



WELFARE DEPRIVATION AMONG RIVERINE HOUSEHOLDS IN SOUTHWESTERN NIGERIA

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ABSTRACT

This study had examined the level of welfare deprivation among riverine households in southwestern Nigeria using five dimensions consisting of sixteen welfare indicators. This study adopted the household as the unit of poverty measurement. Using the principal component analysis, the deprivation index of the households was aggregated into a three-component deprivation structure, namely: housing condition deprivation; health and nutrition deprivation; and social network deprivation. Descriptive analysis showed that riverine households has a mean household size of 5 with quite a good proportion of them (56%) not meeting the Federal Government of Nigeria (FGN) policy of minimum educational attainment at least 9 years of formal education. Over 89% and 68% of the households defecates and dumps refuse directly into the surrounding water and (or) bushes by the river side, a practice that is predominant among households in Lagos and Ogun state where houses were built directly on water and (or) on river bank. Majority (46%) of the households constructed their houses on the river with plank walls and floor, the surrounding water bodies also serving as source of drinking water to about 63% of them. 74.78% of the households are also lacking in basic household assets (such as radio, TV sets, set of chairs, mattress, bednet, etc.) and a means of transport such as cars and bikes with only a few possessing one or two canoes. Obviously as a form of community self-help strategy, the surveyed riverine household's posse's strong socio-political affiliation as over 84% and 92% are actively involved in politics and community development projects, respectively. Considering the deprivation characteristics of the riverine households, it was recommended that policy intervention programmes - such as access to public basic educational facilities as well as other stable means of income than farming, fishing and natural resource collection activities- should be put in place to reduce their deprivation level in many of the indicated welfare dimensions.

Keywords: riverine households, welfare indicators, principal component analysis, natural resource collection.

INTRODUCTION

The coastal areas in Nigeria predominantly comprise of fishing communities/settlements of varying sizes mostly located on the edge of freshwater forest and on the top of beach ridges. There are about 20 millions (22.5%) of such people living along the coastline stretching some 800 km in length (Ibe and Awosika, 2004). Many of these riverine households are exposed to risky situations occasioned by devastating natural/environmental hazards such as erosions and floods which have perpetually subjected them to a situation of homelessness, hopelessness, reduced welfare status and abject poverty (Siyanbade, 2006). For instance, a study by Sardar *et al.* (2008) revealed that riverine households in Pakistan often do not find adequate and appropriate shelters; quality food and drinking water; adequate and hygienic sanitation; privacy for women, particularly for the lactating mothers and adolescent women. In addition, floods often force the students out of academic activities since their learning centers are often used as makeshift flood shelters in affected areas. Flooding incidents in Nigeria (e.g. in Cross River State in 1998 and Victoria Island and Ikoyi areas of Lagos State in the early 2000s) have rendered over 5000 people homeless and also having implications on boundaries and landscape of the areas affected (Xinhua English News-Wire, 1998). The flooding situation in the Nigerian coastal regions is getting worse by the year and riverine communities along the coast are the worst hit by these disastrous events. Floods provoke

water level variability and also render the use of artisanal fishing equipments less effective through the large volumes of debris it transports, thereby causing more harms to the economic activities of the fisher folks thus worsening their poverty situations (Siyanbade, 2006).

World Bank (2001) study revealed that the poor in Nigeria are usually confronted with lack of assets, as well as receiving income from local economies in which wealth and status come from nature (land and water bodies). These situations not only affect the income and nutritional intake of the poor, but also affected their ability to acquire assets, most especially landed property and also their quest for better social amenities, such as education, health care services food, water, etc. which in turn has implications on child mortality, maternal mortality and decreased life expectancy of the poor in the country. Over the years, the country's educational system has fallen, shortage of funds continued to be a constraint to educational development at all levels. At the primary school level, the shortage of funds resulted to delays in the payment of teacher's salaries, and inadequate supply of books and teaching aids. Worst hit are girls whose parents never wanted to send to school because they are usually seen as household help. Poor women, because of their lack of education, often have too many children, frequently suffer from hunger and malnutrition and related illness which often undermine their productivity. Thus they continue to find themselves in poverty.



Aigbokhan (2000) observed that poverty level in some south-southern states of Nigeria was particularly high in Akwa Ibom, Delta and Edo states, which to a large extent are coastal areas. This variation in the poverty level within a geographic zone underscores the need to pay particular attention to riverine communities when designing national policy intervention programmes to alleviate poverty. The poor attitude of artisanal fishermen towards adoption of appropriate fishing technology in Nigeria has been reported in literature (e.g., Oladele and Adekoya, 2006) and this has considerable effect on their catch level and hence, on their income and welfare status. For instance, Cinemre *et al.*, (2006) reported the unwillingness of fisher folks to negotiate for optimum catch level that reduces wastage of fishing input resources and minimizes fishing cost; hence, they are constantly faced with low level of returns and poor welfare even in the face of abundant natural fish stock.

