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# SOCIO-PSYCHOLOGICAL IMPLICATIONS OF HIGH-RISE HOUSING

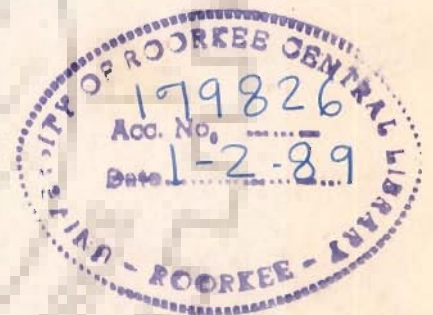
A THESIS

*submitted in fulfilment of the  
requirements for the award of the degree*

*of*  
DOCTOR OF PHILOSOPHY  
*in*  
ARCHITECTURE

By

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AUGUST, 1987

Graphs

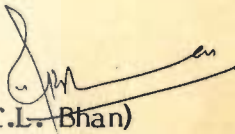


UNIVERSITY OF TECHNOLOGY  
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I hereby certify that the work which is being presented in the thesis entitled **SOCIO-PSYCHOLOGICAL IMPLICATIONS OF HIGH-RISE HOUSING** in fulfilment of the requirement for the award of the **Degree of Doctor of Philosophy** submitted in the **Department of ARCHITECTURE AND PLANNING** of the University is an authentic record of my own work carried out during a period from Aug.1977 to Aug.1987 under the supervision of **Prof. Vishwamitter, Prof. Dr. Swaran Pratap and Dr. S.K. Misra.**

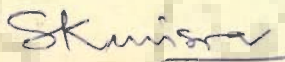
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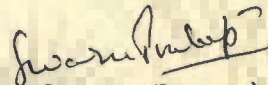
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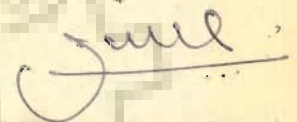
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## P R E F A C E

Planning and design of high-rise buildings for a high density habitation of heterogenous groups of urban people is a challenge. Their social and cultural background with varying values makes it crucially important to understand the provision of the physical environment that could meet a wide variety of people's social and psychological needs.

The problem becomes all the more difficult because a high density physical environment is expected to cater for those values.

In order that planners and designers of high-rise habitation may be able to create a suitable living environment, it is necessary that a comprehensive study of the people living in such physical environments is undertaken to identify and evaluate all such values, particularly, those related to social and psychological implications that have their direct impact on physical environment.

The ultimate goal of such a study is to seek all necessary planning and design information that can be utilized to humanize the habitable environment. The current practice of designing high-rise buildings on physical standards has not been able to satisfy the collective needs of people. It is, therefore, imperative that the direction of planning and design should take into consideration the dynamics of human values in combination with regularity standards of buildings. The study and analysis undertaken in this thesis report has precisely worked in this direction wherein a definite effort has been made to bring out the importance and significance of socio-psychological values as projected determinents of the physical environments of high-rise buildings.

## ABSTRACT

Rapid growth of the population of our metropolitan cities and consequent demand for additional shelter is making high-rise apartment living inevitable as well as viable. However, designers, planners and builders while constructing such apartments seem to be guided by rising land values only. Not much attention is paid to social and psychological factors in planning and shaping high-rise living. "In the past too much attention has been given to technical research of which direct importance is clearly obvious. Too little attention has been given to social, psychological and biological and other problems especially those directly related with human life in all its respects" (Ettinger, 1960).

The present study endeavours to gather and analyse empirical evidence on the design and other implications of social and psychological factors concerning high-rise living. The objective being to evolve some guidelines to make this built environment comparatively more conducive for harmonious and happy living.

Bombay, with the largest concentration of high-rise residential buildings in the country, has been selected for the purpose of the present study. A study-design has been formulated to gather bipolar responses, such as satisfaction/dissatisfaction, happiness/unhappiness etc. of the high-rise residents. Details relating to socio-psychological aspects of such resident have been analysed with the help of appropriate statistical techniques.

An attempt has been made in this investigation to gather and analyse user responses with a view to improve the planning and design of high-rise buildings and complexes.

The study concludes with general and specific recommendations for attracting greater attention on social, psychological and other biological needs directly related with the human life in all its respects. A greater interaction between Architects, City Planners and Social Scientists at the design and planning stage has been recommended to help planners and decision makers.

The study consists of eight chapters devoted to various aspects of high-rise living. A brief description of salient features deliberated separately in each chapter is highlighted in the following paragraphs. Details of the manner which has been followed to elaborate each chapter under separate sub-heads constituting the table of contents of the main thesis report has been included in the beginning of this abstract.

#### **CHAPTER - I Introduction**

This chapter in the main overviews the subject within the concept of housing urban population in general and high-rise living in metropolitan cities in particular. Consequent upon the spectacular and alarming rate of growth of population, demand for housing has abundantly increased. Industrialization and subsequent migration of people to towns and cities has aggravated the housing situation further. The evolution which leadsto walled spaces and community living included need and importance of housing with its definitional content have been discussed in this chapter. High-rise housing, in situations where land is scarce, has become technically a viable solution to house large number of people in metropolitan cities. However, the subtle human aspects comprising of social and psychological factors which seem to have, by and large, got undermined in the design and planning of these high-rise apartment buildings, have been highlighted. Causes of development of these apartment buildings in India and other countries, including a brief historic glance and emergence of tall building structures, have also been discussed. Aim and objectives and

scope of the study have been included in this chapter to provide a conceptual background to the issues associated with living in high-rise buildings.

## **CHAPTER - 2 Review of Literature**

This chapter reviews briefly the relevant literature covering the socio-psychological and physical aspects, relating to high-rise residents and buildings. Most of it relates to western societies as very limited research on the subject has been conducted in India. However, history and circumstances leading to vertical development in Bombay have been highlighted. High-rise housing conditions in urban areas of certain other countries reflecting different circumstances have also been discussed. Studies and surveys undertaken in these countries to identify and analyse users reactions and preferences have also been referred to in this Chapter.

These user studies conducted on high-rise living in other countries as well as in India have been deliberated separately. Opinions of renowned personalities and authorities in the field of high-rise buildings have also been included, under a separate sub-head, to highlight their view point on living in high-rise buildings. These studies have been of immense help in conducting the present study.

## **CHAPTER - 3 Research Design and Methodology of the Study**

This chapter discusses the methodology and limitations of the study. Details regarding test and final questionnaire, both relating to formation and canvassing are discussed here. Statistical techniques used and methods of shaping tables have also been discussed and analysed in the chapter. A total of 800 households were considered for both the core and the sub-urban areas of Bombay. With great effort 460 responses were obtained from the inhabitants living in 7 to 32 storey buildings. For the processing and analysis of data,

floor levels and number of storeys in each building have been considered as independent variables and these have been classified as low, medium and high on the basis of collapsing frequency distribution of responses. Social, psychological and physical factors have been assumed to be dependent variables. Weightages have been assigned to these with the help of a three point scale of low, medium and high rankings on the basis of the range of minimum and maximum scores obtained. The data was processed at Tata Institute of Social Sciences, Bombay. The Chi-square tests have been applied intensively in the study. The test of significance helped to ascertain whether the association between variables is significant or not. Contingency co-efficient indicates the magnitude of the association.

#### CHAPTER - 4 Social Environment

In this chapter an attempt to identify and analyse important aspects of the social environment in high-rise habitation is undertaken. Here family, cultures and occupational backgrounds of high-rise residents have been examined. It is observed that nucleated families with grown up children, by and large, live in upper floors. Nucleated families with young children and or extended families comprising elderly persons and young children live in lower floors. The proportion of such families decreases with the increase of floor levels. Details pertaining to various social activities and interactions such as sports, conversation, participation in each others' social events and get togethers have been obtained. The results of our survey indicate that there is keen desire for social interaction. Over nine-tenths of the inhabitants (94%) expressed their desire to maintain and develop social contacts and interactions and to enjoy the benefits of a happy living with neighbours in a socially conducive environment. However, this desire somewhat diminishes in the upper floors. Occurrence of social interaction in corridors, lifts and stairhalls at various floor



levels appears to be incidental. Even the vertical circulation spaces of lifts (cabin and lobbies) and the staircases are not socially active. At least, as many as 61% of the inhabitants felt so. Spaces such as lobbies act sociofugal in the absence of necessary facilities for a climate of social homogeneity among different age group inhabitants. It becomes very clear that human habitations in such situations do not provide a congenial social environment for interaction and socialization. This is an important issue and a challenge for the planners and designers of high-rise buildings.

## CHAPTER - 5 Psychological Environment

This chapter explores the impact of high-rise buildings on the psychological behaviour of the inhabitants. Here broad aspects of human behaviour like irritation, tension, anxiety and insecurity etc. are examined and analyzed. Both the physical and psychological factors that contribute to the phenomenon of irritation and tension, such as long waiting for elevator, poor maintenance of services, fear of fires and earthquakes, occasional leaking toilets, annoyance and loss of personal identity, child care and supervision, obstruction of view and breeze by the hanging of long clothes, noise created by children running about and skating etc. inside the apartment, irritating humming sound in water taps and clattering of window glass panes due to wind have been considered. The survey also covered other psychological factors contributing to the feeling of insecurity and anxiety. These are elevator failure and ascending of stairs, children playing down below, vertigo fear, danger of getting stranded in the elevator, loneliness, lack of communication with children playing outside the flat and lack of contact with nature. For example, long elevator waiting is irritating and cause of tension for as many as 85% of the inhabitants. About 86% residents are apprehending that they or their children may get trapped inbetween the floors in elevators and this creates some feeling of

insecurity and anxiety. The stresses thus caused by high-rise built environment are generally stated to be 'Oppressive' by the inhabitants.

Taking care of the above psychological factors while preparing designs and plans for high-rise buildings and complexes is a big issue and a challenge for the future of high-rise living in the country.

**Social and Psychological Implications :** Most of the inhabitants experience complete lack of 'Socialization' inbetween and among different age and social groups. Provision of public spaces is neither adequate nor designed to promote social interaction. This feeling is more pronounced among the residents of higher floors. Children feel isolated and constrained as they cannot give vent to their childhood feelings freely for want of space and company. There is strong tendency to force children to remain inside most of the time. Housewives and elderly persons find the environment quite hostile as they cannot interact and socialize the way these used to do before shifting to high-rise apartments.

Psychological implications focus at the wider range of issues related to users' reactions to the feeling of intense irritation due to long waiting periods in lift lobbies, children playing on floors, lack of privacy and noise due to strong wind on higher floors. Residents are very much apprehensive of fires, earthquakes, vertigo effects or dangers of children falling from balconies and or stairs. Anxiety, a contributory factor to tension, prevails among large number of users due to ascending and descending of the staircases and lifts while with luggage. Additional factors responsible for tension result from lack of facilities such as convenient clothes drying spaces and gardening activity, restricted children playing schedule, lack of spaces for keeping bicycles, prams and other children sports and playing items etc. Lack of visual of aural communications with children playing down below also contributes to insecurity and tension.

Social and Psychological Responses : Synthesis of socio-psychological implications yields certain suggestions for evolving appropriate and workable design and plan guidelines for high-rise apartment buildings. One of the challenges is 'socialization'. It can be tackled qualitatively by the humanisation of impersonal spaces such as entrance foyer, lift, staircase and corridor spaces at each floor, set backs and parking spaces on ground etc. Humanisation is conceived to be process of transfusion of invisible requisites of socio-psychological values into three dimensional physical form. The study shows that these spaces are potential assets for socialization which are currently being treated as no man's land, not only by the users but also by designers. Thus socio-psychological implications explicitly emphasise the importance of providing variety of physical spaces in high-rise apartment buildings, which can facilitate occasional community meetings or adequate spaces for children's play etc. This can be achieved by introducing functional as well as interesting design features like seating arrangements in public spaces and open spaces at different floors for children to play. Outdoor landscaping including design features like lighting, seating arrangements etc. for the well planned community spaces at each floor can be used to further enhance the quality of the social life. To reduce user's tension on account of long lift waiting, there is a need to plan for its effective reduction. To achieve this, staggering of lift stoppages has been considered as an effective alternative to stoppage of lift at each floor. This is to ensure the use of staircases which otherwise remain generally unused.

## CHAPTER - 6 Built Environment

This chapter investigates the existing physical environments with a view to improve the future environment so as to make high-rise living acceptable and comfortable. Opinions of the high-rise inhabitants have been obtained to

find out their preferences for floor levels and building types (number of storeys). Reactions of users pertaining to their satisfaction with the available spaces in the apartments as also those relating to layout of different rooms, positioning of doors and windows, orientation and indoor climate and common facilities like playing areas and their accessibility have been gathered and analysed in this chapter.

To assess the impacts of these vital data inputs to the high-rise apartment buildings the survey material collected from respondents living in 7 to 32 storey tall buildings has been analysed. About 80% of the respondents clearly indicate their preference in favour of occupancy of lower floors i.e., upto 6th floors level. Very insignificant number of respondent (about 5%) preferred to live at higher floors i.e., 12th floor and above. Among those residents (7%) who preferred 7 to 11 (medium) floors, 47% expressed their satisfaction with living at these floors itself. A major issue therefore relates to the challenge of planning and design of apartment buildings consisting of more than eleven (11) floors. The survey data relating to design factors and components of apartments do not give rise to any controversy as far as the occupancy of the residents go. By and large, the occupants seem to be fairly satisfied with planning, layout, interrelationship and number of rooms, area and orientation of apartments. About 68% residents showed their satisfaction in this regard.

## CHAPTER - 7 Synthesis

In this chapter synthesis of issues and challenges arising on account of the analysis of social, psychological and built environments of high-rise apartment buildings is attempted. It follows that an integrated approach needs to be evolved to overcome the problems arising on account of high-rise living.

Such an approach alone will help evolve appropriate and satisfying plans and designs to make high-rise a happy reality in metropolitan cities.

The statistical analysis of the data procured through the survey was performed which helped in determining the rank order of the factors causing problems. Subsequently, the level of significance of each cause was found out. On the basis of this level of significance/correlation, suggestions as recommended guidelines have been made for an integrated approach to the issues and challenges thrown by these problems.

The list of these issues according to their **rank order** is given below :

1. The urge for social interaction to socialize with others.
2. Tension and scare on account of security and safety of children using elevators and playing unattended on ground below.
3. Irritation caused on account of waiting for lift arrival.
4. Tension and irritation due to irregular water supply.
5. Irritation, tension and fatigue caused on account of ascending stairs and lifting heavy household goods in case of lift failure.
6. Deprivation of natural surroundings on account of lack of green space and garden for aesthetics and mental happiness.
7. Irritation and tension caused on account of light garbage, drifting in through windows etc.
8. Irritation caused due to unsightly comments and figures scribbled on common space and lift cab walls.
9. Irritation and disturbances due to noise created by clattering of window glass and fearful sounds by gushing winds.

10. Mounting tension and irritation on account of disturbing noise created by children playing in and outside the flat above and alongside.
11. Tension and irritation caused due to inconvenience on account of undue delays in electric, plumbing repairs.
12. Irritating situations mounted with tension caused due to unresolved leaking toilet/kitchen in the immediate floor above.
13. Tension and worry on account of insecurity and fear of children slipping through stairs or windows.
14. Irritation and disturbances caused due to noise created by late night parties, music and dance.
15. Worry, tension and deprivation caused due to lack of communication with children, in need of help etc., playing below on ground.
16. Anticipated fear felt on account of the dangers of devastating fire and earthquake hazard.

The percentage of respondents listing the cause in rank order above vary from 94 for rank order 1 to 44 for rank order 15.

## CHAPTER - 8 Conclusions and Recommendations

### Conclusions

Important findings are presented here in this chapter in the same sequence as outlined in the rank listing of the problem causing factors based on the responses of the high-rise residents presented in the previous chapter:

- Tension and worry on account of fear of children getting stranded in the elevator and their safety and security while playing unattended below on the ground increases with increase of floor level upto 11th floor whereafter it remains same with further increase of floor level.

- Irritation and tension caused due to waiting for longer time for elevator increases with the increase of floor level upto 11th floor and decreases thereafter with further increase of floor level.
- Irritation caused due to irregular water supply does not increase substantially with the increase in building height upto 20 storey whereafter it decreases with further increase of building height upto 32 storeys.
- Anxiety and fear on account of elevator failure and ascending of stairs with heavy household goods increases with the increase of floor levels and building height.
- Feelings of deprivation and dissatisfaction increases with the increase of floors upto 11th floor whereafter such feelings remain unchanged with further increase of floors.
- Irritation on account of light drifting garbage thrown from windows above increases with the increase of floor level upto 11th floor. Irritation on this account at higher floors decreases with further increase of floor levels.
- Anxiety and tension due to anticipated fear of fire and earthquake hazards increases with increase of floor level upto 11th floor whereafter anxiety and tension on account of fire and earthquake remains same with further increase of floor level or building height.
- Desire for socialization increases in direct proportion to the increase of floor levels upto 11th floor and decreases thereafter with further increase of floor levels.
- Level of social interaction, because others in the high-rise buildings keep to themselves, among residents decreases distinctly with the increase of floor levels upto 11th floor level where-after level of social interaction decreases with further increase of floor levels.

The above findings which have been presented in detail in the main thesis report, suggest that physical form of built environment and socio-psychological issues and challenges are very closely related. A good number of high-rise problems can therefore be taken care of by improvements and innovations in the physical environment. Even other problems do not seem to defy solution, rather these can be overcome by appropriate organisational and managerial technique.

### **Recommendations**

The study indicates that most of the socio-psychological problems although occur in all types of high-rise buildings, but their severity and frequency is perceived more intensely upto 11th floor level. Thereafter and upto 31st floor level the survey does not reflect any appreciable impact of these problems. It seems residents have compromised with the prevailing high-rise situation. Problems arising above 32 storey high-rise buildings are beyond the scope of this study. The recommendations made below are therefore directed as guidelines for the consideration of designers, planners and the decision makers of multi-family high-rise buildings. Important recommendations are:

- Low-rise walk-up apartment buildings should be preferred to high-rise apartment buildings with elevator arrangements.
- Slab block with balcony access should be preferred to point block high-rise apartment buildings for possible repetition of visual interaction, familiarization and consequent to it better socialization. However, balcony access suitably placed inbetween two floor levels and connected to the building by small bridges at intervals would add further to generally preferred selected neighbourhood contact.
- Fast speed elevator with limited stoppages should form an important



- mode of vertical circulation in addition to slow speed elevator with provision of stoppages at each floor.
- Semi public community space zones in the elevator lobby should be provided to make lift waiting a pleasant experience and a place of comfort, convenience and suitable for interaction.
  - Sitting lounges in the circulation lobbies should be provided for deliberate social interaction at all floor levels in general and upper floors in particular. These should help in developing intimacy, contact, understanding, companionship, neighbourliness and security.
  - Physical transition between entrance door (personal entry) and balcony accessway (semi-public space) being in immediate neighbourhood makes for personalization of the apartment space. A level change inbetween the two should be provided for in the design to bring the individualized characteristics of the apartment.
  - All the window openings should be provided with a projecting slab at sill level. Alternatively floor slab at every fifth floor level should be projected to offer obstruction to a direct vertical view. Balcony also should be provided with comparatively high railing and projecting slab. These provisions would not permit a direct under-view and minimise/ prevent vertigo affects at higher floor levels.
  - A separate space exclusively for cloth drying preferably near bath rooms with honeycombed external wall for better ventilation should be provided at all the floors in each apartment.
  - Sit out spaces, to accommodate greenery and plant growing material, should be provided for in each apartment alongwith accessway and balconies.

- Fire escape located suitably on the outside of the building, easily accessible, distinctly visible and well connected to balcony or corridor access in slab block and lobby in point block high-rise buildings should form an important design concept. Built-in fire fighting equipment including fire alarm and detection system should be strictly followed in design of high-rise buildings.

Where feasible different high-rise blocks belonging to one or even more housing societies should be provided with partially enclosed and well maintained skyways at suitable floor levels and usually put to use as community space as an additional fire escape route.

#### **Author's Publications on High-Rise Living**

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'High Rise Living : A Comprehensive Study', Paper presented at 33rd Annual Town & Country Planning Conference at Trivandrum, Institute of Town Planners, India, April, 1985.

## ACKNOWLEDGEMENTS

I wish to express my deep and sincere gratitude to Professor Vishwamitter, Architecture & Planning Department, Dr.(Mrs.) Swaran Pratap, Professor, Humanities & Social Science Department, University of Roorkee and Dr. S.K. Misra, Architect, Dy. Director, Central Building Research Institute, Roorkee, for their valuable and painstaking guidance in preparing this research work. Their expert opinion and suggestions that they made available to me from time to time throughout the period of research at the University is gratefully acknowledged.

I am thankful to Dr. O.N. Wakhlu, former Principal, Regional Engineering College, Srinagar for having sponsored me for this study under Q.I.P. Scheme of Ministry of Education, Govt. of India, New Delhi.

Thanks are due to Head, Prof. Rattan Kumar, faculty and staff of the Architecture & Planning Department, University of Roorkee, for extending all help and facilities during the period of my stay at the University of Roorkee, Roorkee.

I wish to place on record and acknowledge with sincere thanks and gratitude, the guidance and help provided to me by Sh. R.D. Naik and Sh. J.C. Sharma of the Tata Institute of Social Sciences, Chambur, Bombay in processing the data on the Machine Processor at their Institute. I am also grateful to Indian Council of Social Science Research, Govt. of India, New Delhi and acknowledge gratefully their financial assistance rendered to me in processing data at T.I.S.S., Bombay.

I can never forget and wish to place on record the painstaking help rendered to me by Dr. M.L. Pandit, Asstt. Professor, Regional Engineering

College, Srinagar. His timely help made it possible to give final shape to this document, which is gratefully acknowledged.

My thanks are due to my nephew, Dr. Sudesh Dhar, Scientist, T.I.F.R., Bombay, who bore many inconveniences caused during my stay with him at Bombay. The author also acknowledges with thanks Dr. M.N. Viladkar, my friend, for providing moral support and comparing the draft as also to Sh. Anil Gangoo my nephew for his assistance. Sh. D.N. Koul, Regional College, Srinagar is thanked for his assistance in typing the first draft.

The author also recalls with gratitude, Secretaries and Presidents of various Housing Societies in Bombay, who helped him in contacting residents of their high-rise apartments. Cooperation of concerned and unconcerned high-rise residents is also acknowledged. They all made my work rich and of rewarding experience.

The good wishes and blessings of my deceased uncle Pt. D.N. Bhan and my mother are acknowledged. Great help was gained by me with patience and endurance of my wife Smt. Mohini Bhan, who took the burden and carried on with the household single-handed during my stay at Roorkee and while preparing this document. Her encouragement and help is acknowledged. Inspiration of my daughter Renu and my son Rajesh is appreciated.

Sincere thanks are due to Mr. Ashok Kr. Sharma, Department of Civil Engineering, University of Roorkee, Roorkee for nicely typing the thesis manuscript.

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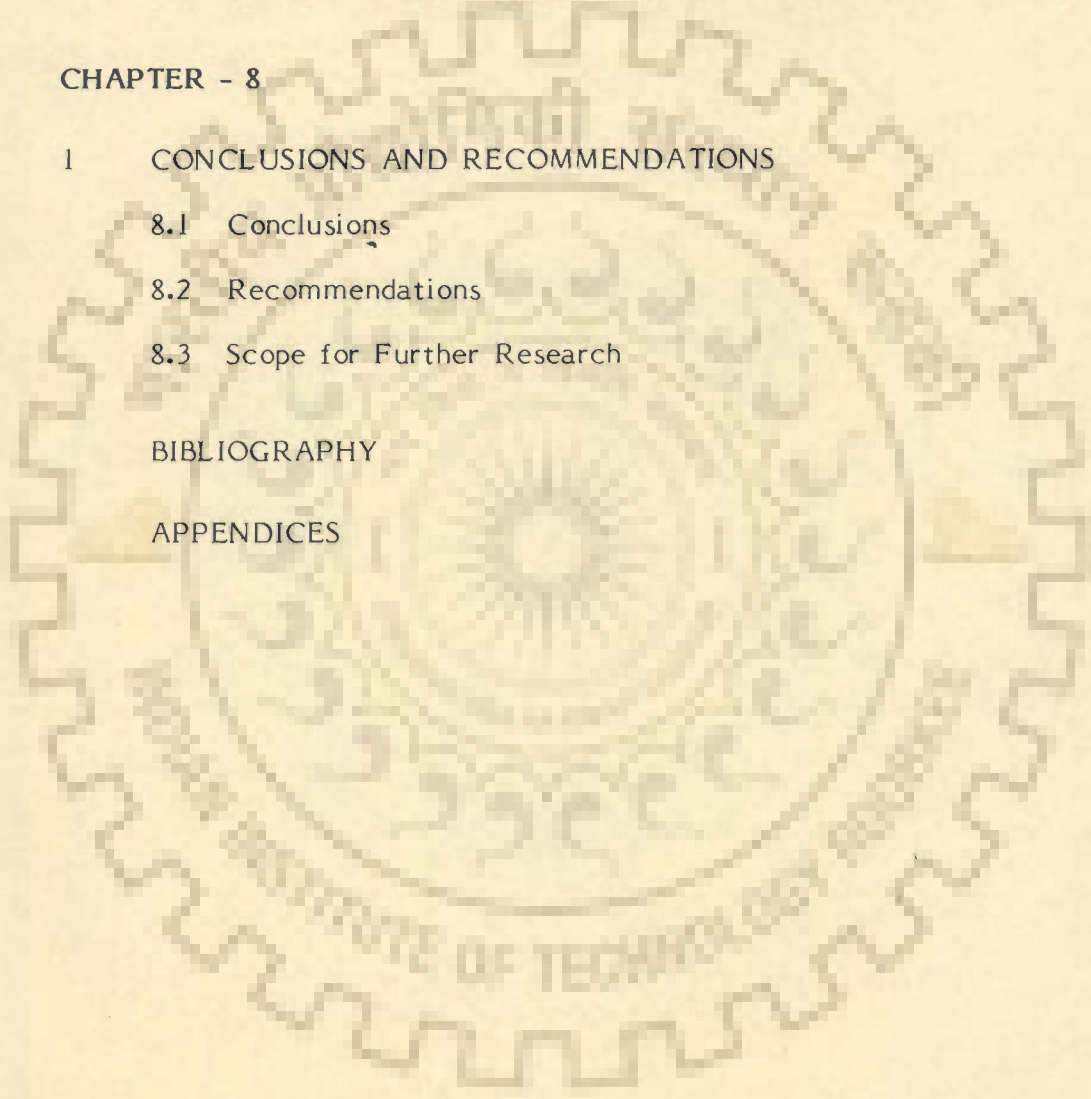
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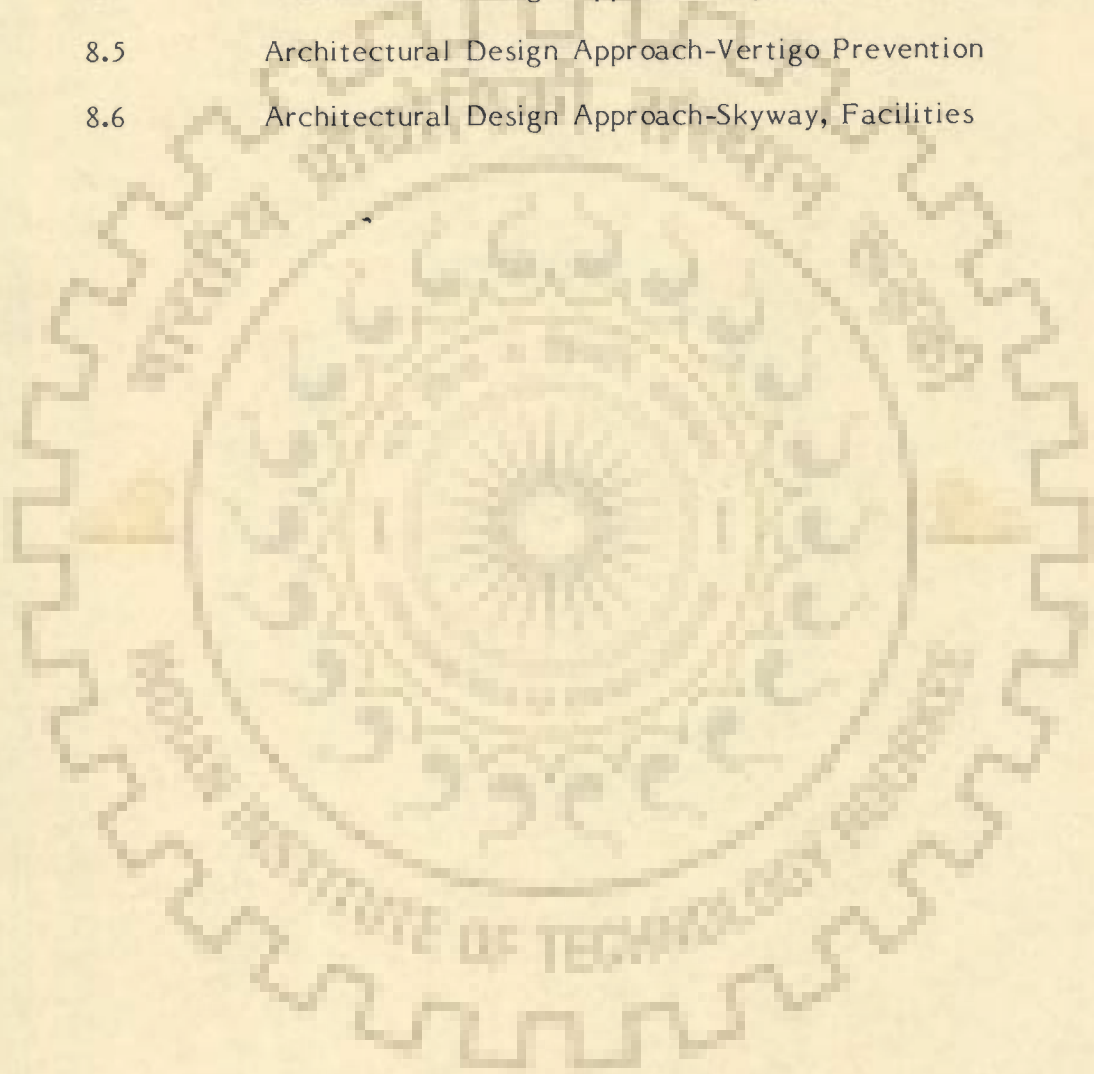
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## CHAPTER - I

### INTRODUCTION

#### 1.1 POPULATION

Despite many efforts to check the growth of population, the world population continues to increase at an alarming rate. This is particularly so in the low and middle income group of countries. In 1984 the population of the world increased by 80 million. The third world, already accounting for three-fourths of the world population, recorded an increase of 73 million in its population during the year. Since mortality rate continues to decline, the increases in future population are likely to surpass those being recorded currently.

Growth of Urban population is very spectacular. This population in the developing countries is increasing at almost 4 percent a year. This percentage is over twice that of the growth of rural population. Between 1950 and 1980, the urban population of the developing countries, excluding China, increased by 585 million. Most of the increase in urban population in these countries is accounted for by the big cities. Share of these cities in the total urban population has increased from 2 percent in 1950 to 15 percent in 1980.

Increasing numbers pose serious problems for the developing countries. Provision of basic necessities like food, clothing and shelter for the additional population requires huge investment which most developing countries are finding it difficult to match. The pressure on land is increasing both for the production of food grains and settlement of large human population. This aspect of the growing population is too well known to need any illucidation here.

The problem of shelter and space for the settlement of human beings, though most pressing one, has not received the attention it deserves. The necessities of food and clothing are more urgent ones and most of available resources are utilised for this purpose. But if the problem of shelter including the provision for safe drinking water, sanitation, health services, education and transport, is not attended to with all the seriousness, the problem is likely to plunge the existing social system in chaos.

The problem of shelter and land is particularly acute in the urban areas which have accounted for most of the investment in the developing countries. "Thirty five years ago there were few, if any, shanty colonies in and around the cities of the third world. Today an estimated 40 percent of the urban population lives in such structures, on illegally occupied land". (Jha, 1985).

Nearly half the urban population did not have access to piped water and private toilets in 1980. If the present trend continues, the developing countries would enter the twenty first century with 62 percent of their 2,100 million urban population living in shanty towns built on illegally occupied land. (Jha, 1985).

The situation in this regard in our country does not seem to be any different. Industrialization and consequent migration of large population into towns and cities has aggravated it further. Although only 20 percent population lives in urban areas, yet India is considered as one of the largest urban population bearing country in the world. The increase in urban population, as per figures given below has been of a high order:

1951	62.4 million
1961	78.9 million
1971	108.8 million
1981	160.0 million.



The growth of the urban centres in India has been phenomenal. According to census figures, the increase in number of cities and towns having a population of more than 0.1 million, is as follows:

<u>Year</u>	<u>No. of towns &amp; cities with more than 0.1 million population</u>
1951	75
1961	113
1971	142
1981	216

During 1971-81 population of urban India grew by 46.02 percent which is higher by 8.1 percent in comparison to 1961-71 decade. It shows that both the urban population and its growth rate are increasing fast. In this growth rural-urban migration (estimated at 28 million persons during 1971-81) plays a significant role. For example, over 55 percent of the increase in the urban population during 1971-81 decade was accounted for by this migration. In absolute terms urban population during the decade increased by 51.2 million. The share of urban population has increased from 16.7 percent to 23.5 percent and the metropolitan cities account for 27 percent of the total urban population in the country. If rural-urban growth rate differential trend at 2 percent continues, the share of urban population would rise, to over 31 percent by 2001 (Misra, 1987). The current number of urban dwellers at 170 million (1986) is already posing serious problems.

As per estimates quoted in the Seventh Plan, nearly 60 percent of the addition to population between 1985 and the year 2000 will be in urban areas. Out of a net addition of 76 million people during 1986-91, the share of urban areas will be 38 million. "The absolute magnitude of growth of urban population in the country is going to be staggering in the near future despite the fact two-thirds of the Indians would still be living in rural areas". (Malhotra, 1987).

According to the population projections the ratio of urban to rural population would be 34.8 percent by the turn of the century.

### Population of India (millions)

<u>Year</u>	<u>Urban</u>		<u>Rural</u>		<u>Total</u>
	N.	%	N.	%	
1971	108	19.7	440	80.3	548
2001	329	34.8	615	65.2	945

The lopsided urban development creates enclaves of population explosion in a few cities which in turn makes the urban land a very very scarce commodity. Pull of bigger cities is bound to continue before large scale employment opportunities are made available in rural and semi-urban areas.

## 1.2 HOUSING : NEED AND IMPORTANCE

Shelter is a basic necessity. It comes just after needs of food and clothing. "In a hierarchy extending from lower or more basic needs to higher or more specialized needs, i.e. from shelter, security comfort, convenience, through socializing, self expression, and aesthetics, a lower need must always take precedence over a higher one. Not until the lower needs have been satisfactorily met will the higher one emerge into consciousness" (Cooper, 1975).

A pyramidal framework or scale is representative of the hierarchy of these human needs, which Abrams Maslow has developed (Stagner, 1969).

These are:

- Physiological Needs  
(Hunger, thirst, oxygen, recovery from fatigue)
- Safety Needs  
(Freedom from pain, protection of physiological goal)
- Belongingness and Love Needs  
(Friendship, love, tender, affection)

- Esteem Needs  
(Prestige, achievement, status, dominance)
- Need for Self-Actualization  
(Expression of capacities and talents).

### Pyramidal representation of hierarchy of human needs



**Source:** Adopted from Abrams Maslow, Motivation and Personality, 2nd Ed. Harper & Row, New York, 1970. (Scanlan, 1979)

Shelter has certain distinct characteristics. It is not portable like food or clothing. It cannot be moved from place of surplus to place of scarcity to help remove imbalances. Therefore, being immobile, development of trade and transport does not affect this commodity directly.

A house is the place where the human family seeks shelter from natural hazards. The role of a house for overall human growth is also very significant. It influences the development and behaviour of individuals and families and helps in improving their quality of life. It is a place where children, citizens of tomorrow, grow, think and play. It is a place, where most of our time is spent in various activities concerning living. A good part of one's life time

is spent in the house and the neighbourhood.

A man works for 44 hours a week, 50 weeks in a year and takes about half an hour to one hour travelling from and back home, spends the remaining time, from a minimum of one-third to a maximum of over two-thirds of his time, at home (Wood, 1940). This indicates that a house is a part and parcel of man's life. But very few houses provide a conducive environment for proper growth of human beings. A house is cultural artifact than a physical unit. Its construction, and maintenance correspond to the affordability and values people place on a dwelling. "For an individual or a family, a house is i) shelter, ii) symbol, iii) physical protection and v) psychological identity. The role of house as an environment for human growth is significant one. It has potential to support human life in a meaningful way, influencing the development and behaviour of individuals and families and improving their quality of life". (Aroni, 1975).

A house can be defined as an organization of physical elements enclosing a part of space, to be suitably useful for living. It is a space where man can move freely within and between physical settings to satisfy not only his hunger, thirst, sex and similar biological needs but also his needs for affiliation, achievement, success and other social motives. "A good house is essential for decent living which plays a great part in providing convenience in the performance of daily chores of life for comfortable living. It has great significance for promoting social well being and good neighbourliness" (Mathur, 1978).

It is the place where human being has the first experience of social life and where basic traits like friendship, cooperation, love, loyalty, devotion etc. are nourished. Hence human being is exposed to family reciprocity and social life.

According to Satenig (1973) "a house is a logical place for children where socialization develops, wherein family they form close relationship and contact which influence their development and growth". It is a place where the present day changing value system of life and living can suitably be adopted without loosing cultural heritage and encourage human requirements of love, sensitivity, morality, ethics and the like. In a house man and his family is introduced to larger human community within the housing cluster and beyond in the neighbourhood, the school and the group. Hence while planning for a shelter the aspects of environment have to be considered as well.

The concept of shelter is planning and construction in wider context. This will include planning for habitation in a community considering living, working and other spaces like children's education and play and societal relationship within the community. Shelter and environment appear distinct, but the two are interrelated. One is focusing into the other and make living happy and habitable. The environment is not only one's surroundings but all that affects life and human behaviour.

A vital function of housing, therefore, is to promote family life and the overall personality. "The personality of a man is formed in the first instance by the particular way of life with which he is confronted as a child in the home which reflects all the characteristics of the society concerned.... Good housing i.e. well planned and well built dwelling, streets and neighbourhoods are of inestimable importance for the development of today's child who would become tomorrow's active citizen". (Ettinger, 1960).

The sociological aspects of housing are well brought out by Gist (1974) in the observation that "we are interrelated with many facts of social life—economic, political, legal, sociological, medical and theological". Housing has an important bearing on the morale, health and efficiency of the people.

In the advanced countries provision of housing is regarded as an investment in human capital.

Housing affects family life. Each member in his own way contributes to it. Individually their share would be according to their reaction to the housing environment they live in. Tessie (1970) explains the effect of housing in family life thus: "Housing may affect the social and affectional aspect of family life by influencing directly the reactions of the members of the group. The response to a individual may be limited or heightened depending on the provision made in his home for rest and privacy or quite that gives sense of peace and inner strength".

Privacy has been the age old human requirement. It provides an individual with freedom to choose his activity all by himself without any disturbance. Privacy is defined "as an individual's freedom to choose what he will communicate about himself and to whom he will communicate it in a given circumstance" (Ittelson, 1974). While Westin (1967) defines privacy as the claim of individuals, groups or institutions to determine for themselves when, how and to what extent information about themselves is communicated to others. Privacy is not merely a question of physical distance between members, homes or the position of windows but it is a extremely complex phenomenon. Privacy concerns relationships between people.

Consequences of lack of privacy among ghetto families have been highlighted by Lawis & others (Ittelson, 1974). Castles and forts were constructed for reasons of privacy as well. "It was in the seventeenth century that privacy became the new luxury of the well to do. In the twentieth century it has become a recognised need, if not a possession of a humblest worker" (Tessie, 1970).

### 1.3 SOCIO-PSYCHO-CULTURAL ASPECTS TO HOUSING

Man is primarily a social being and his very origin depends on social life. Housing has not only great sociological but also psychological, economical and biological benefits and promotes economic development and human welfare more than other things. Dis-satisfaction due to bad housing nullifies the benefits of food and clothing. Despite such importance the problem of housing has not received adequate attention in most countries. "Shelter and protection are the most obvious of housing projects and are none-the-less the most neglected" (Jameson, 1973).

In India too housing is not receiving its due importance. "While there is lot of emphasis on agriculture and industry, housing tends to be a low priority item in the country's plans with the result that housing problem is assuming serious dimensions" (Singh, 1978). The problem could perhaps be solved by attaching due importance to housing and treating it as a social problem.

The present housing situation in the country would reveal that the gap between demand and supply is increasing at an alarming pace. The present level of investment in the housing sector is low and inadequate. The private or public sector housing agencies are not building fast enough to meet the growing housing needs. National Buildings Organisation estimated housing shortage at the beginning of the Seventh Plan at 5.9 million units widely distributed across different urban areas in the country. According to Sundram (1987) "The increase in population between 1985 and 1990 is expected to generate an additional requirement of housing units to the extent of 3.8 million units in urban areas". This means that even if the aim is only to freeze the existing backlog in housing shortage, "it would be necessary to build at

least 3.8 million units during the plan period".

#### 1.4 APPROACHES TO HOUSING

In the remote past provision of human shelter was relatively a simple affair. Caves were man's first abode. The Neolithic man built durable habitations like pit dwellings, lake dwellings and beehive huts (Arther, 1965). As the evolution of human society progressed, the emerging homo-sapien's intelligence and ingenuity led to the construction of the roof structures with timber and stone (Khan, 1972). The primitive man sought some kind of protection against natural elements and wild animals. With the development of the society, need for sheltered spaces began to include the need for privacy and later for protection even from other men. This development led to the evolution of walled living spaces (dwellings), walled cities, forts and towers. Perhaps defensive lookout towers were man's first tall constructions.

It is believed that two major factors promoting community living were possibly kinship and religion (Calderwood, 1964). Emergence of social groups and their distinct social status also led to the evolution of cluster housing. The chiefs lived high above others at higher or elevated ground to be distinctly visible in the settlement. Their status and power was reflected by the height of their palaces and towers. In nut-shell defence, social status and will of dominance have contributed largely to the emergence of housing cluster. The chiefs felt safe and elevated by living at higher vantage points of the cities. By this they established dominance over others. Subsequently it became a belief that people living at higher or elevated levels were essentially dominant in terms of power, prestige and wealth. The size and height of their residences, reflected the level of their dominance.



Sprawling mansions with large greenery expanses around have faded into architectural history. The rectangular boxes of concrete and iron jutting into the skyline have changed the grandeur of the past. Mass produced high-rise buildings in the core areas of the cities have pushed the delicacies of the past into oblivion. Initially, living spaces were used for many purposes. These purposes were to provide sheltered spaces for residence, work place and storage. Limited knowledge of different materials and the structural know-how restricted the scope of high-rise living spaces in olden days, though high level and vintage living was necessitated for protection and security. Turrets of castles, of course, must have been erected for this reason. Nevertheless these stand no comparison to present day high-rise buildings.

High-rise buildings were initially erected for non residential purposes (Misra, 1970). Fast-growing population in urban areas seems to have encouraged the development of multi-storey apartment buildings providing homes for many.

But today the complexity of our society and progress in science and technology have made the provision of shelter a very complex affair. It no longer involves simply a protection against the elements. Presently shelter must satisfy social, psychological, aesthetic and economic needs of the modern man.

In the initial phase of socialisation housing development proceeded mostly horizontally. Villages and towns started shaping themselves by the spread of housing clusters. Technical developments made it possible to settle large numbers of people in towns and cities. With the development of transport trade and industry, large towns and cities became a reality. Without profound technical developments in transport, sanitation, storage

and utility services it would not have been possible to sustain large towns and cities. However, with the turn of the present century most of the cities became congested and overcrowded mainly because these reached limits of horizontal expansion. The most important hurdle in this regard has been lack of land for construction purposes and wherever available its prohibitive cost. Fast urbanisation resulted in overcrowding and scarcity of available living spaces, which made high-rise living inevitable in our metropolitan areas (Pathak, 1973). In other words horizontal expansion of most cities and towns became no longer feasible. This is particularly so as horizontal expansion can encroach upon peripheral agricultural land around towns and cities.

### 1.5 HIGH-RISE DEVELOPMENT

As regards the high-rise developments, Bhalla (1967), ex-President, Indian Institute of Architects, and renowned professional in the country, propounded that apart from aesthetic consideration there are three reasons for the construction and adoption of high-rise buildings in general and for residential purposes in particular. The reasons are:

1. Shortage of land resulting in high land values.
2. Need for concentration of certain functions.
3. Prestige purpose.

Even the growing knowledge of design techniques and construction methods have lead to the emergence of many tall structures all over the world. What was once regarded as American urban phenomenon can now be seen in many small towns and even in the country side. High-rise buildings have solved certain specific problems. In spite of cost escalation high-rise buildings have offered many advantages.

According to Jain, (1980), the principle of "all and everyone in the same place" was considered a pre-requisite for higher productivity. The urge to increase productivity also encouraged high-rise living. Centralized location of the staff was necessary for higher productivity. Growing technical feasibility to high-rise construction as also living in them furthered the shift from horizontal to vertical living. The innovation of newer materials made it possible to construct slimmer and taller buildings. "Many more additional factors could also compel man to build as high as his wishes". In the eyes of Fazl-ur Khan, the engineer for the tallest buildings on earth, (Sears Tower, Chicago with 110 floor) some of these factors can be:

- Publicity for the property owners,
- Shortage of work space for expanding activities,
- Optimum use of floor area with minimum ground coverage,
- Central location.

- Easy transportation,
- Maximum output with minimum input,
- Working at same address,
- Psychology of one up than thy neighbour,
- Romance of being in the tallest building.
- Occupant of the heighest level liking or having illusion of gathering cloud around him,
- Rapid vertical communication system.
- Prestige of occupant.

Other factors which exercise compulsion for planning high-rise buildings are enlisted below:

- Financial viability,
- Availability of appropriate building technology,
- Availability of financial and other resources,
- Computerised designing ,
- Structural system .
- Telecommunications inside tall structures ,
- Electric gadgetry,
- Alarm system .
- Fire escape ,
- Advancement of science-study of wind, weather, temperature etc..
- General precautionary measures like smoke detectors, sprinkler etc.,
- Storage of water and
- Stand-by for power generation and more vital are psychology of occupants of tall structures and their socio-economic considerations.

"The architects who desire to create, albeit, tall structures on Indian Sub-continent, would be well advised to evaluating their designs and if need be even learn the real lessons of building vertically. Their doing otherwise might create cities without souls, just the same way that has happened in many of the advanced countries of the world". (Jain, 1980).

Scarcity of land and increasing pressure of population, as per Gogate (1973), have resulted in spiralling of land prices. The affluent having capacity, do not miss the opportunity to erect high-rise buildings and enjoy heavy premium on their investment. Land speculation and, of course, the scarcity of residential accommodation encourages construction of high-rise apartment buildings.

Mahatta (1978) a well know architect of Bombay is also of the opinion that high-rise development has been adopted due to the non-availability of the scarce land. Other considerations include growing distance from work places service centres and transportation facilities, clean environment and fresh air. High value of commercial space would enable the builders to recover the cost with premium. This is why commercial skyscrapers predominate the skyline of cities in our country. The author suggests that under Indian conditions the challenge of fast urbanisation can be met more by tall buildings. It is high time to demolish ill planned 4 to 5 storey buildings and use land under these for raising tall structures with enough open spaces. Meticulous planning and design is imperative for such buildings.

As per Geddes (1974) the reasons for the adoption of tall buildings, include:

- The migration of people attracted by industry to urban areas, and consequent need for housing.

- The basic aspiration of man to built tall, encouraging and stimulating architectural and engineering ambition and vision.
- The development of towns and cities for widely varying reasons, from slum clearance to the creation of centers of commerce-partly sociological and political, partly big-business.
- Economic and financial considerations as assessed at the time of decision.
- The hope to achieve higher densities of population in an agreeable manner and the conservation of land by the idea of high bulk.

Fortunately developments in science and technology have made it possible for man to conquer nature to a large extent. In so far as building technology is concerned, this development among other things has made it possible to erect structures skywards. Dependence on skyscrapers has been increasing the world over, be it the developed western hemisphere or the developing eastern hemisphere. However, our success to rise further high depends mainly on the development of scientific and technological know-how, advancements in construction techniques, development of building industry, and market trends for investments and return.

"The present skyscraper was completely a new invention with almost no antecedents prior to the middle of the 19th century", (Blake, 1974), although man's obsession to rise-high up in the skies is as old as the history of mankind itself. Initially shelter on the tree tops was sought to ward the dangers of wild beasts and floods in the river valleys. This must have been the first of man's attempts to build huts on high wooden stilts and use vertical space for his safe living. "This kind of preferential living was further revealed in his opting for vantage points for defence structures and erecting tall towers again for protection or for observation of celestial objects". (Jain, 1980).

