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Impact of Hazardous Ambience on Housing Locations in Dimapur Town, Nagaland

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Abstract

Solid wastes have become an environmental hazard universally. The aim of this research is to investigate the effects of environmental conditions in Dimapur Municipal area on the residential location. In particular, the study focuses on the effects of environmental hazards like garbage dumping and unhygienic public sewers on property values. To this aim, the paper presents a hedonic Regression model estimating the housing price (rent) in municipal areas as a function of environmental variables. The study has been carried out using data collected in Dimapur town which is the commercial hub of Nagaland state, and one of the most important transit routes of Nagaland and Manipur. The results indicate that environmental hazards like garbage dumping sites, unhygienic public sewers and other forms of pollution significantly impact housing choices and residents are willing to pay for better waste management in the study area. The study also reveals that some residents bear environmental hazards in order to avail better locational advantages.

Introduction

Environmental pollution, especially solid wastes, is growing with rapid urbanization in most countries, particularly in developing countries like India. The ever increasing migration of people from rural areas with growing opportunities in the urban centres is adding to the woes of urban areas. The problem arises because of the lag in arrangements of proper waste management system for the rising urban population. The problem is accentuated more due to lack of civic sense among the populace. The people also do not practice segregation of various wastes which add to the problems of proper and scientific waste disposal by civic bodies. Moreover, in urban areas, waste facilities are located near waste producers in order to reduce handling and transportation costs. This phenomenon is most visible in a developing country like India where earlier urban places have been developed in an unplanned manner and the fast growing urban population are faced with congestion and environmental hazards. However, on several occasions people have to make a trade off with the locational choice and are often forced to stay in highly unhygienic locations thereby exposing themselves to various hazards. Choice of location and a reasonable environment becomes prominent with the knowledge of location, price, increase of earning and entitlement. These locations and environmental factors gain significance 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. When making the decision either to rent or build/buy a place to live, there are two broad categories of factors that must be considered: the first category represents the financial aspects and second category is a set of personal and emotional factors (on neighbourhood and environmental qualities), which are more intangible but nevertheless play an important role in the decision to buy.

The hedonic pricing models value goods for their utility-bearing attributes (Rosen, 1974). Statistical methods such as regression analysis are used to measure the value of a particular attribute, taking into account additional attributes associated with the particular good under study. Many hedonic studies examine the value of attributes that contribute to overall housing studies (Deaton and Hoehn, 2004). In these studies, housing prices are used as the dependent variable and explanatory variables generally include structural characteristics of the house, neighbourhood, and measures of environmental quality. A measure of the distance between each home or neighbourhood to the nearest hazardous waste site is used as one measure of environmental quality (Kohlhase, 1991; Kiel and Zabel, 2001). A hazardous waste site is generally viewed as a disamenity having a negative influence on perceptions of environmental quality.

Researches on hedonic method have indicated that residential property values are reduced by increased proximity to hazardous waste sites (Deaton and Hoehn, 2002, 2004; Braden et al., 2011). However, it was also shown that people's perception about hazardous waste sites might also change sometimes. Kohlhase (1991) pointed out that a significant discount in the price of houses in Houston's housing market located close to toxic waste dumps. The result was found only after the sites have been identified and publicized by the Environmental Protection Agency (EPA). Before that knowledge coming to public, neighbouring people hardly gave any importance to it. Vor and Groot (2011) also found industrial sites to have a statistically significant negative impact on property values. Studies have also revealed that environmental quality strongly influence on social relations (Taghvaee et al., 2013). But many urban dwellers in India, particularly the poor, are either unaware or indifferent of the environmental hazards they are exposed to. Even if some are

conscious of the hazards, many are compelled to live under such conditions due to various reasons (Vupru, 2019).

Ambient air quality also comes into play in the determination of house prices or rents of apartments. A number of studies have examined the relationship between air quality and property values using hedonic technique and identified air pollution as one of the significant variable in explaining residential property values (Ridker and Henning, 1967; Anderson and Crocker, 1971; Chay and Greenstone, 1998; Chattopadhyay, 1999; Zabel and Kiel, 2000; Murty and Gulati, 2004). All these studies found significant willingness to pay for improvement in ambient air quality and thus the increased house prices. Thus, preference for environmental or natural resource quality can be reflected in the variation in house prices, and would be suitably estimated by using hedonic pricing techniques, as shown by Ketkar, 1992 (cited in Kiel,1995), Leggett and Bockstael (2000), and Deaton and Hoehn (2002).

