

## **ENVIRONMENTAL FACTORS AND RESIDENTIAL CHOICE IN DIMAPUR TOWN, NAGALAND**

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**Abstract:** *Urbanization in India has led to not only acute housing problems but also environmental problems. However, many urban dwellers in India, particularly the poor, are either unaware or indifferent of the environmental hazards they are exposed to around them. Even if some are conscious of the hazards, many of them are compelled to live under such conditions due to various reasons. Despite the widespread concern for better and healthier housing environment, very little research has been carried out in order to understand and mitigate the problems of living conditions in most urban areas, especially in developing countries like India. Housing choice in an urban area like Dimapur assumes a special significance for the presence of heterogeneous ethnic, social and cultural groups with varied requirements and lifestyles. This paper tried to identify the environmental factors that influence households in determining their residential choices along with socio-economic and other factors.*

Key words: Housing choice, Environmental hazards, Dimapur.

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## Introduction

Problem of housing is growing with unplanned urbanization in most countries including India. It becomes acute with the migration of people from across the places with growing opportunities in the urban centres. The problem is reflected more with the lag in rising urban population and arrangements of housing for them. This is a more common phenomenon in a developing country like India where earlier urban places have been developed in an unplanned manner and newly gathered people find it difficult to immediately find a reasonable settlement in an appropriate location. Sometimes, choice becomes secondary for the scarcity of housing in the required location and very high price (rent) thereof. Hence, on several occasions they have to make a trade off with the locational choice and forced to stay in the outskirts of expanding town/city and shuttle daily for occupations, schooling of children, business centres and so on. Choice of location and a reasonable environment becomes prominent with the knowledge of location, price, increase of earning and entitlement. With rising capability and for the convenience of maintaining daily office/ business, education, marketing etc., those city dwellers also become tuned with the higher price (rent). Thus, the location of house as well as surrounding environment become important for enjoying civic amenities and avoid various hazards. These location and environmental factors gain importance with expanding knowledge and awareness, educational and occupational status, affordability (that comes from earning) and by imitating others particularly the people staying in the neighbourhood.

As per the records, 31.16 per cent of India's population lived in urban areas and the housing stock in urban India stands at 78.48 million for 78.86 million households (Census of India 2011). Within these 78.48 million housing several are located in areas without basic civic amenities like adequate and quality drinking water, motor-able roads, electricity, drainage, sewerage, health and education facilities etc. The quality of life in a community is greatly impacted by the availability of adequate and affordable housing (Das, 2014). But as land and real estate prices increase exponentially, more and more households opt for rental housing since their dreams of owning a house becomes more difficult. Hence, rental housing has become a key housing segment especially in urban areas. Rental housing markets benefits both landlords and tenants (Kumar, 2001). It is particularly vital in providing the shelter needs of the migrants and urban poor for

whom shelter choices are restricted in the city (Desai and Mahadevia, 2013). In India, 38 per cent of urban households lived in rented accommodations in 2008-09 (NSSO, 2010).

This article deals with how much the environmental and other factors affect the demand for rental housing in Dimapur town. Dimapur town is considered the 'gateway' of Nagaland and also occupies an important place for the neighbouring districts of Assam and the state of Manipur. Its strategic location on the railway, airway and road routes has given it a growing importance as evident by the commercial prosperity during the last few decades. Moreover, the town also performs the role of a transportation nodal point. The high influx of immigrants (after statehood of Nagaland in 1963) to Dimapur is also accentuated by the fact that it is the only place in Nagaland where Inner Line Permit (ILP) is relaxed (Town Planning Organization, 1975). Besides being the Commercial capital of Nagaland, Dimapur town is also an educational hub attracting many students from rural Nagaland and neighbouring states. The population of Dimapur town is 122834 consisting of 27857 households live in 23 wards. About 68 per cent of households in the study area live in rented accommodations (Census of India, 2011).

### **Literature Review:**

Relationships between the price of a housing unit and its characteristics have been studied by Lancaster (1966), who discussed the utility-bearing characteristics of a commodity, and Rosen (1974) who later extended the study to include a market between buyers and sellers to obtain the equilibrium implicit prices of various attributes. Rosen's approach has been frequently used in housing demand literature because, unlike other consumption goods, the housing market is unique since it manifests the characteristics of heterogeneity, durability and spatial fixity which satisfy several wants. Housing attributes are broadly classified as structural, locational and neighbourhood or environmental attributes.

