Sky Journal of Soil Science and Environmental Management Vol. 6(5), pp. 065 - 071, July, 2017
Available online http://www.skyjournals.org/SJSSEM
ISSN 2315-8794© 2017 Sky Journals

Full Length Research Paper

Proposed model for predicting quantity of government low income housing provision and allocation for South Eastern states, Nigeria

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Accepted 31 May, 2017

Housing, which is one of the essential ingredients in the existence of man and his survival on earth, is being compromised to a miserable instance. One of the reasons for this is the inability of government agents to provide sufficiently for the need of the different categories that desired to be accommodated properly. Low class individuals are mostly the vulnerable class and are exposed optimally to hardship. This is prevalence in South-Eastern Nigeria. The government needs a framework and a platform that will adequately help to monitor and curtail this menace. The aim of this study was to develop a model to predict the quantity of low income housing provision for the South East, States of Nigeria. To achieve this aim, eight Low Income Housing Estates (LIHEs) were selected from 23 LIHEs in four states of south East Nigeria through deliberate sampling method. Questionnaires were administered to the LIHEs residents, landlords and officials of the housing corporations of the South Eastern States of Nigeria- Abia, Ebonyi, Enugu and Imo. Parameters used for the model consist of employment status, household income, household status, household type, plot size, room size and number of years in waiting list etc. Thus, $A_K = H_K + S_K + E_K$ **Where:** A_K **= Total allocation of government low income housing k = the number of months/years in waiting list and runs from** H_K **= Household size, dependence and household income** S_K **= plot size, house type and room size** E_K **= Employment status. The model posits to the reality of employment status as major determinants for GLIH allocation in South East States of Nigeria and supports GH agencies to seasonally reviewing the GLIH allocation policy in South East States of Nigeria and beyond.**

Key words: Framework, LIHEs, employment status, household income, GLIH, model.

INTRODUCTION

Nigeria has witnessed a series of low income housing policy initiatives at different occasions, but none defined its allocation mechanism well as to warrant housing availability and affordability by the low income population. According to Agbola (1995), it is apparent that low income housing policies and programmes initiated aforetimes in Nigeria on the average, have low level of performance which was caused by the poor structure of the economy and nonetheless the poor allocation policy execution. As a matter of fact, low income housing allocation policy in Nigeria is poorly documented leading to rapid policy deterioration of low income housing programmes (Arnott, 2009; Commission on Growth and Development, 2009). Beside it eligibility criteria for allocation is characterize by uncertainties and irregularities. Criteria for allocation of Government Low

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Income houses are not specified. For example, Nigeria has had three major housing polices since the political birth of the nation, fifty - four years ago. The first housing policy was in 1983 during the administration of President Shehu Shagari who ruled in Nigeria between 1979 and 1984. President Shehu Shagari's policy aimed to solving the quantitative housing problems occasioned by the heavy losses of housing units especially in the east region of Nigeria where the Nigerian Civil War (1967-1970) took a great toll of the existing housing stock without stipulating proper provision mechanism to match the housing demand of the low income population (F.R.N, 2006). According to the UN estimates of the time, while Nigeria needed to provide ten units of housing for a thousand of its low income population, it was providing only between two and three units. Also, available evidence point to the fact that the housing provision policy achieved very little, since the political landscape was so inhospitable, that the policy stood little chance of success (Kadiri, 2000; Agbola, 1995). At this juncture, came the evolution of the World Bank's housing policy loans which are divided into three stages focusing mainly on "Sites and Services" scheme-upgrading projects. Still, the development process strategies did not enhance enough housing supply to the urban poor, who desires the houses. Secondly, they gradually shifted the emphasis to housing finance development; and recently this gradually shifted to "housing policy development" loans. But to all avail, housing development processes are not achieved as expected, due to the politics of some specialty interest.

