EXPLORING ANTICIPATED BEHAVIOR CHANGE DUE TO SLUM UPGRADE PROGRAM: A CASE STUDY OF KATHPUTLI COLONY, DELHI, INDIA

By

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"To my parents"
ACKNOWLEDGMENTS

I would like to thank my parents, Sneha and Sunil Bhutada, for encouraging me to pursue my graduate degree and supporting me in all ways in my hard times. I would like to thank Jocelyn Widmer for believing in me as well as guiding me throughout my research study. I would also thank Abhinav Alakshendra for encouraging me and showing me the different perspective to look at informal settlements. Lastly, I would like to thank my friends Chirag, Lalit, Abhishek and Pooja who were always there when I was disheartened and lost.
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<td>CFAR</td>
<td>Center for Advocacy and Research</td>
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<td>DDA</td>
<td>Delhi Development Authority</td>
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<td>DON</td>
<td>Disease Outbreak News</td>
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<td>DUSIB</td>
<td>Delhi Urban Shelter Improvement Board’s</td>
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<td>HPPI</td>
<td>Humana People to People India</td>
</tr>
<tr>
<td>HUDCO</td>
<td>Housing and Urban Development Corporation</td>
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<td>IADB</td>
<td>Inter-American Development Bank</td>
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<td>KIP</td>
<td>Kampung Improvement Program</td>
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<td>MCHS</td>
<td>Markandeya Co-Operative Housing Society</td>
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<tr>
<td>MHUPA</td>
<td>Ministry of Housing and Urban Poverty Alleviation</td>
</tr>
<tr>
<td>NPE</td>
<td>New Political Economy</td>
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<td>PMGP</td>
<td>Prime Minister Grant Project</td>
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<td>RUIDP</td>
<td>Rajasthan Urban Infrastructure Development Program</td>
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<tr>
<td>SDG</td>
<td>Sustainable Development Goals</td>
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<tr>
<td>SPARC</td>
<td>Society For the Promotion of Area Resource Centers</td>
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<tr>
<td>SUP</td>
<td>Slum Upgrading Program</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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Individuals living in informal settlements experience a lack of resources. The Sustainable Development Goals (SDG) enhance the slum upgradation policy using global goals that had been set up by United Nation for developing countries. Slum-free cities, a new agenda has been adopted by Rajiv Awas Yojana (RAY) in India. Indian cities are developing with the aim of slum-free cities by creating a special slum redevelopment committee. These committees are responsible for the physical redevelopment and maintenance of new development.

Slum Upgradation Program (SUP) enhance a community’s quality of life to enjoy health and environmental benefits, enhanced socio-economic upliftment, and increased property values. Evaluation of potential impact factors through direct and indirect outcomes serves as an excellent way to promote the behavior changes in new redevelopments. Participation of the residents and local NGOs in the designing phase are vital factors for the successful redevelopment of any slum. However, if both are not involved, most of the outcomes fail, resulting in unsuccessful SUP. Consequently, analyzing the needs and preferences of the dwellers is prominently important for the
successful long-term planning and designing of the slum and hence long-term planning of the city. This paper will propose a method to monitor and evaluate the indicators and targets that are responsible for behavior change to frame the comparative and predictive study research. This paper investigates the anticipated potential behavior change by comparing the outcomes that have been announced by the developer in Kathputli colony and the results found in former cases including slum redevelopment and the US research studies that were conducted to study the built environment and human behavior. The uniqueness of this paper is that it studies the anticipated changes in the SUP. This paper studies the Kathputli colony in Delhi, India as it is the first in-situ redevelopment in Delhi and is considered to be the pilot program. This in-situ redevelopment was proposed in 2007 and the project was commenced in 2009, with demolition started in 2017.
CHAPTER 1
INTRODUCTION

The National Sample Survey (Census of India, 2012) estimates 65.49 million people live in 13.92 million households which contributes to 5.4% of whole country’s (India) population and 17.4% of urban population in 2011. There is a possibility that this number will go up if interventions and policies are not made sooner. The increasing number of slum dwellers will correspondingly increase health issues, space issues and overcrowding in an informal settlement and this shows the necessity of slum upgradation to improve the standard of living in urban slum areas.

Industrialization in urban areas in the 20th century attracted poor families from rural regions in search of work and money, but this urbanization was unplanned and hence cities were unable to accommodate these immigrants. This was the beginning followed by increased health issues (communicable diseases, non-communicable diseases) as well as social issues (crime rate, economic and land issue). (Mutatkar, 1995)

According to Mutatkar (1995), Mumbai city had 300 families’ coming every day in search of livelihood, but the city could not cope with unplanned growth and they lacked water demand by 30%, sanitation needs as were able to provide only 100,000 toilets in a slum areas and transportation services as it required serving 3.5 million workers in the 29km² area.

Figure 1-1 represents criterion of slum households in 8 Indian cities that varies between the national census and UN-Habitat. In Hyderabad and Chennai, the difference is 4 times, though the author has experienced problems with original data such as undercounting because of the missing population and lack of granularity. The
granularity lacks due to the differences of slum definitions in national census and UN habitat and hence the estimate of the slum in a city. Census estimate slum population using the 2001 definition of slum which measures 24 factors such as personal enumerates, rural-urban areas, literates, main workers, sex ratio etc. whereas UN habitat adopts a different definition of slum which involves tenure of land. (Lucci, P., Bhatkal, T., and Khan, A., 2016).

Figure 1-1. “Share of households classified as ‘slum’ in Indian cities, by definition, (2005-2006)” (Adopted from “Are we underestimating urban poverty?” (2016). (pp.299). Lucci, P., Bhatkal, T., and Khan, A.)

Poverty and slum are two different areas and they are differentiated by economic and health status because they vary in both areas. People living in the slum are not necessarily living in poverty and vice-versa. Poverty is defined based on nutritional status outcome and they earn around $1 per day whereas Indian census 2011 states that a slum is residential areas where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the
safety and health. UN-Habitat defined slum places are not necessarily slummed under Indian census. Authors give three reasons for different health outcomes in slum and poverty areas, first slum areas are suffering from neighborhood effects because of “due to poor sanitation, second any interventions made will benefit everyone in the slum, and third, the interventions (social and health) made in non-slum areas will not work in slum areas. (Ezeh, Oyebode, Satterthwaite, 2017). The definition varies with the country, state or city. (Nolan L., 2015)

This thesis explores the interventions that can be made to upgrade the health and safety of informal settlements. This study involves the researcher reviewing few case studies and the interventions made in the past SUP. Moreover, this paper monitor and evaluate the performance of various indicators as well as explore the behavior changes by evaluating the impacts of the slum upgrading program on the dwellers. The Kathputli colony case, first in-situ redevelopment in Delhi, is being evaluated in this paper. It is a private partnership project introduced in the Masterplan of Delhi 2021. Ideally, this paper compared what happened to the improved household with what would happen in the under-development project.
Figure 1-2. Map showing location of Kathputli colony slum (Google Map, 2017)
CHAPTER 2
LITERATURE REVIEW

Real Life Situation: Slum Health

UN-Habitat states that slum is an area having inadequate access to safe water and sanitation, and inadequate infrastructure and housing, overcrowding, lack of safety (UN-Habitat, 2016). The evidence can be seen in underdeveloped and developing countries such as South Africa, India, Indonesia, etc. In the Global Burden of Disease report (2013), slums have not been identified as “a determinant of health” which means the health of the dwellers is considered not to be influenced by various factors such as behavioral, biological and, environmental and it is overlooked in underdeveloped and developing countries. According to UN habitat definition, in Indian cities like Chennai, Hyderabad, and Delhi, most of the slum dwellers are spread around the city, in places which are not even categorized as slum as per Indian standards. These are poverty-stricken places. (Lucci and Bhatkal, 2016).

Poverty is directly related to slum settlements. The slum has been seen settling near the workplaces which affect real estate land values, higher at the central locations and lower at the perimeter. This increase poverty leads to “income and health inequalities” and results into “poverty trap”. (Ezeh, Oyebode, Satterthwaite, 2017)

Most common outbreaks of communicable diseases in the slum are diarrhea, dengue, and pneumonia. The factors such as the physical environment, social interaction, geographic factors, and institutional factor contribute more towards the illness occurring among children. Children are vulnerable to gastrointestinal infections (Ezeh, Oyebode, Satterthwaite, 2017) and mortality rates of children under age 5 due to diarrhea and pneumonia is very high (Black RE, Morris SS, Bryce J, 2003).
Stunting and cognitive impairment are commonly seen in children living in slums due to the lack of nutrition, and breastfeeding and hence child health in the slum is worse than the rural areas. Slum dwellers are susceptible to the injuries caused by fire, natural calamities, as well as high crime rates due to shared physical and social environment. (Ezeh, Oyebode, Satterthwaite, 2017)

Table 2-1. General and slum-specific evidence of neighborhood effects (Adapted from: The history, geography, and sociology of slums and the health problems of people who live in slums. (2017). (page no. 6). Ezeh A, Oyebode O., Satterthwaite D.))

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<td><strong>Physical Environment</strong></td>
<td><strong>Social Interactions</strong></td>
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<td>The risk of childhood illness in Indian families is more strongly associated with a neighbor’s defecation patterns than with the family’s defecation behavior.</td>
<td>Findings of an experimental study in the USA showed that providing vouchers to move to a better-off neighborhood improved health in the short term, and young children’s prospects in the long-term.</td>
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<td>Slum environment and water supply are heavily contaminated with feces in many slums.</td>
<td>Crime rates vary substantially among slums, reflecting different cultures that have developed within them.</td>
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<td><strong>Geographic Factors</strong></td>
<td><strong>Institutional Factors</strong></td>
</tr>
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<td>Poor people in rich cities in the USA have better health than equally poor people in poor cities</td>
<td>Teachers can have lower expectations of pupils who live in poor neighborhoods</td>
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<td>Many slums are exposed to geographic hazards, such as flooding, subsidence, and local pollution from factories.</td>
<td>Some slums are stigmatized so that residents’ rights are infringed to the point of expropriation.</td>
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According to WHO/United Nations Children’s Fund (UNICEF) and the Joint Monitoring Program (JMP)

Improved sanitation facilities are those designed to hygienically separate excreta from human contact. These include wet sanitation technologies (flush and pour flush toilets connecting to sewers, septic tanks or pit latrines) and dry sanitation technologies (ventilated improved pit latrines; pit latrines with slabs; or composting toilets)

(Watson et al., Main report, Pg. 12)

Lack of availability of water results into uncleaned latrines in a slum area and forces people to defecate in the open (Mutatkar, 1995). The epidemics spread faster in slum areas, there are more than 50 cases of epidemics worldwide in 2017 (only 1 in India) and every year the number is same or more (Disease Outbreak News, WHO). Uncleaned surrounding/ gathering of debris and inadequate housing styles are main factors to give birth to the pathogens that lead to infectious diseases as a result of the presence of rats in the debris and formation of bacteria in the water and mud accumulation (Ezeh, Oyebode, Satterthwaite, 2017). Dengue is one of the thriving infectious diseases in slum caused by the vector, Aedes mosquito (WHO).