Statement of the Problem

Good and clean environments provide amenities and services which contribute fundamentally to the quality of urban life and appreciates the property values (Van Herzele and Wiedemann, 2003; Chiesura, 2004). In contrast, hazardous environmental sites are found to depreciate property values (Deaton and Hoehn, 2002). In the recent decades, Dimapur town has experienced an increase in population as compared to the preceding years (Vupru, 2019a). Consequently, this has led to an increase in pollution particularly of solid wastes, further exacerbated by shortfalls in solid waste management system. Nevertheless, environmental attributes are gaining popularity and importance in the residential housing selection.

Notwithstanding the universal alarm for improved and healthier housing environment, very few researches have been

carried out to understand and mitigate the living conditions in most urban areas, especially in small towns like Dimapur.

Objectives

The present paper is to identify the environmental factors which influence residential choices of housing. Also, the willingness to pay for environmental attributes has been examined through the estimated rent equation.

Methodology

Firstly, a table of the relevant environment variables in relation to the various wards has been presented. Then 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 weighted pollution index was constructed on the basis of presence of seven types of pollution near the place of residence. The index has been constructed by assigning weights to opinion expressed by each respondent on each option such as near garbage dumping site, polluted sewer/drain, polluted stream, heavy traffic noise, noisy market area, playground/concert area and community/ town hall. These weights have been computed by calculating the ratio of the sum of each option (for all the respondents) to the sum total score of the seven options. Presence or absence of each option is accrued value 1 (one) or 0 (zero). Then value of each option corresponding to every respondent is multiplied by the weight of that particular opinion and then added up to get overall index for the corresponding respondent. Symbolically, pollution index (PI) = $\sum W_i X_i$, where W_i is the weight of the i^{th} value of individual pollution variable.

A multiple linear regression model of the type $Y_i = \alpha + \sum_1^k \beta_i X_i + U_i$ is considered where Y_i represents the monthly rent paid by the i^{th} respondent, X_i the i^{th} variable representing

environmental characteristics, U_i the random disturbance term with usual classical regression properties and β represents the impact of a marginal change in the i^{th} explanatory variables.

Analysis and Results

The Ward-wise percentage distribution of the respondents according to some environmental quality indicators and their willing to pay (per month) to remove or clean these disamenities is highlighted in Table 1. The quality of neighbourhood environment impacts the quality of life and therefore, the housing price to a great extent. It is observed that about 80 percent of all respondents are satisfied with the water quality in the town. Problem of sewage clogging ranges from 0 to as high as 36 percent in certain wards. Overall, about 15 percent of the respondents live near some water bodies like river, stream or pond. It is also observed that several parts of the town get flooded during rainy season (overall 12 percent). It is obvious that garbage is thrown or deposited randomly around the town as about 31 percent of the respondents are located near garbage areas. Public sewer is found to be well distributed as 50 percent of the respondents stay near public sewers. All the streams which flow across the town appears to be highly polluted and almost 11 percent of the respondents live near such polluted streams.

The study also reveals that respondents are willing to pay for proper disposal of wastes and for maintenance of good environmental ambience. Individually, there are some respondents who are willing to pay Rs. 1000 per month for timely garbage disposal and on the average, the willingness to pay (WTP) for timely and proper removal of garbage (solid wastes) is found to be Rs. 270 per month. Similarly, for proper maintenance of public sewage and streams, the average WTP is found to be Rs. 270 and Rs. 227 per month respectively.

Table 1: *Ward-wise Percentage Distribution of the Respondents According to Some Environmental Quality Indicators and Willingness to Pay (WTP)*

Ward	Satisfactory Water Quality	Sewage Clogging	Located near River/ Pond	Flood Prone during monsoon	Located near Garbage Yard	Located near Public Sewer/ Drain	Located near Polluted Stream	WTP_ GA	WTP_ PSew	WTP_ PoStr
1	80	0	15	0	35	50	25	175	185	170
2	57.14	14.29	28.57	14.29	18.18	50	31.82	195	186	167
3	55	20	40	35	25	30	25	140	135	128
4	81.82	22.73	31.82	27.27	40.91	63.64	13.64	218	205	168
5	85	5	0	0	35	55	0	225	225	187.5
6	77.27	36.36	9.09	4.55	22.73	77.27	0	196	196	135
7	82.61	17.39	8.7	21.74	30.43	60.87	0	252	230	126
8	85.71	4.76	9.52	9.52	28.57	52.38	14.29	229	245	162
9	90	5	0	5	20	25	5	308	305	258
10	90.91	0	50	18.18	27.27	31.82	36.36	286	259	273
11	95.45	0	13.64	13.64	45.45	45.45	13.64	407	398	405
12	86.36	0	18.18	9.09	27.27	31.82	9.09	561	530	502
13	90.91	4.55	4.55	4.55	22.73	36.36	4.55	359	339	268
14	86.36	0	9.09	9.09	50	72.73	4.55	420	402	350
15	95.24	9.52	4.76	19.05	23.81	23.81	4.76	231	207	148
16	90.48	19.05	14.29	9.52	28.57	57.14	9.52	307	276	190
17	85.71	4.76	0	0	28.57	52.38	0	245	231	198
18	90.48	28.57	4.76	28.57	33.33	85.71	4.76	314	319	233
19	54.55	27.27	0	9.09	18.18	77.27	0	250	250	250
20	71.43	4.76	28.57	9.52	47.62	47.62	4.76	414	414	374
21	81.82	9.09	9.09	0	27.27	18.18	4.55	236	236	207
22	85.71	28.57	23.81	23.81	38.1	28.57	23.81	212	198	152
23	50	4.76	23.81	4.76	38.1	76.19	9.52	233	229	160
Av	**80.43**	**11.58**	**15.10**	**12.01**	**30.96**	**49.97**	**10.64**	**278.83**	**269.57**	**226.59**