Structural attributes such as floor area or size (Carroll, Clauretje and Jensen, 1996), number of rooms, bedrooms and bathrooms (Rodriguez and Sirmans, 1994), floor level (So, Tse and Ganesan, 1997), provision of balcony (Chau, Wong and Yiu, 2004), have been found to significantly affect house prices positively. Good architectural design also commands a price premium (Millhouse, 2005). Researchers also surmised that age of building is negatively related

to property prices (Rodriguez and Sirmans, 1994). However, Li and Brown (1980) found a positive effect of age on some buildings due to historical significance or vintage effects of the buildings. Forrest, Glen and Ward, (1996), found that availability of garage positively impact house prices. Other empirical works found that structural quality, such as exterior structure and condition of floors; windows and walls also influence housing prices (Morris, Woods and Jacobson, 1972).

In respect of neighbourhood attributes, both Chattopadhyay (1999) and Zabel & Kiel (2000) examined the relationship between air quality and property values and established that air pollution significantly reduces residential property values. Thus, preference for environmental or natural resource quality can be reflected in the variation in house prices (Leggett and Bockstael, 2000; and Hoeln and Deaton, 2002).

The questions of hazards, security, etc., are also important criteria for people's preference of residential houses. The influence of other negative externalities have also been empirically studied: such as crime rates (Thaler, 1978), traffic noise (Nelson, 1982); airport noise (Nelson, 1980); hazardous waste sites (Hoeln and Deaton, 2002); industrial sites (Vor and Groot, 2011), all are found to have statistically significant negative impacts on property values of the area.

### **Statement of the Problem:**

Housing comes as a bundle of attributes like size, type and construction features, location in respect of various desired destination of everyday life (e.g., distance from educational institutions for the families having school/college going children, distance from workplace, market, main road of connectivity in the neighbourhood, whether having green surrounding or not etc). Preferences of various attributes inherent in a house are reflected in the variation of prices offered for variation in such attributes and final choice by a potential buyer (tenant in the present case) is made depending on her/his capability, requirement and availability of various attributes including environmental conditions. It is observed that urban green spaces, clean water bodies and good environments provide amenities and services that contribute fundamentally to the quality of urban life and appreciates the property values (Van Herzele and Wiedemann, 2003; Chiesura, 2004). As opposed to this, hazardous environmental sites are found to depreciate

property values (Hoeln and Deaton, 2002). Many urban dwellers in India, particularly the poor, are either unaware or indifferent of the environmental hazards they are exposed to around them. Even if some are conscious of the hazards, many of them are compelled to live under such conditions due to lack of entitlement or for availing targeted opportunities/facilities available in the neighbourhood. However, day by day the environmental attributes are gaining importance in the residential housing selection.

Despite the universal concern for better and healthier housing environment, very little research has been carried out in order to understand and mitigate the living conditions in most urban areas, especially in developing countries like India.

### **Objectives:**

The present paper tried to identify if the environmental factors along with socio-economic and other conditions also influence residential choices of housing. Also, the willingness to pay for environmental attributes will be examined through the estimated rent equation. In particular, the attempt is to examine the environmental awareness of the residents and their preference for it in the residential choice.

### **Methodology:**

Firstly, a descriptive statistics of the relevant environment, socio-economic and structural variables in relation to the rental housing has been presented. Then bivariate Pearson's correlations among the relevant socio-economic, structural and environmental variables are computed to have an idea of relationship between the selected variables in choosing accommodations. In order to examine the impact of environmental variables on the residential demand along with other characteristics, thirteen important characteristics as independent variables have been included.

A semi-log multiple linear regression model of the type  $\text{Ln}Y_i = \alpha + \sum_1^k \beta_1 X_i + U_i$  is considered where  $\text{Ln}Y_i$  represents the natural log of monthly rent paid by the  $i^{\text{th}}$  respondent,  $X_i$  the  $i^{\text{th}}$  variable representing environmental, socio-economic and structural characteristics,  $U_i$  the

random disturbance term with usual classical regression properties and  $\beta$  represents the impact of a marginal change in the  $i^{\text{th}}$  explanatory variables.