According to Arnott (2009), these projects, although in some cases relatively large, were concerned as experimental demonstration projects seeking to meet three primary objectives: the provision of affordable adequate housing for low income families; Cost recovery from the beneficiaries resulting in the elimination of public subsidies; and replicability of such projects by the private sector, demonstrating that it could in future produce affordable housing in large numbers. The first objective of these projects is that physical provision of low cost housing units was broadly achieved. Unfortunately, the large majority of projects met neither the second nor the third objective (Adejumo, 2009; Obialo, 2006; Ezenegu, 2000; Akeju, 2007; Jiboye, 2009). The second housing policy was the most detailed and debated housing policy. Amongst the vexed problem of the housing sector, the 1991 National Housing Policy tackled the problems of availability and accessibility of land, building material sourcing, cost and availability problem, the institution apparatus and strategies modalities of allocation for the low income housing provision.

In fact, the 1991 housing policy closely mirrored the international opinion that government should, henceforth not engaged in direct housing production but should instead; provide the enabling environment for the execution and actualization of policy objectives and directives (Agbola, 2004). However, 1991 housing policy as evidenced in its contents and the various institutional apparatus established to actualize them, the performance of the housing sector has been objectively poor as measured by the number of Nigerians who newly owned houses or who have access to decent accommodation. There is a widening and frightening gap between aspirations, expectations and the capacity of realization and yawning chasm between the magnitude of demand and the capacity of supply (Agbola, 1995).

The lapses of the 1991 housing policy promoted the introduction of the third national housing policy in 2002. The main thrust of the policy is the use of the private sector as the fulcrum of the new policy which represents a major shift in government view on how to promote mass housing for the citizens (Olayiwole, 2004). Still, this did not allow specificity of allocation process and how it is applied to achieve result. There was no specified rooted allocation method and specified eligibility criteria for the successful applicants.

South East State of Nigeria - Abia, Anambra, Ebonyi, Enugu and Imo States were part and parcel of the above mentioned housing policies despite each State being created at a particular time. Some of her towns - Aba, Onitsha, Umuahia, Enugu, Owerri etcetera benefited from different housing policies as witnessed in Nigeria. Though, an ancient town like Enugu which was the capital city of then East Central State of Nigeria benefited much more of the government presence in low income housing. The South-East States - Abia, Anambra, Ebonyi, Enugu and Imo have not introduced or drifted from the conventional housing policies as established by Nigeria Government rather queued into already existing National Housing Policies which formed the bedrock of these States Housing policies. Each State of the South-East Nigeria, has State Housing Corporation which is fully in charge of any government Housing project and has played many vital roles in providing housing for the entire urban population of which low income population is inclusive.

The provision of government low income housing in South-East, Nigeria has been on the increase and this might point at rapid population increase in the cities of South-East of Nigeria which about seventy percent of the urban population in these cities are low income(Federal Office of Statistics, 1996; National Population Commission,2006). These low income populations ranking the highest in population of the urban areas of South-East of Nigeria are still facing untold housing challenges. The cry for government housing by the low income population is quite perturbing in the streets of the cities of the South-East of Nigeria. Yet, there are lots of government low income housing estates located in the cities of South-East of Nigeria. The low income populations in the cities of South-East do not feel the presence of government in addressing it housing challenges.

Table1. Total number of federal and state government low income housing built and total number of low income applicants since 1981-2001.

States	Houses provided by		No of applicants by		Total no. of houses provided by the Govt.	Total no of applicants	Shortfalls
	Federal FE	State SE	Federal FE	State SE	FE + SE	FE + SE	
Abia	825	902	1115	1006	1727	2121	444
	48.73**%**	33.56**%**	38.81%	24.21%	39.42%	30.17%	16.76%
Ebonyi	100	600		1350	700	1350	650
	5.91**%**	22.32**%**	-	32.48**%**	15.98**%**	19.21**%**	24.56%
Enugu	330	615	800	750	945	1550	605
	19.49%	22.88%	27.85%	18.05%	21.57%	22.05%	22.85%
Imo	438	571	958	1050	909	2008	1099
	25.87%	21.24%	33.34%	25.26%	23.03%	28.57%	41.15%
Total	1693	2688	2873	4156	4381	7029	2648
							100%

Proposing low income housing allocation policy is not enough but the implementation and management of the allocation policy by Government matters so much to achieving results. As a result, the government's ability to provide better allocation policy for making houses available for the low income population proves abortive, due to bad supervision.