"The creative genius of man has found the answer in vertical expansion with which the present state of technological advancements is quite a practical solution" (Lal Rajinder, 1965). This type of vertical development provides for increased density and thereby utilization of minimum land area leaving sufficient open spaces for play, recreation and other urban activities.

## 1.6 GENESIS : EMERGENCE OF TALL BUILDINGS

The urge to build upwards is perhaps associated with the desire to achieve sublime in the art of tall building structures right from ancient Egyptian Pyramids, West Asiatic Ziggurats through Medieval Cathedrals and Castle Spikes to the present day, 'Skyscraper Blocks'. The earliest and grandest tall masonry of ancient world, around 280 B.C. was Light House of pharos, about 131 mts. (400 feet) above the Mediterranean near Alexandria Egypt at the marsly mouth of river Nile.

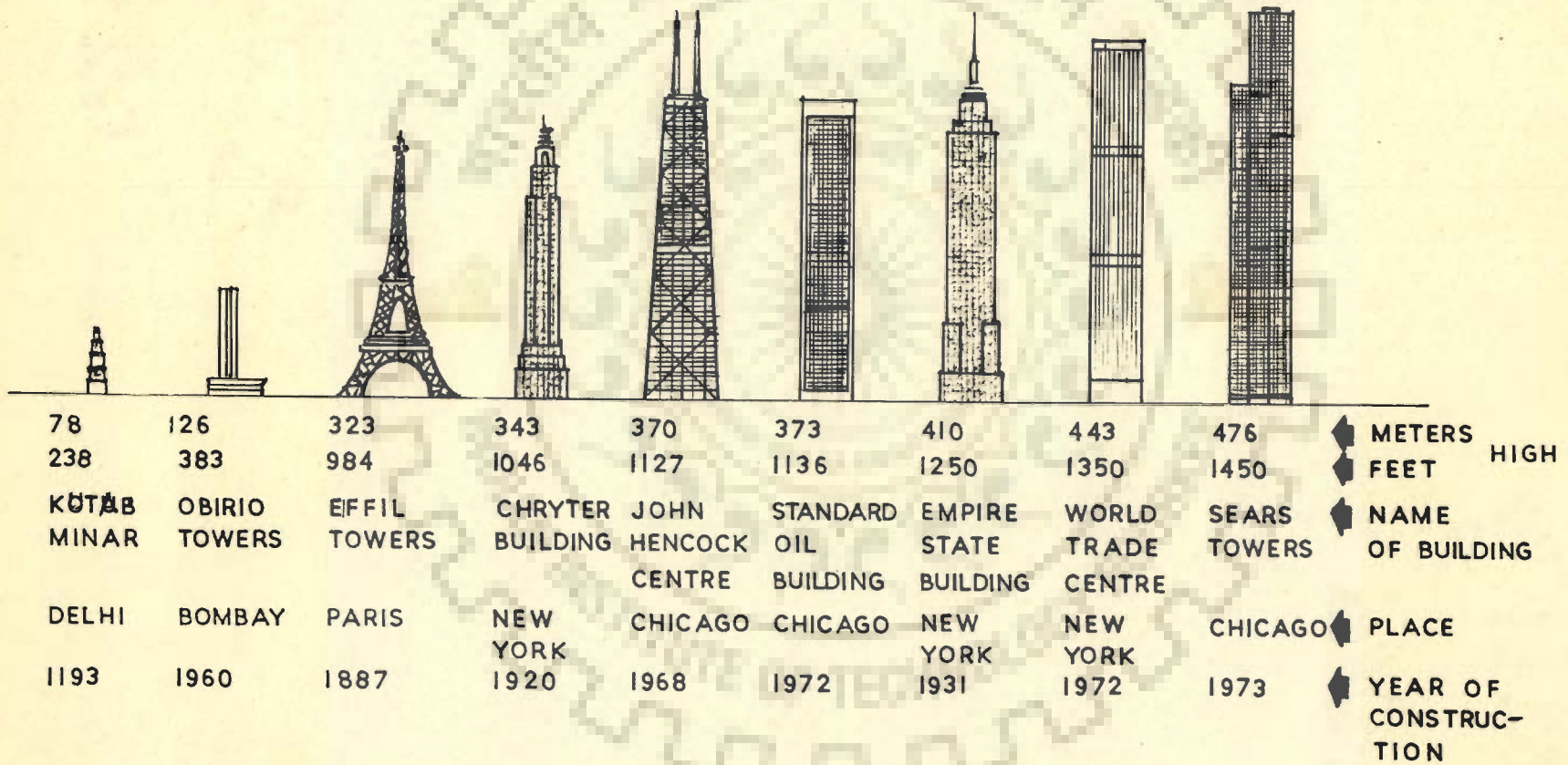
It was rapid industrialisation in 19th century that population concentration in urban areas resulted in increasing land values which boosted construction of multi-storey buildings. First kind of Iron framed structure was 'Light House' constructed in 1843 at Black Rock Harbour, Long Island. In the year 1854 a six storey 'Harper Brothers' building of wrought iron beams over cast iron columns in conjuncture with masonry, replacing timber framing, was constructed. The invention of 'Hydraulic Lift' in the year 1852 made it possible to construct multi-storey buildings. William Le Barn Jenney father of skyscrapers constructed, 'Leither Building' the first of new generation large scale office building, in 1879. The innovation of electrically operated lift in 1880 made things easier and 'Cage construction method' of George, B. Port with interior courtyard wall of cast iron column and wrought iron beams filled with brick panels, was adopted in construction of New York 'Produce Exchange' in 1881 and claimed to be first of its kind.

Innovation of steel made it possible to increase the height of buildings upto about 26 mts (80 feet). Skeleton construction was adopted by Jenney in 1885 in the construction of 11 storey 'Home Insurance' building in Chicago. 'Rand Mc Nally' (9 storey) and 'Tacom' (13 storey) buildings were constructed in 1889 in Chicago. 'World Buildings' (New York), a 13 storey structure and 6 storey dome and 'Mandock Building,' a 16 storey tallest masonry building were the innovations of 1890 and 1891 respectively. In the year 1891 another tall building 'Masonic Temple' in Chicago rose 20 storey in height. Lateral bracing to counter the high wind loads was adopted in this 90 mts. (274 feet) tall building. New York took the lead when Bruce Price constructed, 'American Surety Building', a 21 storey structure in 1895. 'Ivins Syndicates Park Row Building' with 29 storeys got erected in 1898. 31 storeys were added to 10 storey 'Singer Tower' building in 1906 making this building about 200 mts. (612 feet) high. In the year 1907 a 50 storey, about 230 mts. (700 feet), high building was erected. 'Woolworth Building' a masterpiece from Cass Gilbert and last of neoclassic design, with 60 storeys and about 262 mts. (800 feet) in height, dominated the skyline in 1913. The process continued slowly but steadily upto 1930 with Craig Severence's 'Manhattan Tower' about 304 mts. (927 feet) high and Van Alen's, 'Chrysler Tower' about 343 mts. (1046 feet) high, dominating the skyline. In 1931 yet another land mark, 103 storey high 'Empire State' building was achieved. Thereafter the process slowed down for some time. It was after a lapse of about 40 years i.e. in 1972 'World Trade Centre' with 110 storey, about 444 mts. (1352 feet) high, building was constructed.

Chicago did not lag behind New York and erected world's tallest building as of date 'Sears Tower' 110 storey (Fig. 1.1) and about 476 mts. (1450 feet) in height constructed in 1975. During the year 1956-57 Frank Lloyd Wright

# EMERGENCE OF TALL STRUCTURES

COMARATIVE DEVELOPMENT OF BUILDING HEIGHT



SOURCE: ARCHITECTS TRADE JOURNAL JAN/FEB 1980



designed one mile building but it remained an utopia. During the economic spurt of the 50's Tokyo was the first Asian country to have a maze of high-rise complexes...In nearby Hong Kong veritable skyscrapers lean on each other as if precariously stacked. Manila, Singapore, Kuala Lumpur, and Taipei too have their share of skyscrapers (Dutt, 1979). Hong Kong with its difficult topography has successfully met massive housing requirements, including housing of one million refugees from China, by resorting to high-rise apartment buildings (Jephcot, 1971). Moscow too resorted to multi-storey apartment buildings to solve the huge housing problem of the metropolis. These included 16 storey experimental buildings with commune kitchens.

#### 1.6.1 The Indian experience

Qutub Minar in Delhi, Jay Stamba in Chittorgar, the historic structures erected even centuries before the dawn of Industrial Revolution stand testimony to India's capacity to build high. Their design and architecture is yet to be matched. It is heartening to know that high-rise building is not a new phenomenon in our country. According to Sheikh Ramzan "Aurangabad was once Chicago and New York of India". In 18th century the city had large number of seven to nine storey buildings. Four storey buildings were very common (News and Information, 1982). However, until recently this type of development does not appear to have spread and flourished beyond this period.

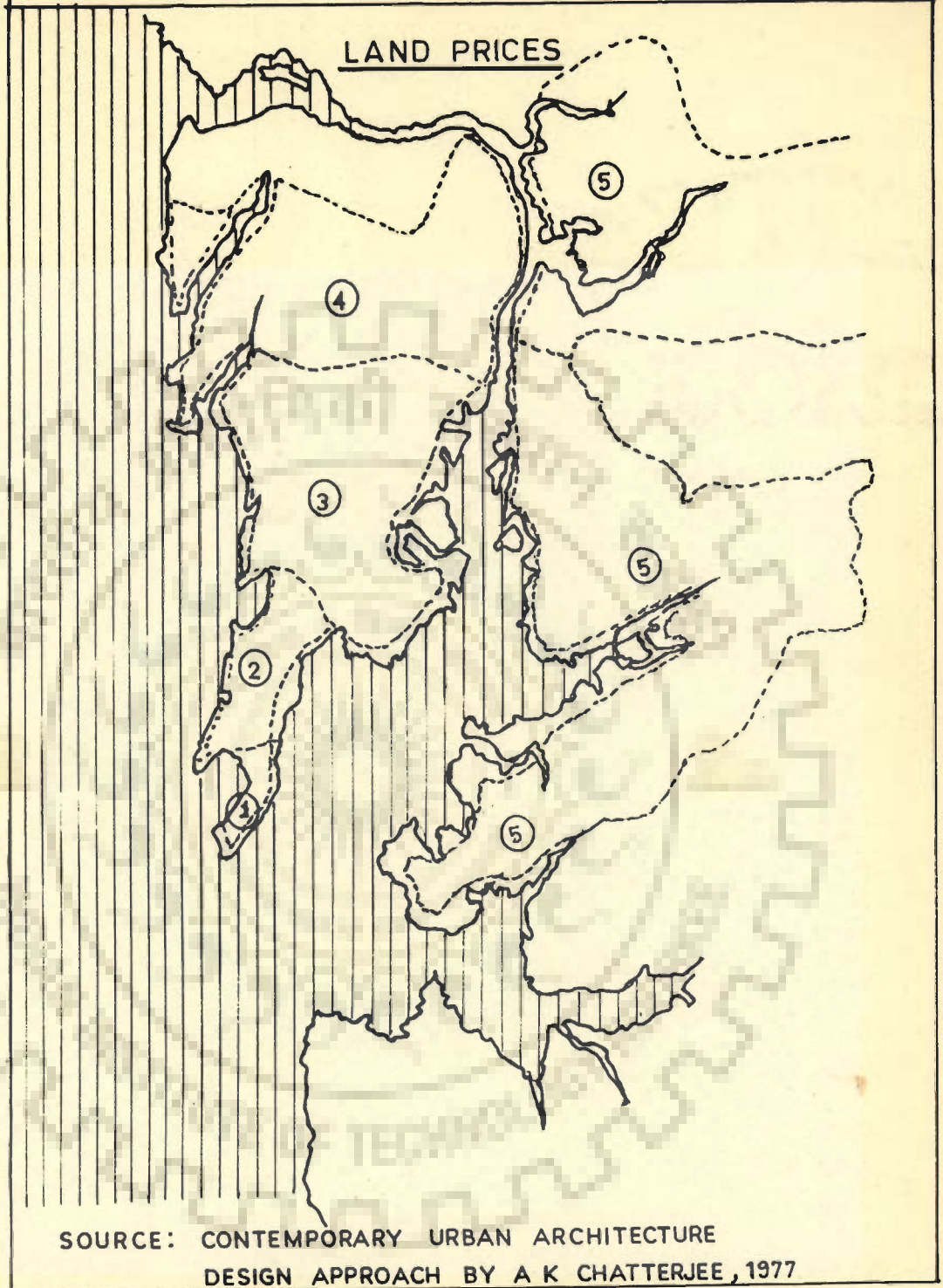
The current phase of high-rise buildings in India is believed to have been prompted by commercial needs of the big business houses (Mahatta, 1978). High-rise apartment living followed the construction of high-rise commercial buildings. This development is primarily a peculiarity of our already congested cities. According to Kanvinde (1985) "Powerful boom of urbanisation and an international style of architecture swept the world and penetrated this

country as well". In India, urbanisation process has been very fast in the four cities of Calcutta, Bombay, Delhi and Madras. The cities sprawled around or spread linearly from city core (CBD), year after year due to increasing population and other economic activities which opened new employment and trade opportunities. Consequently the four cities assumed metropolitan status. Delhi's population increased from 1.4 million in 1951 to 5.8 million in 1981. In Bombay it was about 2.85 million in 1951 and 8.25 million in 1981. The situation in this respect has not been very different in Calcutta, and Madras. The population of these two metropolitan cities in 1981 touched 9,165,000 and 42,76,000 respectively. The fast urbanisation in these metropolitan cities pushed up land values enormously, making it almost impossible for most income categories, barring very high income groups, to purchase plots of land and construct one or two storey bungalows. Land prices in Bombay as of 1980 (Fig.1.2 ) varied from Rs.300 to Rs.500 per m<sup>2</sup> in its extended suburban areas, Rs. 500 to Rs. 1000 per m<sup>2</sup> in Sub-urban areas and over Rs. 1000 per m<sup>2</sup> in the city's core' area (Phatak, 1980).

Growth of population and high land values, it seems, compelled people to opt for high-rise living. Fast urbanisation has, in a way, made high-rise living inevitable in our metropolitan areas (Pathak, 1973). None-the-less technical feasibility and economic viability have also favoured vertical development.

Consequently our cities also acquired the new status symbols of modernity and affluence and the pace of skyscrapers coming up in the country rose high. Like in some advanced countries, in India also tall buildings are becoming landmarks of our big cities. These were pioneered in Bombay metropolis. 'Usha Kiran' was the first high-rise residential building in the city and the country. It stands 24 storeys high on Carmichael Road and was constructed

# BOMBAY METRO-POLITAN REGION FIG. 1.2



- 1 OVER RS. 1000/- PER M<sup>2</sup>
- 2 RS. 500/- TO 1000/- PER M<sup>2</sup>
- 3 RS. 300/- TO RS. 500/- PER M<sup>2</sup>
- 4 RS. 100/- TO RS. 200/- PER M<sup>2</sup>
- 5 BELOW RS. 100/- PER M<sup>2</sup>

in 1961. Before this year, the municipal by-laws did not permit construction of buildings above 12 storeys. However, these laws were changed and permissible building heights were raised. Thereafter, attempts to house people in high-rise apartments got intensified.

Bombay is leading all the Indian cities both in respect of number of high-rise buildings and the number of storeys\* 'Oberoi Towers', a hotel building and 'Sagar Sangeet', a residential building at Colaba in Bombay are respectively 36 and 32 storey high. (Fig. 1.4).

Since space is at a high premium here, every new construction is stretched vertically piling floor over floors. At Cuffe Parade\*\* and Colaba, the south tip of the Bombay peninsula, commercial as well as residential tall buildings have come up in a big way. Areas like Bombay Central, Pedder and Warden Roads, Worli, Bandra almost all the areas along the rail routes have witnessed proliferation of high-rise residential buildings.

New Delhi, the capital of India, long restrained by Edward Lutyne's designs has also yielded and tall buildings got erected. Although detailed data in respect of high-rise buildings in the metropolis is not available yet these become visible in most areas. Mention in particular may be made of high-rise buildings housing State Bank of India, Bank of Baroda, Vikas Minar, Hansalaya and New Delhi Municipal Civic Centre. A few high-rise buildings, (6 to 8 storey apartment blocks) have come up at Rama Krishnapuram, Shahjahan Road, and Kasturba Gandhi Marg. These buildings are standing high in the skies as a witness to the high-rise boom in New Delhi. Some details in this regard are indicated in Table 1.1.

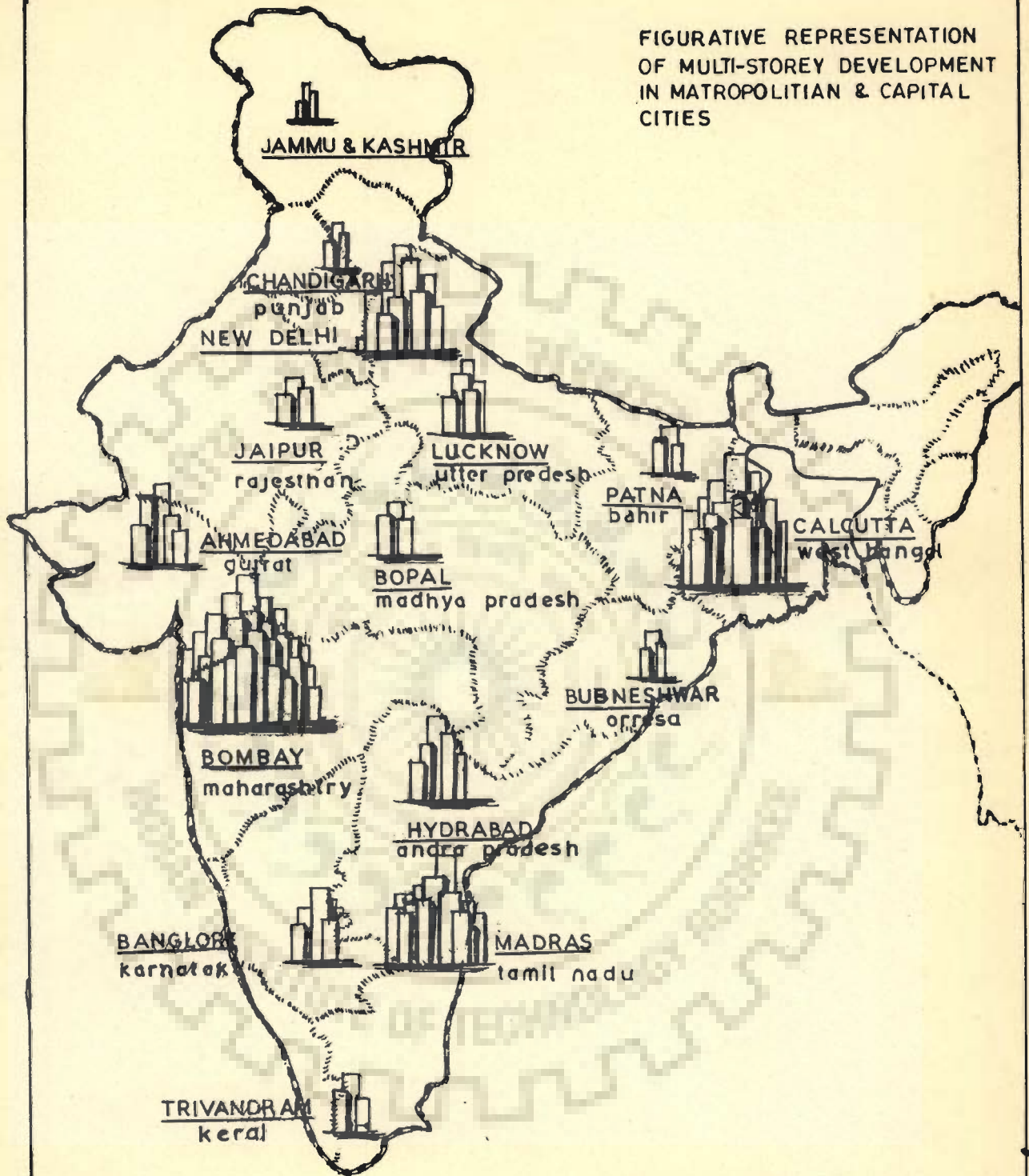
In the year 1981 it was recognised that land prices were high in metropolitan city of Madras, and multi-storey buildings have come up on its 16

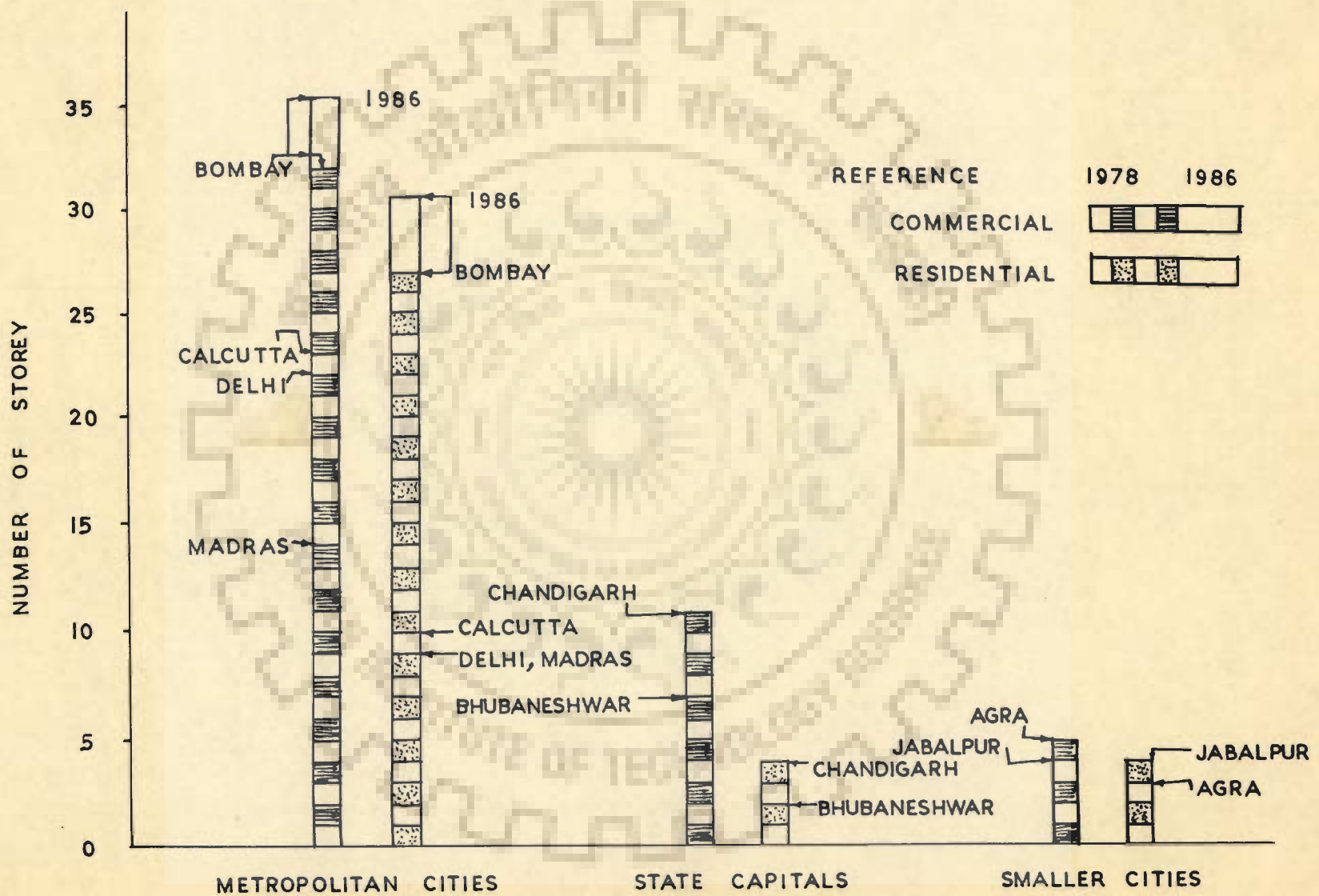
\*Fig. 1.3

\*\* Fig. 1.5(a) & (b).

# MAP OF INDIA

FIG. 1-3





**TRENDS IN HIGH-RISE DEVELOPMENT INDIA**

SOURCE: N.B.O JOURNAL NEW DELHI VOL. XXIII OCT. 1978.

FIG.1.4

**CLUSTER OF HIGH-RISE APARTMENTS, CUFFE PARADE, BOMBAY**



Skyline Formed by High-Rise Apartment Buildings.



Closer View of The Cluster.

CLUSTER OF HIGH-RISE APARTMENT BUILDINGS, BOMBAY



Closer View of A Cluster, Cuffe Parade.



View of A Cluster, Colaba.





Table 1.1 Multi-Storey Development in New Delhi

S.No.	Year of Construction	Name of Building	No. of Storeys	Height		Type
				Mt.	Ft.	
1.	1969	AKAS DEEP	12	43	140	OFFICE
2.	1970	HIMALAYA HOUSE	14	52	170	MULTI PURPOSE
		STATE BANK OF INDIA	14	53	175	OFFICE
		ASHA DEEP	11	40	130	RESIDENTIAL
3.	1971	BANK OF BARODA	15	64	210	OFFICE
		HANSALAYA	21	89	290	OFFICE
4.	1972	VANDAN	14	55	180	OFFICE
		SURYA KIRAN	13	46	150	OFFICE
		DELHI ADMINISTRATION	14	49	160	OFFICE
5.	1973	HINDUSTAN TIMES HOUSE	18	81	264	OFFICE
		ANSAL BHAWAN	12	43	140	OFFICE
6.	1975	KASTURBA HOSPITAL	5		55	WARD
7.	1976	VIKAS MINAR	23	82	269	OFFICE
		R.B.T.B. HOSPITAL	5		55	MULTI PURPOSE
8.	1977	MUNICIPAL MARKET	5		55	MULTI PURPOSE
9.	1979	HINDU RAO HOSPITAL	6		66	HOSTEL
10.	1985	PUNJAB NATIONAL BANK	10		115	OFFICE
11.	1986	FLATS AT EAST OF KAILASH	12	42	137	RESIDENTIAL
		FLATS AT KATWARIA SARAI	8	30	100	RESIDENTIAL
12.	1987	KAILASH APARTMENTS	12	53	173	RESIDENTIAL
		FOOD CORPORATION INDIA	13	50	164	OFFICE

arterial and sub-arterial roads (India Express, 1981). The areas like Advani Road on the North-beach, Adyar River on the South, Beach Road on the East and Madras-Tiruchi railway line on the west were identified for the construction of multi-storey buildings, L.I.C. building on the Mount Road is conspicuously rising high up in the Madras city's skyline.

The metropolis of Calcutta does not lag behind in this competition. High-rise commercial as well as residential buildings are scattered all over the city especially in areas like Park Street, Circular Road, Chowrangi Street, Lake Garden and in other areas which are largely under residential use.

The construction of high-rise residential buildings is likely to be intensified further in our big cities for a variety of well known reasons. There is no alternative to house large number of new residents. Even the government and public sectors have resorted to construction of multi-storey buildings to provide housing to their employees. The main objective of encouraging group co-operative housing is to boost high-rise living.

### **1.7 STATEMENT OF THE PROBLEM**

According to United Nation's, half the population by the turn of this century will be living in cities. Most of the increase in urban population, particularly in the developing economies is likely to occur in already developed cities. Where could these people be housed ? The magnitude of the urban population being so large, one wonders how people can be settled in these cities. Perhaps high-rise living which is not yet so common, would be the dominant form of living by the time we enter the next century.

Initially multi-storey apartment homes, built mostly by private agencies, were in general meant for well to do sections of society, who could not find

any suitable land for constructing their houses and who could bear heavy premium for large built up areas. The high-rise homes in the beginning were mostly large and luxurious. As per one journalist, "the modern flat is the place of those who wish to be relieved of house owning and its cares" (Evans, 1982). "The middle class community in Bombay city does not seem to favour the skyscrapers that are coming up, firstly because it is beyond their means to own a luxurious flat in such tall buildings, and secondly, because the common man thinks that these buildings are being constructed not for the benefit of the middle-class community but to its detriment, so far as the civic services are concerned" (Chatterjee, 1977).

This situation has by now changed substantially. Today it is mostly the people in middle income groups in the urban areas who are forced by their economic constraints to opt for high-rise apartments. Land values are so high that they cannot think of buying a piece of land and construct a house of their own. Even the development authorities in big cities have banned sale and purchase of residential land by individuals. They are encouraged to form societies and construct multi-storey apartment buildings. This kind of development is likely to gain momentum in the years to come. The day may not be far off when a good proportion of people in middle income groups would have to compromise with high-rise living in most parts of the urban world.

Although high-rise living is a reality, yet social and psychological problems associated with it have not attracted much of the attention of social scientists and architects. Extensive survey of available limited research material, does not yield much information on the subject. Some social scientists including Gutman, Beedle, Marget Meed, and a few architects and planners have conducted some studies on high-rise living. But in our country studies

concerning high-rise living have not attracted any attention of social scientists, architects and planners.

However, studies concerning high-rise living conducted by architects and social scientists elsewhere, during the last decade have dealt with various aspects of high-rise residential environments. (Bechtd, 1972). The investigations have primarily focused on institutional environment (Ittleston, 1970), dormitories (Heilweil, 1973) and private homes (Canter, 1972). As per Greenberg (1977). Specific research efforts in this regard have focussed mainly on office buildings. Inter-relationships have been found to exist between various parameters and user preferences and responses (Gutman, 1965). A survey of studies on high-rise living reveals clearly that such living is not without problems. Researchers have found a great deal of resistance to such living.

There are no two opinions that living in high-rise apartment buildings gives rise to some dis-satisfaction among residents for one or the other reason. This dis-satisfaction is believed to vary with floor levels and building heights. "There is some evidence that considerable variation exists in resident's satisfaction as a function of increase in height" (Francescato, 1977).

It is sad to note that people show reluctance and resentment to accept high-rise residential buildings unless forced by circumstances. "Wherever the high residential buildings have come up people are reluctant to shift in them unless forced by housing shortage" (Lal Rajinder, 1965). The fate of 'Pritt Igeo' housing project also supports the above contention. "The dramatic demolition by explosive of the 'Pritt Igeo' housing project in St. Louis in 1972 (Fig. 1.6) signalled the beginning of the next round of clearance. This time it will be the turn of the revealed high-rise housing projects constructed in the inner city areas of the western world. Here in Britain, some of the

PRITT IGOE HOUSING PROJECT IN ST. LOUIS 1972  
DEMOLITION BY EXPLOSIVES



FIG. 1.6

notorious derelict housing blocks in Mersy side are now the focus of attention. The tower blocks, recently put for sale and available for a new pounds had been constructed only a decade ago" (Editor, 1978). Building home is a cultural phenomenon and being a social unit of space, its positive purpose is the creation of environment best suited to the way of life of a people. Had it not been so the situation at Pritt Igoe, where people did not agree to move in, would have been somewhat different. "The high-rise boom is now over. Some blocks like Liver-pools' Piggeries became unlivable and were evacuated. Many but not all housing authorities have now adopted a policy of not building high" (Rapoport, 1969). It is also now official policy to keep families with children near the ground. This was done on the basis of recommendations of Central Housing Advisory Committee which recommended "families with several children should as far as possible be accommodated in houses or maisonettes rather than flats" (HMSO, 1952). Even in San Francisco, an anti high-rise campaign in 1970 was launched to get all further high-rise constructions banned (Michael, 1981). The experience of Caracas shows high flats provide better physical conditions. However, the use of 'Super blocque' on a vast scale to rehouse very poor peasant population has given rise to many social problems.

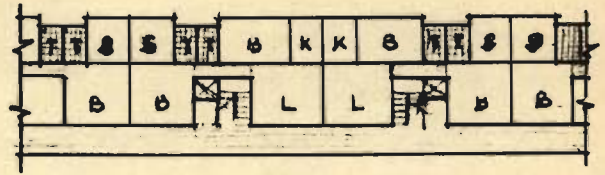
Why do people resent a high-rise living ? This question though very important cannot be answered conclusively unless detailed investigations on the subject are carried out. The Editor (1982) Indian Architect tells us that

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#### **Types of Apartment Buildings (Fig. 1-7)**

- Slab blocks : Tall or high-rise buildings of flats with access from a balcony, central corridor or one access to every two or more flats.
- Point blocks : A tower of flats built around central services of staircase and elevator shaft.
- Multi-storey Apartment Building : A building built of many storeys and consisting of residential flats piled one over the other.

**SLAB BLOCK**

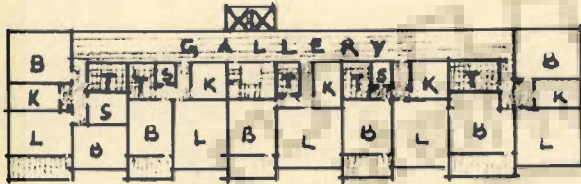


**BALCONY ACCESS**

THREE ROOM FLATS

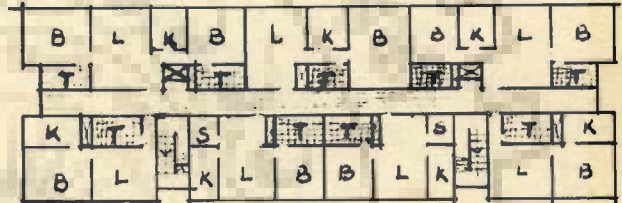
**LEGEND**

- L = LIVING ROOM
- B = BED ROOM
- K = KITCHEN
- S = STORE
- T = TOILET



**GALLERY ACCESS**

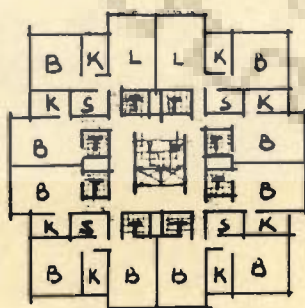
TWO & THREE ROOM FLATS



**CORRIDOR ACCESS**

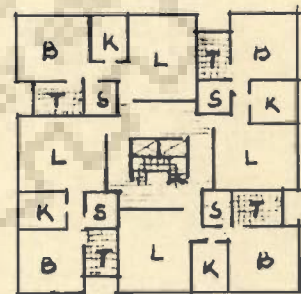
TWO & THREE ROOM FLATS

**POINT BLOCK**



**DIRECT ACCESS**

ONE & TWO ROOM FLATS



**DIRECT ACCESS**

TWO ROOM FLATS

"population pressure and today's high cost of energy have helped acceptance of life in flats at 'dizzy height'. It is no more a debatable point in most other metropolitan cities in the country. How best that imperative can be made acceptable by the community, lessening the burden of limitations on living in flats must impose, will depend on the community as also the civil administration".

The question is not, can the tall building be built, but rather, should it be built ? While technical and engineering aspects of planning and design of tall buildings have been researched in good detail in the past, but very little attention has been paid to the analysis of high-rise living. "In the past too much attention has been given to technical research, of which direct importance is clearly obvious. Too little attention has been given to social, psychological, biological and other problems especially those directly related with human life in all its respects" (Ettinger, 1960).

So far as India is concerned, we have not come across any substantial research studies in the area of high-rise living. A National Conference on Tall Buildings was no doubt held in New Delhi in 1973. But high-rise living did not become a very important subject of discussion in the conference. However, awareness of the ills of high-rise living were brought to light and emphasised.

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However, multi-storey, point block, tower block, slab block, super blocque, skyscraper, high-rise apartment, dwelling tower, high flat or apartment all, throughout this document, are considered to be of seven storey and above buildings with facility of lift. In Bombay, all types of high-rise apartment buildings have been built but lately point block construction seems to be gaining popularity.



The conference was an outcome of the conscious efforts of Architects, Engineers and City Planners in the direction of identifying and analysing the problems of planning, design, construction and the craze for high-rise apartment buildings (Balchandani, 1973).

It was felt that large scale adoption of tall buildings in urban India was not desirable unless sufficient work on the sociological aspects was undertaken. The conference recommended that empirical data in this regard should be collected and researched into before permitting tall apartment buildings. The other recommendations included the following:

- i) Studies be made to evolve a desirable settlement pattern that would avoid the necessity of tall buildings as general feature in the cities of this country.
- ii) The question of availability of land in the light of rapid urbanisation should be studied further to recommend optimum utilisation of such land and prevention of conversion of valuable agricultural land for non-agricultural purposes.
- iii) The problem of viability of tall apartment buildings should be studied not in isolation but in totality including social and longterm costs.
- (iv) The social factors involved in the adoption of tall buildings in planning should be studied further to evolve suitable design norms to conform to the social needs of the users.

The conference emphasized that while designing human settlements it should be ensured that horizontal slums do not get converted into vertical slums. Further, it was observed that tall buildings should not be built for reason of prestige alone "but their design and location should take into account

several environmental and psychological factors so that scale and identity of human beings is not lost" (Balchandani, 1973).

Importance of social aspects of high-rise living has been high-lighted in the Draft Status Report on Housing and Construction Technology prepared by National Committee on Science and Technology, Government of India, New Delhi in July, 1975.

Lack of studies concerning high-rise living in India is not something strange. This living is a recent development and does not account for any noticeable share of housing yet. We lack studies and data even on subjects which have been important from centuries. But this does not mean that we do not require to conduct some investigations on a priority basis. As already explained, India is to witness a phenomenal growth of urban population, especially in the metropolitan areas. The need for high-rise apartments, being the only viable means of housing urban people, is bound to grow very fast.

Our very limited experience of high-rise living does indicate that such living gives rise to many human problems. These may be minor and major. But no effort has so far been made to identify the same. Their identification is very crucial for the future of high-rise living in 'India'. Once the problems are identified, steps can be taken to resolve these by making amends in the design, layout, surrounding-environment, public utilities and other important factors. being a poor country, we cannot afford to blow up our expensive tall buildings nor can we sell them at throw away prices. However, we can take care and see that we minimise inconveniences caused by such living and thereby make high-rise apartments acceptable to most metropolitan people.

Our metropolitan cities, already accounting for 27 percent of total urban population, are expected to accommodate additional 175 million people by 2001. Naturally the densities in metropolitan cities are likely to further accentuate. Thus the present crowded metropolitan cities are expected to get even more crowded.

### 1.7.1 The study and its scope

Keeping in view the bright prospects of high-rise residential buildings in the major cities of the country, it is necessary that attempts to identify all sorts of factors causing dis-satisfaction among residents be undertaken on priority basis so that steps could be taken to overcome these problems. The present study makes a beginning in this direction. Analysis of socio-psychological factors constitutes the main thrust of the investigation. Even factors related to physical aspects of high-rise buildings have been dealt with in sufficient detail. It may not be wrong to state here that the construction of such buildings in India follows, by and large, the patterns and designs developed elsewhere. But so far as socio-psychological factors are concerned, these vary from country to country. Here we can't benefit by studies conducted in other countries, especially in the developed world. We have therefore to rely on our own studies. This is why socio-psychological factors attract most of our attention in this study.

The number of people with sufficient experiences of living in high-rise apartments is yet very much limited in our country. Most of these are concentrated in the metropolis of Bombay, where high-rise apartment were pioneered and where such living has flourished, atleast, in respect of numbers.

The shape and surroundings of the city made vertical growth of buildings more urgent than in the other metropolises. A house, here, is a luxury and

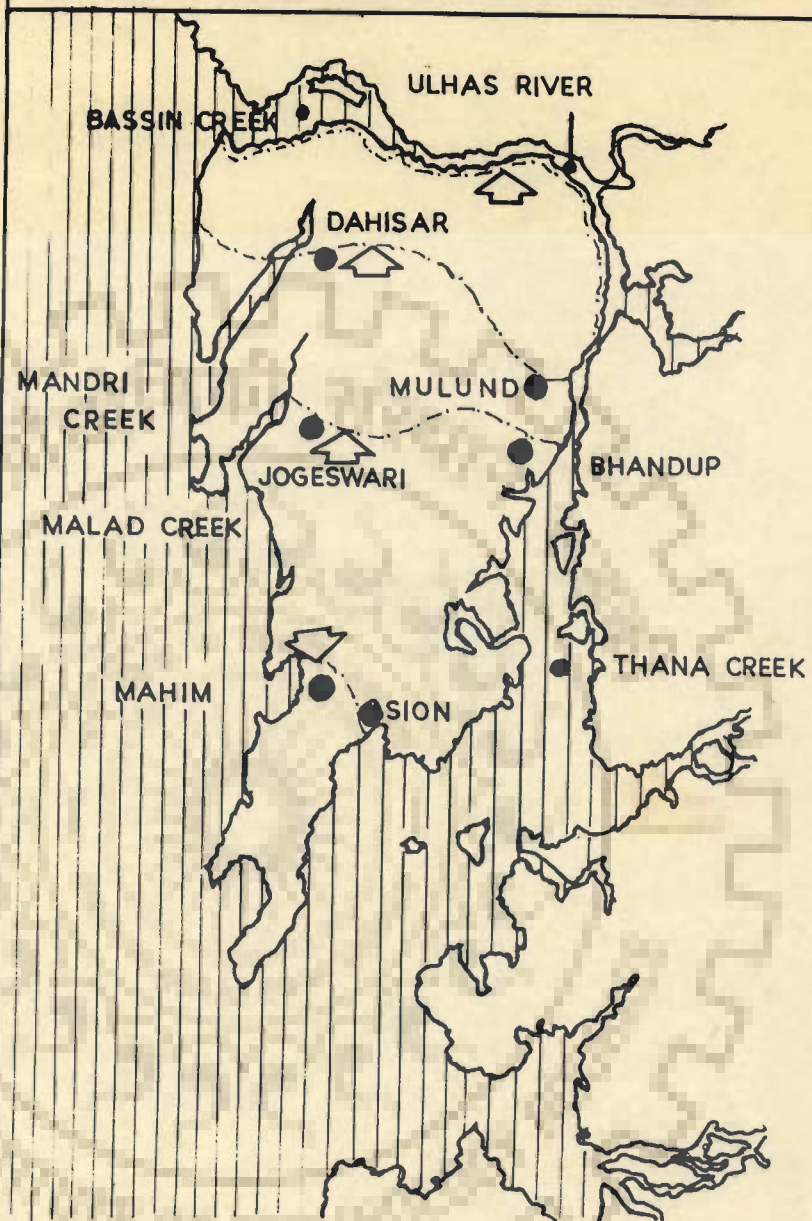
journey to and from place of work by public or private transport a nightmare (Bhatia, 1975). Bombay an urbs prima in India and capital city of prosperous Maharashtra, is a saturated metropolis. It is not only a major port, a financial capital, centre of industry, but also a well known educational and cultural centre. It is a peninsula surrounded on three sides by water, a replica of the Indian continent with a wedge shaped North-South strip of land.

The core or centre of this metropolitan development, was initially limited to the Mahim-Sion Creek line prior to 1950, covering an area of approximately 175.08 sq. km. (26.19 sq. miles) which includes 68 sq.km. of original island city of Bombay (Fig. 1.8). A sub-urban area of 194 sq.km. (86 sq. miles) was merged with the city. The jurisdiction of the Municipal Corporation was further extended by merging the areas of the extended sub-urburbs in the year 1957. The total area now under the jurisdiction of the Municipal Corporation of Greater Bombay is 436.86 sq.km. (169 sq. miles). This covers an area up to Dehisar on the west and Mulund on the east. The geographical boundries of land covering almost an area of about 481.74 sq.km. (186 sq. miles) extend in its further north, upto Bassein Creek on the west and Ulhas River on the east (Chatterjee, 1977). This triangular shaped piece of land virtually separated from the main land accommodates 8.25 million people in 1981.

Phenominal growth of population from 0.9 million in 1901 to 8.25 million in 1981 has naturally forced, high-rise commercial buildings in general and high-rise living in particular, on the city. The growth of these buildings especially for commercial purpose initiated in the core area, around the fort located in the southern tip of the island- which became the central business district of the city, has been very fast. The development of the port with a natural harbour fostered fast growth of trade and industry. This in turn lead

# CONTINUEOUS EXTENSION OF BOMBAY MUNICIPAL AREA

FIG.1-8



- 1 BASSEIN CREEK LINE: 1965 [186 SQ. MILES] 481.74 SQ. KM.
- 2 DAHISAR MULUND LINE: 1957 [169 SQ. MILES] 437 SQ. KM.
- 3 JOGESWARI BHANDUP LINE: 1950
- 4 MAHIM SION LINE: PRIOR TO 1950 [2619 SQ. MILES] 175.08 SQ. KM.  
(ORIGINAL BOMBAY MUNICIPAL LIMIT)

SOURCE : CONTEMPORARY URBAN ARCHITECTURE  
DESIGN APPROACH BY A.K.CHATTERJEE, 1977

to the concentration of population (residential building) and economic (commercial building) activity in south Bombay. Naturally it necessitated going vertically within the narrowing southern land strip of the city which was the only alternative under the circumstances. Details regarding the growth of such living, discussed in the preceding section, amply bear this out.

The city has the distinction of being the birth place of high-rise residential buildings and also of recording the fastest growth of such buildings in the country. This trend is likely to continue, rather to accentuate further, as the city is estimated to have a population of 15 million by the turn of the century (Fig. 1.9).

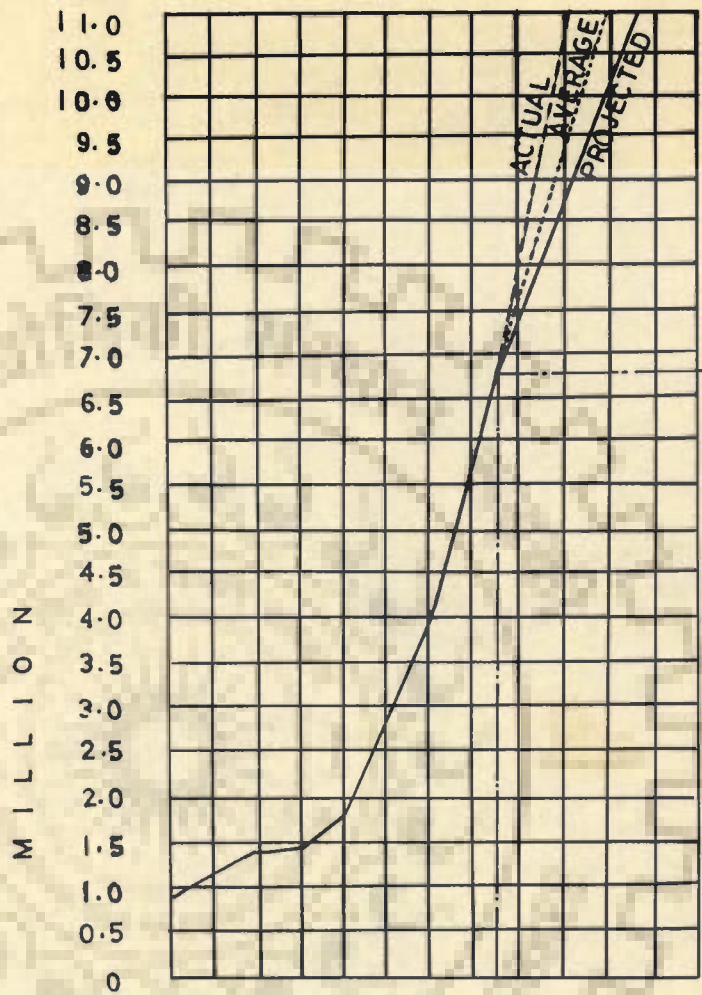
Bombay is therefore the ideal city for any study relating to different aspects of high-rise living. People with somewhat longer experience of such living in comparison to other cities in the country, are concentrated here. They are sufficiently aware with varied problems of such living. Over the years they have formed definite opinions about these problems and their possible solutions. Their experiences, if properly analysed, can greatly help in identifying problems associated with high-rise and apartment living.

The concentration of high-rise buildings on two well known railway trunk routes facilitates the job of contacting such residents in comparison to other cities where such buildings are scattered. This concentration has resulted in the frequent interaction of high-rise residents, which in turn enables them to learn about the experiences of many of their counterparts.

Since the study is based on the experiences of the residents in just one city, the results of the study, rather causes of dis-satisfaction so identified, may not be fully representative of such living for the whole country. Climatic, cultural, geographical and many other related factors may contribute to

# POPULATION PROJECTION FOR GREATER BOMBAY AD 2001

FIG.1.9



1901  
1911  
1921  
1931  
1941  
1951  
1961  
1971  
1981  
1991  
2001  
2011  
2021

YEAR	POPULATION
1966	49,51,970
1971	57,06,419
1974	68,13,000
1976	63,84,132
1981	70,62,073

68,13,000 (ACTUAL 1974)

the satisfaction or otherwise of high-rise residents in a city. Since these factors vary from city to city, factors causing dis-satisfaction may also vary from place to place. But this cannot be helped under the given constraints of time and resources. Besides a conclusive identification of such factors can be attempted only after a number of comparative studies across cities and within each city are undertaken on sufficient enough scale over a period of time. The present study does not aim to do this. It only attempts to contribute modestly to our understanding of high-rise residents and their special problems, both physical and socio-psychological.

