A capability approach to the analysis of rural households' wellbeing in Nigeria

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Abstract

Rural households in Nigeria have been characterized as poor, and with little opportunity for development. Many studies have equated poverty with well being, however empirical literature on well being is less researched. This paper attempts bridge the knowledge gap in the empirical literature of well being studies and specifically the use of the capability approach in its application in the Nigerian well being context which is not as well researched as poverty studies. The study made use of the Nigerian Core welfare indices survey questionnaires of 2006 to provide data relevant to capability well being dimensions. The dimensions include housing, health, nutrition, education, asset ownership/economic, information flow and security. The first part of the study involve developing indices of well being using the fuzzy set in order to generate a composite well being index by the elementary indicators of the well being dimensions. The second part of the study used a logistic regression to explore the variability in achieving the composite well being index value by a set of Conversion factors. The fuzzy set result revealed that the capability to attain a desired state of well being is highest with respect to asset ownership and lowest with respect to security. The logistic analysis shows that the predicted probability of attaining the mean capability well being level increases for male headed rural households, increasing educational level and age of the head, increasing household size, employment in the public sector and residence in any other geopolitical zone except the Northwestern zone.

KeyWords: Well being, Capability, Rural Households, Nigeria.

1. **INTRODUCTION**

The multi dimensional nature of well being has been found more relevant than the uni dimensional methods that characterize traditional welfare economics. This has given rise to the studies on multi dimensional studies available in many welfare studies in Nigeria. The plurality of human life advocates that well being be addressed as much as possible in its multi dimensional form in order to develop sustainable policy issues. There is thus a need to move from mainly income approach to the analysis of well being to other dimensions of health, education, security, nutrition and other quality of life dimensions. Well being has been recognized to encompass more than income and consumption issues to include issues of health, education, nutrition, security, environmental integrity, freedom, social relations and affiliations. However, it is not just the multi dimensional matter that matters, but the meaning of well being in its contextual and methodological framework.

The need to define and measure well being has also led to the developmendt of different theories on the subject matter. However, none has come close in the last decades to finding an adequate definition of well being as Amartya Sen's Capability approach, (Chiappero, 2000). Although less known in empirical literature in Nigeria, it is the aim of this study to employ the capability approach to explore the possibility of finding a meaning for well being in the context of rural households in Nigeria using the Nigeria's 2006 Core Welfare Indice Survey. Since well being has been found to be a rather ambiguous term to define and measure, the use of the Fuzzy set theory is more applicable to its analysis. While other indexing methodologies are available, it is the purpose of this paper to make use of the fuzzy set theory used in well being studies by Chiaperro, (2000) and Majumder, (2006, 2009) to analyse the fuzzy well being concept. Using a logistic regression, the study seeks to find the relationship among certain conversion factors and the probability of attainment of a composite well being index level for the rural households in Nigeria. The regression will aim at reporting both the odds and the marginal effects in the analysis.

Arising from the foregoing, the study aims to answer the following questions:

What is the well being status of rural Nigerians using the capability approach?

What are the factors that drive rural Nigerian well being?

Answers to these questions will go a long way in aiding the understanding of well being issues in Nigeria.

2. **LITERATURE REVIEW**

Well being is synonymous with good quality of life, (Narayan et al, 2000). It includes such dimensions as material wellbeing, often expressed as having enough bodily well being which includes being strong,

being in the right frame of mind and looking good; social well being which includes caring for and settling children, having self respect, peace and good relations in family and community; having security, which includes civil peace, safe and secure environment, personal and physical security and confidence in the future; having freedom of choice and action which includes being able to help others in the community. This implies that there is more to well being than income and/or asset dimension, even though they are important well being a determinants, (Frey and Stutzer, 2001, Stevensons and Wolfers, 2008, Easterlin, 2003, Ijaiya *et al*, 2009).

The choice of measurement of well being has elicited a number of literatures both in the economic and non economic field, (Easterlin, 2003, Knight and Kingdon, 2004, Chiappero, 2000, Robeyns, 2005, Clark 2005[b]). The novel approach which has been deemed superior to other developmental approaches is the Capability Approach of Amartya Sen, (Sen, 1999, cited by Yee, 2003 (Nussbaum, 2007. Chiappero, 2000, Clark, 2005[a]). The approach looks at the development of well being in its different dimensions. Chiappero (2000) analysed well being using five dimensions of housing, health, education and knowledge, social interaction and psychological conditions. Majumder, (2006) analysed well being for Indian women in the following evaluative spaces: nutrition, reproductive life, health and morbidity, housing, autonomy and exposure to mass media. Kuklys, (2005) used two dimensions of health and housing. The Nigerian case study used one dimension of Housing ownership to analyse the well being of retirees in Osun state, Nigeria, (Adisa *et al*,2000).

The capability approach sees well being as the ability to achieve a set of functionings which are of value and which an individual is free to choose from. Alkire, (2007) highlighted five methods of choosing dimensions as: data availability, public consensus, assumptions, ongoing participatory process and empirical evidences regarding people's status. There is a fine line between the indicators that define functionings and those that define capability. However, Anand, *et al*, (2004) posited that the indicators that define well being from a data set can be recognised as follows:

a. Questions asked about some functioning but which actually translate to being capabilities for achieving other functionings. For example, a question that asks about nearness to source of food is actually asking about the capability of the household to gain adequate nutrition; such question is treated as a capability set based question.

b. Other questions that actually relate to capabilities or the absence of it.