More so, this has really affected the psychology, socio-economic development of the low income persons in the cities of South-East of Nigeria. Effective government low income housing allocation policy may sharpen their economic ethos which may lead to the fulfillments of their social aspirations in life.

Against this background above, the main subject of this study is to develop a new model to predict the quantity of low income houses to be built at any specific time in South East of Nigeria.

i.) Eligibility and allocation methods, which government used in allocating low Income housing in South-East, Nigeria?

ii.) What quantity of low income houses built as against the applicants for low income housing?

iii.) What are the socio-economic characteristics of the occupants of the Government low income housing in South-East, Nigeria?

iv.) What model could be developed to predict the quantity of houses to be built in a specific period of time?

Study area

This study focuses on an investigation into housing allocation policy in South-East, Nigeria with specific interest on developing a new model for low income housing allocation built by the Federal and State Governments under public housing programme and private sectors. The study area covers all the towns in South-East, Nigeria with specific focus on the six towns of the South-East Geo - Political zone of Nigeria.

The cities under consideration include Aba and Umuahia in Abia State, Abakaliki and Afikpo in Ebonyi State, Enugu in Enugu State and Owerri in Imo State. Abia, Anambra, Ebonyi, Enugu and Imo States are the five states located within the south-East geo-political zones and the states' socio-cultural affinity make the South East geo-political zone spectacular in Nigeria,

METHODOLOGY

To achieve the study, eight low income housing estates (LIHEs) were selected from 23 LIHEs in four states of south East Nigeria through deliberate (purposive) sampling method and 2000 questionnaires were administered to the LIHEs residents, landlords and officials of the housing corporations of the South Eastern States of Nigeria- Abia, Ebonyi, Enugu and Imo. Also data were sourced from Archives to validate the total number of LIH built. Table 1 reveals that a total number of 4381 low income houses was built across the four States of South East States of Nigeria- Abia, Ebonyi, Enugu and Imo States and 7,029 low income applicants applied for the houses starting from 1981 - 2001. Abia state recorded a total of 1727 Low Income Houses built by Federal and State Governments with a total of 2121 applicants who applied for the Low Income Houses from 1981 - 2001. This represents 39.42% of the total Government Low income housing built by Federal and State Governments within the specified time above. While Enugu had a total of 945 Federal and State Low Income Houses built with 1550 Low Income applicants who applied for the allocation of these houses. The total houses provided represent 21.57% of the entire houses built and 22.05% of the Low Income applicants. Also, Imo State recorded 23.03% and 28.57% of houses built and the low income applicants representing a total of 909 low

Table 2. Predicted Aggregate Provision of GLIH for South East States, Nigeria. (2001-13).

Years	Houses available for allocation
2001	334
2002	551
2003	825
2004	1269
2005	1832
2006	2467
2007	3088
2008	3568
2009	3992
2010	3318
2011	3319
2012	2115
2013	1326

income houses built and 2008 low income applicants respectively. Then, Ebonyi State had 700 Low Income Houses built with a total of 1350 Low Income housing applicants who applied for the allocation within the periods of 1981 - 2001. This represents 15.98%of the total low income housing built and 19.21% of Low income applicants in South East States of Nigeria.

DISCUSSION OF FINDINGS

Interpretatively, this reveals a wide gap between low income houses built by the Federal, State Governments and the number of Low income applicants who applied for the allocation of these Low income houses.

By implication, there are inadequate governments low income houses built in states of South East, Nigeria.
And this has caused high rents, slums and shanties living, long journey to work, conversion of packaged trucks to living houses, high occupancy rates etc.

Thus, $A_K = H_K + S_K + E_K$ (1)

Where: A_K = Total allocation of government low income housing

k = the number of months/years in waiting list and runs from

K_1 ..... K_n

H_K = Household size, dependence and household income

S_K = plot size, house type and room size

E_K = Employment status

To define H_K i.e. household income

All these, are signs of failure of the Government - Federal and States to house the low income people in the South East States of Nigeria.

