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A case-study of slums: an informal housing for people below poverty line (BPL) in India

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Abstract. In the present scenario, with the growth in the population, one out of every five Indians are 'below poverty line' which means that their income is below $1.9 per day. Slums are highly populated residential areas in the urban settlements with low incomes. As a consequence of their low incomes, they are compelled to reside in the slum areas faced with adverse conditions like lack of sanitation, availability of clean drinking water, lack of connectivity, and improper area distribution. The analysis draws on field observations of people living in such areas acquired by conducting interviews and focus group discussions. Further, using a temperature and RH meter, a digital anemometer and a lux meter, the readings of temperature, relative humidity (RH), wind speed, and light intensity were recorded. Also, the street dimensions, distance between roads and houses, dimensions of rooms are measured using laser distance meter. In this paper, the characteristics of the slum areas like the space occupation of each house, street connectivity, kinds of common spaces, distances between two houses, and materials used for construction is analysed. Improper zoning as a product of abrupt planning and narrowly defined goals of development produce a disparity in the occupancy ratio, that is the amount of space utilized by a single person is less than that of the standardized units, which in turn leads to lack of privacy. This study helps to identify spatio-temporal vectors responsible for creation of slums and tries to provide socio-economic policy-level solutions to improve their living standards, thus leading to a sustainable and inclusive society.

1.Introduction

A slum is defined as a densely populated residential area which is closely packed with shanty houses, narrow passages, degraded sanitary conditions, lack of privacy and absence of basic necessity like clean drinking water, electricity, drainage systems, schools and health care facilities. These are unauthorized and illegal structures built on encroached private land or government lands [1]. Slums can also be considered as a by-product created in order to cater to the ever-growing population in the developing countries[2]. According to UN-HABITAT, slum is defined as a household where in group of individuals living in a particular area which lacks: - a) properly designed and constructed house that protects the residents from natural calamities; b) sufficient amount of space allotted to each member of the household; c) availability of safe drinking water; d) proper sanitation conditions i.e. clean toilets and a proper drainage system; and d) the ownership of the land [3].The major reason of the development of

the slums is rapid urbanization and economic growth occurring in an informal fashion wherein the residents do not hold the legal rights to live in those areas.[4] These areas not only undermine the quality of living but also the opportunities of growth in terms of profession, education and healthcare [5]. Another reason for this rapid growth of slum areas is the high level of poverty in urban areas created due to lack of sources of income [6]. Many of these people resort to constructing temporary dwellings with refuse materials in lands that are illegally encroached by them. These temporary structures end up becoming the places of their permanent dwellings, for the lack of any other alternative. Emergence and growth of slums is mainly seen in the cities of developing countries[5]. They are often unsafe and insecure without an adequate facility of protection from natural or man-made calamities. Along with it, the layout of the buildings is poor and its design has a direct impact on the thermal comfort of the residents[4]. People have constructed their dwellings in the space available to them. The spatial configuration of these dwellings is clustered which obstructs the air flow, resulting in improper ventilation to the dwellers[7]. The connectivity of these areas from the primary roads is bad. They have badly maintained drainage systems with no provision of refuse evacuation. One of the crucial points in a slum is the population density. According to the world bank, the average population density of India is 450 (number of people per sq. km of land area)[8]. This number increases in the slum areas and causes problems like overcrowding. Decent affordable housing is a basic human need as it contributes to the physical and mental conditions of the occupants and attributes to the growth of society as a whole. This paper studies the various indicators that lead to the formation of a slum and tries to provide socio-economic policy-level solutions to advance their life-styles and create a progressive and sustainable future.

1.1. Indian Scenario

As of 2017, the population of India has become 1339.19 million wherein one out of every five Indians are below poverty line (BPL). Most of these families living under BPL have around 4-5 members each with only 2-3 breadwinners. This happens as the mind-set of these people do not allow women to take up any kind of work, putting the pressure of earning solely on the shoulders of men in the family. However, there occur situations where women are forced to work, usually as domestic help, and the income generated out of this is very less when compared to the earnings of men.

