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Housing Deficit and Environmental Challenges in Enugu Urban

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Abstract: ***Deterioration in environmental quality has been the bane of most urban settlements in Nigeria. This study examined the role of housing deficit on environmental degradation. Survey research method was adopted in this work, and using the data collected on the respondents' perception on some identified environmental indicators, the level of degradation due to inadequate dwellings was measured and statistically tested. Three null hypotheses were tested using Structural Equation Modelling (SEM). A positive relationship was identified. Housing deficit (HD) increased significantly as population (POP) increased (standardized coefficient = 0.169, p<0.05). Increase in (HD) significantly increased environmental degradation (ENV), with standardized coefficient = 0.528, p < 0.05. Furthermore as (POP) increased, a significant increase was observed in (ENV), with standardized coefficient = 0.147, p< 0.05. 32.6% of the variance in (ENV) was accounted for by (POP) and (HD), while 2.9% of the variance in (HD) was accounted for by (POP). For improved environmental quality, the government of Enugu State should develop a sustainable policy on provision of adequate housing for the ever growing population.***

Keywords: Deficit, Degradation, Environment, Housing, Population

1. Introduction

The urgent need to examine housing deficit – environment linkages in urban areas is all the more imperative as urban populations grow in leaps and bounds every day. As stated in the Brundtland Commission's Report, ' Our Common Future' , " the future will be predominantly urban and most immediate environmental concerns of most people will be urban" , (World Commission on Environment and Development, 1987). Agenda 21 further argues that urban growth has exposed a large percentage of the urban population to very serious environmental hazards and the rate has far exceeded the capacity of the municipal and local agencies to provide the environmental health services required (Hardoy, Mitlin and Scatterthwaite, 2001). A healthy urban growth should be accompanied by availability of decent dwelling units to house the growing population. This is seldom the case as the uncontrolled influx of people to the urban centers in search of better amenities, jobs and better living conditions has resulted in phenomenal urban expansion which consequently induces undue stress on the available infrastructure thus creating abysmal shortage of habitable dwellings. Housing deficit arising from unanticipated population growth, practically sets the stage for various forms of environmental degradation. In a spontaneous reaction to cope with the situation, unplanned housing developments emerge at every available space. Other environmental considerations by way of adequacy of health facilities, social amenities, basic infrastructural facilities, good sanitary conditions and better life support systems become less important as most developers are per-occupied with just the provision of any shelter not minding its cost and condition. Growth of substandard settlements results.

The environment provides all life support systems with air, water and land as well as the materials for fulfilling all developmental aspirations, (Lawanson, 2005). In harnessing these environmental assets for developmental purposes, its sustainability must be a major factor as the concept of sustainable development seeks to pursue development in the most sustainable manner with the protection of environmental quality as its main focus to ensure that the desired balance between economic, social and environmental strategic goals are maintained. As the urban population grows, availability of dwelling units decrease even faster and how this urban population performs in terms of resource use and waste generation has even greater implications for sustainable development. Associated with this is the growing number of people living in abject poverty. They are now forced to live in shelters and neighborhoods characterized by poor living conditions, overcrowded houses, inadequate water supplies, poor sanitary conditions, poor drainage systems and high waste generation with inefficient mechanism for collection and management. People tightly packed into unsanitary housing are inordinately vulnerable to natural disasters and health problems (Kinder, 2015).

This highly celebrated concept which uses, as its tool, Environmental Impact Assessment (EIA), for ensuring sustainable development, is central to any development initiative; be it industrial, social or infrastructural development. Urban development problems, therefore, as opined by Awosusi and Jegede (2013), could be viewed from both socio – economic and environmental perspectives. Also according to Mabogunje (2002), urbanization is the root cause of the high rates of environmental degradation, pollution and social delinquency.

Authors, such as Aribigbola (2008); Ogundele and Jegede (2011); Ajanlekoko (2001); Amao and Ilesanmi (2013); Olotah (2010); Olotuah and Bobadoye (2009), have respectively in their works addressed issues on urban development and housing delivery. However the linkage between housing deficit and environmental degradation still requires a more critical attention. Olotuah (2010), citing Adejumo (2008), stated that in Nigeria, the rate of provision of new housing stock has lagged severely behind the rate of population growth, resulting in a staggering housing deficit,

and that according to (Onyebueke, 2002; Isimi, 2005; Okelede, Adebayo, Iweka and Uduma-Olugu 2009), an annual production of more than 70,000 housing units to cope with the population trend is required. Nigeria as a whole is, to say the least, in dare need of improved housing stock, but it will be equally necessary to balance this need with available resources of land to avert possible dearth and extremely high cost of urban land which may turn out to be out of the reach of the majority of the urban dwellers, thus further compounding the problem. This paper, therefore examines some environmental degradation indicators with a view to establishing a linkage with deficiency in housing stock resulting from unhealthy population growth in Enugu urban.