The data need for this study is dependent on availability of data, objectives of the study, trend in well being literature and the criteria drawn from Anad *et al*, (2004) stated above.

The use of the fuzzy set has been employed in various indexing in poverty and welfare studies that celebrate multidimensionality, Oyekale and Okumadewa, (2008), Oyekale et al, (2008) Kubi et al, (2007). The use of fuzzy sets in well being studies have been seen in the works of Chiapperro, (2000), Majumder, (2006, 2009). Kuklys, (2005) argues that the use of the fuzzy set is appropriate in well being studies because it presents forms of sigmoid and trapezoidal functions as opposed to only linear forms.

According to Chiappero, (2000), capabilities and functionings are strictly related to the intrinsic characteristics of people, including age, gender, health and disability conditions as well as to the environment (social and institutional levels). De'Muro, (2010) is of the opinion that what a person makes of the resources available to him depends on a number of contingent circumstances, both personal and social. Thus, the capability well being will be studied in the presence of such factors, which Kuklys, (2005) calls conversion factors. Majumder, (2009) refers to these factors as explicative factors and in the study categorized them into three as, Individual factors (age, physical condition, sex, and skills); Social factors (gender, marital status, political inclination, religion, chaste); and physical factors (geographical locations, climate,). This study will also analyse capability well being using the conversion factors available from the 2006 CWIQ data set used.

3. DATA AND METHODOLOGY

The data for this study is from the Core Welfare Indicators survey of Nigeria, 2006. The CWIQ survey made used of the National Population Commission's 1991 census as the sample frame for the 1st stage of choosing Enumeration Areas in each Local Government area in the two stage samplings procedure for the survey. The 2nd stage involves the Housing Units. In each local government, 10 Enumerations areas were systematically selected, and a listing of the Housing Units and Households within them were made. The listing within the first sample provided the sample frame for the second selection. From the list of the Housing Units, 10 Housing Units were again systematically selected and all Households within the selected housing Units interviewed. Thus at each local government level, the sample size was 100 housing Units. In all, 77, 400 Households were interviewed and 59, 567 were rural households. After sorting for missing data, the sample size used for the study was 29, 391 rural households, which covers a good representation of the rural households in Nigeria.

The fuzzy set analysis

In well being analysis using the capability approach, well being and deprivation are not seen as contexts within clear and defined boundaries, rather they are conceptualized as fuzzy concept, which are not exact concepts. One useful tool for the analysis of such vague concept is the Fuzzy set theory, developed by Zadeh, (1965). It has been used in many welfare and poverty studies over the years.

The fuzzy set substitutes the characteristic function of a crisp set that assigns a value of 1 or 0. Larger values denote higher degree of membership. (Chiappero, 2000, Majumder, 2009). The degree of well being is shown by the placement of the individual on the 0 or 1 value or other values in between. The model is considered as follows: Assume X is a set and x an element of X. A fuzzy subset P of X can therefore be defined as follows: P= $\{x, \mu_p(x)\}$ for all $x \in X$.

$\mu_p(x) = X \rightarrow 0,1$. The $\mu_p(x)$ is a particular membership function with values between 0 and 1. In these analyses, given X is a set of households (j=1…..n) and P is a fuzzy subset of X (the set that denotes well being membership); the membership function of well being for the ith individual (the set of people with well being values equal to or above a set point) will be:

$x_{ij}=1$; condition of full achievement of functionings with respect to well being

$x_{ij}=0$; condition of total failure to achieve the set of functionings

$0 \leq x_{ij} \leq 1$; conditions within the range of full achievement and zero achievement.

Estimating Membership Functions

The variables that define indicators of well being are either dichotomous or categorical in nature.

- **Dichotomous Variables**

Dichotomous variables are answered by either 'Yes' or 'No'; with the 'yes' being a state of well being and the No, a state of deprivation. According to Njong and Ningaye, (2008), from a universal set of X households, we define the membership function of fuzzy subset of P for the ai^{th} household (i=1….n) that possess the jth well being attribute (j= 1----m) as:

$\mu_p(ai) = X_j(ai) = x_{ij}$,

$X_{j(ai)}$ is the m order of well being attributes that will result in a state of well being if totally or partially owned by the ai^{th} household.

$x_{ij}=1$, if the ai^{th} household possess the jth attribute (that is it completely has the well being attribute)

$x_{ij}=0$ if the ai^{th} household does not possess the well being attribute.

Categorical Variables

Categorical variables present themselves in a range of values, rather than just two values. Expressing the membership function for these variables take the form:

$\mu_p(ai) = X_j(ai) = x_{ij}$, and thus;

$$x_{ij} = 1, \text{ if } 0 < C_{ij} \leq C_{max}$$

$$x_{ij} = C_{max} - C_{ij} / C_{max} - C_{min}, \text{ if } C_{min} \leq C_{ij} \leq C_{max} \quad \dots\dots\dots\dots\dots..(1)$$

$$x_{ij} = 0 \text{ if } C_{ij} \geq C_{min}$$

Where C_{max} is the value that depicts high level of deprivation in the jth attributes , which translates to lowest level well being; while C_{min} is the lowest level of deprivation in the jth attribute which indicates highest level of well being in the ai^{th} household. Thus, the modalities are arranged in decreasing order of well being attainment. C_{ij} values are the intermediate values within the two thresholds, which depicts the position of the ai^{th} household within the modalities set forth. This assumes that the modalities in the data set are equally spaced. Oyekale, *et al,* 2008 specifies this membership function as:

$$x_{ij} = C - Ci/C - 1 \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (2)}$$