Available Health Care Facilities

Modern public hospitals, private hospitals, and government dispensaries are available within cities. Public hospitals provide the services at reasonable rates, but the workforce is limited, traveling time to hospitals is high, and waiting time is lengthy, so people prefer private hospitals (Mutatkar, 1995). For the people in a slum, distance and cost can be an obstacle for usage of health services (Lilford, et al., 2017). The attitude of health service provider should be positive towards slum health protection because mortality rate in the slum is higher and it requires immediate attention.
UN defines pit latrines as a form of improved sanitation but Lilford (2017) states that pit latrines are not very helpful in improving the health of the slum because of lack of hygiene education and the poor maintenance services. A study in Odisha (India) shows null results for the utilization of pit latrines because people were not using those facilities for two main reasons, poor maintenance and inadequate set up (Clasen et al., 2014).

**Government and Community Participation**

In the health and wellbeing of the country, slum health has received limited attention from the government. In situ development is beneficial for slum health and safety but sanitation in the slum is a challenge still today. Figure 2-1 represent a "three-level generic casual model" that the authors have used in slum upgradation research. The macro level involves politics and economics affecting all the citizens. Meso-level involves policies for slum. Micro-level involves the interventions in the slum. (Lilford, et al., 2017)

Figure 2-1. Representation of causal pathways affecting the lives of people who live in slums. (Adapted from paper Improving the health and welfare of people who live in slums. (Page 561). Lilford, R.J., Oyebode, O., Satterthwaite, D., et al., 2017)
Inappropriate or inadequate planning by government causes mass slum aggregation and hence it becomes harder to maintain the unplanned growth in the city. Local governments make sure that the projects of land development for slums are not being a money-making business but upgrading the slum for the long term. This form of development can be successful or unsuccessful depending on the corruption and incompetent government. In cities such as in Brazil (Porto Alegre and Belo Horizonte) a successful development has been achieved because local government strived to ensure that the land market does not favor the rich people and also do not let the poor people get affected by high prices. (Lilford, et al., 2017)

Subbaraman (2012) states that being notified, or un-notified slum is important from educational and health point because if the slum is un-notified by the government, it is hard to provide benefits to the dwellers. In Kaula Bandar (un-notifies slum in Mumbai), the mortality rate was 58% compared to the Mumbai slum (notified slum) 28% (Subbaraman, et al., 2012). This defines the lack of education and health safety in the Kaula Bandar slum. Indian cities face the slum problems because half of the slum areas are un-notified unlike Chinese cities, people must register for basic amenities if they migrate to new cities (Qiu, P. et al., 2011).

Many Non-Government Organizations (NGO) are coming forward to help informal settlements to educate people and to promote community engagement. Interventions are used to encourage local engagement, activities within community, and innovations. In slum upgrading physical and engineering interventions can fight the issues with unsatisfying water quality, and sanitation and indirectly tackles the infectious diseases, such as diarrhea (Lilford et al., 2017). A successful intervention using cement
floor was implemented under “Piso Firme (solid floor) Program” in Coahuila, Mexico by a child health foundation and it resulted in reduced diarrheal infection in children in the Coahuila. The success of the program encouraged the intervention of cement floor countrywide in Mexico. (Cattaneo et al., 2009).

**Background**

**Known limitations:** Many interventions had been done for slums in different countries. These interventions mainly focus on water, sanitation, house improvements, lighting, road repaving, garbage disposal and health and public services. The improvement has been seen in India from 1980s, the number of latrines has been increased in slum areas (Mutatkar, 1995). Behavioral interventions have been made within the slum to promote healthy individual’s habits to improve public health, for example an intervention to wash hands is made in different pediatric studies and it resulted into the reduced prevalence of diarrhea in Pakistan and Nepal. (Bowen et al., 2012)

Migration is not the main carrier for continued slum enlargement because slums will grow even if the economic growth of the underdeveloped countries is stationary and it creates a poverty trap in advanced urbanized countries (Ezeh et al., 2017).

“Resettlement and relocation” (Lilford et al., 2017), is a program that provides a substitute living environment and is effective for countries with lower population like the US but not efficient for populated countries such as India because it lacks the resources and political stance, as well as the authors, says that most people will return to their original places (Barnhardt, Field, Pande, 2015). This program is preferable in the cases of deficient infrastructure development and in-situ slum upgradation policy (Collins and Shester, 2013). “Title and Tenure” policy encourages in situ development by offering
title to the people in their home and communities whereas in countries like India proving
a security of tenure without a title is more than sufficient because the lands are disputed
(Lilford, et al., 2017). A study in Peru shows that people in slum areas do not secure a
tenure because they do not invest unless they feel security against summary eviction
(Buckley, Kalarickal, 2005).

Case Studies of Slum Redevelopment

Rio de Janeiro Urban Upgrading Program, Brazil

In 1970, Rio de Janeiro Urban Upgrading Program was implemented to relocate the *favelados* (slum dwellers) to the outskirts of the city in high rise building by demolishing Rio Catacumba favela (Perlman, 2009). The objective of this project was “to improve living conditions of the urban poor by upgrading basic infrastructure and increasing the supply of urban and social services in targeted neighborhoods” (Perlman, 2009). The main objective was to reduce the risk of geological and environmental accidents such as landslides and floods, transit access, reduce the incidence of vector-borne disease, and increases usage of public services (Soares, 2005). The project was worth $300 million out of which Inter-American Development Bank (IDB) funded $180 million, and it constituted an urban sector initiative and a poverty improvement effort. Out of 5.4 million people in Rio de Janeiro, 25% people lived in a favela (slum) or unauthorized colonies. The executive summary (1995) of Rio De Janeiro Urban Upgrading Program states that they had invested to improve basic sanitation, street systems, drainage, garbage collection systems, public lighting, hillside stabilization, reforestation, child care centers and land legalization (Perlman, 2009).
This project was led by a development bank but later it was handed over to the Brazilian government and it became a fully government driven project. In the first phase of the project, it achieved almost 90% of its goal. Soares and Soares (2005) say that out of 54 favelas 38 were intervened successfully. The problem arose when the data collection agencies lost the evaluation data of the interventions. So, the major issue of the program was incomplete components of monitoring and evaluation which delayed program evaluation activity. The second phase of the project was focused on child health and education and housing value. According to Soares (2005) analysis, the impact of the sanitation was significant.

Soares and Soares (2005) found through a statistical analysis that sewer access increased between 17% - 23.5% whereas water access varied from 6.4% to 8.1%. However, while there were improvements in sanitation and water, the childhood mortality rate did not change. Impact evaluation of both phases could not be measured and hence an evaluation strategy was not provided to a comparison group that would form a counterfactual. Moreover, there was no data showing the improved health outcome and quality of life in the communities. On the basis of qualitative data, the author assumes that the key goal of integrating the favelas into the urban fabric has been achieved. (Tulier, and Gossman)

Perlman (2009) reports economic repercussions in Rio de Janeiro, the added expenses after the upgradation program were causing a net loss of household incomes. The expense includes mortgage for houses, payment of water, electricity and other services as well as time and money required to travel to the work site. Moreover, the executive summary (1995) mentions the conditions for relocation which involves
relocation based on the income levels. Perlman (2005) claims that this relocation disturbed the social and cultural life and did not integrated the *favelados* but segregated them from many urban amenities and hence there was the illegal growth of new developments and an increase of crime rate. Moreover, there was positive impact of improved water quality and sanitation on children’s health in Rio De Janeiro, the issues related to the poor quality of construction started to appear and it created suspicion among the favelados to pay the long-term mortgage (Perlman, 2005).

Table 2-2. Evaluation of Rio de Janeiro urban upgrading program, Brazil

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>Infrastructure, Urban and social services, Poverty</td>
<td>Water access, Paved street, Nurseries, Health and education</td>
</tr>
</tbody>
</table>

**Kampung Improvement Program, Indonesia**

Kampung Improvement Program (KIP) was started Jakarta in 1969. The main objective of the program was to improve the quality of life of urban *kampungs* (slum) and reduce the urban poverty. After the success in Jakarta, the program was spread in the country and it was one of the successful nationally implemented slum upgrading program. This program started under First Five-Year Development Plan of the country. The central government of Indonesia, the local government of Jakarta and the World Bank funded this program for 14 years from 1974 to 1988, as the World Bank had prioritized urban development in Indonesia for that period. (Das. 2008)

Andavarapu and Edelman (2013) state that the aim was to improve the physical conditions of the dwellers so that the housing would improve and simultaneously uplift the socio-economic status. Initially, for ten years, KIP focused on infrastructure
development in public spaces and then slowly turning towards child health. Das (2008) in his dissertation found out that KIP has been implemented around 800 cities in Indonesia in 30 years and for easy implication, the program was designed in a way that allowed advanced implementation, because of the low cost and simple technology. Das (2008) discusses that “traditional Indonesian societal customs of deliberation and discussion, community mutual self-help, reciprocal assistance and volunteering for community activities” broadly contributed towards the success of the program in reducing the poverty.

Table 2-3. Evaluation of kampung improvement program, Indonesia

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>Physical infrastructure,</td>
<td>Water access, Paved street, Toilets, Houses</td>
</tr>
<tr>
<td></td>
<td>Poverty, Community</td>
<td>Socioeconomic, Infrastructure (water access/ drains/ garbage bin), infrastructure (road), Housing, Health</td>
</tr>
</tbody>
</table>

Markandeya Project in Dharavi Slum, Mumbai

Appadurai (2001) states that as the largest populated city (over 12 million), Mumbai (India) consist of around 40% of slum population (6 million) and the 2016 census shows this population has increased to about 20 million with 41.3% people living in a slum (World Population Review, 2018). Dharavi in Mumbai is known as one of the largest slums redeveloped in Asia. The Dharavi Redevelopment Project was very important from an economic point for the city because it is located in the heart of the city and many small businesses were situated there and the future redevelopment and future strategies to approach slum growth were also dependent on this project (Patel, and Arputham, 2008).

