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SPATIAL DECISION SUPPORT SYSTEM FOR LIVELIHOOD PROGRAMMES IN NORTHERN NIGERIA

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ABSTRACT
The paper examines the relevance of geospatial maps and technics in execution of livelihood support projects among rural poor. Previous attempts towards driving the poor along prosperity pathways in Nigeria have failed because of incorrect deployment of interventions in time and space. Global positioning systems and Geographical information systems were employed in this study to provide insight to the challenges faced by previous livelihood support projects in the country while also providing a robust spatial decision support system for geographical targeting of interventions to vulnerable households. The study selected 1,459 households from the 42,000 households adopted for the Feed the Future Project in 3 northern States namely; Sokoto, Kebbi States and the Federal Capital Territory. Acquired survey data were converted into GIS maps so as to expose hidden trends in the characteristics of target population and to suggest the best options for interventions. The data were subjected to spatial analysis such as simple distance analysis. The outcomes revealed 86% of sampled households to be largely below the poverty line. This is mainly due to poor access to facilities like health care, markets, good roads, agricultural inputs, agricultural information and advisory services. 10 % of children's absolute score of Mid Upper Arm Circumference (MUAC) revealed acute malnutrition. 42 % of the household however now have stronger safety nets as a result of the interventions. The study found Spatial Information technology highly useful in social intervention project as the one by the Feed the Future project.

Keywords: Livelihood support, Wealth ranking, Spatial Information Systems, Northern Nigeria.

INTRODUCTION

Northern Nigeria has been recently rated as one of the most vulnerable political regions to poverty in the country (Yusuf *et al*., 2010; Ozughalu and Ogwumike, 2013; Jaiyeola and Choga, 2021). As the global poor and hungry population advances towards the one billion mark by 2030 (Ahiuma-Young, 2017; FAO, 2017), concerns have been expressed about the future status of northern Nigeria (Report Africa, 2020). Particularly with presence of insurgents and armed bandits ravaging northern Nigeria, climate change and desertification will only be mere additional factors of poverty and hunger (Abraham and Fonta, 2018). It is therefore understandable to find several non-governmental organizations implementing programmes to ensure that the first two Sustainable Development Goals are actualized in Northern Nigeria.

For people in developing countries, globally coordinated efforts need to be multiplied to keep many above the tide of starvation and poverty (FAO/IFAD/WFP, 2002; OECD, 2020). Many people will become vulnerable to malnutrition and starvation except drastic, timely and effective measures are taken against poverty and malnutrition in many developing countries of the world (FAO, 2010; Action Against Hunger, 2021**).** For instance, The United Nations Children Education Fund (UNICEF) alerted in 2017 of the impending starvation to death of about 1.4m children in the third world before 2020 (Global report on Food Crisis, 2020; BBC News, 2017). Available report reveal that every year, about 5 m children under the age of 5 die of malnutrition-related issues (Feed the Children, 2020). In 2019, the world lost about 5.2 m children to hunger and diseases (WHO, 2020a). Furthermore, according to Feed the Children (2020), 1 out of 9 people around the world (about 820 million) suffer from hunger. Several authors have also forecasted death of several adults from starvation and nutritional deficiency related diseases (Evans, 2005; Madea, 2014; WHO, 2020a). There is no gainsaying about the fulfilment of this in many Asian and African countries like Nigeria (WHO, 2018). Only a full blown pandemic of nutrition deficiency induced disease is what is still been awaited.

In response to this, many governmental or non-governmental organizations are directing resources at eradicating poverty, hunger and malnutrition in nuances of poverty alleviation and zero hunger programmes. An example of this was a five-year livelihood support project named "Feed the Future" (FtF) project which was executed between 2014 to 2018. The project's aim was to help the target beneficiaries progress out of poverty. The strategy was to increase agricultural productivity, enhance

nutrition while also improving on health, education and entrepreneurship (Feed the Future Annual Report, 2015).
Very vulnerable families were aided in diversifying their income sources and embarking on robust nutrition activities through improvement on household dietary diversities. Cash transfers were introduced to help meet nutritional needs, recovery of assets and overcoming obstacles against income-generating activities of vulnerable families (Bailey and Hedlund, 2012). It was believed that if households increase in agricultural productivity, they are likely to increase income generation and improve on their nutritional status, it will only remain for them to have stronger social safety net to easily move along the prosperity pathway. These four key areas were therefore pursued tenaciously as the project goals (FAO, 2017).

