

Studying and Analysing Daylight in Rehabilitation Schemes in Mumbai

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Abstract -SRA schemes in India is noticed to have reverse effect on the tenants, while designing and planning process tenants are not considered and always be the last component of the chain which led them back to horizontal slums. Tenant's social and economic aspects got neglected during the rehabilitation process. Building sector consumes most part of the energy generated. In this study, daylighting factors is studied with respect to daylight performance of a Slum Rehabilitation schemes in the city of Mumbai. Surveys conducted in the slum rehabilitation housing were interviewed to determine the daylight factor and social and economic aspects. Information was obtained by further investigating the factors that influence occupants' health, control and habits in their built environment that regulates their comfort and lack of stress. Results show two primary cause of distress and discomfort in the study area owing to economic distress and Social environment related. Economic distress was from low-income and high electricity bills due to higher household appliance ownership, and social environment discomfort was due to lack of social spaces and poor design of the slum rehabilitation housing.

Keyword: Daylight, Slum Rehabilitation, Built environment

1. INTRODUCTION

Urbanization in India, is pushing the energy demand at high rate of 8% per year. Currently need to meet urbanization requirement, is increasingly putting pressure on energy needs. Building bye-laws their awareness and implementation add to the burden. While such development is better from the point of minimizing energy usage for transportation, the close proximity of the high-rises limits the sky-component and daylight penetration. This in turn affects the quality and the quantity of daylight received, especially at the lower floors, and puts pressure on artificial lighting needs. Especially, in a country like India which has prolonged sunlight hours it seems imperative to have regulatory norms that integrate daylighting into the housing sector. The building bye-laws of Indian cities prescribe that every habitable room should have one or more apertures like windows, opening to external environment such that in no case the glazing to floor ratio be less than 10% of all habitable spaces and the prescribed minimum distance between buildings is based on the «sustained vertical angle requirements» as per NBC-2005 Part 8 Sec 1. These laws were first developed in the UK, primarily for low rise terraced houses, which assume that all windows receive a fairly good amount of «sky component» and that there is a constant angle of obstruction among the buildings. Indian context Building sector in India consumes one third of total energy, out of which almost all accounts for residential sector whereas 8% is consumed by the commercial sector. In the residential sector,

there is a growing trend of single person households, especially In the metropolitan cities, which is more likely to push this

energy consumption and demand upwards. Thus the energy consumption in the building sector might become a challenge, if not arrested at this stage.

India needs to concreate design guidelines and parameter in the residential sector to encourage green building bylaws and guidelines. There are building code and standard guidelines to save energy consumption in the building for different zones and condition. Major factor that affects energy consumption is lack of day light and ventilation. So there is urgent need to implement green energy building guidelines and standards for better future.

2. Methodology & Description of the survey

Natvar Parekh Compound (NCP) located in Govandi area in Mumbai has total 60 buildings speared in 5.05 ha of area. Each building consist of G+7 floor which have 12 unit on single floor which makes 96 units in single building. There are total 5760 unit in the site of which i have selected 30 units for survey The 30 units selected for the surveys according to the buildings positions and floor hierarchy. Earlier studies done in the NCP shows that there is large number of patients of contagious dieses founded which is because of very high density and closely placed between buildings in the NCP. Buildings are placed at distance of 2.5 m spacing between them which is not enough for the 24 m high building. Large



FIG.1: Images from Slum Rehabilitation Houses in NPC

Questionnaire Format use for Surveys: -

A. Environmental

1. Daylight availability at home
2. Daylight available as compared to horizontal slums
3. General Comfort at home.
4. Use of Mechanical Sources to maintain comfort at home (Mechanical/Natural/Ceiling fan only)
5. Operating schedule of Windows and Door thought the day

6. Common diseases identified in the compound

B. Socio-economic

7. Appliance and its use

8. Electricity use

C. Social and architectural

9. Day light factor and other Environmental factor considered during design

10. Common Space , Safety and Noise Measurement and quality

D. Health

11. Health related problems occurred because planning

12. General Feeling at home

For the surveys only family head of the family surveyed. Interview conducted in Marathi language. Questionnaire for survey is prepared on the base of literature study and some modification in questionnaire made at the time of surveys on site considering on site problems and situation. The main objective of the surveys to understand and daylight and its economic and social affects tenants facing because of it. Structure of the surveys simply focused on the daylight and importance in the slum rehabilitation scheme in the Mumbai.