1.2. Socio-economic perspective

The socio-economic perspective defines the behaviour of people towards their property [6]. This describes the importance an individual give to their living surroundings. In developing countries, where the population keeps growing, it is noticed that individual make their residential choices based on their economic backgrounds and stability [5]. Most of these buildings can be maintained with a proper system of sanitation and drainage only when the residents co-operate with the government. This becomes more difficult when there is illegal subletting of the spaces wherein the government shifts the focus from maintaining the living standards to the illegal occupancies. Another aspect is also the affordability to live in a particular place e.g., cities and towns, sub-urban area, rural areas. The value of land depends on its surroundings. Consequently, people with low income reside in areas with lower environmental standards [6].

2. Methodology

Two low-income residential areas in Hyderabad, Telangana, are surveyed. One of them is a slum area located in NTR Nagar, situated in the middle of the city. The other one, Kismatpur, is a settlement at the outskirts of the city and is sparsely populated. The locations of these studies are contrasted, wherein, in one of the cases, the breadwinners mostly worked as domestic help and earned monthly wages whereas, in the other, the breadwinners are daily wage labourers with a fluctuating income. These settlements along with their connectivity and built environments with their thermal qualities are analysed. A detailed study is done to measure the temperature, relative humidity (RH) light intensity and wind speed of selected houses, using a temperature and RH meter, lux meter and anemometer respectively. This is done to get a better understanding of the degree of enclosure. The street dimensions, distance between roads and houses, dimensions of rooms are also measured using a laser distance meter, showing the connectivity of these settlements from the main roads. The habitants are interviewed both individually

and collectively to understand their personal experiences and, the problems faced in the community. The study is done to compare the two contrasting settlements and to identify the one with better living conditions. A scaled figure-ground diagram is constructed to understand the built density, connectivity, landmarks and other settlement characteristics.
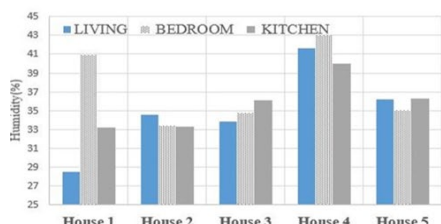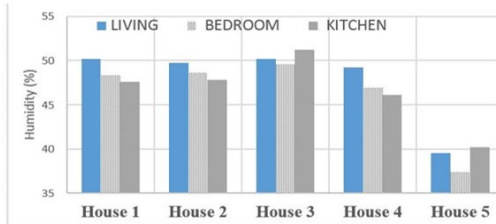

Figure 1. Humidity-NTR Nagar
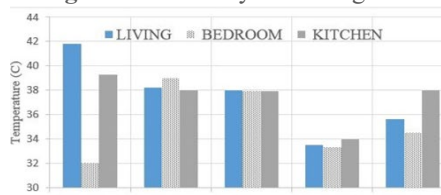

Figure 2. Humidity-Kismatpur

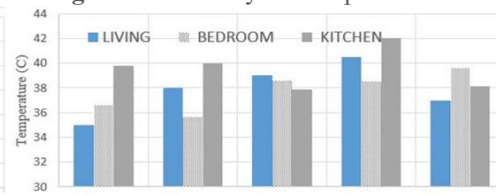**Figure 3.** Temperature- NTR Nagar

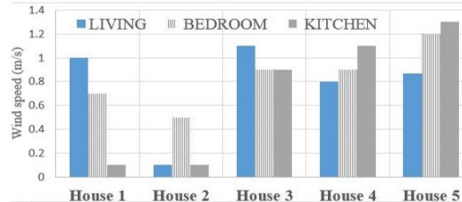
Figure 4. Temperature- Kismatpur

Figure 5. Wind speed-NTR Nagar
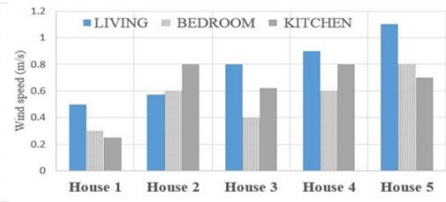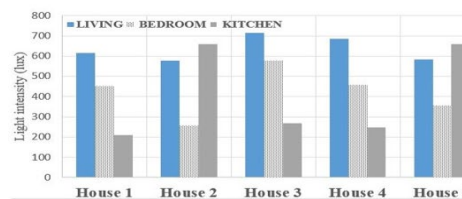