However, just as it is common with other failed interventions of the past, the bottleneck of the FtF project would also include discovery of were to direct intervention efforts for maximum results. For example, the questions of locating the poor or hungry; why they are poor and hungry need to be answered prior to the project execution (Terrence, (2018). Project proponents also need to know mid-term of the project how the beneficiaries have fared with the interventions provided thus far. These are questions of spatial dimensions that must be must be answered for interventions to be effective. With these answered, gains recorded with the past previous intervention on poverty and hunger eradication can be identified and deepened (World Bank, 2020).

Incidentally, spatial technologies namely: Geographic information systems and global Positioning systems have been combined with other survey techniques in the past to solve project challenges similar to those listed above. They have also proven to be veritable in several livelihood support projects Thakur *et al.,* (2016), they are capable of presenting concealed trends useful for developing a spatial decision support system for projects that requires detailed consistent monitoring and evaluations such as poverty alleviation, income generation and nutrition improvement programmes.

In this study, Global Positioning System (GPS) was integration with Remote Sensing data and Geographical Information Systems (GIS) to examine the impacts of livelihood support projects in three northern States of Nigeria.

Mapping methodologies and spatial analysis

Study area

The study was conducted in four local governments selected from Sokoto and Kebbi States as well as the Federal Capital Territory (FCT). The households were randomly selected and the spatial distribution is as presented in the map below.

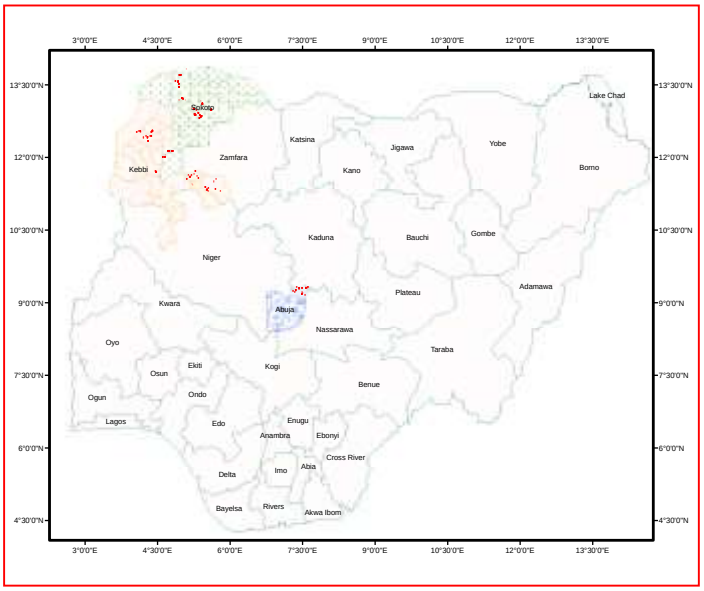

Fig. 1: Map of Nigeria showing the two States the FCT with the households (in red dots)

The study area is generally agrarian with a greater percentage of the land use devoted for agriculture. The land cover can be described as grassland with an extensive flood plain and tortuous river good for suitable agriculture.

Sample determination and data collection

The sample size was determined using US-AID sample sized determinant table which permits a sample of 1491 from a population of 50,000 at 95% confidence level and error margin of 2.5%. a sample size of 1,459 households were therefore

randomly selected from the 42,000 households that were registered for the FtF project in the study area. The number of households selected per state were based on the ratio of the population of households registered for the project in each state. 816 households were selected in Sokoto and were drawn from villages in Tangaza, Dange-Shuni, Rabba and Kebbe LGAs of the State. In Kebbi State 429 households randomly selected from the two local government areas namely: Birnin Kebbi and Danko Wasagu. The survey in Abuja was in only one municipal council; Bwari from where 214 households were selected.

Survey instruments

The survey instrument consisted of an electronic version of structured interview guide for the households. The questions were designed to elicit essential information with regards to FtF interventions and its impacts on the poverty and nutritional status of the responding households. The electronic form was uploaded on to GPS-enabled android tablets which were distributed to enumerators. All selected households were visited by enumerators and the geographic coordinates of the households were recorded along with their respective responses to the questions. This enabled capturing of responses, household biodata and socio-economic data along with their respective geographic locations, thus making the data spatial and acceptable for spatial analysis. With this opportunity, it would be easy to understand spatial patterns and variations in impacts of the project with regards to specific interventions aimed at improvement of health, dietary diversity, nutrition, education agricultural productivity, income generation and entrepreneurship. Access of households to resources sometimes influences the relative time span in moving out of poverty.