Markandeya slum is part of Dharavi slum area, the whole area was affected by the mosquito-borne disease malaria and it was unsuitable for development. Yet with
time the city of Mumbai grew so fast and that too around Dharavi slum that Dharavi became the center point of the city and for local businesses. In 1988, under India’s Prime Minister Grant Project (PMGP), a central agency created to run the slum redevelopment program, the Markandeya slum was chosen for redevelopment. The redevelopment initiative was taken by the Markandeya Co-Operative Housing Society (MCHS) with the help of a local NGO, Society for the Promotion of Area Resource Centers (SPARC) without any international support such as World Bank. (Andavarapu and Edelman, 2013)

SPARC is globalized NGO which means it is connected to foreign countries and can develop funds from those countries. SPARC involved the residents and took their opinion in the design phase. While conducting the Markandeya project, MCHS and SPARC had to deal with PMGP during the period of 10 years of redevelopment on various issues such as financial and housing unit issues. This differences between SPARC and PMGP led to frequent changes in the initial project. The initial project involved low rise building with 94 units and public toilet and community terrace. Over ten years, land regulations changed to higher density and the project was finalized as high rise building with 180 units and private toilets. Mukhija (2003) describes the challenges faced by the NGO SPARC for the redevelopment of Markandeya slum. This project is an example of projects “based on the theoretical backdrop of New Political Economy (NPE) where NGOs play a key role in redevelopment efforts, and the emphasis is on decentralization” (Andavarapu and Edelman, 2013). Even though the project was eligible for a low-income housing loan from Housing and Urban Development Corporation (HUDCO), a collateral was demanded from SPARC in 1992. Moreover, in
1993, the construction cost of the project increased, and SPARC had to decide whether to loan more money or build more market-rate units. MCHS decided to build additional units to take out the burden of the residents. Despite all the hard work and challenges, the first resident moved into the new apartments in 1998. From this case, it can be concluded that even though decentralization policy increases direct decision-making opportunities and responsibility of the participant, decentralization in slum redevelopment may lead to financial and physical conflicts on claiming newly built high-value property assets to decide and divide the share of benefit. (Mukhija, 2003)

Table 2-4. Evaluation of markandeya project in dharavi Slum, Mumbai

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>India Housing, Land tenure</td>
<td>Houses, Toilet, Community terrace</td>
<td>Housing, Land tenure, Legal structure</td>
</tr>
</tbody>
</table>

The Rajasthan Urban Infrastructure Development Program (RUIDP)

Jaipur has a population of 3.1 million people with 10.62% of people living in a slum (census 2011). Being about 160 miles away from country's capital city Delhi, Jaipur city has been developing very fast in terms of economic activities, real estate investments, and new businesses. The city is not able to cope with the fast growth and hence could not provide the basic amenities mainly water to all people especially slum. To fulfill the water need, women have to go far to fetch the water for their families and it has resulted in the consumption of unsafe water by slum dwellers. Three institutions have been striving for slum improvements: the Government of Rajasthan, Humana People to People India (HPPI), and Center for Advocacy and Research (CFAR) in Jhalana Doongri and Manoharpura slum. (Parmar, M.S.)
RUIDP is a state level program created for six cities in 2001. The main objective of this urban infrastructure development program was to develop sewage and water supply management for the city (Parmar, MS).

The intervention has succeeded as per the RUIDP website declares that: The impact of CAPP activities under RUIDP motivated the community for the sustainable development of facilities created by RUIDP. The public was motivated for taking sewerage connections, proper disposal of solid waste, hygiene, conservation of drinking water, aware and follow the traffic rules, conservation of heritage structures. Several campaigns, seminars, orientations, training were organized at different levels on various facets health, hygiene, water and sanitation, solid waste management, sewerage, property connection, road safety and other RUIDP related sector.

But the actual scenario has not been changed much because of some barriers such as cost and maintenance so not many people are using the sewer connections and hence some people are still defecating in open out of which women have to face many abuses. (Parmar M.S., pg. 8)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>India Infrastructure, Community, Health</td>
<td>Sewerage, Hygiene, Sanitation, Safety</td>
<td>(Mixed results)</td>
</tr>
</tbody>
</table>

**Case Studies of Built Environment Affecting Human Behavior**

In the United States, there has been many studies that are focused on the human behavior due to the interventions in built environment. For example, a research by Handy and authors (2002) had studied the built environment to find out the walking and bicycling behavior of people. The authors found out that walking and bicycling are very popular only if they are not compared with the other modes of transport such as car, airplanes, train, etc (Handy et. al, 2002). Few more interesting research studies from the US are discussed in this section.
A research study conducted in Northern California by Handy and authors (2005). This research studied association of travel behavior to built environment. This study addressed two hypotheses. First, a well design of built environment where the destinations are closer and viable transportation services are available tends to drive lesser comparing to the places that lacks both, distance to destination and transportation services. Second, when people move to well built environment where destinations are close with the available services, a tendency to drive decreases. To study these hypotheses, few factors have been studies through surveys, they are accessibility, physical activity option, safety, socializing, outdoor spaciousness, attractiveness, pro bike/ walk, car dependent, etc. The results shows that the neighborhood with lesser density, land use, transit services and pathways drives higher than the traditional neighborhood. (Handy et. al, 2005)

Another research study conducted in Austin, Texas (2006) by Cao and authors. This paper studied the influential factors on pedestrian behavior. In the Austin, 6 neighborhood areas were selected. The neighborhoods were divided in pair wise according to their development era such as 2 from traditional neighborhood era (20th century), 2 from early modern era (1950-70) and 2 from late modern era (after 1970). The strolling trips as well as shopping trips were surveyed in those neighborhoods. Moreover, characteristics of the neighborhood street system and street characteristics (such as safety, shade, houses, scenery, traffic, people, store location, walk comfort and advantage) were studied in each neighborhood. Additionally, the authors studied the preferences of residents. The study found that not only built environment, but residents preferences also has huge part on pedestrian behavior.
One more interesting research conducted to study the environment effect on the availability of physical activities and obesity. A cohort study conducted where distribution of physical activity facilities and access to those activities were sought and finds the effect of lack of access to these activities on overweight among the population. To study effect on physical activities and obesity, communities were divided according to there socioeconomic status such as high and low socioeconomic status community. This study concluded that low socioeconomic status communities has higher rate of obesity and lesser physical activities as these areas lack availability and access to the facilities whereas higher socioeconomic status community has 1 or more facilities available. (Gordon-Larsen et. al, 2006)

Summary

For SUP a proper planning is needed including defining indicators, finding outcomes and final outputs. Indicators give a brief idea of the intervention, Output is the expected results of the intervention and outcome are the actual results of the intervention over few years after completion of project. The literature review presented introduces readers to the importance of build environment in the human behavior. This it also shows the various indicators, output and outcome of a SUP, the role of community involvement in the design phase of the SUP, the advantages and dis-advantages of centralized (government taking responsibility for SUP) and decentralized (local NGO taking responsibility for SUP) approach, and an overview of the issues and challenges faced while redeveloping the slum. More importantly, it tells the story of behavior changes happened over time such as the success of the SUP due to the involvement of the dwellers, lack of trust and stress due to doubtful land tenure, finding new places to settle due to the uncomforted new redevelopment. Collectively, these themes highlight
the importance of analyzing behavior changes in slum areas that are directly related to government and community participation for slum upgrading initiatives because the residents know their requirements for living more than the developers as well as the paper emphasize the outcomes that have been studied from various scholarly articles that examine the positive and negative impact of the redevelopment on the community. Moreover, the case studies examine the outcomes of different programs and the financial, physical challenges that have been overcome.

Figure 2-2. Outline of slum upgradation process
CHAPTER 3  
METHODOLOGY  

Process of Evaluation  

In an attempt to study the impact evaluations of slum upgrading interventions, this paper implements a modified version of a methodology originally conceptualized by Erica Field (2006). This paper encompasses a comparison of case studies to obtain an average impact of slum upgrading program on an informal settlement. In this method of Comparative Framework and Predictive Framework, results from a similar slum which underwent the same development are compared with Kathputli colony to identify future issues that can be applied to Kathputli. The analysis will provide the change of behavior and responsible factors in a slum in developing countries, in this case, Kathputli colony in Delhi. Erica Field discusses the process as “to obtain the average impact of the program on a group of individuals by comparing them to a similar group of individuals who were not exposed to the program”, yet this process is modified. Kathputli colony is undergoing the new in-situ redevelopment, so the indicators and outcomes that have been proposed are being studied and the behavioral change will be discussed.

Three overlapping targets for SUP that were used to extrapolate varying outcomes of the project are:

1. Ensure availability of basic amenities and adequate housing;
2. Provide special attention to sanitation (water quality and waste management), because of their collective environmental contribution to infectious disease outbreaks;
3. Provide safety and wellbeing of people and accessible green and public spaces.
In the first target, infrastructure is analyzed to understand how the basic amenities will change the behavior and reduce the infectious disease diarrhea. The second target focuses on the sanitation where behavior change due the improved water sources and proper sewage management system is studied. The third target focuses on the behavior change due to improved corridor including green/ open spaces. All these targets are revolving around one infectious disease which is diarrhea.

In order to extrapolate these interventions, data from the different successful and failed slum upgradation projects was studied to perform comparative framework and create data prediction models.

Figure 3-1. Target and indicators to evaluate anticipated behavior change
Table 3-1. Tabular form of evaluation of targets and indicators

<table>
<thead>
<tr>
<th></th>
<th>Ensure availability of basic amenities and adequate and affordable housing</th>
<th>Infrastructure: roads, building, energy source</th>
<th>accessibility to places</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide special attention to water quality and waste management</td>
<td>Sanitation: individual toilet, Individual water source</td>
<td>Accessibility to water, Quality of water, improved hygiene, Improved habits,</td>
</tr>
<tr>
<td>2</td>
<td>Provide safety and wellbeing of people and accessible green and public spaces.</td>
<td>Build environment, green Corridor</td>
<td>Clean neighborhood, clean air, reduced diseases</td>
</tr>
</tbody>
</table>

**Analysis of Interventions and Behavior Change**

**Reviewing documents:** According to the National Census (2012), National Capital Territory of Delhi has the highest population density in India. In 2012, Delhi housed for 22 million people. According to the Ministry of Housing and Urban Poverty Alleviation (MHUPA), Delhi is the second most populous city in the world after Tokyo (UN 2014). Slum Upgradation policy was integrated into the Masterplan of Delhi 2021 and under that, the Kathputli colony was selected for the redevelopment. Lack of resources caused negative health impact on children of Kathputli colony. Inadequate sanitation, open defecation and stagnant water caused infectious diseases. Lack of proper housing structures resulted in dampness and overcrowding. Shortage of energy resources (like proper nutrition, clean water) also affected the growth of these children. (Lubby et al., 2004)

Kathputli colony, under a public-private partnership, was chosen to be rehabilitated in 2007 by the Delhi Development Authority (DDA). In 2009, the Raheja developers won the bidding for the in-situ rehabilitation project in Kathputli colony. The rehabilitation project consists of three phases. The first phase involved assigning a
temporary shelter, in a transit camp, to the eligible families who are living in Kathputli for more than 10 years. This phase has started in Oct 2017 and around 1300 families are moved to the Anand Parbhat transit camp. The second phase, which is yet to begin, is in-situ redevelopment and construction of high rise building. The last phase will be allotment of the newly constructed apartments to these dwellers.