General Indoor Daylight and Air Quality
(Survey responses in number out of 30)

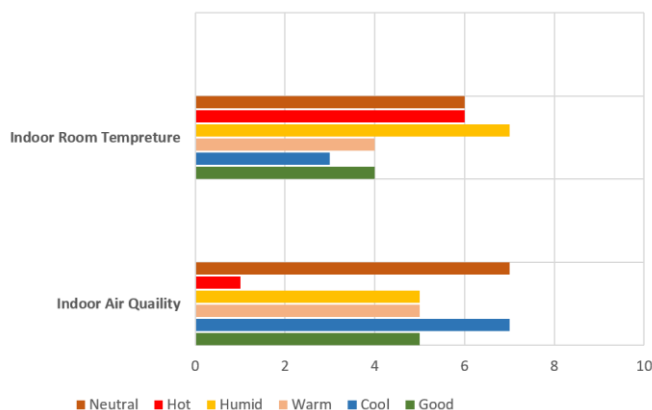


Fig.2 In the surveys most of tenants said indoor room temperature is more often warm and humid to counter this most of the tenants use ceiling fan or most of the time they have to keep door of the houses open which is not possible in many cases because of security and privacy reason

After Surveys observation shows that most of the tenants income is within the range of 6000 – 10000 rupees there is exception in very few cases where earning is on higher range above 20000 rupees. Which categorized most of the tenants in lower income group considering their monthly income. Most important factor all the tenants mentioned in the survey is that lack daylight and lack of social space is what they are missing in the slum rehabilitation schemes compared to their horizontal slums. Informal conversation also pointed out the distribution

of spaces is not consider at all while planning and implementation of the slum rehabilitation scheme. All the females pointed out the cooking space is very congested and not sufficient and absence of utility space in the units.

Slum vs SRA : Survey responses in number out of 30

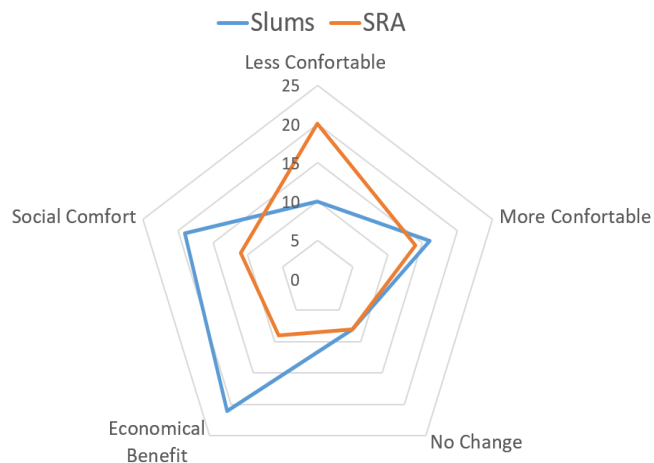


Fig.3 In the surveys majorly tenants responds with they are happy with the infrastructure , hygiene, water and sanitation facilities but almost everyone is not satisfied with lack of daylight available , cross ventilation factor, and connectivity with the social space they have to use in horizontal slums

When questioned about the daylight factor compare to their previous horizontal slums almost one third of the tenants responds their rehabilitated houses are less comfortable and because of inappropriate site planning and restricted internal floor spaces the houses get very low daylight inside. Because of Restricted floor area tenants mostly use furniture to distribute spaces inside which also blocks day light coming inside the house and makes dark spots inside.

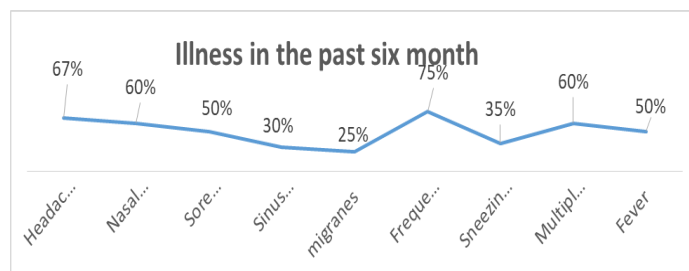


Fig.4 Survey Responses Out of 30 Converted into Percentage

According to previous studios respiratory diseases like TB, cough, headache, fever were most other important aspect tenants facing due to lack of daylight is they have to depend more on mechanical sources for light and ventilation throughout the day which increases the electricity consumption and electrical bills. Average monthly bill of tenants are between 750 – 1500 rupees which is almost more than one fourth percent of their monthly income which disturbs tenants economic structure. Almost one third of the tenants use ceiling fan 10-12 hours day regularly and ventilation fan for 3-4 hours day mostly while cooking time.