Figure 6. Wind speed- Kismatpur

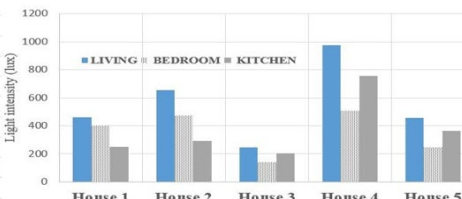**Figure 7.** Light intensity- NTR Nagar

Figure 8. Light intensity- Kismatpur

3. Results

Both areas are located quite far from the primary roads making connectivity for the residents highly difficult. Most of the inhabitants belonged to the low-income groups who had migrated from nearby villages in search of better education and job opportunities. Some of the major problems faced by the inhabitants are regarding the water supply, sewage system, power supply and land ownership. The power outage is a major concern of the occupants, as they received electricity for just 5-6 hours per day; and the water supply in both areas is provided in the morning hours between 6-9 A.M. Since these people were illegally subletting government land, they also faced problems with the authorities and had to constantly move from one place to another. The houses are arranged in a clustered manner because of which the interior space does not receive enough sunlight. This congested spatial organization is prone to frequent fires. The streets are very narrow and do not allow fire engines to pass through. This arrangement also affects the wind flow. The absence of proper and enough openings results in higher rates of humidity in the rooms.

Since the construction material is aluminium/ tin sheets, they do not buffer the external heat, making the interiors hot and humid. The roads are narrow allowing only a single 4-wheeler vehicle to pass through at a time. Moreover, proximity amongst the people creates a social harmony between them. In NTR Nagar, there is a church, a mosque and a temple in the vicinity. The people living in this area share the common spaces irrespective of their religious differences creating a rich cultural community. The two settlements, NTR Nagar and Kismatpur are compared after analysing its indicators. It is observed that, in NTR Nagar, house 1 and house 5, had comparatively better living conditions as they have higher

wind speeds to combat the excessive heat (Figure 5). It is also observed that the temperature reduced from house 1 to house 5 (Figure 3). The relative humidity is lowest in the house 1 and highest in house 4 (Figure 1). The light intensity is the highest in the living rooms of all five houses (Figure 7).

In Kismatpur, the wind speed is seen to be moderate in all houses (Figure 6). The light intensity is the highest in house 3 (Figure 8). The max temperature is 42 degrees (in house 3) (Figure 8). The relative humidity is the highest in house 3 and lowest in house 5 (Figure 2).

While comparing the two settlements, it is observed that Kismatpur has better living conditions than NTR Nagar as it is on the outskirts of the city of Hyderabad, Telangana. The indicators such as light intensity, wind speeds are higher, and temperatures are lower, supporting good conditions for living.
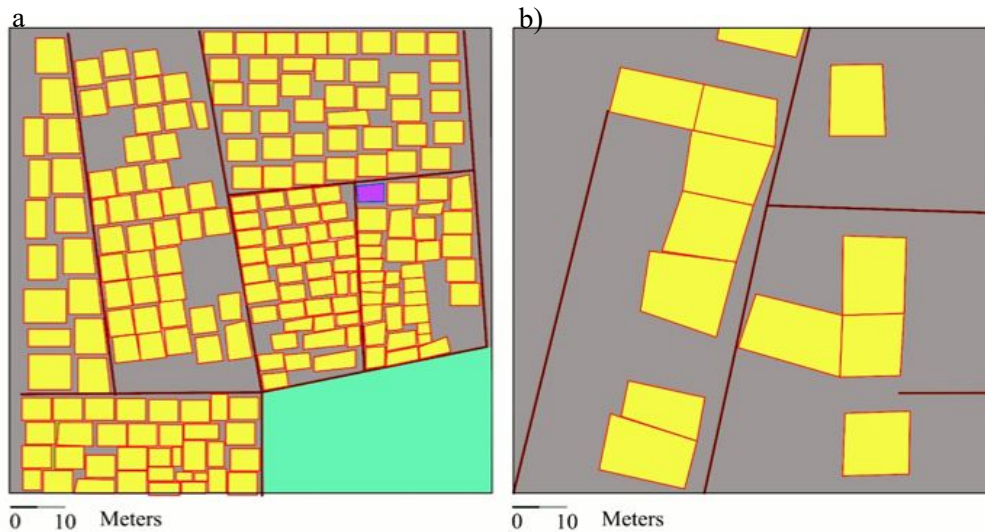