### 1.7.2 Aim of the study

The study attempts to examine various aspects of high-rise buildings and their residents. The intention is to help improve the design and environment of high-rise living apartments with a view to increase the satisfaction and acceptability of such environment.

The study also aims to evolve appropriate social and psychological parameters of satisfaction for better living in high-rise buildings. It attempts to understand and investigate living patterns social attitudes and psychological reactions, of the residents of high-rise buildings. In fact they constitute first generation of high-rise residents in the context of Bombay and India too. Before this most of them have been living in single family housing units.

To design a suitable high-rise dwelling the designer requires a great deal of information and knowledge about living habits, customs social backgrounds and life styles of the possible residents. The present investigation by identifying these parameters can greatly facilitate the job of the high-rise building designers. Secondly it intends to examine the belief that high-rise living causes social dis-satisfaction and attempts to formulate guidelines



for taking care of social and psychological aspects of such living. Thirdly the study intends to examine suitability of vertical housing development system in an urban agglomeration in India. It also, attempts to formulate decision parameters representing social and psychological factors. The findings of the study should help evolve design parameters for future high-rise projects and other schemes undertaken for improving urban residential sector. In short this investigation intends to study the built environment and the users of that environment with a view to increase the level of satisfaction derived from the environment.

The study is therefore likely to benefit all professionals like architects, engineers, planners and decision makers as well as social scientists. Results of the study are expected to help decision makers in evolving appropriate policy so far as high-rise apartment buildings, their planning and design are concerned.

### 1.7.3 Criterion for high-rise buildings

What constitutes a high-rise building ?

A high-rise is defined as "increased number of family dwellings drawn into small ground coverage which results in a tower multi-storey block generally seven storey and above with a lift" (Jephcot, 1971). "High-rise is a building higher than six storey or 75 feet in height" (Williams, 1977). Generally buildings with ground and six storey or more have been considered to constitute high-rise. This criterion has been adopted by Bombay Metropolitan Regional Development Authority (BMRDA) and Architects Combine (1973). These organisations classified buildings under the following categories (Fig.1.10):

- G + 1 or G + 2 as Bungalow. ('G' denotes ground)
- G + 2 to G + 5 as walk up and,
- G + 6 and above with lift as high rise.

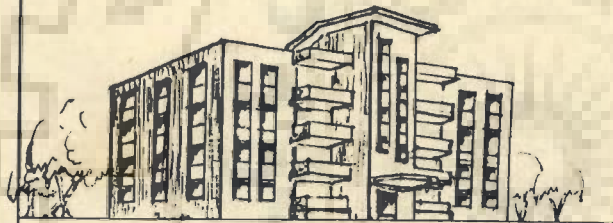
# CRITERION FOR HIGH-RISE BUILDING

FIG. 1-10



◀ BANGALOW  
ONE STOREY

BANGALOW  
TWO STOREY ▶



◀ WALK UP APARTMENT  
UPTO SIX STOREY

HIGH RISE  
SEVEN STOREY & ABOVE ▶



Any residential building comprising seven or more storeys with elevator for vertical circulation has been considered as high-rise residential building for the purpose of the present study.

The outline of the rest of the investigation is as follows:

In chapter two an attempt is made to put together whatever limited research work has been undertaken in the area of socio-psychological aspects of the residents of high-rise apartment buildings. Methodology for undertaking the present work is discussed in Chapter III. The next three chapters analyse the existing position in respect of social, psychological and built environments of high-rise residents of Bombay. This analysis is based primarily on data collected during field survey. Chapter VII makes an attempt to synthesize the results of the study. The major findings of the study are linked with different aspects of high-rise living, keeping in view the fact that such living is likely to be the only alternative available to most people in metropolitan areas to house themselves. Summary and conclusions including recommendations on basis of the study are discussed in Chapter VIII.

## CHAPTER - 2

### REVIEW OF LITERATURE

#### 2.1 INTRODUCTION

The purpose of this chapter is to survey briefly the results of whatever limited research has been undertaken by institutions and individuals, in the area of high-rise living. This survey has been of immense value and help in shaping the structure and design of the present study. This is in spite of the fact that almost all the available literature on high-rise living pertains to countries other than India. It is only recently that some research work in this area has been initiated in our country.

#### 2.2 USER STUDIES ON HIGH-RISE LIVING IN OTHER COUNTRIES

We start with Williamson's comparative study of high-rise residents of Germany and France. The study covered 420 German and 152 French high-rise dwellers. Over half his respondents thought high-rise living to be a temporary arrangement. This gave them a feeling of belonginglessness and resulted in impersonal environment. Majority of the respondents both from Germany and France felt life in high-rise buildings uneasy, frightful and isolated. The study indicated that social alienation increases with increase in density. The percentage of respondents feeling socially alienated stood at 42% for high-rise dwellers, compared to 22% for low-rise residents. In French cities mothers in particular were worried for various reasons. The danger of children falling from balconies, their likely entrapment in elevator and risk in dead areas of the building and its surroundings bothered them. Mothers frustrated their children by not allowing them to go out of the flats all alone. Social interaction among high-rise residents is a function of both design and social needs of the individual. A hallway hardly encourages

formation of social network. "The preference for a given floor or floors is determined by the person's general responsiveness to living in an upper floor, especially the desire for a view and escape from noise. High rentals associated with upper floors along with difficulty in the supervision of children are major deterrents to moving upwards. The inability to see and communicate with children at play is also a critical factor. The measure of 50 feet or four stories has been indentified at the limits of optical efficiency. All in all, the viability of the high-rise rests with a number of factors, among others, access to central city, the desire for anonymity, the feeling of exhilaration (anxiety), and a mix of aesthetic and physical factors ranging from overall architectural design to the nearness of other towers and the quality of elevator service" (Williamson, 1978). The author concludes that high-rise is not an impossible mode of living but a more imaginative solution should be tried. Better amenities, lower density and improved designs could strengthen tenure or overcome the inbuilt negative aspects of high-rise buildings. For families with young children and families needing greater social interaction, high-rise would have limited appeal or scope.

Marcus and Hogue (1977) have evolved a useful set of guidelines for designing high-rise flats. Their pains-taking research reveals that very few attributes of single family housing have been taken care of in the design of high-rise buildings. This neglect results in dis-satisfaction as high-rise flats do not provide an appropriate living environment. The authors have indentified the missing attributes and those creating problems for some high-rise residents and offered certain design and management solutions. The objective of this study has been to find ways and means to make high-rise buildings, which might be the only available alternative in certain situations, more humane.

Newman (1977) also undertook an enlightening study of residents' perceptions of buildings height. The importance of certain social psychological and behavioural aspects has been emphasised. These include;

- i) Person's characteristics i.e. life style, demographic factors, socio-economic background etc.,
- ii) Environmental features i.e. number of floors and dwelling units, floor area per dwelling unit,
- iii) The individuals perception of the environment,
- iv) The individuals assessment of and satisfaction with environment.
- v) The individuals behaviour with respect to the environment.

Newman is of the opinion that there is considerable agreement on the importance of studying the relationship between aspects of the built environment and the users of that environment. All concerned hope to improve the quality of the design and concomitantly increase the satisfaction derived from it. In 1971, a study by Campbell & others was conducted with the specific objective of studying the satisfaction of high-rise apartment dwellers. It indicated that "Satisfaction drops as we move from residence of single family houses to those in high-rise units". Newman found that people living in single family homes had the greatest satisfaction while those in high-rise buildings had the least. However, Newman emphasises that other important factors, such as the way people perceive their environment and their assessment of it, have bearing on their residential satisfaction.

Ash (1966) interviewed 200 house-wives with children under 16 years of age and with at least one years experience of living in flats at Liverpool, Leeds and London to study different aspects of high-rise living. Analysis of this data does not seem to establish any specific relation between floor height and residents' satisfaction. However, physical and social characteristics of

the estate including site situation, family income and responsibilities, dimensions, designs and available amenities seem to influence their satisfaction. Nevertheless, some problems were noted in high-rise blocks than those of single family houses.

Analysis of noise levels, privacy, children play, amenities and physical and social characteristics of estates in the three cities, supported the general conviction that single family houses in general suit families with young children. Partition walls and floors seem to cause great deal of irritation as noise or disturbance reaches from one flat to another. Ground floor residents in flats lack privacy due to frequent movement of other residents of their block and other blocks around. This problem is complicated by the passerby's curiosity to peep in.

Further analysis of his data shows that even the problem of open space for children has made high-rise living very unpopular. One parent is quoted to have observed ironically that they were supposed to lock the children and let them out for school only. Even children were prevented to enter green lawns. Hence children did not go out of their flats for months. The study confirms that high-rise block living does not suit people with young children. Residents showed preference for houses compared to flats in multi-storey buildings. There is a strong urge to own a dwelling well designed and constructed with pleasant surroundings where children can play in safety.

Francescato et.al. (1977) in their study have evolved methods to measure satisfaction of residents with their housing. Their approach to this problem corresponds to that of Campbell & Fiske's (1967). Their survey is based on 37 selected heterogeneous housing complexes. Their occupant satisfaction and perception survey (OSAPS) evoked responses from 32% of the respondents. They included 135 from high-rise and 192 from low-rise apartment buildings.

The study found no significant differences in respect of problems encountered by residents living in high-rise and low-rise housing types. Recreation facilities, parking arrangements and privacy were the only areas where experiences differed. Francescato's multiple regression equation, determined in the two groups, predicted effectively residents' satisfaction with their housing types. It revealed that present residence is better than the previous one with which they were satisfied. However, so far as variables like privacy, neighbours in surrounding blocks and safety and security are concerned, the two groups showed differences of perception. The study confirms the view that satisfaction cannot be assessed in absolute terms but is in fact a function of residents expectations and previous experience. The authors recommend that designers should give due weightage to number of blocks and locational factors.

Greenbergs, et.al. (1977) undertook another study of apartment residents with special reference to environment. The study suggests that designers should exercise caution in dealing with the satisfaction of high-rise residents. Any high-rise building design should necessarily take care of living habits and expectations of the prospective residents. Their study focussed attention on variables such as level of floor living in, effect of apartment density and length of stay in the apartment. They found environmental perceptions to be function of particular factors or variables. The impact of noise as a disturbing factor diminished with the rise in floor levels. "The higher the floor of residence, the more residents perceived their apartments as being quite, efficient, secure, conducive to studying, convenient and functional". The residents' dis-satisfaction in high-rise buildings was found to be mainly due to lack of certain facilities like parking and laundry facilities, elevators and well lighted and ventilated stair well. "The higher the floor of residence, the less tenants indicated satisfaction with elevators, parking and laundry facilities". Similarly residents' satisfaction with their environment is inversely



related to the density. "Occupants of more densely populated apartments find their apartment and their building to be uncomfortable places to live". The level of satisfaction and the motivation to adjust to living in high-rise flats is also influenced by the expected duration of residence. "Tenants who anticipated longer terms of occupancy generally report more satisfaction with their environments than tenants who expected to move sooner. It may be speculated that this finding reflects the long-term tenant's need to psychologically justify his long-term occupancy decision" (Greenbergs, 1977).

The above findings are quite helpful in evolving appropriate designs for high-rise living. Barbay (1976) also states that preference of designers mostly overlook social factors. Buildings are used by tenants or owners according to accepted social values. The design process should, therefore, take full care of these values. This in turn demands detailed research in the following areas:

- i) The extent to which different housing types either help or inhibit various life styles.
- ii) The extent to which status symbol and class values influence relationship between social consideration and physical requirement in housing.

Campbell (1976) did not find significant variation between high and low-rise living. Although only 20% respondents opposed high-rise living, yet some difficulties were no doubt observable. These were lack of recreational spaces and facilities, conspicuous and fearful noise of the wind, lack of privacy from neighbours and lack of social interaction.

Wellman & Whitaker (1974) while comparing people living in high and low-rise buildings found that "there is no convincing evidence that experience of

living in high-rise buildings is pathological. The residents of such dwellings are similar to other urbanites in their ability, to form network of social relationship, to their involvement in urban institutions and in their mental health" (Duvall, 1981). However, their findings suffered from certain limitations. Their sample from high-rise dwellings consisted of women without children. Duvall found women with children from high-rise lagging behind in socialisation in comparison to those from single family dwellings. Insufficient spaces for the playing of children was distressing and found high-rise to be unsafe, with high marital disorder and poor mental health.

Three-fifths of people in Singapore in 1977 were living in exclusively high-rise public houses. This proportion was expected to increase manyfolds and further increase thereafter. The government here is keen to develop a sense of community living among high-rise dwellers. Persistent efforts were therefore intensified to promote good neighbourliness and community spirit (Michael, 1978).

### 2.3 USER STUDIES ON HIGH-RISE LIVING IN INDIA

Lal Rajinder (1965) has referred to a comparative study of multi-storey habitation initiated by Central Building Research Institute, Roorkee. The study was undertaken to evaluate the socio-psychological impact of multi-storey living. The investigation covered 72 families from different social stratas living in four storey flats at Delhi. Nearly two-third of children were found to dislike multi-storey living. However, nearly half of the housewives liked multi-storey living. This survey indicates that better educated, economically better off and small families accepted these flats rather more easily although their preference was found to be for single storey independent bangalows with lawns etc. Only one of 72 families surveyed, preferred multi-storey living whereas nearly 28% liked double storey and next nearly 71%

preferred single storey buildings for their residences. Analysis in the following table shows the like and dislike of living in flats on the parts of husbands, wives and children.

### Like and Dislike for Multi-storey Living

Respondent	Like		Dislike		Neutral	
	No.	%	No.	%	No.	%
Husband	23	32.0	32	44.4	17	23.6
Wife	29	44.0	37	56.0	-	-
Children	48	29.6	114	70.0	-	-

**Source:** Proceedings of Symposium on 'Changing Concepts of Human Habitation'- CBRI, Roorkee-1965.

A study to examine the reactions of the residents of multi-storey buildings, allotted to government employees, only at New Delhi, was undertaken in 1973 (NBO, 1974). The objective was to gather information regarding general housing needs and requirements of the government employees so that the source could be incorporated in future house designs to achieve maximum satisfaction of maximum number of these employees.

Ramakrishna Puram and Shahjahan Road where multi-storey blocks constructed by government for its employees were selected for this study. Eleven blocks of eight storey buildings with 23 flats in each were surveyed. One six storey block with 17 households and a 4 storey block with 32 servant quarters were included in this survey. These buildings comprise 138 type V and 132 type VI flats and are 'Y' and 'T' shape in plan.

In all 76 allottees of type V and 73 type VI were covered under the sample. Their monthly incomes ranged from Rs. 1251 and Rs. 2750/-. Nearly 79% of the selected families comprised 5 or less members. Children below

5 formed very small proportion in both types of flats.

It was observed that over two-thirds of residents had complaints about working of lifts, cleanliness of common spaces, waste disposal system and working of soil pipes.

Most of the residents showed preference for buildings with 'Y' shape plan to those with 'T' shape plans. Almost all (96%) residents opined that housing blocks without lift should be 2-4 storey in height. Nearly half of the residents suggested 5-8 storeys in case of a lift in the building. Majority reported their extensive use of balconies.

The investigation found that multi-storey building in itself was not disliked but the physical and social problems faced by their residents make these less acceptable.

#### **2.4 SUB-COMMITTEE REPORT, HMSO**

The Central Housing Advisory Committee in England in 1950 appointed a sub-committee (HMSO, 1952) to examine, among other things, the social needs and problems of families living in large blocks of flats. The survey conducted by the Committee covered cities of London, Liverpool and Manchester. It also examined the available material on the subject from United States, Belgium, Holland and Germany. Noise, lack of privacy, courtyards and kitchen gardens were identified as the special problems of flat residents. Suggestions, to improve the lot of flat residents, of the Committee included:

1. Flats not more than 5 storey high buildings be constructed.
2. Three storey high buildings would be ideal.
3. Open spaces in between and around the buildings should be made

green. Plantation of trees be undertaken more intensively.

4. Community spaces be maintained properly to encourage their intensive use. Separate play-grounds for children of different age groups with appropriate play equipment and facilities be provided.
5. At least small balconies in each flat, central staircase, spaces for social get-togethers, screened drying spaces be suitably provided.
6. Safe and lockable enclosures be provided for cycles, prams and pets.

## 2.5 OPINIONS ON HIGH-RISE DEVELOPMENT

High-rise buildings have been resorted to in the urban agglomeration of many other countries. Jephcot (1971), says that tall blocks of flats are an everyday sight in most of our large industrial cities. These owe their origin to the pressures arising out of the limited space in urban area and the need to rehouse large sections of population who have too long lived in homes which are something of a disgrace to our contemporary society. York (1950) traces the evolution of high-rise living in the following words." The origin of the flat dates from the period when the influx of country dwellers in search of work in industrial areas, had so concentrated density of population in towns that the increased demand and the consequent rise in land value, made it unreasonable to build every individual urban house on its own individual plot". As per the author, prestige also seems to have prompted the erection of high-rise buildings in the form of palaces and castles. However, high-rise construction does reflect the advancement of technology so far as construction methods, building materials and building equipment are concerned.

"Prestigious motives on the part of architect distinguished for its height often play a key role here. These design aspirations frequently correspond with those of the investor as well as a special group which identifies itself with the location of the given buildings". (Timbay, 1972).

Competition may be another reason for the development of high-rise buildings. This factor alone may prompt people to make tall buildings, even if they do not need these. This view is substantiated by Sfantesco (1973). Rivalry between New York and Chicago for possessing world's tallest buildings, may have greatly contributed to the growth of high-rise living.

The investigation of Jiri Havranek, et.al. (praha) shows that "high-rise dwellings is, as a rule motivated by certain reasons, bound up specifically with the project. Usually, these reasons are of a compositional nature and are mainly an attempt to vary the skyline to create a dominant focal point in a mainly low built-up settlement. It has to be mentioned that such a dominant building is mostly a hotel or administrative building and not dwelling houses. At other times it is saving on the ground area when the price of plots is very high, specially in the centre of the town with a high density of population etc. A certain role is also played by functional considerations.

High-rise buildings offer flats with different type of living which complements the choice of flats already greatly restricted and thus they enable to satisfy differing needs of the residents. A very valuable gain for the city dwellers is the open view, or the view into the distance from the open window". Living at higher levels is more suitable for clean and hygienic atmosphere, less noise and in pleasant environment. The authors refer to the work of Musil and Mackova wherein 130 cases were examined. Of these, sufficient

lift capacity was not provided in 126 cases. The lack of lift capacity was as high as 70%. Waiting time was mostly given as 3 to 5 minutes. As per the authors lifts, as a rule, were installed and brought into operation after some months of completion of the buildings. Patients suffered the most. Over two-fifth (44%) of 359 flat dwellers reported that lift system broke down on an average.

Currently much attention is given to the problems of design. Heimsath (1977) rightly stresses the importance of analysing and understanding social factors which alone will enable architects to make high-rise living acceptable to people in general.

Hole (1968) observes that human behaviour involves a highly complex interaction between the physical environment (natural and man made) and technology on the one hand and his social values on the other. Therefore, the physical environment and human behaviour can not be viewed as a simple cause and effect relationship.

Civilization is reflected in buildings and the architecture of entire community and not through an individual's architectural effort. In this behalf, Codella (1973) remarks that "our buildings today reflect our civilization ... not only because of modular materials, but also because of the speed of construction... a direct result of the importance of time and money". In all types of buildings, this is reflected through its repetitive grid like pattern for both vertical and horizontal elements. The author feels that high-rise living associated with high density of population effect many more things including the environment. He says that "we are learning too late perhaps that when a tall or large building is 'plugged' into its site many ecological circuits are shortened, causing congestion, overcrowding, lack of security, vandalism, pollution and now a psychological aversion to occupying tall

buildings". It is therefore, essential that much more comprehensive planning by design professionals be made before buildings are built. Such buildings must not cause ecological short circuits. Why "more and more people are becoming afraid to enter our tall buildings ...not to mention working or living in them" Codella asks ? Perhaps our houses have become cell like boxes. Corridors, lobbies, entrances etc. are no longer inviting but simply places to get out of quickly. "Park Avenue, New York City, once an inviting haven of warmth and charm, is now as architectural wasteland of graph paper looking buildings". Defects of such structures need rectification by rediscovering people and knowing their likes and dislike. Architects of today must study the complete human behaviour to understand society for whom they erect buildings. We already have technology to erect safe buildings as high as we want. However, economically viable, technologically innovative and upto date structure will not be acceptable unless planned comprehensively. "Comprehensive planning is an orderly programme of developing a large area of man's environment while remaining with a balanced ecology with nature. According to Codella a comprehensive plan may encompass a block, neighbourhood, city, state, region, country, continent, world and now, even extra terrestrial environments". We have already gained triumph over the economical aspect of high-rise buildings. The author highlights the need to study aspects like congestion, security, noise, psychological and sociological problems and similar other aspects of comprehensive planning. As design professionals, we are just beginning to really believe that we should be a part of the early decision making phase of all construction". Otherwise the future of tall residential buildings would be very bleak.

Social and psychological characteristics of tall buildings for Lawis (1961) include living among multitude of quarters, lack of privacy, overcrowding, a high incidence of alcoholism, frequent resort to violence, early initiation



into sex, a relatively high incidence of the abandonment of wives and children, predominance of the nuclear family, strong predisposition to a authoritarianism and a great emphasis upon family solidarity an ideal rarely achieved. The author stresses the humanitarian aspects of high-rise living wherein economic and technological advances also play vital roles.

In the opinion of Herrenkohl (1973) high-rise and high density are synonymous. High-rise buildings have two features. These features make them prominent and distinguished in the whole urban system "One is conscious of them because of their size and because of the technological accomplishment they represent" (Herrenkohl, 1973). Consequently tall buildings have become subject of community discussion. High density or overcrowding in high-rise leads to other problems. This is why low density situations or suburbs are preferred for residences. In the opinion of Calhoun (1962), overcrowding leads to disordered behaviour. Overcrowding has detrimental physiological affects, as well. The author recommends "more working relationship between designers and behavioural scientist. "Existing buildings should be assessed for their behavioural impact. Now designs should be approached with careful planning in the behavioural realm. Then, there should be follow-up to determine the effects after the building is constructed. Costs of buildings should be assessed not only in terms of construction and operation but also in terms of costs for extensive renovation or social services maintenance".

Socio psychological climate prevailing in housing estates has shown that socially conscious design approach, which includes the influence of location and design of buildings on the human relationship, would always be ideal with good results. For his study, Olivegren (1976), on better socio-psychological climate for housing estates, has taken an example of a 'pedestrian enclosure size type housing estate' - with motor traffic outside the area. Explaining various layout patterns, the author emphasises that when buildings are planned but laid randomly, the possibility of social interaction is minimised

to almost lowest, as the inhabitants' activities get dispersed (Fig. 2.1). "To those living and visiting the area, the impression given is that of a place devoid of activity, vitality and colour. They are witness to only a few of the many human activities really going on within the estate". But when the same buildings are laid to a pattern, channelising and concentrating the inhabitants' activities, possibility of interaction increases and becomes more fruitful. This design approach will greatly augment social events and possibility of greater and new social actions when buildings are planned and laid in an organised pattern. "Activity differentiation on such an estate will produce a more varied socio-psychological and mental hygienic climate" (Olivegren, 1976).

To give practical shape to high-rise apartment blocks' proposals, Tarozewski (1972) had advocated a new concept of planning these buildings. The concept, by and large, approximates the one suggested by Johnnas Olivegren. Tarozewski stresses the importance of recreational facilities in such housing with appropriate micro-climate to be useful throughout the year. His concept provides for housing units of cylindrical shape. These in the form of complex of tall buildings of various geometrical arrangements, for about 15,000 inhabitants would ideally suit after experimenting wind tunnel effects. Each such complex provides a set of functions necessary for inhabitants. Such complexes facilitate provision of sports and recreational areas for all age groups, better services, rest, entertainment, children care and education facilities and parking areas at reasonable cost. The complex could consist of (i) High-rise residential towers about 20 storey in height; (ii) Two or three storey ring of pavilion for service and children care ; (iii) Sports, rest and entertainment area centrally placed under light weight pneumatic cover. Flexibility in interior has to be designed to permit and make possible easy rearrangement. Large usable area need earmarking for multi-functional use.

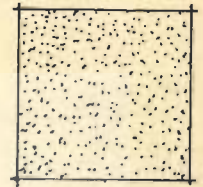
## LAYOUT PATTERNS

Fig. 2.1

## RANDOM LAYOUT

BUILDING PLANNED &amp; LAID AT RANDOM

The Dispersed Inhabitants .  
Activities Result in Less Social Interaction

Buildings Laid Random  
Without Any Pattern

## PLANNED LAYOUT

BUILDING PLANNED &amp; LAID TO PATTERN

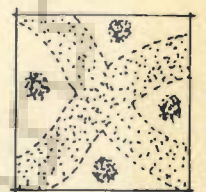
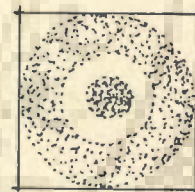
Concentrated or Channalised.  
Inhabitant's Activities Result  
in More &  
Fruitful Interaction

Buildings Laid to Planned Patterns



BUILDING PLANNED &amp; LAID TO PATTERN

Special Concentration of Inhabitant's  
Activities in Fixed or Limited Areas  
Result in Greater Social Activities  
Possible Social Interaction & More  
Mental Hygienic Climate

Buildings Laid to Planned Patterns with  
Special Concentration Areas

BUILDING PLANNED &amp; LAID TO PATTERN

Special Concentration Where  
Inhabitant's Activities Culminate  
in Normal Way at Some Pivotal  
Point Centre Result in Greater  
Social Interaction & Better  
Mental Hygienic Climate

Buildings Laid to Planned Pattern with  
Special Concentration at Pivotal Centres

**Source:** Johannes Olivegren, "Better Socio Psychological Climate in  
Housing Estates" Ekistis Vol.41 No.245 April 1976.

## CHAPTER - 3

### RESEARCH DESIGN AND DATA PROCESSING

#### 3.1 INTRODUCTION

This chapter, in the main, is devoted to a discussion relating to different aspects of research design and data processing adopted in this study. First of all the framing of the questionnaire used for field survey has been discussed. Thereafter, an attempt is made to explain our choice of sampling, keeping in view the problems encountered during the testing of the questionnaire. This experience helped us in re-framing certain parts of the questionnaire. Methodology used to tabulate and present data has also been briefly discussed in the Chapter. The last section is devoted to the methods employed to analyse the field data for the purpose of the study.

#### 3.2 FRAMING OF QUESTIONNAIRE

As already stated, scope of the present study is restricted to space already provided to the households in high-rise apartment buildings. The study intends to gather reactions of households with a view to assess their level of satisfaction and dis-satisfaction with the given housing and the environment. The assessment is expected to help in the future development of high-rise living. The study does not in the main focus on space requirements, size of households and such other aspects of housing. But attempts to investigate the social and psychological factors causing satisfaction or dis-satisfaction among the high-rise inhabitants. No ready made questionnaire would meet the requirements of such a study. A questionnaire was, therefore, formulated for the purpose. This questionnaire was evolved after a thorough study of questionnaires used in various studies in and outside the country. A few studies on multi-storey residents have been undertaken in our country. National

Buildings Organisation, New Delhi and Central Building Research Institute, Roorkee alone have conducted such studies on residents in government flats in Delhi. Questionnaire used in these studies were quite useful to us in the preparation of the preliminary questionnaire. Besides the researcher held extensive discussions on the subject with experts in National Buildings Organisation, New Delhi and Central Building Research Institute, Roorkee. Thereafter a preliminary questionnaire was formulated. This questionnaire was designed as "Trial Short" (Abrams, 1965) with a view to 1) standardize questions so that these are easily and consistently replied and 2) gain sufficient experience in conducting interviews and administering questionnaire.

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QUESTIONNAIRE SCHEDULES DEVELOPED BY VARIOUS AGENCIES

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1. Horizon Research Service, Bombay
  - i) 1977-78 - T.V. Brand Image Study.
  - ii) 1977-78 - Eves Weekly Readers Study.
2. National Buildings Organisation, Govt. of India, New Delhi
  - i) 1970 - Consumers reaction survey on flats in multi-storeyed buildings in the government sector.
  - ii) 1972 - Survey of consumer preferences on government residential buildings, type II, III and IV in New Delhi.
  - iii) 1973 - Survey of consumer preferences on governmental residential buildings, dormitory type hostel accommodation New Delhi.
3. Indian Council of Medical Research, New Delhi  
Research of health survey
  - i) Household schedule, ii) Health & Morbitory schedule
  - iii) Vital statics schedule, iv) Pregnant women schedule
4. The National Swedish Institution for Building Research, Stockholm  
Orientation and floor level, a study in preferences of dwellers in point block by Thiberg (1966).
5. Tata Institute of Social Sciences, Bombay  
Household Survey of Greater Bombay.

Through the preliminary questionnaire, views of respondents were solicited on the content and meaning of each question in the questionnaire. This exercise was conducted to ascertain that respondents understood our questions and that none of the important questions had been left out.

Our preliminary questionnaire included questions on conditions of houses living in previously before occupying the present flat, accommodation in the present flat, individual preferences, social interaction with neighbours, psychological reactions to various conveniences and inconveniences, location of flats and scores of questions relating to planning and design criterion of the tall buildings. Details regarding residents' occupations, incomes, religions, ancestral places and other particulars of the households were also included. However, the main focus of the questionnaire concerned socio-psychological satisfactions and dis-satisfactions of high-rise residents. The final draft of the questionnaire emerged only after the preliminary questionnaire was test checked. Many questions had to be added and or deleted on the basis of our experience during pre-testing. A copy of the questionnaire used for the study is given in Appendix-II.

Standardized questionnaire proforma considered suitable for such a survey was employed in this study. In such proforma, identical questions with same wording and in the same order are presented to all respondents. Selected questionnaire, as per Young (1967) and Selltiz (1966), ensures that all respondents are replying to the same question as the difference in questions or their order can influence the meaning and implications of a given question. The standardized questionnaire proforma ensures some uniformity in recording responses.

### 3.3 QUESTION CONSTRUCTION

Check type close ended questions were formulated as respondents find such questions understandable and easy to answer. Close ended questions suit written proforma especially where respondents fill in the questionnaire themselves. The respondent can attribute the effect to the cause and arrive at justified result at his leisure and accordingly answer the questions. Some questions assumed dichotomous form (two point scale) like 'yes', 'No'; 'satisfied' and 'Dissatisfied'; 'Happy' and 'Unhappy'. Some questions assumed fixed alternative form in which the responses of the respondents are limited to stated alternatives. For some of the questions a three point scale was employed where, in addition, to the above 'do not know' feature is included. Few other questions are open ended (inviting response of respondent's own choice).

To put the questionnaire in proper order simple objective type questions are followed by others regarding attitudes, reactions, feelings, motives and preferences. "People are often more willing to answer objective questions about situation and behaviour than about attitude, preferences and motives" (Selltitz, 1966). Moreover, they find it easy to indicate their attitudes of motives after the situation has been clearly specified. On the basis of these details the final questionnaire comprises three proforma schedules. Each schedule consists of questions on different aspects of the study.

#### 3.3.1 Information Schedule

This proforma aims to obtain detailed information as regards the social environments and patterns of living of the high-rise habitats. Reactions pertaining to nearness or otherwise of neighbours, overall environment, location of common facilities for children's play and spots, movements of elderly parents, visitors, elevators, holding of social functions, choice and preferences

for floors and building's height and related problems were sought through this schedule. Details regarding social parameters, which include questions on social interactions, contacts and social relations, forms an important part of this schedule.

### 3.3.2 Reaction Schedule

This schedule is completely devoted to an analysis of psychological aspects and reactions of the residents which in turn cause tension and frustration. A set of objective questions were framed to measure the degree of happiness or unhappiness, satisfaction or dis-satisfaction and such other psychological traits. Code numbers were devised for different levels of satisfaction to facilitate the job of respondents.

Each section in this schedule consists of a bunch of questions concerning movements, attentions, activities, feelings, fears, emotions, distrust, motivation, sympathy, hate etc. The proforma consists of questions under eight major headings. Residents' satisfaction or dis-satisfaction with high-rise buildings have been detailed out in this proforma. Blank spaces, to invite additional suggestions are provided in the schedule. Questionnaire adopted by Haber (1977) for assessing things liked or disliked about tall buildings by 300 undergraduate students at the University of Maryland guide provided guidance in framing appropriate questions.

### 3.3.3 Identification Schedule

"Culture is paramount because it has a past as opposed to fashion and fades which are aphemeral" (Adinarayan, 1964). Therefore, studies in regard to individuals necessiate the inclusion of questions pertaining to the cultural background of the individuals and other members of the household.



This proforma attempts to gather information regarding the high-rise buildings included in our survey. Details of location, orientation and number of storeys of these buildings cover a major portion of this proforma. Besides questions concerning the occupancy status (owner or tenant), floor levels occupied, age, places of birth, places where educated, marital status, occupations, religions and incomes are included. Other questions in this proforma relate to the respondents' experience of living in high flats in high-rise buildings, places of work and their distance from residences. Details regarding respondents ancestral place of residence as also their experience of living in Bombay have also been included. Even questions relating to respondents' choice of floor levels and building types (number of storeys) are included in this proforma.

#### **3.4 SELECTION OF RESPONDENTS AND CANVASSING OF QUESTIONNAIRE**

Any investigation in the area of living and housing is beset with number of formidable problems. This is particularly so where the research is being conducted by an individual. The time and financial constraints do not permit the researchers the luxury of field staff. The problem becomes all the more difficult where the investigation happens to be first of its kind. Very few studies concerning high-rise buildings and their residents have been conducted in our country. This has already been discussed in the preceding chapter. Lack of secondary data and observations of fellow researchers increase the dependence on data collected through a limited field survey.

Seeking cooperation from unknown and heterogeneous group of residents during field survey is a difficult and challenging job. Most of the residents try to avoid any field investigator on one excuse or the other. They do not agree to cooperate even with investigators appointed by the government and given the authority to conduct the survey. A doctoral scholar has to seek

the cooperation on his own. It was an uphill task to seek an interview with the very busy people of Bombay Metropolis. It was only through the support of agencies concerned with one or the other aspect of high-rise housing that the researcher could seek interviews with the residents of high-rise buildings in Bombay. Assistance of Secretaries and Presidents of various housing societies, friends and acquaintances and some students of Tata Institute of Social Sciences, Bombay, was sought to canvass the questionnaire. Before approaching a respondent, a leaflet (Appendix-I) was handed over to him explaining the purpose of the study and requesting for his cooperation. Appointments were sought with each respondent. These and some other constraints do limit the freedom of research scholars but this does not mean that no study is possible. However, the scholar has to make certain compromises and make certain deviations from the text book research designs.

The survey work started with a three week exploratory survey during which the researcher familiarized himself with the high-rise residential localities, composition of high-rise buildings their designs, environments and residents living in them. Thereafter, in March 1978, one hundred questionnaires were distributed among a cross section of high-rise residents in different localities of Bombay Metropolis. Every attempt was made to cover all types of high-rise buildings and high flat residents. Pre-test survey evoked 52 percent response. Reactions gathered during this round immensely helped in finalising the questionnaire and the selection of respondents for the final questionnaire. Respondents for the final survey were chosen randomly from areas selected for the study and included most of the households considered in the preliminary survey. Settli (1964) is of the opinion that persons considered for the final survey should include those interviewed in the preliminary survey.

### 3.5 THE SURVEY

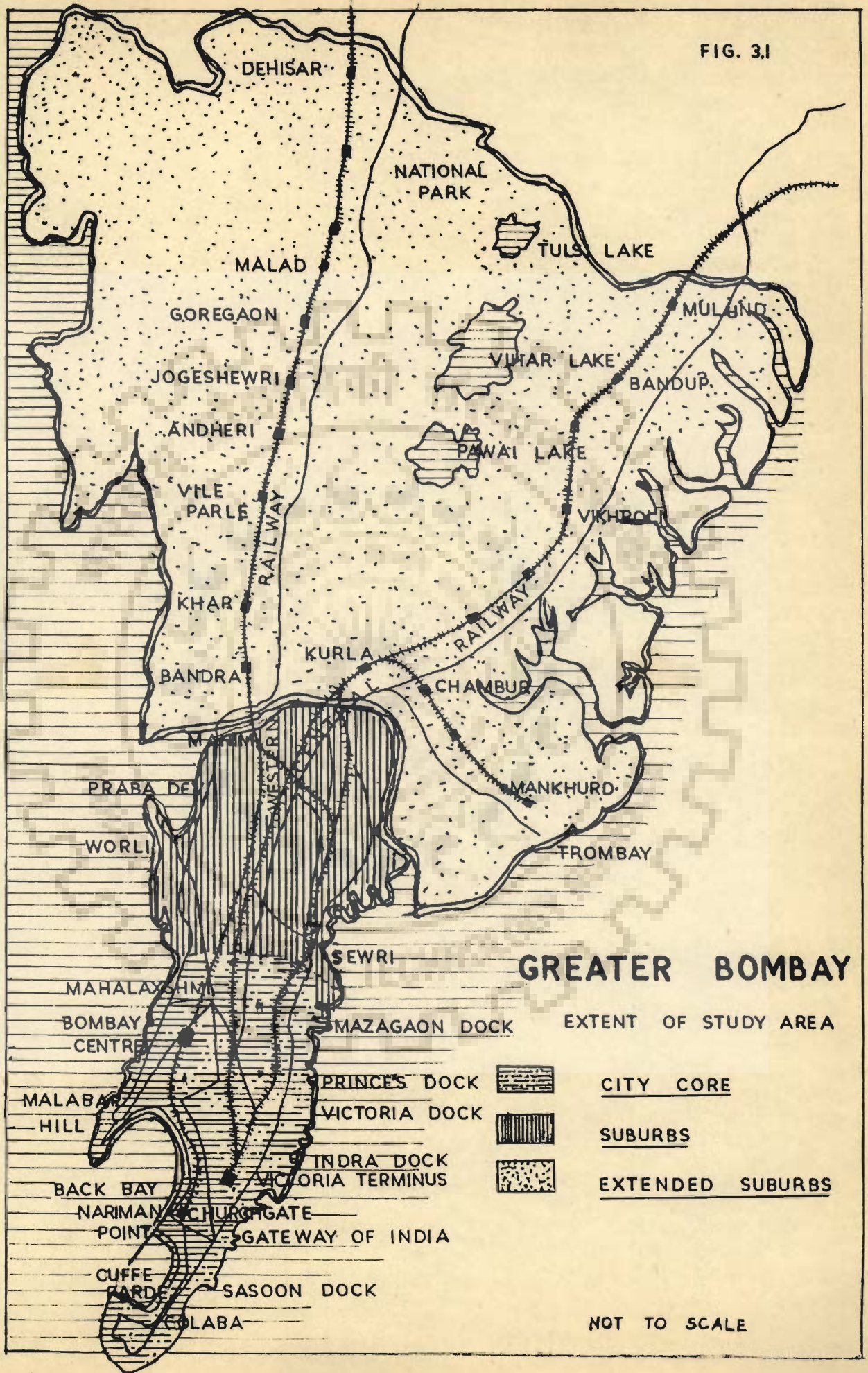
Under this study 800 questionnaires were distributed among high-rise residents. Of these 480 respondents filled and returned the questionnaires. 20 of these had to be discarded for being either incomplete or blank. Thus the results of the study are based on the tabulation of 460 questionnaires, or 57 percent of the total selected respondents. All these respondents were living in buildings having seven or more storeys, defined as high-rise building for this study. All the buildings covered under this investigation had the facility of a lift for vertical circulation.

High-rise buildings (Fig. 3.1) in Bombay Metropolis are concentrated mainly in South Bombay and along the two trunk routes (linear corridor developments) of the city and are namely,

- Western Railway-Churchgate to Borivaly. This corridor extends from South to North direction and
- Central Railway-Victoria Terminus to Thana which extends from South to North-East direction. However, for this purpose of random sampling, the city was stratified geographically into the following three segments:




1. Core city .. Colaba, Cuffe parade, Byculla, Mahalaxmi and Bombay Central.
2. Suburbs ... Wadala, Dadar, Worli-face and Prabhadevi.
3. Extended Suburb ... Bandra, Malad, Bhandup, Mulund and Trombay.

FIG. 3.1



### GREATER BOMBAY

EXTENT OF STUDY AREA

-  CITY CORE
-  SUBURBS
-  EXTENDED SUBURBS

NOT TO SCALE

The above stratification helped in broadening the coverage and in enhancing the representative character of the study. A cross section of people live in the high-rise buildings in the above mentioned areas of the metropolis. Their occupations, ethnic backgrounds, religions, income levels, tastes and experiences are varied.

However, the area sampling technique, in which samples are continuously distributed in time and space at equal intervals, could not be accomplished in totality in this study. Selected respondents in many cases did not help and had to be replaced by other residents who willingly cooperated.

Non-cooperation of some residents made it difficult to follow random sampling method. It became a compulsion then to include any willing resident in our sample. Even among such respondents, some did not return the questionnaire, while a few filled it partially. It was with the help of certain residents, who understood the relevance of the study, that survey could be completed. They actually persuaded their neighbours, relatives, friends and acquaintances to cooperate and complete the questionnaire.

### **3.6 DATA PROCESSING AND ANALYSIS**

To process and analyse data collected during the field survey, a 'Code Book' was devised. Almost each possible answer of the respondents was given a code number to facilitate the job of data processing. Allotment of code numbers was decided with the help of specialists in the area. Code, in the form of numerals, made it possible to process the data on Data Processing Machine. Code sheet developed for the purpose of data recording and processing is given in Appendix - III. A deck of 1840 cards were punched with coded information recorded in the Code book.

Heavy reliance on correlation analysis has been made in the analysis of data. In this analysis, Physical Characteristics of high-rise buildings, which do not vary, constitute the independent variables. These include, among others, floor levels and building heights (number of storeys). Dependent variables on the other hand are the reactions, attitudes, feelings and other observations of the residents. These variables are influenced by the floor levels or the number of storeys.

Building heights and floor levels of the high-rise buildings in the study have been broadly classified under three heads; namely, low, medium and high. This classification was arrived at on the cumulative frequency distribution of the 460 respondents among the floors and different building heights. So far as the classification of floors is concerned, the frequency table was divided into three categories of low, medium and high. The dividing lines were drawn by finding the cumulative frequency distribution of nearest to one-third (153) of the sampled respondents. In the case of floors, the cumulative frequencies at 114 and 294 become the dividing lines by being nearest to one-third criteria. Respondents upto 114 frequency represent low floor level. This level covers 1st to 6th floors. Medium floor level is represented by 180 respondents living in 7th to 11th floors. The remaining 166 respondents represent high floor levels (12th to 31st floors).

Similar criteria has been evolved to arrive at low, medium and tall high-rise buildings. Here cumulative frequency nearest to the first one-third turns out to be 170. They represent respondents of low high-rise category of buildings. Such buildings cover 7 to 15 storey buildings. Medium high-rise buildings are represented by 16 to 20 storey buildings. Such buildings are represented by 160 respondents as per the cumulative frequency method. Buildings with 21 to 32 storeys, as per this method, come to represent

tall high-rise buildings. In all 130 respondents lived in this category of buildings.

**Table 3.1 Contingency Table Representing Respondents in Floor Levels and Number of Storeys of High-Rise Buildings**

(Floor-wise)	Category of Buildings (Storey-wise)			Floor-wise Totals of respondents
	Low 7 to 15	Medium 16 to 20	High 21 to 32	
Low 1 to 6th	61	33	20	114
Medium 7 to 11th	91	61	28	180
High 12 to 31st	18	66	82	166
Storey-wise totals of respondents	170	160	130	460
				Total sample of respondents

The contingency table (Table 3.1) represents frequency distribution of respondents in respect of the two independent variables of building heights and floors levels. This table confirms the floorwise and storey-wise distribution of sampled respondents arrived at with the help of cumulative frequencies of each category. In this table each cell value represents the number of respondents in low, medium or high floor levels and building height categories. For example, 33 in the first row and the second cell, represents the number of respondents living in low (1-6) floor levels in medium (16-20) high-rise buildings. Similarly 82 in the last row and the third cell, represents the number of respondents living in high (12- 31) floor levels in tall (21 - 32 ) high-rise buildings. The marginal totals of the three cell values in rows i.e., 114, 180 and 166 represent the total number of respondents living in respective floor level categories. Likewise marginal totals of the three cell values in columns i.e., 170, 160 and 130 represent the total number of respondents living in respective high-rise building categories.

### 3.6.1 Contingency (Cross-tabulation) Analysis

For the analysis and interpretation of the data collected from the sampled high-rise apartment building households and to investigate sets of relationships among two or more variables, contingency table (cross tabulation) analysis is adopted. "A cross tabulation is joint frequency distribution of cases according to two or more classificatory variables. The display of distribution of cases by their position on two or more variables is the chief component of contingency table analysis and is indeed the most commonly used analytical method in the social sciences" (Nie, 1975). For the distribution of cases by their position in respect of floor level categories or number of storey categories for two or more variables or the cases located with respect to both variables at the same time is the main feature of the cross tabulation analysis. "These joint frequency distributions can be statistically analysed by certain tests of significance, e.g., the chi-square statistics to determine whether or not the variables are statistically independent, and these distributions can be summarised by a number of measures of association, such as contingency coefficient, phi, tau, gamma etc., which describe the degree to which the value of one variable predict or vary with those of the other" (Nie, 1975).

Processing of data was undertaken at the Department of Research Methodology, Machine Data Processing Section, Tata Institute of Social Sciences, Bombay. Bivariate and Multivariate cross tables were accomplished by computing the independent variable in nine categories as shown in Table 3.2.

In this table frequencies in rows 1,4,7 added together represent responses from 1 - 6 floors; frequencies in rows 2,5 and 8 together represent responses from 7-11 floors. Rows 3,6 and 9 represents 12 & higher floors. Similarly frequencies from 1,2 and 3 added together represent responses



Table 3.2 Cross-tabulation of Variables

Independent Variable (No. of storeys)	Sl. No.	Independent Variable (Floor level)	Frequency of Dependent Variable			
			Low	Medium	High	Total
7 - 15 Storey	1	1 - 6 Floor				
	2	7 - 11 Floor				
	3	12 - 31 Floor				
16 - 20 Storey	4	1 - 6 Floor				
	5	7 - 11 Floor				
	6	12 - 31 Floor				
21-32 Storey	7	1 - 6 Floor				
	8	7 - 11 Floor				
	9	12 - 31 Floor				
Total.						460 respondents

from 7-15 storey buildings; rows 4,5 and 6 from 16-20 storeys; and rows 7,8 and 9 together represent responses from 21 storey and above. The dependent variables have been weighed/ranked differently depending upon the nature of variable and the objective of analysis. Terms like 'yes', 'no', or 'strong', 'mild' and 'low', 'medium' and 'high', etc. have been used for this purpose. The last column in the tables indicate the marginal totals for each category of floor levels and building heights.

For simplifying the presentation of data, collapsing of responses of different categories was suitably done. Major dependent variables of psychological stresses like tension, irritation, bad feelings etc., leading to dissatisfaction compared sets of components or elements separately dealt with in detail in the later discussions or analysis. Each component was provided with a spectrum of responses expressing reactions. To measure the psychological stresses a scale to weigh the importance of each response, was made on the basis of the following weightages:

Weightage	Spectrum of responses	Code
5.	Strong or persistent or a range of high feelings.	1
3.	Mild or sometimes or a range of medium feelings.	2
1.	Less or no effect or a range of low feelings.	3
0.	Non-committal, no experience	4

The scale thus ranged from one(1) to the product of maximum weightage 5 and total number say 'n' of components i.e. 1 to 5xn. The range includes respondents who remained non-committal with zero weightage. As the number of respondents in each case was different, the scale ranges were suitably arranged separately in three levels of reactions namely little or no effect, mild and strong.

Cross tabulation of variables as discussed above had to be done to arrive at conclusions in regard to social and psychological attitudes and reactions of high-rise apartment residents. For this purpose a tabulation plan, with the list of variables to be cross tabulated, was prepared. Tabulation plan is designed to determine the scheme of cross tabulation of variables depending on the importance of one with the other variable or variables. Tabulation plan is made to list out variables which are being considered for cross tabulation. The tabulation plan was prepared after assessing the importance of each variable and their probable reactions, relations or effects on other variables. This helped us to verify the relation of one with the other variable.

Computation of various contingency tables, cross tabulating independent variables with dependent ones and wherever necessary dependent variables with other dependent variables, was decided upon on the basis of the tabulation

plan or scheme. Frequency (numerical value) of responses in each cell in a row represents percentage of respondents of the total residents living in the designated category of the floor or number of storeys' level. The number is thus also the percentage of respondents in the three cells in the particular column. Two way and mostly three way contingency tables have been made and results tested for the relation between the variables. In some cases although results were tested on the basis of three way tables but the frequencies were suitably collapsed and the tables presented as two way contingency tables.