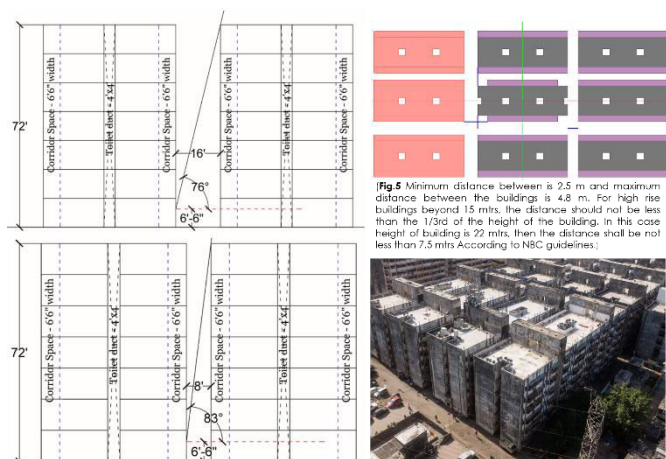


Fig 5 Minimum distance between is 2.5 m and maximum distance between the buildings is 4.8 m. For high rise buildings beyond 15 mtrs, the distance should not be less than the 1/3rd of the height of the building. In this case height of building is 22 mtrs, then the distance shall be not less than 7.5 mtrs According to NBC guidelines.

3. CONCLUSIONS

Above study explore the on ground circumstances in the slum habitation schemes From the tenant's point of view and how inappropriate planning and design approaches affect their living environment they are used to live before rehabilitation in horizontal slum. When we asked tenants regarding their solution to improve daylight and air quality in their houses most of them respond available of utility place in the houses and windows on two walls for the cross ventilation are most important changes required. Right now for ventilation most of them use exhaust fan but there is no solution available to improve daylight. However daylight aspect also affect environmental factor and economical factor also which is most of the tenants' concern. to achieve desirable daylight in the lower unit also proper design solution and its implementation in necessary. Finding observed from the on-site survey can give us real time problem tenants facing which has to address with community participation which is lacking till now.

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BIOGRAPHIES

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I am pursuing my post-graduation degree in environment design. This paper is part of my thesis design dissertation where emphasis given towards improving daylight quality in Slum Rehabilitation Schemes in Mumbai

The most of the issue because of poor day light were dampness, moldy odors and stuffy air inside the houses. After the day light stimulation analysis it clearly shows buildings placed centrally in the Natvar Parekh Compound averagely receives only 20- 60 lux at the lower floors and 60-90 lux at the upper floors which is far low than the standards. Inappropriate planning and closely placed building are the main reason for this. Further use of passage as utility and storage restricts the day light coming inside house (Fig.5&6)

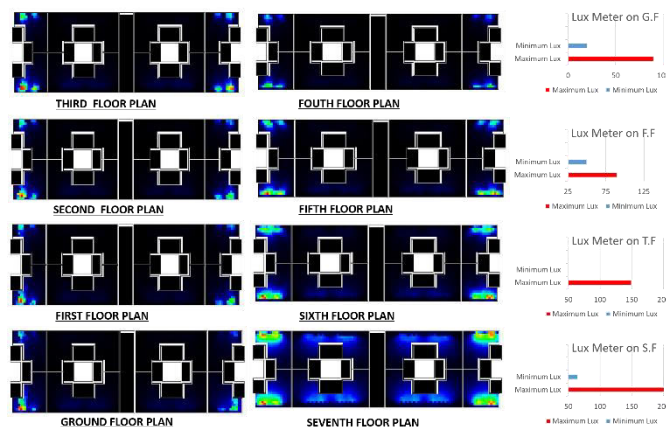


Fig. 6: Existing Daylight Stimulation of the NCP at 12.30 pm

Lack of social space in the corridors and between the building make it difficult for tenants to socialize and for children as there is no space for play or recreation provided that makes isolates them from the neighborhood which is completely contrast to their previous living habits. There is minimum 2.5 m and maximum 4.5m meter width between two buildings which is mostly acquired for the parking purposes that means there is no space for social gathering. Closely placed building not only restricts natural daylight and ventilation in the units but also affects their social and economic aspects which can be concluded by the responses from the surveys. Overall tenants are satisfied with the permeant houses, sanitation and hygiene facilities they have been provided but considering their private, social and economic aspect there are not comfortable in the rehabilitation housing