### Analysis and Findings:

An overview of the summary statistics of the respondents in Table 1 showed that the average family size is 4.32 and average number of families staying in same building is 3.97. Thus, on an average, 16-17 numbers of people stay in a building in the area. The average time required for getting the first accommodation in Dimapur town is 1.34 months, and it increased from zero or hardly a week during four decades back to even 6 months at present. It is an indication of sharp rise in demand for housing in the town during last few decades. Monthly family income of the respondents ranges from Indian Rupees (Rs) 5000 to Rs 75000, which is an indication of significant inequality in income across the respondents. Monthly rent paid by those individuals, as it depends significantly on their earning capability, also ranges from Rs 800 to Rs 20000. The carpet area as well as compound area ranges from a merely 120 sq.ft. and 300 sq. ft. to 5000 sq.ft. and 90000 sq.ft. respectively.

	Min	Max	Mean	Coeff of Var.
Time spent to get First Accommodation (Month)	0	6	1.34	86.91
Duration of Stay (years)	1	71	19.68	70.72
No of Families Staying in the Same Building	1	30	3.97	88.81
Family Size	1	10	4.32	39.78
Monthly Family Income (INR)	5000	75000	33673.47	62.30
Monthly Rent (INR)	800	20000	5620	58.20
Carpet Area (Sq.Ft.)	120	5000	662.07	71.56
Compound Area (Sq.Ft.)	300	90000	3832.98	119.85

N = 490 respondents

Source: Field Survey during 2015-16

The environmental quality in the neighbourhood impacts the quality of live to a great extent. Table 2 exhibits some important environmental quality indicators across the wards of Dimapur town. Availability of sufficient and good water is most essential for healthy living. It is observed that there is disproportionate water availability across the town. In 2 wards, less than 50 per cent of the sampled households receive unrestricted water supply throughout the day. In case of water quality, more than 90 per cent of the respondents in 7 wards are satisfied with the water while only 50 per cent of respondents are satisfied in ward 23. Open sewers which do not flow freely may pose serious environmental hazards. It is observed that except for 2 – 3 wards, a large majority of the respondents in the town are exposed to open sewer. Several residents are also found to be facing the problem of sewage clogging triggering rain floods during monsoon which has become a serious health concern.

Open space with good scenic views is a preferred option for people because it adds to their quality of live. But it is observed that respondents in 3 wards of the town have no views of green cover around their houses while in majority of the wards only a small percentage of the sampled respondents enjoy such views. This implies that in most of the wards people are living in congested areas with no open space. Urban areas in India generate a lot of wastes (liquid as well as solid) and waste disposal systems are far below appreciable standards. The survey found that a high percentage of respondents are living near garbage dump yards and public sewages. Also, water bodies in the urban areas are usually highly polluted. It is observed that many respondents have taken residence near rivers, streams or lakes. The survey also found a high percentage of respondents residing near heavy traffic roads or junctions exposing themselves to higher air and noise pollutions.

As stated earlier, housing comes as a bundle of attributes and people make their housing choices depending on capability, availability, requirement and preferences. Therefore, though the survey found most respondents living in and around poor environmental surroundings, it may be because they are either unaware or indifferent of the environmental hazards they are exposed to. Another reason for such observation may be that the respondents compromise environmental benefits for other structural and locational conveniences. Also, it may be noted that Dimapur town is a relatively small town with lesser population compared to most cities and so the level of pollution may still be at tolerable level. Hence, the environmental disamenities may not be alarming enough to dissuade people from living around such places.