Proposed model for predicting quantity of government low income housing provision for South East States, Nigeria

In this study, the model is proposed to predict quantity of government low income house to be built to match the low income applicants over a number of years (Table 2 and Figure 1). Amongst all things, the model shall bridge the gap between the shortfalls in government low income houses built and the number of low income applicants. This helps to justify the need for the model. With respect to this model, eight distinct parameters where used as mathematical tools for the model. These parameters consist of employment status, household income, household status, household type, plot size, room size and number of years in waiting list etc

The household income is favourably affected by the government low income housing allocation. All things being equal, the more the H/HS size, the larger the quest for allocation but for in a specific time period

Thus $H_K = BA_{K-1}$ (2)

The plot type determines the house type built by the Government which in turn determines the room size of the low income person. Plot size is stipulated not by the actual level of H_K (household income) but by its change

$S_K = D\,(H_k - H_{K-1})$ (3)

Since we are considering the low income population, then we keep the employment status constant. Since, we

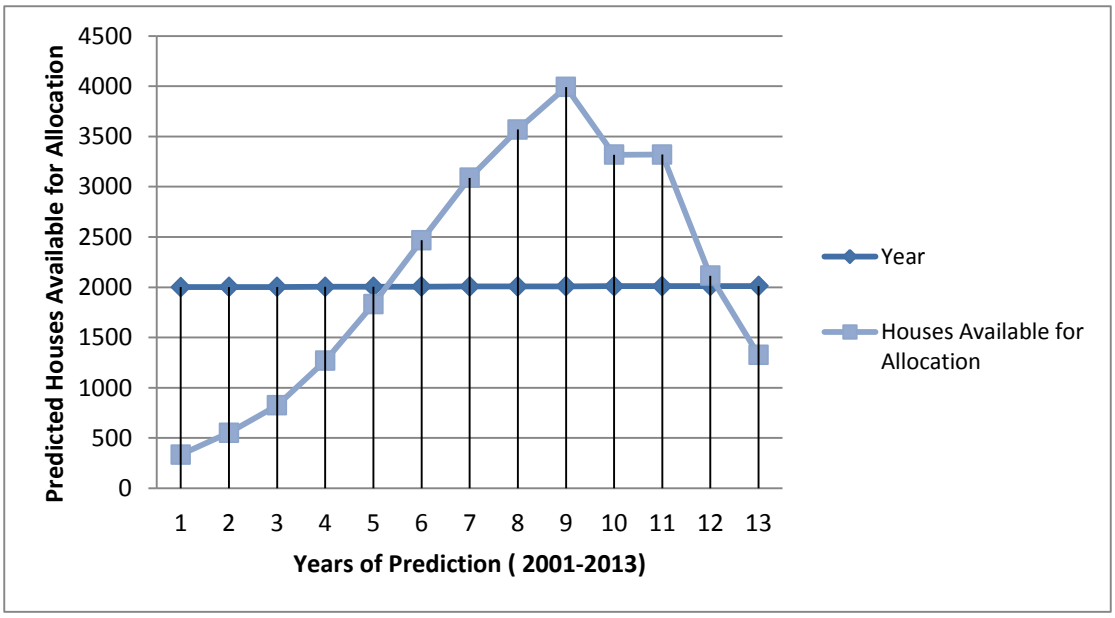

Figure 1. Line graph showing predicted aggregated provision of GLIH in South East States of Nigeria.

already know that low income population is between the income brackets of #18,000-20,000, therefore the employment status 'E' says is constant with these three assumptions, equation (1) now reduces to:

$$A_K = BA_{K-1} + D\ (H_K - H_{K-1}) + E \quad (4)$$

$$= BA_{K-1} + D\ (BA_{K-1}) - D\ (BA_{K-2}) + E$$

$$A_K - BA_{K-1}(1+D) - DBA_{K-2} = E \quad (5)$$

Where,

A_K = total low income housing allocation for the specific period

$BA_{K-1}(1+D)$ = housing income, dependence and household size

DBA_{K-2} Represents plot size, type of house, and room size

E = represents employment status

Then equation (5) implies that employment status is the function of the allocation for the government low income housing in South East States of Nigeria and beyond which seriously determine the household income,$BA_{K-1}(1+D)$ also household income invariably determines DBA_{K-2} i.e. the plot size, type of house and room size allocated to the low-income population.