The in-situ redevelopment involves 2800 apartments with apartment unit minimum of 30.5 sq. m. which includes a room of 9 sq. m., a multipurpose room of 6.5 sq. m., a bath and WC of 1.2 sq. m., and a kitchen of 3.3 sq. m. with other important neighborhood-scale amenities, including a school and health center.

Figure 3-2. Typical layout of a unit in redevelopment "Details of dimensions of a typical flat," towards a slum free Delhi, accessed February 15, 2018, http://www.kathputlicolonydda.com/proposed-units.asp.
<table>
<thead>
<tr>
<th>Indicators</th>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hygiene- Healthy Lifestyle</td>
<td>-Housing</td>
<td>-Cleanliness</td>
</tr>
<tr>
<td></td>
<td>-Individual bathrooms and Toilets,</td>
<td>-Improved health</td>
</tr>
<tr>
<td></td>
<td>-Accessible water</td>
<td>-Land tenure</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>-Green parks,</td>
<td>-Part of the urban sector</td>
</tr>
<tr>
<td></td>
<td>-Religious structures,</td>
<td>-Safety and security</td>
</tr>
<tr>
<td></td>
<td>-Open-air theatres,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Police station,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Fire station,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Parking facilities,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Multipurpose hall,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Community development center,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Electric substations,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Medical center,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Health care center</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Shops for daily conveniences</td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial Assistance</td>
<td>-Exhibition spaces for local Arts and Crafts,</td>
<td>-Wellbeing</td>
</tr>
<tr>
<td></td>
<td>-Open-air theatres for performances,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Storage spaces for artifacts to showcase and sell and/or export the art and handicrafts to visiting tourists</td>
<td></td>
</tr>
<tr>
<td>Socio-Economic Upliftment</td>
<td>-Adequate facilities and provisions for the artist to practice and perform their art,</td>
<td>-Income</td>
</tr>
<tr>
<td></td>
<td>-Display areas to showcase the artifacts to sell and export,</td>
<td>-Community</td>
</tr>
<tr>
<td></td>
<td>-An amphitheater to conduct large public performances,</td>
<td>-Education</td>
</tr>
<tr>
<td></td>
<td>-School site,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Playground,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Multipurpose hall,</td>
<td></td>
</tr>
</tbody>
</table>
Monitoring and Evaluation of Indicators of Behavior Change

Infrastructure

Reflecting on the high population in Delhi, spillover has a significant impact. Kathputli will be surrounded by wealthier neighborhood and due to that the slum is going to experience many positive spillovers such as high land value, reduction of crime rate and access to roads, green spaces etc. whereas, improved infrastructure can directly affect the intra-household bargaining due to increased financial burden after change in the style of living. The improved infrastructure also creates gender issues such as divorces. The DDA has approved the unit plan of 30.2 m² for each family inclusive of 1 bedroom, 1 living room and 1 WC/ bathroom which is enough space for a family of 2-3. Due to the lack of space, reduction in the household sizes might occur through increased of feticide or divorces in the Kathputli colony. Improved infrastructure will increase the confidence of the dwellers within the community and reduce the fear of social exclusion.

The Infrastructure will involve changes such as high-rise building, better roads and power supply for everyone. The slum dwellers are used to living on the ground in their private houses and now they have to shift into these high-rise buildings. The change is big as the people have never used an elevator and never lived on a height. Previously, the dwellers were living in Kachha houses built using mud and brick and now the structure will be made of concrete and hence the people will have Pakka houses. The slum experiences flooding in monsoon season, where the rainwater, mixed with garbage and fecal matter enters into the houses of the dwellers. The main reason being the lack of infrastructure (proper sewage drains) which leads to over clogging of drains. The cement floor will definitely reduce the child illness, especially diarrhea as it
provides a solid platform where water cannot be saturated, lowering the chances of infectious diseases.

Due to the wealthy neighborhood, the new patterns of roads will improve the accessibility to places. Roads in Kathputli colony were mere walking trails made by the dwellers. These trails were filled with garbage and at some places came in direct contact with an open gutter/ drains. The open drains increased the spreading of infectious diseases such as diarrhea among the dwellers. The new development will build a paved road and the roads will be kept clean as DDA has taken the responsibility of maintenance in Kathputli colony. The new drainage system will reduce the infectious diseases as the drains will be properly covered.

The dwellers were using contaminated water for bathing, which could be a reason for chronic diarrhea among children. Heating the water using Geyser or hot coil (very common in India) reduces the number of bacteria in the water. In this way, availability of power supply to the dwellers will help them get clean water for bathing purpose and reduce diarrhea.

Table 3-3. Evaluation performance of an indicator: Infrastructure

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Outcomes</th>
<th>Behavior Change</th>
<th>Potential for Improved Public Health Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Cement floor</td>
<td>-Prevention from flooding water entering the house,</td>
<td>-Reduced diarrheal disease</td>
<td>-Prevent contact with harmful germs</td>
</tr>
<tr>
<td>-High rise building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Covered drains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Paved roads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Electricity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sanitation will involve clean drinking water and proper sewage disposal in the Kathputli colony. The entire area was surrounded by debris and the garbage was not cleared on a regular basis. Moreover, they were experiencing neighborhood effect where the lack of cleaning habit in the neighbor was affecting the child's health more than the cleanliness of his own family. Here, uncleanliness involves defecation pattern, contamination of water due to feces, lack of proper disposal of water used to clean the utensils. This pattern invites the diseases in the community. The Kathputli colony lacks proper drainage line causing the saturation of waste water on the surface. The individual units have separate kitchen and bathrooms having a provision to get rid of the black water.

Lack of sanitation and hygiene are main problems in the Kathputli colony. Usually, women have to fetch the water for the whole family, no matter how questionable the quality is. The dwellers understand the hazardous effects of consuming contaminated water and hence they boil it for a longer time than usual to kill the harmful bacteria in it.

Additionally, widespread open defecation (lack of sanitation and hygiene), saturation of water in open spaces and garbage saturation in the neighborhood is the main reason of many infectious diseases (diarrhea, cholera, hepatitis, malaria) in the Kathputli colony. Even though the government has provided common bathrooms/ porta potty, cleanliness is not maintained and hence the dwellers avoid using these facilities and prefer open spaces to defecate.

The developer and DDA have designed an apartment with an individual supply line of quality water and WC for each family (2800 apartments). It will reduce household
work for women due to available services inside the house. Also, women will save time as they don’t have to go very far to fetch water and dispose the trash. Individual WC and bathrooms will be the responsibility of each family hence they need to maintain it however they need to be trained regarding the same. This will majorly reduce the illnesses that the dwellers were experiencing, especially diarrhea in children due to the improved pattern of defecation and better water sources will improve the quality of water.

Table 3-4. Evaluation performance of an indicator: Sanitation

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Outcomes</th>
<th>Behavior Change</th>
<th>Potential for Improved Public Health Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitation -Private toilet and kitchen -Individual water source</td>
<td>-Improved sanitation (clean drinking water and adequate sewage disposal) -Reduced diarrheal disease</td>
<td>-Proper disposal of Sewage -Habits of cleanliness and maintenance</td>
<td>-Potable water -Prevent contact with harmful germs</td>
</tr>
</tbody>
</table>

**Open Spaces**

As mentioned in infrastructure, positive impact on behavior change can be observed as SUP focusing on the potential reduction of infectious diseases by improving sanitation and creating local health centers. The benefits provided by the government will affect the mental health of the dwellers. Relocation of Kathputli colony to Anand Prabhat, 5 km from the original location, has caused a lot of stress on employment and social interaction due to the time consumed in commute to the city. This might result in the dwellers selling the allotted apartments illegally and migrating to places closer to their workplaces. (Dupont et al., 2014)
In Kathputli colony, open spaces only denoted stench of garbage and feces, piles of trash, saturated water and hence bacteria as the Kathputli colony lacks proper waste management system. The rain water or the black water are the main sources of stagnant water in open spaces. Due to the unavailability of garbage services, the open areas in Kathputli were filled with huge trash piles. Moreover, the open spaces were used to defecate due to lack of maintenance of public bathrooms. The decomposing garbage caused an increase in the number of bacteria and in turn infectious diseases. The garbage also consists of non-degradable elements such as plastic, causing environmental pollution. Children playing in these open spaces of contaminated mud were exposed to infections.

Provision of open/ green spaces in the proposed plan will create a healthy environment for kids free of any harmful bacteria. Green spaces keep the dwellers in a fresh environment resulting in healthy minds. Green spaces will control the infectious disease by reducing the garbage and stagnant water on the ground. The availability of spaces for the artist to practice/ perform/ sell their art keeps the artist in business and provide all the necessary objects to stabilize economically, directly improving physical and social health.

Table 3-5. Evaluation performance of an indicator: Open space

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Outcomes</th>
<th>Behavior Change</th>
<th>Potential for Improved Public Health Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Space</td>
<td>-Gardens/ Parks -Garbage disposal</td>
<td>-Improved hygiene</td>
<td>-Clean playgrounds for kids</td>
</tr>
<tr>
<td></td>
<td>services</td>
<td>-Clean environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Reduced diarrheal disease</td>
<td>-Green spaces for the dwellers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Disposal of garbage in garbage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>bins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Cleaning habits</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 4
DISCUSSION

Behavior Changes

Behavior changes are an unavoidable component to evaluate the success of a SUP. Potential impacts of infrastructure improvement are significant. The unpleasant neighborhood of contaminated water, saturated rubbish, flies buzzing over the fecal matter and mosquitoes breeding in stagnant waters make the neighborhood unhygienic. The transition from an unhygienic to hygienic environment results in positive behavior change. In Kathputli colony, the possible positive behavior changes will be as follows:

A. time for self-care as a result of reduced household work since the dwellers will have access to all the basic amenities. Improved water source will reduce the chances of diarrhea epidemics in the community.

