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Quality of Housing in Residential Area's: A Case Study of Bijnor City

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Abstract

Housing is very fundamental to the welfare, survival and health of the individual. United Nation (UN 1996) has pointed out that "the concept of housing is more than a shelter; rather it encompasses all the auxiliary services and community facilities which are necessary for human wellbeing". This is why the international concern has been growing over the deteriorating housing conditions in urban areas of developing nations. Housing quality, as a component of the IEQ, is a matter of great concern, especially in less developed countries. It is a complex concept, because it is not an absolute one like one would expect. The quality of housing within any mohallah/ward of the city should be such that it satisfies minimum health and living standard.

Present studies try to analyze the spatial pattern of housing of a city in a developing country. As we know that nature, process and characteristics of cities of developing countries are altogether different from the developed world. The process of urbanization in a developing country like India is very complex. The cities of India grow more in residential expansion rather the expansion of secondary and tertiary services. Majority of our cities are unplanned and grow haphazardly in all direction due to migration of skilled and unskilled labours in particular. Moreover India is an old civilization and most of our cities are leaving a long history. Therefore, old parts of the city in most of the cases remain congested and very densely populated. The expansion of civic facilities and amenities is a difficult task, and the quality of life is severely inflated.

Key Words: Age of Houses, Ventilation, Building material, Housing Quality.

Introduction: Indoor environmental quality (IEQ) is defined as the wholesome indoor environment in which people spend most of their time. A good IEQ depends on a variety of factors such as ventilators, flow of the air, number of rooms, housing congestion, indoor/outdoor temperature and humidity etc.

In residence with little or no ventilation (common in many developing countries) exposures to indoor air pollution, crowding etc. to the members of households particularly women and young children who spend most of their time indoors, have been measures

many times higher than that of the World Health Organization (WHO) guidelines and national standards (Bruce *et al.* 2000; Smith 1987).

The quality of a residential area not only reflects the city development, planning and allocation mechanisms between socioeconomic groups but also shows the quality of life of the urbanities. The realization of a decent home in a suitable living environment requires the availability of clean air, potable water, adequate shelter and other basic services. In India, there are several parameters which may be used in assessing housing quality. It includes the following: adequate space, structural stability and durability of dwelling units. It depends on age and the material used in building a house, adequate lighting, heating and ventilation, basic infrastructures such as water and electricity supply, the level of comfort, safety, ease of maintenance, adequate and accessible location with respect to work and basic facilities. However, an evaluation of the quality of the existing housing stock in a locality of small/medium towns and cities must take into account general low incomes and cultural practices which bear directly on health and wellbeing of the occupants.

In view of all these considerations, in the present study, housing quality of Bijnor city is judged on the basis of three criteria a) age of buildings, b) building material and c) availability of ventilation.

Study Area: Bijnor city is the head-quarter of Bijnor district. Bijnor is a small city which forms the north-western part of the Meerut Division. The city lies at 29°2′ N latitude 78°0′ E longitude. Its elevation with reference to the MSL is about 237.7 m. The total area of the city is about 365 hectares. The city is built on the slightly undulating ground, about 4.8 km from the left bank of the Ganga. The total population of the city is 93,297 as per census of India 2001.

Objectives:

- To analyse the housing quality in terms of spatial pattern of age of houses in Bijnor city.
- To examine the ventilation and comfort situation in the residential houses and its spatial pattern in Bijnor city.
- To develop the index of housing quality and examine its spatial pattern in the city of Bijnor.

Database and Methodology: Stratified random sampling has been used for obtaining data through self-structured questionnaire with 9.7 % sampling size in 2013. In the first instance, the size of sample basic units has been determined. The housing quality has been evaluated in terms of age of housing, material used in the construction and level of ventilation. Age of houses in all wards has been reduced to the mean age of all houses representing a ward's status on the criterion of age. All houses have been given subjective ranks for the material of construction, e.g., ferro-concrete houses have been given the highest rank and *jhuggis/jhopdis* the lowest rank. The ranks of material houses have been converted into weights by summing up the ranks and dividing the individual ranks by their sum. For example weight of a house is equal to:

$$W_i = \frac{R_i}{\sum_i^n R_i},$$

Where,

W_i is weight of house of specific material i, R_i is rank of that house, $\sum_i^n R_i$ refers to sum of all ranks of houses of different material that vary from 1 to n, n being the highest rank. Ranks differ by 1. Percentages of houses of different housing materials have been multiplied by their respective weights and these weighted percentages of houses have been added to obtain an index of housing materials.