### **3.6.2 Statistical Tools**

To measure the degree of relationship and the extent to which one variable is associated with the other, several statistical measurements and tests are available. Test have been applied to find the correlation and their significance indicating the degree to which value of one predicts or varies with that of the other. Statistical tools are useful in explaining the variation between the variables. Of course, choise of tests depends on the characteristics of variables and general research design.

### **3.6.3 Summary Statistics for Cross-tabulation**

Often it is desirable to summerize the relationship depicted in a cross-tabulation table with a measure of association or a test of statistical significance. A measure of association indicates how strongly the two variables are related to each other. In essence, it indicates to what extent characteristics on one sort and characteristic of another sort occur together. Usually only a sample of the 'universe' of all possible cases, is studied with a hope to infer that a relationship found in the sample actually exists in the universe that the sample represents. A test of statistical significance helps to confirm this

relationship. A test of statistical significance explains the probability that the observed relationship could have happened by chance i.e. the probability that in a representative sample of a given size, the variables would exhibit a relationship as strong as the observed relationship. A test of statistical significance is thus in itself based on the results of a hypothetical experiment. Taking the two variables as totally unrelated to each other in the universe, but each distributed exactly as they are in the observed samples. It is supposed then that an infinite number of samples of the same size are drawn from the universe. The probability of the observed relationship occurring by chance is equal to the proportion of the samples in which the relationship between the two variables is as strong or stronger than the observed sample. The relationship between variables is statistically significant when chance of occurrence in a sample is 5 or less percent and probability of occurrence as observed is 95 percent or more. However, test of statistical significance only indicates the likelihood that an observed relationship in the sample actually exists in the universe represented by the sample but does not indicate the strength of the relationship.

To ascertain whether or not a systematic relation exists between the variables, statistical tool of Chi-square test is most suitable as a nominal level statistical tool of significance. It helps to determine whether the variables in consideration are related with each other. This is done by computing the cell frequencies which would be expected if no relationship is present between the variables given the existing row and column marginal totals. The expected cell frequencies are then compared to the actual values found in the table on the basis of the following expression:

$$\text{Chi-square Or } X^2 = \sum \frac{(f_o^i - f_e^i)^2}{f_e^i}$$

where  $X^2$  = Chi-square statistic

and  $f_o^i$  = The observed frequency in each Cell.  
 $f_e^i$  = The expected frequency and is calculated as

$$F_e^i = \left( \frac{C_i T_i}{N} \right)$$

where  $e$  = is the frequency in a respective column marginal  
 $i$  = is the frequency in a respective row marginal,  
 and  $N$  = stands for total number of valid cases.

The greater the discrepancies between the expected and actual frequency the larger the value of Chi-square. This indicates existence of a systematic relationship between the variables.

In order to determine whether systematic relationship does exist, it is necessary to ascertain the probability of obtaining a value of Chi-square larger than the calculated from the sample, when in fact the variables are independent. This depends in part upon the degree of freedom.

The degrees of freedom ( $df$ ) vary with the number of rows and columns in the table and are important because the probability of obtaining a specific Chi-square value depends on the number of cells in the table. Chi-square helps to decide whether the variables are independent or related but does not show how strong the relation is.

Chi-square thus computed by the expression given above would mean whether the level of confidence from the difference between what is observed and what is expected is significant at a particular probability level. Probability taken in this study is .05 or below with degree of freedom  $(r-1)(c-1)$  where 'r' represents number of rows and 'c' number of columns in the table.

The measure of association describes the degree to which the value of one variable predicts or varies with the other variable. To summarise

the distributions in the cross-tabulation, contingency coefficient (c) and Phi ( $\phi$ ) statistic has been employed. The coefficients take the value of zero (0) when no relation exists, and value of +1 when variables are perfectly related and -1 when variables are inversely related.

#### 3.6.4 Contingency Coefficient

Contingency coefficient is a measure of association between variables and is mainly based on Chi-square value. This coefficient was used for tables with three rows and three columns to measure the association of the independent with that of dependent variables. However, this statistical technique can not be used where number of rows and columns in a table are not equal. The expression used for calculating the coefficient is:

$$C = \left( \frac{X^2}{X^2 + N} \right)^{1/2}$$

where C = contingency coefficient

$X^2$  = Chi-square value calculated by the above explained expression with observed and expected values of the table cells

N = The number of responses or observations.

#### 3.6.5 Phi - Statistic

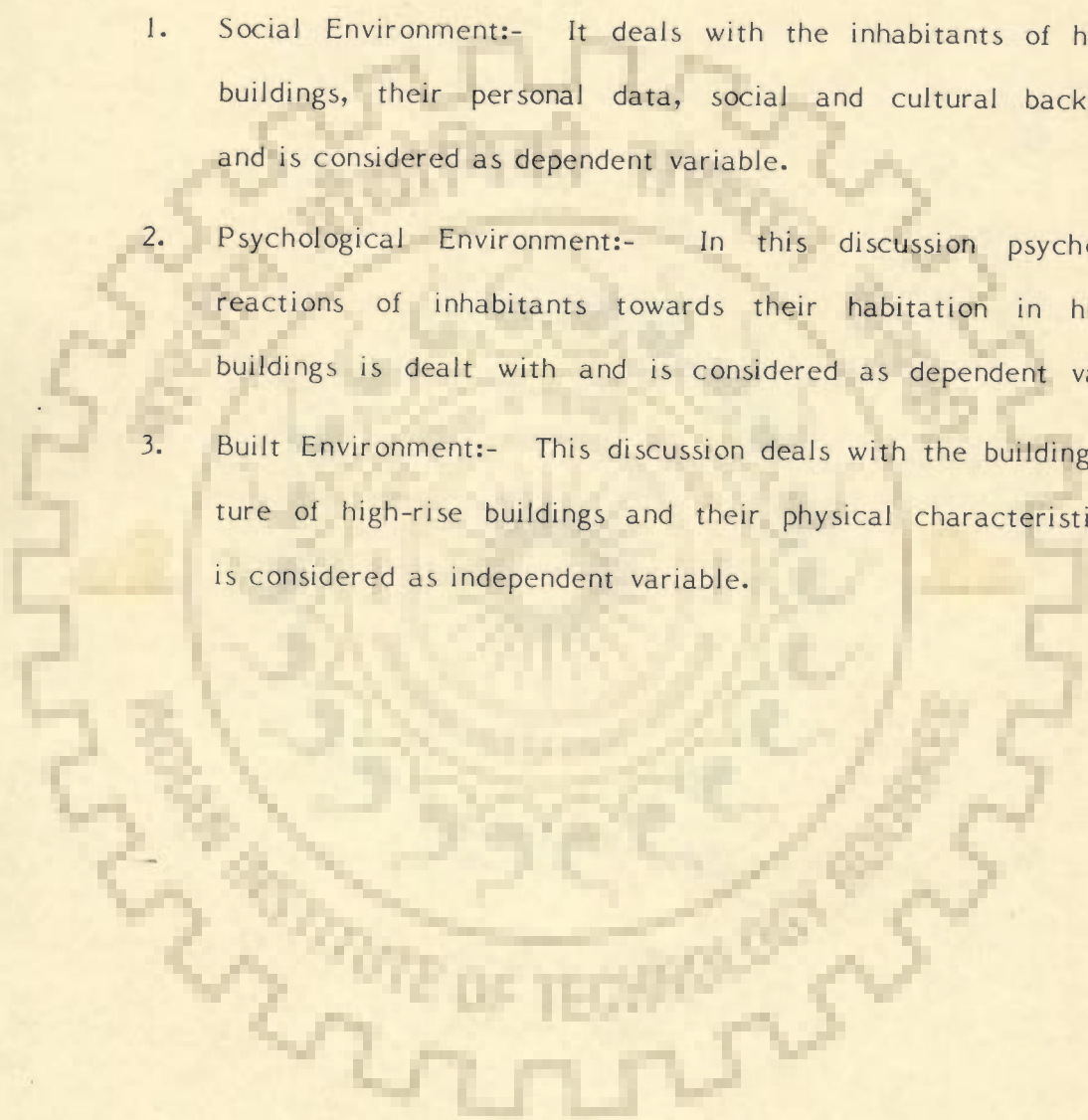
For two by two (2x2) contingency tables, a suitable measure of association, the Phi statistic, has been employed to indicate measure of strength of relationship between the variables and is calculated by the expression

$\phi = \left( \frac{X^2}{N} \right)^{1/2}$ .  $\phi$  statistic has been used wherever necessary for cross checking. For the purpose of making contingency tables into 2x2 tables, clubbing of consecutive cell values was done with only two i.e. lower and higher floor levels or low or tall high-rise building categories.

### 3.7 FORMAT OF PRESENTATION

Data and observations gathered during field survey are analysed in the following chapters. The analysis is undertaken under three heads namely Social, Psychological and Built Environment as given below:

1. **Social Environment:-** It deals with the inhabitants of high-rise buildings, their personal data, social and cultural backgrounds and is considered as dependent variable.
2. **Psychological Environment:-** In this discussion psychological reactions of inhabitants towards their habitation in high-rise buildings is dealt with and is considered as dependent variable.
3. **Built Environment:-** This discussion deals with the building structure of high-rise buildings and their physical characteristics and is considered as independent variable.



## CHAPTER - 4

### SOCIAL ENVIRONMENT

#### 4.1 INTRODUCTION

Urban life and high-rise apartment environment should not merely mean the economic life and just living of its habitates, but should imply living together of healthy human beings. In any kind of social existence, the importance of good neighbourliness is implied. It is not merely the behavioural expression, traits, habits and culture of human beings but also of neighbourliness a vital problem of social relationship. Neighbourliness implies the need for emotional health, the capacity to enjoy life, to live and to make good life possible for many human beings.

High-rise apartment residents are heterogeneous people with different and varied economic and cultural background . They may belong to different castes, classes, linguistic and religious groups. Naturally an individual feels isolated in the midst of vast and varied sea of mankind. High-rise urban habitants lack emotional integration, as the scope and opportunity for participation in common social events is restricted.

Pearl Japhcot (1971) tells us that "multi-storey were socially chilly and tended to cut one off from that topic of inexhaustible interest, human nature". Further "High-rise apartment buildings usually have to be laid at distances, therefore, there is no window one just in front of another of your neighbourers in the next block". Visual proximity and close contact with the neighbour is difficult. It even becomes difficult to know whether the flat is empty or occupied. How can then one resident know his neighbour ? Even where balconies are provided, the same are usually not used for the purpose of sitting and watching the surroundings and the neighbours.



Most of our sample population, barring residents of upper most floors who, belonging to high income business classes, liked to maintain social contacts and interact with other residents especially the immediate neighbours. Paucity of leisure and stranger neighbours were important constraints in their interaction. Even those who like and attempt to develop contacts, may at times not get satisfactory response and thereby culture of interaction is difficult to grow among high-rise residents.

#### 4.2 FAMILY STRUCTURE

The average family size works out to be nearly four. This average is based on a sample of 460 households. As per Table 4.1 about 49% of sampled population formed inhabitants in age group of 25-59 years. School and college going population (6-24 years age) form about 37% of the total residents. Elderly persons of 60 years and above, more or less, equalled the number of young children upto 5 years age. Their respective shares in the sample's population stood at about 7% and 8% respectively.

Various observations made from the table are:

- i) Only 23.6% of 460 households had children below 5 years of age. A large majority (78%) of them had only one such child. Households with two, three or four children of under five years constituted 19 and 3 percent of such households respectively.
- ii) Over seven-tenths (70.4%) of the households had youngsters in the age group of 6-24. Of them 45% had two members, 30% had one member and only 7% households had four to six members in this age group.
- iii) Members of only 20.7% of the households included parents of 60 years age or above. Three-fourths (75%) of such households had only one

parent, 24% both the parents and about 1% had parents and other relations staying with them.

- iv) About 89% among 460 households consisted of family members in the age group of 25-59 years. Nearly 80% of the households had two members; 1% three and 7% one member in this age group. For details see Table 4.1.

It appears that high-rise apartments are inhabited largely by nuclear families, consisting of husband-wife and school or college going youngsters in 6-24 age group. Children below 5 years and elderly persons of over 60 years constitute a very small proportion of the family structure.

Table 4.2 shows over three-fifths (62.0%) of the families in high-rise buildings have children. Of them 7% families have children of under 6 years, 54.8% in the age group of 6-24 years, while 12% are childless. About 17% households lived along with parents and children. Figures in parenthesis indicate the percentage of households with children in the two age groups. The table further reveals that of 54.7% respondents with youngsters in 6-24 age group, 42.1% and 38.5% lived in medium and higher floors respectively against 19.4% at lower levels. Similarly of 7% respondents with under 6 years children, 40.6% and 31.3% lived in lower and medium floors respectively and 28.1% in higher floors.

Respondent families living with parents are mostly concentrated at lower and medium floor levels. The percentage of such households at these floor levels works out to be 38.2% and 34.5% respectively. The situations was in no case very different when data regarding number of storeys of high-rise buildings were analysed.

Thus it follows:

1. Most of the households of high-rise buildings comprise of nuclear families.
2. Households with grown up children live, by and large, in upper floors.
3. Age distribution of children and floor levels or number of storeys of high-rise buildings are positively correlated. In other words families with infants as well as parents live in lower floors of low high-rise buildings.

#### 4.2.1 Marital Status

The data collected in this behalf show a large majority (85.9%) of household heads living in high-rise buildings were married. Only 9.2% were found not to have married and about 5.0% had married but had become subsequently widow/widower. The analysis reveals that, by and large, the residents were adults and married.

**Frequency Distribution of Respondent Household's Marital Status**

Status	Married	Unmarried	Widow/Widower	Total
%	85.9	9.2	4.9	100

#### 4.2.2 Occupational Structure

Table 4.3 provides details regarding the worker and non worker family members of our sampled households. A large majority of 77.6% families consisted of some working and some non working members. In 10.4% households all the members were working. Even housewives of such families attended to some job. Families with cent percent working members were mostly in government services. Nearly eight-tenths (79.2%) of such families were in government jobs. The remaining 20.8% were engaged in business. Even the members

of the families outside the above group were mostly in government and private service. Only a small percentage of the respondents (2.0%) were non workers. Households without any working member consisted of retired persons. It is possible that some such families might have members working outside Bombay.

Incidentally the proportion of households with both worker and non-worker family members seems to increase with the increase of floors upto medium floor level. Thereafter it shows a decreasing trend with further increase in floor levels. Similar is the situation with all worker family respondents. Perhaps tired and exhausted working members prefer to live in lower floors to minimise the inconvenience of going up and down.

The proportion among majority (77.6%) respondents engaged in business seems to increase with increase in the floor levels. Such households, it appears, prefer to live on higher floors for reasons of secrecy, privacy, prestige and ego. Higher paying capacity of businessmen may also explain the above phenomenon.

#### **4.2.3 Places of Work and Mode of Travel**

The distance of high-rise buildings from work places must be one of the most important factors in the selection of a flat and the locality. Work places for majority of the respondents (58%) were found to be within 5 kilometers from their apartment residences. This distance was 25 Kms or more for just 10% respondents. In the case of 19% respondents this distance worked out to be between 6 to 10 kms. For the remaining respondents distance from work places ranged between 11 and 24 Kms.

So far as the modes of transport used to cover the distance between residence and places of work are concerned, only 5% respondents were found

to cover it by foot. About 46% availed public transport, 16% to 23% covered this distance by their two or four wheeler vehicles. Only one-tenth of the respondents had the facility of official transport for the purpose.

Nearly 75% of the respondents answered questions relating to the ownership of different kinds of vehicles. Of these, over two-thirds (68%) owned 2 or 4 wheelers, only 7% owned bicycles.

#### 4.2.4 Income Structure

It is obvious from the table below that 88% households responded to the question concerning monthly family incomes. More than two-fifths (43%) of the respondents earn between Rs.1501 and Rs.2500 a month. The monthly incomes of about one-third (33%) of the respondents aggregated Rs. 2501 or more. Only 12% respondents were in the lowest income category of Rs. 1500/- or below.

The income levels of the respondents in the table are, at best, an underestimate. There is a very strong tendency among the respondents to conceal a part of their income. This aspect was fully reflected in their standards of living.

**Distribution of Respondents by Levels of Monthly Income**

Income	Rs.1500/- or less	Rs.1501/- to Rs. 2500/-	Rs.2501/- and above	No Resp- once	Grand Total
NO	55	197	153	55	460
(%)	11.9	42.8	33.3	11.9	100

#### 4.2.5 Ancestral Residential Background

For a large majority (78%) of our sample household couples (Table 4.4) the ancestral places of residence is same, which means both husband and wife belong to either villages, towns, cities or Bombay. Of these about 27% each were from villages or towns, 31.8% from cities and only 13.8% from Bombay. For 11% household couples, husbands were from towns and wives from either villages, cities or Bombay. Of them 33% wives were from villages, 55% from cities and 11% from Bombay. For the families (6.8%) husbands were from cities and wives from either village, towns or from Bombay. Of these families 28.6% wives were from villages, 46.4% from towns and 25% from Bombay. Similarly for the remaining sample household couples (4.6%) husbands were from Bombay and wives from towns and cities. Of them 47.7% housewives were from towns and remaining 52.8% from other cities. In our sample households it is observed that there is no household couple where husband belonged to Bombay and wife to village.

Table 4.5 shows more than half (56.7%) the elderly respondents born, as expected, in villages and towns. Nearly three-tenths (31.0%) were born in cities and only 12.4% in Bombay. Almost a similar pattern emerges in so far as respondents of 25-59 year age group are concerned. Over half (51.9%) of such respondents were born in villages and towns, nearly one-third (32.0%) in cities and just 16.1% in Bombay. In case of younger generation (under 24 years) residents, less than one-fifth (18.2%) were born in villages and towns compared to 53.2% in Bombay and nearly three-tenths (28.6%) from other cities. Most of these young-sters were born after their parents had left villages and towns and settled in Bombay or other cities.

More than 95% of elderly members of our samples' population were not educated. The facilities of formal schooling in their childhood were virtually

non existent in most parts of the country side. Consequently such residents are not educated.

In 25-59 age group, 29.7% and less than one-fifth (17.7%) of the respondents had (Table 4.6) their primary education in towns and villages respectively. So far children are concerned, 74.9% and 19.6% had primary education in Bombay and other cities respectively. Similarly 8.1% and 31.7% respondents of 25-59 years age group and 1.6% and 4.1% young-sters have had their secondary standard education in villages and towns respectively.

Most of the young-sters (78.4%) upto 24 years age went to colleges in Bombay, 18.4% in other cities and only 3.2% in towns. In the case of respondents in 25-59 year category, 28.1% and 55.3% took college education in Bombay and other cities respectively, while 16.6% did so in towns.

It follows that most of the middle aged respondents had their primary education largely through schools in rural areas and towns. However, they acquired secondary and college education in cities and towns including Bombay. Presently children were receiving education mostly in Bombay.

#### 4.2.6 Occupancy Status

Analysis of occupancy status of sampled apartment households in high-rise buildings reveals that 43.5% are permanent residents, being owners of the apartments. The majority of the respondents (55.2%) were tenants (temporary residence) including the residents living in flats allotted by government/business agencies.

Respondents Status of Occupancy

Occupancy	Tenant	Owner	No Response	Grand Total
N	254	200	6	460
(%)	55.2	43.5	1.3	100

### 4.3 SOCIAL CONTACTS IN HIGH-RISE BUILDINGS

The urge for socialization is very much present among high-rise residents, almost without exception. This is evident from Table 4.7. Almost all our respondents (94%) expressed this desire and wished to keep up social contact with their neighbours and others around their residential complexes. They would love to know and approach their neighbours and be useful to each other. Residents expressed their desire to provide help or get it when in need. Normally it is difficult to approach others without acquaintance, even the next door neighbours. Some common affinity among residents and neighbours at a particular floor or floors would probably make it possible for them to understand, know each other and provide or get help.

In high-rise living, the neighbourliness aspect is most likely to be missing. Why should it be so? Although high-rise habitants are in no way different from other human beings yet their attitudes to socialisation are decisively influenced by metropolitan living in general and high density high-rise living in particular. People in such situations always remain busy and live a mechanical life. Lot of their spare time is spent in covering distances separating work places and homes. This reduces leisure time which could otherwise be used for socialization in the neighbourhood.

The data analysed in the table reveals that nearly two-thirds (65.8%) of the respondents desire to socialize with neighbours to know them, to get and provide help in need. Only 0.9% respondents did not respond to this question. 28.1% liked to socialize to know others and the remaining 5.2% did not want any kind of socialization because of other problems that they feel are associated with it.

Of respondents desiring to maintain social contacts, to be in a position to get or give help, 40.6% were from higher, 37.3% from medium and 22.1%



from lower floor levels. The results indicate the percentage of residents wishing to socialize, increasing with the increase of floor levels. In other words those living in upper floors desire social interaction much more than their counterparts living in lower floors.

Over half the respondents (53.7%) although liked to maintain social contacts yet did not do so on account of lack of leisure time. 24.1% respondents also liked social interaction, but the attitudes of their neighbours did not suit them. Respondents (8.7%) not wanting to interact did so because social contacts in such residential situations were stereotype without any variety and recreation. 13.5% respondents did not respond to this query (Table 4.8).

Of respondents without much leisure time for socialization, 24.3% were living at lower, 40.9% at medium and 34.8% at higher floor levels. Of respondents who felt social contacts in the neighbourhood to be stereotype, 45.0% were from lower, 37.5% from medium and 17.5% from the upper floors. Those living in upper floors, though claim to like maintain social interaction, seem to be less sociable to those in lower floors. It was observed that more than half (55%) the respondents living in upper (medium and higher levels) floors prefer to develop social contacts away from their residences and usually in clubs or such other institutions. The correlation was found highly significant statistically with Chi-square value of 15.91, at df 4 with .01 probability.

Of respondents who wished to have good social interaction, 53.7% felt lack of leisure time, for them and others, was the main reason inhibiting social relations with neighbours and others. For 19.3% respondents, the reason was self centered attitude that others showed (not responding but keeping to themselves) against their attempts for better socialisation. Only 8.7% of such respondents felt interaction in their environment to be of monotonous

character. Such people find clubs etc. more suitable as they offer variety entertainment.

Of respondents (53.7%) feeling paucity of time to be the cause of non-interaction, 24.3% lived in lower floors, compared to 40.9 and 34.6 percent respectively at medium and higher floors (Table 4.9). nearly one-fifth (19.3%) of the respondents felt that the attitude of their neighbours, to keep to themselves, was for lack of social interaction in high-rise living. Of such respondents 21.3% lived in lower, 30.3% in medium and 48.3% in upper floors. This conclusion is in line with Japhcot's (1971) finding regarding 'Socially chilly' attitudes of such residents.

Of respondents who desire good neighbourly social relations (table 4.10), 64% possessed flats with two or less rooms. The remaining 36% had three or more rooms. In the case of former group 23.4% lives in lower, 47.4% in medium and 29.2% in higher floors. On the other hand of respondents with three or more room apartments 20.8, 27.3 and 51.9 was the percentage of their distribution at lower, medium and higher floors respectively. The floor-wise percentage distribution of such respondents increases with floor levels. A similar positive relation was observed when respondents living in low, medium and tall high-rise buildings were considered.

The results reveal distinctly that the habitants' (living in commodious flats) attitude towards maintaining social relations, has a direct relation with that of floor levels as well as the number of storeys of high-rise buildings they live in.

#### 4.4 SOCIALIZATION AND VERTICAL CIRCULATION

Since socialization is an important requirement for healthy growth of human civilisation, it is necessary to develop some kind of social interaction

among high-rise residents. How can this be done ?

Interaction among high-rise residents could be initiated in the elevator itself and through the common waiting hall at each floor. Some interaction is possible when residents use the staircase. The staircase landing could initiate some casual talk (Japhcot, 1971) especially among familiar residents. Elevator and the waiting space outside it at each floor should be designed somewhat differently to help promote interaction. The elevator is not usually crowded after the morning and evening rush. Residents could therefore try to know each other while using the elevator during lean hours. But such contacts can be very brief. However, the waiting space provided at each floor level outside the elevator provides a possible space for conversation and socialization. Our data, however, do not support the above possibility. High-rise residents rarely converse with one another in the elevator or outside it.

As can be noted from Table 4.11, less than two-fifths (37.8%) of the residents always got engaged in some conversation while 53.9% of them were conversing occasionally. On the other hand 6.7% respondents never conversed with others even while waiting for or using the lift.

For the high-rise residents waiting time for the elevator is usually more at medium and lower floors than at upper floors. It is so because the elevator going upto the top takes time and on its return journey, particularly during morning and evening peak/rush hours, gets fully booked before reaching medium or lower floor levels. This leaves more time, for residents of medium and lower floors, to interact with each other.

Our data indicate that 20.7% and 41.9% of respondents in lower and medium floors get sufficient time for social interaction against 37.4% in

higher floors. In this behalf further data regarding number of storeys of high-rise building, show that 40.8% and 26.4% of respondents were from medium and tall high-rise buildings respectively while 32.8% residents were from low high-rise buildings. This indicates that taller the building more the time available for social interaction in the elevator and outside while waiting for it. The correlation is highly significant beyond .001 level of probability.

#### 4.5 CHILDREN AND THEIR ACTIVITIES

Children are the main victims of high-rise living. Here they have to control even their nature. A child can't help play and interact under any circumstances. Isolation is the worst punishment for them. Parents with small children are in agreement that rearing children in high-rise buildings is a challenging problem calling for some viable solution.

A child of 7-10 years age is normally in a position to recognise his abilities to understand his environs and later in his early adolescence, he is not only able to mutually coordinate his thoughts but becomes competent to recognise and use his physical environment. Hence physical environment considerably influences the behaviour and actions of children. High-rise residential environment can lead to delinquency and vandalism. Children in this environment are not known individually by residents and their activities, therefore, are unrestricted. Their anti-social activities are not noticed and taken care of. Such of their activities, could include theft, pilferage of common facility items, unwanted use of common spaces and unwanted activities in and around buildings. Scribbling caricature, odd figures on walls of entrance halls at various floors, staircases, lifts and other walls could create social problems.

However, vandalism was an unknown phenomenon in high-rise environment in Bombay. This was the opinion of 63% of the sampled respondents. Even 11% respondents did not experience any other undesired activity in their high-rise buildings. Probably it is so because of the presence of employed security staff. However, one-fourth of the sample respondents had experienced such vandal activities in their high-rise apartment buildings. Among these residents, two-fifths were from low high-rise, one-fourth from medium and a little more than one-third from tall high-rise buildings. It is observed that about 60% residents from medium and tall high-rise buildings have such experience compared to 40% in low high-rise.

Proportion of respondents, having experienced vandal activities decrease with increase of number of storeys upto medium high-rise whereafter it increases with further increase of building height. The correlation between vandal activities and number of storeys of high-rise buildings is highly significant having Chi-square value of 17.529 at df 4 and beyond .01 probability.

#### **4.6 SOCIAL ENVIRONMENT FOR THE ELDERLY**

Many urban families include parents, and certain other elderly relatives. In some cases parents are living separately away from their working children.

Nuclear families, among other factors, are a consequence of the extreme paucity of living space in ancestral houses in Bombay Metropolis. Improvement in economic conditions may also encourage the emergence of such families. One-fifth of the respondents among sampled families (20.7%) lived along with parents (Table 4.1) in high-rise buildings in Bombay. Such families generally occupied lower floors and avoided very tall high-rise buildings. This is how (Table 4.12) elderly persons in 17.6% households expressed happiness with their living space. Two-fifths of the respondents (40.7%) expressed their

anxiety as their parents were not living happily in high-rise buildings. Restricted movement, isolation, insecurity, long lift waiting and at times the compulsion of using exhausting staircase caused a great deal of unhappiness for such persons. They wished their elderly persons could spend their leisure in green and open lawns, shade, and the breeze. Provision of Verandahs in the flats could help them to sleep comfortable during summer. Adequate provision of green lawns, trees and verandahs can go a long way in improving the satisfaction levels of residents.

Building's height (no. of storeys)/density of inhabitants and floor levels do seem to bother elderly/residents. Of respondents whose parents were not found happy in high-rise buildings, as many as 20.8% were living in lower, 43.3% in medium and 35.8% in higher floors. It follows that the feelings of aloofness and unhappiness increases with the increase of floors upto medium level but decline with further increase of floors. The correlation between the two is highly significant beyond .001 probability.

Similarly 41.7% of such respondents lived in low high-rise, 24.6% in medium and 33.7% in tall high-rise buildings. The feeling of unhappiness and building heights are also highly correlated, beyond probability of .001.

Nearly 35% respondents (Table 4.13) felt that elderly persons living with them do not find companions of their age during morning or evening stroll, or during a casual walk in a garden or a lawn in the neighbourhood.

Of respondents worried about lack of social interaction for their elderly persons, 20% lived in lower, 39.4% in medium and 40.6% in high level floors. It seems floor levels and reactions of the respondents in this behalf are positively though not significantly correlated. However, correlation between the number of storeys and the levels of social interaction of elderly residents

are highly significant beyond .01 probability.

#### 4.7 FAMILY BEHAVIOUR

Behaviour and attitudes might change after shifting into high-rise building environment. This change in behaviour especially regarding socialization becomes noticeable. Visits to old friends and relatives are likely to be curtailed by the high-rise residents after some time. Data collected to assess the extent of change in behaviour do not substantiate appreciably the view that living in high-rise changes the behaviour and attitudes of the residents. No changes in behaviour and attitudes were observed by over three-fifths (62%) of the respondents. They did not report any change (Table 4.14), whatsoever, in the behaviour and attitudes of high-rise residents. However, 35% respondents had marked some behavioural changes in their relatives and some changes in the attitudes of their own family members.

Of respondents, reporting no changes in the behaviour of their family members and relatives, 32.6% were living in low high-rise and 26.7% in tall high-rise buildings. Behavioural changes seem to be influenced by the type of high-rise buildings. The two are positively related upto medium high-rise building's level. The Ch-square value confirms the significance of this relation at 4 degree of freedom and beyond .02 probability.

Table 4.1 Age-wise Distribution of Sample Households

Age in year	Number of Family members in Each Household							Total	Not applicable	No. Respo-nse	Total House-holds	Total sample population
	1	2	3	4	5	6-8						
1-5	Households											
	N	85	21	2	1	-	-	109	374	37	460	N
	%	78.0	19.0	1.8	0.9			23.6	68.2	8.0	100	
	Population											
	N	85	42	6	4	-	-					137 7.7
6-24	Households											
	N	98	145	57	21	-	2	324	98	38	460	
	%	30.0	45.0	18.0	6.0		1.0	70.4	21.3	8.3	100	
	Population											
	N	98	298	171	84	-	12					663 37.1
25-59	Households											
	N	29	326	40	9	3	2	409	12	39	460	
	%	7.0	80.0	10.0	2.0	0.6	0.4	88.9	70.0	8.4	100	
	Population											
	N	29	652	120	36	15	15					867 48.5
60 & above	Households											
	N	71	23	1	-	-	-	95	332	43	460	
	%	75.0	24.0	0.8				20.7	70.0	9.3	100	
	Population											
	N	71	46	3	-	-	-					120 6.7



Table 4.2 Demographic Characteristics

Floor Level	Floor & Storeywise				Family Composition of sample Households						Total
	Nuclear Families		Families with children		Extended Families		Single Families		No Response		
	Families with children year 1-5	Families with children year 6-24	Families with Parents & children	Families without Parents & children	N	%	N	%	N	%	
1-6	13	40.6	49	19.4	25	32.1	21	38.2	6	13.9	114
7-11	10	31.3	106	42.1	27	34.6	19	34.5	18	41.9	180
12-31	9	28.1	97	38.5	26	33.3	15	27.3	15	27.3	166
<b>TOTAL:</b>	<b>32</b>	<b>7.0</b>	<b>252</b>	<b>54.8</b>	<b>78</b>	<b>17.0</b>	<b>55</b>	<b>11.9</b>	<b>43</b>	<b>9.3</b>	<b>460</b>
<b>No. of Storeys</b>											
7-15	14	43.8	84	33.3	35	44.9	24	43.6	13	30.2	170
16-20	10	31.3	95	37.7	22	28.7	19	34.5	14	32.6	160
21-32	8	25.0	73	29.0	21	26.9	12	21.8	16	37.2	130
<b>TOTAL:</b>	<b>32</b>	<b>7.0</b>	<b>252</b>	<b>54.8</b>	<b>78</b>	<b>17.0</b>	<b>55</b>	<b>11.9</b>	<b>43</b>	<b>9.3</b>	<b>460</b>

Table 4.3 Floorwise Occupational Structure of Sample Households

Floor Levels	Household Families with cent per cent working members			Household Families with both types working members			Household Families without working members	No response	Total
	In service %	In business %	Total N/%	In service & others %	In business & others %	Total N/%	N/%	N/%	N
1-6	31.6	40.0	16 33.3	25.3	19.7	86 24.1	1 11.1	11 23.9	114
7-11	47.7	30.0	21 43.8	39.1	38.2	139 38.9	3 33.1	17 36.9	180
12-31	21.1	30.0	11 22.9	35.9	42.1	132 36.9	5 55.5	18 39.1	166
Total:	79.2	20.8	48 10.4	78.7	21.3	357 77.6	9 2.0	46 10.0	460

**Table 4.4 Family-wise Percentage Distribution of Respondents' Ancestral Residential Background**

Ancestor's Place of Residence of Spouse	<u>Ancestor's Place of Residence of Husband</u>								Total					
	Village	Town	City	Bombay	Total Response		No Response							
	%	%	%	%	N	%	N	%	N	%				
Village	27.0	33.3	28.6	-	109	23.7	10	19.0	119	25.9				
Town	27.6	-	46.4	47.7	108	23.5	10	19.0	118	25.6				
City	31.8	55.6	-	52.8	136	29.6	20	39.2	156	33.9				
Bombay	13.8	11.1	25.0	-	56	12.2	11	21.6	67	14.6				
Total	319	78.0	45	11.0	28	6.8	19	4.6	409	89.0	51	11.0	460	100

**Table 4.5 Agewise Percentage Distribution of Respondents' Places of Birth**

Age in year	<u>Place of Birth</u>			
	Village %	Town %	City %	Bombay %
1-24	4.1	14.1	28.6	53.2
25-59	22.0	29.9	32.0	16.1
60 & above	37.1	19.6	31.0	12.4

**Note :** Each cell of the table represents percentage/proportion of respondents among 460 sample households. Not responded have not been included.

Table 4.6 Age-wise Percentage Distribution of Respondents by Places of Education

Age in years	Place Education, at various levels, Received			
	Village %	Town %	City %	Bombay %
<u>Primary Education</u>				
6-24	1.5	4.6	19.6	74.9
25-59	17.7	29.7	32.7	20.7
60 & above	4.8	4.3	6.3	3.1
<u>Secondary Education</u>				
11-24	1.6	4.1	18.8	75.5
25-59	8.1	31.7	38.1	22.0
60 & above	9.1	33.3	37.3	19.7
<u>College/Higher Education</u>				
17-24	-	3.2	18.4	78.4
25-59	-	16.6	55.3	28.1
60 & above	-	24.2	48.4	27.3

**Note :** Each cell of the table represents percentage of respondents among 460 sample households.  
Not respondent have not been included.

**Table 4.7 Floorwise Percentage Distribution of Respondents' Choice for Socialization**

Floor level	<u>Want to maintain contact</u>			<u>Want to avoid contact</u>					
	To know others	To help & get help	Total	Not to loose privacy		No. Response		Total	
	%	%	N	%	N	%	N	%	
1-6	31.8	22.1	108	25.0	4	10.6	2	50	114
7-11	44.2	37.3	170	39.4	8	32.2	2	50	180
12-31	24.1	40.6	154	35.6	12	50.0	-	-	166
Total	28.1	65.8	432	93.9	24	5.2	4	0.9	460

Chi-sq. test  $\chi^2 = 12.9160$  df 4,  $p > .02$  High significant correlation  
 Contingency coefficient  $c = 0.2025$

**Table 4.8 Floorwise Percentage Distribution of Respondents' Reaction to Social Interaction**

Floor level	<u>Wish to socialize but cannot maintain contact for want of</u>			<u>Do not wish to Socialize</u>					
	Leisure	Variety as available in clubs	Total	To Response		Total			
	%	%	N	%	N	%	N	%	
1-6	24.3	45.0	78	27.2	24	21.6	12	19.4	114
7-11	40.9	37.5	116	40.4	35	31.6	29	46.8	180
12-31	34.8	17.5	93	32.4	52	46.8	21	33.9	166
Total	53.7	8.7	287	62.4	111	24.1	62	13.5	460

Chi-sq. test  $\chi^2 = 15.9116$ , df 4  $p > .01$  High significant correlation  
 Contingency coefficient  $c = 0.1960$

Table 4.9 Floorwise Distribution of Respondents' and their Attitude Towards Social Interaction

Floor level	Others keep to themselves		Not Interacting & reasons thereof				Total		No Reservations		No Response		Total sample households
			Lack of Liesure time		Monotonious without any variety								
	N	%	N	%	N	%	N	%	N	%	N	%	
1-6	19	21.3	60	24.3	18	45.0	97	25.1	5	22.7	12	19.4	114
2-11	27	30.3	101	40.9	15	37.5	153	39.6	8	36.4	29	46.8	180
12-31	43	48.3	86	34.6	7	17.5	136	35.2	9	40.9	21	33.3	166
Total	89	19.3	247	53.7	40	8.7	386	81.7	22	4.8	62	13.5	460

Table 4.10 Floorwise Distribution of Respondents' on the Bases of Apartment Accommodation and Reaction to Socialization

Floor level	Number of Rooms												Total sample households
	Interested in Socialization						Not interested in Socialization						
	Two or less		Three of more		Total		Two or less		Three or more		Total		
	N	%	N	%	N	%	N	%	N	%	N	%	
1-6	32	23.4	16	20.8	48	22.4	43	27.4	23	25.8	66	26.8	114
7-11	65	47.4	21	27.3	86	40.2	71	45.2	23	25.8	94	38.2	180
12-31	40	29.2	40	51.9	80	37.4	43	27.4	43	48.3	86	34.9	166
Total	137	64.0	77	36.0	214	46.5	157	63.8	89	36.2	246	53.5	460

**Table 4.11 Storeywise Distribution of Respondents Reaction to Socialization In and Outside Elevator**

Number of storeys	Always		Occasionally		Never		No Response		Total Sample Household
	N	%	N	%	N	%	N	%	N
7-15	57	32.8	94	37.9	16	51.6	3	42.8	170
16-20	71	40.8	83	33.5	5	16.1	1	14.3	160
21-32	46	26.4	71	28.6	10	32.3	3	42.8	130
Total	174	37.8	248	53.9	31	6.7	7	1.5	460

Chi-square test  $\chi^2 = 15.0761$ , df 4,  $p > .01$  Highly significant

Contingency coefficient  $c = 0.1794$

**Table 4.12 Floorwise Distribution of Respondents' Reactions Relating to the Impressions of Their Elderly Persons to High-Rise Living**

Floor level	Not feeling* happy		Feeling happy		Not applicable (Lower Floor Respondents)		No Response		Total sample Household
	N	%	N	%	N	%	N	%	N
1-6	39	20.8	12	14.8	48	38.7	15	22.1	114
7-11	81	43.3	34	41.9	36	29.1	29	42.6	180
12-31	67	35.8	35	43.2	40	32.3	24	35.3	166
Total	187	40.7	81	17.6	124	27.0	68	14.8	460

Chi-square test  $\chi^2 = 52.1277$ , df 4,  $p > .001$  Highly significant

Contingency coefficient  $c = 0.3903$

\*Elderly persons do not feel happy for remaining aloof, carry scare of staircase in the events of lift failure and feeling inconvenience due to restricted movement etc.

**Table 4.13 Floorwise Distribution of Respondents' Reaction Relating to Impressions of Their Elderly Persons to Other's Company on a Stroll/Walk**

Floor level	Yes find company		Do not find company		No Response		Total sample Households	
	N	%	N	%	N	%	N	
1-6	47	31.1	32	20.0	35	23.5	114	
7-11	56	37.1	63	39.4	61	40.9	180	
12-31	48	31.8	65	40.6	53	35.6	166	
Total	151	32.8	160	34.8	149	32.4	460	

Chi-square test  $\chi^2 = 13.3212$ , df 4,  $p > .01$  Highly significant  
 Contingency coefficient  $c = 0.2026$

**Table 4.14 Storey-wise Distribution of Respondents' having Marked Changes in Behaviour of their Family Members/ Relatives After Shifting into High-Rise Buildings**

Number of storeys	Yes (both relatives and family members)		Yes (Family members only)		No change observed		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N
7-15	48	43.2	22	42.3	93	32.6	7	58.3	170
16-20	28	25.2	12	23.1	116	40.7	4	33.3	160
21-32	35	31.5	18	34.6	76	26.6	1	8.3	130
Total	111	24.1	52	11.3	285	61.9	12	2.6	460

Chi-square test  $\chi^2 = 12.2139$ , df 4,  $p > .02$  Significant correlation.  
 Contingency coefficient  $c = 0.1629$



## CHAPTER - 5

### PSYCHOLOGICAL ENVIRONMENT

#### 5.1 INTRODUCTION

An attempt to understand and analyse the psychology of high-rise habitants has been undertaken in this chapter. The understanding is based mostly on the analysis and presentation of data gathered during field investigation and relating to feelings like irritation, tension, anxiety, fears, likes and dislikes and such other psychological feelings. Ignoring these feelings while planning and designing high-rise buildings may lead to frustrating situations among the residents which in turn may hamper the growth of such living in our fast growing metropolitan cities already faced with an acute scarcity of land resources. Happiness and satisfaction of high-rise residents would depend considerably on our understanding of these psychological feelings and their possible accommodation in our evolving of designs and plans and construction of such structures.

#### 5.2 FEELINGS OF IRRITATION

To measure the levels of satisfaction and dis-satisfaction of high-rise residents, 10 components, contributing to this phenomenon, were considered for investigation. These include among others elevators, water supply, leaking kitchens or bath rooms, scribbling of walls, fire and earthquake, facilities of play and recreation, drying of clothes and the like. With minimum and maximum weightage taken as 1 and 5, the weightage range should be 1-95. However, the analysis of data collected in this behalf yielded 7-83 as the actual range which was suitably distributed in three categories namely low (17-39) medium (40-61) and high (62-83).

### 5.2.1 Elevator

Elevator, the principal mode of vertical circulation of users of high-rise buildings, is one of the main sources of irritation. Elevator has a special and vital role to play and has importance in a high-rise building in general and an apartment building in particular. Elevators being the main source of vertical circulation the residents/users get much used to the elevators that they even use it for going from one floor to the next.

Naturally elevator meant for many floors takes time to respond to the call of waiting residents at various floors. The residents get irritated when the elevator takes time. This, particularly, would be more so with modern automatic (unmanned) lift systems for their well known characteristics.

When the user is in great hurry and/or there may be some emergency, waiting for elevator causes lot of irritation and frustration. Recourse to long and tiring staircase under such circumstances, or when the lift is out of order for some reason, can also lead to frustrating situations. This is particularly true with residents in medium had high level floors. Results from frequency distribution reveals that 230 or half the respondents are frustrated on account of elevator problems. The other half seems to have got adjusted and have overcome such irritants over the period.

Problems, arising on account of waiting for lift, surface at peak hours i.e. when the residents/children have to rush for their work/schools. Irritation on this account is likely to increase with the increase of floor levels and building heights. It is obvious as discussed earlier that the elevator takes sometime to move up and down (the taller the building more the time taken) while residents wait at various floor levels for it. They are apt to get irritated while waiting for the elevator.

Data in this behalf are shown in Table 5.1. Floor levels and building heights (number of storeys) are cross tabulated with the dependent variables of feeling of irritation in this table. It shows majority respondents (84.6%) feeling irritated while waiting for the lift. Of these 27.4% were highly and 57.2% moderately irritated. Among irritated respondents, 37.1% belonged to higher, 40.6% to medium and 22.2% to lower floors. Storeywise the percentages of irritated residents were 37.0 for low high-rise, 35.2 for medium and 27.8 for tall high-rise buildings. It is also evident from the analysis that highly irritated residents lived above 6th floor (38.1% each in 7-11 and 12-31 floor levels in comparison to 23.8% in 1-6 floor level). However, Chi-square test does not reveal any significant correlation between floor levels and irritation due to lift waiting. Perhaps, it is so because residents of high-rise buildings in general have got used and accustomed to long lift waiting in preference to exhaustive and tiresome use of stairs.

Analysis of data in the table below also indicates that of the respondents (84.6%) feeling irritated while waiting for elevator 68.1% were scared of fire and earthquake as well. perhaps the popular movie 'Towering Inferno' created this fear. Haber, (1977) found in his survey that "more than half (55%) of the sample feared fire in tall buildings, women feared fire more often than men and the reason, it was felt since all women work intimately with fire than men. Possibly this is one of the reasons that women were significantly more afraid of fire after seeing 'Towering Inferno' than men were". Only 27.8% of our sample residents who felt irritated did not get scared of fire and earthquake.

The above discussion makes it clear that both the long waiting for lift arrival and fire as well as earthquake are major factors of psychological disturbances in high-rise buildings.

### Reaction of respondents to Long Waiting for Elevator and Fire and Earthquake

Opinion on Long elevator Waiting	Scared of Fire and Earthquake						Total	
	Yes		No		No Response			
	N	%	N	%	N	%	N	%
Irritated	265	68.1	108	27.8	16	4.1	389	84.6
Not Irritated	30	41.6	31	49.2	2	3.2	63	13.7
No Response	2	25.0	4	50.0	2	25.0	8	1.7
	297	64.5	143	31.1	20	4.3	460	100

#### 5.2.2 Water Supply

Water is an essential human requirement. Bombay as a whole is faced with an acute shortage of water supply. Water supply therefore is regulated and controlled. In view of paucity of water, adequate storage system for it is required for high-rise buildings.

More than half (59.5%) the respondents (Table 5.2) were extremely irritated by irregular water supply. Another 23.0% also felt the same way but not that strongly. Only 14.5% did not feel irritated. Residents of 16 to 20 storey buildings were highly irritated on account of water supply. The corresponding percentages for low, medium and tall high-rise residents were 34.3, 40.9 and 24.8 respectively. The data in the table indicate a relation between the two variables of buildings' height and that of water supply. The proportion of respondents, for whom water supply was irregular and irritating, increases with the increase in building height upto buildings of 20 storey. Thereafter the two are inversely related. The Chi-square value of 15.49 at 4 df is highly significant beyond .01 probability. The position regarding water supply in high-rise buildings is not really satisfactory. There

is urgency to provide an additional underground water storage tank increasing overall storage capacity to ensure satisfactory regular water supply to high-rise residents.

### 5.2.3 Garbage Disposal

The strong tendency and habit among people to throw waste material through windows, into the open or lanes,\* is also a great irritant. This habit cannot be accepted by others particularly in high-rise buildings. Arrangements to collect garbage in boxes or baskets and dispose it off in the public garbage collectors have got to be made. Chute garbage disposal system is one where a chute with openings at each kitchen or floor level is provided and is used by all residents. The chute opening provided is usually small and only small sized items can pass through it. Bigger size items become a real problem for disposal. At times garbage gets stuck inbetween and causes great inconvenience to the residents. Great care has to be taken in placing the chute at a very convenient position. Leaking or poorly sealed lids at various levels could become health hazards, odour, flies and other pests can be a great nuisance. As per Backer (1974), "greater the number of families sharing such a facility, the less anyone will feel responsible for its upkeep and cleanliness".

Over eight-tenths of residents (81.3%) were dis-satisfied and irritated with garbage disposal systems (Table 5.3). Only 16.7% respondents did not express dis-satisfaction and did not get irritated on this account.

In some high-rise buildings the ground floor is covered with a flat slab roof for parking. This slab top receives most of the garbage thrown out of windows. The Garbage gets collected and becomes irritating particularly for residents of lower floors, for whom it becomes unsightly and nuisance to look out of window. Some high-rise buildings have provided chutes for

\*Fig. 5.5

disposal of household garbage. But in most of such cases kitchen refuse coming down through chute gets accumulated and decomposed at the bottom. Its odour irritates lower floor residents. All insects proliferate at these floor levels. The flats in the lower floors suffer on account of garbage disposal system. Over eight-tenth of residents covered under the study were irritated by garbage disposal system. Of such respondents 65.5% were living in lower (24.6%) and medium (40.9%) floors and 34.5% in upper floors. Thus floor or building heights and irritation due to garbage disposal are directly related upto 11th floor. Thereafter they are inversely related. This relation is confirmed as significant. Its Chi-square value being 9.74 with 4 degree of freedom and probability beyond .05.

