HEALTH CORRELATES OF HOUSING IN SELECTED CORE AREAS OF OGBOMOSO, NIGERIA.

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Abstract.
Against the background of urban poverty, slum characteristics and morbidity tendencies; this study assesses the health correlates of housing quality in selected core areas of Ogbomoso, Nigeria. Both the quality of housing and residents health were appraised. Six out of ten wards were sampled. Structured questionnaire was administered using multi-stage procedure to three hundred respondents among the sampled wards; eliciting information on quality of housing and state of health of residents in the area. Likhert scaling was used to transform the ordinal data into one of ratio or interval scales to make them amenable to parametric testing. Both ANOVA and chi-square tests were used to explain the difference in the quality of housing as well as incidence of morbidity among the sampled wards. Factor analysis was used to collapse the variables into fewer manageable composites and linear composite of housing quality (HQI) was regressed on that of morbidity incidence (RIMI). A reliable relationship was observed between the two composites with correlation (R) of -979. The study thus recommends a good investment in housing and infrastructural provision towards a better quality of housing.
Keywords: Housing quality, Health, Core Areas, Relationship

Introduction.

A number of recent ecological studies have shown that population groups living in disorganized neighborhoods and deteriorated housing have higher proportion of diseases, accidents, extended illnesses and mental illness than population groups living in adequate housing (Fanning, 1967; WHO, 1987; Shaw, 2004). More than a casual relationship has been demonstrated to exist between inadequate housing and a variety of social morbidities which, like unemployment, poverty and poor education, interfere with the attainment of good social health in the community. At many instances, the physical condition of housing has direct link with health conditions of residents (Page, 2002, Oluwande,1983). The relationship of peeling lead paint leads to poisoning in children, broken stairs; defective and inadequate lightening system, rotten window sills coupled with inadequate or nonexistent window guards influence the incidence of certain accidents in the home. In addition, broken and defective plumbing systems spurring the infestation of rodents and insects, poor management and disposal of waste etc, can be directly associated with the incidence of infections and infectious diseases. This is to mention but few among the health risks associated with poor housing condition.

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It was reported that, out of 121,000 housing units slated to be built between 1994 and 1995, only 1,014 houses were completed (CBN, 1994, 1998; Vision 2010 Main Report). It was also estimated that about 85% of urban population live in single room and the number of occupant per room ranges from 8 to 12. Only 44% of houses inhabited by urban residents were observed to be in physically sound condition (UNICEF, 1989). This suggests that a higher percentage (54%) of urban dwellers especially in the core areas are living in poor housing and stands the risk of collapsible structures that threatens health, life and property.

This illustrates the nature of overcrowding. The impact of this on human especially children's health can be enormous. In particular, respiratory, skin infections, heat related diseases like measles, meningitis (Pholeros, 1993) among others may result. Overcrowding also increases the stress on limited existing health infrastructure and health related facilities such as water supply, waste disposal system etc. the absence or inadequacy of these facilities affects the proper functioning of the dwellings as well as the healthy living of the inhabitants. For example, it has been proved that access to clean water is essential for healthy living while the consumption of impure water have been associated with parasitic diseases like giardiasis, dysentery diseases such as gastrointestinal disorders (gastroenteritis), diarrhea, typhoid fever, hepatitis etc (Hinrichsen, 1998).

Unavailability of sanitary facilities in less quality buildings leaves no option to the residents than to throw their feces/stool into bushes and abandoned buildings and lots nearby. This improper disposal of human waste is capable of contaminating the living area with the help of organisms such as shigella, ecoli, salmonella, rotavirus, etc, and may lead to diverse type of diseases (Bailie, 2002). Epileptic electricity has made the procurement of generators a *sine-qua-non* situation to residents. This, aside from the untold inconveniences caused, prevents the use of

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facilities (e.g food storage) at home and has increased the daily inhalation of the poisonous carbon-monoxide by residents. Poor road surfaces and poor set back to buildings have aggravated the incidence of dust thereby aggravating respiratory cancerous and nervous diseases in homes. Stinking sewers and drains as well as ubiquitous toxic and rotten solid waste have direct bearing to health and livability of residents.