In the same way, ventilation in houses and kitchens has been evaluated from worst to the best on the qualitative assessment to remove pollutants and flow of air. The highest rank has been assigned to the house having the best ventilation in both in rooms and kitchens and vice versa. As explained above, ranks have been converted into weights and these weights have been multiplied by the percentages of the respective houses of wards and added to for a composite indicator of ventilation.

The average age of houses, index of housing materials and that of the ventilation status of houses have been made scale free or standardised applying following formula:

$$V_i = \frac{O_i - O_{min}}{O_{max} - O_{min}};$$

Where,

V_i is new scale free variable, O_i is original variable, $O_{max}\ and\ O_{min}$ are maximum and minimum values of original variable, O_i.

As a first approximation, these standardised variables added together to form a composite index of housing quality. This composite index has been regressed against three scale free variables representing the age of houses, housing material and ventilation. The regression coefficients of the three variables which constituted the index of housing quality have been same. Therefore, their respective standardised regression coefficients have been used to calculate their respective weights. The standardised regression coefficients have been reduced such that they sum up to 1.0. These reduced standardised regression coefficients have been used as weights and standardised variables have been multiplied by them and added together to constitute the final index of housing. Finally these indexes of housing quality are classified into four categories by applying nested mean method.

Age of Housing Unit (Buildings/Houses): Age of housing is an important variable of housing quality, because it influences the human health and attracts diseases directly or indirectly. In old houses of poor materials, moisture and dampness cause allergies and asthma. Old houses are not only prone of dust mites; they are also having spaces for mouse and cockroaches. In these respects, old houses are unhealthy, unsafe and hazardous are prone to collapse due to mild earthquake shock, intense wind, rain or flood.

In the present study of Bijnor city, housing units are divided into four classes of very new; new, old, and very old on the basis of average age of houses. Distribution of houses by age in different wards of Bijnor city is shown in Fig. 1.1

There are seven wards in the category of very new housing. These wards have houses whose age is less than 20 years, and according to the survey they account for 38.75 percent of all sample houses. The second category of new age houses includes six wards. They account 30.75 percent of total sampled houses and ranges between 20 -30 years. There are eight wards falling in the category of old age housing. These wards have houses whose age's ranges between 30-.40 years and in percent it is only 13.25. The last fourth category of older housing includes four wards. The average age of housing in these wards is more than 40 years and they accounts 17.25 percent of all sample houses. As a whole, age of housing indicates clearly that it varies with the process of expansion of the city over the surrounding areas. It is also notified that mostly these wards are located in the periphery of the city which indicates that an expansion always occurs in the outer zone of the city. The entire central zone shows the dominance of the mixed age of houses. Old houses predominate in the southern zone. Thus, the core of the city has miserable housing conditions in terms of age of the house; whereas middle and outer zones have concentration of new houses which are relatively better conditions.