#### 5.2.4 Leaking Kitchens/Toilets

Leaking toilet or kitchen is another important factor causing dissatisfaction and irritation. The respondents narrated numerous instances of leaking kitchen and toilets as also of difficulties arising on this account. The major problems arose when residents whose rooms were leaking into fellow resident's rooms did not co-operate with agencies undertaking repairs. They show cold shoulders and reluctance to permit repair of leakage for three main reasons - (i) to avoid spoiling their toilets and or kitchens (ii) to avoid the inconvenience of removing costlier fitting and fixtures and flooring materials and (iii) to avoid the trouble and inconvenience in making alternative arrangements till such rooms get repaired and ready for re-use. There is no doubt that defective design, construction and materials lead to serious problems after buildings are occupied. Enough care needs to be taken in this regard. Of over three-fifths (62.0%) of the respondents felt toilet rooms to be sources of great irritation. However, 33% respondents considered such possibilities to be rare.

### 5.2.5 Scribbling of Walls

The habit of children to scratch walls, floors and even the ground is also major irritant for high-rise residents. The naughty ones may break the fencing, climb compound walls, and even remove bricks. Elevator cabin walls, staircases and entrance halls are their special liking. Odd comments and other caricature not only become unsightly, ugly but also spoil the smooth and coloured wall surfaces. It becomes a point of notice for all the residents and visitors. Defaming by children becomes conspicuous in high-rise buildings where both children and apartments are concentrated. Children of the immediate neighbourhood may even be involved in such naughty activities.

A large majority (78%) of respondents expressed their resentment over the scribblings by the children. Of these respondents, 51.1% were highly irritated and 26.9% had mild irritations. Irritated residents were more or less equally distributed among different floor levels and building heights.

### 5.2.6 Isolation

Isolation and high-rise living are synonymous. This is particularly so for residents of higher floors of high-rise buildings. Those living in lower floors can watch people and vehicles moving even through a window. But those living at higher levels of high-rise building can not even dare to look out from windows for fear of height phobia and vertigo. Secondly, the height creates a dread, of fall from window/balcony, in them. Thirdly, they can hardly see down anything from such heights. They live in aloofness and isolation which could lead to state of frustration. Non-working housewives in high-rise buildings are the major victims of isolation, especially those living in higher floor levels. Feelings of aloofness is influenced by building types. In balcony or passage type

of high-rise building (Slab block), residents feel less isolated. Residents can sit and watch others from balconies and in the process may develop intimacy with some neighbours. Over two-fifths of the respondents (42.6%) felt staying in high-rise buildings after working members have left the apartment, causes aloofness, seclusion, isolation and irritation. However, over half the respondents (52.4%) did not feel irritated on this account.

### 5.2.7 Sanitation and Plumbing

Sanitary defects in general cause lot of inconvenience to the residents in any environment. It is more so in the case of high-rise environments. However, sanitary problems or inconveniences are rare and such recurrences are occasional. Housing societies generally make arrangements to take care of such problems and these do not therefore become a source of much irritation. However, when the whole plumbing system needs a thorough check up and repairs, it would become a source of irritation, although temporary, for all the high-rise residents equally.

Nearly two-third (64.3%) of the respondents expressed fear of sanitary defects causing irritation, 31% considered such irritation to be very mild. Of respondents feeling much irritated 25.3% were in lower floors, 38.9% in medium and 35.8% in upper level floors.

### 5.2.8 Drying of Clothes

Absence of facilities for drying of clothes are a major irritant for high-rise residents, especially women. Hanging clothes on verandahs or windows\* is a source of irritation for such residents. Nearly three-tenths (28.9%) of the respondents (Table 5.4) are feeling irritated for lack of suitable space for drying of clothes. Among them 15% respondents were terribly agitated

\*Figs. 5.5, 5.6 & 5.7



because those living in the floor over, hang long clothes like women's 'Sari' on their windows and verandas creating lot of disturbance like obstruction in view, welcome breeze and winter sunshine. Of such respondents 49.6% were living on low, 21.8% in medium and 28.6% in tall high-rise buildings. A similar trend to noticed when reaction of respondents from different floor levels, 30.8% in lower, 41.4% in medium and 27.8% in upper floors, is analysed. However, the correlation between building height (number of storeys) and irritation and inconvenience caused on account of hanging long clothes for drying is quite significant. The Chi-square value is 14.60 at df 4 and chances of occurrence are beyond .001 probability. The feelings of irritation on account of lack of clothes drying spaces seem to be inversely proportional to number of storeys upto medium high-rise buildings whereafter the relation seems to be directly proportional. The higher or taller the building the lesser is the proportion of residents' willing to hang their clothes outside their windows and balconies. The danger of clothes slipping and getting lost explains this phenomenon. Even falling clothes become irritants for many residents.

It is found that the afore discussed components when considered altogether (cumulative effects) contribute, in one way or the other, to feeling of irritation for the residents of high-rise buildings. Generally this feeling is high in upper floors and very tall buildings. Table 5.5 shows the combined impact of factors leading to irritation. In all about 67% respondents were feeling much irritated. The data indicate highly irritated residents to be more in tall high-rise buildings (40%), in comparison to their counterparts in medium (34.2%) or low (25.8%) high-rise buildings. The percentage of highly irritated respondents show a direct and highly significant correlation with Chi-square value of 12.82, df 4 at probability of .02.

Floorwise distribution of respondents feeling highly and moderately irritated worked out to be 20.5% for lower, 38.6% for medium and 40.9% for

upper floors indicating a positive correlation between the two variables.

### 5.3 FEELING OF TENSION

To measure level of frustration arising out of persistent in-conveniences and tension, 8 components contributing to this phenomenon were considered for investigation. With minimum and maximum weightage taken as 1 and 5, the weightage range should be 1-40. However, the analysis of data collected in this behalf yielded 3-28 as the actual range which was suitably classified in three ranges i.e., 3-11, 12-20 and 21-28 representing low, medium and high categories respectively.

The tension and inconveniences are caused by the noise of children playing in the flat above, loud music and dancing at big get together parties, movement of furniture, traffic density, insecurity about children especially when out of flat, lack of proper parking facilities and curtailed privacy.

#### 5.3.1 Get-together Parties

Big and small get-together and recreation parties are generally associated with loud music and fun\* which cause lot of inconvenience to other residents especially during late hours. Dance and music parties create great tension when held in lower floors than in higher level floors. Over half the respondents (53.9%) experienced (Table 5.6) lot of inconvenience and tension due to late night loud music and dance parties. But 41.7% respondents did not feel any tension on this account, perhaps, because of living mostly in higher level floors.

However, building heights and disturbances due to late night music and dance parties are significantly correlated. Of respondents feeling tense on

\*Fig. 5.1

this account, 42.3% were from low high-rise buildings. Percentages of respondents from medium and tall high-rise buildings were 29.1 and 28.6 respectively. This inverse correlation between the two variables was tested with the help of Chi-square test. It yielded a Chi-square value of 13.24 at 4 degree of freedom at .02 probability and was found to have a significant correlation.

### 5.3.2 Children Playing Inside/Outside the Apartment

Young children living in high-rise apartments are usually not allowed to play outside the building for well known reasons. Consequently they play inside their flats or in corridors\*. They even disturb furniture and create problems for neighbours especially those living immediately below and adjacent to the flat.

Three-fourth (75.2%) of respondents were irritated by the noise created by children while playing, running, about shouting or by moving furniture and the like. Their play naturally contributes to the feeling of irritation. The percentage of respondents thus irritated was more or less equal for residents of medium (37.9%) and higher floors (36.7%), compared to 23.4% in lower floors. However, irritation of respondents increases with floor levels upto 11th floor only, whereafter, it remains more or less same upto 31st floor.

Respondents feeling facilities for children's play and recreation not to be satisfactory in high-rise buildings get also irritated by disturbances arising on this account. Of 25.8% respondents who rated children play space to be bad, eight-tenths (79.8%) of them felt irritated due to children's play in the flats. The corresponding percentage among those (58.6%) respondents who felt playing spaces for children in the flat to be sufficient and good, was 74.4%. Details are given in Table 5.7. The analysis indicates that for those respondents who feel sufficient children play space should have been

provided perhaps feel that they would not then get disturbed by this kind of noise.

Cross tabulation of data, regarding children's playing facilities provided in the flat and relating to the reaction of parents with kids upto 5 years age, show that three-fourths (74.3%) of them, as detailed below, are happy but mostly scared. Perhaps it is so because kids, left to themselves to play away from parents' view and supervision, feel fearful and get scared. The remaining one-fourth respondents do not even feel happy and satisfied for the inconvenience caused on this account.

#### Reaction of Respondents to Children's Play inside Apartment

Age of Children in Years	Reaction of Respondents					Total
	Happy but Scared	Happy and not Scared	Happy (Total)	Not Happy	No Response	
Below 5	N 58	23	81	26	2	109
	% 53.2	21.1	74.3	23.9	1.8	

#### Children (6-24 Age) Play Outside

	Attended Parents/Servants	Not attended	No Response	Total
Respondents with Children of 6-24 Years Age	N 74	228	22	324
	% 22.7	70.5	6.8	

Seven-tenths (70.5%) of the youngsters in 6-24 year age group, as detailed above, play outside their homes without any escort/attendants. Only 22.7% were accompanied by servants or family members which may be for those of the children who do not want to go out to play without parents. It may be so even for those parents who are scared and do not send their children alone to play away without their own supervision.

Personal care of children at play outside : A little less than half (45%) respondents did not express any tension or inconvenience, whenever their children play away from home. Nearly half (48.7%) of the respondents, however, were very tense on this account. They feared about their children's safety being away, out of sight and not within visual and aural communication range or distance. Parents feel scared and remain worried of any emergency or injury that may be-fall any of their children. They felt they would not be in a position to attend their children, requiring their help, immediately when they call for it.

Of this (48.7%) group of respondents, 23.9% were highly tense and 24.8% mildly. The degree of tension and inconvenience caused on this account increases (as the percentage of such respondents increase) with the increase of floor levels upto medium floors. The corresponding percentage of such respondents for low, medium and higher floors works out to be 22.8, 38.8 and 38.4 respectively (Table 5.8).

Analysis of data relating to children not remaining under personal vigil while playing away on ground far below and the chances of their getting stranded in the lift was also undertaken. Pressing a wrong bottom or power breakdown could scare the children and expose them to dangers. Nearly nine-tenth (86.3%) of the respondents (Table 5-9) felt that children could possibly get stranded in the lift. Of these respondents 41% were tense on this account and 50.4% did not feel so. The possibility of young children travelling all alone in the lift made many respondents fearful and tense. Children upto 5 years age are not allowed to move out of the apartment in high-rise buildings. The possibility and dangers of such children, using the elevator on their own, compels parents to keep them inside. Only 7.6% respondents did not feel any possibility of their children getting stranded in the lift.

### 5.3.3 Communication with Children Playing on Ground

Table 5.10 shows majority (53%) respondents desired that high-rise buildings must have some arrangement or system to facilitate communication between parents in flats and children playing away down below. In the opinion of 20.2% of these respondents, such facility must receive top priority while 32.8% feeling tense for their children have also similar opinion to offer. The desire of high-rise residents for the system was, by and large, directly and significantly related to floor levels with Chi-square value of 14.24 at df 4, beyond .01 probability.

### 5.3.4 Loneliness and Insecurity

The feelings of loneliness and insecurity have also been considered in this study as detailed below. Over two-fifths of respondents (43.7%) expressed their feelings of loneliness. Of these, 61.2% respondents did feel insecure as well and 33.3% did express feeling of loneliness but not insecurity in the flat. Of respondents (47.2%) who did not feel lonely nearly nine-tenths (87.1%) did not even feel insecure.

#### Lonely and Insecure

##### Feel Insecure in the Apartment

Respondents Reaction	Strong		Mild		Total		No Effect		No Response		Grand Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Feel Lonely	46	22.9	77	38.3	123	61.2	67	33.3	11	5.5	201	43.7
Do not Feel Lonely	10	4.6	17	7.8	27	12.4	189	87.1	1	0.5	217	47.2
No Response	3	7.1	2	4.8	5	11.9	7	16.7	30	71.4	42	9.1
Total	59	12.8	97	20.9	155	33.7	263	57.2	42	9.1	460	100

### 5.3.5 Panic

Panic is a state of mind arising on account of certain extreme situations like fire, earthquake, hurricane, intruders, crime, elevator disasters, suicides, natural catastrophes and the like. This is particularly the case with high-rise residents. This psychological disturbance though momentary, may result in disasters. In the case of a fire or an earthquake the decision as to the direction one should take for safety adds to panic. In the case of high-rise residents such situations may result in stampedes, confusion and accidents.

In situations where a stranger intrudes in an apartment, a housewife or a servant can get panicky particularly when all alone in the flat. A similar situation could arise when elevator stops inbetween the floors. Remaining alone all day within four walls of the apartment much above the ground, need for emergency medical attendance, getting locked in a high-rise flat and young children trying to reach window opening levels and many more such acts could all lead to panicky situations. Fortunately not many respondents covered under this study had experienced any of the above situations. Table 5.11 shows 74.4% respondents having never experienced any panic in their high-rise flats. Of respondents having experienced panicky situations, half related these to earthquakes and structural failures. The other half felt panicky for the fear of fires, intruders etc. The above phenomenon affects residents of all the categories of high-rise buildings almost equally. However, Chi-square test shows highly significant correlation between building heights and the extent of panic among respondents at 4 df and beyond .01 probability.

### 5.3.6 Privacy

Lack of privacy in high-rise apartments contributes to tension and dis-satisfaction. Privacy and building types are quite connected to each other.

Families with children and elderly persons prefer balcony access type high-rise apartment buildings, as these facilitate supervision of young children playing largely in access balcony. These also reduce isolation by bringing the residents face to face with their immediate neighbours. Point block with lobby access or even corridor access type high-rise apartment buildings are preferred by families without young children and elderly people and those who do not want to socialize. Even working couples too prefer such apartments. Such buildings provide privacy to the extent that neighbours do not even recognise each other.

### 5.3.7 Custody of Vehicles

High-rise habitants are worried for want of proper facilities for the safe custody of their vehicles. Table 5.12 shows 15.2% residents considering parking as a very serious problem. In all 36.7% residents expressed tension on this account. One-tenth of the respondents did not respond to this question. These include residents not owning any vehicles. Tension arising on account of parking increases with increase in floor levels. Among residents who were tense on this account, 18.3% were from lower floors and 40.8% each from medium and higher floors.

When all the components contributing to insecurity and tension of the high-rise residents are considered together, building heights and floor levels turn out to be important. Higher floors and building heights are in most cases associated with greater degree of tension and fear.

Table 5.13 shows the combined (cumulative) impact of these (discussed) components leading to feelings of fear and tension. On the whole 63.7% respondents were feeling tension. Among them 30.9% showed higher tension and 32.8% were tense but to a lesser extent. Among respondents feeling tension



24.2% were from lower, 38.2% from medium and 37.5% from upper floors. In the case of various building heights, of residents expressing feelings of fear and tension, 41.6% were from low, 30% from medium and 28.3% from tall high-rise buildings. The results indicate that comparatively more respondents in upper level floors are fearful and under tension than their counterparts in lower floors. A significant relation between the number of storeys of high-rise buildings and fear and tension is observed. The data was tested. Chi-square value was found to be 10.10 at 4 degree of freedom and beyond .05 probability.

### 5.3.8 Living and Other Essential Facilities

Almost every resident feels deficiency or lack of one or the other facility in their flats. These arose on account of a spectrum of 15 components, which include accommodation in the flat, green and gardening spaces, spaces for pets and other children's play and sports equipment. Reactions of the respondents in this regard are summarised in a set of tables. These have been classified mainly as strong and persistent, and mild and occasional. To study the effects of all the components together and to arrive at their relative contributions, weightages were assigned ranging from one to a maximum of 5 and suitably classified as low, medium and high as done in cases of feeling of Irritation and Tension.

Consider first of all the accommodation in the flats. Table 5.14 shows that only 29.1 respondents felt the available accommodation to be insufficient. This feeling increases with the increase of floor levels. Of these respondents 45.5% were from low, 20.1% from medium and 34.3% from tall high-rise buildings. The correlation between the two variables was found highly significant with Chi-square value of 16.98 at df 4 and .01 level of probability. Similar exercise in the case of floor levels does not yield any notable pattern.

Families with children and elderly persons prefer balcony access type high-rise apartment buildings, as these facilitate supervision of young children playing largely in access balcony. These also reduce isolation by bringing the residents face to face with their immediate neighbours. Point block with lobby access or even corridor access type high-rise apartment buildings are preferred by families without young children and elderly people and those who do not want to socialize. Even working couples too prefer such apartments. Such buildings provide privacy to the extent that neighbours do not even recognise each other.

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When all the components contributing to insecurity and tension of the high-rise residents are considered together, building heights and floor levels turn out to be important. Higher floors and building heights are in most cases associated with greater degree of tension and fear.

Table 5.13 shows the combined (cumulative) impact of these (discussed) components leading to feelings of fear and tension. On the whole 63.7% respondents were feeling tension. Among them 30.9% showed higher tension and 32.8% were tense but to a lesser extent. Among respondents feeling tension

### 5.3.8.1 Spaces for greenery and gardening

Green lawns with flowers and plants tempt every civilized house-holder, he be an owner of his house or a tenant. Gardening keeps house-holders occupied in spare time and happy. Indoor plants and use of balconies\* for the purpose reflect this curiosity among high-rise residents. A small kitchen garden can keep young and elderly occupied and busy. Most children and elderly or retired persons keep themselves engaged in activities like gardening, painting, repairing broken items. Such engagements not only bring pleasure but also keep the person fit.

Limitation of space do not permit the inhabitants to undertake the above activities in high-rise buildings. Table 5.15 shows over eight-tenth (80.9%) of the respondents dis-satisfied with facilities for undertaking gardening of some kind or minor repairs in their spare time. There is no provision of spaces for such vital activities. The level of dis-satisfaction on these accounts was very high for 47.4%, medium for 33.5% and low for 17.2% respondents. Floor levels and percentage of dis-satisfied respondents are positively correlated and highly significant. These percentages for lower, medium and upper floor levels work out to be 21.2, 39.5 and 39.2 respectively. Chi-square value works out to be 14.79, df 4 and beyond .01 probability. Similar relationship emerges in regard to building heights.

### 5.3.8.2 Spaces for pets, bicycles and children's other playing items

Some families like to keep pets. Generally a space is provided exclusively for the purpose. This is the case when dealing with single family houses. In the case of high-rise buildings, keeping of cows, buffaloes and poultry is not feasible. Pets like cats and dogs can be kept inside the flat. However, some neighbours object their presence as they are disturbing, cause noise and other irritations. Besides most of the flats have no provision for rearing pets.

This too upsets pet lovers. For them life without a pet is incomplete. Even the space to store children's play equipment, prams, bicycles, tricycles and such other things is not generally provided in multi-storey buildings. This does not happen in single or double storey single family houses as the same can be safely kept within the compound itself. The problems arising on account of the movement of such things, in the high-rise flats, also irritate their residents. Occasionally they feel frustrated while lifting such equipment through staircases or the crowded lifts. Under the circumstances some residents prefer to live without these items. However, 59.8% of the respondents did not complain much about lack of space for pets and prams perhaps because they don't keep these for fear of inconvenience to others and have adjusted without. Only 27.9% respondents did feel much about this deficiency in their flats. Among them nearly one-tenth (12.0%) residents were highly dis-satisfied on this account. The level of dis-satisfaction was found to be increasing with the increase of floor levels upto 11th floor, whereafter percentage of respondents declines slightly. About 21.9% residents in low, 39.8% in medium and 38.3% in higher floors were found to be dis-satisfied. The corresponding percentage in Table 5.16 for low, medium and tall high-rise buildings work out to be 35.9, 25.8 and 38.3 respectively. These results show that residents on higher levels in high-rise buildings are more dis-satisfied than their counterparts living in lower levels.

#### 5.4 FEARS&INCONVENIENCES

To measure the level of state of frustration arising out of persistent effects of various elements, 5 components, accruing to this phenomenon were considered for investigation. These are wind, earthquake, fire, height phobia & vertigo and ascending stairs with furniture. With maximum weightage for each variable taken as 5 the weightage range should be 1-25. However, actually

the range turned out to be between 2 and 23, which is suitably distributed in low, medium and high categories. The selection of components here was made keeping in view floor levels and building heights. In otherwards we consider elements of dis-satisfaction varying from floor to floor and buildings height to height.

#### 5.4.1 Wind Effects

Wind at higher levels of higher velocity cause more annoyance and dis-satisfaction than at lower floor levels. "Wind is mentioned more than twice as often as an annoyance in high-rise as in low rise". (Dornbusch, 1977). Its disturbing noise (rattling of doors and windows) and danger of glass panes being broken cause lot of inconvenience and tension.

Over three-fourths of respondents (76.0%) had strong and mild feelings against the ill effects of wind disturbances (Table 5.17). Only 18.7% residents had not experienced any such effects. As expected most of the adversely affected residents lived in higher floors. The floorwise distribution of such respondents was 21.4% in lower 40.6% in medium and 38.0% in higher level floors. This inconvenience caused by wind is strongly and positively related to floor levels upto 11th floor. The correlation as indicated by Chi-square test was found highly significant with 13.57 value at df 4 and beyond .01 probability. Similar relation, though not statistically significant emerges in case of building heights.

#### 5.4.2 Fire and Earthquake Effects

An escape route in case of fire or an earthquake is imperative. It is more so psychologically for elderly persons in high-rise who cannot fight out their way through other confused and panicky habitants. This route in the case of high-rise buildings is long, dangerous and difficult. Nahemow (1977)

suggested that "building should not be made more than eight storeys as fire department can fight fire upto that building height". A film 'Towering Inferno' made on problems of inhabitants of tall buildings has influenced many and made them conscious of various difficulties. "They become more afraid of fire, women in particular" (Haber, 1977). Fear of fire and earthquake is greater in upper floors and taller buildings. Most residents, however, do not consider the devastating powers of fire and earthquake. Being a rare occurrence and resident not having an experience of a tremor or fire, although know these to be devastating yet, do not seem to be bothered about its possible dangers. However, very recent fire (June 29, 1987) in Delhi in which a commercial building namely 'Ansal Bhawan' had made people more conscious of the dangers of fire. The fire in 5th floor took a toll of three lives. In this fire one person jumped out from window and lost his life. Others were involved in confusion and stampede and in that two lost their lives. Helicopters were also pressed into service which rescued a lot of people in the buildings including all ladies working in this tall building.

Table 5.18 shows 43.9% respondents of our sampled households were fearful. Among them 15.3% were from lower, 43.1% from medium and 41.6% from higher floors levels. However, proportion of respondents here shows a sharp increase from lower to medium floor levels. The correlation between the two variables is found highly significant at  $df = 4$  beyond .01 level of probability. Residents in tall high-rise buildings were almost equally fearful on above account than their counterparts living in medium or low high-rise buildings.

#### 5.4.3 Ascending Stairs with Furniture

Staircase in high-rise buildings is a necessary evil. It remains generally unused except for short journeys, one or two floors up or down.

It remains in thorough use in case of any electric or mechanical lift failures. Furniture, luggage and bulky equipment through the staircase\* is carried into high-rise flats. Although not a daily affair yet, users/residents are usually conscious of inconvenience and irritation caused on account of such lift failures. This is evident as majority of our respondents (82.3%) were fearful of lift failures and the inconveniences encountered while shifting furniture and other heavy equipment into the apartments. Floorwise (Table 5.19) 21.2% of such residents were from lower floors, 39.8% from medium and 39.0% from higher floors.

Floor levels and degree of fear associated with ascending staircases in case of lift failure and carrying of heavy furniture are positively correlated. The correlation is highly significant with Chi-square value of 15.14 at df 4 beyond .01 level of probability.

#### 5.4.4 Vertigo Effects

It is a psychological phenomenon of feeling of dizziness, whirling, giddiness and the like when looking down from a height above the ground. In some height elicits anxiety and fear. Such people suffer with height phobia. Vertigo or height phobia could affect any human being. However, its degree and duration vary from person to person. It affects young children, elderly persons and women in particular.

Data collected in this behalf reveal that 63.7% residents were not affected much by the phenomenon of vertigo or the like. Only 20.8% felt its effect (some mildly and some strongly). About 15% of the sample population did not respond to this query. The proportion of such respondents increased with floor levels and building heights upto medium floor levels. Whereafter this trend rather reverses. This explains that the vertigo effect was felt largely

upto medium floors or medium high-rise buildings. Any further increase does not show further increased vertigo effect. Percentage of households with young children and elderly parents decreases with increase in floor levels and building heights partly explains this phenomenon. Besides residents in very tall buildings may never attempt to see through windows and other opening as they cannot see anything from such heights.

The total (altogether) effect of factors discussed in this section have also been computed and analysis (Table 5.20). The impact of these factors on one-third (33.5%) of the respondents is low, for 28.7% it is medium and is high for the remaining 37.8%. In short 66.5% of the respondents experienced dis-satisfaction on account of the above discussed psychological factors. Floor-wise, the levels of dis-satisfaction on the above accounts for 20.6% respondents in lower, 38.2% in medium and 41.2% in high floors were of high and medium magnitude. Here we note a direct relation as the percentage of respondents increases with the increase of floor levels. The correlation between the two variables is highly significant with Chi-square value of 39.88 at 4 degree of freedom beyond .01 probability. However, building heights and levels of dis-satisfaction do not yield statistically significant correlation although the proportions of respondents with such feelings stands at 35.9%, 34.3% and 29.7% for low, medium and high-rise buildings respectively.

### 5.5 LIKES AND DISLIKES ABOUT HIGH-RISE BUILDINGS

The city of Bombay has witnessed spectacular growth of high-rise buildings, especially residential. In other metropolitan cities, like Calcutta, Delhi, Madras, Bangalore and Pune such development is still isolated and scattered. These metropolitan cities have not yet witnessed such growth of high-rise residential buildings as is the experience in the city of Bombay.



Which of the features make high-rise living acceptable or otherwise to people in general ?

An attempt, to identify good and bad features of high-rise buildings in Bombay which in turn affect the likings and dislikings of the residents, has also been undertaken. This identification may be helpful in planning such living in future.

Feature and things of high-rise apartment buildings which are liked/disliked by their residents, are listed as under:

Features liked	Features disliked
Scenery and far sight	High up in the sky
Prestige, status and cosmopolitan living	No greenery
Economic on space	Isolation (impersonalness)
Centrally located	Fire, earthquake and lift failures
Limited social contact	Noisy, unadjusting and quarreling neighbours.
Quiet environ, fresh air and cool breeze.	Monotonous and shadow of other tall buildings.
Free and safe from snakes and other pests.	No control on environment, crowding of people and traffic, congestion.
High above ground	More crimes, thefts, and suicides.

Apparently one feels all the high-rise residents are happy and satisfied with their housing conditions. This however, is not the reality. This conclusion is substantiated by the quantification of the above mentioned eight factors. To assess the contribution of each of the factor the method of dicotomic score was adopted under which respondents had to tick 'like' or 'do not like'. To arrive at the combined effect of these factors a scale was made by assigning weightage of 1 to yes and 2 to no. The total scores thus obtained by each

respondent were classified in three low, medium and high categories. There were eight components in all in each group, the total score therefore ranged from 8 to 16 which were suitably distributed equally in the above mentioned categories. The score of 8 to 10 was rated low, 11 to 13 medium and 14 to 16 as high.

After analysis of these features and items a 'rank order' listing, in each case, has been made on the basis of psychological reactions or feelings of the sampled residents. Few items, in high-rise buildings are very much liked and few very much disliked. Percentage of respondents in each case has been worked out among the sampled residents who responded to these queries.\* It is observed that over four-fifths (83%) of respondents like tall apartment buildings for their neat, clean and quiet environment. Even as many as seven-tenths of respondents liked these for a very good view and scenery (a characteristics of high level apartments) from these high floors, that one can enjoy most. Two-fifths of respondents like these buildings for the feelings of prestige very much involved with high-rise living (Bhalla, 1967).

A listing of features and items Liked about tall apartment buildings is presented in Rank Order Table.

### 5.5.1 Quiet Environment

Over eight-tenths (82.8%) of respondents in Table 5.21(a) like high-rise buildings for its quiet, nice and serene environment. This liking did not change significantly in higher floor levels suggesting thereby that most residents irrespective of their flat height liked quite environment of high-rise apartments. Perhaps only residents of first few (lower) floors did not enjoy this privilege.

\* Table 5.22

### 5.5.2 Good View

It is observed in Table 5.21(a) that 71.3% respondents had liking for tall buildings for a good view and scenery that can be enjoyed by residents. They liked them because all facilities were centralised. Respondents in higher floors and taller buildings were more satisfied than their counterparts in lower floor which is indicated by percentage of respondents from lower, medium and higher floors. 23.8% respondents from lower, 39.3% from medium and 36.9% from upper floors expressed their liking for tall buildings. The proportion of respondents increases with the increase of floor levels upto 11th floor. The relation is found to be significant at probability .05.

Table 5.21(a) Causes for Which High-Rise Apartment Buildings are Liked

Rank Order	Things liked	Percentage of respondents in each case	Remarks
1.	-Quiet Environment	83	
2.	-Good View and Scenery	71	
3.	-Living high above ground	60	
4.	-Free from Pests	59	
	-Centrally located	58	
	-Economical in space utilization	56	Quiet Environment and good view liked most in high-rise living
5.	-Limited social contact	47	
6.	-Prestige gained	42	

### 5.5.3 High Above Ground

Living much above ground, virtually in skies and without much concern with life and movement on the ground is what many do not like of high-rise buildings. This is particularly the case with children, housewives and elderly persons as they mostly remain within their high level apartments. In spite of

this, 59.6% respondents in Table 5.21(a) liked tall buildings. The percentage of respondents expressing their liking for tall buildings varies from 19.7% in lower floors to 43.4% in higher floors. The corresponding proportion for medium floors being 36.9%. Couples, without children and elderly, are in main satisfied respondents from higher floors. There is a direct relation between the proportion of satisfied respondents and floor levels. The two variables yield highly significant correlation with high Chi-square value of 18.27 at 2 degree of freedom and beyond .001 probability. A similar picture emerges when building heights and residents' satisfaction are compared. The two are directly related as the percentages of such respondents increase with building heights or number of storeys. This percentage is 34.3 for low high-rise, 32.8 each for medium and tall high-rise buildings. Chi-square test also showed a significant correlation at df 2 and probability of occurrence to be beyond .05.

#### 5.5.4 Free of Pests

Insects, mosquitoes, snakes and other such dangers do not cause any concern to residents particularly in higher floors. Of course the location and environment of high-rise building plays an important role in keeping the surroundings clean. In Table 5.21(a) 58.7% respondents liked tall apartment buildings for this very reason. Floorwise 25.6% respondents were from lower, 35.9% from medium and 38.5% from upper floors. The proportion of respondents increases with increase of floor levels. The relation between the variables has been found significant with Chi-square value of 9.89 df 2 and .05 probability. Even the correlation between building heights and the variable was found highly significant at probability beyond .01.

Features disliked most about these high-rise apartment buildings have also been listed in a 'Rank Order'. In this analysis also percentage of respondents in each case has been worked out among the sampled residents who

responded to these queries. It is observed that about two-thirds (65%) respondents disliked tall apartment buildings for they feared most the dangers of fire and earthquake. Nearly three-fifths of the respondents did not like these for they were aware of no control over high-rise environment. It is so as the individual householder cannot even attend to the problems in his own flat. For example shifting of a wall, changing of position of doors or windows as also repairing of leaking bath or kitchen floor. The inconvenience caused thus has to be accepted as such until the householder living in the flat above does not agree to repair his floor. About half of the respondents disliked these buildings for being impersonal because a high-rise building is not in the ownership of one individual resident, who could attend to all that is required to be done, but belong to all the residents together. These residents also disliked high-rise buildings as they lack greenery around apartments as is in the case with a traditional single family dwellings. About one-fifth of respondents were bothered by the possibility of crimes, thefts and other dangers.

A listing of features and items disliked about tall apartment buildings is presented in Rank Order Table.

### 5.5.5 Prestige

Some residents feel high-rise apartments confer prestige and status.\* Over two-fifths of the respondents (41.5%), liked high-rise buildings for this reason as given in Table 5.21(a). Floorwise the percentage among those who liked tall buildings worked out to be 23.1 for lower floors, 40.3 for medium and 36.6 for upper floors. The two variables are directly and significantly correlated.

\*Fig. 5.9

**Table 5.21(b) Causes for Which High-Rise Apartment Buildings are Disliked**

Rank Order	Things Disliked	Percentage of respondents in each case	Remarks
1.	-Fire and earthquake	65	
2.	-No control on environment	58	
3.	-Impersonalness and isolation	49	
	-Lack of greenery around	48	
4.	-Monotonous atmosphere	38	Fire and Earthquake seems to scare most residents
5.	-Too tall and inconvenient	28	
6.	-Crime and other dangers	22	
	-Quarreling and unadjusting neighbours	21	

#### 5.5.6 Fire and Earthquake

No accident of fire and earthquake was witnessed by the respondents. But the very thought of such an occurrence causes great discomfort and fear. For a large majority (64.6%) of respondents, in Table 5.21(b), dislike for tall buildings arose on account of fear of fire and earthquakes. Women in high-rise buildings have been found to be more scared on this account than men (Haber, 1977).

#### 5.5.7 Impersonal Environment

An apartment in a high-rise building is indeed privately owned but other common facilities or amenities and infrastructure are not. Everything seems to be impersonal because it does not belong to any individual household. As such impersonalness in attitudes and behaviour is evident.

As per Table 5.21(b) about half (48.5%) of the respondents disliked high-rise buildings for reasons of impersonalness, isolation and lack of greenery

around the apartment experienced in such buildings. Perhaps households without children spend less time in their apartments. They, therefore, do not seem to remain very much attached to them. But those with children felt tall buildings to be more impersonal compared to their previous homes.

#### 5.5.8 Monotonous

About 38.3% respondents in Table 5.21(b) disliked high-rise buildings for their monotonous surroundings paved pathways, concrete entrance, absence of greenery, monotonous view from windows, shadows of other tall buildings obstructing the view and preventing sunshine particularly required in winter months. Of respondents feeling high-rise buildings to be monotonous in character, 31.3% lived in lower floors, 38.6% in medium and 30.1% in higher floor levels. It is very much evident that problems of light, sunshine etc. were felt more by residents on lower floor level. This observation is statistically significant beyond .05 probability.

#### 5.5.9 Neighbourliness

Interruption and disturbances by neighbours, including misunderstandings generally picked on issues relating to play of children do not seem to contribute so much to dislike for high-rise flats. In Table 5.21(b), only 21.3% of the residents expressed dislike for tall buildings on this account. The proportion of such residents was 29.6% at lower, 48.0% at medium and 22.4% at upper floors. In general high level apartments were not disliked much for any neighbourly problems in comparison to their counterparts in lower floors.

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In 'SAGAR SANGEET', a 32 storey tall apartment building in Colaba, Bombay, enquiries by the researcher about certain resident from his immediate neighbours did not yield any information. None of them were familiar with any member of the family in question. They could at best try to give the description of the gentleman entering that flat quite frequently. Such descriptions related to his working in 'Air India' as a pilot, because lot of air travel flaps were found on his briefcase. Beyond this they did not know anything. When the person in question, Mr. Sachedev was contacted for an interview he was found to be working in a sub office of some foreign concern, where work involved lot of air travel.

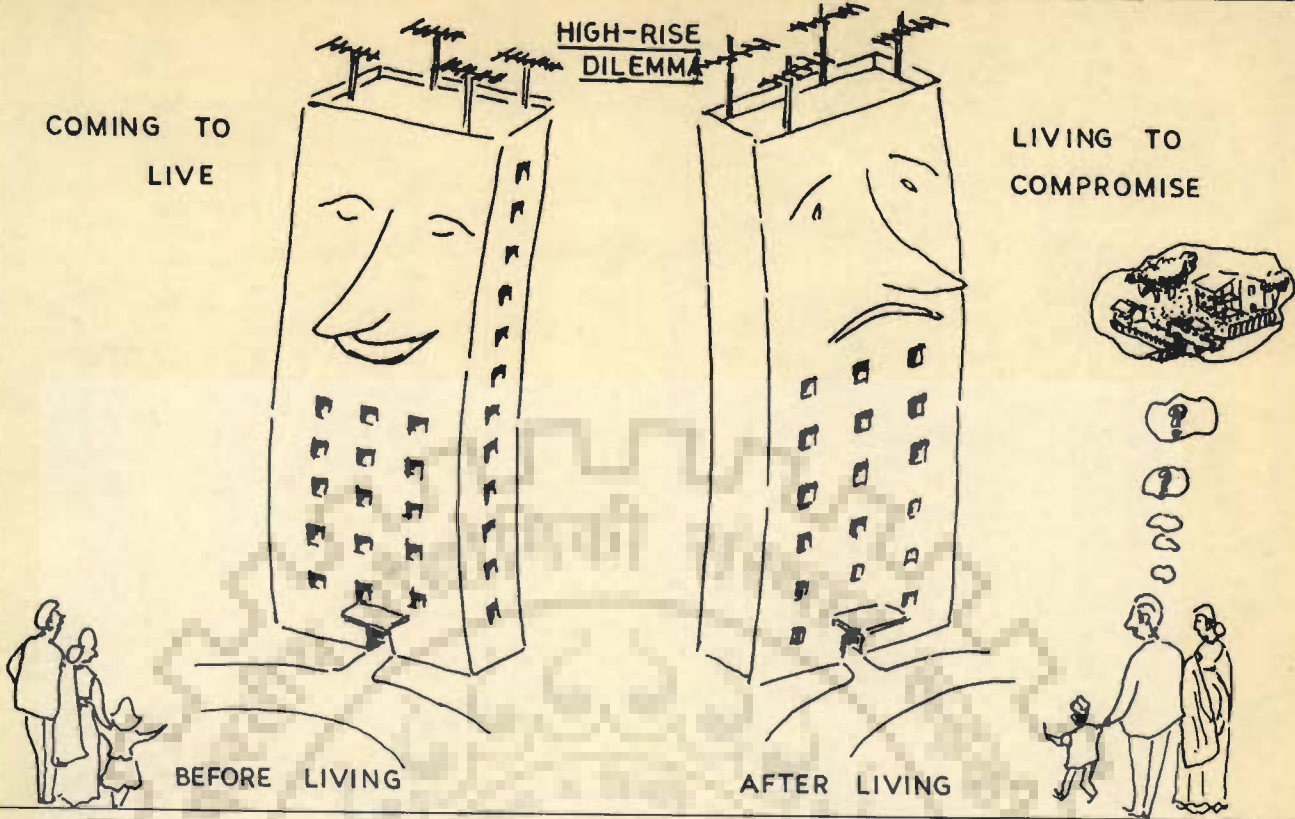
# HIGH-RISE LIVING: DIFFERENT ENCOUNTERS

FIG.5-1

## HIGH-RISE DILEMMA

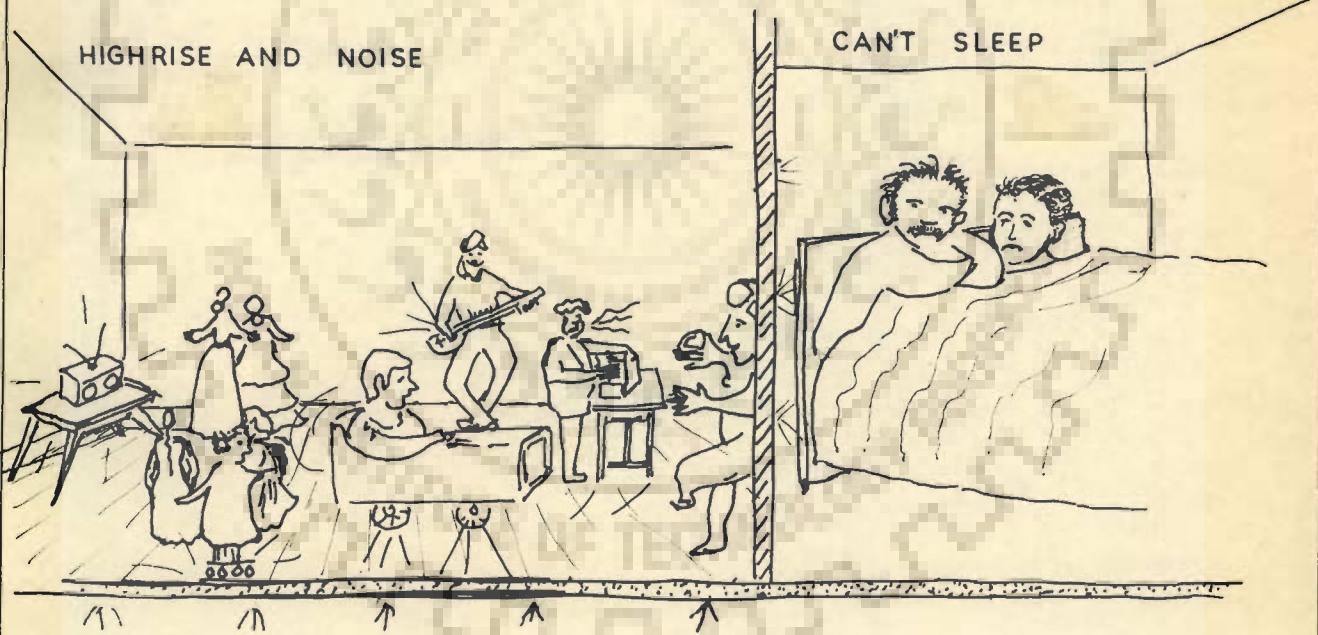
COMING TO LIVE

LIVING TO COMPROMISE



HIGHRISE AND NOISE

CAN'T SLEEP



CAN'T STUDY

NOISE POLLUTION





HIGH-RISE APARTMENT, BOMBAY



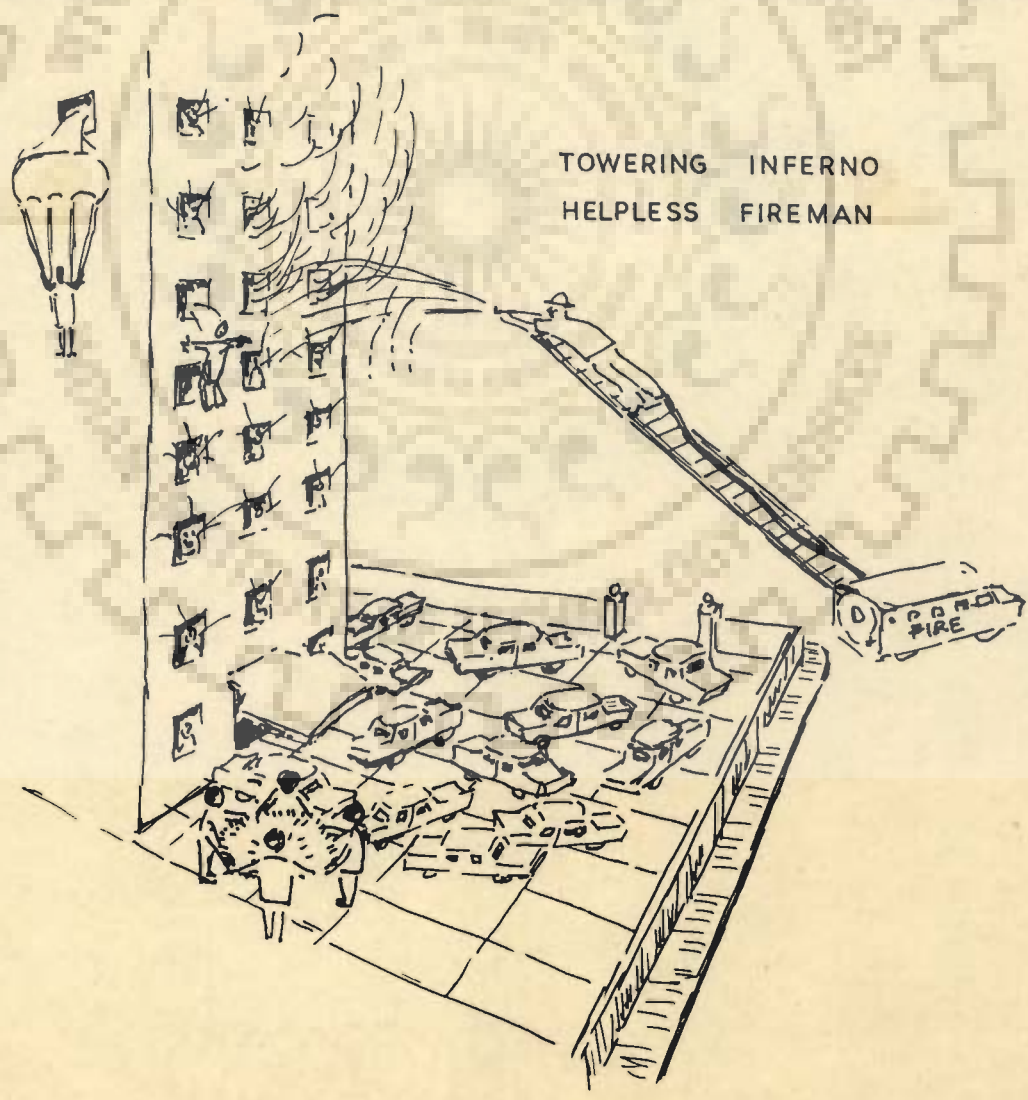
Use of Passage for Children Play, Colaba. (Escorted Child in View).



Use of Parking Lot for Children Play, Cuffe Parade.



CHILDREN PLAYING  
IN LOBBY



TOWERING INFERNO  
HELPLESS FIREMAN

HIGH-RISE APARTMENT, COLABA, BOMBAY



Use of Covered Terrace  
for Growing Plants

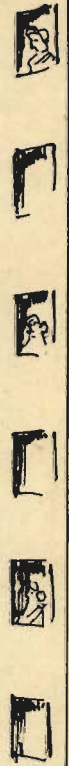
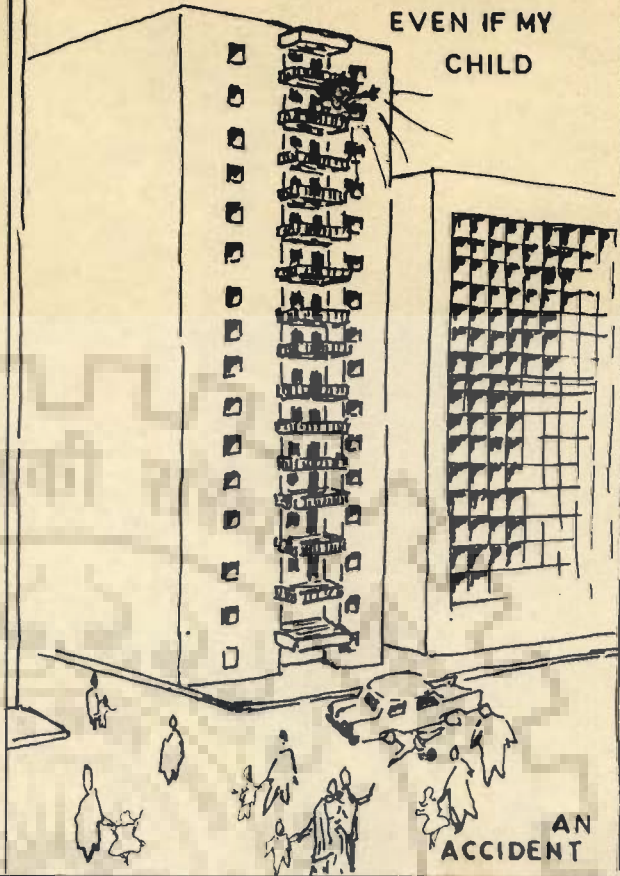


Use of Open Terrace  
as Green Garden.