2. Materials and Methods

Survey research design was adopted in this study. Well-structured questionnaire was administered on the respondents. The data for this study include responses from these respondents on the identified environmental degradation indicators. Respondents were randomly drawn from the three Local Government Areas within the Enugu urban, using purposive random sampling method. The population of Enugu urban is 722664 according to 2006 national population census (NPC, 2006). This was projected to 2014 using 2.8% growth rate (NPC, 1991) to give 901,162 with the formular: $P_t = P_o (1+r\ \%)^t$. A sample of 625,000 was taken from this population to form the study population using the Taro Yamani's Formula: $n = N / 1 = N (e)^2$.

Questionnaires were then distributed to these respondents and 600 valid responses were obtained and used for the analysis. This study is to establish a linkage between deficiency in housing stock in Enugu urban and environmental degradation with a view to sensitizing the government on designing a functional framework for housing delivery policy in the state.

To achieve this, the study very vigorously pursued the following objectives:
1. To identify the environmental degradation indices resulting from inadequate housing stock in Enugu urban.
2. To determine the role of population growth on deficiency in housing stock.
3. To determine the significance of inadequate housing stock on environmental health and safety.

Three null hypotheses were postulated to direct this study.
i. Ho: There is no significant positive relationship between population growth and housing deficit.
ii.Ho: There is no significant positive relationship between population growth and environmental degradation.
iii. Ho: There is no significant positive relationship between housing deficit and environmental degradation.

3. Results and Discussion

3.1. Basic Characteristics of the Respondents

Information on the respondents as well as their perception on the linkage between housing inadequacy and environmental degradation were elicited with the questionnaire. Under the age criteria, 93.3% valid response was recorded from those between 26 and 65 years while only 6.7% came from those under 25 years of age. Out of this number 59.8% were married, 28.5% single, 4.7% divorced while 7% were widowed. The bulk of the respondents had tertiary education (63.3%), while those with secondary, primary and vocational education posted 15.3%, 14.7% and 4% respectively. Others not specified were 2.7% of the study sample. The employment status showed 36.7% in public service, 24.7% self-employed, 34% unemployed while 4.7% were retired from active service. Their income levels showed that 66% fell within N18, 000 and N60, 000 monthly income, while 34% were above N60, 000.

3.2. Rating of Environmental Indicators

The respondents were made to rate some of the identified environmental problems arising from inadequate housing and population increase using the Likert-type scale as follows: Very high (5); High (4); Moderate (3); Low (2); Very low (1). The mean, 3.0, which is the test value was used to evaluate the respondents' opinion on the indicators. The mean values of their rating on the environmental indicators were found to be above the test value falling generally between 3.25 and 4.31, as in table 1.

Table 1: Mean Rating of the Assessment of Environmental Quality in your Neighborhood, Resulting from Inadequacy of Accommodation.

Descriptive Statistics			
	N	Mean	Std. Deviation
Growth of shanty houses	600	3.67	1.187
Increase in Social delinquents	600	3.43	1.225
Poor sanitary conditions	600	3.61	1.296
Health challenges	600	3.32	1.036
Congestion	600	3.79	1.031
Growth in traffic problems	600	3.97	.960
Poor human waste disposal	600	3.90	1.131
Air and water pollution	600	3.58	1.208
Indoor pollution due to inefficient stoves and cooking facilities	600	3.25	1.372
Lack of space for circulation	600	4.21	1.088
Lack of space for recreation	600	4.29	1.056
Poorly managed dump sites	600	4.07	1.232
Intensive use of substandard materials for building purposes	600	3.38	1.124
High cost of accommodation	600	3.94	1.191
Insecurity	600	4.08	.950
Inadequate infrastructure	600	4.11	.954
Undue pressure on existing infrastructure	600	4.15	.951
Breakdown of infrastructure due to oven use	600	4.19	.913
General discomfort	600	4.31	.933
Low productivity	600	4.30	.965
Valid N (listwise)	600		