Note: WTP_GA stands for Willingness to Pay to avoid Garbage Area
WTP_PSew stands for Willingness to Pay to avoid Public Sewer
WTP_PoStr stands for Willingness to Pay to avoid Polluted Stream

Source: Field Survey in 2015-16

From the results of the linear multiple regression analysis of variation in rent for environmental variables, it is found that several of the selected variables have statistically significant impacts on the monthly rent paid (Table 2). The R^2 of 0.37 reveals that 37% of the total variation in the dependent variable is explained by the regression equation while the remaining 63% is captured by the error term. Even after adjusting for the degrees of freedom, 36% is explained by the equation. The two parameters are jointly significant at 1% as shown by the F-statistic (31.47) with p-value of 0.000. Water supply and pollution index are found to have positively significant impacts on monthly rent. 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. On the other hand, pollution is more in heavily populated areas and so the positive coefficient indicates that house rents are more in centrally located areas which also has more inhabitants. However, coefficient of flooded areas, water quality and located near garbage site is found to be significantly negative. Several locations in Dimapur town gets inundated after heavy rainfall due to poor sewage system which are not only becoming more congested due to rampant encroachment but also clogged with solid wastes, especially plastic materials. Therefore, the results reveal that house prices (rent) are relatively lower in those localities. People especially the business community likes to stay near town and intend to pay more rent for the communication and other advantages of township, as evident from the negative coefficient of distance from Garbage site and water quality. Therefore, even though more garbage sites are located around the main town and water quality is poorer, there seems to be some kind of compromise in favour of other benefits.

Table 2: Estimated Coefficients of Regression of Rent Paid on Relevant Environmental Variables

	B	t-Statistics	ρ Sig.
(Constant)	3848.723	14.820	.000***
Water Supply	1095.291	5.542	.000***
Water Quality	-756.926	-2.543	.011**
Located near River/Stream/Lake	-331.483	-.780	.436
Flooded	-1170.882	-3.035	.003***
Pollution Index	512.082	1.715	.087*
Located near Garbage Site	-1159.181	-4.362	.000***
Located near Public Sewer	64.985	.226	.821
Located near Polluted Stream	-4.481	-.009	.993

R^2 = .371, Adjusted R^2 = .359 & F = 31.467 (.000)
Note: *, ** & *** indicate ρ is significant at 10 per cent, 5 per cent and 1 percent level respectively.

Dependent Variable: MonthlyRent
Source: Field Survey during 2015-16

Conclusion and Policy Implications

This study reveals that choice of residential location by the households and the monthly rents are significantly influenced by environmental amenities. It has been found that water supply had a significant influence on people's preference in choosing residential locations. Hence, a house having better water supply is found to carry higher rent. On the contrary, pollution is an environmental disamenity. However, the positive coefficient of pollution index indicates that houses located in higher polluted areas have higher monthly rents. This is probably because centrally located areas have several locational advantages and so although the monthly rent as well as pollution is higher, some residents may favour such places to avail the location advantages. On the other hand, water quality, flooded areas and locations near garbage sites have significant negative impacts on the monthly rent paid. The negative coefficient of water quality may probably be because centrally and heavily populated areas are also places which are more polluted, including water. Therefore, in spite of poor water quality, monthly rents are

higher in these places. Houses located in flood-prone areas and also which are situated near garbage sites carry lower monthly rents as expected.