It is therefore imperative to know the situation of housing in our urban centers. What type of housing is best for healthy living? What housing quality characteristics are the most important when the issue of discussion is healthy city? What are the probable diseases associated with poor housing condition and housing environment and to what degree can we say they are causatively related? To shed light to these questions and many other relevant ones, this study examines the health correlate of housing in selected core area of Ogbomoso, Nigeria.

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Method.

Ogbomoso North Local Government consists of ten wards. Out of these, six wards were sampled. The bulk of the data used was obtained through primary source; and others from secondary source. Structured questionnaire was administered using multi-stage procedure to three hundred respondents among the sampled wards; eliciting information on quality of housing and state of health of residents in the area. Likhert scaling was used to transform the ordinal data into one of ratio or interval scales to make them amenable to parametric testing. Both ANOVA and chi-square tests were used to explain the difference in the quality of housing as well as incidence of morbidity among the sampled wards. Factor analysis was used to collapse the variables into fewer manageable composites and linear regression was used to explain the relationship between housing quality and health of residents.

Concepts, theory and Issues.

A house as the physical structure which human beings use for shelter (Oluwande,1983); the direct expression of changing value, images, perceptions and ways of life as well as people's well being. Housing is the totality of the immediate physical environment largely man made in which family live, grows and decline (Agbola, 2005). It can therefore be concluded that housing means a lot to man and its place in the overall well being of individuals, families and nations cannot be overemphasized. Housing therefore is logically and intricately connects with the health of residents. the importance of this association in housing and health is evident in the value it places on the promotion and maintenance of good quality of life and the emphasis it places on preventive rather than curative measures.

The recognition of health issues in housing as an important factor in urban and rural development field is recent (Egunjobi, 1997). Interest in housing as a determinant of health has fluctuated over the last 2 centuries in response to infectious disease outbreaks, social unrest and class conflict, industrialist interest in maintaining a healthier workforce, and economic downturns leading to crises in housing availability and quality which in turn affect the health of human beings (Krieger and Higgins, 2005). These concerns are all too contemporary for the swelling numbers of urban poor throughout the world, who live in cramped, precarious conditions, often without electricity, running water, or title to the land they occupy. This may particularly apply to this study in that the area under study are the core areas of the city; where the urban poor are expected to be living

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Cycle of Health and Poverty Theory

Housing and its associated health problems is another dimension of the multifaceted nature of poverty. There is an existence of inextricable link between poverty, housing and health which is complex and multiple, reinforcing each other in various ways (Carr, 2004). Poor people worldwide typically face greater environmental risk in their surroundings because they

live in unhealthy locations. They are also prone to health risk such as exposure to indoor smoke and water borne diseases, malnutrition and inadequate health care delivery. All these can be associated with the level of income of such people which is not enough to feed them and their families let alone being able to afford healthy and adequate houses with all facilities that can help to improve healthy living.

The poverty cycle as it relates to health is a problem that affects many people in the contemporary society. It is a vicious continuous cycle in which the poor keeps regenerating but never improve their condition of living and social status. Existing literature shows that it is the poor who suffers poor health outcomes mostly due to the unhealthy housing and sanitary habits as well as dietary conditions which are aggravated by limited finance, poor accessibility to health facilities and most importantly poor housing condition

Again, the increasing populations in cities and towns increased social problems in overcrowded slums. The lack of inexpensive, rapid public transportation forced many workers to live close to their work. These factory areas were not the pastoral areas with which many were familiar, but were bleak with smoke and other pollutants. Most cities and towns were woefully unprepared to cope with the resulting environmental problems, such as the lack of potable water and insufficient sewerage. In this atmosphere, cholera was rampant; and death rates resembled those of Third World countries today in that one out of six children may die before the age of 1 year. Health needs thus find expression in the quality of housing that is requisite for human living. To this end, Basic Principles of Healthful Housing was proposed by, a Committee on the Hygiene of Housing, appointed by American Public Health Association (APHA), (Ehlers and Steel, 1938). These fundamental needs include physiological and psychological needs, protection

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against disease, protection against injury, protection against fire and electrical shock, and protection against toxic and explosive gases.