Figure 9. Figure-ground diagram with road connectivity for a) NTR Nagar; and b) Kismatpur
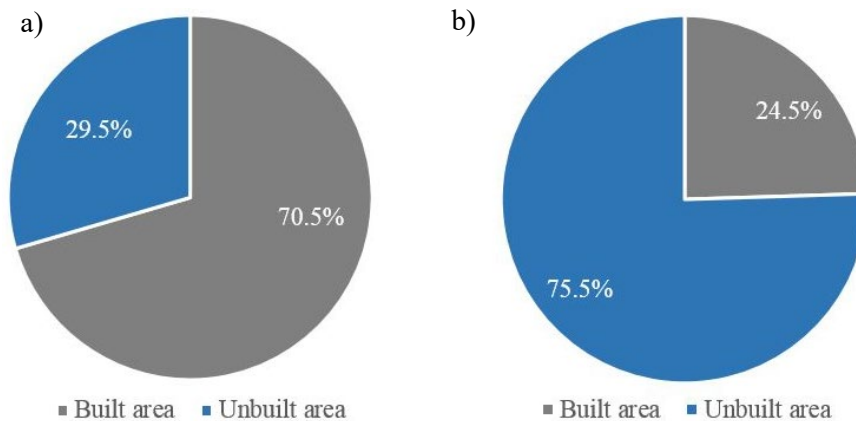

Figure 10. Percentage of built and un-built area in a) NTR Nagar; and b) Kismatpur

4. Discussion

In the cities where there is a large population which stays in slums, there can be two scenarios. One, where there is a settlement in the city area and the functional qualities of the houses are bad, as compared to the areas on the outskirts. The major issue in the outskirts are the lack of transportation and more opportunities for wage earning. The presence of greater population in slums within the city is due to developed amenities and better job opportunities. The area where the people belonging to the low-income group reside, does not have any of the issues mentioned above. Along with this, there is poor connectivity between them and the areas which are developed with such opportunities. Moreover, the population density in NTR Nagar is higher as compared to the population density in the area of

Kismatpur, resulting in a clustered settlement (Figure 9). The high population density results in improper distribution of available land area and amenities as seen in NTR Nagar, where the houses are smaller and clustered. Whereas in Kismatpur, where the population density is lower, the available land area and amenities are equally distributed, and the houses are much bigger. The population density directly affects the built area. In the densely populated area of NTR Nagar, the built area is 70.5% whereas in the sparsely populated area of Kismatpur, the built area is only 24.5% (Figure 10). Table 3 shows the parameters studied in both the settlements using the figure-ground diagram to understand the proximity of various spaces and amenities. The eradication of slum areas is a complex problem which cannot have a linear solution. Measures can be taken in order to reduce the number of slum dwellers by providing them with better educational and job perspectives. Creating faster transportation systems like MRTS (Mass rapid transit system) or metro rail, with connectivity to outer regions of the city would ensure more job opportunities and better living conditions to the dwellers. Development of amenities in the outer parts of the city will also pave ways for these people to settle in better living conditions, thereby reducing the number of slums (Figure 11) in the busy city area. This will also make way for city government to develop the leftover area (if it happens) for a better use.
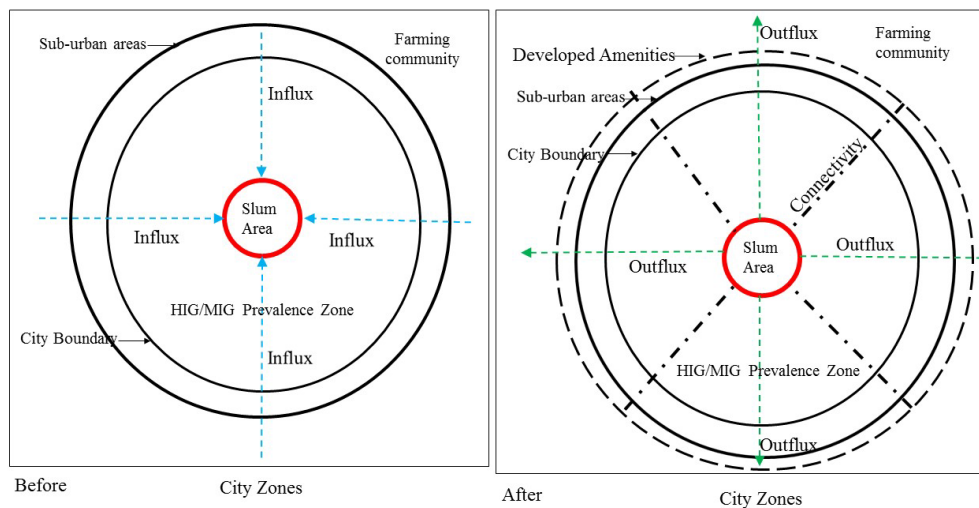