The employment status determines housing needs of the LI and allocation of government low-income housing. Also the income must be within the low-income bracket.

From (5) prediction of the model, starting with the initial values where $A_{0=2}$, $A_{1=3}$ (say) then for a given value of the constant B, D and E we successfully apply equation(5) for K =2, 3, 4 ..... which will predict A_2, A_3.....

The allocation trend tends to make one predict that the employment will stabilize the level of two units, and then some doubts however may arise over the best values for B & D that will make the model a realistic one and the government will like to be able to predict future trends without actually specifying the values of B & D e.g. does the employment status always stabilize at two units no matter what values B & D have or what initial level A_0 and A_1 are used?

A_0 =334, A_1 = 551, A_2 = 825, A_3 = 1269, A_4 =1832, A_5 = 2467, A_6 = 3088, A_7 = 3568, A_8 =3392, A_9 = 3318

This result shows that there is employment for the low-income population and there is deep increase in

household income which triggers the high housing demand by the low-income population and clearly the allocation is not stabilizing at two units. To check whether it is actually stabilizing, we continue with calculation A_{10} = 3319, A_{11} = 2115, A_{12} = 1326. There is a disaster at A_{12}. This may be interpreted as when there is no employment and household income dropped, the low-income persons will no longer go for allocation since they are not employed.

At this juncture, the government may create more jobs for employment so that the low income population will start seeking for government low-income housing allocation again or alternatively the government should provide an interest free housing loan.

A_K - BA_{K-1} (1+D) - DBA_{K-1} = E where K = 2, 3, 4 ……

Where B, D & E are constants and can be re-written as;

A_{K+2} – BA (1+D) + DBA_{K-2} = E (k =0, 1, 2 ……..)

Note that this is a second linear difference equation of the form.

L $(E)_{XK}$ = 0(K)

So we must find one particular solution and the solution of the associated homogenous equation.

$$A_{K+2} - BA_{K-1}(1+D) + DBA_K = 0 \quad (K = 0,1,2 \ldots\ldots\ldots) \qquad (6)$$

For a particular solution of (5) try A_K = a then;

A_{K+1} = A_{K+2} = a. to satisfy (5) we require

a (1 – BA $(1+D)$ + DBA = E $\Longrightarrow$a (1 – $(BA + DBA)$ + DBA = E

If A $\neq$ 1, a = $\frac{E}{1-BA}$

For general solution of(6), we put A_K = λ^K given λ^2 – BA $(1+D)\lambda$ + DBA = 0 and λ = $\frac{BA}{2}(1+D)$ + $\frac{1}{2}\{BA^2(1+D)^2$ –4BA$\}^{1/2}$

If $BA^2(1+D)^2 <$ 4BA; then λ = $\frac{BA}{2}(1+D) \pm \frac{i}{2}$\{4BA-$BA^2(1+D)^2\}^{½}$

This is of the form $\lambda = re^{\pm i\theta}$, where

R = $\frac{1}{2}\{BA^2(1+D)^2$ + 4BA - $BA^2(1+D)^2\}^{1/2}$

$\Rightarrow$ r = $\sqrt{BA}$

Thus we have solution of the form

$$AK = DBA^k \Big/ 2\{B\cos 1(K\theta) + B_{2\sin(k\theta)}\} + \frac{E}{1-BA} \qquad (7)$$

The expression in the square bracket is clearly sounded for all the values of k since both sin and cos functions are bounded. The last terms remain constant and so all depends on the value of BA

- If BA$<$1, $(BA^2)k/2 \to 0\ as\ K \to \infty$
- Whereas if BA > 1, $(BA)k/2$ increases without limit as K increases
- Thus, for $BA^2(1+D)^2<$4BA, we have two possible results:
- BA< 1, the $A_K \to \frac{E}{(1-BA)}$ as K $\to \infty$ and the allocation of government low income housing is stable
- BA > 1, then A_K increases without limit while oscillating and the allocation of government low-income housing becomes unstable. Relating this with the result found earlier above for BA=$\frac{1}{2}$, D=1, $BA^2(1+D)^2$ - 4BA = -1 < 0, BA = $\frac{1}{2} < 1$ and allocation of government low income housing is by (i) and for E = 1, tends to 2 as K $\to \infty$, and the allocation of the government low income will oscillate in an unstable manner which again checks with the numerical result obtained earlier. Although, all ranges of values for parameters B and D have not been analyzed, it is clear that the allocation of government low income housing in the study area is predicted as stable when