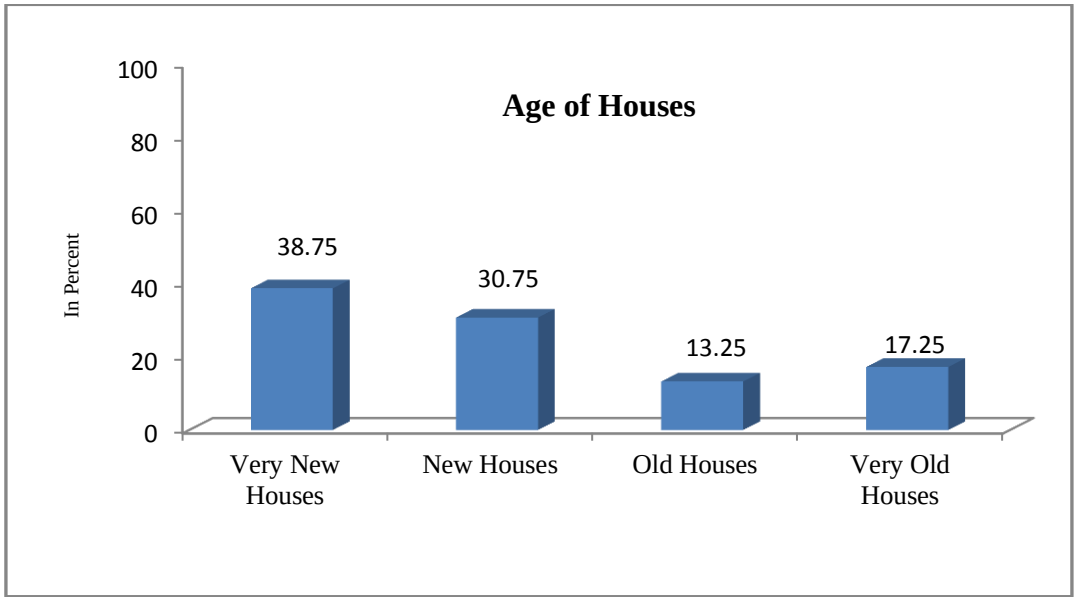


Fig: 1.1 *Source:* Based on calculation of data from field survey

Building Material: Material of housing is also a very important component of housing quality**. F**ive types of houses are recognized on the basis of building material in the study area. These are 1) ferro-concrete, 2) concrete-brick or *pucca* house, 3) *kutcha-pucca* or mixed houses, 4) *kutcha* houses and 5) *jhuggis* and *jhopris.*

The ferro-concrete houses include all residential houses built of good material of concrete and bricks. These are good quality and good ventilated house, and according to the survey they account for 14.75 percent of all sample houses. The concrete-brick or *pucca* houses include those houses built of concrete and bricks. These are also good quality house, and according to the survey they account for 59.5 percent of all sample houses. The *kutcha-pucca* or mixed houses are generally built of bricks and mud. The percentage proportions of this house houses is 15 percent of all surveyed houses and are of medium quality. The *kutcha* houses are made of mud and sun- burnt bricks and is of low quality houses. The proportion this low quality house in the total sample house is worked out as 7.25 percent. The *jhuggi*s is very low quality houses and are made up of makeshift material. They are found only 3.5 percent of the total sampled houses. Ward-wise distribution of the material of the houses is shown in Fig. 1.2.

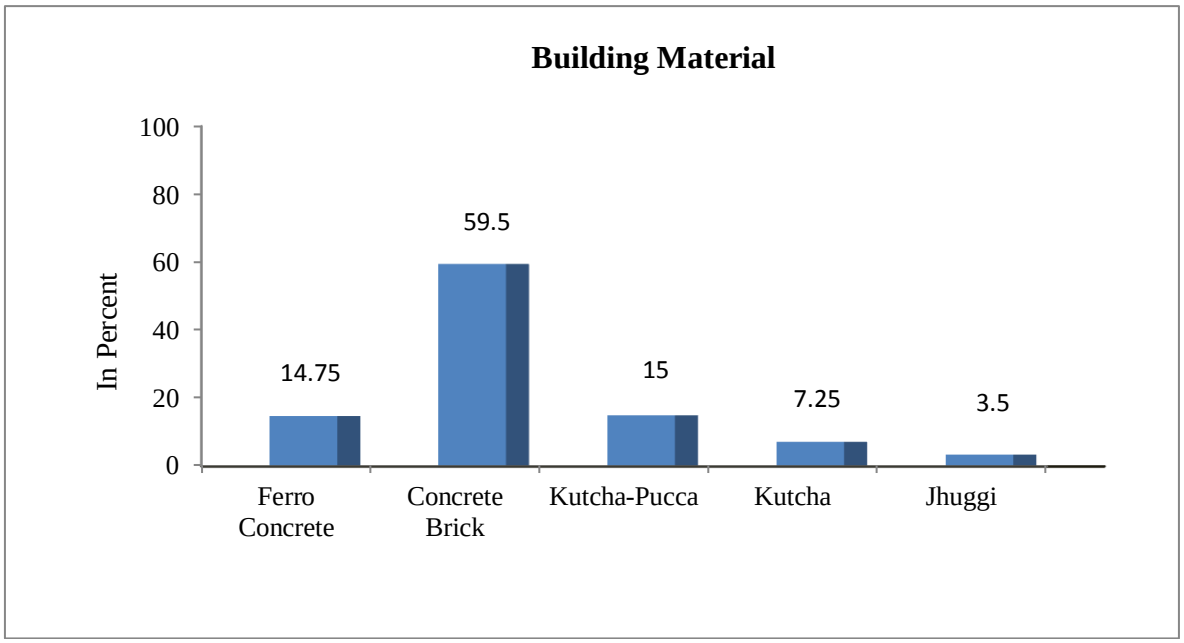


Fig: 1.2 *Source:* Based on calculation of data from field survey

The quality of buildings material shows a random pattern which is most probably related to the socio-economic status of the residents. However, in the case of low quality building material there is observed a strong tendency to locate in the centre or outer periphery of the city, while the northern and southern part of the city has good material or high quality housing.