B. cleanliness and maintenance habits will improve due to the provision of individual household comprising of kitchen and bathroom.

C. social gatherings will increase in the open spaces such as gardens and community halls, built for the same purpose. These interactions were a part of the community’s life well before the development was proposed, but the surroundings were unclean and stench all over the place. The environment people live-in affect their behavior. In the new development, the green spaces will provide attractive landscape and get rid of the unpleasant odor. Such environment will promote positive thinking in the dwellers.

D. provision of parks and gardens will help reduce the childhood illnesses in Kathputli colony. The kids who used to play in the contaminated mud and dirt, came in direct contact with hazardous germs and bacteria. Since the proposed parks will be
clean and maintained by DDA, rather than scattered with garbage and waste, the children can enjoy playing in the gardens without their parents having to worry about harmful bacteria and diseases.

**E.** financial planning will be prioritized due to the spillover effect of the wealthy neighborhood. Availability of adequate facilities and better accessibility will encourage the artists to perform and showcase their art to a wider audience.

**F.** educating the dwellers will improve their ability to think beyond, for example planning for the future. The provision for school will be an advantage for the kids in the Kathputli colony where they can learn and apply the obtained knowledge in day to day life. Kids who are helping their families in the businesses will get an opportunity to study and hence shape their careers.

**G.** The easy availability of health aid will push an individual to pay attention towards their health. The dwellers, especially women avoid going to the hospitals because the commute to the hospital is time-consuming and the waiting period at the hospital is very long. The convenience of healthcare centers in the neighborhood will motivate the dwellers to take proper care of themselves unless the hospital charges are higher.

The possible negative behavior change includes mental stress due to financial burden, explained below:

**A.** as mentioned in the clause, the dwellers will have to pay rent for the apartment unit on yearly basis, but the rent has not been notified. When the dwellers didn’t pay rent for their old houses. But now when they move to the high-rise buildings, they will have to pay a stipulated yearly rent to DDA. The dwellers even find it difficult to
make their ends meet and this rent will add to the burden. In addition to this, there will be a constant fear looming over their mind regarding the doubtful tenure of their apartment units. This will cause a fear and lack of trust in the government.

**Community Participation**

Some negative effects on sustainable infrastructure can be seen as a result of the dwellers leaving the community over time (Field and Kremer, 2006). Community participation is valuable in SUP as the dwellers needs and requirements should be understood by the developer, for adequate development. Hence the physical involvement of NGOs in meetings and events is necessary. Many SUPs like RUIDP failed due to lack of involvement of community and local NGOs in the planning and designing phase. Banda and authors (2013) indicate that instead of meeting/surveying with local people, DDA had met Pradhans to discuss the project and the dweller’s involvement was merely a “receipt of information” regarding the envisioned project. Some dwellers even confessed that they were introduced to the DDA rehabilitation project for the first time at the commencement ceremony (Banda et al., 2013). A scheme is required to be published before finalizing and implementing it in order to receive an objection from the beneficiary (if have any) but the DDA did not follow this procedure. Additionally, the project did not comply with Rajiv Awas Yojana (RAY) as this is the first slum redevelopment in Delhi. RAY focuses on “slum free city” and shelter for every citizen with availability of infrastructure and basic amenities.

Lastly, the development process would have become easier if the DDA had taken the local NGOs on board, especially Bhule Bisre Kalakar and the Kalakar Trust. Why involvement of NGOs is essential? NGOs like the Kalakar Trust have built a school and Bhole Bisare Kalakar have provided space for artists to practice. They are raising
funds to provide benefits such as platforms to exhibit art and also, to improve the living conditions in Kathputli colony. These NGOs understand the community issues, and concerns better than DDA. On the other hand, the authorities like DDA can motivate the community to participate in the formal sectors. This can also result in integration and reduce the fear of interaction with authorities.

The Delhi Urban Shelter Improvement Board (DUSIB) was established after the Kathputli rehabilitation project began in 2007. According to the framework of DUSIB act, to undertake a project, the landowning agency needs an agreement. Had the project started under DUSIB, the land tenure could have been transferred to the dwellers and not DDA. For future tenders, DUSIB needs to compulsorily comply with RAY.

The new design proposes adequate facilities and provisions for the Kathputli artist to practice and perform their art. Moreover, upscale neighborhoods such as Raheja Phoenix will benefit the artists as the infrastructure will increase the accessibility and attract wider audience. This will eventually appraise the value of the artwork.

**Future Research**

Moving forward I would like to visit Delhi and study/ interview the people intensely to understand the behavior pattern. This paper concentrates on the conceptual and predictable framework to discuss the possible behavior change that can occur. The surveys and interviews in few years will help to gather more information.

This project is in its initial phase and it provides opportunities for prospective and retrospective study designs. The present situation implies the controversial outlook of the surveys conducted in Kathputli colony by various civil societies. Additionally, DDA is accused of not conducting comprehensive surveys. There is an opportunity to conduct surveys to evaluate the outcomes of slum upgradation in Kathputli colony to define the
success and failure of the program. To analyze the results of the program, various potential factors need to be evaluated such as ethnic tension, mobility, gender issues, mental health, formal integration, etc. Ethnic tension stratifies the impact of the program on race and ethnicity. Mobility may generate a bias in estimating the impacts, but it is endogenous to the program and produce a high rate of surveys. Gender issues such as divorces and feticide will need to be studied few years after the redevelopment as the average family is 5-6 people in Kathputli colony and one bedroom-hall-kitchen unit is not sufficient for them. Evaluation should monitor all the components by asking questions particular to urban settings, public goods, etc. It has been seen that the dwellers will not contribute themselves in the surveys as well as the housing market and residential mobility is affected by the program. Hence, the surveys might cause a bias. Some techniques such as paying the dwellers to contribute or other ways. (Field and Kremer, 2006)

As mentioned earlier, this development is an improvement of living standard (inclusive of electricity, water supply and roads) for some while degrading for others. Moreover, the developers have planned to construct the “Raheja Phoenix” (first-to-be tallest building, a skyscraper, in Delhi) next to the redeveloped Kathputli colony (Banda, Vaidya, and Adler, 2013). This can be a measure shift for the dwellers to be surrounded by the wealthier households. There is scope to study the economic shift which can be carried out over ten years.

All the evaluation for behavior change in the Kathputli colony dwellers overlaps and comes down to a single outcome which is the mental stress of security of land tenure. The civil society that studied the Kathputli rehabilitation project, main study
focus was lack of surveying and data collection accusing DDA of relying on qualitative data and quantitative analysis. Moreover, the incoming slum survey data is not even reorganized to make use of it. The demolition of the community has started and yet the survey is still in debate.
CHAPTER 5
CONCLUSION

This thesis studied the anticipated behavior changes and Potential for improved public health outcome of dwellers during the initial phases of the project by using the facts and results of former cases. When I started studying Kathputli colony, I had thought of it as a similar slum like others, where dwellers are living such a lifestyle; not out of interest but due to lack of resources. But I realized there is more to it when I did a deep dive. Most of the residents of Kathputli colony are a talented artist and sell their art for a living. But nowadays, rather than showcasing their art, they tend to do jobs (driving, plumbing) for the sheer purpose of fulfilling their everyday needs. Moreover, it is first in-situ development in the mega city Delhi and this project is considered to be the pilot project.

DDA and the developer think that providing a middle-class house for the slum dwellers is the best way of rehabilitation. All the upgradation will be significant for the dwellers but looking at the behavior change over a long period of time and considering the outcomes from the former SUP, there are some positive and negative impacts. The main behavior change anticipates after evaluating slum upgradation in Kathputli will be improvement of health and decrease in health issues especially infectious diseases because the present condition of the colony are appealing, lacking sanitation including water quality, basic drainage and disposal facilities.

Table 5-1 shows the anticipated behavior outcome after the rehabilitation. Providing Pakka houses using concrete makes a big difference in the lifestyle of the dwellers. Such houses will improve the quality of living and overall health of the dwellers. The main reason being that every family will be responsible for cleaning their
own house and the absence of harmful bacteria (which were earlier present due to the existence of fecal matter and garbage in open areas close to the house and drain water entering the slums during floods), will prevent the diarrheal diseases. Proper sanitation services including individual toilets, sewage management system, covered drains and proper disposal of waste create a clean and healthy environment for the dwellers. This will reduce the defecation and dumping of garbage in open spaces, keeping the surroundings pleasant. Moreover, spaces such as a community hall and display areas will provide an enjoyable platform for the artist’s activities. Also, the green spaces involve parks and gardens for kids which will provide a variety of outdoor equipment for kids to play. Kids can now play in the open spaces, without the fear of coming in contact with bacteria from contaminated water and disposed garbage.

Table 5-1. Thematic representation of future outcomes and behavior change

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Behavior change</th>
<th>Potential for Improved Public Health Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>After</td>
<td></td>
</tr>
<tr>
<td>-Kachha house made of mud and bricks</td>
<td>-Cement floor</td>
<td>-Prevention from flooding water entering the house,</td>
</tr>
<tr>
<td>-Flooding</td>
<td>-Covered drains</td>
<td>-Improved social amenities</td>
</tr>
<tr>
<td>-Open drains</td>
<td>-Paved roads</td>
<td>-Reduced diarrheal disease</td>
</tr>
<tr>
<td>-Improper roads</td>
<td>-Electricity</td>
<td>-Reduced diarrheal disease</td>
</tr>
<tr>
<td>-Infectious diseases: diarrhea</td>
<td>-Individual toilet and kitchen</td>
<td>-Proper disposal of Sewage</td>
</tr>
<tr>
<td>-Irregular and bad quality water</td>
<td>-Individual drinking water and adequate sewage disposal</td>
<td>-Habits of cleanliness and maintenance</td>
</tr>
<tr>
<td>-Improper waste water management</td>
<td>-Reduced diarrheal disease</td>
<td>-Potable water</td>
</tr>
<tr>
<td>-Defecation in open</td>
<td>-Improved sanitation (clean drinking water and adequate sewage disposal)</td>
<td>-Prevent contact with harmful germs</td>
</tr>
<tr>
<td>-Infectious diseases</td>
<td>-Individual water source</td>
<td>- tends to water</td>
</tr>
</tbody>
</table>

51
Table 5-1. Continued

| Stagnant water | Gardens/Parks | Improved hygiene | Disposal of garbage in garbage bins | Clean playgrounds for kids |
| Rubbish in neighborhood | Garbage disposal services | Clean environment | Cleaning habits | Green spaces for the dwellers |
| Defecation in open spaces | Infectious disease: diarrhea | Improved economy | Disposal of garbage in garbage bins | Prevent contact with harmful germs |

Delhi’s master plane 2021 and RAY (Rajiv Awas Yojana) scheme (which seeks to provide housing and tenure guarantee to the urban poor) requires the involvement of NGO’s in the planning process. In Kathputli colony, DDA made little courage to involve them and DDA did not comply with RAY. Regardless of the government’s decision to rebuild the colony, DDAs redevelopment project have many similarities with earlier unsuccessful SUPs, including lack of community involvement, NGO involvement, and communication. This is the basic foundation on which a successful SUP stands.