Where $1 \leq Ci \leq C$,

so that $0 \leq x_{ij} \leq 1$

In specifying the Fuzzy Well being Index for the population, as a ratio of the well being index of the ai^{th} household, the formula presented by Njong and Nigaye, 2008, Oyekale *et al*, 2008 is adopted as follows:

$$\mu_p = \frac{\sum_{i=1}^{n} \mu_p(a_i)n_i}{\sum_{i=1}^{n} n_i} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(3)$$

μp is the fuzzy well being index for the population of households studied.

$$= \frac{1}{n} \sum_{i=1}^{n} \mu_p(a_i)n_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (4)}$$

Equation 3 and 4 express the degree of attainment of the selected well being attribute

This could also be conceptualized as:

$$\mu p = \frac{\sum_{j=1}^{m} x_{ij} w_j}{\sum_{j=1}^{m} w_j} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots. \text{ (5)}$$

Where w_j is the weight given to the jth attribute

$$w_j = \log \frac{n}{\sum\limits_{i=1}^{n} x_{ij} n_i} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ (6)}$$

Choice of Capabilities Indicators

The choice of indicators from the dimensions to be used for the analysis in the capability evaluative space is premised on Anand *et al*, 2004. Rather than use all sets of indicators which are both funtionings and capabilities, this helps us to define and differentiate, albeit in a thin line the indicators of capabilities from achieved functionings. Thus, the study will differ from others which make use of functionings as capabilities in using the capability approach. The indicators of the capability dimensions used are either categorical or dichotomous and are classified as follows:

- The first is related to frequency of problem in achieving a set of capabilities. These are categorized into never, seldom, sometimes, often and always, and were used in that order as decreasing well being levels in terms of the capability.

- The second set involves means of transportation to accessing the capability dimension of interest. These are categorized as Foot, vehicle, motorcycle, boats and animals. With this capability, the utility easily accessed by foot gives better well being status, followed by those accessed by vehicle once the access is not a walking distance to the house.

- The next set of categorical variables deal with the Time to get the capability dimension of interest. The options are 0-14 minutes, 15-29 minutes, 30-44 minutes, 45-59 minutes, >60 minutes. The best capability achievement is one where the rural household is able to access quicker than the other.

The dichotomous variables answer questions with 'Yes' or 'No', where the yes translates to Well being and the no to a state of deprivation in the indicator of interest. Appendix 1 shows how the dimensions and indicators are operationalised in the study.

The logistic regression

Logistic regression describes the relationship between categorical response variable and a set of predictor variables. The categorical variable can be binary, ordinal or nominal. This study uses a binary logistic regression as the response variable is dichotomous.

The general model is given thus:

$P(Y_i=m)=1/1+e^{-z}$………………………………..(7)

$P/1-P= e^z$ ………………………………………... (8)

P is the probability of occurrence of the dependent variable Yi equal to a certain value.

Z is the predictor variable and can be said to be a linear combination of the conversion factors;

e is the base of natural logarithm and

P is the estimated probability of occurrence of one point of the dependent variable.

From equation 7,

$1-P = 1 - 1/1 + e^{-z}$ …………………….......(9)

1-P is the probability of failure.

Given that $\Omega = P/1-P$ ………………………(10)

Then, $\Omega = e^{z} = \exp(Z)$ ……………………(11)

$\Omega = P/1-P$, represents the Odd of the evaluative factors (the functionings) occurring for each conversion factor,

Assuming Z is a linear function of a set of predictor variable, then,

$Z = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ….. \beta_k X_{ki}$ ……………………………. (12)

If (12), then;

$\Omega = e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + …..\beta k X_{ki}}$ ………………………………………(13)

In this study $P(Y_i \geq m)$ is the probability of occurrence of the ith, individual that attain well being values greater than or equal to the mean values ; these are ascribed 1; and 0 otherwise. The logistic regression model is thus given as :

$\Omega = \exp(\beta_0 + \beta_1 \sum X_{1i} + \beta_2 \sum X_{2i} + …..\beta_k \sum X_{ki})$ …………………………………(14)

The conversion factors are:

X1i: Individual Household factors (Gender of household head, Age of household head, household size)

X2i: Social factors (Occupational group of household head, Marital Status of household head, Educational Status of household head)

X3i: Environmental Factors (Geopolitical zone of rural household)

The conversion factors in this study are given below, please note that the base variables for the regression are designated '0' as follows:

Gender of household head: Dichotomous; Female-1, male =0

Age of household head: categorical: 15-44 years=0, 45-69 years=1, $\geq$70 years=2

Marital Status of Household head: categorical; Single=0, Married(Monogamy)=1, Married(Polygamy)=2, Divorced/Widowed/Separated=3,, Informal union=4.

Educational Status of Household head: categorical ; None=0, some primary=1, Completed Primary =2, some secondary =3, Completed Secondary =4, Post secondary =5.

Household size: **categorical;** 1-5 =0, 6-9 =1, ≥10 =2

Occupational Group of Household Head: categorical; Public Service= 0, Private(Formal) =1, Private (informal) =2, Self Employed(Agriculture) =3, Self Employed (Others) =4, Unemployed =5, Others=6.