Ventilation of the Residences: Ventilation is also an important factor in determining the quality of houses. Adequate ventilation is important in the indoor environmental quality. It helps in cleaning indoor air, polluted by breathing, burning of fuel, smoking and other sources. It is a necessary condition for health and wellbeing of the residents. There are

many types of pollutants found in the indoor air so ventilation is important in removing the indoor air pollutants.

In Bijnor burning of fuels generally takes place within the houses, so the absence of ventilation increases the concentration of harmful gases and particulate matter in the houses. To examine the spatial pattern of problem of ventilation in the city, wards are classified into four categories of very good, good, bad and very bad proportion of houses having proper ventilation. The class of very good ventilation includes all those housing units which have adequate or very much sufficient ventilation to clean the indoor air. The good ventilation is those houses which have sufficient ventilation .The bad ventilation of houses is that house which is not in good condition and the rate of ventilation is bad. Poor ventilation of houses includes that housing unit which is not in good condition and their ventilation system is not working properly. The data of ventilation of sampled houses collected through observation and have been classified into four categories on the basis of adequate or sufficient ventilation to clean the indoor air. Ward-wise distribution of the ventilation of the residences is shown in Fig. 1.3.

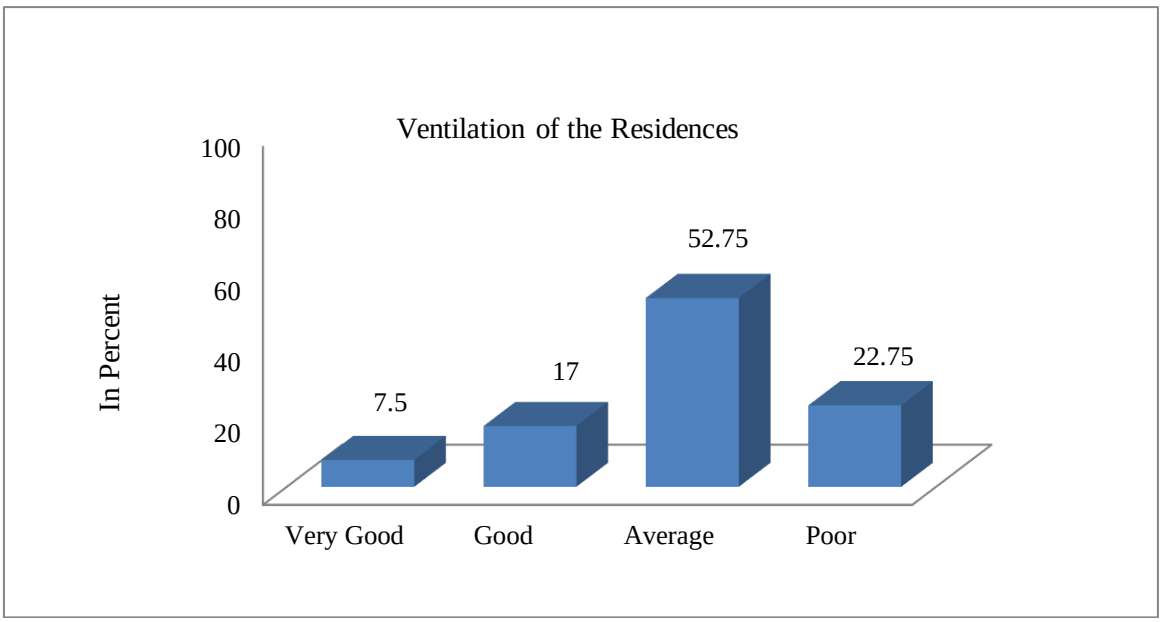


Fig: 1.3 *Source:* Based on calculation of data from field survey

On the basis of the above discussion, it may be safely concluded that ventilation is a major problem in the study area. It shows a spatial pattern whereby it is good in the outer zone and bad in the middle zone and of medium level in the inner zone.

Housing Quality

On the basis of above discussed characteristics and their numerical values, an index of quality of housing in Bijnor city is developed that ranks wards according to the housing conditions. The wards are classified into four categories of very good, good, bad and very bad housing quality.