Developing spatial data base

Geographical coordinates of each respondent that were obtained with the aid of a GPS-enabled tablets were compiled into a spreadsheet (MS Excel) and tabulated against each of the measured Feed the Future performance indicators extracted from the survey instruments. The table of x,y coordinates, of the GPS measurements were then added to ArcMap to create a new point layer which were later exported from ArcMap and created as new point feature class in ArcCatalog from the data, to make it permanent. Shapefiles of Nigerian administrative boundaries (States and Local Government Areas), were used as the base maps.

Maps and Spatial Analysis

A number of thematic maps were created to display hidden trends in the results obtained from the field data collection. Foremost the geographical spread of the households sampled were displayed as point symbols on an administrative map of the three states super imposed on the administrative map of Nigeria.

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Survey Instruments and Field Data Collection

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The electronic form was uploaded on to GPS-enabled android tablets which were distributed to enumerators. All selected households were visited by enumerators and the geographic coordinates of the households were recorded along with their respective responses to the questions. This enabled capturing of responses, household biodata and socio-economic data along with their respective geographic locations, thus making the data spatial and acceptable for spatial analysis. With this opportunity, it was easy to understand spatial patterns and variations in impacts of the project with regards to specific interventions aimed at improvement of health, dietary diversity, nutrition, education agricultural productivity, income generation and entrepreneurship.

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Maps and Spatial Analysis

A number of thematic maps were created to display hidden trends in the results obtained from the field data collection. Foremost the geographical spread of the households sampled were displayed as point symbols on an administrative map of the three states super imposed on the administrative map of Nigeria. These maps helped in visualizing the spatial spread of respondents and spatial patterns of trends. The analysis of the performance indicators measured explained reasons behind the people's varied responses to specific project interventions for improvement of agricultural productivity, nutrition, health, education and entrepreneurship.

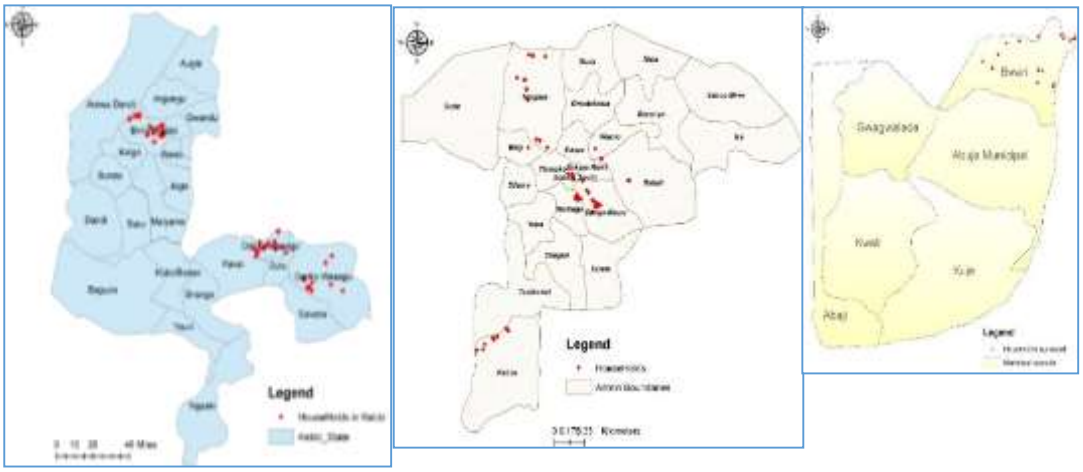

Figure. 2; Geographical locations of Households selected for the study in Kebbi, Sokoto and Abuja

RESULTS AND DISCUSSION

The outcome of spatial analysis of a few of the project performance indicators have been graphically presented below.

Adoption of Improved Agricultural Technologies for Improved Livelihood

It was important to commence spatial analysis of the respondents with the level of adoption of improved agricultural practices as one of the interventions. Since the response on this was structured into Yes or No, a Boolean map showed the spatial distribution of the two classes of adoption. The adopters are represented in blue while the non-adopters are in red. The spread and locations of households that have adopted new technologies and the non-adopters can be visualized. The map shows the extent of success of the project with regards to adoption of the interventions on improved agricultural technologies and practices.