Geopolitical Zone of Household: categorical Northwest =0, North East =1, North Central =2, South East =3, South West =4, South South =5

This study will employ the mean values for the membership functions as the base value in determining the dependent variables for the models to be used. Thus, the dependent variable will be binary such that it is 1 if the well being value is greater than or equal to the mean well being value, 0 otherwise.

The regression is further tested with the Pearson test.

4. RESULTS AND DISCUSSIONS

Multidimensional Well being assessment

Membership Degree to the Elementary Indicators of Well Being

Appendix 2 shows the membership degrees to the fuzzy indicator set for each dimension of capability well being. The result shows that rural Nigeria has the highest capability well being when assessed based on assets ownership/income and economic dimensions with a value of 0.0881. The implication of this is very important, since ownership of economic assets and improved economic activities are not just in themselves well being indicators, they also proffer the ability to attain higher levels in other well being dimensions. For example, increase in the amount of land used compared to previous year will be an indication of better well being in terms of productive resource; it is also however a means of gaining capability to increase access to improved housing, health care, education, and nutrition from the produce of the increased farm land. Thus, capability approach provides insight into the fact that the farmer has increased ability to choose which of the sets of functioning (in terms of health, housing and other achievements) he wants to attain based on the value he places on them and the freedom to choose to either remain at the same level of well being or use his increased capability to move to a higher capability set.

In descending order, the capabilities with the lowest level of achievement by rural Nigeria are Nutrition, Health and Security, at 0.0265, 0.0274 and 0.0217 respectively. Developing the capabilities in these dimensions will increase the well being of rural Nigeria considerably. These are important because adequate nutrition and good health are important capabilities in enabling rural households take part in productive activities if they choose to. In the same vein, secure environment increases the capability of

engaging in income and non income generating activities without fear of molestation or any form of intimidation.

Based on the well being indexing for the elementary indicators of the well being dimensions, the composite well being index for rural Nigeria by the fuzzy logic aggregation is estimated at 0.2697. This indicates that the capability of rural Nigeria to attain the valued capabilities set available to them is approximately 27%. Following Amartya Sen's argument, therefore, the result shows that the capability of Nigerian Rural dwellers to make use of the resources available to them in order to achieve functionings that they value and that they have freedom of choosing is about 27%.

Membership Degrees by Socio economic Characteristics of Rural Nigeria

Appendix 3 shows the fuzzy logic computation of well being index by socioeconomic characteristics of the respondents. With respect to Gender of household head, the well being index for male headed household is 1.48% greater than that of female headed household. This may be because in male headed households, there are other adult females who contribute positively to the wellbeing status of the household as compared to female headed households who may likely not have anyone lending a helping hand. Also, men tend to be less risk averse than women and thus are more likely to take up other investments that could translate to an increase in the wellbeing level of the household.

With respect to age of household head, households being headed by people in the age range of 15-44, which could be classified as the productive age, have higher well being than the other two groups. The age range of 15-44 years has well being of 0.271, while those of age range 45-69 and ≥70 have well being indices of 0.270 and 0.261 respectively. This result is logical since it is expected that those within the productive age bracket will have the resources to access required infrastructure and assets as well as take part in other productive activities that will make them achieve a better standard of living than those who are not. It is also seen that the reduction in well being is a continuum, that is, as the household head gets older, the household wellbeing reduces. It should be noted however that the drop in well being is not too sharp for the three age groups signifying the development of certain capabilities that serve to maintain some level of well being after the household heads have exceeded the reproductive ages.

The result of fuzzy logic in obtaining the index of well being with respect to household size shows that the larger the family size, the higher the quality of life of the household. Results in Apendix 3 shows that with household size greater than or equal to 10, the well being index is 0.295, while for household size of 1-5 and 6-9, the indices are o.260 and 0.278 respectively. This is not an exception as majority of the rural dwellers are engaged in agriculture, with the need for family labour prevalent in rural agriculture in Nigeria. Thus, a household with a greater number of members have more opportunity to improve their

livelihood than those with smaller sizes. The opportunity to increase well being for large household may be in the form of increased diversification of farming enterprise, economies of scale that arise from the differing levels of human capital development and capital base as well as access to capital through different affiliations with social capital groups.

For marital status of household head, household heads that are married, either in monogamy or polygamy have higher well being than the other groups. However, household heads in polygamous relationships have the highest capability well being at 0.289, followed by those in monogamous relationships at 0.265. This suggests that as with the issue on large household sizes, polygamous relationships also confer the size and diversity needed by the majority farmers in rural areas to access resources/infrastructures to improve their well being. Divorced and separated household heads have the lowest level of capability well being in this group. This suggests that this group is vulnerable to increasing deprivation as a result of the loss of spouse and not because the household head willingly lives alone.

In the occupational group, the result confirms that the main occupation of rural Nigeria is farming, with a sample size of 14,481 out of the total sample size of 29, 391. However, people working in the public service have a higher well being level, 0.304, than other occupational groups. This is followed by self employed households in occupation other than farming, with index 0.267. Farming households have index of 0.262, ranking them 4th in well being index analysis for occupational groups. Public service will tend to induce higher capability well being because it affords the household some steady flow of income, which is important in building capability to make use of other resources within the environment. It is almost certain that households where the head is in public service will also be more willing and able to take advantages of educational and health care facilities that are available to enhance his household's capability wellbeing.