<table>
<thead>
<tr>
<th>Settlement type</th>
<th>Settlement Name</th>
<th>Most recent official size estimate (year)</th>
<th>Estimated population</th>
<th>Year of foundation</th>
<th>Location (Region of Delhi)</th>
<th>Location (Based on approx. distance from center of Delhi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JJC</td>
<td>Anantram Dairy Harijan Basti</td>
<td>311 jhuggis (2014)</td>
<td>1,750 –2,000</td>
<td>1972</td>
<td>South Delhi</td>
<td>Core</td>
</tr>
<tr>
<td>JJC</td>
<td>F Block Punjabi Basti</td>
<td>455 jhuggis (2014)</td>
<td>5,000</td>
<td>1975 - 1985</td>
<td>West Delhi</td>
<td>Core</td>
</tr>
<tr>
<td>JJC</td>
<td>Indira Kalyan Vihar</td>
<td>2,315 jhuggis (2014)</td>
<td>25,000 – 30,000</td>
<td>1978</td>
<td>South Delhi</td>
<td>Semi-Core/ Semi-Periphery</td>
</tr>
<tr>
<td>JJC</td>
<td>Kusumpur Pahari</td>
<td>4,909 jhuggis (2014)</td>
<td>50,000</td>
<td>1974</td>
<td>South Delhi</td>
<td>Semi-Core/ Semi-periphery</td>
</tr>
<tr>
<td>JJC</td>
<td>Sanjay Camp</td>
<td>4,250 jhuggis (2014)</td>
<td>25,000 – 30,000</td>
<td>Late 1970s</td>
<td>South Delhi</td>
<td>Core</td>
</tr>
<tr>
<td>Settlement type</td>
<td>Settlement Name</td>
<td>Most recent official size estimate (year)</td>
<td>Estimated population</td>
<td>Year of foundation</td>
<td>Location (Region of Delhi)</td>
<td>Location (Based on approx. distance from center of Delhi)</td>
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<tr>
<td>JJC</td>
<td>Jai Hind Camp</td>
<td>1,000 jhuggis (2014)</td>
<td>5,000 – 6,000</td>
<td>~ 2000</td>
<td>South Delhi</td>
<td>Semi-Core/ Semi-periphery</td>
</tr>
<tr>
<td>Re-settlement colony</td>
<td>Savda Ghevra</td>
<td>8,686 plots</td>
<td>50,000</td>
<td>2006</td>
<td>North-West Delhi</td>
<td>Periphery</td>
</tr>
<tr>
<td>Re-settlement colony</td>
<td>Mangolpuri</td>
<td>28,478 plots</td>
<td>300,000 – 350,000</td>
<td>1975</td>
<td>North-West Delhi</td>
<td>Semi-Core/ Semi-periphery</td>
</tr>
<tr>
<td>Resettlement colony</td>
<td>Madanpur Khader</td>
<td>10,484 plots</td>
<td>150,000</td>
<td>2000</td>
<td>South Delhi</td>
<td>Semi-Core/ Semi-periphery</td>
</tr>
<tr>
<td>Unauthorized colony</td>
<td>Sangam Vihar</td>
<td>No official estimate</td>
<td>1,000,000</td>
<td>1979</td>
<td>South Delhi</td>
<td>Periphery</td>
</tr>
<tr>
<td>Type of settlement</td>
<td>Population in millions (2006)</td>
<td>Percentage of total Delhi population</td>
<td>Legality</td>
<td>Individual Water Supply</td>
<td></td>
<td></td>
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<tr>
<td>--------------------------------------------</td>
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</tr>
<tr>
<td>Jhuggi Jhopri Cluster (JJC)</td>
<td>2.448</td>
<td>14.80%</td>
<td>Illegal and unplanned</td>
<td>No right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slum Designated Area</td>
<td>3.148</td>
<td>19.10%</td>
<td>Legal but unplanned</td>
<td>Right, but restricted for technical reasons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unauthorized Colony</td>
<td>0.874</td>
<td>5.30%</td>
<td>Illegal, unplanned but secure</td>
<td>No right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resettlement Colonies</td>
<td>2.099</td>
<td>12.72%</td>
<td>Legal, planned, and informalized</td>
<td>Right not delivered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural Village</td>
<td>0.874</td>
<td>5.30%</td>
<td>Zone of exception</td>
<td>Exempt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regularized – Unauthorized colony</td>
<td>2.099</td>
<td>12.72%</td>
<td>Legal but unplanned</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Village</td>
<td>1.049</td>
<td>6.35%</td>
<td>Zone of exception</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned Colony</td>
<td>3.909</td>
<td>23.70%</td>
<td>Legal and Planned</td>
<td>Good</td>
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<td></td>
</tr>
<tr>
<td>Total Population</td>
<td>16.5</td>
<td>100.00%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Settlement type</th>
<th>Settlement name</th>
<th>Water</th>
<th>Sewage and toilet</th>
<th>Drains</th>
<th>Solid waste</th>
<th>Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>JJC</td>
<td>Anantram Dairy Harijan Basti</td>
<td>NDMC pipeline with six taps in the basti, taps at the CTC, and an NDMC water tank</td>
<td>No individual toilets, all depend on a well-managed CTC</td>
<td>Underground drainage system</td>
<td>One dhalao about 50 meters away, with regular collection</td>
<td>NDMC provided but with kacha (temporary) bills</td>
</tr>
<tr>
<td>JJC</td>
<td>F Block Punjabi Basti</td>
<td>DJB tankers, tube wells, and households located in neighboring colonies</td>
<td>One CTC that is poorly managed, individual toilets with storage pit built in half the houses</td>
<td>No drainage system</td>
<td>No dhalao nearby; an MCD truck passes by and garbage can be thrown in it if it stops</td>
<td>Legal metered connections (BSES Rajdhani); illegal tapping into electric mains; sharing electricity with neighbors</td>
</tr>
<tr>
<td>JJC</td>
<td>Indira Kalyan Vihar</td>
<td>Piped water supply (same pipes providing drinking and nondrinking water), tube wells, tapping of main water lines, and water tankers</td>
<td>Four currently functional CTCs, private toilets with outlets into large drain</td>
<td>Narrow storm water Drains</td>
<td>One dhalao at a corner of the settlement; collection of garbage does happen but overflow of garbage in areas surrounding the dhalao is a common sight</td>
<td>Legal metered connections (BSES Rajdhani)</td>
</tr>
<tr>
<td>Settlement type</td>
<td>Settlement name</td>
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<td>Electricity</td>
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</tr>
<tr>
<td>JJC</td>
<td>Kusumpur Pahari</td>
<td>Majority depend on DJB tankers, private tube wells within the JJC</td>
<td>Dysfunctional CTCs, many go for open defecation, very few have built individual toilets</td>
<td>Narrow storm water drains</td>
<td>There is one <em>dhalaao</em> in the middle of the settlement along the main road that runs through the settlement</td>
<td>Legal metered connections (Reliance-BSES); there are families that still don’t have electricity as they cannot afford to pay the bill</td>
</tr>
<tr>
<td>JJC</td>
<td>Sanjay Camp</td>
<td>One handpump, public tube well, public taps in neighboring market areas, water taps, water tanker</td>
<td>One CTC which is inadequate, many go for open defecation</td>
<td>Only one part of the basti has drains</td>
<td>No <em>dhalaao</em>, instead 7 garbage dumpsters placed at different points in and around, garbage also thrown in the open near the railway line</td>
<td>No formal supply, hooking and zapping of formal electricity supply</td>
</tr>
<tr>
<td>JJC</td>
<td>Jai Hind Camp</td>
<td>Only tankers: some DJB, others that are paid for; private water tankers for non-drinking water</td>
<td>Open defecation, common constructed toilets and bathrooms for a minority part of the JJC</td>
<td>No drainage system</td>
<td>No <em>dhalaao</em> in walking distance, private collection of garbage for minority part of JJC</td>
<td>No formal supply, hooking and tapping of formal electricity supply</td>
</tr>
<tr>
<td>Settlement type</td>
<td>Settlement name</td>
<td>Water</td>
<td>Sewage and toilet</td>
<td>Drains</td>
<td>Solid waste</td>
<td>Electricity</td>
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</tr>
<tr>
<td>Resettlement colony</td>
<td>Savda Ghevra</td>
<td>DJB water tankers for drinking water and private tube wells for non-drinking water</td>
<td>No sewer lines; one CTC per block but inadequate and poorly maintained in most cases; individual private toilets built by residents with 'septic tanks'; open defecation by poorer households</td>
<td>Storm water drains constructed but poorly maintained</td>
<td>NGO-based door-to-door collection of garbage for many blocks; <em>dhalao</em> for disposal; garbage also thrown in the open, uninhabited spaces</td>
<td>Received legal metered connections (TPDDL) a few months after resettlement</td>
</tr>
<tr>
<td>Resettlement colony</td>
<td>Mangolpuri</td>
<td>Piped water supply since about 20-25 years</td>
<td>Sewer lines approximately laid down 10-15 years ago; most households have toilets connected to the sewage system; CTC users are mostly tenants and JJC dwellers within the colony</td>
<td>Underground drainage system; it also has open storm drains</td>
<td>MCD garbage van comes regularly; households have privately appointed cleaners in the inner lanes; there are also a few <em>dhalao</em> within the colony</td>
<td>Received legal metered connections in early 1980s.</td>
</tr>
<tr>
<td>Settlement type</td>
<td>Settlement name</td>
<td>Water</td>
<td>Sewage and toilet</td>
<td>Drains</td>
<td>Solid waste</td>
<td>Electricity</td>
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</tr>
<tr>
<td>Resettlement</td>
<td>Madanpur Khader</td>
<td>Privately installed hand pumps for non-drinking purposes, DJB tankers and privately purchased water jars for drinking purposes</td>
<td>No sewer lines; CTCs that rely on ‘septic tanks’; some CTCs are dysfunctional, and residents usually defecate in the open at night; some households have built private toilets with ‘septic tanks’</td>
<td>Drains constructed but poorly maintained</td>
<td>MCD designated <em>dhalaos</em> (several of which are being renovated; households have privately appointed cleaners in the inner lanes; NGOs also collect garbage from households for a fee)</td>
<td>Legal metered connections (BSES Rajdhani)</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>Sangam Vihar</td>
<td>Majority depend on government and private tube wells, a few residents procure water from DJB and private water tankers</td>
<td>No sewer lines; individual toilets that empty into “septic tanks”, which are often simple cesspools with no protection against seepage; open defecation by poorer households</td>
<td>Storm water drains running along the pucca roads but poorly maintained</td>
<td>Private contractor for door-to-door collection in a few blocks; MCD “tipper” vehicles pass through the main roads and garbage can be thrown in them directly</td>
<td>Formal electrification has happened in stages: 1988 (electric substation for electricity provision for area inhabited prior to 1981); 1999 (Single Point Delivery System); late 2000s (legal metered connections from BSES Rajdhani)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference</th>
<th>Type of Intervention</th>
<th>Program Details</th>
<th>Method</th>
<th>Outcomes measured</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galiani and Schargrodsky (2010)</td>
<td>Land Titling</td>
<td>Argentina (1984). A law was passed expropriating the former owners’ land to entitle the occupants.</td>
<td>Natural experiment</td>
<td>Housing investment, household size, children education, credit market access</td>
<td>Entitled families substantially increased housing investment, reduced household size, and enhanced the education of their children relative to the control group. No significant effect on credit market access.</td>
</tr>
<tr>
<td>Galiani and Schargrodsky (2011)</td>
<td></td>
<td></td>
<td></td>
<td>Titles premium, titling in the long run</td>
<td>The estimated titling premium is 18.5 percent (the difference in real estate value paid for a house of similar characteristics between titled and untitled properties, after controlling for housing investments). Almost 30 percent of the titled parcels seem to have now become de-regularized due to unregistered intrafamily (death, divorce, others) or inter-family (informal sales, occupation, etc.) transactions. A plausible explanation is that the legal costs of remaining formal seem to be quite high for the low value of these parcels and the titling premium.</td>
</tr>
<tr>
<td>Reference</td>
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<tr>
<td>Field (2005)</td>
<td>Land Titling</td>
<td>Peru (1996-2003). Nationwide titling</td>