Wherever they exist, coastal regions are mostly affected by the scourge of poverty and the situation can make a riverine community within an urban metropolis far worse than rural areas. Poverty situation arises when households are deprived in basic welfare commodities/activities. In the study by Sardar *et al.*, (2008) which showed that 64.7 percent of the riverine households were living below poverty line with lives and property at the risk of flooding/erosion. The situation in the Nigeria coastal region is not in any way different as the consequences of crude-oil exploration produced a shock in the local economy that results in decreasing economic activities (particularly agricultural) leading to decreasing crop outputs and fish catch, with an attendant increase in poverty level and welfare loss (Maduagwu, 2000). In the 2003 assessment of poverty situation in Nigeria, Ondo State ranked 7th poorest among the 36 States considered (UNDP, 2003). In another study (FGN/UNDP, 1998) assessing the poverty situation in six selected States in Nigeria (namely, Sokoto, Bauchi, Cross-river, Enugu, Kaduna, and Ondo), Ondo State was ranked 3rd poorest. According to the Ondo State Poverty Study (1995) based on income poverty index, about 45% of the households were in extreme poverty, while 85% were identified poor. Surprisingly, out of these 45% identified poor households, 55% were from the riverine areas. This current study had examined the multidimensional deprivation situation of riverine households in Southwestern Nigeria.

Conceptual framework

A 'deprivation index' is a list of items (or activities) which have two characteristics, given the prevailing social and economic conditions in a time and place. First, the items on the list should be widely seen as necessary for a household to have a standard of living above the poverty level. In other words, these should be items which most households not in poverty are likely to have. Second, these items should be such that households in poverty are likely to find some of them unaffordable and so not have all those items (Duclos and Gregoire, 2003). The deprivation index, if it is well developed,

should contain those items that distinguish the poor from the non-poor in the prevailing social and economic conditions. The items in a deprivation index are not necessarily a comprehensive list of basic needs, since in a wealthy society even the poor are likely to have most of the basic necessities. The deprivation index advances the measure of poverty in a number of ways compared to existing measures: reflection of the real life experiences of the poor; communicating a powerful and compelling picture of poverty to the public; measuring actual standard of living of the people; capturing dimensions of poverty that income does not, for example social isolation; reflecting public perception of poverty; reflecting government investment in services and in-kind benefits; as well as complementing (but not replacing) existing income measures (Bossert, *et al.*, 2006).

RESEARCH METHODOLOGY

Study area

The empirical setting for this study is Ogun, Ondo and Lagos States in the Southwestern zone of Nigeria. Ogun state is bounded in the West by Republic of Benin; on the South by Lagos State and the Atlantic Ocean; on the North by Oyo and Osun states; and shares boundaries on the East with Ondo State. It lies within Latitude 6°N and 8°N and Longitude 3°E and 5°E, divided into 4 socio-political zones, with 20 LGAs. Ondo State lies between Longitude 4°E and 6°E and Latitude 5.45°N and 8.15°N, bound in part by Kwara, Kogi and Ekiti States in the North; Edo and Delta States in the East; Ogun, Oyo and Osun States in the West; and the Atlantic Ocean in the South with 18 LGAs. Lagos State is bounded in the East by the Ogun State and the Atlantic Ocean, and in the Western part shares common boundary with Republic of Benin. These three States form the coastal bed of Southwestern zone of Nigeria, where artisanal fishing activities are carried out predominantly among the settlers. However, land-based farming activities (crop and livestock farming) are practiced in some upland communities as primary occupation, while some of the inhabitants also engage minimally in cropping and livestock rearing as some sort of secondary activities. Other informal sector activities are also characteristic of the riverine households such as natural resource collection (sharp sand, fuel wood, etc.) from the water bodies.

Study data and sampling procedure

Primary data were collected from household heads using a multi-stage sampling procedure. In the first stage, Ogun, Ondo and Lagos States were purposefully selected in the South-western zone of Nigeria, as they constitute the coastal region of the zone. All the Local Government Areas (LGAs) belonging in the coast of Ogun and Ondo States were purposively selected for this study at the second stage, (namely Ogun waterside, Ipokia and Ijebu-East LGAs in Ogun State; and Ilaje, Ese-Odo, and Irele LGAs in Ondo State). For Lagos State, 3 LGAs (Epe, Badagry and Mainland LGAs) were selected to display the



socio-economic characteristics of the enclosed riverine communities similar to the other States. These 9 LGAs have some similarity in their rural-sector composition with a diverse economic (formal and informal employment); demographic (mixture of upland and coastal communities) and occupational base (predominantly fishing, natural resource collection, land-based farming, and artisan activities). Subsequent stages involved a proportional selection of wards (Pampalon and Raymond, 2000) at the third stage and village/towns at the fourth stage. In the final stage, 5 households (HH) were selected and interviewed per village/town, resulting in 500 households out of which only 448 valid questionnaires were analyzed in this study. The unit of analysis was the household whereas the male or female head was interviewed. Welfare indicators for which data were generated selected on the basis of their association with the two dimensions of deprivation in literature - namely material and social - (Townsend; 1979; Pampalon and Raymond; 2000 and Rampalon, *et al.*, 2009); three of them were as used in the UNDP Human Poverty Index; and they are generally within the Millennium Development Goals (MDG) framework. The Food and Nutrition dimension was added to this study for the wider coverage, as in done by the British Department of Communities and Local Government (BDCLG, 2007). The proportionality factor used in the third stage to select wards is given below:

$$P_i = \frac{n_i}{N_i} \times 20 \quad (1)$$

where P_i = number of sampled wards

n_i = number of wards in the particular LGA of interest

N_i = total number of wards in all the 9 LGAs (i.e., 114)

i represents the referenced State (Ogun, Ondo, Lagos).