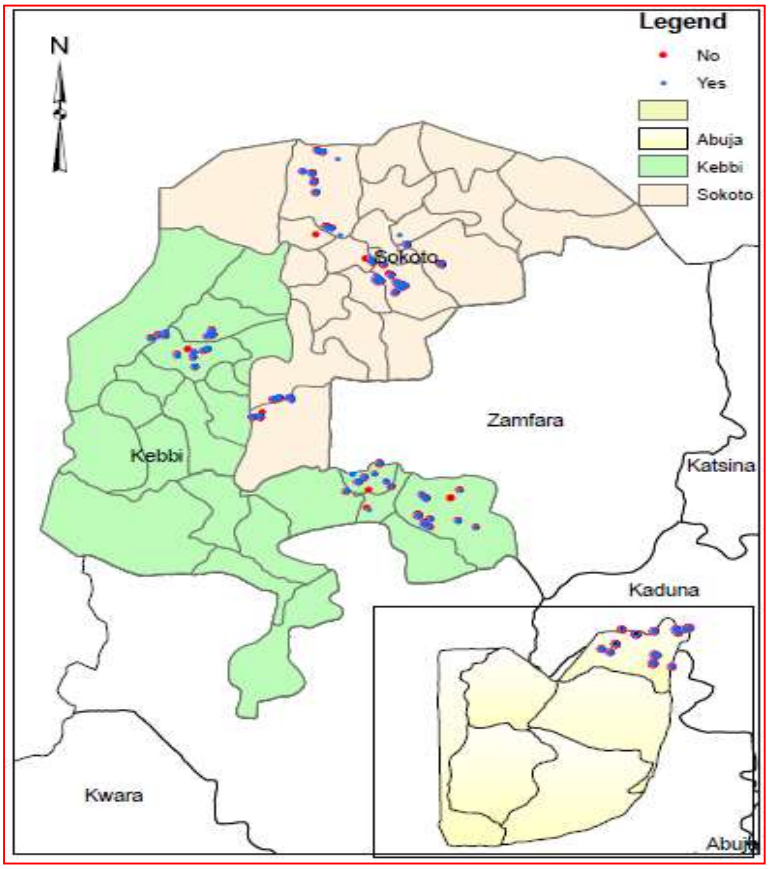

Fig.2: Adoption and non-adoption of improved agricultural practices by households

Anthropometric Status of Children under 5 years

The level of malnutrition based on mid-upper arm circumference (MUAC) varied from severe-, moderate, acute- malnutrition, to normal nutrition (Table 1). No cases of severe and moderate acute malnutrition were observed in FCT; about 16.7% of children had acute malnutrition, while 83.3% were well nourished. Kebbi State had 2.1% children who were in the range of moderate acute malnutrition and 14.6% with acute malnutrition; 83.3% were well nourished. Sokoto State with 11.3%, 8.1% and 25.8% children in the range of severe-, moderate-, and acute malnutrition had the highest cases of acute malnutrition; only 54.8% of the children were well nourished.

Table 1: MUAC-for-age Z-Scores of Children under 5 years

Indicator	State		
	Fed Capital Territory (%)	Kebbi (%)	Sokoto (%)
Severe acute malnutrition	-	-	11.3
Moderate acute malnutrition	-	2.1	8.1
Acute malnutrition	16.7	14.6	25.8
Well nourished	83.3	83.3	54.8

Source: Field Survey, 2017

However, it should be noted that the observed percentage of well-nourished children in the three locations notwithstanding, reports of other authors (Fiorentino *et al.*, 2016) on similar work revealed that the prevalence of acute malnutrition is still high in the locations. Acute malnutrition contributes to increased morbidity, impaired physical and mental development, and is associated with micronutrient deficiencies (Fiorentino *et al.*, 2016).

Table 2 shows that stunting was more rampant among the three locations. Only 10% and 5% of the children examined were underweight in FCT and Kebbi State, while there was no case of underweight in Sokoto State. Wasting was observed at 5% level among the children in Kebbi. Height-for-age (measure of stunting) reflects achieved linear growth and its deficits indicate long-term cumulative inadequacies of health or nutrition. The worldwide variation of prevalence of low height-for-age (below

-2 SD of the NCHS/WHO reference) is considerable, ranging from 5 to 65% among the less developed countries. Weight-for-age (measure of wasting) reflects body mass relative to chronological age. It is influenced by both the height of the child (height-for-age) and his or her weight (weight-for-height).

