... Subhashree Nath .....

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Place, Date

Unterschrift (Vor- und Nachname)
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