This led to 20 wards been selected from the 9 LGAs.

Another proportionality factor was used in the fourth stage to select towns/villages as given below:

$$X_j = \frac{q_i}{Q_i} \times 100 \quad (2)$$

where X_i = number of sampled towns/villages

q_i = number of major town/wards in the particular ward of interest

Q_i = total sum of major towns/villages in the 20 wards selected (i is the referenced ward).

This led to 100 major towns/villages covered in the course of data collection. A final proportionality factor was introduced in the final stage to select households as given as:

$$H_i = \frac{s_i}{S_i} \times 500 \quad (3)$$

where H_i = number of sampled households

s_i = number of households in the particular town/villages

S_i = total sum of households in the 100 towns/villages selected

i represents the referenced town/village.

This led to 500 households interviewed in this study.

Methodological procedures for constructing an 'enforced' index of multidimensional deprivations

Basic geographic units (political wards) were chosen for the purpose of constructing the index of multidimensional deprivation for the riverine households, being the smallest possible homogenous geographical entity. A long list of several welfare items was presented to the households in random order to indicate which one(s) were perceived as a necessity for an acceptable standard of living given the prevailing socio-economic condition in their society, and which one(s) they lacked by choice and (or) by reason of unaffordability. The choice of the indicators followed previous studies (e.g., Pampalon and Raymond, 2002; Oyekale and Okunmadewa, 2008). The list contained items/services that can generally be acquired by household disposable income. This approach reflects Mack and Lansely's (1985) concept of deprivation being about lack of socially perceived necessities. The initial deprivation index was therefore computed from a deprivation score generated by multiplying the likelihood of an item being perceived as a necessity by the likelihood of a respondent not having the item. Based on the final list generated containing sixteen (16) welfare items/indicators*, indices of multiple deprivation were constructed for the riverine households using the principal component analysis (PCA) approach (following Pampalon and Raymond, 2000; Rampalon, *et al.*, 2009; Tello, *et al.*, 2005; Curtis, *et al.*, 2006; and Benach, *et al.*, 2003) to reduce the indicators to fewer dimensions. A varimax rotation was applied to these dimensions to increase their readability and to make them independent (orthogonal), generating the Eigenvalues. Only components whose Eigenvalues exceeds 1.00 were retained for the generation of deprivation indices. Political wards were then grouped together in terms of their factor scores to reflect the importance of each component in each ward. For each component, the factor scores were ranked from least to most deprived ward, dividing the resulting distribution into equal quintiles of 20%. The resulting five sets of quintiles were later cross-tabulated to determine which segments of the population are not deprived in any of the three dimensions, and which segments are deprived by each and a combination of dimensions.

Analytical techniques and methods

Measures of welfare deprivation among the riverine households

The number of welfare deprivations suffered by the riverine households in the study area was identified, as



well as all households that are deprived in any dimension. Following Bourguignon and Chakravarty (2003), an identification function $\rho(y_i; z)$ was specified, of the individual household's deprivation vector y_i and the cutoff vector z taking on two values: $\rho(y_i; z) = 1$ if household i is poor, and $\rho(y_i; z) = 0$ if otherwise. Applying ρ to individual household deprivation vector (of welfare indicators) expressed in y yields the set of $Z \subseteq \{1, \dots, n\}$ of households who are deprived in y given z . For any given y , let $g^0 = [g_{ij}^0]$ denote the 0-1 matrix of deprivations associated with y , whose typical element g_{ij}^0 is defined by $g_{ij}^0 = 1$ when $y_{ij} < z_j$, and $g_{ij}^0 = 0$ otherwise. The variable g^0 is a $n \times d$ matrix whose ij^{th} entry is 1 when household i is deprived in the j^{th} dimension, and 0 otherwise. The i^{th} row vector of g^0 , denoted by g_i^0 , is the household i 's deprivation vector. From the g^0 a column vector c of deprivation counts is then constructed whose i^{th} entry $c_i = |g_i^0|$ is the sum of weighted deprivations suffered by household i . The vector c was instrumental to the identification of the welfare dimensions in which the poor households are deprived and the determination of the incidence of deprivation among the sampled households.

Principal component analysis

The Principal Component Analysis (PCA) is a multivariate statistical data reduction tool used to reduce large number of variables to a smaller number of dimensions. It is a linear combination of optimally-weighted observed variables used to compute aggregate index for the welfare variables included in this study. From the set of 16 variables, the PCA created a set of orthogonal (uncorrelated) components/indices, each component being a linear weighted combination of the 16 variable indicators of the form:

$$C_1 = b_{11}(x_1) + b_{12}(x_2) + \dots + b_{1q}(x_q) \quad (4)$$

where C_1 = subject's score on principal component 1 (the first extracted component)

b_{1q} = regression coefficient (weight) of observed variable q

x_q = subject's score on observed variable q .