Fundamental physio-psychological Quality of Housing that Guarantees Health

Housing should provide for the following physiological needs: protection from the elements, a thermal environment that will avoid undue heat loss, a thermal environment that will permit adequate heat loss from the body; an atmosphere of reasonable chemical purity ,adequate daylight illumination and avoidance of undue daylight glare, direct sunlight, adequate artificial illumination and avoidance of glare, protection from excessive noise, and adequate space for exercise and for children to play (Ehlers and Steel, 1938).

The first three physiological needs reflect the requirement for adequate protection from the elements. The lack of adequate heating and cooling systems in homes can contribute to respiratory illnesses or even lead to death from extreme temperatures. The fifth through the seventh physiological concerns address adequate illumination, both natural and artificial. Research has revealed a strong relationship between light and human physiology. The effects of light on both the human eye and human skin are notable. According to Zilber, one of the physiological responses of the skin to sunlight is the production of vitamin D. Light allows us to see. It also affects body rhythms and psychological health. Average individuals are affected daily by both natural and artificial lighting levels in their homes. Adequate lighting is important in allowing people to see unsanitary conditions and to prevent injury, thus contributing to a healthier and safer environment. Improper indoor lighting can also contribute to eyestrain from inadequate illumination, glare, and flicker.

Houses should not be contiguous to or have noise producing activities close to it. This is to avoid certain health risks. (This is the eighth physiological concern.), The U.S. Environmental Protection Agency (US EPA, 1974) produced a document recommending maximum of 55

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decibels outdoors and 45 decibels indoors noise levels to prevent hearing loss. Besides reduction in hearing ability, the effects of noise includes elevated blood pressure; negative cardiovascular effects; increased breathing rates, digestion, and stomach disturbances; ulcers; negative effects on developing fetuses; difficulty sleeping after the noise stops; plus the intensification of the effects of drugs, alcohol, aging, and carbon monoxide (American Speech-Language-Hearing Association). In addition, noise can reduce attention to tasks and impede speech communication. Finally, noise can hamper performance of daily tasks, increase fatigue, worker inefficiency and cause irritability Noise Abatement Commission (NAC, 1929, 1930) (US EPA, 1974). The ninth and final physiologic need is for adequate space for exercise and play. This promotes fitness and avoidance of health risks such as obesity, diabetes etc

Seven fundamental psychological needs for healthy housing include the following: adequate privacy for the individual, opportunities for normal family life, opportunities for normal community life, facilities that make possible the performance of household tasks without undue physical and mental fatigue, facilities for maintenance of cleanliness of the dwelling and of the person, possibilities for aesthetic satisfaction in the home and its surroundings, and Concordance with prevailing social standards of the local community. All of these will promote residents satisfaction and as well community cohesion which is essential to preventing the occurrence of environmental nuisances and social vices that are injurious to resident's health.

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Result and Discussion

This section discusses the major findings of the study. The first section appraises the condition of houses in the area. The following section appraises the incidence of housing related diseases while the last concerns with the probable relationship between quality of houses and incidence of diseases.

Table 1: Housing Condition Appraisal.