Figure 11. Preliminary urban-planning framework showing the influx of population before proposed solution and Out flux of population after the proposed solution
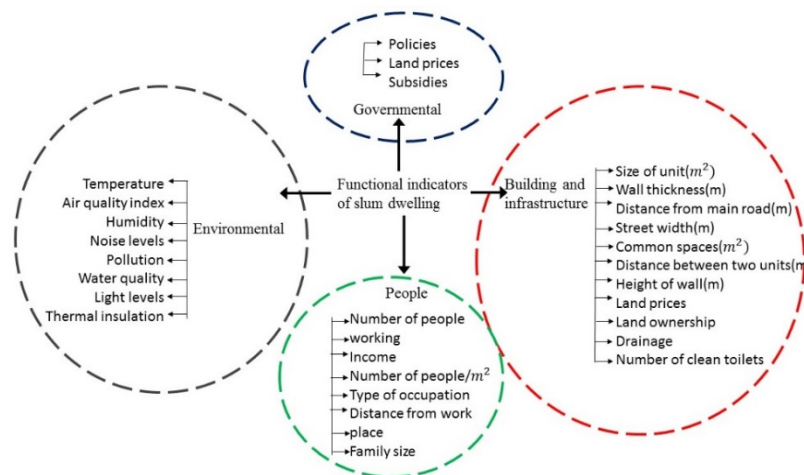

Figure 12. The functional indicators of slum dwelling

By creating a proper transport networking system between the city, sub-urban and outskirts areas, and providing better facilities in the outer areas of the cities, a solution for the recurrent problem of slum generation can be curbed. Another method of reducing slums is identifying the functional indicators of a slum dwelling (Figure 12). These functional indicators, which are 30 in number, are classified in four

major heads: 1) Governance, 2) Infrastructural, 3) Environmental and 4) Societal. There functional indicators once collected, collated, analysed and then corrected by 1) better policy measures, 2) better quality of house designs and materials, 2) sustainable and environment friendly architectural design and 4) better human resource development.

Table 1. The parameters studied to understand proximity of various spaces from the figure-ground

Parameters	NTR NAGAR	KISMATPUR
Area studied(m²)	8156.49	8156.49
Street dimension(m)	4	7
Distance from main road(m)	563.13	133.36
Distance from bus stop(m)	581.41	171.4
Distance from market(m)	397.67	621.86
Distance between two houses(m)	0.5-0.7	1
Nearest school(m)	494.4	142.12
Nearest hospital(m)	403.5	309.2

5. Conclusion

This paper discusses the living conditions of two distinctive areas, based on indicators such as wind speed, temperature, relative humidity (RH) and light intensity. The result showed that the conditions are better in the outer area when compared to the slum area inside the city. A study of these indicators led to a better understanding of living standard of population. The contrasting population densities of the two studied areas showed that the major problem lies in the distribution of the available land area and amenities to the residents equally. This shows that those who dwell in the outskirts have better living conditions compared to population within the city. This study identifies the spatio-temporal vectors responsible for creation of slums. If better infrastructure, suitable policy, environmental concern and human capital development take precedence, these city dwellers' standard of living can be improved. This will further increase the productivity of such people which will improve their living standards, thus leading to a sustainable and inclusive society. In a developing country like India, with restricted amount of land area, it is important to have equitable distribution of resources including land and buildings for each person, at the same time having enough space for agricultural lands, roads, forest and other natural habitats.

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