$BA^2(1+D)^2$ -4BA < 0 and BA$<$1 that is

$\frac{1}{4}BA^2(1+D)^2<$BA < 1

Generalizations

From the model above, we want to predict the number of low Income Houses (LIH) that will be ready for consumption or allocated for a particular year to the low income persons by the government according to the low income housing needs assessments and the government stipulated eligibility criteria for allocation of LIH. Whereas A_o represents the total allocation of the GLIH at a specific base year ready for allocation. While A_1 represents the projected or predicted total number of GLIH ready for allocation for the first year. The prediction continues till the k^{th} term of the year / any year in focus.

Model Implications

i.) The model posits to the reality of employment status as a major determinants for GLIH allocation in South East States of Nigeria and beyond…..$A_k = \frac{E}{1-BA}$;

ii.) The model supports GH agencies to seasonally reviewing the GLIH allocation policy in South East States of Nigeria and beyond;

iii.) Generating data for socio-economic characteristics of the beneficiary of LIH programmes in South East Nigeria;

iv.) To help determine housing needs and their effective demands, in a particular time….A_{k-1}…….A_{k-n};

v.) The model also posits that GLIH allocation oscillates with time, as well as effective demand for GLIH is seriously dependent on the growing rate of employment in economic sector. $A_k = BA^{k/2}[B_1 \text{Cos}(\theta) + B_2 \sin(\theta)] + \frac{E}{1-BA}$.

vi.) Gives Government maximum expectation of recouping their expenses in provision with time from the beneficiaries.

vii.) Minimizes waste of housing resources, work on fixed housing budgets; and

viii.) Finally, the allocation model regulates allocation only to eligible applicants, using Low Income Price Index (LIPI) eligibility.

Conclusion

However the study reveals that there are shortages in the low income housing provision in the South eastern states of Nigeria. This affected the socio-economic and physical development of the low income groups exposing them into untold hardships and housing problems resulting in high rents, housing deviants (slum growths and squatter settlements) and unethical habitations that are detrimental to the population and the urban environment.

REFERENCES

Adejumo A (2009). Some thoughts on affordable and social housing in Nigeria.

Agbola T (1995). Functions and responsibilities of the federal and state governments in human settlement development in Nigeria in the next two decades. HABITAT II, 3:222-244, Abuja, 26th -28th July.

Agbola T (2006, December 4). Taking a closer look at Housing: Washington D.C: Financial Standard, 12-15.

Akeju AA (2007). Challenges to providing affordable housing in Nigeria. Proceedings of 2nd Emerging Africa International Conference on Housing Finance in Nigeria, Abuja. Nigeria.

Arnott R (2009). Housing policy in developing in countries: The importance of the informal Economy. Urbanization and Growth. D.C, Washington: World Bank.

Ezenegu VC (2000). Fundamentals of housing. Awka: Fountain Publishers.

Federal Office of Statistics. (1996). Annual abstract of statistics. Lagos: Government Press.

Federal Government of Nigeria. (2004). National Housing Policy. Abuja: Government Press.

Federal Republic of Nigeria official Gazette. (2006). Legal notice on publication of the breakdown of the national and state provisional totals of 2006 census. Lagos: The Federal Government Press.

Jiboye AD (2009). The challenges of sustainable housing and urban development in Nigeria. J. Env. Res. & Policies,4: 23-27.

Obialo DC (2006). Trends in policy: Legislation, funding and practices. Owerri: Global Press Limited.

Olayiwole LM, Adeleye O, Ogunsakin L (2005). Urban housing crisis and responses in Nigeria: Planner's view point, Proceedings of XXXIII IAHS World Congress on housing. Pretoria, South Africa.