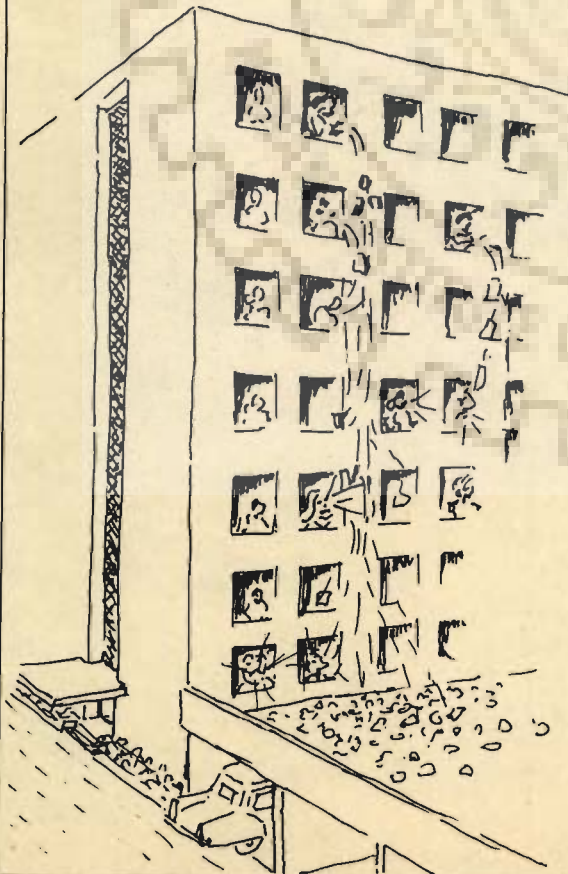
AN INCIDENT



CANT RECOGNISE  
EVEN IF MY  
CHILD



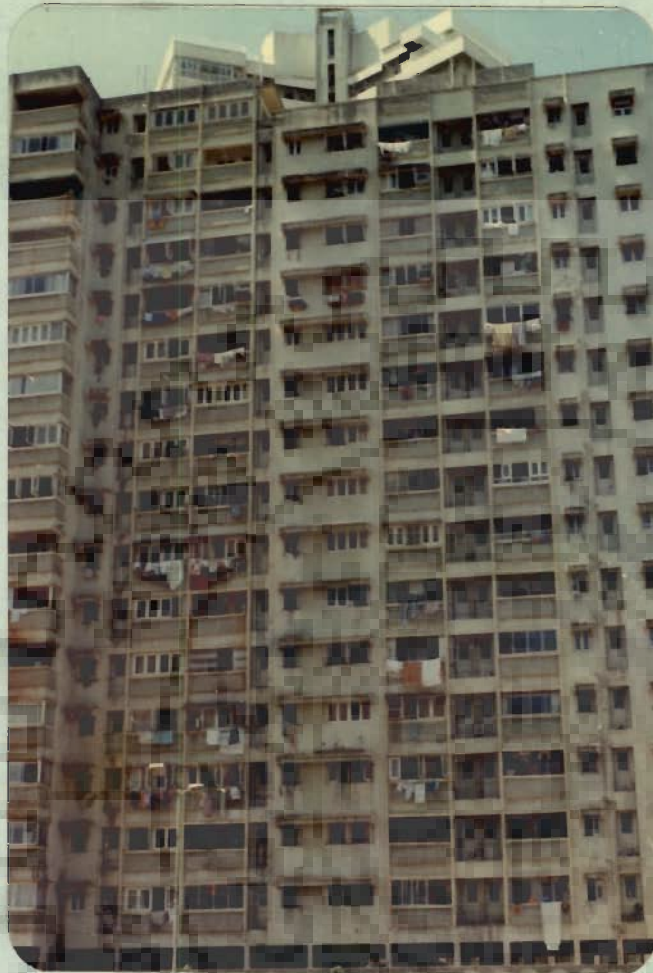
DRIFTING GARBAGE



HANGING CLOTHES



## HIGH-RISE APARTMENT BUILDING, BOMBAY



Facade of a Building  
Cuffe Parade.

(Use of Windows/  
Verandahs as  
Drying Space).

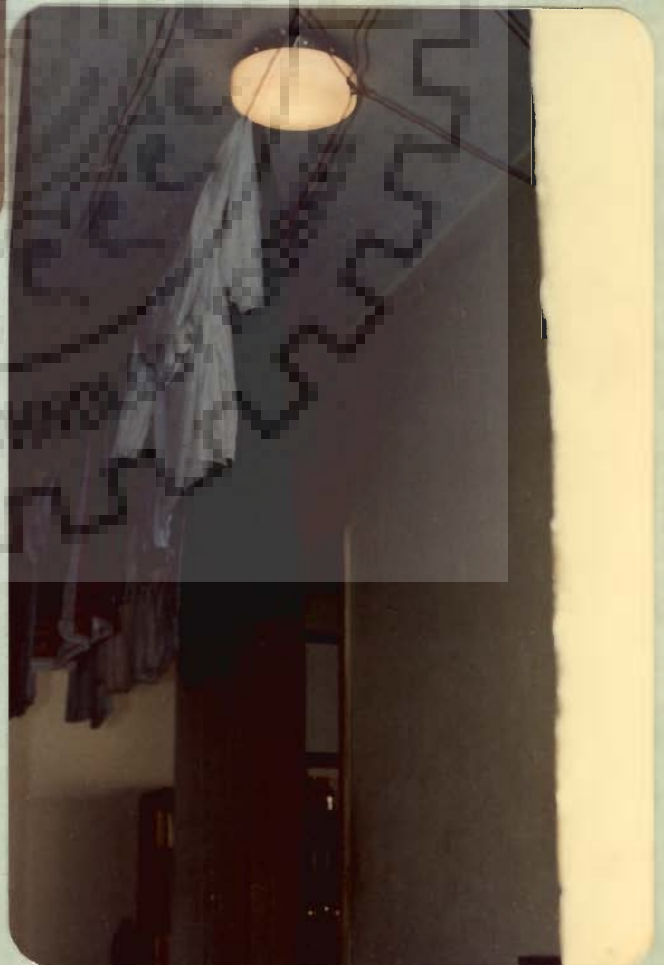


Close-up of Balcony,  
Colaba.  
(Use of Balcony as  
Drying Space).

HIGH-RISE APARTMENT, COFFE PARADE, BOMBAY



Use of Room Ceiling for Drying Clothes



Use of Corridor Ceiling for Drying Clothes

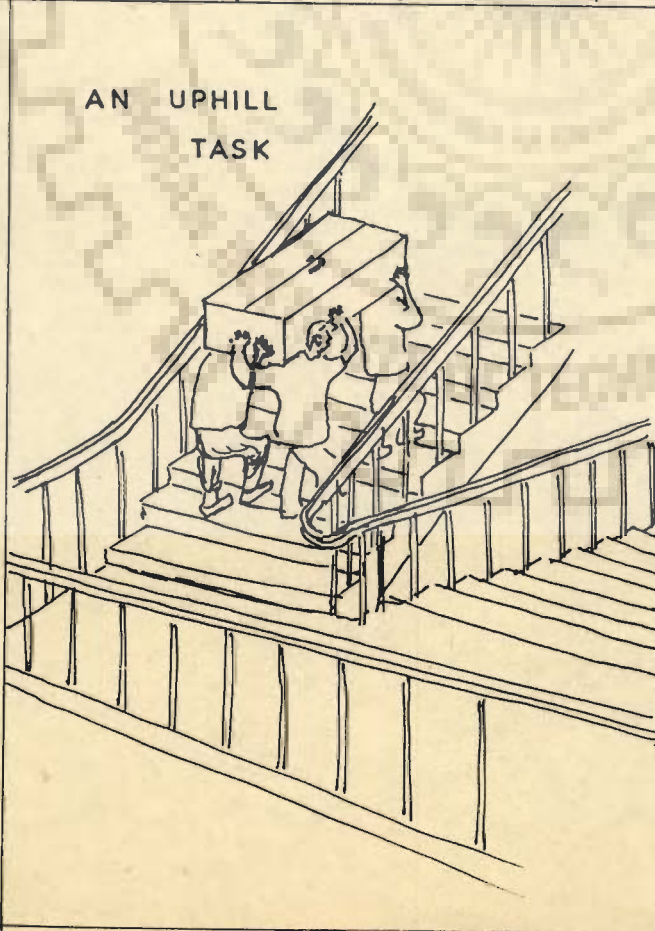
# HIGH-RISE LIVING : DIFFERENT ENCOUNTERS



ALL IN ONE?  
EVEN SCAVENGER



UNKEMPT STAIRS



AN UPHILL  
TASK



LIFT FOR ALL

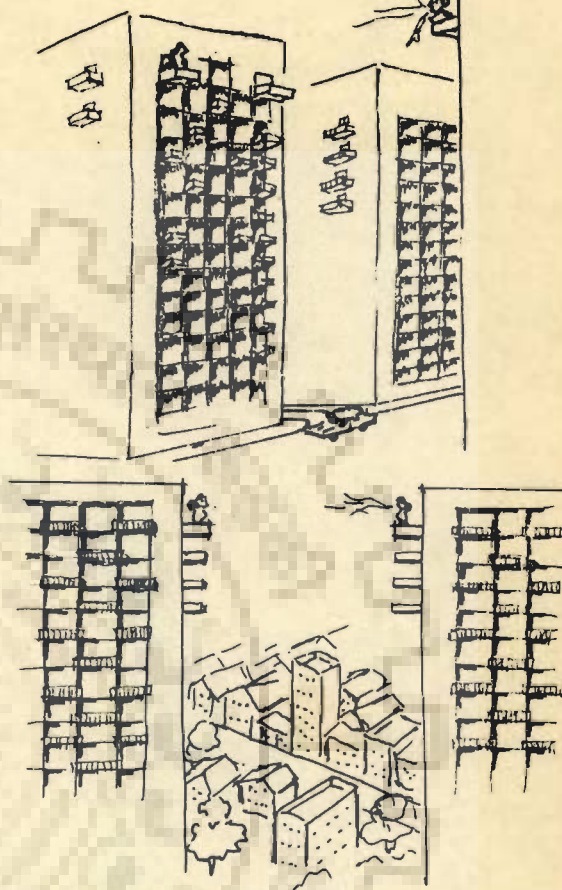
# HIGH-RISE LIVING : DIFFERENT ENCOUNTERS FIG. 5.9

HIGHRISE SHADOW

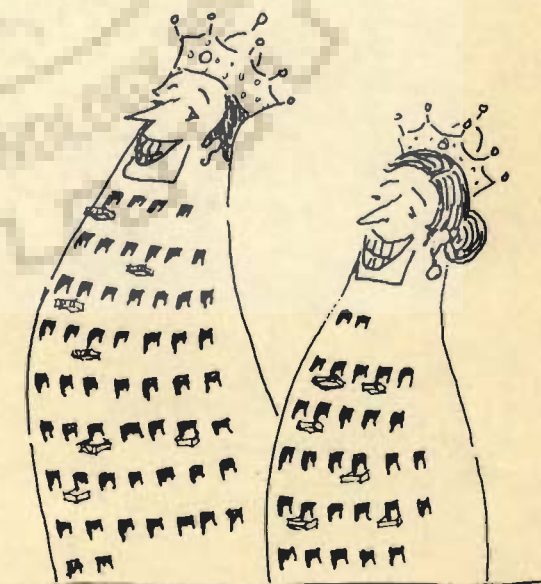


SOCIAL INTERACTION ?

BUT FOR THIS DISTANCE



EARTHQUAKE SCARCE



HIGHRISE: STATUS SYMBOL



Table 5.1 Distribution of Respondents (Floor & Storey-wise) Degree of Irritation on Account of Elevator Waiting

Floor level	Strong		Mild		Total		No Effect		No Response		Total samples Households
	N	%	N	%	N	%	N	%	N	%	
1-6	30	23.8	57	21.7	87	22.2	24	38.7	3	37.5	114
7-11	48	38.1	110	41.8	158	40.6	19	38.2	3	37.5	180
12-31	48	38.1	96	36.5	144	37.1	20	31.7	2	25.0	166
Total	126	27.4	263	57.2	389	84.6	63	13.7	8	1.7	460
Chi-square test	$X^2 = 7.9133$ , df 4, p < .05					Not significant					
Contingency coefficient	c = 0.1311										
Number of Storeys											
7-15	47	37.3	97	36.9	144	37.0	23	36.5	3	37.5	170
16-20	45	35.7	92	35.0	137	35.2	20	31.7	3	37.5	160
21-32	34	27.0	74	28.1	108	27.8	20	31.7	2	25.0	130
Total	126	27.4	263	57.2	389	84.6	63	13.7	8	1.7	460
Chi-square test	$X^2 = 0.5292$ , df 4, p < .05					Not significant					
Contingency coefficient	c = 0.0349										

**Table 5.2 Storey-wise Distribution of Respondents' Irritation due to Irregular Water Supply**

Number of Storeys	Strong		Mild		Total		No Effect		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N	%	
7-15	94	34.3	44	41.5	138	36.3	26	38.8	6	46.2	170
16-20	112	40.9	30	28.3	142	37.4	13	19.4	5	38.5	160
21-32	68	24.8	32	30.2	100	26.3	28	41.8	2	15.4	130
Total	274	59.5	106	23.0	380	82.6	97	14.5	13	2.7	460

Chi-square test  $\chi^2 = 15.4970$ , df 4,  $p > .01$  Highly significant

Contingency coefficient  $c = 0.1830$

**Table 5.3 Floorwise Distribution of Respondents' Irritation on Account of Waste Material Thrown from Windows**

Floor level	Strong		Mild		Total		No Effect		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N	%	
1-6	76	27.7	16	16.0	92	24.6	21	27.3	1	11.1	114
7-11	104	37.9	49	49.0	153	40.9	23	29.9	4	44.4	180
12-31	94	34.3	35	35.0	129	34.5	33	42.8	4	44.4	166
Total	274	59.8	100	21.7	374	81.3	77	16.7	9	1.9	460

Chi-square test  $\chi^2 = 9.7477$ , df 4,  $p > .05$  Significant correlation

Contingency coefficient  $c = 0.1454$

Table 5.4 Storey-wise Distribution of Respondents' and Irritation on Account of Hanging of Long Clothes

Number of Storeys	Degree of Irritation										Total sample Households
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
7-15	34	48.6	32	50.8	66	49.6	96	32.9	8	22.2	170
16-20	14	20.0	15	23.8	29	21.8	111	38.1	20	55.6	160
21-32	22	31.4	16	25.4	38	28.6	84	28.9	8	22.2	130
Total	70	15.2	63	13.7	133	28.9	291	63.3	36	7.8	460
Chi-square		$X^2 = 14.6021$ , df 4, $p > .01$						Highly significant			
Contingency coefficient		c = 0.1824									

Table 5.5 Storey-wise Distribution of Respondents' Feeling Irritated for Various Problems (considered altogether)

Number of Storeys	Level of Irritation								Total sample Households		
	High		Medium		Total		Low				
	N	%	N	%	N	%	N	%			
7-15	40	25.8	61	39.9	101	32.8	69	45.3	170		
16-20	53	34.2	54	35.3	107	34.7	53	34.9	160		
21-32	62	40.0	38	24.8	100	32.5	30	19.7	130		
Total	155	32.6	153	33.2	308	66.9	152	33.0	460		
Chi-square test		$X^2 = 12.8227$ , df 4, $p > .02$						Highly significant correlation			
Contingency coefficient		c = 0.1646									

**Table 5.6 Dance and Late Music Parties and their Impact on the Residents (storey-wise)**

Distribution of Respondents' Feeling of Inconvenience & Tension

No. of Storeys	Strong		Mild		Total		No Effect		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N	%	N
7-15	49	52.6	56	36.1	105	42.3	62	32.3	3	15.0	170
16-20	22	23.7	50	32.3	72	29.1	76	39.6	12	60.0	160
21-32	22	23.7	49	31.6	71	28.6	59	28.1	5	25.0	130
Total	93	20.2	155	33.7	248	53.9	192	41.7	20	4.4	460

Chi-square test  $\chi^2 = 13.2428$ , df 4,  $p > .02$  Significant correlation  
 Contingency coefficient  $c = 0.1709$

**Table 5.7 Impact of Children's Play Inside Flats**

Distribution of Respondents' Feeling Tense & Scared

Rating of provision for playing spaces	Strong		Mild		Total		No comments		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N	%	N
Good	62	22.9	139	51.5	201	74.4	62	22.9	7	2.6	270
Bad	37	31.1	58	48.7	95	79.8	22	18.5	2	1.7	119
No Response	21	29.6	29	40.8	50	70.4	16	19.7	5	7.0	71
Total	120	26.1	226	49.1	346	75.2	100	21.7	14	3.1	460

Table 5.8 Floorwise Distribution of Respondents' Feeling Tension for Insecurity of Children Playing away

Floor level	Degree of Tension										Total sample Households
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
1-6	25	22.7	26	22.8	51	22.8	59	28.5	4	13.8	114
7-11	42	38.2	45	39.5	87	38.8	78	37.7	15	51.7	180
12-31	43	39.1	43	37.7	86	38.4	70	33.8	10	34.5	166
Total	110	23.9	114	24.8	224	48.7	207	45.0	29	6.3	460

Chi-square test  $X^2 = 3.3268$ , df 4,  $p < .05$  Not significant  
 Contingency coefficient  $c = 0.0888$

Table 5.9 Reaction to Fear of Children getting Stranded in Elevator  
 Distribution of Respondents' Degree of Tension

Reaction to use of lift by children	Degree of Tension										Total sample Households	
	Strong		Mild		Total		No Effect		No Response		N	%
	N	%	N	%	N	%	N	%	N	%		
Possible to get stranded	68	17.2	95	23.9	163	41.1	200	50.4	33	8.3	397	86.3
No risk	8	22.9	5	14.3	13	37.2	19	54.3	3	8.6	35	7.6
No response	5	17.9	5	17.9	10	35.8	12	42.9	6	21.4	28	6.1
Total	81	17.6	105	22.8	186	40.4	232	50.4	28	6.1	460	100

Table 5.10 Floorwise Distribution of respondents' Feeling Worried and Tense Due to Lack of Communication With Children Playing Down on Ground

Floor level	Degree of Tension								Total sample Respondents N	
	Strong		Medium		Total		No Response			
	N	%	N	%	N	%	N	%		
1-6	15	16.1	37	24.5	52	21.3	56	31.3	114	
7-11	30	32.3	60	39.7	90	36.8	69	38.5	180	
12-31	48	51.6	54	35.8	102	41.8	54	30.2	166	
Total	93	20.2	151	32.8	244	53.1	197	38.9	460	
Chi -square tests		$X^2 = 14.2470$ , df 4, p > .05					Highly significant			
Contingency coefficient		c = 0.1805								

Table 5.11 Storey-wise Distribution of Respondents' Feeling Tension in Panicky Situations

Number of Storeys	Degree of Tension & Fear										Total sample Households N
	Yes in case of fire and earthquake		Yes, in cases other than fire etc.		Total		Do Not Feel		No response		
	N	%	N	%	N	%	N	%	N	%	
7-15	27	50.9	14	24.1	41	36.9	127	32.1	2	28.6	170
16-20	9	17.0	28	48.3	37	33.3	118	34.5	5	71.4	160
21-32	17	32.1	16	27.6	33	29.7	97	28.4	-	-	130
Total	53	11.5	58	12.6	111	24.1	342	74.4	7	1.5	460
Chi-square test		$X^2 = 13.5756$ , df 4, p > .01					Highly significant				
Contingency coefficient		c = 0.1705									

Table 5.12 Floorwise Distribution of Respondent s' Degree of Tension for Parked Vehicles Not Under Personal Care

Floor level	Degree of Tension										Total sample Households N
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
1-6	14	20.0	17	17.2	31	18.3	68	28.0	15	31.3	114
7-11	24	34.3	45	45.5	69	40.8	90	37.0	21	43.8	180
12-31	32	45.7	37	37.4	69	40.8	85	35.0	12	25.0	166
Total	70	15.2	99	21.5	169	36.7	243	52.8	48	10.4	460

Chi-square test  $\chi^2 = 7.3638$ , df 4,  $p < .05$  Not significant correlation  
 Contingency coefficient  $c = 0.1325$

Table 5.13 Storey-wise Distribution of Respondent s Feeling Tension for Various Problems (considered altogether)

Number of storeys	Level of Tension								Total sample households N
	High		Medium		Total		Low		
	N	%	N	%	N	%	N	%	
7-15	58	40.8	64	42.4	122	41.6	48	28.7	170
16-20	43	30.3	45	29.8	88	30.0	72	43.1	160
21-32	41	28.9	42	27.8	83	28.3	47	28.1	130
Total	142	30.9	151	32.8	293	63.7	167	36.3	460

Chi-square test  $\chi^2 = 10.1004$ , df 4,  $p > .05$  Significant correlation  
 Contingency coefficient  $c = 0.1455$

Table 5.14 Storey-wise Distribution of Respondents' Feeling Deficiency of Spaces for Various Activities

Number of storeys	Degree of Inconvenience										Total sample Households
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
7-15	28	48.3	33	43.4	61	45.5	102	34.6	7	22.6	170
16-20	10	17.2	17	22.4	27	20.1	117	39.7	16	51.6	160
21-32	20	34.5	26	34.2	46	34.3	76	25.7	8	25.8	130
Total	58	12.6	76	16.5	134	29.1	295	64.1	31	6.7	460
Chi-square test		$X^2 = 16.9888, df 4, p > .01$					Highly significant correlation				
Contingency coefficient		c = 0.1941									

Table 5.15(a) Floorwise Distribution of Respondents' Feeling Deficiency of Gardening Space at the Apartment Level

Floor level	Degree of Deprivation										Total sample Households
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
1-6	41	18.8	38	24.7	79	21.2	30	38.0	5	55.6	114
7-11	84	38.5	63	40.9	147	39.5	30	38.0	3	33.3	180
12-31	93	42.7	53	34.4	146	39.2	19	24.0	1	11.1	166
Total	218	47.4	154	33.5	372	80.9	79	17.2	9	1.9	460
Chi-square test		$X^2 = 14.9789, df 4, p > .01$					Highly significant correlation				
Contingency coefficient		c = 0.1782									



Table 5.15(b) Storey-wise Distribution of Respondents' Feeling Deficiency of Gardening Space at the Apartment Level

Number of storeys	Degree of Deprivation										Total sample Households
	Strong		Mild		Total		No Effect		No response		
	N	%	N	%	N	%	N	%	N	%	
7-15	69	31.6	61	39.6	130	34.9	37	46.8	3	33.3	170
16-20	75	34.4	54	35.1	129	34.7	27	34.2	4	44.4	160
21-32	74	33.9	39	25.3	113	30.4	15	19.0	2	22.2	130
Total	218	47.4	154	33.5	372	80.9	79	17.2	9	1.9	460
Chi-square test		$\chi^2 = 11.3062, df 4, p > .05$					Significant correlation				
Contingency coefficient		c = 0.1595									

Table 5.16 Storey-wise Distribution of Respondents' Feeling Deficiency of Space for Rearing Pets, Keeping Transit Items and Children's Prams, Tricycle/Bicycle and Sports Kit

Number of storeys	Degree of Deprivation										Total sample Households
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
7-15	21	38.2	25	34.2	46	35.9	103	37.4	21	36.8	170
16-20	12	21.9	21	28.8	33	25.8	104	37.8	23	40.3	160
21-32	22	40.0	27	37.0	49	38.3	68	24.7	13	22.8	130
Total	55	12.0	73	15.9	128	27.9	275	59.8	57	12.4	460
Chi-square test		$\chi^2 = 9.9791, df 4, p > .05$					significant correlation				
Contingency coefficient		c = 0.1554									

**Table 5.17 Floorwise Distribution of Respondents Feeling Wind Effects**

Floor level	Strong		Degree of Irritation Mild		Total		No Effect		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N	%	N
	1-6	26	17.2	49	24.6	75	21.4	32	37.2	7	29.2
7-11	67	44.4	75	37.7	142	40.6	33	38.4	5	20.8	180
12-31	58	38.4	75	37.7	133	38.0	21	24.4	12	50.0	166
Total	151	32.8	149	43.2	350	76.0	86	18.7	24	5.2	460

Chi-square test  $\chi^2 = 13.5798$ , df 4,  $p > .01$  Highly significant correlation  
Contingency coefficient  $c = 0.1737$

**Table 5.18 Floorwise Distribution of Respondents Feeling Fear of Fire and Earthquake**

Floor level	Strong		Degree of Fear Mild		Total		No Effect		No Response		Total sample Households
	N	%	N	%	N	%	N	%	N	%	N
	1-6	18	13.3	13	19.4	31	15.3	75	33.9	8	21.6
7-11	62	45.9	25	37.3	87	43.1	80	36.2	13	35.1	180
12-31	55	40.7	29	43.3	84	41.6	66	29.9	16	43.2	166
Total	135	29.3	69	14.5	202	43.9	221	48.2	37	8.0	460

Chi-square test  $\chi^2 = 21.4855$ , df 4,  $p > .001$  Highly significant correlation  
Contingency coefficient  $c = 0.2198$

Table 5.19 Floorwise Distribution of Respondents' Feeling Fearful for Ascending Stairs & With Household Goods

Floor level	Degree of Fear										Total sample Households N
	Strong		Mild		Total		No Effect		No Response		
	N	%	N	%	N	%	N	%	N	%	
1-6	45	20.4	35	22.3	80	21.2	29	42.0	4	35.7	114
7-11	80	36.4	70	44.6	150	39.8	22	31.9	8	57.1	180
12-31	95	43.2	52	33.1	147	39.0	18	26.1	1	7.1	166
Total	220	47.8	157	34.1	377	82.3	69	15.0	14	3.1	460

Chi-square test  $\chi^2 = 15.1458$ , df 4,  $p > .01$  Highly significant correlation  
Contingency coefficient  $c = 0.1822$

Table 5-20 Floorwise Distribution of Respondents' Feeling Tension and Fearful for Various Problems (considered altogether)

Floor level	Level of Tension & Fear								Total sample Households N
	High		Medium		Total		Low		
	N	%	N	%	N	%	N	%	
1-6	24	13.8	39	29.5	63	20.6	51	33.1	
7-11	88	50.6	29	22.0	117	38.2	63	40.9	
12-31	62	35.6	64	48.5	126	41.2	40	26.0	
Total	174	37.8	132	28.7	306	66.5	154	33.5	

Chi-square  $\chi^2 = 39.8830$ , df 4,  $p > .0001$  Highly significant correlation  
Contingency coefficient  $c = 0.1822$

Table 5.22 Respondents' Opinion About Tall Buildings (Floor-wise)

	Floorwise Distribution of Respondents							
	1-6 floors		7-11 floors		12 - 31 floors		Total	
	N	%	N	%	N	%	N	%
<u>Like Tall Buildings</u>								
High above ground*	54	19.7	101	36.9	119	43.4	274	59.6
Good view	78	23.8	129	39.3	121	36.9	328	71.3
Prestige*	44	23.1	77	40.3	70	36.6	191	41.5
Free from pests*	96	35.6	98	36.3	76	28.1	270	58.7
Quiet Environments								
Good Breeze, Fresh and cool air	93	24.4	145	38.1	143	37.5	381	82.8
Centrally located	63	23.7	106	39.8	97	36.5	266	57.8
<u>Dislike Tall Buildings</u>								
Neighbourliness*	29	29.6	47	48.0	22	22.4	98	21.3
Fire & Earthquake Dangers	77	25.9	110	37.0	110	37.0	297	64.6
No control on Environment	74	27.6	99	36.9	95	35.4	268	58.3
Impersonalness & Isolation	62	27.8	84	37.6	77	34.5	223	48.5
Lack Greenery	54	24.5	89	40.5	77	35.0	220	47.8
Monotonous*	55	31.3	68	38.6	53	30.1	176	38.3

\*Significantly correlated

## CHAPTER - 6

### BUILT ENVIRONMENT

#### 6.1 INTRODUCTION

This chapter attempts to analyse the built environment dealing in the main with the infrastructural characteristics of high-rise buildings. Seven storeys and more as referred in this volume have been considered as high-rise buildings for this study. Each aspect of the built environment has been separately analysed and interpreted. These include types of high-rise buildings considered in the sample, types of apartments with varying sizes and number of rooms, physical environments in and around the high-rise apartments including facilities of utility services and amenities available in these apartments. Some discussions focus attention on the residents' choice for having shifted to the present apartment buildings. The detailed analysis highlighted their preference for the floors as well as type of high-rise buildings.

#### 6.2 TYPE OF APARTMENT BUILDING

High-rise buildings for this study vary between seven and thirty two storey apartment buildings with lift facilities for vertical circulation. About three-fifth (60.4%) of the respondents are drawn from comparatively taller buildings, 28.7% from moderately taller and about 11% from buildings upto 10 storeys in height. Details are given on next page.

The floorwise distribution of respondents is that about 39% respondents are living in 7 to 11 floor apartments, 24.8% upto six floors, 22% and 14% are from 12 to 16 floors and 17th and above floors respectively. As is evident majority of respondents are drawn from 1-16 floors in 11 to 32 storey apartment buildings.

### Distribution of Respondents Drawn from High-Rise Buildings

<u>No. of Storeys</u>		7-10	11-15	16-20	21-32	Total
(N)		50	132	138	140	460
(%)		10.8	28.7	30.0	30.4	100

<u>Floor Levels</u>		1-6	7-11	12-16	17-31	Total
(N)		114	180	103	63	460
(%)		24.8	39.1	22.4	13.7	100

### 6.3 PHYSICAL CHARACTERISTICS OF HIGH-RISE APARTMENTS

**6.3.1 Layout:** Utility of a flat is measurable in terms of its layout in general and the characteristics of rooms in particular. These include room sizes (length & breadth), floor areas, relative position of rooms, ventilation, sunlight and natural light, horizontal and vertical circulation, position of doors and windows, exterior view, access and inter-connections of various rooms, working of elevators and availability of other facilities and amenities, in particular. These physical characteristics are of utmost importance to residents of high-rise flats, for their happy and comfortable living.

The above listed physical characteristics are measured by the response range which varied from very bad to very good opinion of the respondents of high-rise buildings. Each response was allotted a weightage. On the basis of the weightages, respondents' opinion was grouped into three categories namely good, fair and bad.

While measuring cumulative effect of various elements of the layout of different rooms, it was found that a good number of residents (70.7%) felt

their flats were fair enough and good in size and areas. Three-tenths of the respondents expressed their dis-satisfaction so far as the planning and layout of the flats in general and rooms and the utility services in particular, are concerned. It appears that such respondents had grown up children and their flats did not meet their housing and related requirements. The percentage of respondents indicating fair and high satisfaction stood at 25.5% of those in lower floors (upto 6th floor), 38.2% of those in medium (upto 11th floor) and 70% in the case of high floors (upto 31st floor).

While analysing layout details of drawing, dining, bed, kitchen and toilet rooms, largely (70 to 95%) respondents were found satisfied. So far as store room and balcony space were concerned, surprisingly a large majority (73% in case of store room and 64% in case of balcony space) of respondents did not answer this question. It is implied that most flats in high-rise buildings were not provided with a separate store room and an open balcony. The facility of a balcony is not provided perhaps due to rainy and moist weather conditions of Bombay. Of respondents having a balcony in their flats, 47% were from medium and tall high-rise buildings and 52.6% from low high-rise buildings and were satisfied with the provision of balcony. Of respondents expressing satisfaction in respect of kitchen room space and its layout, 38% were living in lower floors in low high-rise buildings in comparison to 62% residents in upper floors of tall high-rise buildings.

### 6.3.2 Orientation

Bombay is situated on the western coast of our country. The climate is, by and large, hot and humid. Cool sea breeze from the west, is always welcome, almost all the year round. Hence east-west direction of buildings, in general, is ideal for this city. Data collected in this behalf show many of

high-rise apartment buildings constructed in east-west orientation hence majority expressed satisfaction in this behalf.

### 6.3.3 Floor Area

Flat type residential accommodation initially constructed for well to do with higher paying capacity, in multistorey buildings comprise of large floor areas with spacious rooms and other facilities and amenities. However, the data as indicated below shows majority (59%) of the respondents living in flats with floor areas below 110 sq.m. (1000 sq.ft.), 32% in flats with a floor area ranging from 110 to 165 sq.m. (1001 to 1500 sq.ft.). This area exceeded 165 sq.m. (1500 sq.ft.) in case of 5% respondents only.

Frequency	Below 110 sq.m.	110-165 sq.m.	Above 165 sq.m.	No. Response	Total
No.	270	147	24	19	460
(%)	58.6	31.9	5.2	4.3	100

Respondents in flats of 110 sq.m. area and below are concentrated on lower and medium high-rise buildings. The percentage of such respondents work out to be 53.3% in low, 35.6% in medium and only 11% in tall high-rise buildings. Respondents in flats of 165 sq.m. or more area concentrate in tall high-rise buildings with 66.7% residents while the percentage in comparison in medium and low high-rise buildings stand at 8.3 and 25 respectively. Of respondents with flat size ranging from 110 to 165 sq.m. area, 8.8% lived in low, 38.8% in medium and 52.4% in tall high-rise buildings. The analysis indicates that in very tall high-rise buildings, floor area of apartments is larger (more than 165 sq.m.) in comparison to medium and low high-rise buildings where the area appears to be within 165 sq.m.



### Number of Bed Rooms

Frequency	One Bed Room	Two Bed Rooms	Three Bed Rooms	Four Bed Rooms	Total
No.	53	240	150	14	460
(%)	11.5	52.1	33.3	3.1	100

#### 6.3.4 Bed Room

Of 460 flats considered in this investigation, 63.6% had one or two bed rooms. Flats with 3 or more rooms accounted for 36.4% of the total. The data analysed in this regard shows more than half of respondents, in our sample, live in medium sized (with two bed rooms) flats while one-third live in flats with three bed rooms. very few in comparison to these live in flats with more than three or less than two bed rooms.

While analysing data collected in respect of the altogether effect (cumulative) of physical environment on the residents of high-rise buildings, it is found (Table 6.1) that about two-fifths (38.9%) among the respondents were highly satisfied with orientation, ventilation, breeze and provision of other spaces for parking, washing etc., while less than one-third expressed these to be just satisfactory. About one-third feel dis-satisfied with provision of these aspects in general in their apartments. Perhaps this proportion of respondents lives in congested high-rise buildings where they perhaps, do not enjoy sunshine, breeze, ventilation due to agglomeration of these tall buildings. They also lack proper parking, washing and drying spaces. Of respondents expressing satisfaction and good feelings as regards the provision of physical environments, nearly two-fifths live in tall high-rise, one-third in medium and less than three-tenths in low high-rise buildings. The result shows direct relationship between number of storeys and physical environments. Thus the proportion of respondents increases with the increase in number of storeys of high-rise buildings. Highly significant relation between the two variable

is confirmed with Chi-square value of 12.2058, df 4 and beyond .001 level of probability.

**6.3.5 Ventilation, Breeze and Sunlight :** A large majority(77.8%)of respondents satisfied with ventilation in their apartments were happy and of the view that planning and design should ensure good ventilation etc. Only 4.8% of the respondents did not find this aspect good and satisfactory.

Tall high-rise buildings permit sufficient and unrestricted air movement of circulation in all direction at all times. Most of the respondents (81.5%) felt breeze conditions in their apartments to be good and satisfactory. Although with the increase of building height breeze is freely available without any disturbance from neighbouring buildings yet, wherever clusters of high-rise buildings predominate low-rise buildings, adverse affects, like shadow of other buildings and disturbed sunshine, breeze etc., are bound to occur. This phenomenon is irritating for residents especially during winter months. However, as far as our sample is concerned, sunshine was good for 75.9% respondents and only 4.1% respondents weighed this natural facility to be dis-satisfactory and bad.

### **6.3.6 Utility Spaces/Facilities/Services**

#### **Parking**

Provision of parking spaces necessary for residents is an essential component in planning and design of high-rise apartment buildings. In the present study this requirement, by and large seems to be satisfactory in the opinion of these residents. About two-thirds (66.5%) (24.5% fair and 42.0% good) of them find parking spaces provided in their building complexes to be fair enough and good. Only 15% did not find it so but bad. Of respondents (42.0%), one-fourth (24.5%) thought it to be fair enough. Here it is found that the response

proportion decreases with the increase of building height (42% from low, 29.5% from medium and 28.5% from tall high-rise buildings). The analysis shows that less number residents from tall high-rise in comparison to those from low high-rise buildings are satisfied in this behalf. Sufficient parking spaces seems to be provided on the ground under the high-rise building structure itself.

### 6.3.7 Children Play Space

Children playing facilities space inside and outside high-rise buildings is as essential as any structural element of the building itself. During our field survey children were observed playing in corridors, stairhalls, entrance foyers and every available common spaces inside buildings ( Figs. 5.2 & 5.3 ). School going children do not generally like to play inside and prefer to play outside the building they reside in. It is not generally possible to provide such facilities in all tall structures. It is also obvious that provision of such spaces and facilities would mean an additional increment to already very high cost of flats. Such spaces even if provided are found in buildings for very high income category residents. While analysing data in Table 6.2 based on the combined (cumulative) scores, it is found that 27.8% respondents were fully satisfied with the provision of play spaces in and outside their buildings. About 32% respondents were found dis-satisfied here. The remaining 40% respondents felt playing facility and space provided in their buildings was satisfactory. It is observed that more respondents in low and medium high-rise buildings were satisfied to their counterparts in tall high-rise buildings. Of respondents who carried an opinion that provisions of children's play space in high-rise building in good, 20.3% were from tall high-rise and 31.3% and 48.4% from low and medium high-rise buildings respectively. Chi-square result shows highly significant relation between the two variables.

### 6.3.8 Recreational Areas and Accessibility

Provision of recreational facilities in high-rise buildings would add to the amenities provided in any multi-storey residential complex. But usually this facility seems to be non-existent in most high-rise buildings. This is evident from the responses of the inhabitants. More than half (56%) of the respondents reported complete absence of such facilities. While 22.4% rated this facility to be satisfactory to some extent. It is only 21.5% who expressed complete satisfaction in this regard. As far as access to high-rise apartments is concerned, half of the respondents (49.6%) rated it to be good and satisfactory. Of the remaining half, about 29% felt complete dis-satisfaction, and 21.5% were satisfied to some extent (Table 6.3).

## 6.4 PHYSICAL FACILITIES

Human beings are never satisfied with what they have and are always wanting. Satisfaction in human life is an important aspect of mental health and thereby quality of life. To analyse the degree of satisfaction, dis-satisfaction of residents a few important components, contributing to their living in high-rise buildings were included in the questionnaire. These include water and electric supply system, fire fighting system, sanitary and garbage disposal system, transport system, as well as facilities like telephone, health or medical care, police protection and above all education facility. Problem on these or on any of these accounts can cause great deal of dis-satisfaction. These can lead to frustrating situations and come in the way of happy and healthy living.

Analysis of above mentioned factors reveals that water supply and fire fighting facilities were the two most important requirements for which residents were dis-satisfied. In case of other components most respondents were quite satisfied with the existing arrangements. As far the water supply

system in high rise buildings, nearly two-thirds (61.5%) of the respondents expressed their dis-satisfaction. Among them more than two-fifths (46%) were from medium high-rise compared to 25.1% in tall high-rise and 28.9 in low high-rise buildings (Table 6.4). The data when put to Chi-square test yielded significant relation between the two variables at df 2 and .001 probability level and Chi-square value = 42.24 was observed. In the case of fire fighting system (Table 6.5) a little more than half (54.6%) of the respondents showed their dis-satisfaction in this behalf, while about two-fifths (38.1%) were satisfied, 7.40% either did not reply this question or said it did not apply or pertain them. Nearly two-fifths (41.2%) of the respondents among residents of medium high-rise buildings were dis-satisfied on this account. The corresponding percentages among tall high-rise and low high-rise buildings were 24.8 and 34.4 respectively. A direct correlation is observed. Number of respondents increase with the increase in number of storeys upto 20 storeys. Further, increase in the number of storeys show a decline in the number of respondents. Chi-square value of 9.93, df 2 and probability at .01 level show a highly significant relation between the two variables.

The combined effect of all the physical factors shows 34.6% respondents highly satisfied with all the facilities, 32.4% rating their satisfaction to be medium (neither very good nor very bad), 33% experienced very low satisfaction or were dis-satisfied. The analysis reveals that two-thirds of respondents are fairly satisfied and one-third dis-satisfied. The degree of satisfaction seems to be decreasing (38.6%, 32.8% and 28.6%) with the increase of the number of storeys (Table 6.6). However, the relation has been found to be significant with df 2, Chi-square = 10.25 and probability of occurrence to be less than 5%.

## 6.5 VERTICAL CIRCULATION

Residents of high-rise buildings have two forms of vertical circulation, the elevator and the staircase. 'Staircase' is utilized as supplement or substitute to 'elevator'. However, staircase is used in case of emergencies like fire, accidents, electric power failure etc. Elevators are the best means of vertical movement. They are fast and suit all equally.

The elevator working was, by and large, found to be satisfactory mode of vertical circulation. This opinion was expressed by more than half (57.8%) the respondents. 41.7% were not at all satisfied with its service. However, waiting long for more than 5 minutes or so irritated almost all the respondents equally.

Time taken by the elevator to reach a floor is directly related to the height of the building. Longer the distance more the time required for the elevator to reach a particular floor after a demand is registered. It stops almost at every floor on each trip and takes long to reach the top most or the ground floor. Its hopping movement means inconvenient waiting for its users. Such irritating encounters cause sometimes frustrating situations.

## 6.6 LIVING ENVIRONMENT

**6.6.1 Migration :** Bombay, a city of only nine hundred thousand people in the year 1901 has now crossed seventy five hundred thousand and the population continues to grow at over 4% a year. The population is expected to shoot upto 15 million by the end of the century. Migration to Bombay from its surrounding areas and from other cities, towns and villages in the country is a major contributor to Bombay's population growth (Phatak, 1980).

Our sample of respondents fully reflects the migratory roots of Bombay's high-rise population. Only 18.9% respondents turned out to be from Bombay

city itself. In other words nearly four-fifths (77.2%) of respondents were migrants to Bombay. About 57% of them had migrated from cities, 30.7% from towns and 12.4% from villages. Nearly three-fifths (59%) of the migrants had been staying in Bombay for over 15 years, 36% for 6 to 15 years and only 5% for one to five years (Table 6.7). Before migrating to the city of Bombay, over three-fourths (77.6%) of our respondents were found to have had lived in low floors in houses of one, two or three storey walk-up apartment buildings. Only 10.2% were those in medium and higher floor levels. Most of the respondents irrespective of floor levels they occupied, had no or very little experience of living in high level floors or in tall high-rise buildings. This leads us to an observation that high-rise apartment buildings for our generation are a recent phenomenon in our country.

**6.6.2 Logistic of Shifting :** What should have been the possible reasons which made these residents to shift to the present apartments in high-rise buildings ? In response, to this query, our data in this regard yields that paucity of living accommodation, owning a residence, and joint family living were the main reasons. However, better financial and economic status or position and place of work were few others which included these reasons for their shifting to the present flat accommodation. It has been observed that generally people preferred lower floors while selecting their apartments in high-rise buildings (72.2% opted for lower and 7.5% for higher floors). Their choice, of course, was very much dependent on the availability of their choice floor.

Residents having gained some experience of living in a particular residential environment can definitely form an opinion about their living environment. Their suggestions and comments can go a long way in overcoming the shortcoming of such an environments.

Over two-fifths (45%) of our respondents felt single storey dwelling are most desirable for healthy human growth. However, one-fourth felt that apartment buildings should not be more than 3 storeys while in case of one-fifth of respondents these buildings could be four to six storeys even. In the opinion of only 7% such buildings could be 7 to 12 storeys and for 8% these buildings could exceed 13 storeys in height.

It is interesting to note that the proportion of respondents who liked higher floor levels show a decreasing trend. This trend is observed from the results after analysing data. 36% respondents liked ground floor, 31% 2nd and 3rd floors, 8% liked 4th and 5th floors. As far as higher floors are concerned 9% opined for 6th to 8th floors, 10% for 9th to 11th floors and there were 6% of respondents who liked 12th or above floor.

It is further noted that majority respondents (75%) expressed liking for ground to 5th floors, while 25% preferred 6th and higher floors.

### **6.6.3 Choice of Present Floor/Storey**

The analysis reveals that shifting from the previous accommodation to the present high-rise has not always been arbitrary or dictated by economic factors alone but also influenced by the following factors:

1. Paucity of living space;
2. The only choice within the means;
3. Nearness to place of work;

Few other factors also must have had their impact in their selection but the expanding family and accommodation requirements as well as the location and economic viability must have been the foremost.



Human beings like to have strong cultural and ethnic preferences. Bombay leads in this respect. Each area in the Metropolis has developed here on ethnic lines. Some Christian and mostly Parsi communities are found in Colaba and Fort areas; Mulsim's in Masjid and Byculla areas; Maharashtra's in Dadar; South Indian's in Mahim; Bandra area is overwhelmingly populated with Christian's; and Gujrati's are found mostly in Khar, Santa Cruz and Juhu areas. However, the present investigation does not seem to, largely, substantiate the above to have been the major factor of their high-rise choice. On the other hand, prestige of the cosmopolitan locality does seem to be one of the major influences contributing to their choice of the floor level and building height of the high-rise apartment buildings. Prestige being synonymous with high-rise may be a misnomer. Yet it happens to be one of the important reasons for the selection of high-rise apartments, particularly for those who can afford to buy higher floors in tall high-rise buildings.

Table 6.8 fairly elucidates the residents' choice/reasons for shifting to present high-rise apartment buildings. It is observed that among respondents (88%) who shifted from their previously occupied residences, mostly one or two storeys, 32.5% now live in higher 42.3% in medium and 25.2% even now live in lower floors. Of 25.2% respondents, 57.7% had chosen their apartments for other considerations like nuclear family living with larger living space etc. than apartments being in high-rise buildings, which was the choice of only 20% respondents, 22% had no choice as the apartments were allotted to them. Of those (42.3%) living in medium floors, 49.3% had chosen their apartments for other reasons and not because the apartments were in high-rise, the choice of other 40% respondents. In case of respondents living in higher floor levels, 31% had chosen these for other consideration, 51.7% for being in high-rise buildings and 17.2% had no choice or option as they live in apartments allotted to them.

#### 6.6.4 Preference of Floor Levels and Buildings' Heights

Among residents, on the basis of their past living experience, a very large majority of respondents (91%) indicated preference for lower floors. The corresponding proportion for medium and higher level floors were only 3.9% and 4.8% respectively.

Of respondents (91%) indicating preference for lower floor apartments, 25.5% were presently also living in lower floors, 40.8% in medium and 33.7% in higher floor levels as in Table 6.9(a). A large proportion (96.7%) among residents in high-rise buildings in Table 6.9(b), shows preference for low high-rise buildings. On the other hand, only 1.9% and 1.4% show preferences for medium and tall high-rise buildings respectively. Among 96.7% respondents indicating preference for low high-rise, 40% were found even now also living in low high-rise buildings, 31.4% in medium and 26.9% in tall high-rise buildings.

To assess respondents' preferences for floor levels and building heights, with reference to their past building type lived in and present floor level and building residing in, a suitable scale was developed. The data in regard to floor level and building height variables were computed in tables considering respondents' residence where they lived in past, they live at present and they, otherwise, prefer to live. Details of the three categories considered for the analysis are given in the Table 6.9(a) & 9(b).

Each cell in these tables represents past, present and preferred floor or building height. For example, first column represents 1-2 floors lived in past, second column considers lower, medium or higher floor levels living in at present and the other three columns indicate preference for lower, medium and higher floors. Number of respondents are represented in the first column in its three rows as  $L_1L_2L_3$ ,  $L_1L_2M_3$ ,  $L_1L_2H_3$  (first row),  $L_1M_2L_3$ ,  $L_1M_2M_3$ ,

$L_1^M H_3$  (second row), and  $L_1^H L_3$ ,  $L_1^H M_3$ ,  $L_1^H H_3$  (third row). Where  $L_1^M H_1$ ;  $L_2^M H_2$  and  $L_3^M H_3$  represent low, medium and high categories of past; present and preferred floor levels or number of storeys indicated on the table.

For analysis of data a scale with values of +2, +1, 0, -1 and -2 was developed in Table 6.10(a) and 10(b) to represent living in floors/high-rise buildings two levels below preferred, one level below preferred, same level as preferred, one level above preferred and two levels above preferred respectively. The computation in the table shows 25% respondents living presently in lower, medium or higher floors were incidentally also living in according to their preferred choice respectively. Therefore, shifting to present corresponding floor in high-rise building must have not been a compulsion, a force or a thrust to them. Around 70% lived in medium or higher floors when they actually have preference for lower floors. Not getting the floor of their choice, the respondents must have shifted to the present apartment un-willingly. Remaining 5% respondents lived in lower or medium floors when their preference was for higher floors. Again in their case too the floors, they live at present, were not according to their preference, hence they too must have shifted in them unwillingly.

Of 25% respondents who preferred lower, medium or higher floors and were also living presently in their preferred floors, most of them (94%) were living in lower floors while as 4.1% and 2.1% were living in medium and higher floors respectively. Among 70% respondents who preferred lower floors but were living in medium or higher floors, majority (86%) of them were living in lower floors. The remaining 7.4% and 6.3% were living in medium and higher floors respectively. Out of the remaining 5% respondents, who preferred medium or higher floors but were living in lower floors, as

many as 90% were living in lower floors and remaining 10% in medium floor levels and none in higher floor levels.

Similarly, when considering building height (Number of Storeys), it is observed that 37.1% respondents lived at present in low, medium and tall high-rise buildings which were the same as they had preferred. Hence shifting in these buildings must not have made difference to them. This was not the case with 61.9% respondents who lived in medium or tall high-rise buildings when their preference was for low high-rise buildings. Hence they must have shifted unwillingly to the buildings they occupy now. Remaining 1% respondents lived in low or medium high-rise when their preference was tall high-rise buildings. In their case also buildings they live in were not as per their choice or preference and hence must have shifted unwillingly to the high-rise buildings they live presently.