	Housing Condition Variables	Aaje	Okelerin	Sabo	Aguodo	Saja	Isaleafon
1	Building Type	283.4	331.7	320.3	297.5	305.9	295.6
2	Building Age	123.8	294	229.2	147.5	144.7	138.5

3	Occupancy Ratio	10.3	37.5	58.3	41	15.6	23.1
4	Floor Condition	231.3	234.3	237.7	245	202.8	219..2
5	Wall Type	178.6	234.3	220.9	185	172.2	173
6	Wall Condition	233.5	243.7	279.1	247.5	211.3	223.3
7	Roof Condition	228.8	265.8	258.3	245	216.7	231.6
8	Ventilation	21.4	40.6	37.5	37.5	25	15.4
9	Toilet Availability	35.7	62.5	54.2	40	44.4	38.5
10	Toilet Type	31	65.6	50	35	44.4	30.8
11	Toilet Adequacy	35.7	53.1	50.1	42.5	47.2	34.6
12	Bathroom Availability	40.5	87.5	83.3	80	72.2	51.5
13	Bathroom within Building	4.8	6.3	4.2	30	11.1	7.7
14	Kitchen Availability	26.2	62.5	41.7	62.5	25	38.5
15	Kitchen within Building	4.8	3.1	4.2	17.5	5.6	15.4
16	Electricity Adequacy	124	75	104.2	127.5	133.5	95.9
17	Water Source Adequacy	278.7	278.2	283.3	277.5	294.4	273.1
18	Waste Disposal Adequacy	167	303.1	225	195	147.4	184.6
19	Drainage Availability	61.9	84.4	66.7	62.5	75	76.9
20	Drainage Condition	9.5	15.6	8.3	22.5	13.9	19.2
21	Housing Satisfaction	197.5	228.2	254.2	257.5	210.9	203.9
22	Housing Condition Index	2,046.6	2,488.4	2,732.2	2,225	2,039.8	2,038.1

Source: Author's Field survey, 2011.

In this study, some building types are considered to be better than others because of their design, room size and their ability to promote or facilitate health enabled environment. For instance, some of the buildings may promote circulation, ventilation, comfort and other housing attribute that are germane to quality health. To this end, weights were attached to different building type in order of quality. Therefore, the least weight (1) was attached to 'compound house' type, while the maximum weight (5) was attached to 'duplex' type of building. The summary of this is presented on table 1. This shows that generally in the study area, there are fewer quality houses. Nevertheless, there is relatively more quality houses in Okelerin (331.7) followed by Sabo (320.3), Saja (305.9), Masifa (297.5) Isaleafon and the area having the least quality houses was Aaje (283.4).

In the same vein, buildings with younger ages were reckoned with to have more health promoting quality and are so ranked. The highest score again goes to Okelerin (294), followed by Sabo (229.2). the least score one again goes to aaje. The size of the room occasioned by the design is not enough to measure housing quality. The intensity of usage also count. This was

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measured in this study by the occupancy ratio of the buildings. Here, the more the number of persons living in a room the less the score obtained by the house. The highest score for this variable goes to Sabo (58.3), followed by Aguodo (41), Okelerin (35.7), Isaleafon (23.1), Saja (15.6) while the least score goes to Aaje (10.3). Using a similar method, the type and condition of floor, wall and roof were ranked; and the score distribution followed almost the same pattern. This affirms a point that housing quality though generally poor in the area studies is relatively better in some areas (wards) than the other.

Table 2: X^2 test of Difference in Housing Condition

Housing Quality	X2	P Value
Building Type	36.072	.071
Building Age	91.581	.000**
Floor Type	16.502	.086
Floor Condition	42.4977	.000**
Wall Type	26.136	.037**
Roof Type	7.370	.195
Roof Condition	19.989	.017**
Ventilation	16.678	.082
Toilet Availability	7.095	.214
Toilet Type	21.417	.124
Toilet Adequacy	31.096	.054**
Bathroom Availability	32.182	.000**
Bathroom within Building	44.405	.000**
Kitchen Availability	22.796	.001**
Kitchen within Building	27.675	.000**
Kitchen Alternative	45.458	.000**
Electricity Availability	10.899	.037**
Electricity Adequacy	21.382	.013**
Water Source Adequacy	31.086	.001**
Waste Disposal Adequacy	31.810	.005**
Drainage Availability	122.813	.000**
Drainage Condition	23.677	.001**
Housing Satisfaction Index	53.912	.000**

Source: Author's Computation, 2011.