Table 2: Occurrence of malnutrition based on weight and height measurements

State	Indicator (Percent of occurrence)		
	Stunting	Underweight	Wasting
FCT	50	10	-
Kebbi	40	5	5
Sokoto	37.3	-	-

The spatial analysis of anthropometric measurements of households in which children under the age of 5 years had their Mid-upper arm circumference (MUAC) measured was conducted. This was important for the purpose of rapidly assessing their nutritional and health status. The survey recorded children with as low as 7 cm MUAC absolute score. Locations with children MUAC reading less than 10.9 mm implying severe malnourishments are shown in red. Under the red category are 11 children; namely 2 from Abuja, 2 from Kebbi and 7 from Sokoto. However, several of the households sampled had very high absolute score for the MUAC assessment.

The map was drawn to also show the geographical spread of the status of children based on absolute score of the Mid Upper Arm Circumference (MUAC). Two groups disaggregated into severely malnourished children (in Red) and the normal children in Green were identified on the map.

Fig. 3: Extremes in nutritional status of Children under 5 years from MUAC assessments

The severely malnourished (red) category are 11 children with 2 from Abuja, 2 from Kebbi and 7 from Sokoto. The localities of all moderately malnourished children can also be seen. The spread of severe and moderately severe malnutrition against the normal and well-nourished children by the MUAC assessment can be seen. The general observation is that very few children are reported to be undernourished or wasting as graphically presented in the map below.

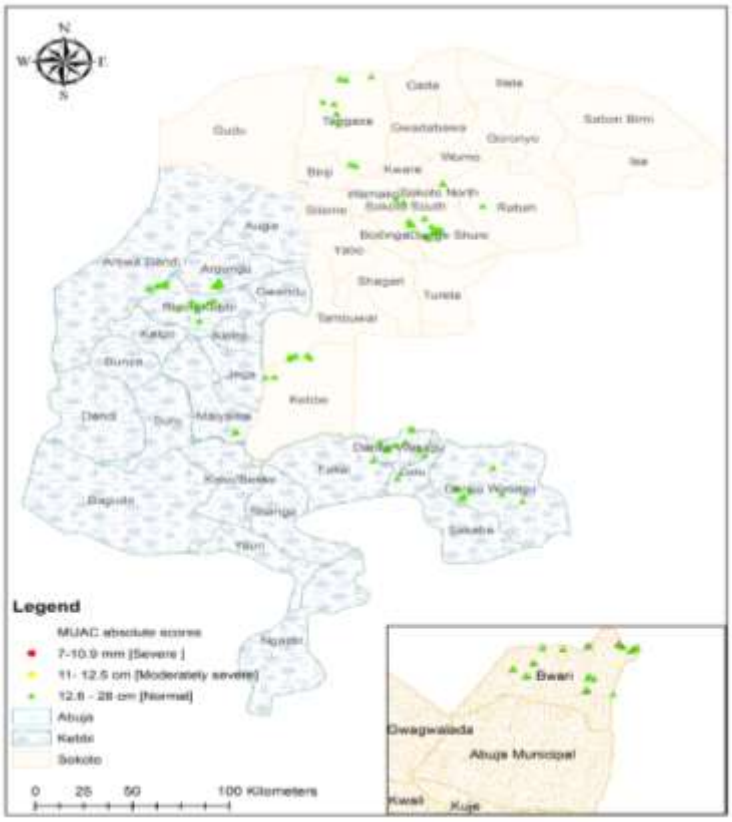

Fig 4. MUAC Absolute Score

Wealth ranking and progress out of poverty

The locations farm-families that did not improve on their income particularly from agricultural enterprises were identified with GIS. Associated reasons for this was also recognized. The characteristics of the milieu of poor households normally explains their poverty. For instance, resource constraints and other constrictions were easily highlighted in poverty endemic areas. These localities can therefore be isolated for future poverty reduction interventions. With regards to poverty, the spatial spread was characterized by the plot of extremely poor (red) against moderately poor (green) and wealthy (blue). Except on a few locations in Kebbe, Rabah and Dange-shunni where we have the wealthy and the extremely poor in close proximity, the general trend is that the extremely poor and the moderately poor clustered together.