<td>Quasi experiment</td>
<td>Housing investment, credit market access</td>
<td>Significant effect on residential investment: the rate of housing renovation rises by more than two-thirds compared to baseline level. Investment attributed to lower threat of eviction and not to an improvement in credit access due to the titling program.</td>
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<td></td>
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<td>program</td>
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<tr>
<td>Field and Torero (2003)</td>
<td></td>
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<td></td>
<td>Credit market outcomes</td>
<td>No effect on the likelihood of receiving credit from private sector banks, although interest rates are significantly lower for titled applicants regardless of whether collateral was requested. In public sector loans, property titles are associated with approval rates 12 percent higher when titles are requested by lenders and no correlation found otherwise.</td>
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<td>Field (2007)</td>
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<td></td>
<td>Labor supply</td>
<td>Households with no titles spend an average of 13.4 hours per week maintaining informal tenure security (14 percent reduction in total household work hours). Individuals are 40 percent more likely to work at home. Titling increases total labor force hours and reallocates work hours from home to the outside labor market.</td>
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<tr>
<td>Field (2003)</td>
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<td>Family size</td>
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<td>Family size of households with titles is significantly smaller. Up to a 22 percent reduction in fertility associated with the increase of the female’s bargaining power derived from the ownership of land assets. Also changes in tenure security may exert an independent negative influence on desired number of offspring.</td>
</tr>
<tr>
<td>Galiani, Gertler, Martinez, Cooper, Ross and Undurraga (2011)</td>
<td>In-situ housing improvement in slums (replace old house with better prefabricated houses)</td>
<td>Un Techo Para Mi País in slums in El Salvador and Uruguay (2007-2008)</td>
<td>Randomized experiment</td>
<td>Satisfaction with housing and life, labor market outcomes, children health, household size and safety variables.</td>
<td>Improvement of the quality of housing greatly and the satisfaction with housing and with the quality of life. Perceptions of security improve in El Salvador, whilst there is no change in Uruguay. No effect in self reported crime. In both countries better housing has no effect either in the possession of assets, in labor outcomes (income, labor supply) or household size. Child health is also unaffected by the intervention (measured by diarrhea and respiratory disease prevalence).</td>
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<tr>
<td>Cattaneo, Galiani, Gertler, Martinez and Titiunik (2009)</td>
<td>Replacing dirt floors for cement floors</td>
<td>Piso Firme in Mexico (since 2000)</td>
<td>Quasi-experiment</td>
<td>Happiness, children health, children cognitive development, labor market outcomes, consumption.</td>
<td>The intervention interrupts the transmission of parasitic infestations and reduces the incidence of both diarrhea and anemia. Significant improvement in child cognitive development. Adults report to be substantially happier, as measured by their degree of satisfaction with their housing and quality of life, and have significantly lower scores on depression and perceived stress. No effects in consumption or labor supply.</td>
</tr>
<tr>
<td>Devoto, Duflo and Dupas (2011)</td>
<td>Piped water connection (without improving quality of available public taps)</td>
<td>Low-income households living in Tangiers, Morocco (2008).</td>
<td>Randomized experiment</td>
<td>Take up after the program, health, mental wellbeing, labor market outcomes, time use, social relationships in neighborhood.</td>
<td>High willingness to pay for access to a private tap at home: within a year 69 percent of households in the treatment group had purchased a connection (against 10 percent in the control group), and as a result their average monthly water bill more than doubled. No change in the incidence of water-borne diseases. Important time gains which did not lead to increases in labor market participation, income, or schooling attainment.</td>
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<tr>
<td>Gonzalez-Navarro and Quintana-Domeque (2010)</td>
<td>Street pavement</td>
<td>Acayucan (Mexico) in 2006.</td>
<td>Randomized experiment</td>
<td>Housing improvements, household assets, consumption, labor market outcomes, satisfaction with government.</td>
<td>Increase in home improvements: from 0.4 to 0.8 reforms. 50 percent increase in the likelihood that the family has bought materials for home improvements in the previous six months (from 15 percent to 24 percent). Increase in the number of durable goods owned by the household by 12 percent and motor vehicle ownership by more than 40 percent. No statistically significant effect on monthly per capita expenditure (non-durable consumption). 25 percent increment in housing values. Rents rose by 31 percent in paved streets. Individuals who use collateral-based credit rose from close to 2 percent in the control group to nearly 5 percent in the treatment group. Families living along streets that were treated with pavement were between 0.35 and 0.39 points more satisfied with the local government (on a 4-point scale).</td>
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<tr>
<td>Botvin, Griffin and Nichols (2006)</td>
<td>Family Skill Training</td>
<td>Life Skills Training in schools in disadvantaged urban neighborhoods of the US (2004).</td>
<td>Randomized experiment</td>
<td>Delinquency, violence</td>
<td>3 months after the intervention, significant reductions in violence and delinquency for intervention participants relative to controls (less verbal and physical aggression, fighting, and delinquency). The results indicate that a school-based prevention approach previously found to prevent tobacco, alcohol, and illicit drug use can also prevent violence and delinquency.</td>
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<td>Katz, Kling and Liebman (2001)</td>
<td>Relocation Program. Voucher to move to low poverty neighborhood</td>
<td>Moving to Opportunity. Baltimore, Boston, Chicago, Los Angeles, and New York (US), 1994.</td>
<td>Randomized experiment</td>
<td>Wellbeing, safety, health, behavior, labor market outcomes.</td>
<td>Those offered vouchers experienced improvements in multiple measures of wellbeing relative to a control group, including safety, health, and behavioral problems among boys. There were no significant short-run impacts of vouchers on the employment, earnings, or welfare receipt of household heads.</td>
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<tr>
<td>Galiani, Murphy and Pantano (2012)</td>
<td>Relocation Program. Voucher to move to low poverty neighborhood</td>
<td>Moving to Opportunity. Baltimore, Boston, Chicago, Los Angeles, and New York (US), 1994.</td>
<td>Structural model combined with randomized experiment</td>
<td>Neighborhood choice</td>
<td>Effects of counseling and poverty-based location constraints are both large and that the location constraints (poverty rate of receiving neighborhood) end up dominating. Subsidy take up is sensitive to the particular design of the location constraint, with very stringent constraints inducing very low take up. Due to reduced subsidy take-up rates, restricting subsidy use to very low (i.e. lower than the 10 percent required by the program) poverty neighborhoods would increase average exposure to poverty.</td>
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<td>Soares (2005)</td>
<td>Integral Slum Upgrading program</td>
<td>Favela Bairro Upgrading Program in Brazil, first stage (1995-2000).</td>
<td>Quasi experiment</td>
<td>Access to services, housing values, mortality, literacy, income</td>
<td>Positive results of the program, especially related to an increase in the coverage of water and rubbish collection in favelas that outpaced the comparison groups identified. The impacts on sewerage was the most significant one in the aggregate level, moreover, an analysis by income quartile reveals that the poorest quartiles did benefit from sewerage, while the richest quartiles benefited in a lesser extent. This heterogeneous impact is also seen with respect to water and rubbish collection. Effects on housing values were not detected, though it can be due to data and methodological limitations. The authors do not find significant effects in the reductions of mortality due to poor sanitation conditions or homicides. The estimated effect on illiteracy rate of head of household, income of the head of the household and population is not statistically significant.</td>
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<tr>
<td>Banerjee, Duflo, Glennerster and Kinnan (2009)</td>
<td>Large scale introduction of Microfinance institutions in slums</td>
<td>Slums in urban Hyderabad, India (2005)</td>
<td>Randomized experiment</td>
<td>Economic outcomes (consumption, business creation, income), human development outcomes (education, health and women’s empowerment).</td>
<td>15 to 18 months after lending began in treated areas, the treated areas featured more new business openings, higher purchases of durable goods and especially business-related durables, and higher profits in existing businesses. Households with an existing business at the time of the program invest more in durable goods, while their nondurable consumption does not change. Households with high propensity to become new business owners increase their durable goods spending and see a decrease in nondurable consumption. Households with low propensity to become business owners increase their nondurable spending. Even in treated areas, over 70 percent of households do not take microloans, preferring to borrow from other sources. No impact on health, education, or women’s empowerment outcomes after 15–18 months of the program.</td>
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<td>Card, Ibarrarán, Regalia, Rosas and Soares (2007)</td>
<td>Youth Employment Program</td>
<td>Juventud y Empleo program in the Dominican Republic (2001-2007)</td>
<td>Randomized experiment</td>
<td>Labor market outcomes</td>
<td>No average significant impacts on the employment rate; but the effects are positive and economically significant for the youngest age group (17-19 years old). Positive effects on the monthly total labor earnings for those employed of 17 percent (though estimated with a small sample size).</td>
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<td>Attanasio, Kugler and Meghir (2008)</td>
<td></td>
<td>Jóvenes en Acción. Colombia (2005)</td>
<td>Randomized experiment</td>
<td>Labor market outcomes</td>
<td>Widespread and large effects on women, but fewer effects on men. Women offered training are more likely to be employed and work more days and longer hours. Being offered training increases paid employment by about 14 percent and increases days and hours worked by about 11 percent. The monthly wage and salary earnings of women offered training are about 18 percent higher than those of women not offered training. The likelihood of being employed in jobs that offer nonwage benefits and of having a written contract is 5 percentage points higher for women offered training. Men also benefit from being offered training, but the effects for men are more limited (8 percent increase in wages). Cost-benefit analysis suggests that the program generates a large net gain, especially for women.</td>
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APPENDIX B
PRESENT POLICIES AND STRATEGIES