Significant at 95% Confidence level

The chi-square test revealed that at 95% confidence level, there is no significant difference in the building type (P value = .071), Floor type (P value = .086), roof type (P value = .195), Ventilation (P value = .082), Toilet availability (P value = .214) and Toilet type (P value = .124) comparing the wards within the study. This connotes that, the quality of houses in the different

wards that comprises the study area are significantly different though all the area had similar building type floor type, roof type, ventilation and toilet situations, the quality of buildings in the study area cannot all be said to be in the same category. In other words, the factors that made the quality of the buildings in the study area different are: age of building, floor condition, wall type, roof condition, toilet adequacy, bathroom adequacy, kitchen adequacy and the adequacy of other facilities such as electricity, water, waste disposal and drainage. Invariably, these factors become important to the explanation of the relationship between housing and health in this study.

Table 3: Resident's Health Appraisal.

S/N	Incidence of:	Aaje	Okelerin	Sabo	Aguodo	Saja	IsaleAfon
1	Asthma	278.5	184.3	187.4	242.5	269.4	238.5
2	Typhoid	180.9	143.9	156.4	175	180.7	173.1
3	Skin Irritation	159.5	159.4	145.8	160	172.3	184.5
4	Malaria	121.4	125	129.2	130	111.1	338.4
5	Cholera	257.2	212.6	149.9	212.5	186	215.2
6	Diarrhoea	259	176	194	214	197	208
7	Dysentery	174.1	131.8	147.9	171	173.8	166.7
8	Accident	166	122	148	159	157	155
9	Health Condition Index	997.5	825.2	768.7	920	919.5	1,149.7

Source: Author's Field Survey, 2011.

As presented on table 3, one would observe that the incidence of asthma is relatively higher in Aaje (278.5) followed by Saja (269.4), followed by Aguodo (242.5), Isale Afon (238.5) and relatively lower in Sabo (187.4) and Okelerin (184.3) wards. The distribution followed the same pattern for typhoid fever, dysentery and accident among the sampled wards. For the other diseases examined in the study, the distribution followed a somewhat similar pattern. However, to compare the incidence of ill-health among the wards, the sum of weight of all the diseases considered were computed and which became the surrogate for the health condition index in the study. Summarizing the incidence of poor health in the study therefore, one would observe that, Isale Afon ward is hardest hit (1,149.7), followed by Aaje (997.5), Aguodo (920), Saja (919.5), Okelerin (825.2) and the relative incidence of ill-health is lowest at Sabo (768.7) ward.

Table 4: ANOVA Test of Difference in Incidence of Diseases Among the Wards

	Health Indicator	F Value	P. value
1	Incidence of Asthma	3E+032	.000
2	Incidence of Typhoid	5E+031	.000
/3	Incidence of Skin Irritation	5E+031	.000
4	Incidence of Malaria	2E+033	.000
5	Incidence of Cholera	2E+032	.000
6	Incidence of Diarrhea	2E+031	.000
7	Incidence of Dysentery	1E=032	.000
8	Incidence of Accident	1E+031	.000

Source: Authors Computation, 2011.

It is observable from table 4 that there is difference in the incidence of all the listed diseases among the sampled wards at ninety-five percent confidence level. Invariably therefore, the established factors that differentiate the housing quality (table 2) may all be linked to the relative high incidence of diseases in the wards where they exist.

Relationship between Housing and Health.

Factor analysis was used to collapse the variables both of health and housing quality in the study. The rerult is presented on table 5. In all, six linear composites were emerged. Based on the loadings, two of the composites were regarded as health indices, however, one of the two was considered residual (residuals are the factors that replicate another factor but has a lower eigen values or communalities Tabachnick *et al* 2001), and the other, a surrogate for Relative Incidence of Morbidity Index (RIMI). Relative Incidence of Morbidity Index extracted 81.7% variance of the total set. The variables that loaded highly under it in descending order are: Incidence of typhoid (.969), Incidence of Dysentery (.961), Incidence of Asthma (.960), incidence of Accident (.910), Incidence of Diarrhoea (.823), Incidence of Cholera (.569), Incidence of Skin irritation (.477) and the least is Malaria (.198). this implies that when morbidity is mentioned in this study, typhoid is the most important illness under cosideration followed by Dysentry and the least important is malaria in the order that they have been listed. One reason that may be adduced for malaria not been very important in the explanation of haelth in this study is that malaria exists almost everywhere; regardless of the house quality.