RESULTS AND DISCUSSIONS

Household socio-economic characteristics

Comparative characteristics of deprived and non-deprived households

In Table-1, the poor are generally characterized by lack of welfare variables. With the exemption of malaria treatment methods, domestic lighting, number of meal per day, cooking fuel and political participation in which percentage of deprived households in modality were relatively low (34.15, 11.83, 26.79, 32.37 and 15.40, respectively), the class of the deprived brings together households that have no access to modern energy, health, education, good housing condition, drinking water, adequate meals, basic needs and a means of transportation. The non-deprived class gathers households with satisfactory access to these goods of comfort. However, significant difference in the possession of welfare goods and services between an average poor and non-poor households only occurs in the year of formal education variable, at the 1% level. This is an indication that access to formal education is a strong source of variation in the characteristics of the deprived and non-deprived riverine households.

Households' deprivation counts

Table-2 presents the number and percentage of deprivations suffered by the riverine households. None of the surveyed households suffered deprivation in exactly one or two welfare dimensions only.

This finding depicts the true multidimensional poverty status of the riverine households. Only three (0.7%); seven (1.6%) and twenty-one (4.7%) households suffered deprivation in exactly three, four and five dimensions, respectively. Percentage of the riverine households that experience deprivation in exactly six (11.6%); seven (21.2%); eight (22.3%); nine (19.0%) and ten (13.6%) dimensions is relatively larger than the other groups. Again, intuitively, none of the households suffer deprivation in as many as thirteen to sixteen indicator variables.

**Table-1.** Comparative characteristics of the poor and non-poor household (*15 poverty indicators).

Variable / Modality	Deprived Households				Non-deprived Households				t-value
		Freq.	% of class in modality	% of class within modality		Freq.	% of class in modality	% of class within modality	
Year of Schooling	Less than minimum basic education	249	55.58	58.36	Members with minimum basic education	199	44.42	42.74	3.0390***
Child Enrolment	No child enrolled in school	359	80.13	53.20	Child enrolled in school	89	19.87	56.18	-0.5032
Malaria treatment and control method	Not using modern health facilities	153	34.15	56.86	Uses modern health facilities	295	65.85	52.20	-0.9369
Self-reported health condition	Poor health condition	273	60.94	56.41	Good/excellent health condition	175	39.06	49.71	-1.386
No. of meals per day (food adequacy)	Inadequate meals	120	26.79	47.69	Adequate meals	328	73.21	54.83	1.0662
Domestic lighting	Primitive lighting	53	11.83	54.72	Modern lighting	395	88.17	53.67	-0.1431
Toilet type	Unhygienic toilets	400	89.29	53.50	Hygienic toilets	48	10.71	56.25	0.3603
Solid waste disposal	Fills ditches with refuse	304	67.86	54.99	Uses refuse bins	144	32.14	48.05	-1.106
Wall material	Planks/bamboo/iron sheets/sacs	326	72.77	55.17	Cemented/Brick	122	27.23	53.46	0.2865
Floor material	Plank/bamboo/mud	423	94.42	54.46	Cemented	25	5.58	40.91	-1.2425
Water source	Unprotected sources	282	62.95	53.55	Protected sources/	166	37.05	63.64	0.6617
Cooking fuel	Primitive fuels	145	32.37	61.64	Modern fuels	303	67.63	50.00	-1.326
Have basic assets and a means of transport	Do not have basic h/hold assets	335	74.78	54.32	Have basic h/hold assets	113	25.22	52.21	.3893
Political Participation	No political influence	69	15.40	60.87	Have political influence	379	84.60	52.51	-1.2811
Involved in comm. Development projects	Not involved in community activities	26	5.80	50.00	Involved in community activities	422	94.20	54.03	0.3991

Source: Field survey data, 2010.

* The household monthly per capita food expenditure was used as a standard variable against which a two-group mean comparison test have been conducted for the other 15 (i.e., $I_k - 1$) non-monetary poverty indicators.

**Table-2.** Distribution of households' deprivation counts.

No. of deprivations suffered	Number of households	Percentage of households
One	0	0%
Two	0	0%
Three	3	0.7%
Four	7	1.6%
Five	21	4.7%
Six	52	11.6%
Seven	95	21.2%
Eight	100	22.3%
Nine	85	19.0%
Ten	61	13.6%
Eleven	20	4.5%
Twelve	4	0.9%
Thirteen-Sixteen	0	0%

Source: Field survey data, 2010.

Statistics of deprivation counts: Mean = 8; Mode = 8; Var. = 2.798

Incidence of multidimensional deprivation among riverine households

Summary statistics presented in Table-3 shows that the proportion of riverine households deprived in each dimension ranges from 5.8% for “participation in community development projects”, to 97.5% for “source of drinking water”. By implication, 94.2% of the riverine

households participated in the various community development programmes engaged in by the respondents as their communal contributions to reducing their suffering within the neighbourhood, prominent among which is erection of passage planks on the water surface for households living exclusively on water, among others.

Table-3. Incidence of deprivation among riverine households.