In the figure below, the income from sales of agricultural products by households is presented.

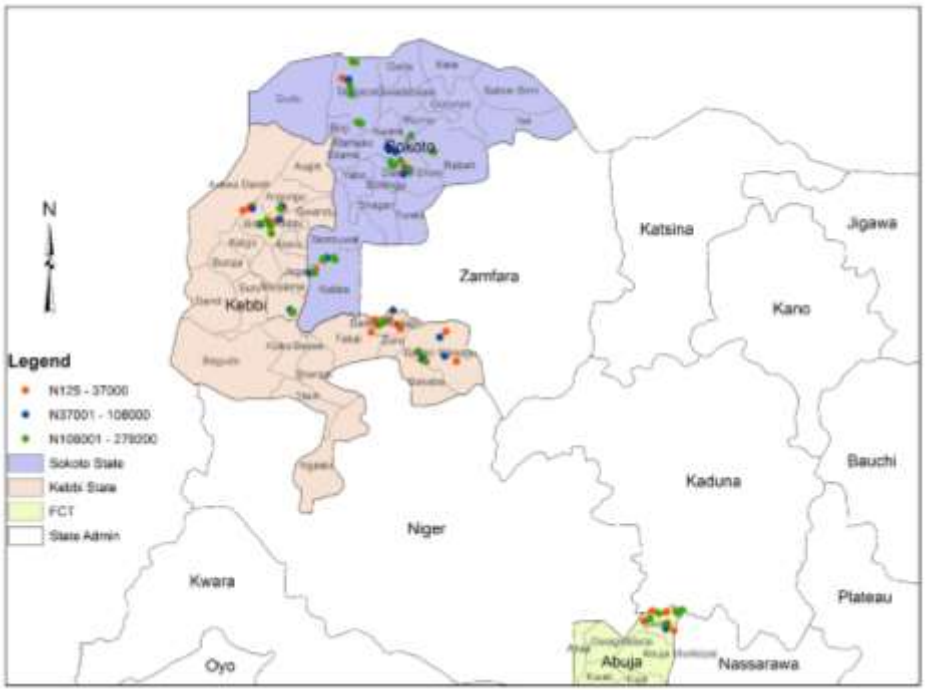

Figure 5. Income from Sales of Agricultural Produce

The spatial distribution of households according to income from sales of farm produce from previous harvest is graphically presented on the map above. Highest household income values ranged from N125 to 279,200. Sixty-one out of four hundred and seventy-two households (green dots) that earned income from agriculture were ranked as highest income earners with a revenue range of N100,000 to N279, 200. The red dots on the map represented the 198 households with very low income of not more than N37,000.

This type of map shows where the poor are; the geo-ecological characteristics and attributes surrounding the poor suggest the reasons for poverty. This map is very useful in planning and geographical targeting of interventions such as poverty alleviation programmes. The locations of households and farm-families that did not make much income from agricultural enterprises possibly owing to resource constraints or other constrictions can also be easily identified for future interventions.