Thus, the result of the study implies that residents of Dimapur town are conscious of hazardous ambience like flood-prone areas and garbage sites in their choice of residential location. Nonetheless, the contradictory negative coefficients of water quality and pollution index may be because of the strong locational advantages of centrally located areas which overshadow the harmful environment.

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

- More environmental awareness need to be created among the residents highlighting the dangers of environmental hazards, especially solid wastes.
- Proper solid waste disposal management needs to be put in place. Towards this end, segregation of solid wastes into degradable and non-degradable wastes needs to be practiced.
- Systematic location of Garbage sites and timely removal of garbage.
- Sanitation tax may be charged from the residents after proper study of their willingness to pay (WTP) and the revenue can be utilized for the proper garbage treatment and maintenance of public sewer.

References

Anderson, R.J. Jr. and Crocker, T.D. (1971). Air pollution and residential property value. *Urban Studies,* 8, 171-180.

Braden, J.B., Feng, X. and Won, D.H. (2011). Waste sites and property values: A meta-analysis. *Environmental and Resource Economics*, *50* (2), 175-201.

Chattopadhyay, S. (1999). Estimating the Demand for Air Quality: New Evidence Based on the Chicago Housing Market. *Land Economics*, *75* (1). 22-38.

Chay, K.Y. and Greenstone, M. (1998). *Does air quality matter? Evidence from the housing market.* NBER Working Paper 6826. Accessed June 25, 2015, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.199.480&rep=rep1&type=pdf.

Chiesura, C. (2004). The Role of Urban Parks for the Sustainable City. *Landscape and Urban Planning*, 68, 129-138.

de Vor, F. and de Groot, H.L.F. (2011). The Impact of Industrial Sites on Residential Property Values: A Hedonic Pricing Analysis from the Netherlands. *Regional Studies*, *45* (5), 609-623, DOI: 10.1080/00343401003601925.

Deaton, B.J. and Hoehn, J.P. (2002). The effect of hazardous waste sites on property values in zones of high industrial activity: a hedonic approach. *Paper submitted for the AAEA 2002 Annual Meeting,* Long Beach, California. Accessed January 25, 2019, http://ageconsearch.umn.edu/bitstream/19612/1/sp02de01.pdf.

Deaton, B.J. and Hoehn, J.P. (2004). Hedonic analysis of hazardous waste sites in the presence of other urban disamenities. *Environmental Science & Policy*, 7, 499-508.

Kiel, K.A. (1995). Measuring the impact of the discovery and cleaning of identified hazardous waste sites on house value. *Land Economics*, *71* (4), 428-435.

Kiel, K. and Zabel, J. (2001). Estimating the economic benefits of cleaning up of Superfund sites: The case of Woburn, Massachusetts. *The Journal of Real Estate Finance and Economics*, 22, 163-184. DOI: https://doi.org/10.1023/A:1007835329254.

Kohlhase, J. (1991). The impact of toxic waste sites on housing values. *Journal of Urban Economics*, *30* (1), 1-26.

Leggett, C.G. and Bockstael, N.E. (2000). Evidence of the Effects of Water Quality on Residential Land Prices. *Journal of Environmental Economics and Management*, *39* (2), 121-144.

Murty M.N. and Gulati, S.C. (2004). A Generalized Method of Hedonic Prices: Measuring benefits from reduced urban air pollution. *Natural Resources Accounting*, CSO, GOI. Accessed November 24, 2013, http://www.iegindia.org/workpap/wp254.pdf.

Ridker, R.G. and Henning, J.A. (1967). Determinants of residential property values with special reference to air pollution. *The Review of Economics and Statistics*, *49* (2), 246-257.

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product differentiation in pure competition. *Journal of Political Economy*, *82* (1), 35-55.

Taghvaee, A.A., Maroufi, S. and Pahlavan, S. (2013). Evaluation of the Effects of Environmental Quality on Residents' Social Relations: Aab-Kooh Sector in Mashhad City. *Basic Studies and New Technologies of Architecture and Planning*, *3* (1), 43-54.

Van Herzele, A. and Wiedemann, T., 2003. A monitoring tool for the provision of accessible and attractive urban green spaces. *Landscape and Urban Planning, 63*, 109-126.

Vupru, V. (2019). Environmental Factors and Residential Choice in Dimapur Town, Nagaland. *International Journal of Research in Social Sciences*, *9* (4), 1064-1077.

Vupru, V. (2019a). Rental Housing Market in Dimapur Town, Nagaland: An Empirical Study. *Dimapur Government College Journal*, *1* (5), 37-51.

Zabel, J.E. and Kiel, K.A. (2000). Estimating the Demand for Air Quality in Four U.S. Cities. *Land Economics*, *76* (2). 174-194.