Deprivation dimension	Welfare Indicator	Number of deprived households	Percentage of deprived households	% of dimension in which households are better off
Education	Year of schooling	317	70.8 (0.0215)	50%
	Children school enrolment	89	*19.9 (0.0189)	
Health	Self-reported health	273	60.9 (0.0230)	50%
	Method of malaria treatment/control	153	*34.1 (0.0224)	
Food/Nutrition	No. of meals per day	65	*14.5 (0.0167)	50%
	Monthly food expenditure	241	53.8 (0.0236)	
Household living condition	Material of the floor	443	94.4 (0.0000)	40%
	Domestic light	53	*11.8 (0.0153)	
	Toilet type	400	89.3 (0.0146)	
	Source of drinking water	437	97.5 (0.0073)	
	Household assets	113	*25.2 (0.0205)	
Social integration	Political affiliation	69	*15.4 (0.0171)	100%
	Participation in community development projects	26	*5.8 (0.0111)	

Source: Field survey data, 2010.

Figures in parentheses are the standard errors. * Welfare indicator in which households are relatively better off.



For the education, health and food/nutrition dimensions, households were better off in one (i.e., 50%) of the two indicators making up each of those welfare dimensions. In about 71% of the surveyed households, no household had a member with the minimum required universal basic education of nine years (Junior Secondary education) as set under the Nigerian education policy to achieve the second millennium development goal (MDG2). However, only few (about 20%) of the households have their school-age children (6-15 years) not presently enrolled in school, indicating that deprivation in the education dimension may be short-lived among the riverine households. Sixty-six (66%) of the households either visit registered hospitals, patronize drug sellers or use insecticide treated bed nets to treat/prevent malaria incidence, while over 60% of them still have adult members with self-reported health status below average. In terms of food adequacy, less than 15% of the households had children aged 6-15 years feeding on less than 2 major meals per day while sufficient food was

available to close to 46% of the surveyed households. Obviously, level of material deprivation was more prominent within the living condition dimension as only in three (basic assets and domestic lighting) of the five indicators were households not deprived, representing 40% of the indicators within this dimension. Majority (97.5%) of the households obtained water from unprotected wells, springs, rivers, lagoons, rains, stagnant water and forest creeks that were common within their neighbourhood. All households were however 100% better off in the two indicators that make up the social integration dimension which is a reflection of high level of social capital among the riverine households in political and community development activities.

Household deprivation characteristics and structure

Index of multiple deprivations

Households' distribution according to their socially defined necessities is presented in Table-4.

Table-4. Welfare indicators and respondents' socially defined necessities.

Indicators	* % of lacking households	% of households enforced lack experiencing	% of households necessity stating
At least one h/hold member with 9 years of formal schooling	56	36	52
Enrolled all children aged 6-15years in school	80	47	58
Used bed net/insecticide to prevent mosquito	77	12	54
Having at least 'good/sound' health condition	61	29	97
Living above the food poverty line (food availability)	67	55	82
H/hold children eat at least 2 major meals/day (fd. adequacy)	27	41	91
House connected to electricity/have generator/shade lamps	12	3	50
Household uses own septic tank (WC)/protected toilet	89	18	66
House floor made of concrete/tiles	94	46	49
Household have access to clean/improved water source	84	43	45
Household possesses all of the following **basic assets:			
- radio/TV, phone, fan, mattress, pressing iron and at least any one of:			
- bicycle, motorcycle, canoe or car	75	31	81
At least one household member is an active politician	15	29	55
At least one h/hold member is involved in community work	6	22	76

Source: Field survey, 2010.

*Figures have been rounded to the nearest whole number.

**Itemized assets are assumed to be the minimum basic that enables socially acceptable household functioning relating to information, communication, comfort, good public appearance and mobility.



The more widely lacked items tended to be more generally regarded as necessities by the respondent households, with the exemption of food adequacy (for household children) and access of households to acceptable source(s) of domestic lighting which 91% and 50% of the households regarded as a necessity and those items were actually possessed by 73% and 88% of the households, respectively. For concrete/tiled floor as well as access to improved water source, only 49% and 45% of the households regarded them as a necessity but 94% and 84% of them are actually lacking those items, respectively.

In terms of observed characteristics of deprivation, only 3% of the few households experiencing lack in domestic lighting actually reported enforced lack (that is, they would like to enjoy power supply but could not afford the charges). This follows a priori expectation given the fact that many of the surveyed riverine communities have been connected to the power grid. Even where power supply was epileptic, access to domestic generator or, at the worst, a shade lamp for indoor lighting was not a major challenge for most households. Such was the case for methods of malaria treatment and household level participation in community-development activities in which 12% and 22%, respectively experienced enforced lack. The most critical items among the enforced categories are food availability (55%) and food adequacy for household children (41%) which as many as 82% and 91% of the households, respectively, regarded as a necessity. Also alarming is the case of education indicators (year of formal education and child enrolment in school) which 52% and 58% of the households identified as being socially necessary but in which 36% and 47%, respectively, are experiencing enforced lack.