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Table 5: Factor Components

Variables	Components					
	HQI	2	3	4	RIMI	2
Building type	.934					
Building age	.977					
Occupancy ratio	.761					
Floor condition		.718				
Wall type	.976					
Wall Condition	.652		.549			
Roof Condition	.912					
Ventilation	.853					
Toilet Availability	.955					
Toilet type	.906					
Toilet Adequacy	.852					
Bathroom Availability	.822					
Bathroom within Building		.770				
Kitchen Availability	.682	.660				
Kitchen within Building		.796				
Electricity Adequacy						
Water Source Adequacy				.631		
Waste Disposal Adequacy	.926					
Drain Availability						
Drain Condition						
Asthma					.960	
Typhoid					.969	
Skin Irritation						.833
Malaria						896
Cholera					.569	
Diarrhoea					.823	
Dysentery					.961	
Accident					.910	

Source: Author's Computation, 2011.

In the same vein, there were four factors that may be regarded as housing quality factors out of which three were considered residual. Hence, one of the four became a surrogate for housing quality extracting 97.4% variance of the total set. In the explanation of housing quality especially as it relates to health, in descending order, the important variables are: Age of building having communality of .977; wall type (.976), toilet availability (.955), building type (.934), waste disposal adequacy (.926), roof condition (.912), toilet type (.906), ventilation (.853), toilet adequacy (.852), Bathroom availability (.822), occupancy ratio (.761), electricity adequacy (.698), through to the least kitchen position within building (-.413).

The Relationship

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To explain the relationship between the linear composites of housing quality (HQI) and morbidity (RIMI) the former was regressed on the latter. The result of the regression analysis is presented on table 6.

Table 6: Regression Model

Model	Dependent	Independent	R	R^2	F	Pvalue	B		P value
1	RIMI	HQI	-.979	.959	236.423	.000	a	8.23	.000
							HQI	-.979	.000

Source: Author's computation, 2010

N.B: RIMI – Relative Incidence of Morbidity Index. HQI – Housing Quality Index

The coefficient of correlation (R) between RIMI and HQI is .-979. The F value is 236.423 and the P value is .000. These imply a strong negative correlation between the two at .005 alpha level. In other words as the quality of houses increases the incidence of morbidity decreases. The coefficient of determination (R^2) suggests that 95.9% of why residents would be affected by diseases listed in the study in the order that they have been listed is attributed to the poor quality of their housing environment. In other words, morbidity tendencies is accounted for by 95.9% factors of housing; meaning that if it is desired that morbidity be alleviated, there must be a meaningful investment in housing for quality. Calibrating the regression model therefore, using the regression equation: Y = a + bx + e. (where *Y* is the dependent variable and in the case of this study; the Relative Incidence of Morbidity Index (RIMI), *x* is the independent variable which is the Housing Quality Index (HQI), *a* is the constant and *b* is the regression coefficient).we have:

RIMI (Relative Incidence of Morbidity Index) = 8.23 - .979 HQI (Housing Quality Index). This suggests that a unit decrease in housing quality may produce a corresponding .979 (97.9%) of the already existing diseases in the area if all other factors are kept constant.

Conclusion.

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It was found out in the study that housing is an important correlate of health. Perhaps many of the diseases in the neighborhoods are as a result of the poor housing condition. Individuals, governments and other stakeholders are therefore advised to invest in their houses to make it quality. Governments are especially urged to provide basic facilities such as toilets, potable water waste collection service etc to enhance housing quality and forestall occurrence of infectious diseases.

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