For educational status of household head, the wellbeing index is highest for households with head possessing Post Secondary education at 0.294, followed by those with some secondary education and completed secondary education at 0.274 and 0.270 respectively. The lowest well being index is however found in the category of those with some primary education at 0.254.This is consistent with expectation, that education is an important measure of well being as well as a precursor to developing well being. Thus, it is expected that households whose heads are educated have better capability to value and decide on the sets of functionings they want to achieve.

With respect to Geopolitical zones, the North Eastern zone has the highest level of capability wellbeing at 0.29, followed by the South-South, 0.27 and then the North Central, 0.27. This implies that these zones have higher capabilities to tap into the existing resources to attain their desired levels of functioning. The

lowest wellbeing level for geopolitical zones is from the South West, with an index of 0.19. Thus, activities that only promote income growth without developing the capabilities of the zone to translate the economic growth into desired and valued living standard are ineffective.

Membership Degrees by States and the Federal Capital Territory

In Appendix 4, capability well being in its multidimensionality is shown for the 36 states in Nigeria and the Federal Capital Territory. It reveals that Zamfara State has the highest level of capability well being at 0.473 followed by Bayelsa and Katsina State at 0.332 and 0.31 respectively. The three states with the lowest level of well being are Imo, Ogun and Rivers states at 0.151, 0.157 and 0.188 respectively. Two of the states with the high scores are from the North Western Geopolitical Zones, while the states with the lowest scores are from the south. This suggests that even with the higher levels of infrastructures within the south that makes them access educational and, health the number of people with access to these infrastructures are few and are probably concentrated in the urban centres. Thus, rural dwellers in these areas do not have the opportunity to achieve higher capability well being and have to settle for what is available. The differences between the rural and the Urban in the two Northwestern states are most probably blurred, and most especially in Zamfara state where the result suggests very little distinction in capability of rural and urban dwellers in achieving well being. The sharp distinction in accessing infrastructure between the rural and urban centres may actually account for the low index values in states such as Ogun, Oyo, Ebonyi, Imo, Lagos and even the Federal Capital Territory who have low capability well being in their rural areas.

Result of the Logistic Regression to Isolate Factors that Affect Capability Well being

The logistic analysis presents the relationship between the conversion factors and the achievement of a level of wellbeing below or above the average well being of rural Nigeria. Appendix 5 shows the result of the logistic regression.

The log odds for female under gender of household head are 0.294. This implies that having a female as household head as compared to having male as the household head significantly increases the log odds of attaining a well being level equal to or above the average by 0.294 holding all other variables constant.

The log odds of Wellbeing index greater than or equal to the mean is 0.079 for age group 45-59 years age category and 0.208 for >=70 years age category. This conveys the meaning that a being in the age group 45-59 as compared to the 15-44 years age group increases the log odds of attaining the well being status by 0.079, while it also increases the log odds by 0.208 for being in the >=70 years group than in the 15-44 years old group. Thus, for rural households, older household heads tend to confer better capability well being than for households with younger household heads. This is consistent with the study of Majumder,

(2006), where older women are likely to achieve better well being than younger women. It also conforms to recent studies that subscribe to the U bend of life, in which both global and emotional well being tend to increase as one gets older (The Economist, 2010, Bowling, 2010). This presupposes that income alone does not account for well being, rather, other subjective elements that make life worth living are appreciated by people as they grow older, given them an overall level of well being that they value.

The log odds of well being for the household increases by 0.271, 0.292, 0.323, 0.462 and 0.523 for household heads with primary, some primary, secondary, some secondary and post secondary education respectively rather than having no education. The result shows that higher level of education of the household heads significantly increases the capability well being of the rural household.

In terms of occupational groups, households whose heads are in the public sector are more likely to attain better capability well being levels than those in other occupational groups. Being in the private (informal), agricultural, other self employed and unemployed occupational group rather than in the public sector significantly decrease the log odds of attaining at least the average wellbeing level by 0.489, 0.480, 0.240, and 0.662 respectively. The result implies that being in the public sector presents some form of stable monthly salaries which leads to development of better capability well being than being in other occupational groups, where such stable income may not be forthcoming.

Having a household size of 6-9, and ≥ 10 significantly increase the log odds of attaining at least the average well being level by 0.074 and 0.191 respectively. The result indicates that in rural Nigeria, higher household size is synonymous with higher well being levels, probably as a result of larger economies of scale, increased farm labour availability and opportunity to diversify income generating streams.

While the log odds of attaining a higher level of well being increases for being married rather than being single, and decreases for being divorced or in informal union rather than being single, the results are not significant.

The log odds of well being increases significantly for being in geopolitical zones of North East, North Central, Southwest and South South, while it reduces for being in the South East rather than in the North West geopolitical zone of Nigeria.

5. CONCLUSION AND POLICY ISSUES

Multidimensional well being of rural Nigeria using the capability approach was analysed with the fuzzy set theory and the logistic regression. The results showed that of all the states in Nigeria, Zamfara State has the highest potential in terms of well being opportunity while Imo state has the lowest potential. It also revealed that the indicators of well being in the capability space are not well developed in rural

Nigeria. Health, Nutrition and security are three of the least developed well being potential in rural Nigeria. This has a lot of implications for policy matters, since the three dimensions are important as functionings and capabilities in the overall well being dimensions.