This analysis in general indicates that sample population although living in high-rise buildings, by and large, prefer lower floors and low high-rise buildings. This leads us to an understanding that living in high-rise buildings in general is not a special preference as is usually understood, assumed or contemplated.

On the basis of this and other findings detailed in Chapters 4 and 5, it is inferred that high-rise living is not really suitable for the people, in general and for our conditions and social systems in the country, in particular. However, in developing economy where urban areas are in advanced stage of urbanisation, involving transformation of population, production process and socio-political environment like metropolitan and other cities in our country, high-rise living is inevitable. Suitable changes in the planning and design of these high-rise apartment buildings would have to be made to make them better suited and acceptable in general to people in our country.

Table 6.1 Floorwise Distribution of Respondents Reactions to Environment In and Around

Number of storeys	Respondents' Rating						Total sample Households N
	Good		Fair		Low		
	N	%	N	%	N	%	
7-15	51	28.2	54	41.5	65	43.6	170
16-20	60	33.1	59	45.4	41	27.5	160
21-32	70	38.7	17	13.1	43	28.9	130
Total	181	38.9	130	28.7	149	32.4	460
Chi-square test		$X^2 = 12.2058, df 4, p > .001$ Highly significant correlation					
Contingency coefficient		$c = 0.1607$					

Table 6.2 Storey-wise Distribution of Respondents' Reaction to Children Play Space

Number of storeys	Respondents' Rating						Total sample Households N
	Good		Fair		Bad		
	N	%	N	%	N	%	
7-15	40	31.3	68	36.9	62	41.9	170
16-20	62	48.4	56	30.4	42	28.4	160
21-32	26	20.3	60	32.6	44	29.7	130
Total	128	27.8	184	40.0	148	32.2	460
Chi-square test		$X^2 = 15.9152, df 4, p > .001$ Highly significant correlation					
Contingency coefficient		$c = 0.1828$					

**Table 6.3 Storey-wise Distribution of Respondents' Reaction to Facility of Recreation and Access**

Number of storeys	Respondents' Rating						Total sample Households N
	Good		Fair		Bad		
	N	%	N	%	N	%	
7-15	77	33.8	40	40.4	53	39.8	170
16-20	85	37.3	37	37.4	38	28.6	160
21-32	66	28.9	22	22.4	42	31.6	130
Total	228	49.6	99	21.5	133	28.9	460

Chi-square test  $X^2 = 9.7493$ , df 4,  $p > .05$  Singnificant correlation  
 Contingency coefficient  $c = 0.1511$

**Table 6.4 Storey-wise Distribution of Respondents' Opinion About Water Supply**

Number of storeys	Respondents' Opinion						Total sample Households N
	Satisfied		Dis-satisfied		No Response		
	N	%	N	%	N	%	
7-15	87	51.5	82	28.9	1	12.5	170
16-20	28	16.6	130	45.9	2	25.0	160
21-32	54	31.9	71	25.1	5	62.5	130
Total	169	37.4	283	61.5	8	1.7	460

Chi-square test  $X^2 = 42.2429$ , df 2,  $p > .001$  Highly significant  
 Contingency coefficient  $c = 0.2923$

Table 6.5 Storey-wise Distribution of Respondents' Opinion About Fire Fighting Facilities and Equipment

Number of storeys	Respondents' Opinion						Total sample Households N
	Satisfied		Dis-satisfied		No Response		
	N	%	N	%	N	%	
7-15	77	44.0	86	34.4	7	20.6	170
16-20	46	26.3	103	41.2	11	32.4	160
21-32	52	29.7	62	24.8	16	47.1	130
Total	175	38.1	251	54.6	34	7.4	460

Chi-square test  $\chi^2 = 9.9370$ , df 2,  $p > .01$  Highly significant  
Contingency coefficient  $c = 0.1509$

Table 6.6 Storey-wise Distribution of Respondents' Opinion About Overall (cummulative) Effect of Lack of Various Facilities

Number of storeys	Level of Feelings								Total sample Households N
	High		Medium		Total		Low		
	N	%	N	%	N	%	N	%	
7-15	68	42.8	51	34.2	119	38.6	51	33.6	170
16-20	40	25.1	61	40.9	101	32.8	59	38.8	160
21-32	51	32.1	37	24.8	88	28.6	42	27.6	130
Total	159	34.6	149	32.4	308	67.0	152	33.1	460

Chi-square test  $\chi^2 = 10.2590$ , df 4,  $p > .05$  Significant correlation  
Contingency coefficient  $c = 0.1477$

Table 6.7 Respondents' Migration and Period of Their Stay in Bombay

Period of stay in Bombay in years	Migration from						Total	
	Village		Town		City		N	%
	N	%	N	%	N	%	N	%
1-5	2	11.1	4	22.2	12	66.6	18	5.0
6-15	13	10.1	39	30.2	17	59.6	129	36.0
Above 15	29	13.9	66	31.7	133	54.3	208	59.0
Migrants	44	12.4	109	30.7	202	56.9	335	77.2
Non-Migrants							87	18.9
Non-Responsive							18	3.4
Total sample Respondents =							460	100.0



Table 6.8 Reasons for Respondents' Choice to Live in Apartments in High-Rise Buildings

Floor level Lived in	Living in	Respondents' Choice						Total	
		To live in High-rise Apartments		Other considerations		Allotted Apartment			
		N	%	N	%	N	%	N	%
1-2	1-6	18	20.0	52	57.7	20	22.2	90	25.2
	7-11	60	40.0	74	49.3	17	11.3	151	42.3
	12-31	60	51.7	36	31.1	20	17.2	116	32.5
	Total	138	39.0	162	45.0	57	16.0	357	88.0
3-5	1-6	1	33.0	1	33.0	1	33.0	3	11.1
	7-11	1	12.0	5	63.0	2	25.0	8	29.6
	12-31	6	40.0	7	40.0	3	20.0	16	59.6
	Total	8	30.0	13	48.0	6	22.0	27	7.0
6 and above	1-6	1	50.0	1	50.0	-	-	2	10.0
	7-11	1	33.0	-	-	2	67.0	3	15.0
	12-31	5	33.0	7	47.0	3	20.0	15	75.0
	Total	7	35.0	8	40.0	5	25.0	20	5.0
Grand Total		153	38.0	183	45.0	68	17.0	404	100.0

(Contd.....)

Table 6.8 (Contd.....)

Buildings with No. of Storeys

Lived in	Living in								
1-3	7-15	50	35.2	83	58.4	9	6.3	142	39.2
	16-20	58	46.4	43	34.4	24	19.2	125	34.5
	21-32	35	36.8	36	37.9	24	25.3	95	26.2
	Total	143	39.5	162	44.8	57	15.7	362	89.6
4-6	7-15	-	-	-	-	1	100.0	1	3.8
	16-20	4	28.6	8	57.1	2	14.3	14	53.8
	21-32	3	27.3	5	45.5	3	27.3	11	42.3
	Total	7	26.9	13	50.0	6	23.1	26	6.4
7 and above	7-15	-	-	-	-	-	-	-	-
	16-20	2	50.0	2	50.0	-	-	4	25.0
	21-32	1	8.3	6	50.0	5	41.7	12	75.0
		3	18.8	8	50.0	5	31.2	16	4.0
Grand Total	155	38.0	183	45.0	68	17.0	404	100	

Table 6.9(a) Respondents' Preference for Floors Visa-Vis Floors Living in and Lived in Past

Floors Lived in (L <sub>1</sub> )	Floors Living in (L <sub>2</sub> )	Floors Preferred to live in 1 - 6		(L <sub>3</sub> )	7 - 11		(M <sub>3</sub> )	12 - 31		(H <sub>3</sub> )	Total		Not Responded	Grand Total	
		N	%		N	%		N	%		N	%			
1-2 (L <sub>1</sub> )	1-6 (L <sub>2</sub> )	83	25.5	L <sub>1</sub> L <sub>2</sub> L <sub>3</sub>	4	28.6	L <sub>1</sub> L <sub>2</sub> M <sub>3</sub>	3	17.6	L <sub>1</sub> L <sub>2</sub> H <sub>3</sub>	91	25.5	13	370	
	7-11 (M <sub>2</sub> )	133	40.8	L <sub>1</sub> M <sub>2</sub> L <sub>3</sub>	7	50.0	L <sub>1</sub> M <sub>2</sub> M <sub>3</sub>	11	64.7	L <sub>1</sub> M <sub>2</sub> H <sub>3</sub>	151	42.3			
	12-31 (H <sub>2</sub> )	110	33.7	L <sub>1</sub> H <sub>2</sub> L <sub>3</sub>	3	21.4	L <sub>1</sub> H <sub>2</sub> M <sub>3</sub>	3	17.6	L <sub>1</sub> H <sub>2</sub> H <sub>3</sub>	116	32.5			
	Total	326	91.3		14	3.9		17	4.8		357	88.0			
3-5 (M <sub>1</sub> )	1-6 (L <sub>2</sub> )	2	8.7	M <sub>1</sub> L <sub>2</sub> L <sub>3</sub>	-	-	M <sub>1</sub> L <sub>2</sub> M <sub>3</sub>	1	25.0	M <sub>1</sub> L <sub>2</sub> M <sub>3</sub>	3	11.1	21	48	
	7-11 (M <sub>2</sub> )	7	30.4	M <sub>1</sub> M <sub>2</sub> L <sub>3</sub>	-	-	M <sub>1</sub> M <sub>2</sub> M <sub>3</sub>	1	25.0	M <sub>1</sub> M <sub>2</sub> H <sub>3</sub>	8	29.6			
	12-31 (H <sub>2</sub> )	14	60.9	M <sub>1</sub> H <sub>2</sub> L <sub>3</sub>	-	-	M <sub>1</sub> H <sub>2</sub> M <sub>3</sub>	2	50.0	M <sub>1</sub> H <sub>2</sub> H <sub>3</sub>	16	59.3			
	Total	23	85.2		-	-		4	14.8		27	7.0			
6 and above (H <sub>1</sub> )	1-6 (L <sub>2</sub> )	2	10.5	H <sub>1</sub> L <sub>2</sub> L <sub>3</sub>	-	-	H <sub>1</sub> L <sub>2</sub> M <sub>3</sub>	-	-	H <sub>1</sub> L <sub>2</sub> M <sub>3</sub>	2	10.0	22	42	
	7-11 (M <sub>2</sub> )	3	15.8	H <sub>1</sub> M <sub>2</sub> L <sub>3</sub>	-	-	H <sub>1</sub> M <sub>2</sub> M <sub>3</sub>	-	-	H <sub>1</sub> M <sub>2</sub> H <sub>3</sub>	3	15.0			
	12-31 (H <sub>2</sub> )	14	73.7	H <sub>1</sub> H <sub>2</sub> L <sub>3</sub>	1	100.0	H <sub>1</sub> H <sub>2</sub> M <sub>3</sub>	-	-	H <sub>1</sub> H <sub>2</sub> H <sub>3</sub>	15	75.0			
	Total	19	95.0		1	5.0		-	-		20	5.0			
Grand Total		368	80.0		15	3.3		21	4.6		404	87.8	56	12.2	460

where L<sub>1</sub>M<sub>1</sub> & H<sub>1</sub> represents Low, Medium & High Floors respondents lived in past  
 L<sub>2</sub>,M<sub>2</sub> & H<sub>2</sub> represents Low, Medium & High Floors respondents live at present  
 L<sub>3</sub>M<sub>3</sub> & H<sub>3</sub> represents Low, Medium & High Floors respondents prefer to live.

Table 6.9(b) Respondents' Preference for Buildings (No. of Storeys) Visa-Vis Building Living in and Lived in Past

Buildings Lived in	Buildings Living in	Buildings Prefer to Live in									Total N	Total %	No Res- ponse	Grand Total
		7 - 15			16 - 20			21 - 32						
		N	%	(L <sub>3</sub> )	N	%	(M <sub>3</sub> )	N	%	(H <sub>3</sub> )				
1-3 (L <sub>1</sub> )	7-15 (L <sub>2</sub> )	140	40.0	L <sub>1</sub> L <sub>2</sub> L <sub>3</sub>	-	-	LLM	2	40.0	LLH	142	39.2		
	16-20 (M <sub>2</sub> )	110	31.4	LML	7	100.0	LMM	2	40.0	LMH	119	32.9		
	21-32 (H <sub>2</sub> )	94	26.9	LHL	-	-	LHM	1	20.0	LHH	95	26.2		
	Total	350	96.7		7	1.9		5	1.4		362	89.6	45	407
4-6 (M <sub>1</sub> )	7-15 (L <sub>2</sub> )	1	3.8	MLL	-	-	M <sub>1</sub> L <sub>2</sub> M <sub>3</sub>	-	-	MLH	1	3.8		
	16-20 (M <sub>2</sub> )	14	53.8	MML	-	-	M <sub>1</sub> M <sub>2</sub> M <sub>3</sub>	-	-	MMH	14	53.8		
	21-32 (H <sub>2</sub> )	11	42.3	MHL	-	-	M <sub>1</sub> H <sub>2</sub> M <sub>3</sub>	-	-	MHH	11	42.3		
	Total	26	100.0		-	-		-	-		26	6.47	10	36
7 and above (H <sub>1</sub> )	7-15 (L <sub>2</sub> )	-	-	HLL	-	-	HLM	-	-	H <sub>1</sub> L <sub>2</sub> H <sub>3</sub>	-	-		
	16-20 (M <sub>2</sub> )	4	26.7	HML	-	-	HMM	-	-	H <sub>1</sub> M <sub>2</sub> H <sub>3</sub>	4	25.0		
	21-32 (H <sub>2</sub> )	11	73.3	HHL	-	-	HHM	1	100.0	H <sub>1</sub> H <sub>2</sub> H <sub>3</sub>	12	75.0		
	Total	15	93.8		-	-		1	6.2		16	4.0	1	17
Grand Total		391	85.0		7	1.5		6	1.3		404	87.8	56	460

where L<sub>1</sub>M<sub>1</sub> & H<sub>1</sub> represent Low, Medium & Tall High-rise buildings, respondents lived in past  
 L<sub>2</sub>M<sub>2</sub> & H<sub>2</sub> represent Low, medium & Tall High-rise buildings, respondents live at present  
 L<sub>3</sub>M<sub>3</sub> & H<sub>3</sub> represent Low, Medium & Tall High-rise buildings, respondents prefer to live.

Table 6.10(a) Analysis of Respondents' Preferences for Various Floor Levels Visa-Vis Floorwise Living in & Lived in Past

Floors Lived in	Floors Living in	Floors Preferred to Live in					Total Respondents	
		Present Preferred (L <sub>2</sub> /H <sub>2</sub> )		Present Preferred (M <sub>2</sub> /H <sub>2</sub> )		Present Preferred (L <sub>2</sub> /M <sub>2</sub> )		
		(L <sub>3</sub> )	(M <sub>3</sub> )	(L <sub>3</sub> /M <sub>3</sub> )	(H <sub>3</sub> )			
		+2	+1	(0)zero	-1	-2		
1-2 (L <sub>1</sub> )	1-6 (L <sub>2</sub> )	-	-	83 L <sub>2</sub> L <sub>3</sub>	-	4 L <sub>2</sub> M <sub>3</sub>	3 L <sub>2</sub> H <sub>3</sub>	
	7-11 (M <sub>2</sub> )	-	133 M <sub>2</sub> L <sub>3</sub>	7 M <sub>2</sub> M <sub>3</sub>	11 M <sub>2</sub> H <sub>3</sub>	-		
	12-31 (H <sub>2</sub> )	110 H <sub>2</sub> L <sub>3</sub>	3 H <sub>2</sub> L <sub>3</sub>	3 H <sub>2</sub> M <sub>3</sub>	-	-		
		110 30.8%	136 38.1%	93 26.0%	15 4.2%	3 0.8%	357	
3-5 (M <sub>1</sub> )	1-6 (L <sub>2</sub> )	-	-	2 L <sub>2</sub> L <sub>3</sub>	-	-	1 L <sub>2</sub> H <sub>3</sub>	
	7-11 (M <sub>2</sub> )	-	7 M <sub>2</sub> L <sub>3</sub>	-	1 M <sub>2</sub> H <sub>3</sub>	-		
	12-31 (H <sub>2</sub> )	14 H <sub>2</sub> L <sub>3</sub>	-	2 H <sub>2</sub> M <sub>3</sub>	-	-		
		14 51.9%	7 25.9%	4 14.8%	1 3.7%	1 3.7%	27	
6 & above (H <sub>1</sub> )	1-6 (L <sub>2</sub> )	-	-	2 L <sub>2</sub> L <sub>3</sub>	-	-	-	
	7-11 (M <sub>2</sub> )	-	3 M <sub>2</sub> L <sub>3</sub>	-	-	-		
	12-31 (H <sub>2</sub> )	14 H <sub>2</sub> L <sub>3</sub>	1 H <sub>2</sub> M <sub>3</sub>	-	-	-		
		14 70.0%	4 20.0%	2 10.0%	-	-	20	
Grand Total		138 34.0%	147 36.0%	99 25.0%	16 4.0%	4 4.0%	404	
		N %	N %	N %	N %	N %		
		246 86.3	93 93.9	18 90.0				
		21 7.4	4 4.1	2 10.0				
		18 6.3	2 2.1	- -				
	285 70.0	99 25.0	20 5.0			404		

Table 6.10(b) Analysis of Respondents' Preferences for Various Buildings Visa-Vis Buildings Living In and Lived in Past

Buildings Lived in	Buildings Living in	Present (H <sub>2</sub> ) Preferred (L <sub>3</sub> ) +2	Present (M <sub>2</sub> /H <sub>2</sub> ) Preferred (L <sub>3</sub> /M <sub>3</sub> ) +1	Present (L <sub>2</sub> M <sub>2</sub> H <sub>2</sub> ) Preferred (L <sub>3</sub> M <sub>3</sub> H <sub>3</sub> ) (0)zero	Present (L <sub>2</sub> /M <sub>2</sub> ) Preferred (M <sub>3</sub> /H <sub>3</sub> ) -1	Present (L <sub>2</sub> ) Preferred (H <sub>3</sub> ) -2	Total Respondents
1-3 (L <sub>1</sub> )	7-15 (L <sub>2</sub> )	-	-	140 L <sub>2</sub> L <sub>3</sub>	-	2 L <sub>2</sub> H <sub>3</sub>	362
	16-20 (M <sub>2</sub> )	-	116 M <sub>2</sub> L <sub>3</sub>	7 M <sub>2</sub> M <sub>3</sub>	2 M <sub>2</sub> H <sub>3</sub>	-	
	21-32 (H <sub>2</sub> )	94 H <sub>2</sub> L <sub>3</sub>	- H <sub>2</sub> L <sub>3</sub>	1 H <sub>2</sub> H <sub>3</sub>	-	-	
	-----		94 25.9%	116 32.0%	148 40.9%	2 0.6%	
4-6 (M <sub>1</sub> )	7-15 (L <sub>2</sub> )	-	-	1 L <sub>2</sub> L <sub>3</sub>	-	-	26
	16-20 (M <sub>2</sub> )	-	14 M <sub>2</sub> L <sub>3</sub>	-	-	-	
	21-32 (H <sub>2</sub> )	11 H <sub>2</sub> L <sub>3</sub>	-	-	-	-	
-----		11 42.3%	14 53.8%	1 3.8%	-	-	
7 & above (H <sub>1</sub> )	7-15 (L <sub>2</sub> )	-	-	-	-	-	16
	16-20 (M <sub>2</sub> )	-	4 M <sub>2</sub> L <sub>3</sub>	-	-	-	
	21-32 (L <sub>2</sub> )	11 H <sub>2</sub> L <sub>3</sub>	-	1 H <sub>2</sub> H <sub>3</sub>	-	-	
-----		11 68.7%	4 25.0%	1 6.3%	-	-	
Grand Total		116 28.7	134 33.2	150 37.1	2 0.5	2 0.5	404
		N	%	N %	N	%	
		210	84.0	148 98.7	4	100.0	
		25	10.0	1 0.7	-	-	
		15	6.0	1 0.7	-	-	
		250	61.9	150 37.1	4	1.0	404

## CHAPTER - 7

### SYNTHESIS

#### 7.1 GENERAL

Our urban population has been growing quite rapidly in recent years. It has already doubled between 1961 and 1981. Urban dwellers during this period have increased from 78.9 to 159.7 million. The share of urban to total population has shown 12.7 percent increase between 1901 and 1981 from 11 to 23.7%. The spectacular growth of population witnessed by large and metropolitan cities has been largely due to migrants seeking employment, business, education or settlement. According to current estimates, 4 million people in India migrate every year, a good number of them to metropolitan areas. Since urban facilities and amenities do not match with the growth of population, life in some of these areas is no longer comfortable. As a consequence many people are forced to live in slums. Nearly 13 out of 42 million (30.8%) people in 1981, living in cities of 10 lakhs or more, are slum dwellers. By 1991 these slum dwellers are likely to aggregate 20 million and will constitute 38.8% of the slum dwellers in the country (NBO, 1987).

Land and housing shortage are the most important metropolitan problems of the day. Most metropolitan areas in the country have virtually reached the limits of horizontal expansion. As such large number of urbanites have to cover long distances to reach their work places. Continued migration of people and natural increase in population are likely to add further to these problems. Even in the most prosperous Bombay Metropolis, the current annual demand for new housing units at 60,000 is three times the number actually constructed in the formal sector (Sehgal, 1986).

Where and how can the additional households be housed in our fast growing cities ? There is one answer and that is high-rise apartment buildings. This kind of housing development looks to be inevitable. Perhaps this alone can overcome the problem of acute land shortage and growing distances in our expanding cities. Introduction of elevators has made erection and living in high-rise buildings possible. Both elevator and high-rise technologies are available to us and with these it should be possible to house our metropolitan residents without exerting much pressure on already scarce land.

A shift from horizontal to vertical housing expansion is not a very simple development. It involves, among other things, adjustment rather transformation of social, psychological and physical environments. This transformation is bound to be complex, time consuming and dependent on our understanding of issues involved and their incorporation in our planning, designing and construction of high-rise residential complexes. Evidences from other countries indicate that high-rise living without careful planning and design has not been acceptable to people even in the advanced west. There are instances, though rare, where prestigious buildings for want of residents had to be blown up or demolished. Pritt Igoes an award-winning United States Tower Complex Housing Project in St.Louis is an example where buildings were dynamited in 1972 only after a decade of their construction. Before doing so they were put to sale for few pounds. "The interest payments will continue for, perhaps, another 50 years to swell the city's debt. But it is now in the extreme cases seemingly less expensive to sell off or demolish this unwanted housing stock" (Editor, 1978). At places such buildings did not yield even the interest on investment.

A shift from a single family dwelling to a multi-storey apartment dwelling is, perhaps, as complicated and delicate as a shift from domestic system



of production to that of factory system. It requires a gradual transformation in social value system. It involves living under entirely different set of conditions and situations. New neighbourhoods, assortment of many neighbours yet in seclusion, high above the ground, distant from nears and dears, and so on. The composition of neighbourhood differs substantially from single family dwelling types. Even the freedom to move into and out of one's house is restricted here by the availability of lift. Naturally the process is complicated.

High-rise living is still in its infancy in India. Not many studies particularly in social and psychological aspects of high-rise living have been undertaken in this vital and promising area of our future metropolitan living. How do our high-rise habitants feel in their apparently beautiful apartments? Are they satisfied with this kind of living? What kind of deficiencies do they find in the new environment? These and many other related questions, though crucial and vital for the future of high-rise living, await detailed investigation. Our knowledge about such details at present is very limited. Incidentally even the National Housing Policy document 1987, being silent about this kind of living, does not seem to attach any importance to high-rise housing. It seems to have escaped even the attention of national planners.

As already stated the main aim of the present study was to understand broadly living of people in high-rise buildings and identify the problems that they experience after shifting to, this kind of, high-rise living. The study intended to analyse their experiences with a view to benefit and plan the future of such living. It is at least a humble beginning. Future research would detail out each and every aspect involved with high-rise living.

In view of limitation of resources and time, the scope of the study was restricted to Bombay Metropolis. It has a very good concentration of high-rise residents in the country. On the basis of preliminary survey and test

questionnaire, most of the problems of high-rise residents here were found to fall under three major heads, namely, social, psychological and physical. This pattern is evident in studies conducted outside the country as well.

As already mentioned, residents of high-rise buildings have to live in completely new social set-up. Here most residents are and also remain strangers even after staying in the same building. They are separated from their relations and age old neighbours, they and even their ancestors knew from generations. They no longer enjoy the freedom to call on their immediate neighbours whenever they like without any prior appointment. The old practices of all women and aged assembling together under small groups for hours is no longer valid for high-rise residents. Here every resident is busy and is very much choosy about and in selection of acquaintances and making friendship. Even children find themselves under great constraints. Their freedom is restricted considerably in such living.

Consequently high-rise residents are confronted by a host of social problems. These problems are bound to arise in any situation particularly where high-rise living is a first experience. It may not be possible to eliminate all such problems yet some of these can be taken care of by planning high-rise buildings after thorough study and consideration of all these problems. Appropriate changes in design, layout, provision of recreational and open spaces etc. for high-rise complexes can mitigate social tensions to a large extent.

Social problems alone do not bother and challenge high-rise residents initially. Even the individual resident is confronted by an entirely new set of psychological problems. He has many additional reasons to feel tense, insecure, isolated and ignored. The pathetic situation that Mrs. Roshan Nadar Rabadi, a housewife of Hughes Road, Bombay underwent illustrates one such high-rise living problem. Mrs. Rabadi although due to her own negligence found

herself get locked, in her bath room at the 14th floor, felt helpless at the floor (FPJ, 1979).

Elevators are no doubt the main source of vertical circulation in high-rise buildings. However, getting trapped in them due to any failure or waiting for them also influence the individual and his psychology. The experience of entrapment in elevator in between two floors for Mr. K.N.Damle, (Shahani, 1979), a resident of 18th floor of a high-rise building, is horrifying, yet he has to use the lift at least twice a day. The scare of fire and earthquake always daunts most high-rise residents. Such instances, though rare, affect the psychology of the individual. Mr. Damle is shattered after having seen a film about a sky-scraper on fire plus an interview with the Fire Officer appearing in a news paper, which has left a deep and sad impression on him. Memories of fire in Sidharta Hotel. in which 37 people were killed and Gopala Towers in New Delhi in 1983 had yet to get wiped off our minds when just another devastating fire on 29th June 1987 at Ansal Bhawan broke out. This fire has left very fresh memories of the devastating powers of fire hazards particularly in case of high-rise buidings. "The buildings continue to be death traps" (Mehta, 1983).

Residents remain tense on account of their children wanting to play outside the flat. As such they forced their children to remain inside the flat. As per one news item (TOI, 1987), a 10 year child of a high-rise apartment when forced to remain inside shot at both his parents with a gun. The father was pronounced dead while the mother was hit by two gun shots, but safe recovering in hospital. Of course, the news does not pertain to our Country. There are hosts of such other factors. Here again proper planning and education may help in reducing the relative importance of certain psychological factors.

The physical environment including the building and its surroundings play an equally important role in determining the levels of satisfaction and dissatisfaction of high-rise residents. "The concept of territory is basic to the home environment and we have forgotten it", is how American Architect Oscar Newman (1975), pinpoints the root-cause of the problem. As per Newman, "collective space, the responsibility of no single family, risks becoming a no-man's land. People in single family dwellings are closely identified with their property". Britain's Environment Minister Peter Shore, in U.N.Habitat Conference at Vancouver (H.T., 1976), said, "multi-storey housing blocks in the inner cities created more problems than they solved". He told the meeting that "I do not want to see any more massive schemes of high-rise blocks of family dwellings. We are determined, henceforth, to build on a human scale". Faulty designs, lack of spaces for drying of clothes, placement of doors and windows, storage spaces, corridors and their dimensions, balconies, provision of sufficient and pleasant waiting spaces for elevator users, number and capacity of elevators, open spaces, outer view and many other physical factors are important determinants of satisfaction and safety of residents.

## **7.2 FORMULATION OF RANK ORDER OF SOCIO-PSYCHOLOGICAL PROBLEMS**

Some of the factors mentioned here and elsewhere and their relative importance are formulated in Table 7.1. It shows the rank order position of each factor as indicated by the analysis of the reactions of the respondents.

## **7.3 COMPREHENSIVE INTEGRATED APPROACH TO ISSUES & CHALLENGES**

Reactions of high-rise residents on social, psychological and physical or built environments obtained during field investigation have already been discussed in the preceding three chapters. What challenges are thrown up by these for the future of high-rise living are already known. How can these challenges be met? Even this aspect has partly been covered in each of the above mentioned chapters. However, the challenges and solutions are

inter-related in so far as social, psychological and built environments are concerned. It is through an integrated approach that problems of high-rise residents can be solved and such living made easy and acceptable to most metropolitan residents.

The following chart is formulated as the schedule of major issues and challenges emerging from the study and confronting high-rise residents, planners and designers. The list is not exhaustive but just illustrative.

### Social Aspects

<u>Issues</u>	<u>Challenges</u>	<u>Architectural Design Approach</u>
Lack of social contact among a) Families b) Housewives c) Elderly persons d) Children	Promote socialization and interaction to bring sense of neighbourliness, sense of community and to avoid isolation, loneliness, helplessness and seclusion but foster friendliness, acquaintance and companionship.	<ul style="list-style-type: none"> <li>-Provision of proper facilities like lounges, wide balconies and corridors, halls for social and cultural events, reading room etc.</li> <li>-Provision of proper facilities for promotion of interaction among children (indoors and outdoors activities).</li> <li>-Provision of proper facilities for promotion of socialization among housewives and elderly persons.</li> <li>-Provision of common facilities for encouraging organisation of marriage celebrations, parties and the like at specific community spaces within high-rise building complex.</li> <li>-In addition formation of voluntary organisations, by housing societies by arranging cultural activities, sports occasional get together, joint celebrations of major social events like Deepawali, Idd, Christmas, Holi etc., would go a long way in helping meet the challenges.</li> </ul>

## Psychological Aspects

Issues	Challenges	Architectural Design Approach
Isolation	Loneliness, boredom alienation and tension	-Promotion of socialization by providing right facilities within the high-rise building complex already discussed.
Impersonalness	Conflict and ill feelings	-Providing facilities for development of belongingness, interaction and familiarity.
Panic	Insecurity, fear and tension	<ul style="list-style-type: none"> <li>-Provision of quick and safe fire escape for reaching down on ground.</li> <li>-Adequate provision for fire fighting and security.</li> <li>-Adequate and appropriate majors to avoid panicky situations.</li> <li>-Construction of earthquake resistant buildings.</li> </ul>
Lift waiting	Delay, inconvenience anger and irritation	-Reduce long waiting for lifts by adding fast elevator and reducing lift stoppages but convenient to all floor levels.
Privacy	Interference, exposure, disturbance and uneasiness	-Provision of facilities where possible, greater privacy by modifying design as also by placement of doors, windows and balconies.
Drying of clothes	Disturbance, anger conflict and misunderstandings	-Provision of proper facilities for drying clothes not visible from outside spoiling building facade and not creating disturbance to other residents living in next lower floor.
Noise : created by late night parties, children playing in and outside apartments	Disturbance, inconvenience, anger and irritation	<ul style="list-style-type: none"> <li>-Provision of properly designed community hall (in basement/ground floor) for functions, parties etc.</li> <li>-Provision of children's play facilities at each floor in balcony access etc.</li> <li>-In addition educating residents to avoid noise would also help meet the challenges.</li> </ul>
Child care	Fear, worry and tension arising on account of unattended children playing down below	-Provision of, audio-visual contacts, appointed supervision for safety of children would help meet the challenge.

Garbage disposal	Irritation, inconvenience and tension	<ul style="list-style-type: none"> <li>-Provision of properly designed and placed garbage disposal facilities.</li> <li>-Educating residents to avoid throwing waste from windows and balconies.</li> <li>-Special daily facilities for garbage removal.</li> </ul>
Problems of water supply	Inconvenience and irritation	<ul style="list-style-type: none"> <li>-Provision of sufficient water storage system at the ground and terrace levels and even at various levels to ensure undisturbed regular water supply at all levels.</li> </ul>
Problems of repairs and maintenance of sanitation, plumbing and electric power.	Tension, inconvenience and irritation	<ul style="list-style-type: none"> <li>-Arrangements for maintaining a complaint register in entrance lounge and quick attendance to repairs and maintenance of plumbing and electric power problems.</li> </ul>

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The above chart is suggestive but not exhaustive. Many more such issues and solutions referred to in the text can be included in the chart. However, the ones listed in the chart are very important and crucial. As can be seen, there is some possibility to meet every listed challenge. The solutions are neither difficult nor beyond the reach of residents and housing societies. Proper identification of issues, challenges and solutions can go a long way in meeting the basic socio-psychological and physical requirements of high-rise residents. In case this is not done then the future of high-rise living can itself turn out to be bleak. But we cannot afford that situation given the constraints of urban land and fast growing population. Happily the issues and challenges are manageable and these need to be given due attention by all the concerned. The experience of living in high-rise flats over the period would, by itself, help the residents to adjust to new kind of living. It is only in the initial phase that some problems might appear to be formidable. It is here that designers, planners and housing societies have to play a very positive role by sparing no effort to overcome the problems of new living.

Table 7.1 Rank Order Listing of Problem causing Factors/Issues Based on the Response Percentage of High-Rise Household Respondents

Rank Order	Causes/ Issues	Percentage of Respondents Listing the Issues	Results of Chi-square Test		Level of Significance
			Chi-square Value*	Contingency Coefficient	
1.	2.	3.	4.	5.	6.
1.	Socialization: The urge for social interaction to socialize with neighbours	94	12.9160	0.2025	.02
2.	Tension & Scare: Caused on account of security and safety of children using lifts and playing unattended on ground far below	86	5.4222	0.1113	.05**
3.	Irritation: Caused on account of waiting for lift arrival.	85	7.9133	0.1311	.05**
4.	Tension & Irritation: Due to irregular water supply at different floor levels	83	15.4970	0.1830	.01
5.	Irritation, Tension & Fatigue: Caused on account of ascending stairs and lifting heavy household goods in case of lift failures	82	15.1458	0.1822	.01
6.	Irritation & Tension: Caused due to light garbage/waste materials drifting in the apartment through windows, balconies etc.	82	9.7477	0.1454	.05
7.	Deprivation of Natural Surroundings: Caused on account of lack of green spaces and garden for aesthetics and material happiness.	81	14.9787	0.1782	.01
8.	Irritation & Scare: caused due to unsightly comments and caricature on entrance hall, corridor and other common space walls including lift cab walls.	78	1.2630	0.5321	.05**

(Contd.....)



1.	2.	3.	4.	5.	6.
9.	Irritation and Disturbances: Caused due to noise created by clattering of window and balcony door glass panes and fearful sounds by gushing winds.	76	13.5798	0.1737	.01
10.	Mounting Tension & Irritation: Caused on account of disturbing noise created by children playing in and outside the flat and alongside.	75	1.2740	0.5020	.05**
11.	Tension & Irritation: Caused due to inconvenience faced because of undue delays in electric and plumbing repairs.	64	8.9283	0.1410	.05**
12.	Irritation & Misunderstanding: Caused due to unresolved leaking toilet/kitchen in the immediate floor above.	62	5.7243	0.1134	.05**
13.	Tension & Worry: Caused on account of insecurity and fear of children slipping through stairs or windows.	58	8.5918	0.1354	.05**
14.	Irritation & Disturbance: Caused due to noise created by late night parties music and dance.	54	13.2428	0.1709	.02
15.	Worry, Tension & Deprivation: Caused on account of lack of communication with children, in need of help etc. playing far below on the ground.	53	14.2470	0.1805	.01
16.	Anticipated Fear: Caused on account of dangers of devastating fire and earthquake hazards.	44	21.4855	0.2198	.001
17.	Inconvenience, Worry & Deprivation: Caused on account of lack of proper drying space.	42	9.6282	0.1478	.05

(Contd.....)

1.	2.	3.	4.	5.	6.
18.	Fear & Worry: Caused due to unattended children playing in corridors etc.	40	9.2012	0.1467	.05**
19.	Fear, Worry & Tension: Caused on account of parked vehicles not under personel supervision.	37	7.3638	0.1325	.05**
20.	Inconvenience: Caused due to lack of sufficient living, storage and other spaces.	29	16.9888	0.1941	.01
21.	Irritation & Tension: Caused on account of disturbance and inconvenience due to long hanging of clothes preventing breeze, sunshine and view.	29	14.6021	0.1824	.02
22.	Inconvenience: Caused due to lack of space for rearing pets, storage space for children's play and sports equipment (Prms, Bicycle, tricycle and playing kits).	28	9.9791	0.1554	.05
23.	Panic & Tension: Created due to intruders and other unexpected situations.	24	13.5756	0.1705	.01

\* Chi-square test value with .05 probability at 4 degree of freedom is 9.468. This and other higher values have been considered to have significant correlation between the variables being tested.

\*\* No significant correlation.

## CHAPTER - 8

### CONCLUSIONS AND RECOMMENDATIONS

This study was undertaken primarily to understand the behaviour aspects and reactions of the residents of high-rise buildings. Naturally residents, the users of built environment as individuals and as social groups and the built environment itself constituted the basic parameters for the investigation. Housing is very intimately connected and interwoven with the individuals, society and their development. High-rise housing situation in urban areas of certain other countries, reflecting different circumstances have also been discussed. Studies and surveys undertaken in these countries to identify and analyse users' reactions and preferences have also been referred to. The city of Bombay which leads all Indian cities in respect of tall apartment buildings was chosen for this study. Such buildings in Bombay continue to be the only viable alternative for housing the fast growing population given the very limited land area and soaring land prices. Non-probability sampling method was used for the selection of high-rise buildings of the city. Residents of lower floors were also included in the study to facilitate comparison. The results of the study are expected to be helpful in improving the functional and design aspects of high-rise buildings, besides in shaping an appropriate policy in this regard. The study is also expected to help Architects, Planners and Decision-makers in formulating schemes to house, most suitably, growing urban population especially in metropolitan and other larger cities in the country. An attempt to identify major socio-psychological problems of the high-rise residents and to evolve appropriate and integrated approach to solve the same has been undertaken in depth in the study.

## 8.1 CONCLUSIONS

Most respondents living in high-rise apartment buildings are found to consist of nuclear families with grown up children. It is true as should have been expected that most families have children. About one-eighth of the households alone are without children. About one-fifth of the households include those with parents or other elderly persons. More than half the nucleated families with grown up children occupied medium or higher floors. The proportion of households with children under 5 years decreases with the increase in floor levels. It is observed that mostly employed residents preferred lower floors while those in business seem to prefer medium or higher floors. The latter perhaps prefer such floors for privacy and prestige.

Over two-fifths of the respondent households had shifted to Bombay from towns and rural areas. More than half had migrated from other cities. Only one-fifth of the respondent households are the original residents of Bombay city (Table 6.7). Over two-fifths of the resident households were in the medium annual income range of under Rs.20,000/- to Rs.30,000/-. Only one-third of the respondent households were in the annual income range of over Rs.30,000/-.

Almost all the residents wish to maintain social contacts with their neighbours and socialize. A significant relation between socialization and the number of storeys of high-rise buildings is observed. Need for socialization seems to be increasing with the increase of building height upto medium high-rise building. Younger children, though keen to play in the open, are not allowed to do so in high-rise building environment. The parents do not like their children to play outside without escort. This is particularly so after the eleventh floor. Elderly persons in high-rise buildings generally remain indoors. They are dis-

satisfied because they cannot enjoy the company of other elderly persons living in high-rise buildings. These persons generally wish to spend their time in the open green lawns around high-rise buildings but cannot do so for a variety of reasons, discussed in the text.

Usually long waiting for the lift is irritating and boring. Lift waiting time and floor levels (upto medium floors) are directly related. Irritations due to long waiting for lift are directly proportional to floor levels upto the eleventh floor. Thereafter the two are inversely related.

Irregular water supply is a major cause of irritation for high-rise residents. This irritation is directly proportional to the floor levels and building heights upto 20 storey buildings. Thereafter the two variables again indicate inverse relationship. The correlation between the two is highly significant.

Paucity/lack of clothes drying space results in hanging of clothes on the verandah and window sills. Irritation on account of hanging of clothes on the external facade of the high-rise apartment building is found inversely correlated with number of storeys upto medium high-rise buildings beyond which the correlation is direct.

Irritation due to garbage and rubbish coming through the windows from above is directly related to floor heights upto 11th floor whereafter it is found to be inverse. In other words the irritation on this account increases with the increase of floors upto the 11th floor level and with further increase of floor level irritation decreases. The correlation is found to be a significant one.

The combined or altogether impact of all the components causing irritation is correlated significantly with building height. The irritation marginally

increases with increase of building height upto medium high-rise building level and thereafter with further increase of building height irritation marginally decreases. By and large, all residents in high-rise buildings feel irritated when all the factors causing irritation are considered altogether.

Late night music and dance parties are also irritating. This irritation decreases with the increase in building heights. The correlation is significant.

Lack of communication with, and supervision of, children playing on the ground scares the residents especially when there is some problem with the children. This scare is directly related to floor levels and building heights. The correlation is highly significant here.

The possibility of high-rise residents getting involved in panicky situations on account of fire and earthquake hazards contributes greatly to the fear and tension. The very idea of a fire or earthquake frightens and shakes them. The fear of fire and earthquake increases sharply with increase of floor level (lower and medium). Marginal decrease in fear is observed with further increase of floors. The two are strongly correlated.

Fear of accidents and inconvenience associated with the ascending and descending of stairs in case of elevator failures, as well as carrying of heavy furniture and household goods and the number of storeys are directly correlated. This inconvenience increases with the increase of building heights and floor levels. The correlation is significant.

Commulative effect of components causing tension has been found to possess a direct and significant correlation with floor levels and building heights.

Desire for green and gardening spaces adjacent to the residences (for growing flowers and vegetables) increases with the increase of floor levels more so upto 11th floor whereafter no change is observed. The correlation is found to be highly significant.

It was observed that the feeling of lack of space for pets, children playing kits, prams, bicycles etc., increases with increasing floor levels showing thereby that residents of higher level are more dis-satisfied comparatively to their counterparts in lower floors. The correlation between the two variables is significant.

Inconvenience and irritation caused by the wind as expected, is directly related with floor levels. Upto medium floor levels this feeling increases whereafter any increase in floor level does not influence this feeling, further more.

The combined impact of various components causing fear and inconvenience and the floor levels are directly and significantly correlated. This impact increases with the increase of floor levels.

## 8.2 RECOMMENDATIONS

The following main recommendations follow from the study:

The investigation reveals that people in general do not like very high flats under the prevailing circumstances. Most people desire a small house, with a small front green lawn and a backyard for their convenience and that of their children and elderly persons. However, given the present and fast growing demand for metropolitan housing, high-rise apartments are the only viable alternative. Our findings regarding high-rise living can therefore help in evolving appropriate design guidelines for high-rise apartments. These

findings can also help in taking care of certain socio-psychological problems associated and peculiar to such living.

Irritation caused by waiting for lift needs to be minimised. Primarily, this could be done by an additional fast speed elevator to take passengers directly to upper floors. The stoppages of other lift could be made at 6th, 9th..4 floor levels in corridor access slab block high-rise buildings. One stoppage would serve three floors (one floor where it stops, and one each floor above and below this floor). Limiting the cab stoppages thus would ensure saving of about two thirds of the waiting time otherwise required. In the case of balcony access type high-rise buildings, a different design could be adopted. Balcony access, at alternate staircase landing levels providing access to various floors, would have to be running through the length of the building. The balcony has to be placed conveniently at a level inbetween two floors and connected to the building by bridges at the landing levels. In this way two floors, by ascending and descending one flight in each case, are served. This would ensure saving of about half the lift waiting time otherwise required. Young children and toddlers would also get discouraged to slip out in lobby and sometime in lift as they would have to go one flight up or down before reaching into the balcony access. Possibility of accidental fall or lift entrapment would, perhaps, become rear in such a case.

The foyer or the entrance hall needs to be made a pleasant waiting place. The entry to the building should have a beautiful lounge,\*an attractive and pleasant sitting space, neat and clean environment with provision for displaying notices about general meetings, festival celebrations and the other informations relevant for the residents. The lounge be made inviting with green plants, a nice and aesthetically well finished flooring etc. Residents should be tempted to sit here and enjoy some leisure time. This would promote social interaction also. Such sitting lounges should be provided preferably at each\*\*



or alternate floors. Alternatively lounges could also be provided alongwith the restricted elevator stoppages suggested above. This will help make lift waiting time pleasant. Such a common sitting place would also help elderly persons\* to interact, with their counterparts living in different floors as they are not permitted otherwise to go out without any escort. Even house wives with young kids could use such spaces when feeling lonely and aloof. A complaint book be placed at each of the waiting lounges. All complaints need to be urgently attended. Timely attendence of the complaints will go a long way in making high-rise a happy experience.

Underground water storage tank with maximum possible capacity and another similar tank on the top of the building with a regulator need to be provided to minimise inconvenience to the residents on account of water supply. Storage tanks could alternatively be arranged at convenient floor intervals (5th/6th floor) to ensure uninterrupted and undisturbed water supply to all the floors.

Garbage chutes and their utility can be improved considerably. They should have larger entry openings and placed suitably. The openings should not turn to be dangerous for children. Each kitchen should be provided with a garbage disposal unit. Collection dump at the bottom of the chute needs to be sealed properly to check pests and flies and odour. Timely removal of the garbage thus collected in collection dumps should also be ensured.

A separate clothes drying space, like an enclosed veranda\*\*with proper ventilation, needs to be provided to each dwelling unit along or near the bath room or washing space. This space should be enclosed so that clothes are not visible from outside. The external wall of the space could be made with honey-combed brick or jalli (trellis work) to provide adequate air circulation and light. A couple of hanging rods at a convenient height under the

ceiling or between two end wells of this enclosure can serve as a comfortable drying space. Also clothes would not get blown away by air flow/wind. A portion of this space could also store left over items and those used occasionally.

Provision of a locker to each dwelling unit either underground or on the ground floor shall facilitate storing of bicycles, playing kits and prams, tricycles etc. The space could also be used as a transit store.

A washer and a dryer are not very common among the households. Laundry facilities therefore needs to be provided. These laundry facilities should be provided at the ground and every 5th floor\*. This facility at these floors will provide effective service without any risk or tension. Even children or elderly persons in the household can take and bring clothes to and from laundry one floor or maximum two floors up or down\*.

Families with very young children should preferably be housed in lower floors i.e. close to the ground to enable children to play in the open. Some play area should be carved out even in the access balconies or passages\*\* where mothers could directly or indirectly watch/supervise their children without any tension. It would also help housewives, who remain lonely for the day to gradually interact and socialize with other counterparts.

To minimise vertigo effect all the openings on the external walls of the building should be provided with a projecting slab\*\*\* at the sill level which would not permit a direct underview. Alternatively a sunshade should project out of the building at every 5th floor and should be over the windows and continuous throughout length and breadth of the building facades. It could also be arranged over the window openings provided they are placed/positioned in such a way that the projecting sunshades over the window at lower level obstruct a direct

\*Fig. 8.6

\*\*Fig. 8.2

\*\*\*Fig. 8.5

view of the ground.

The access balcony in slab block high-rise apartment buildings should be usually more in width at intervals. The additional space could be useful as play space for kids.\* The parapet of the balcony should be high enough to prevent children to jump over it. However, small well protected openings or punctures would allow inquisitive children to look through and would prevent them to climb the parapet and invite accidents.

Large verandahs and balconies should be provided with each dwelling. This would provide elderly persons and others an opportunity to get engaged to grow flowers and small plants in pots in their leisure time. Although this would not really satisfy their urge for gardening yet it would keep them busy in their leisure time and would result in their better satisfaction.

To prevent fire accidents, provision of adequate and effective fire safety equipment should be statutory requirement for all high-rise buildings. Occupation certificates by Municipal Authorities should be issued only after ensuring installation of fire safety equipment as required. Fire safety equipment needs to be installed at each floor. The residents should be made familiar with its use to impart confidence and avoid confusion. Adjacent buildings need to be connected where possible by enclosed bridges (skyways)\*\* atleast at every 8 or 10th floor levels. These could be used as community space and in case of fire as fire escape which would help minimise stampede and accidents thereof.

Service lifts of larger size are necessary. This would help keep the passenger lifts exclusively for the residents and the guests. The service lifts could be used to lift furniture and other heavy household goods as also by servants, sweepers, hawkers etc.

The problems arising on account of late night music and dance parties,

\*Fig. 8.2

\*\*Fig. 8.6

festivities, chantings during religious functions could be taken care of by the provision of a sound proof community halls/centre, preferably in ground floor of each high-rise apartment building.