Source: Researchers' Computation

3.3 Test of Hypotheses

Structural Equation Modelling (SEM) was used for testing of hypotheses in this study. SEM consists of statistical

models that aim at explaining relationships among multiple variables. It examines the structure of interrelationships expressed in a series of equations similar to a series of multiple regression equations (Hair *et al*, 2010). They further emphasize that these equations depict all of the relationships among constructs used in the analysis. Hypothesis one proposed that population increase has no direct positive effect on housing deficit. The result revealed a statistically significant relationship since the calculated p–value 0.003 was less than 0.05 ($p < 0,05$), table 2.

Table 2: Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
HD	<---	POP	.061	.021	2.936	.003	par_8
B13v	<---	HD	1.000				
ENV	<---	HD	1.189	.253	4.702	***	par_9
ENV	<---	POP	.121	.033	3.685	***	par_10
B13iv	<---	HD	.588	.196	3.002	.003	par_1
B13iii	<---	HD	2.326	.470	4.949	***	par_2
B13ii	<---	HD	2.315	.468	4.942	***	par_3
B13i	<---	HD	2.616	.526	4.976	***	par_4
V4	<---	ENV	1.000				
V3	<---	ENV	.916	.039	23.652	***	par_5
V2	<---	ENV	.695	.040	17.488	***	par_6
VI	<---	ENV	.645	.051	12.769	***	par_7
B13iv	<---	B13v	.339	.029	11.649	***	par_11

Source: Researchers' Computation

Hypothesis two equally proposed that population increase has no positive influence on environmental degradation. The result showed a statistically significant relationship ($p < 0.01$). Furthermore, hypothesis three proposed that a positive relationship does not exist between housing deficit and environmental degradation. The result also indicated the presence of a statistically significant positive relationship. The standardized regression weights (table 3), showed that one standard deviation increase in population resulted in increase in housing deficit by 0.169.

Table 3: Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
HD	<---	POP	.169
B13v	<---	HD	.239
ENV	<---	HD	.528
ENV	<---	POP	.147
B13iv	<---	HD	.168
B13iii	<---	HD	.661
B13ii	<---	HD	.651
B13i	<---	HD	.704
V4	<---	ENV	.834
V3	<---	ENV	.908
V2	<---	ENV	.670
VI	<---	ENV	.515
B13iv	<---	B13v	.405

Source: Researchers' Computation

Furthermore, one standard deviation increase in population brought about 0.147 standard deviation increase in environmental degradation. Very importantly too, one standard deviation increase in housing deficit resulted in 0.528 standard deviation increase in environmental degradation. Population increase and housing deficit accounted for 32.6% of the variance in environmental degradation, (table 4).

Table 4: Squared Multiple Correlations: (Group number 1 - Default model)

			Estimate
HD			.029
ENV			.326
B13v			.057
VI			.266
V2			.449
V3			.824
V4			.696
B13i			.496
B13ii			.424
B13iii			.437
B13iv			.225

Source: Researchers' Computation

3.4 Model Fit Summary

The model revealed a chi-square result of $X^2 = 106.003$, (table 5).

Table 5: CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	24	106.003	31	.000	3.419
ıturated model	55	.000	0		
Independence model	10	1855.521	45	.000	41.234

Source: Researchers' Computation

Chi-square is one of the statistics used for measuring goodness of fit. Its objective is to determine the extent to which the estimated covariance matrix is equal to the observed covariance matrix in the model. If the p-value of the chi-square is non-significant, it is an indication of model fit. In this study, it is 0.000 at degrees of freedom (*df*) = 31; however, the researchers used additional measures of model fit such as, Goodness of Fit Index (GFI) = 0.966; Adjusted Goodness of Fit Index (AGFI) = 0.939, (table 6).

Table 6: RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.035	.966	.939	.544
Saturated model	.000	1.000		
Independence model	.197	.542	.441	.444

Source: Researchers' Computation

The Comparative Fit Index (CFI) and Incremental Fit Index (IFI) = 0.959, (table 7), while the Root Mean Square Error of Approximation (RMSEA) = 0.064, (table 8).