The regression results reveal that the level of capability well being of rural Nigeria varies with the different conversion factors. It is surprising that capability well being is positively related with age. However, it follows what the Economics, (2010) and Bowling, (2010) view of the u bend of life, where well being actually tends to increase with increasing age. Capability well being is also found to be positively interacting with household size and the polygamous nature of household heads. This infers that there is still a major dependence on farm family labour by the majority of the rural populace. Thus, the larger the family size, the better the ability of the household to develop its capacity for improved well being. Improved educational status, increases the capability well being of rural households. This has a great policy implication on the need to develop the educational sector as it concerns the rural areas in Nigeria. Being in the Northwestern zone of Nigeria also confers some low level of attainment on the composite well being value on the rural populace therein.

The research has been able to add to knowledge on the measurement and definition of well being using the capability approach, an area which is less extensive in the Nigerian Developmental literature. There is however a need for a more comprehensive data base that will capture the dimensions and indicators of capabilities different from functionings in order to have a clear understanding of the place of freedom and agency that form an important part of Amartya Sen's capability theory. In terms of policy issues, this study suggests enhanced human capital development and agricultural productivity development as key issues that must be worked upon to improve rural well being.

REFERENCES

Adisa A L, Agunbiade O M, Akanmu O E,(2000): House ownership as a well being index among retirees in osun state, Nigeria. The Journal of International Social Research, Volume 1/5, Fall, 2008.

Alkire S.,(2007): Multidimensional Poverty: How to Choose Dimensions; Human Development and Capability Association(HDCA), February, 2007

Anand P., Hunter G. and Ron Smith, (2004): Capabilities and Well being; Evidence based on Sen-Nussbaum Approach to Welfare. The Open University, Milton Keynes.

Bowling A., (2010): Do older and younger people differ in their reported well being? A National Survey of Adults in Britain. Oxford Journals, Medicine, Family Practice, Volume 28, Issue 2. Pp 145-155

Canadian Index of well being: posted on www4.hrdc.gc.ca

Chiappero E. M.,(2000): A Multidimensional Assessment of Well being based on Sen's Functioning Approach.Forthcoming in Rivista Internazionale Di Scienze Sociali, n. 2, 2000.

Clark, D. A. (2005[a]); Sen's Capabilities approach and the many spaces of human well being; Journal of Development studies, Vol 41, No 8, November, 2005, Pp 1339-1368

(2005[b]): Capability Approach: its development, critic and recent advances. Economic, Social And Research Council, Global Poverty Research Group, Working Paper 32

De Muro P., (2010): Rethinking Rural Well being and Poverty. FAO, 3rd WYE City Project

Easterlin R.A.,(2003): Building a Better Theory of Well being; Presented at Conference' Paradoxes of Happiness, University of Milano-Bicocca, March ,2003

Frey B S and Stutzer A,(2002): What can Economists learn from Happiness Research? Journal of Economic Literature, vol 40, 2002, pp 402-435

Ijaiya M. A., Ijaiya G. T.,Bello R.A ,Ijaiya M. A and Ajayi M. A., (2009): Income Diversification and Household Well being in Ilorin Metropolis, Nigeria; International Journal of Business Management, Economics and Information Technology, Vol 1, No1.

Kingdon G.and Knight J. (2004): Subjective well being versus income poverty and capabilities poverty? Global Poverty research group, Centre for the study of African Economies. GPRG-WPS-003

Kubi K.,Ampomah E. A. and Ahorto C. N.,(2007): Multidimensional Analysis of Poverty in Ghana Using the Fuzzy Sets Theory; Poverty and Economic Policy, PMMA Working Paper 2007-21

Kuklys W, (2005): Amartya Sen's Capability Approach (theoretical insight and empirical applications), Springer, Berlin.

Majumder A., (2006): The State and Plight of Indian Women: a multidimensional Assessment of Wellbeing based on Sen's Functioning Approach.
(2009): Capability and Women's Well being in India: Empirical Study Based on National Family Health Survey 2&3.

Narayan D, Chambers R Shaha M.K and Petesch P, (2000): Voices of the poor; Crying out for a change. Oxford University Press.

Narayan D, Peter, Schaffc K, Rademacher A and Koch-Schulte, (2000): Voices of the poor; Can anyone hear us? Oxford University Press

Njong A.M. And Ningaye P., (2008): Characterising Weights in Measurement of Multidimensional Poverty: An application of Data Driven Aproaches to Cameroonian Data: OPHI Working Paper 21

Oyekale A S and Okumadewa F Y, (2008): Fuzzy Set Approah to Multidimensional Poverty in Abai State Nigeria. Research Journal of Applied Science, Medwell Journals, 2008

Oyekale T. O , Okumadewa F. Y., Omonona B. T. and Oni O. A, (2009): Fuzzy Set Approach to Multidimensional Poverty Decomposition in Rural Nigeria. The Icfai Journal of Agricultural Economics. Vol IV, Nos 3&4, July & October, 2009, Pp 7-44.

Robeyns I.,(2005): The capability approach, a theoretical Survey. Journal of Human Development, Vol 6 No 1, March 2005.

Stevenson B. and Wolfers J. (2008); Economic growth and subjective well being: Reassessing the Easterlin Paradox. National Bureau of Economic Research, Working Paper Series 14282

The Economist, 2010: Age and Happiness: The U Bend of Life. December 16, 2010(Print Edition).