Principal component of the welfare deprivation index

Table-5 presents result of the integration of welfare deprivation indicators into a deprivation index as carried out using the principal component analysis. The result revealed a clustering of the welfare deprivation indicators into a three-component structures which were labeled according to the types of variable forming each of the clusters, thus: housing condition deprivation (20% explained variance); health and nutrition deprivation (18% explained variance); and social network deprivation (8% explained variance) making a total variance of 46%. While the housing condition/material components clearly portrays variations closely associated with material possession, house durability and asset ownership of the households, the health and nutrition component displays close association with food availability, food adequacy and healthcare condition of the household. By the closeness of the type of welfare variables they portray - both components addressing the living condition of the households - as well as the value of the explained variance of each component, there seems to be a close link between these two components. On the other hand, the third component shows variation associated with social network and community development variables. The 'domestic energy source' variable was included among the social network dimension because it loads more heavily in this component more than any other, and since communal efforts are sometimes required in community electrification schemes in such areas as cutting and erection of poles. This result displays a close pattern to the Townsend (1987)'s two-component structure of material and social dimension deprivation.

Table-5.Principal components of the welfare deprivation index.

Principal components → ↓ Welfare deprivation indicator	Housing condition deprivation	Health and nutrition deprivation	Social network deprivation
House wall made of planks, thatched, sack or plant material	0.61	0.00	0.24
House floor made of planks, mud or covered with bare sand	0.74	0.11	0.25
Household uses pit toilet, defecates around the bush/in water, or shares a toilet	0.63	0.29	0.18
Waste disposes solid waste around the house/in surrounding water	0.71	0.04	0.04
Household cooks with firewood, charcoal, or other plant material	0.66	0.01	0.09
Household drinks water from uncovered well, surrounding lagoon/river, forest creeks or rain water	0.48	0.28	0.13
No household member with 9 years of formal schooling	0.45	0.33	0.16
At least one school-age child not enrolled	0.50	0.28	0.24
Household lacks one of the basic assets and a means of transport	0.81	0.17	0.04
Household members do not visit a hospital/uses bed net to	0.14	0.59	0.10



cure/control malaria			
Health of h/hold head/adult member of the household poor status	0.06	0.61	0.05
H/hold spends less than 2/3 rd of MPC food expenditure	0.27	0.45	0.20
H/hold children eat less than 2 major meals per day	0.16	0.54	0.15
H/hold uses kerosine lamp without shade or not connected to power grid	0.07	0.26	0.51
No member of the h/hold is actively involved in politics	0.25	0.27	0.53
No h/hold member participates in community dev. projects	0.09	0.06	0.64
Explained variance	20%	18%	8%
Cumulative variance	20%	38%	46%

Source: Field survey, 2010 *** Significant at the 1% level

LR test for independence: $\lambda^2(120) = 452.61$ Prob > $\lambda^2 = ***0.0000$ Rho = 1.0000

LR test for sphericity: $\lambda^2(135) = 453.27$ Prob > $\lambda^2 = ***0.0000$ SE (Rho) = 1.0000

NB: The above values are the saturations between the well-being indicators and the components. They are interpreted like correlation coefficients. Figures in parentheses are the standard errors of the explained variance by components.

Multi-dimensional deprivation characteristics

Combining the wards into larger, homogenous groups helped to ensure some level of statistical accuracy in exploring the location and socio-economic differences in the deprivation characteristics among the riverine households. For each of the three components, the factor scores were ranked from the least to most deprived wards, dividing the resulting distribution into 20% quintiles of approximately 90 wards each. This resulting five (5) quintiles are labeled as Q1 to Q5 being the least deprived and most deprived segments of the sample of households, respectively. A cross-Table of the three components with one another (each one having 25 cells) produced households that were not deprived according to either of the two measures combined in a cross-Table; which ones were deprived in one but not the other; and which ones were deprived according to both segments. Therefore, for any two-component cross-Table, cell Q1Q1 represents the most privileged, while cell Q5Q5 represents the most deprived households according to the combined welfare dimensions. The resulting deprivation pattern is presented in Table-6. The pattern of material, social and health deprivation shows both similarities and dissimilarities among the three components. Generally, the most deprived segments of the riverine households in terms of material and housing condition are more noticeable than the most privileged segments. Comparatively, there is no much difference in the proportion of most deprived households across the three geographical locations covered in the study (Ogun, Ondo and Lagos States). For social network deprivation, more proportions of the households were

more privileged across the three States with similar trend in their deprivation pattern. Proportion of deprived households in terms of health and nutrition is more (2.17%) in Ondo State, followed by in Ogun State (1.14%).

Table-6 also shows the demographic pattern of the riverine households with respect to the three deprivation components. There was as twice as many materially deprived female-headed households as there were male-headed households. However, in terms of social integration, more male-headed households were deprived. Polygamous households deprived in material and housing condition variables were in excess of three folds more than household's monogamous households that were so deprived, but in terms of social network deprivation, more monogamous households (39.96%) were affected than polygamous households (12.72%). A decreasing proportion of the riverine households were associated with increasing household educational level, just as the reverse was almost the case with social network deprivation. While there was no particularly clear association of household health and nutrition deprivation with educational attainment, it was however noticeable that more non-literate households suffer more of this class of deprivation than their more formally educated counterparts. Households with increasing number of non-working members were more associated with material/housing and health/nutrition deprivation than other households, while it had no particular pattern of association with social network deprivation.