Table 7: Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.943	.917	.959	.940	.959
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Source: Researchers' Computation

Table 8: RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.064	.051	.077	.044
Independence model	.259	.249	.269	.000

Source: Researchers' Computation

The above fit indices are adjudged moderate and agree with (Ahmad *et al*, 2006). They were arrived at following a Post hoc Model Modification (PHMM). The indicator variables show standardized regression weights greater than or equal to 5 except for indicator variables $B_{13\ iv}$and B_{13v}. These show a moderate convergent validity.

The estimation of the SEM model in this work was based on the maximum likelihood. Analysis of Moment Structures (AMOS) software, version 18 was used for SEM computations. The oval shaped constructs shown in the model are latent variables (constructs), while the rectangular shaped are observed variables (figure 1). The observed rectangular variable (POP) indicates population growth, while the latent construct (HD) indicates housing deficit. Housing deficit comprises five (5) indicators used for measuring housing deficit. Each indicator variable has an error term attached to it. Furthermore, the latent construct (ENV) stands for environmental degradation composed of four (4) indicator variables

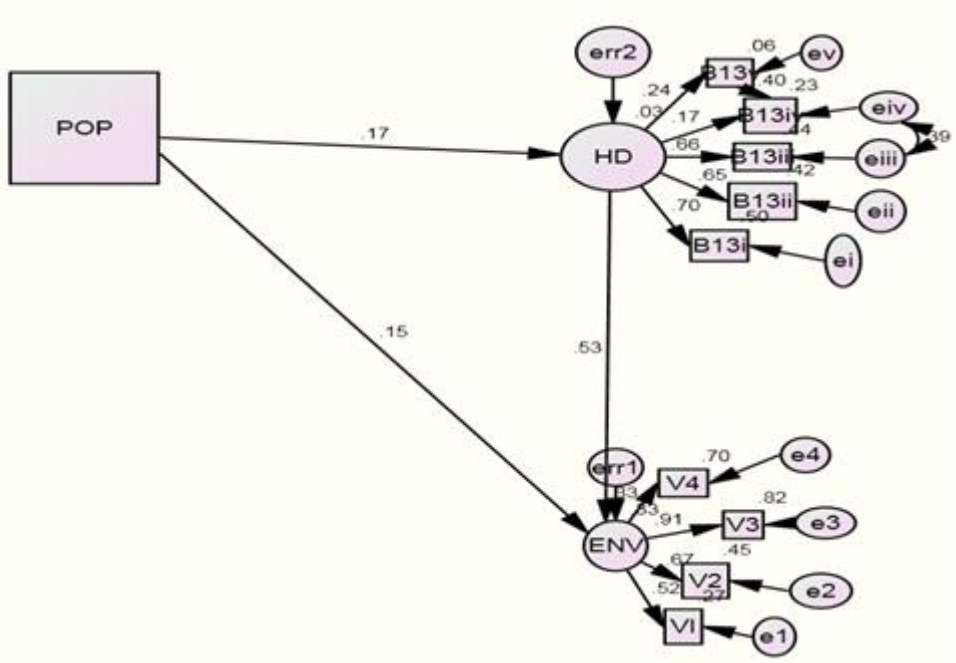

Figure 1: Model

Source: Researchers

3.5. Summary of Findings

Housing deficit (HD) increased significantly as population increased (standardized coefficient = 0.169, $p<0.05$). Also, increased (HD) significantly increased (ENV), with standardized coefficient = 0.528, $p < 0.05$. Furthermore, increase in (POP) significantly increased (ENV), with standardized coefficient = 0.147, $p< 0.05$. The 32.6% of the variance in (ENV) was accounted for by (POP) and (HD), while 2.9% of the variance in (HD) was accounted for by (POP).

Interestingly, population increase accounts for 2.9% of the variance in housing deficit. The small percentage variance indicates that error term, being factors unknown to the researchers accounts for the remaining 97.1%. This indicates that there are other possible factors that could have accounted for the remaining variance such as, natural disasters, flooding, fire and some other man-made variables. As earlier stated, population increase and housing deficit account for 32.6% variance in environmental degradation while other factors (error terms) account for the remaining 67.4%.

4. Conclusion

Interesting revelations were made from this study. There is a statistically significant linkage between population growth and housing deficit as well as between housing deficit and environmental degradation. When there is uncontrolled population increase, both housing and other basic infrastructural facilities are subjected to undue pressure and this takes a toll on environmental quality. It is therefore suggested that appropriate housing development framework be put in place to adequately respond to unanticipated rise in the urban population, to ensure environmental sustainability.

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