Yee D., (2003): Book Review: Development as Freedom, David Yee Book Review.

Zadeh L A, (1965): Fuzzy Sets. Department of Electrical of Electrical Engineering and Electronic Research Library, University of California; Information and Control, Vol 8, Pp 338 -353, 1965.

APPENDIX 1
Capabilities Dimensions and Indicators

The dimensions and the indicators of capabilities used in the study are as follows:

a. Housing/Housing utility(μ_1): there are six indicators for this dimensions;

$\mu_{11:}$ Frequency of problem paying for house rent,

$\mu_{12:}$ frequency of problem paying utility bills and

$\mu_{13:}$ frequency of problem with supply of drinking water.

$\mu_{14:}$ Time to nearest supply of drinking water

$\mu_{15:}$ Means of transportation to supply of water

The last indicator sees well being in terms of housing as the increase in ownership of house. It is :

$\mu_{16:}$ Housing Ownership increased in the last 5 years

b. Health (μ_2): there are three indicators used in analyzing the dimensions of well being in terms of health. These are:

$\mu_{21:}$ Frequency of problems paying for health care services,

$\mu_{22:}$ time to nearest health clinic and

$\mu_{23:}$ means of transportation to nearest health clinic.

c. Nutrition (μ_3): there are three indicators here as well,

$\mu_{31:}$ Frequency of problems satisfying food needs,

$\mu_{32:}$ time to nearest food market and

$\mu_{3:}$ means of transportation to nearest food market.

d. Education(μ_4): there are five indicators with respect to capability well being on education.

$\mu_{41:}$ Frequency of problem paying school fees

$\mu_{42:}$ Time to nearest primary school

$\mu_{43:}$ Time to nearest secondary school

$\mu_{44:}$ Means of transportation to nearest secondary school

$\mu_{45:}$ Means of transportation to nearest secondary school

e. Assets/Income (μ_5): there are nine indicators to this dimension;

$\mu_{51:}$ Area of land owned compared to previous year

$\mu_{52:}$ Area of land used compared to previous year

$\mu_{53:}$ economic situation of household compared to previous year

$\mu_{54:}$ Economic situation of community compared to previous year

$\mu_{55:}$ Employment opportunity increased in the last 5 years

$\mu_{56:}$ Agricultural input availability increased in the last 5 years

$\mu_{57:}$ Buyers of agricultural produce increased in the last 5 years

$\mu_{58:}$ Availability of consumer goods increased in the last 5 years

$\mu_{59:}$ Credit facilities improved in the last 5 years

f. Security, (μ_6): there are two indicators for this dimension.

$\mu_{61:}$ Security Situation of household compared to previous year

$\mu_{62:}$ Police services improved in the last 5 years

g. Information/Knowledge flow: this dimension has five indicators.

$\mu_{71:}$ Availability of extension services improved in the last 5 years

$\mu_{72:}$ Time to nearest public transport

$\mu_{73:}$ Time to nearest all season road

$\mu_{74:}$ Means of transportation to public road

$\mu_{75:}$ Means of transportation to all season roads.

APPENDIX 2
Capability Well Being to the Elementary Indicators

Capability Dimension	Indicators	Index Per Indicator	Index Per Dimension
Housing(μ_1)	μ_{11}	0.0013	
	μ_{12}	0.0042	
	μ_{13}	0.0095	
	μ_{14}	0.0057	
	μ_{15}	0.0011	
	μ_{16}	0.0129	0.0348
Health(μ_2)	μ_{21}	0.0098	
	μ_{22}	0.0122	
	μ_{23}	0.0054	
			0.0274
Nutrition(μ_3)	μ_{31}	0.0093	
	μ_{32}	0.0118	
	μ_{33}	0.0054	
			0.0265
Education(μ_4)	μ_{41}	0.0069	
	μ_{42}	0.0084	
	μ_{43}	0.0129	
	μ_{44}	0.0020	
	μ_{45}	0.0055	
			0.0357
Asset/Socioeconomy(μ_5)	μ_{51}	0.0119	
	μ_{52}	0.0127	
	μ_{53}	0.0120	
	μ_{54}	0.0123	
	μ_{55}	0.0067	
	μ_{56}	0.0119	
	μ_{57}	0.0123	
	μ_{58}	0.0049	
	μ_{59}	0.0033	
			0.0881
Security(μ_6)	μ_{61}	0.0112	
	μ_{62}	0.0105	
			0.0217
Information Flow(μ_7)	μ_{71}	0.0049	
	μ_{72}	0.0102	
	μ_{73}	0.0111	
	μ_{74}	0.0046	
	μ_{75}	0.0049	
			0.0356
Composite (Average)			**0.2697**