**Table 2: Ward-wise Percentage Distribution of the Respondents According to Some Environmental Quality Indicators**

Ward	24Hrs Water Supply	Satisfactory Water Quality	Open Sewer	Sewage Clogging	Located near River/Lake	Flood Prone during monsoon	View of Green Cover	Located near Garbage Yard	Located near Public Sewer/Drain	Located near Polluted Stream	Located near Heavy Traffic Road
1	80	80	60	0	15	0	0	35	50	25	80
2	61.9	57.14	95.24	14.29	28.57	14.29	31.82	18.18	50	31.82	72.73
3	60	55	85	20	40	35	100	25	30	25	10
4	63.64	81.82	100	22.73	31.82	27.27	59.09	40.91	63.64	13.64	72.73
5	80	85	100	5	0	0	30	35	55	0	80
6	77.27	77.27	36.36	36.36	9.09	4.55	0	22.73	77.27	0	90.91
7	60.87	82.61	91.3	17.39	8.7	21.74	34.78	30.43	60.87	0	17.39
8	52.38	85.71	66.67	4.76	9.52	9.52	14.29	28.57	52.38	14.29	9.52
9	55	90	55	5	0	5	15	20	25	5	25
10	72.73	90.91	81.82	0	50	18.18	36.36	27.27	31.82	36.36	40.91
11	68.18	95.45	54.55	0	13.64	13.64	68.18	45.45	45.45	13.64	40.91
12	86.36	86.36	50	0	18.18	9.09	59.09	27.27	31.82	9.09	18.18
13	81.82	90.91	59.09	4.55	4.55	4.55	40.91	22.73	36.36	4.55	22.73
14	72.73	86.36	59.09	0	9.09	9.09	50	50	72.73	4.55	40.91
15	38.1	95.24	80.95	9.52	4.76	19.05	4.76	23.81	23.81	4.76	61.9
16	57.14	90.48	90.48	19.05	14.29	9.52	85.71	28.57	57.14	9.52	28.57
17	90.48	85.71	14.29	4.76	0	0	4.76	28.57	52.38	0	90.48
18	71.43	90.48	57.14	28.57	4.76	28.57	9.52	33.33	85.71	4.76	90.48
19	86.36	54.55	18.18	27.27	0	9.09	0	18.18	77.27	0	100
20	80.95	71.43	61.9	4.76	28.57	9.52	71.43	47.62	47.62	4.76	33.33
21	59.09	81.82	59.09	9.09	9.09	0	27.27	27.27	18.18	4.55	45.45
22	42.86	85.71	90.48	28.57	23.81	23.81	28.57	38.1	28.57	23.81	33.33
23	57.14	50	100	4.76	23.81	4.76	38.1	38.1	76.19	9.52	28.57

Source: Field Survey during 2015-16

**Table 3: Correlations Among Various Environmental, Socio-Economic and Structural Variables**

	LnMont hlyInc	Edu_ Head	Fam_ Size	Carpet Area	Water Supply	Ventil ation	House Dryness	House Direction	Located_ River/Lake	Dist_Fores t Cover	Sewer Flow	Safety	Water Storage
LnMonthly Income	1												
Education of Head	.588**	1											
Family Size	.331**	-.079	1										
Carpet Area	.601**	.323**	.383**	1									
Water Supply	.495**	.438**	.019	.313**	1								
Ventilation	.493**	.406**	.119**	.405**	.453**	1							
House Dryness	.296**	.260**	-.030	.183**	.393**	.312**	1						
House Direction	.069	.085	-.070	-.008	.071	.078	.048	1					
Located Near River/Lake	.002	-.035	.001	.010	-.017	-.014	-.068	-.051	1				
Distance from Forest Cover	-.079	-.043	-.047	-.126**	-.052	-.111*	.077	.003	-.166**	1			
Sewer Flow	.313**	.173**	.133**	.270**	.140**	.271**	.130**	.038	.091*	-.268**	1		
Safety	.477**	.424**	.052	.301**	.599**	.473**	.386**	.071	-.103*	-.031	.226**	1	
Water Storage	.448**	.406**	.098*	.406**	.429**	.327**	.122**	-.028	.043	-.138**	.306**	.324**	1

\* & \*\* indicate that the coefficient is significant at 5% and 1% level of significance by two tailed test respectively.

Source: Field Survey during 2015-16

Bivariate correlations among most of the environmental, socio-economic and structural variables are found to be significant (Table 3). Family income has a significant positive correlation with education of the head of family, family size, size of house, facilities available in the house taken on rent for stay and safety. Besides family income, family size has significant positive correlation with the size of house and the quality of other housing facilities. Education of the head of family is significantly correlated to the desired structural variables like size of the house and quality of housing facilities but inversely to the family size, location of house near river or lake and distance from deep forest, though not statistically significant. This shows that higher educated head of households tend to have smaller family size and live closer to the main town areas and most of them are found to prefer good structural and environmental qualities besides safety.