(a) Nodal Agency for the Scheme:

DUSIB will be Nodal Agency for relocation/rehabilitation of JJ clusters from the lands belongings to MCD and Delhi Govt. and its department/agencies. In case of Central Govt./agencies like Railways, Delhi Development Authority, Land and Development Office, Delhi Cantonment Board, New Delhi Municipal Council, etc. they will be free to carry out the relocation/rehabilitation themselves as per the policy of the Delhi Govt. or may entrust the job to DUSIB.

(b) Survey:

(i) A priority list for shifting of JJ clusters would be prepared by DUSIB in consultation with the Urban Development Department, Government of NCT of Delhi, in the first phase survey for shifting of 44 JJ clusters, as mentioned in Annexure-I, will be carried out by DUSIB.

(ii) On the request of the Land-Owning Agency, the joint-survey and biometric identification with photos of the beneficiaries’ families i.e. husband, wife and family members would be carried out jointly by DUSIB and land owning agency.

(iii) If jhuggies had come up after 31.12.1998 and the JJ dwellers who do not fulfill the eligibility conditions will be treated as ineligible and their jhuggies will be removed/demolished by the concerned Land-Owning Agencies so that cluster is cleared as a whole.

(c) Eligibility Conditions:

(i) The beneficiary JJ dweller must be a citizen of India and not less than 18 years of age.

(ii) The annual income of the family of the JJ dweller should not be more than Rs. 60000/-, (Rupees Sixty Thousand) as is also the criteria under Basic Services to Urban Poor, Government of India.

(iii) The JJ dweller cannot claim the allotment of a flat as a matter of right.

(iv) The name of JJ dweller should figure in the joint bio-metric survey conducted by DUSIB with the representative of the land-owning agency concerned. Based on the joint survey/bio-metric survey done by the DUSIB and land-owning agency, verification of documents and determination of eligibility, the eligibility list will be finalized by a Committee comprising of the Deputy Director (SUR), Food Supply Officer, Tehsildar,

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Assistant Electoral Registration Officer of the area concerned and Officer of the land owning agency of the cluster.

(v) The JJ dweller will be entitled for one residential flat only even if he/she is occupying more than one jhuggies.

(vi) No flat shall be allotted if the Jhuggie is used for commercial purpose.

(vii) The Jhuggie being used for both residential and commercial purpose can be considered for allotment of one residential flat only. In case the ground floor of the jhuggie is being used for commercial purpose and other floors for residential purpose, that will entitle the JJ dweller for one residential flat only if such commercial and residential parts are occupied by the same person.

(viii) In case of multistoried jhuggie occupied by the same person or different persons for residential purpose, the allotment will be considered to the occupant of ground floor only.

(ix) Allotment will be made in the joint-name of the husband and wife occupying the jhuggi, Bio-metrics along with photos of both husband and wife and members of family will be prepared and maintained by Slum and JJ Department.

(x) The cutoff date of residing in the jhuggie for making a JJ dweller eligible for allotment shall be 31.12.1998. The name of the JJ dweller should be in the voters' list as on 31.12.1998 and at the time of survey and he/she should also possess ration card issued on any date pre 31.12.1998 or thereafter, up to the date of survey.

(xi) The allotment of flat will be subject to the result of pending decision and outcome of the SLP (Civil No. 3166-3167/2003) in the Hon'ble Supreme Court of India and all other similar cases relating to Slums relocation pending in the various courts.

(xii) In case a JJ dweller expires after the survey, but his/her legal heirs are in possession of jhuggie with all the required documents of eligibility as stated above, the claim of his/her, widow/widower, could be considered for allotment of flat. However, such allotment would be subject to completion of all other conditions. In such case, only one flat will be allotted.

(xiii) The allotment of the flat will be made by DUSIB on license basis, initially for 15 years which may be extended. The license is not transferable in any manner whatsoever except in case of death of the licensee. The licensee shall not rent out and part with the possession of the flat and the same will be exclusively used for his/her family members only.

(xiv) The licensee shall use the flat for residential purpose only.

(xv) Neither allottee nor any of his/her family member(s) should own any plot/pacca house, full or part in Delhi.
(xvi) The allottee shall abide by the terms and conditions of the allotment of flat on license basis and shall pay the license fee/ ground rent as to be determined by DUSIB in a reasonable manner and shall continue to pay the same timely.

(xvii) DUSIB has the right to cancel allotment of the flat and to takeover the possession of such flat in case the stipulated terms and conditions are violated by the allottee. In such event, such allottee cannot claim any compensation; whatsoever and such allottees shall handover the peaceful possession of the flat to the licenser.

(xviii) In case it is discovered that the allotment has been procured by misrepresentation, suppression of facts or fraud and producing fake documents, etc., the allotment shall stand cancelled and possession of the flat shall vest with the licenser without paying any compensation to the allottee. This shall be without any prejudice to any criminal action called for.

(d) Non-Eligibility Conditions:

Allotment of flats will not be made in the following cases: -

(i) If Jhuggie has come up after 31.12.1998 and a jhuggie dweller does not have sufficient proof/ documents of eligibility and is not covered by the above eligibility norms.

(ii) The owners of Jhuggies who have rented out/ sold out the Jhuggies and are not in possession of a jhuggie at the time of removal.

(iii) Vacant/ demolished/ unoccupied jhuggie at the time of survey.

(iv) The JJ dwellers squatting on road berms, foot-paths, right-of-way, community areas, safety zones of railways as per court orders.

(v) Jhuggie dweller once allotted plot/ flat will not be eligible for future allotment.
APPENDIX C
DUE PROCEDURE FOR AN EVICTION BY A DELHI GOVERNMENT AGENCY

1. Requirement of Land on which a JJ cluster is situated
   I. A Land Owning Agency (LOA), which is a department of the GNCTD, requires land on which a JJ cluster is situated for a public purpose - Land cannot be cleared unless required for a special public project as per the NCP (SP) Act, 2011
   II. The concerned LOA informs the DUSIB of the requirement to clear the land

2. Survey of Households in JJ cluster
   DUSIB and LOA undertake a survey of households during which:
   I. Issue of Notice for Survey
   II. Requirement to inform community of the modalities of the survey including documentation prerequisites
   III. Conduct of household survey

3. Decision on Eligibility for Relocation
   I. DUSIB decides which of the surveyed households are eligible for relocation

4. Release of List of Households Found Eligible for Relocation
   I. DUSIB releases list due of those eligible for relocation and those who are not and effectively communicates the same to affected parties (through internet and other means)
   II. Grievance redressal mechanism provided

5. Distribution of Possession Letters
   I. Letters for possession of EWS flats distributed by DUSIB to households found to be eligible relocation

6. Obligations of the Land-Owning Agency
   I. Payment to DUSIB as per the number of household found eligible for relocation
   II. Issuance of Certificate for Requirement of Land

7. Notice for Eviction
   I. Date of Eviction and Relocation decided jointly by DUSIB and Land-Owning Agency
   II. Notice issued and effectively communicated to parties
   III. Forum to challenge eviction

8. Service Provisioning
   I. At the site of eviction
   II. Provision of transport for households to relocation site
   III. Basic services at relocation site

Figure D-1. Kathputli colony, a colony of artist (Adopted from Getty images: free photos. https://www.gettyimages.com/photos/kathputli-colony?family=editorial&phrase=kathputli%20colony&sort=mostpopular#license)
Figure D-2. Demolition of the Kathputli colony begin (Adopted from Getty images: free photos. https://www.gettyimages.com/photos/kathputli-colony?family=editorial&phrase=kathputli%20colony&sort=mostpopular#license)
Figure D-3. Heart touching situations after the demolition started (Adopted from Getty images: free photos. https://www.gettyimages.com/photos/kathputli-colony?family=editorial&phrase=kathputli%20colony&sort=mostpopular#license)
Figure D-4. Proposed infrastructure development in Kathputli colony (Adopted from Source: https://ebuild.in/kathputli-colony-delhi-new-delhi-gpm-architects-and-planners)

Figure D-5. Proposed development in Kathputli colony (Adopted from Source: http://www.kathputlicolonydda.com/proposed-units.asp)
Figure D-6. Proposed open space management in Kathputli colony (Adopted from Source: http://www.kathputlicolonydda.com/proposed-units.asp)

Figure D-7. Proposed floor plan by Builder (Adopted from: http://www.kathputlicolonydda.com/proposed-units.asp)
Figure D-8. Proposed development by builder (Adopted from: http://www.kathputlicolonydda.com/proposed-units.asp)
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BIOGRAPHICAL SKETCH

Kalyani received his Bachelor of Science degree in the spring of 2014 while majoring in Civil engineering from Pune University. Kalyani graduated with a Master of Urban and Regional Planning degree in the summer of 2018 from University of Florida.