Source: Researcher's computation, 2011

Appendix 3

Capability Well Being Based on Socioeconomic Characteristics

S/N	CHARACTERISTIC	SUBSET	WELLBEING INDEX
1	GENDER OF HOUSEHOLD HEAD		
		Male	0.271
		Female	0.256
2	AGE OF HOUSEHOLD HEAD		
		15-44 years	0.271
		45-69 years	0.27
		>=70years	0.261
3	HOUSEHOLD SIZE		
		1_5	0.26
		6_9	0.278
		>=10	0.294
4	EDUCATIONAL STATUS OF HOUSE HOLD HEAD		
		None	0.263
		Some Primary	0.254
		Completed Primary	0.264
		some secondary	0.274
		completed secondary	0.271
		Post secondary	0.294
5	MARITAL STATUS OF HOUSEHOLD HEAD		
		Single	0.264
		Married(Monogamy)	0.265
		Married(Polygamy)	0.29
		Divorced/Widowed	0.249
		Informal Union	0.256
6	GEOPOLITICAL ZONE		
		Northwest	0.231
		North East	0.293
		North Central	0.27
		South West	0.191
		South East	0.244
		South South	0.27
	OCCUPATIONAL STATUS OF HOUSEHOLD HEAD		
7		Public service	0.304
		Private(Formal)	0.266
		Private(Informal)	0.255
		Selfemployed(Agric)	0.262
		Self Employed(other)	0.267
		Unemployed	0.262
		Others	0.255

Source: Researcher's Computation, 2011

APPENDIX 4

Capability Well Being by States and the Federal Capital Territory

S/N	STATE	N	WELLBEING INDEX
1	ABIA	596	0.2505
2	ADAMAWA	728	0.212
3	AKWA IBOM	1697	0.256
4	ANAMBRA	475	0.2133
5	BAUCHI	903	0.2113
6	BAYELSA	227	0.332
7	BENUE	1223	0.2741
8	BORNO	1269	0.2143
9	CROSS RIVER	585	0.2692
10	DELTA	732	0.2272
11	EBONYI	521	0.2048
12	EDO	412	0.2264
13	EKITI	461	0.306
14	ENUGU	497	0.1906
15	GOMBE	628	0.2448
16	IMO	1123	0.1509
17	JIGAWA	1633	0.2717
18	KADUNA	846	0.2097
19	KANO	2157	0.2291
20	KATSINA	1236	0.3168
21	KEBBI	1036	0.243
22	KOGI	580	0.2323
23	KWARA	479	0.238
24	LAGOS	191	0.1986
25	NASSARAWA	740	0.2433
26	NIGER	1224	0.2782
27	OGUN	728	0.1569
28	ONDO	717	0.2359
29	OSUN	878	0.2276
30	OYO	1133	0.2396
31	PLATEAU	360	0.2004
32	RIVERS	653	0.1878
33	SOKOTO	1208	0.26
34	TARABA	344	0.257
35	YOBE	508	0.1943
36	ZAMFARA	488	0.4732
37	FCT	175	0.2244

Source: Researcher's Computation, 2011

APPENDIX 5

Isolating Factors that determine Capability well being

Predictor Variables	Coefficients	Marginal Effects
Gender of Household head (b: male)	0.29425***	0.70801***
	(0.05989)	(0.1468)
Age of household head (b: 15-44 years)		
45-69 years	0.07929**	0.018655**
	(0.02893)	(0.00681)
> 70 years	0.20815***	0.04981***
	(0.04803)	(01167)
Marital Status of Household head (b: Single)		
Married (Monogamy)	0.01730	0.00406
	(0.05751)	(0.0135)
Married (Polygamy)	0.05300	0.01250
	(0.06680)	(0.01581)
Divorced/Widowed/Separated	-0.06188	-0.01445
	(0.07579)	(0.01759)
Informal Union	-0.26556	-0.06013
	(0.17616)	(0.03821)
Educational level of household head (b: None)		
Some primary	0.27188***	0.06555***
	(0.06754)	(0.01661)
Completed primary	0.29296***	0.070238***
	(0.03761)	(0.00916)
Some secondary	0.32331***	0.078237***
	(0.06750)	(0.01669)
Completed secondary	0.46289***	0.11226***
	(0.04402)	(0.01088)
Post secondary	0.52262***	0.12729***
	(0.05189)	(0.01288)
Occupational group of household head (b:public)		
Private (Formal)	0.05468	0.01293
	(0.09719)	(0.02312)
Private (informal)	-0.48977***	-0.10719***
	(0.08107)	(0.01624)
Self employed (agriculture)	-0.48003***	-0.11244***
	(0.04879)	(0.01135)
Self employed (others)	-0.24030***	-0.05551***
	(0.05069)	(0.01149)
Unemployed	-0.66184***	-0.13957***
	(0.13304)	(0.02431)
Others	-0.42554***	-094929***
	(0.06139)	(0.01759)
Household size (b: 1-5)		
6-9	0.07413*	0.17477*
	(0.02969)	(0.00702)
≥ 10	0.19067***	0.04558***
	(0.05053)	(0.01226)
Geopolitical Zone (b: Northwest)		
North-east	0.45796***	0.10950***
	(0.04022)	(0.00971)
North central	0.58781***	0.14270***
	(0.04525)	(0.01115)

South-east	-0.67674***	-0.14586***
	(0.05837)	(0.01123)
South west	0.42669***	0.103182***
	(0.04878)	(0.01202)
South South	0.12209*	0.02898*
	(0.04991)	(0.01195)
Constant	-0.6905***	
	(0.0807)	

NB: Significance level is given as ***, ** and * for 1%, 5% and 10% respectively.

b= base category omitted in the regression for categorical variable

APPENDIX 6

Pearson Goodness of Fit Test for Logistic Regression

Number of Observations   =29391

Number of covariate patterns   = 3186

Pearson Chi2(3160)   =3547.01

Prob>chi2   =0.0000