**Table 4: Estimated Coefficients of Regression of Rent Paid on Relevant Socio-Economic, structural and Environmental Variables**

	B	t-Statistic	Sig.
Constant	3.663	14.27	.000
Family Income	.314	10.25	.000
Education Level of Head	.007	0.42	.674
Family Size	.064	6.61	.000
Carpet Area	.000	12.05	.000
Water Supply	.086	2.90	.004
Ventilation	.074	2.41	.016
House Dryness	.060	1.44	.151
House Direction	.026	1.99	.047
Located near River/Lake	-.054	-1.36	.174
Distance from Forest Cover	.000	7.64	.000
Sewer Flow	-.079	-3.02	.003
Safety	.109	3.14	.002
Water Storage	.036	1.95	.052
$R^2 = 0.78$ , $Adj. R^2 = 0.77$ & $F = 126.51$ (.000)			

Dependent Variable: Ln Monthly Rent

Source: Field Survey during 2015-16

From the results of the semi-log linear multiple regression analysis of variation in rent for environmental, socio-economic and structural characteristics, it is found that most of the selected variables have statistically significant impacts on the monthly rent paid (Table 4). The  $R^2$  of 0.78 reveals that 78 % of the total variation in the dependent variable is explained by the regression equation while the remaining 22 % is captured by the error term. Even after adjusting for the degrees of freedom, 77 % is explained by the equation. The two parameters are jointly significant at 1 % as shown by the F-statistic (126.51) with p-value of 0.000. Monthly family income, family size, carpet area of the house, water supply, ventilation, house direction, distance from forest cover, safety and water storage capacity are found to have positively significant impacts on monthly. Proper ventilation is essential in a hot place like Dimapur and so the positive coefficient is on expected line. Water is not only one of the essential items for survival but it is also essential for cleanliness and people face significant problem in collecting water from various sources in growing urban centres and sometimes have to buy from vendors. Hence, a house having good water supply and greater water storage capacity is expected to charge more rent. The safety status is found to have a significant positive impact on rent. By convention, certain direction which the house faces are preferred by people and in India it is observed that most people have a stronger preference for south-facing and east-facing houses and least prefer a house which faces west. The result of this study reinforced that observation which implies that people pay more rent for such preferences. However, coefficient of sewer flow is found to be significantly negative. People especially the servicemen and business community like to stay near town and intend to pay more rent for the communication and other advantages of township, as evident from the positive coefficient of distance from forest cover. Therefore, even though the sewer flow is not good around the main town there seems to be some kind of compromise in favour of other benefits.

### **Policy Implications and Conclusion:**

This article reveals that residential choices by the households and the monthly rents are significantly influenced by environmental amenities, social-economic conditions and structural characteristics of the house. Monthly family income and family size are found to significantly affect the monthly rent in a positive way. In choosing the type of house to stay, it is observed that size of the house has significant positive impact on rent as expected. People are also found to be

willing to pay higher rent for those houses facing south or east in contrast to houses facing north and west. With regard to the environmental and other amenities available in and near the house which impact the health and quality of life, it is found that ventilation, water supply, water storage capacity, distance from forest cover and safety provided by the house has significant positive impacts while sewer flow has significant negative impact on the monthly rent paid. Thus, the study found that residents have a preference for good and hygienic houses but are not impacted much by the environmental qualities around their housing units in their residential choice.

From the overall analysis, certain important policy implications may be highlighted:

- (1) Well-planned Apartment/Flats system of housing may be promoted to mitigate the rising scarcity of housing in Dimapur if horizontal expansion is not feasible.
- (2) More environmental awareness need to be created among the residents highlighting the dangers of environmental hazards and/or benefits of ambient environmental quality.
- (3) Proper waste disposal management and public sewer system are essential since they are important environmental factors. Towards this end, more tax may be charged from the residents and the revenue can be utilized for the proper garbage treatment and maintenance of public sewer.

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