### 8.3 SCOPE FOR FUTURE STUDIES

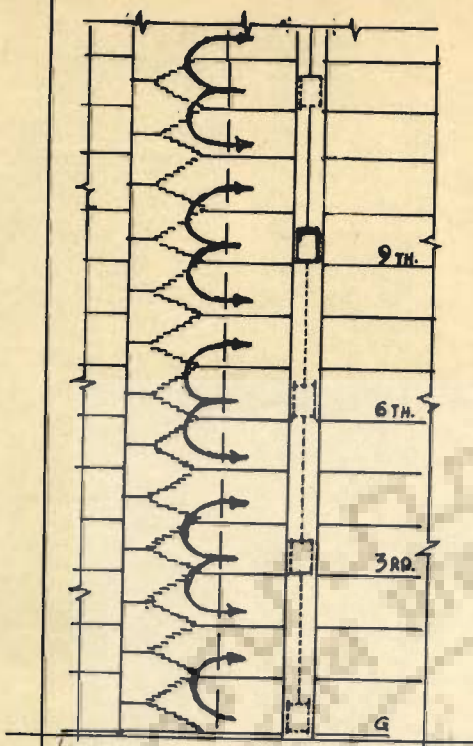
The study of high-rise living is still in its infancy in India. There is considerable scope for all kinds of studies in this new and vital area, particularly in the metropolitan cities of Delhi, Calcutta, Madras and Bombay. Without such studies high-rise development cannot be properly planned and executed. Comparative merits and demerits of different types of living can be discussed only after a number of studies of high apartment living are conducted. There is urgent need for close collaboration between the designers, builders and behavioural scientists. Future high-rise apartment building schemes and designs should include costs for social service maintenance.

Future research should focus on the following:

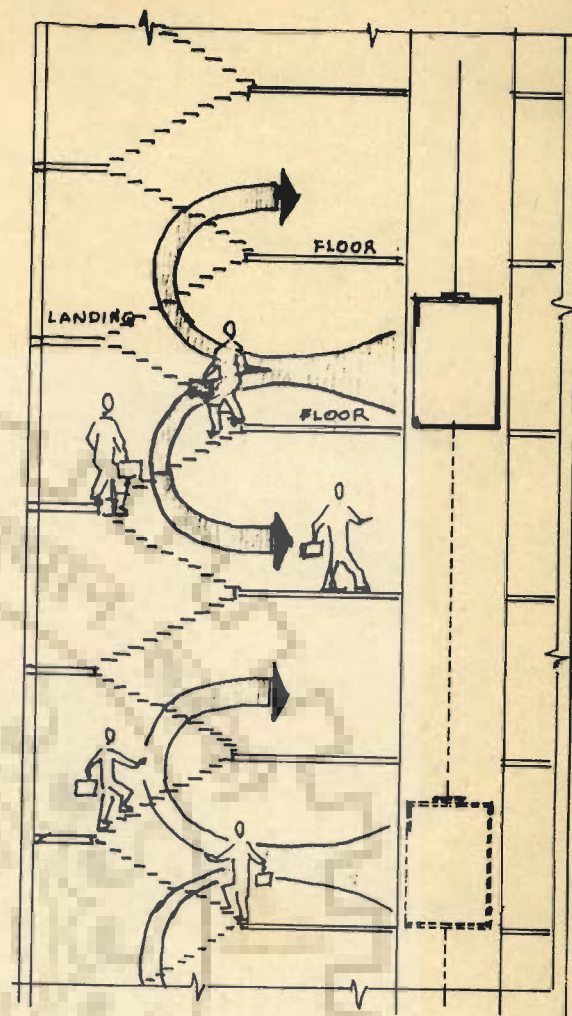
- behavioural studies on inhabitants of high-rise apartments, immediately on their occupancy of such apartments as well as after two to three years of their experience in living in them. Such studies would help in evolving appropriate high-rise apartment design,
- Vertigo studies at various floors/building heights on various age groups of occupants of high-rise buildings need to be undertaken to determine optimal and ideal apartment building heights,
- Study of high density low-rise buildings to help solve housing problems in the country,
- Study of statutory and architectural control in regard to the socio-psychological problems in high-rise apartment buildings and,

- Study of various building forms and shapes to help innovate new high-rise building designs.

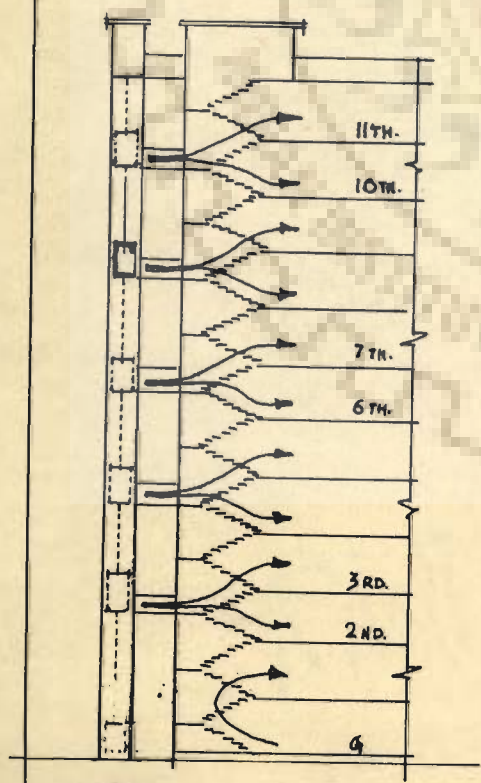




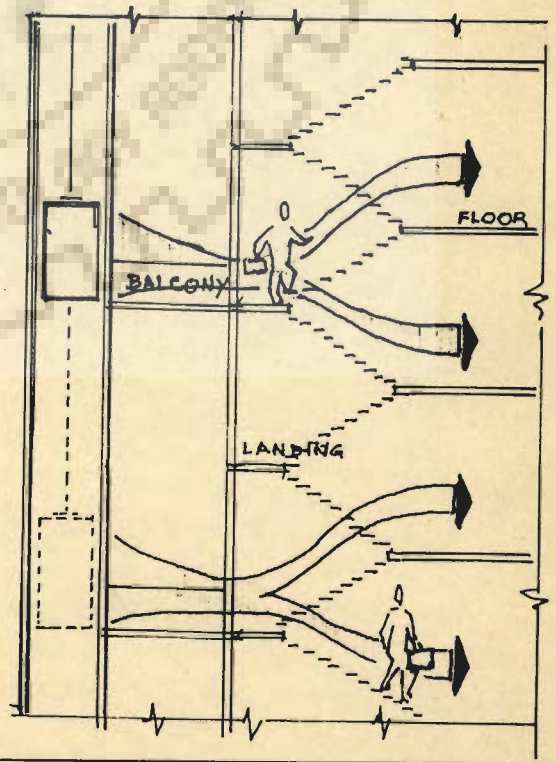
LIFT CAB STOPS



CORRIDOR ACCESS  
FLOORS & LIMITED LIFT STOPPAGE

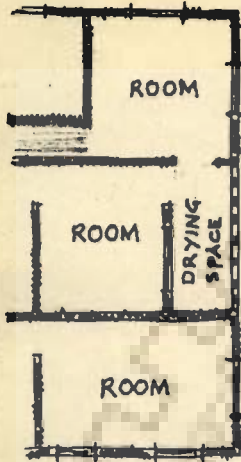


LIFT CAB STOPS

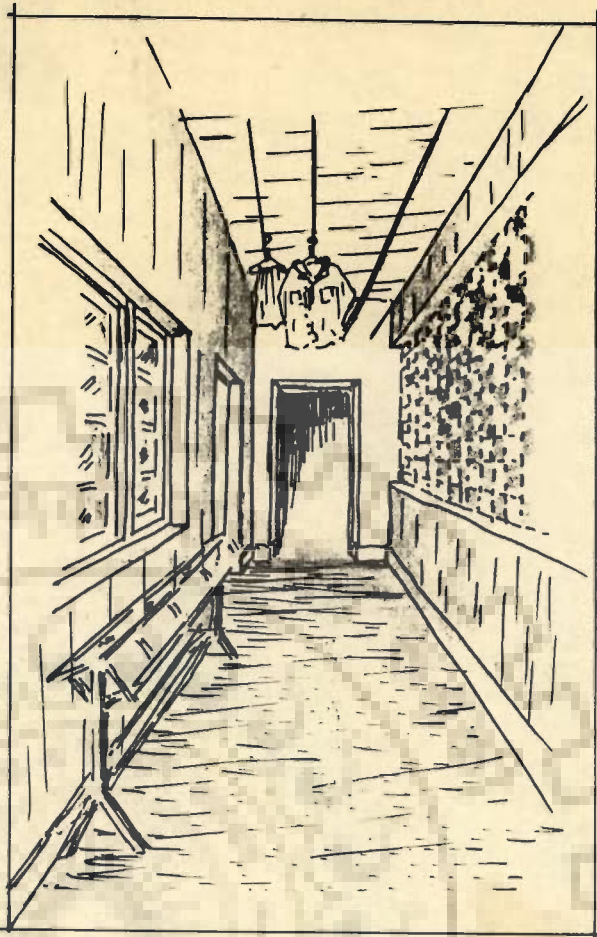


BALCONY ACCESS

## DRYING ENCLOSURE



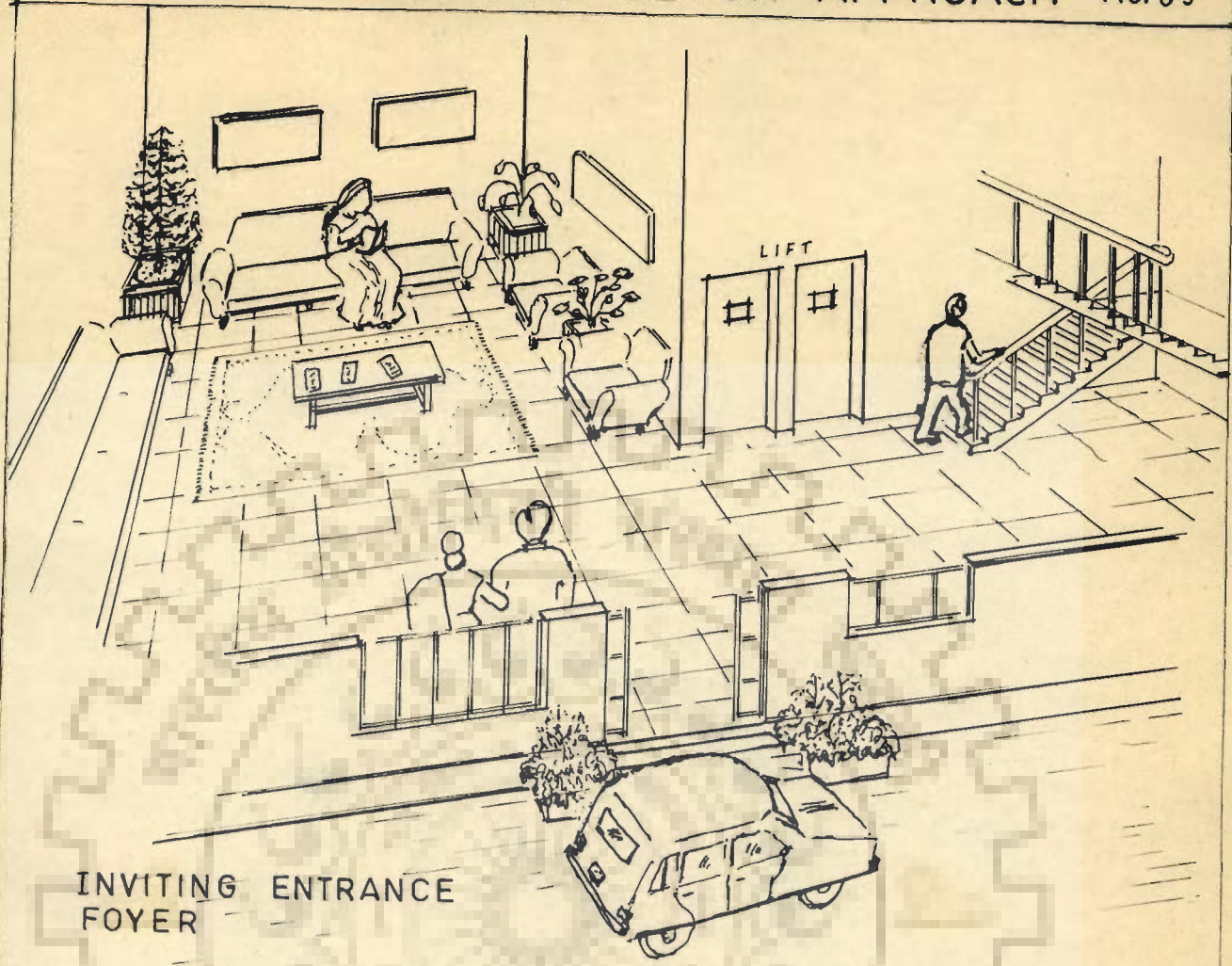
PLAN



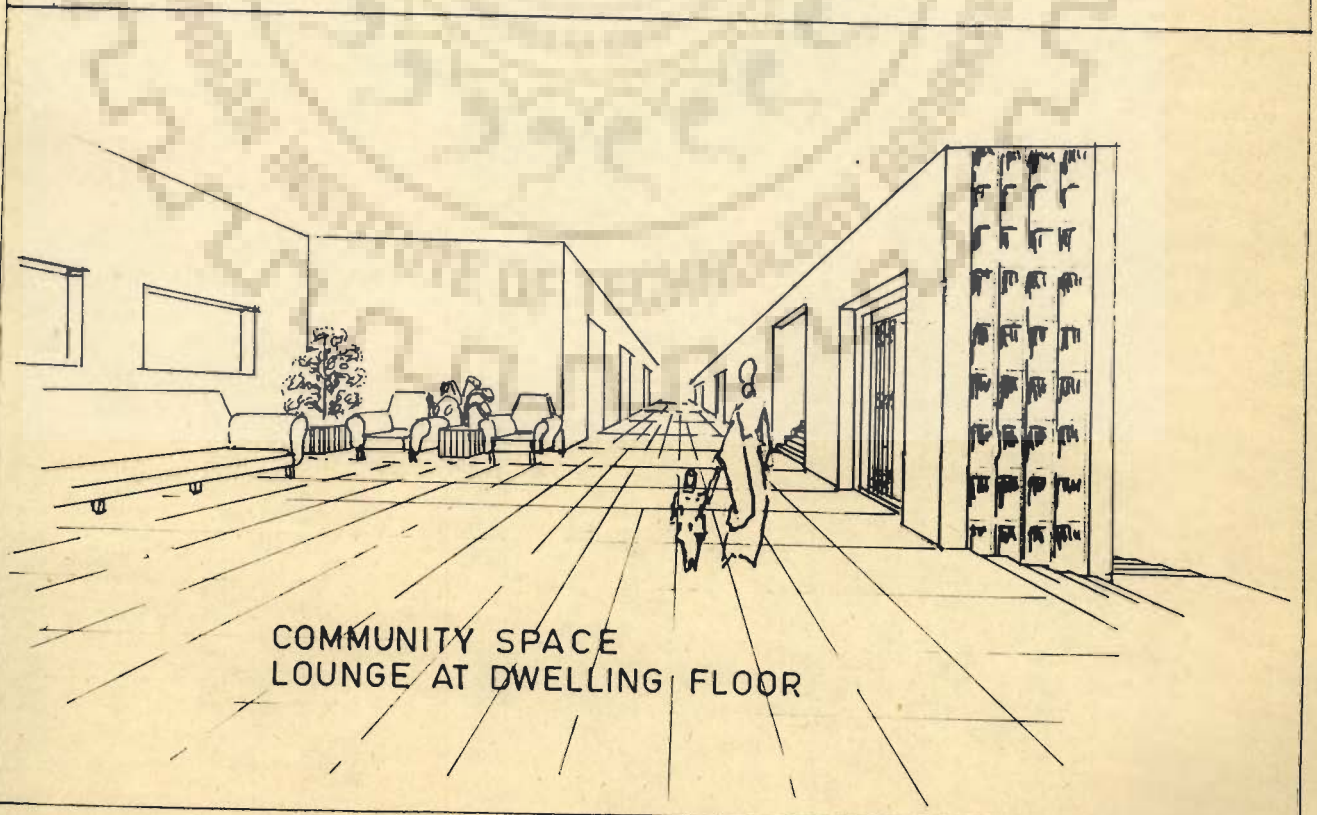
VIEW

## SOCIAL INTERACTION





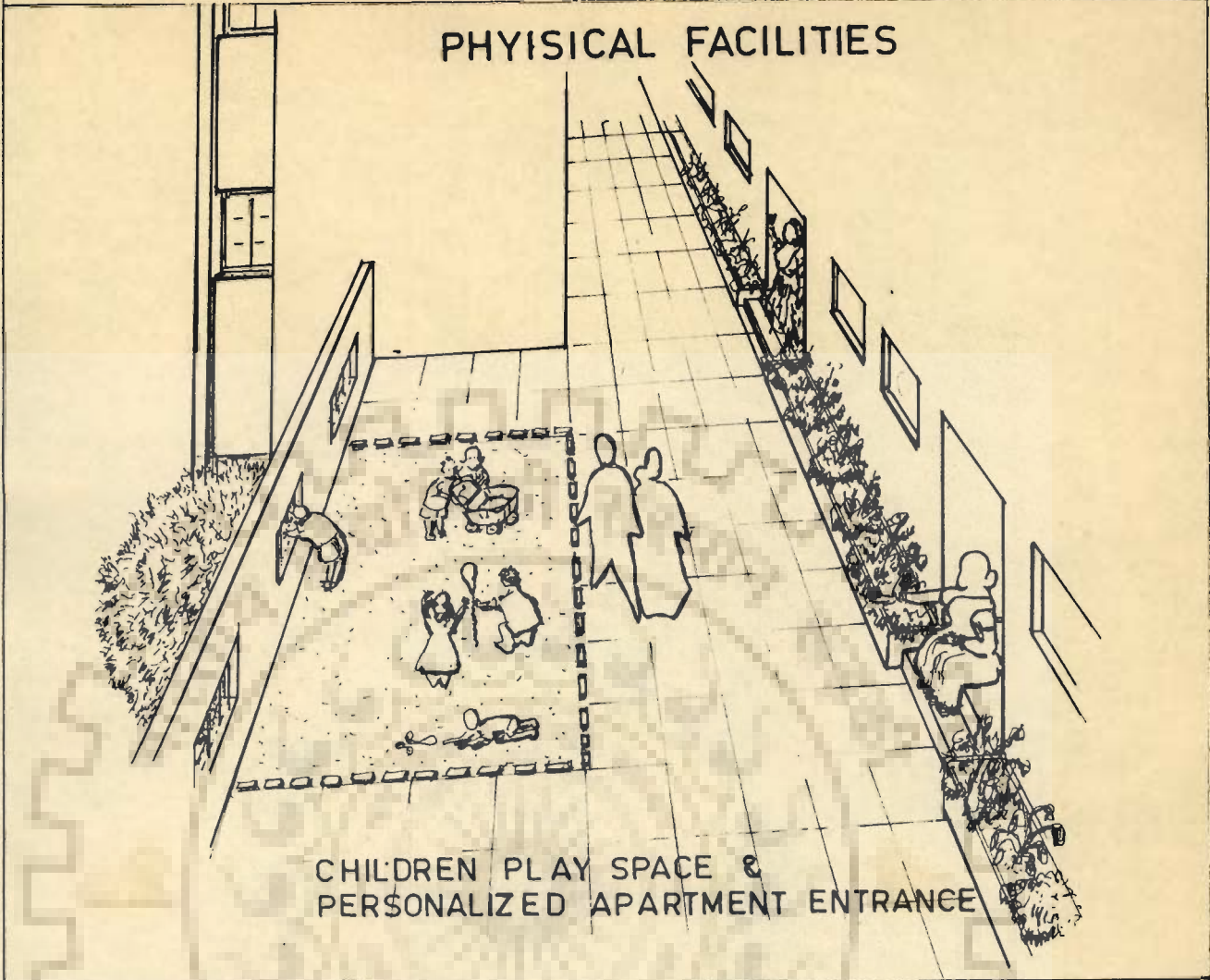
INVITING ENTRANCE  
FOYER



COMMUNITY SPACE  
LOUNGE AT DWELLING FLOOR



PHYSICAL FACILITIES



CHILDREN PLAY SPACE & PERSONALIZED APARTMENT ENTRANCE

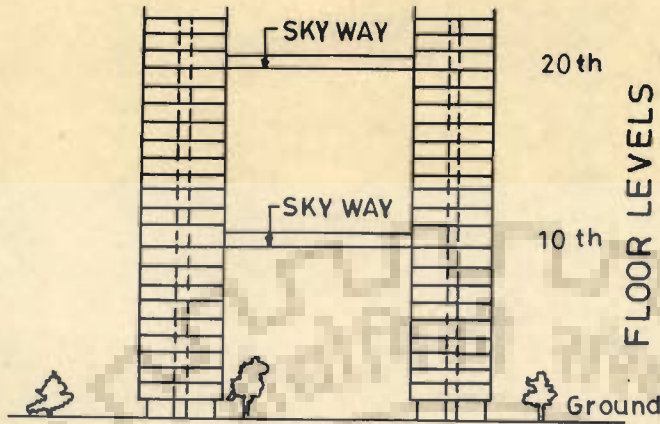


CONVENIENT MOVEMENT SPACE FOR HOUSEWIVES, ELDERLY PERSONS & CHILDREN

# ARCHITECTURAL DESIGN APPROACH

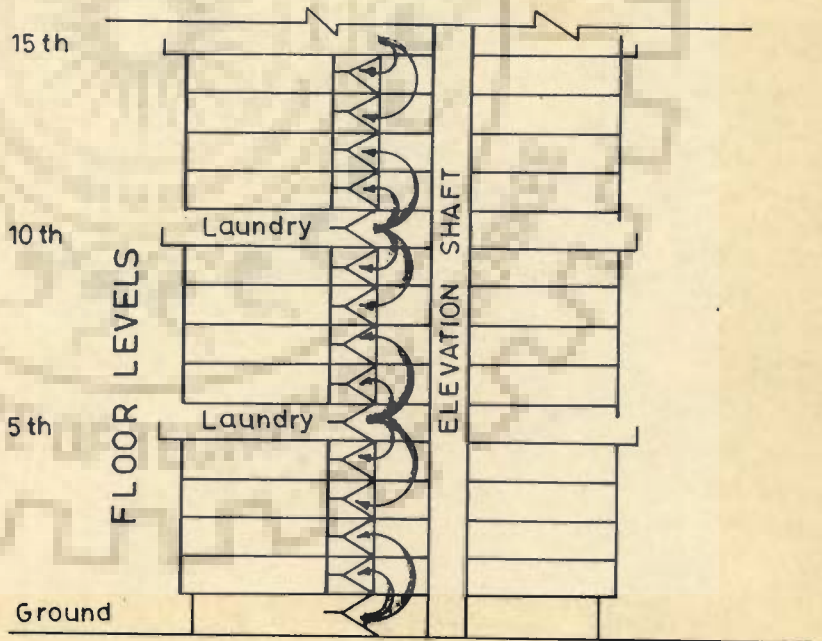
FIG. 8.6

## FIRE ESCAPE & OTHER FACILITIES



FIRE ESCAPE IN HIGH-RISE BUILDINGS

SERVICES FLOORS FOR  
WATER SUPPLY  
PLUMBING  
LAUNDRY



FACILITIES IN HIGH-RISE BUILDING

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## APPENDIX - I

**A Request to High-Rise Residents  
in the Study Area in Bombay**

**C. L. BHAN**

SR. LECTURER REGIONAL ENGINEERING COLLEGE, SRINAGAR (KASHMIR)



ON DEPUTATION AS RESEARCH SCHOLAR  
DEPTT. OF ARCHITECTURE & PLANNING  
UNIVERSITY OF ROORKEE, ROORKEE, (U.P.)

Dear Sir/Madam,

Living in high-rise apartments has become an inevitable component of modern life as a result of heavy urbanisation. The living environment of these apartments has become a subject of crucial concern to the residents and the designers alike. The Western experience indicates that the residents are generally not too happy with the living environments of high-rise buildings probably because they have no other choice. Since this experience is relatively new in India, we should learn from the experiences of the residents with a view to create a better and healthy living environment in future high-rise developments.

With this objective in mind, a study has been initiated in the Deptt. Of Architecture & Planning, University of Roorkee, to investigate all relevant aspects of high-rise living. You are requested to highlight the problems as you personally react to them and record on the proforma that I will soon be handing over to you personally. I am eagerly looking forward for a privileged meeting with you.

Thanking you and with high regards,

Yours faithfully,

  
(C.L. Bhan)



APPENDIX - II

Questionnaire Schedules

DEPARTMENT OF ARCHITECTURE & PLANNING  
UNIVERSITY OF ROORKEE

**SOCIO-PSYCHOLOGICAL STUDY OF HIGH-RISE LIVING IN BOMBAY**

Resident's Name..... Relation with Head of Household.....

**A P P E A L**

Respondent is requested to consider himself for a while as an individual, not in anyway connected/ attached with, the flat he/she is living in, emotionally or otherwise, as an owner or a tenant.

Enlighten the investigation by your experience of having spent sometime as a resident in this flat.

**Unbiased Answers** are solicited to be based purely on your experience merely as an inhabitant of the flat in a high-rise building.

II CHARACTERISTICS OF SOCIAL & PSYCHOLOGICAL STRESS ON THE INHABITANTS OF, HIGHRISE APARTMENT BUILDINGS

(Please use code Nos. to answer the following)

CODE : Feel strongly and persistently = 1	Do not feel at all = 3
Feel mildly and only sometimes = 2	Can not say = 4

**Factors Responsible for PSYCHOLOGICAL STRESS of inhabitants of High-Rise Buildings**

**Feel irritated due to :**

- |  |  |
|--|--|
| 2.1 Waiting long for lift <input type="checkbox"/>   | 2.2 Liftman indicating, lift going in the other direction <input type="checkbox"/>   |
| 2.3 Servants, hawkers, milkmen, maids etc. travel along with residents <input type="checkbox"/>                    | 2.4 Possibility of missing hawkers, his call not audible at this height/floor <input type="checkbox"/>                                     |
| 2.5 Scribbings on lift walls and other surfaces <input type="checkbox"/>   | 2.6 Leakage in bath room above <input type="checkbox"/>  |
| 2.7 Remaining indoors all the day/time <input type="checkbox"/>  | 2.8 Irregular water supply <input type="checkbox"/>  |
| 2.9 Hammering sound of taps <input type="checkbox"/>   | 2.10 Sanitary defects not quickly attended <input type="checkbox"/>  |
| 2.11 Garbage thrown from windows <input type="checkbox"/>  | 2.12 Light garbage drifting in the flat through windows <input type="checkbox"/>   |
| 2.13 View, breeze & light obstructed, by long clothes hung on upper floor balcony/windows <input type="checkbox"/> | 2.14 Inconvenience caused by Drivers, Servants & their friends playing laughing aloud in the parking area itself. <input type="checkbox"/> |
| 2.15 Scavengers knock at early morning hours <input type="checkbox"/>  | 2.16 More Charges of Servants at higher floors to those at lower floors <input type="checkbox"/>   |
| 2.17 Wiring faults being difficult to detect <input type="checkbox"/>  | 2.18 Crackers played on door front, corridors etc. <input type="checkbox"/>  |
| 2.19 Wrong delivery of mail & goods, addresses being numerous <input type="checkbox"/>                             | 2.20 Delayed medical attendance; doctor having to search for flat <input type="checkbox"/>   |

**Feel in convenient due to :**

- |  |   |
|--|---|
| 3.1 Noise created by parties, loud music and dance <input type="checkbox"/>            | 3.2 Noise created by flushing tank above <input type="checkbox"/>               |
| 3.3 Noise created by movement of furniture etc at upper floor <input type="checkbox"/> | 3.4 Noise of childrens' play at upper floor & corridor <input type="checkbox"/> |
|  | 3.5 Traffic Noise (if living in lower floors/levels) <input type="checkbox"/>   |

**Feel tension due to :**

- |   |  |
|---|--|
| 4.1 Children not under personal care <input type="checkbox"/> | 4.2 Parking not under personal vigil <input type="checkbox"/>                        |
| 4.2 Lack of privacy <input type="checkbox"/>                  | 4.4 Lack of personalism (building of cooperative ownership) <input type="checkbox"/> |

**Feel for**

- |   |  |
|---|--|
| 5.1 Insufficient accommodation <input type="checkbox"/> | 5.2 Free movement within the Flat <input type="checkbox"/> |
| 5.3 Open space at this level <input type="checkbox"/>   | 5.4 Childrens' play area <input type="checkbox"/>          |
| 5.5 Clothes drying spaces <input type="checkbox"/>      | 5.6 Space for prams & pets <input type="checkbox"/>        |

CODE : Feel strongly and persistently=1	Do not feel at all=3
Feel mildly and only sometimes=2	Can not Say =4

**Feel for**

- |  |                          |   |                          |
|--|--------------------------|---|--------------------------|
| 5.7 Space for growing flowers & vegetables | <input type="checkbox"/> | 5.6 Green open space at easy reach            | <input type="checkbox"/> |
| 5.9 Neighbourhood/Group cohesion           | <input type="checkbox"/> | 5.10 Movement space for invalids and elderly  | <input type="checkbox"/> |
| 5.11 Communication with children at play   | <input type="checkbox"/> | 5.12 Safety at the time of earthquake or fire | <input type="checkbox"/> |

**Feel**

- |  |                          |  |                          |
|--|--------------------------|--|--------------------------|
| 6.1 Insignificant                                  | <input type="checkbox"/> | 6.2 Socially disappointed                          | <input type="checkbox"/> |
| 6.3 Nervous (Specially children & elderly)         | <input type="checkbox"/> | 6.4 Insecure (Specially Housewife during day time) | <input type="checkbox"/> |
| 6.5 Lonely (specially Housewife during day time)   | <input type="checkbox"/> | 6.6 Jail like environment                          | <input type="checkbox"/> |
| 6.7 Marooned at this height (Specially when alone) | <input type="checkbox"/> | 6.8 Lost in crowd (high density)                   | <input type="checkbox"/> |

**Feel effects of, at this height (sometimes only)**

- |  |                          |  |                          |   |                          |                |                          |
|--|--------------------------|--|--------------------------|---|--------------------------|----------------|--------------------------|
| 7.1 Wind                                   | <input type="checkbox"/> | 7.2 Air Pollution                      | <input type="checkbox"/> | 7.3 Fire                                  | <input type="checkbox"/> | 7.4 Earthquake | <input type="checkbox"/> |
| 7.5 Vertigo (For elderly & others as well) | <input type="checkbox"/> | 7.6 Shadow due to other tall buildings | <input type="checkbox"/> | 7.8 Ascending Stairs with heavy furniture | <input type="checkbox"/> |                | <input type="checkbox"/> |
| 7.7 Ascending stairs when lift fails       | <input type="checkbox"/> |  |                          |   |                          |                |                          |

**Things Liked about Tall buildings**

CODE : YES=1 NO=2

- |  |                          |  |                          |
|--|--------------------------|--|--------------------------|
| 8.1 Like view of scenery   | <input type="checkbox"/> | 8.2 Like to see far  | <input type="checkbox"/> |
| 8.3 Like height  | <input type="checkbox"/> | 8.4 Like general facilities available                            | <input type="checkbox"/> |
| 8.5 Like feeling of prestige & status  | <input type="checkbox"/> | 8.6 Economical on space  | <input type="checkbox"/> |
| 8.7 Centrally located, convenient, near to store                                 | <input type="checkbox"/> | 8.8 Good for Social life, meeting people in fixed areas          | <input type="checkbox"/> |
| 8.9 Quite environments   | <input type="checkbox"/> | 8.10 Safe  | <input type="checkbox"/> |
| 8.11 Like fresh air & cool breeze  | <input type="checkbox"/> | 8.12 Like cosmopolitan area                                      | <input type="checkbox"/> |
| 8.13 Feel free from snakes, mosquitoes & other insects in comparison to low-rise | <input type="checkbox"/> | 8.14 Economic due to less use of fans, cooler & air conditioners | <input type="checkbox"/> |

**Things Disliked about Tall buildings**

CODE : YES=1 NO =2

- |  |                          |   |                          |
|--|--------------------------|---|--------------------------|
| 9.1 Dislike height                                   | <input type="checkbox"/> | 9.2 Miss Greenery                                   | <input type="checkbox"/> |
| 9.3 Feel isolated                                    | <input type="checkbox"/> | 9.4 Fear fire & earthquake                          | <input type="checkbox"/> |
| 9.5 Fear, sometime being stuck in lift               | <input type="checkbox"/> | 9.6 Neighbours noisy                                | <input type="checkbox"/> |
| 9.7 Tall buildings are impersonal                    | <input type="checkbox"/> | 9.8 Tall buildings are monotonous                   | <input type="checkbox"/> |
| 9.9 No personal control on environmental             | <input type="checkbox"/> | 9.10 Shadow of other tall buildings                 | <input type="checkbox"/> |
| 9.11 Increased incidence of crime, theft and suicide | <input type="checkbox"/> | 9.12 Increased incidence of quarrel with neighbours | <input type="checkbox"/> |
| 9.13 Rush of people                                  | <input type="checkbox"/> | 9.14 Rush of traffic                                | <input type="checkbox"/> |

**Residents Satisfaction**

CODE : Satisfaction=1 Dissatisfaction=2

- |                                      |                          |                            |                          |
|--------------------------------------|--------------------------|----------------------------|--------------------------|
| 10.1 Water Supply system             | <input type="checkbox"/> | 10.2 Sanitary System       | <input type="checkbox"/> |
| 10.3 Garbage disposal system         | <input type="checkbox"/> | 10.4 Transport System      | <input type="checkbox"/> |
| 10.5 Fire fighting facility & system | <input type="checkbox"/> | 10.6 Police facility       | <input type="checkbox"/> |
| 10.7 Post & Telegraph facility       | <input type="checkbox"/> | 10.8 Dispensary facility   | <input type="checkbox"/> |
| 10.9 School facility                 | <input type="checkbox"/> | 10.10 Neighbours behaviour | <input type="checkbox"/> |

**Residents Suggestions & Preference towards better living**

.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

For more Suggestions please use additional paper

DEPARTMENT OF ARCHITECTURE & PLANNING  
UNIVERSITY OF ROORKEE  
ROORKEE (U.P.)

**SOCIO-PSYCHOLOGICAL STUDY OF HIGH-RISE LIVING IN BOMBAY**

**Questionnaire**

Please (X) the Box/Boxes for an Appropriate Answer

**Particulars of the present Apartment**

**1.1 Did you choose the present apartment for the following :**

- |  |                             |  |                             |
|--|-----------------------------|--|-----------------------------|
| The only available at higher level                   | -1 <input type="checkbox"/> | The flat being in high-rise building               | -2 <input type="checkbox"/> |
| The locality being centrally located                 | -3 <input type="checkbox"/> | The locality being a cosmopolitan area             | -4 <input type="checkbox"/> |
| The locality being near the place of work            | -5 <input type="checkbox"/> | The locality being prestigious and full of glamour | -6 <input type="checkbox"/> |
| The lower floor flat not available as an alternative | -7 <input type="checkbox"/> | The price range being within budget for a dwelling | -8 <input type="checkbox"/> |

Any other (specify).....

**1.2 Had choice been available to you at the time of selection, which one of the following (Buildings) would you have preferred to the present :**

- |               |                             |                |                             |                 |                             |
|---------------|-----------------------------|----------------|-----------------------------|-----------------|-----------------------------|
| Single Storey | -1 <input type="checkbox"/> | Double Storey  | -2 <input type="checkbox"/> | Three Storey    | -3 <input type="checkbox"/> |
| Upto 6 Storey | -4 <input type="checkbox"/> | Upto 10 Storey | -5 <input type="checkbox"/> | Above 10 Storey | -6 <input type="checkbox"/> |

**Priority-wise preference for the no. of storey of the apartment building**

First Priority.....storey 7 | Second Priority.....storey 8 | Third Priority.....storey 9 | Last of all .....storey 10

**1.3 Had choice been available to you at the time of selection which one of the following (Floors) would you have preferred to the present :**

- |   |                             |  |                             |
|---|-----------------------------|--|-----------------------------|
| Ground floor in single storey             | -1 <input type="checkbox"/> | One/Two floors in double Storey          | -2 <input type="checkbox"/> |
| Flat at third floor                       | -3 <input type="checkbox"/> | Any one floor between 4th. & 6th. floors | -4 <input type="checkbox"/> |
| Any one floor between 6th. & 10th. floors | -5 <input type="checkbox"/> | Any floor above 10th. floor              | -6 <input type="checkbox"/> |

**Priority-wise preference for the floor :**

First Priority .....floor 7 | Second Priority.....floor 8 | Third Priority.....floor 9 | Last of all .....floor 10

**1.4 Social Contact**

**1.4.1 Do you like to maintain Social Contact with neighbours :** Yes -1 , No -2 , Do not know -3

**1.4.2 If yes,**

Is it for the following reason/reasons :

- |                                 |                             |   |                             |
|---------------------------------|-----------------------------|---|-----------------------------|
| To know neighbours              | -1 <input type="checkbox"/> | To know other's attitude to life & living | -2 <input type="checkbox"/> |
| To come to others' help in need | -3 <input type="checkbox"/> | To get help when in need                  | -4 <input type="checkbox"/> |

**If no,**

Is it for the following reason/reasons :

- |                                 |                             |   |                             |
|---------------------------------|-----------------------------|---|-----------------------------|
| Bad experience of such contacts | -5 <input type="checkbox"/> | No privacy maintained by regular visits of neighbours | -6 <input type="checkbox"/> |
|---------------------------------|-----------------------------|---|-----------------------------|

(Please give no. in the Box/Boxes)

- (a) At this floor -1
- (b) In this building -2
- (c) Around this building -3

To what extent you feel like talking to neighbours :

Great extent -1  , Not much -2   
 Not at all -3  , Go to club for the purpose -4

During a day what is the frequency of your neighbour visiting you or vice-versa :

Once or twice -1  , Many times -2   
 Very rarely -3  , Never -4

Comment on friendship that you would have made had you been in low-rise bldg. in comparison to present one :

More friends -1  , Less friends -2   
 No comments -3

for lift :

Never -1  , Occasionally -2   
 Often -3  , Always -4

1.4.6 Do you feel your neighbours are :

People very different to you -1   
 More or less like you -2   
 Can not be said (no contacts) -3

1.4.8 Comment on borrowings from and to neighbours :

Seldom -1  , Frequent -2   
 Very rarely -3  , Never -4

1.4.10 Is it for the reasons that people are not interested to maintain social contact in bldgs. they reside in :

No response -1  No spare time -2   
 Self-centredness -3  No variety -4   
 Whole day spent in travelling & office -5   
 Contacts of choice generally found in clubs -6

**Children**

Do you need to remain vigilant lest the toddler might slip away in lobby and Staircase :

Very careful -1  , Not much -2   
 No Problem (No toddlers) -3   
 No risk, so no need -4

1.5.2 Do children feel happy to play away from home in open near about :

Very happy -1  Happy -2   
 Not happy -3  Very bad -4   
 Scared -5  Difficult to say -6

Do you think your children would have made more friends had this flat been in a low-rise building :

More friends -1  , Just the same -2   
 Less friends -3  , Difficult to say -4

1.5.4 Do you think it is possible for children to get stranded in lift by mistake or mischief :

Very much -1  Just possible -2   
 Impossible -3  Difficult to say -4

Who attends children at play :

On their own -1  , Servant -2   
 Family member -3

1.5.6 Do children insist upon your company for a evening walk/stroll out of this building :

Yes -1  No -2

**Leisure**

Do you spend your leisure time on holidays and working days :

Relaxing at home -1   
 Outside in club -2   
 Outside visiting friends & relatives -3   
 Reading Books -4   
 Inside the flat attending to hobby -5   
 No leisure time available -6

1.6.2 What other things you attend to during the available liesure time :

(a) On a holiday.....  
 .....  
 .....  
 (b) On a working day.....  
 .....  
 .....

Which other activities would you like to remain engaged with during the your leisure time

.....  
 .....

7.1 Do you find any change in frequency of visitors to your flat since you came here :  
**Yes :**  
 Increased -1  Decreased -2   
**No :** Not very different now -3

7.2 **If Yes :**  
 For such a change what possible reasons you think of :  
 .....  
 .....  
 .....  
 .....

1.7.3 Have there been any cognisable remarks from your friends or relatives in respect of your flat :  
 Yes -1  No -2

1.7.4 **If yes :**  
 What kind of remarks passed regarding :  
 Location of building.....  
 Location of flat.....  
 Accommodation.....  
 Ventilation.....  
 Light (natural).....  
 (artificial).....  
 Any other.....

**8 Elderly**

8.1 Do elderly feel comfortable and happy living at this floor :  
**If yes :** (Please give reasons) :  
 .....  
 .....  
**If no :** (Please give reasons) :  
 .....  
 .....

1.8.2 Do elderly feel vertigo effects at this height :  
**Yes :**  
 Very severe -1  Mild -2   
 Only at times -3  Persistently -4   
**No :**  
 Never -5  No complaints -6

8.3 Do elderly get company for taking stroll, discussions etc. as is found in low-rise buildings.  
 Yes, possible in a high-rise building too -1  No, impossible in a high-rise building. -2

**9 Elevators**

9.1 Lift service in this building is :  
 Very convenient -1  Just convenient -2   
 Inconvenient -2  Extremely inconvenient 1

1.9.2 Does lift failure in between floors happen in this building :  
 Seldom -1  Frequent 2 -   
 Never -3

9.3 On an average how much time you have to wait for the lift :  
 .....

1.9.4 While waiting for the lift what do you feel and think at the time :  
 Feel frustrated and wish changing nearer to ground -1   
 Think about shortcomings of high-rise building -2   
 Does not affect me -3

9.5 Has it ever happened that you had to use staircase because of delay in lift arrival:—  
 Many times -1  Once or twice only -2  Never -3

**10 Miscellaneous**

10.1 Do/Have you feel/felt/faced any difficulty in performing marriages and other similar big functions in tall buildings :  
 Yes -1  No -2   
**If yes,** why do you feel so (Please give reasons)  
 .....  
 .....

1.10.2 After shifting here do you find noticeable change in the behaviour of :  
 (a) Your family members  
 Yes -1  No -2   
 (b) Your relations :  
 Yes -1  No -2

10.3 Is it inconvenient to move & attend emergency cases for medical aid.  
 Extremely inconvenient 1  Very inconvenient 2   
 Inconvenient 3  Not inconvenient 4

1.10.4 Do you think vandalism is more in high-rise to that of low-rise buildings : Yes -1  No -2   
**If yes,** give reasons :  
 .....  
 .....

10.5 Have you ever felt panicky on any account during your stay here :  
 Yes -1  No -2  **If yes,** give main causes.....  
 .....  
 .....

(Please (X) the Box/Boxes for an appropriate answers)

Owner  -1

OR

Tenant  -2

**12 Identification of Dwelling**

Building : 12.1 Name : ..... 12.2 Number of Storeys : Ground + .....  
 Flat : 12.3 Floor : ..... 12.4 Flat No. .... 12.5 Area : .....  
 12.6 Orientation :—North South  -1 East-West  -2  
 12.7 Window openings on:—North  -1, South  -2, East  -3, West  -4

**13 Building Space**

How many rooms in the flat and the purpose of their use : (Fill in the no. only please)

Room used for	No. of Rooms	Room used for	No. of Rooms	Room used for	No. of Rooms	Room used for	No. of Rooms
Living	<input type="checkbox"/>	Dining	<input type="checkbox"/>	Dining cum living	<input type="checkbox"/>	Kitchen	<input type="checkbox"/>
Beds with attached toilet	<input type="checkbox"/>	Beds without attached toilet	<input type="checkbox"/>	Study	<input type="checkbox"/>	Bath	<input type="checkbox"/>
W.C.	<input type="checkbox"/>	Verandah	<input type="checkbox"/>	Balcony	<input type="checkbox"/>	Any other (Specify)	<input type="checkbox"/>

**14 Demographic Characteristics**

Codes for the following schedule

Col. (5) & (6)	Col. (7)	Col. (8)	Col. (9)	Col. (10)	Col. (11)
Village 1	Resident 1	Single 1	Govt. service 1	Hindu 1	Upto Rs. 1000 1
Town 2	Temporary resident 2	Married 2	Pvt. service 2	Muslim 2	1001—1500 2
City 3	Temporary away 3	Widowed 3	Own business 3	Zoroastrian 3	1501—2500 3
Met. city Bombay 4 5		Divorced/ Separated 4	Retired 4	Christian 4	2501—3500 4
			Unemployed/Student 5	Other (specify) 5	3501—5000 5
			Housewife 6		Above 5000 6

Key to enter the information (Fill-in only the code nos. given above)

Sl. No.	Name of the family member	Relation with the Head	Age in years	Place of birth	Education received at					Residential Status	Marital Status	Present Occupation	Religion	Apx. monthly income in Rs.
					Primary	Secondary	College/Uni.	Technical	Higher					
(1)	(2)	(3)	(4)	(5)	(6)					(7)	(8)	(9)	(10)	(11)
14.1		Husband/wife = Head												
14.2		Husband/wife												
14.3		Son/daughter												
14.4		Son/daughter												
14.5		Son/daughter												
14.6		Son/daughter												
14.7		Father/brother												
14.8		Mother												
14.9		Others												

**15 Period of Stay** (Fill in only the no. of years stayed in the present building)

Less than One year  One to Five years  Six to Ten years  Eleven to Fifteen years   
 Sixteen to Twenty years  Above Twenty years

**16 Conveyance owned** (Fill in actual no.)

Car/Jeep..... Station wagon..... Motor cycle/Scooter..... Bicycle.....



**17 Place of Work**

Please (X) the boxes for an appropriate answer

17.1 How far is your place of work from your residence :..... Km.

17.2 How do you generally travel this distance daily : Own  Public transport  2

Owned Transport				Public Transport			
On foot	1 <input type="checkbox"/>	Cycle	2 <input type="checkbox"/>	Taxi	7 <input type="checkbox"/>	Bus	8 <input type="checkbox"/>
Scooter/Motor cycle	3 <input type="checkbox"/>	Car	4 <input type="checkbox"/>	Train	9 <input type="checkbox"/>	Train & Bus	10 <input type="checkbox"/>
Official vehicle	5 <input type="checkbox"/>	Pooled vehicle	6 <input type="checkbox"/>	Train & Taxi	11 <input type="checkbox"/>		

**18 Ancestral place of Residence**

	Head of the family	Village	Town	City	Metropolitan city	Bombay
18.1	Head (Husband/Wife)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
18.2	Spouse	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

**19 Other places the family Lived-in for at least five years**

(Please move to the next, if this question is not known to you)

	Husband	Village	Town	City	Met. City	Bombay
19.1	Parents	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
19.2	Grand Parents	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
	Wife					
19.3	Parents	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
19.4	Grand Parents	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

**20 House/Flat liked most among the ones Lived-in**

20.1 Liked most the house/flat at.....floor in.....storey building

20.2 Liked it most for reasons :

Near the place of work	1 <input type="checkbox"/>	Near the Children school	2 <input type="checkbox"/>
Near the market & other facilities	3 <input type="checkbox"/>	Near to the ground	4 <input type="checkbox"/>
Being in a low-rise building	5 <input type="checkbox"/>	Being in a high-rise building	6 <input type="checkbox"/>
No crowding	7 <input type="checkbox"/>	Commodious accommodation	8 <input type="checkbox"/>

**21 Particulars of the Household before shifting in the present flat**

21.1 Staying in Bombay since childhood Yes-1  No-2

**If no.**

	Village	Town	City	Met. City
21.1.1 Came to Bombay from	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
21.1.2 Period of stay in Bombay till date	<input type="checkbox"/> <input type="checkbox"/> years			
<b>Before shifting in the present flat</b>		21.1.3 Lived at : <input type="checkbox"/> <input type="checkbox"/> floor,		21.1.4 Lived in : <input type="checkbox"/> <input type="checkbox"/> Storey building

21.2 If lived in any of the floors above 4th. floor were you : Very Happy -1  / Happy -2  / Not Happy -3

21.3 Reasons for shifting in the present flat .

To own a dwelling	1 <input type="checkbox"/>	To live at a higher level off ground	2 <input type="checkbox"/>
To live in a tall apartment building	3 <input type="checkbox"/>	To remain away from street noise	4 <input type="checkbox"/>
To be near to the place of work	5 <input type="checkbox"/>	To have more specious accommodation	6 <input type="checkbox"/>
To be nearer the ground	7 <input type="checkbox"/>	Being sensitive to vertigo effect	8 <input type="checkbox"/>
.....	<input type="checkbox"/>	.....	<input type="checkbox"/>
.....	<input type="checkbox"/>	.....	<input type="checkbox"/>

21.4 Do you wish to live in a **still taller** apartment building Yes-1  No-2

**If yes,**

21.4.1 How tall the building should be   Storey, 21.4.2 which floor the flat should be   floor





**APPENDIX - III**

**Code Sheet**