Very good housing quality: Very good quality of housing has been found in five wards. The index value of this category is more than 0.73. The total population of this category is 17,188 that are the 18.42 percent of the total population of the city. It means almost twenty percent of households are living in very good quality of houses with proper ventilation system. These wards have houses whose average age is less than 20 years. Of the total sample housing units in these five wards, ferro-concrete houses make 23.4 percent of them. In two wards, these houses are relatively more concentrated than the other three wards. The percentage proportion of concrete and brick with equally good roof material houses is very high accounting for 54.7 percent of the sample housing units in these wards. It means almost 60 percent of houses are made of good materials. The proportions of kutcha-pucca (mixed material) houses are found only 15.6 percent, whereas the percentage of *kutcha* houses is very low, only 5.5 percent of the total sample houses. The concentration of *Jhuggis/jhopri* has been found in very small proportion only 0.8 percent of the total sample houses in these five wards.

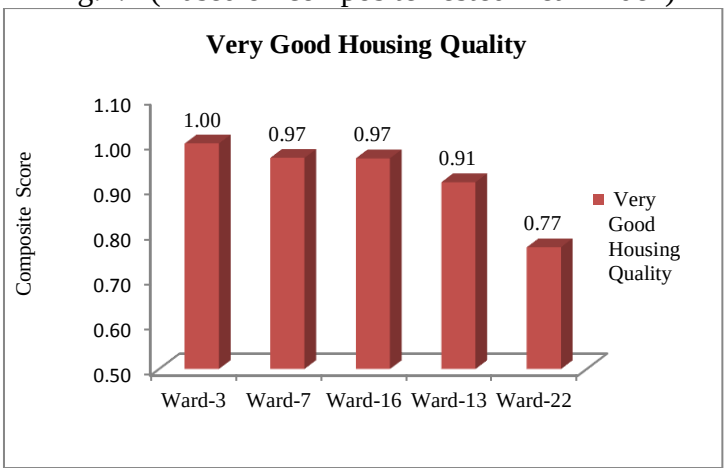
Good Quality Houses: There are eight wards falling in the good housing quality. The index value of this category varies between 0.49-0.73. The Total population of these eight wards is 29,298 that are the 31.40 percent of the total population of the city. This percentage shows that a considerable proportion of population of the city has good housing quality. All these wards are located in the southern part of the city except two that lies in the northern periphery and the central part of the city. These wards have a mixed proportion of newly constructed houses and old constructed houses. The house is mostly built with concrete-brick and some *kutcha pucca* houses are also seen in these wards, but ventilation is found satisfactory in all houses of these wards. *Aangan* and small veranda have been found in most of the houses so ventilation is not a big issue in these wards.

Bad housing quality: The bad housing quality is found in six wards. The index value of these wards ranges between 0.24-0.49. These wards together have a population of 27,869 which constitute the 29.87 percent of the total population of the city. In these wards houses is made of concrete-brick material but ventilation has not to be found satisfactory. The rooms of these houses are generally in small size with the poor ventilation system, while in some of the houses not a single window or *roshandaan* has been found in their rooms. Out of these eight wards, two wards have the highest concentration of concrete-brick houses with medium type ventilation. Of these wards, two are located in the north- east of the city; two are located in the south east of the city while remaining two in the south west of the city.

Very bad housing quality: The very bad housing quality is also found in six wards. The index value of this category is less than 0.24. The total population of this category is 18,942 that is the 20.30 percent of the total population of the city. It means a less proportion of households living in very poor housing quality and is affected by the bad IEQ. The sample data reveal that the concentration of *kutcha* houses and *jhuggis/jhopri* houses is found higher in these wards. Generally in *kutcha* houses ventilation has been found very satisfactory, but in these houses it is found not to be satisfactory both in terms of building