**Table-6.** Characteristics of households by quintiles of material, social and health deprivation.

Material/ housing condition deprivation	Sex of H/hold head		Household dependency ratio (DR)			Household family type		Highest educational level within the household				State/location of household		
	Male (%)	Female (%)	0 (%)	0<DR ≤ 0.5 (%)	0.5<DR ≤ 1 (%)	Mono (%)	Polyg (%)	None (%)	1 ⁰ (%)	2 ⁰ (%)	3 ⁰ (%)	Og. (%)	Ond (%)	Lag (%)
Q1	10.94	4.02	5.13	1.12	8.75	11.38	3.57	3.79	7.14	3.79	0.22	2.46	5.13	7.37
Q2	13.62	5.36	3.57	2.01	13.39	13.39	5.58	0.67	6.70	9.15	2.46	5.36	5.13	8.48
Q3	10.27	3.56	2.90	2.90	7.81	10.71	2.90	1.12	2.23	7.59	2.68	2.90	2.90	7.81
Q4	3.79	0.67	2.01	0.89	1.56	3.13	1.34	0.25	0.22	2.68	1.56	1.56	0.89	2.01
Q5	18.08	44.20	9.82	12.05	40.40	14.51	47.77	28.57	16.74	16.07	0.89	20.50	19.8	21.88
Social network deprivation														
Q1	36.61	16.07	8.04	10.27	34.38	39.96	12.72	14.29	26.33	11.61	0.45	17.19	18.3	17.19
Q2	13.62	4.24	4.24	2.01	11.83	13.62	4.24	1.79	5-13	9.15	1.79	4.91	4.24	8.71
Q3	9.38	3.13	1.56	2.23	1.56	9.15	3.35	0.68	3.80	5.80	2.23	3.34	3.13	6.03
Q4	4.24	2.01	2.01	3.13	3.13	5.13	1.12	0.45	0.67	3.79	134	1.33	1.34	3.57
Q5	1.12	0.67	0.89	0.22	0.67	1.35	0.45	0.67	0.22	0.67	0.89	0.67	0.22	0.89
Health and nutrition deprivation														
Q1	1.79	1.34	0.67	1.11	1.56	2.00	1.12	0.22	1.12	1.56	0.22	3.13	0.11	0.15
Q2	11.38	2.90	3.13	3.13	8.04	11.83	2.46	1.34	5.13	6.25	1.56	9.82	4.46	0.36
Q3	20.09	8.39	4.46	4.13	19.42	20.76	8.26	2.90	10.27	11.38	4.46	6.03	7.81	15.18
Q4	27.91	10.71	5.36	7.59	25.67	29.69	8.93	9.60	14.06	13.39	1.56	8.39	11.4	18.30
Q5	0.22	0.45	0.12	0.22	0.45	0.67	1.67	1.52	1.48	0.22	0.45	1.14	2.17	0.67
Material and social														
Q1 and Q1	3.57	4.24	0.67	0.22	7.37	15.85	12.95	26.12	1.34	5.13	4.46	8.04	1.56	4.24
Q5 and Q5	8.26	52.90	0.45	1.56	1.12	1.34	6.47	22.54	12.72	10.94	1.12	4.46	5.13	7.14
Material and health														
Q1 and Q1	0.89	1.79	1.56	2.01	0.22	0.45	0.89	9.82	12.05	40.40	3.57	2.01	13.4	2.90
Q5 and Q5	11.38	3.57	5.13	1.18	8.71	20.98	24.78	6.47	8.71	7.59	1.56	5.80	3.35	2.68
Social and health														
Q1 and Q1	7.81	1.34	2.01	0.89	1.56	0.45	0.22	8.04	10.27	34.38	4.24	11.83	2.23	5.80
Q5 and Q5	3.13	0.22	2.00	1.12	0.67	1.11	2.46	4.13	19.42	29.69	8.93	5.36	7.59	25.67

Source: Field survey, 2010

Q1: Least deprived segment of the households; Q2: Less deprived segment of the households; Q3: Deprived segment of the households;

Q4: More deprived segment of the households; Q5: Most deprived segment of the households; Q1Q1: Most privileged segment of the households; Q5Q5: Most deprived segment of the households.

The combined effect of any two of the three dimensions of deprivation can be felt by observing the pattern of their interactions with socio-economic variables at the two extremes of the quintiles, Q1Q1 and Q5Q5.

Pearson correlation coefficients (significant at 1% level) between the deprivations components were as follow: material and social dimension (0.788); material and health/nutrition dimension (0.418); and social network and



health/nutrition dimension (0.398). This correlation behavior contributes to the reason for the variations among quintiles, being large for some and small for others. For material and social deprivation interaction, more households were deprived with a fall in educational attainment, with a 7.14%, 5.13% and 4.46% of the most deprived households located in Lagos, Ondo and Ogun State, respectively. Combined deprivation in social and health dimensions also shows similar pattern of geographical distribution, but with a reversed trend for combined material and health deprivation dimension, being 5.80%, 3.35% and 2.68% for Ogun, Ondo and Lagos State, respectively. Also, for combined material and social dimensions, more female-headed households were found to suffer deprivations.