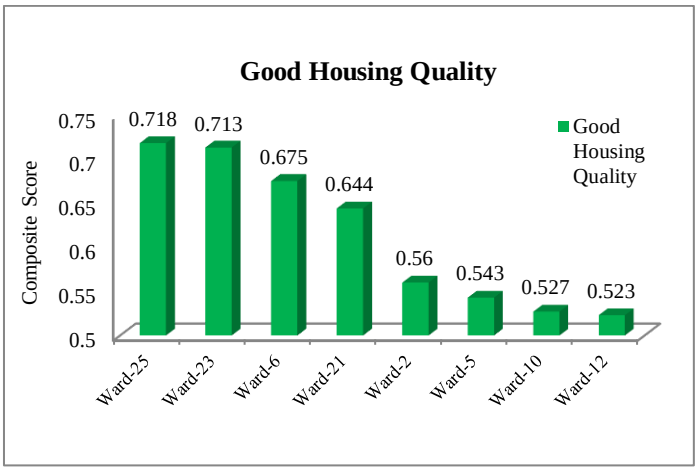
material and ventilation. Poor housing quality also reflects the social and income status of the households. The people of these houses mostly belong to poor income group and are not aware of hygiene and indoor quality. Out of these six wards two wards are located in the centre of the city, two wards in the south- west and the remaining two in the southern periphery of the city.

Fig.2.1 (Based on composite nested mean Index)



Source: Based sampled households survey

Fig.2.2 (Based on composite nested mean index)



Source: Based sampled households survey

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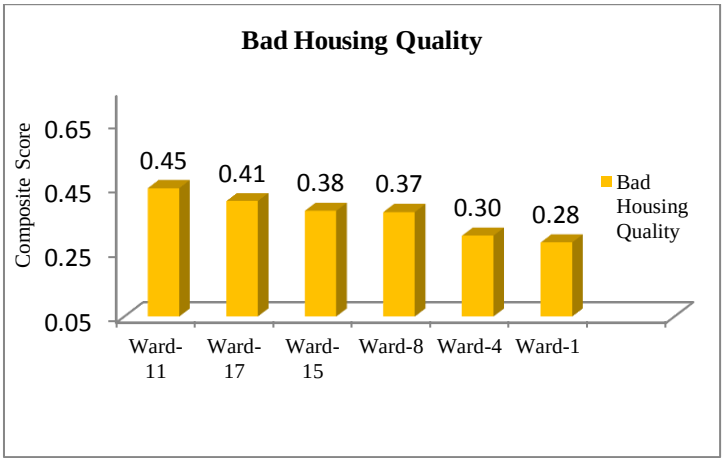
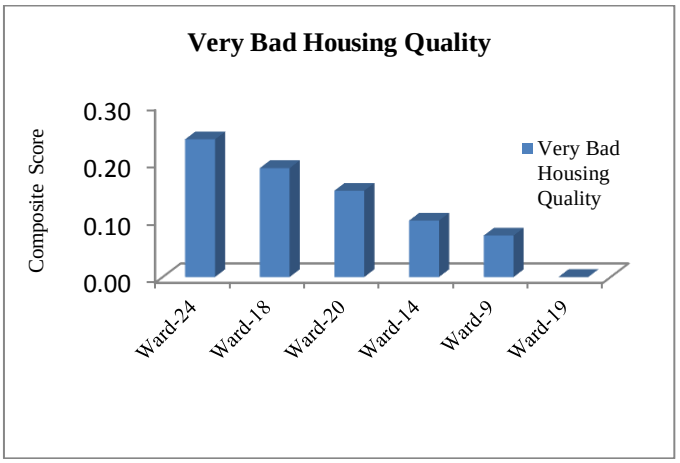


Source: Based sampled households survey

Fig.2.4 (Based on composite nested mean index)



Source: Based sampled households survey

Conclusion: As a whole, housing quality in Bijnor city presents a very dismal picture of the city. On an aggregate level about fifty percent of the population lives in sub-standard housing quality. Housing quality in the city, though show some relation with the gradual occupation of the city, it is more closely associated with socioeconomic status and concentration of population. The core of the city is more problematic as it shows. The low income and middle income groups have densely concentrated in the centre of the city. As a result, dwelling units have multiplied by construction, addition and partition of houses which generally are old. This has resulted, in the absence of proper ventilation, sharing of living space and shortage of housing facilities. Therefore, due to congestion and crowding in the central zone, high income people have also developed their residential enclave in the

outer zone. Thus the outer zone is characterised by both substandard and high quality housing environments.

In a town renewal programme, it is necessary for a healthy indoor environment that crowded and congested parts of the city are uncongested by developing such housing colonies on uncultivable land around and near the city linked to the core of the city through mass transit systems. New buildings should be designed keeping the old design so that natural ventilation and natural daylight minimise energy demand. For, buildings of the new design would require packing of building and ultimately ending up in sick building syndrome as is the case in the West.

It is suggested that more and more analytical researches of small cities should be conducted to extend this exploratory study. However, these researches must be conducted on smaller observation units with scientific instruments for measurement.

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