CONCLUSIONS AND RECOMMENDATIONS

This study examines the level of welfare deprivation among riverine households in southwestern Nigeria using five welfare dimensions that consist of sixteen poverty indicators, using the household as the unit of analysis. The deprivation index of the households was aggregated into a three-component deprivation structure using the principal component analysis, namely: housing condition deprivation; health and nutrition deprivation; and social network deprivation. Over 89% and 68% of the households (predominantly in Lagos and Ogun State) defecates and dumps refuse directly into the river brinks or bushes around the river side. Majority (46%) of the households constructed their houses on the river with plank walls and floor, the surrounding water bodies also serving as source of drinking water to about 63% of them. Majority (54.32%) of the households are also lacking in basic household assets (such as radio, TV sets, set of chairs, materess, bednet, etc.) and a means of transport such as cars and bikes with only a few possessing one or two canoes; but having strong socio-political affiliation as over 84% and 92% are actively involved in politics and community development projects.

REFERENCES

- Aigbokhan B. E 2000. Poverty, Growth and Inequality in Nigeria: A case Study. African Economic Research Consortium (AERC) Research Paper, Nairobi, Kenya.
- Benach J., Yasui Y., Borrell C., Pasarin M.I., Martinez J.M and Daponte A. 2003. The public health burden of material deprivation: excess mortality in leading causes of death in Spain. *Prev Med.* 36(3): 300-308.
- Bossert W., C. D'Ambrosio and V. Peragine. 2006. Deprivation and Social Exclusion. *Economica.* 74: 777-803.
- Bourguignon F. and S. Chakravarty. 2003. The Measurement of Multidimensional Poverty. *Journal of Economic Inequality.* 1: 25-49.
- British Department of Communities and Local Government. 2007. The English Indices of Deprivation. Available at www.communities.gov.uk.
- Curtis S., Copeland A., Fagg J., Congdon P., Almog M and Fitzpatrick J. 2006. The ecological relationship between deprivation, social isolation rates of hospital admission for acute psychiatric care: A comparison of London and New York City. *Health Place.* 12(1): 19-37.
- Duclos J and Gregoire P. 2003. Absolute and relative deprivation and the measurement of poverty. Centre interuniversitaire sur le risqué, les politiques économiques et l'emploi; working paper 03-02.
- Ibe A.C and Awosika L.F. 2004. Sea level rise impact on African coastal zones. *Journal of Nigeria Institute for Oceanography and Marine Research* 4: 153. <http://www.cien.columbia.edu/doc>
- Lasso de La Vega C. and A. Urrutia. 2010. Characterizing how to aggregate the individuals' deprivations in a multidimensional framework. *Journal of Economic Inequality* (awaiting publishing).
- Mack J. and S. Lansley. 1985. Poor Britain. London and Boston: G. Allen and Unwin
- Maduagwu A. 2000. Alleviating poverty in Nigeria: Africa economic analysis publication. 23(2): 34-41.
- Oladele O.I and Adekoya A.E. 2006. Implication of farmers' propensity to discontinue adoption of downy-mildew resistant maize and improved cowpea varieties for extension education in southwestern Nigeria. *Journal of Agricultural Education and Extension.* 12(3): 195-200.
- Ondo State Poverty Study Group. 1995.
- Oyekale A.S and Okunmadewa F.Y. 2008. Fuzzy Set Approach to Multidimensional Poverty Analysis in Abia State, Nigeria. *Journal of Applied Sciences.* 3(7): 490-495.
- Robert Pampalon and Guy Raymond. 2002. A deprivation Index for Health and Welfare Planning in Quebec. *Public Health Agency of Canada (PHAC).* 21(3).
- Richard Matern, Michael Mendelson and Michael Oliphant. 2009. Developing a Deprivation Index: The Research Process. The Caledon Institute of Social policy. ISBN: 1-55382-419-9.
- Sardar M.S., Tahir M.A and Zafar M.I. 2008. Poverty in riverine areas: Vulnerabilities, social gaps and flood damages. *Pakistan journal of life and social sciences.* 6(1): 25-31.



Siyanbade D.O. 2006. Disaster Management in Nigeria: Preparedness and Prevention. Olive Tree Publishing Ventures, Lagos, Nigeria.

Pampalon R., Hamel D., Gamache P and Raymond G. 2009. A deprivation index for health planning in Canada. Chronic Diseases in Canada. 29(4): 178-191.

Tello J.E., Jones J., Bonizzato P., Mazzi M., Amaddeo F and Tansella M.A. 2005. A census-based socio-economic status (SES) index as a tool to examine the relationship between mental health services use and deprivation. Social Sciences Med. 61(10): 2096-2105.

Tim Callan, Brian Nolan and Christopher T Whelan. 1993. Resources, Deprivation and the Measurement of Poverty. Journal of Social Policy. 22(2): 141-172

United Nations Development Programme UNDP. 1998 and 2003. Human Development Reports, Nigeria Oxford University Press, Nigeria.

World Bank. 2001. World Development Report, 2000/2001, Oxford University Press, New York, USA.