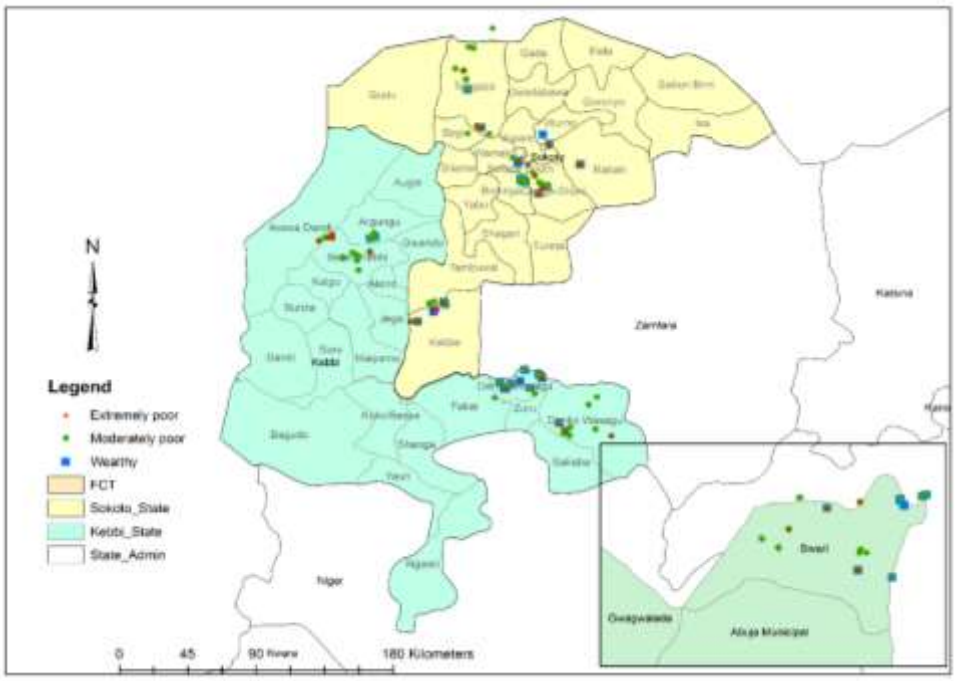

Figure 6. Wealth ranking of households

Similarly, the comparison of extreme poverty and wealth in the sampled households can be appreciated through graphical presentation on State basis. The spatial distribution of the households on the basis of extreme poverty and wealth was also shown in maps. Further, the spatial distribution of households according to income from sales of farm produce from previous harvest is also graphically presented on a map. The household income ranged from N125 to 296,000. 61 of the 472 household with income from sales from previous harvest had between 100,000 to 296,000. These are represented with dark brown dots on the map while those households with low income from sales of farm produce (in pink dots) are about 198.

Distance of Households to Infrastructures

A major constraint to movement out of poverty is proximity of the vulnerable to essential infrastructures as well as farm inputs. Starkey and Hine, (2014) directly associated lack of road infrastructure, distance to marketing and health care with poverty. Gibson and Rozelle (2002) linked poverty to lack of access to infrastructure in Paupa New Guinea. Distance analysis to infrastructures such as hospitals, markets, schools, water points and good roads are important measures to reduce poverty. Distance maps show the proportion of households that have access by proximity to health care facilities and major markets.

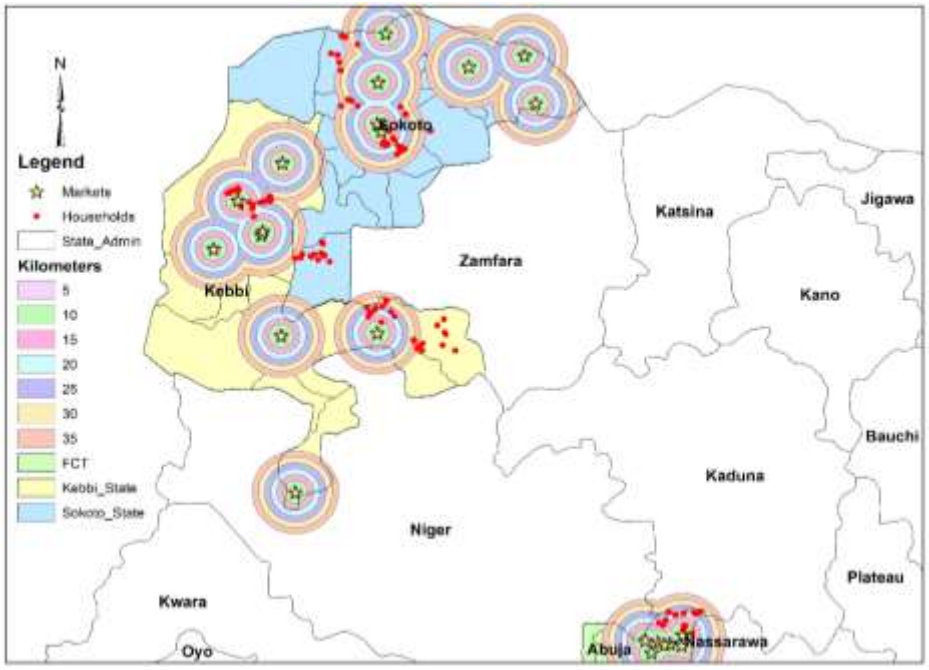

Figure 7. Distance analysis showing proximity

The straight line is the shortest distance between two points. The distance analysis using concentric circles represent Euclidean (shortest) distance between the households (red dots) to major markets (yellow stars). Each circle represents 5 kilometer distance; implying that even by shortest distance, most of the households are more than 30 kilometers from the major markets. Meanwhile, the cost of transporting produce from farm to markets increases with distance covered, and this exerts significant pressure on household income and savings.

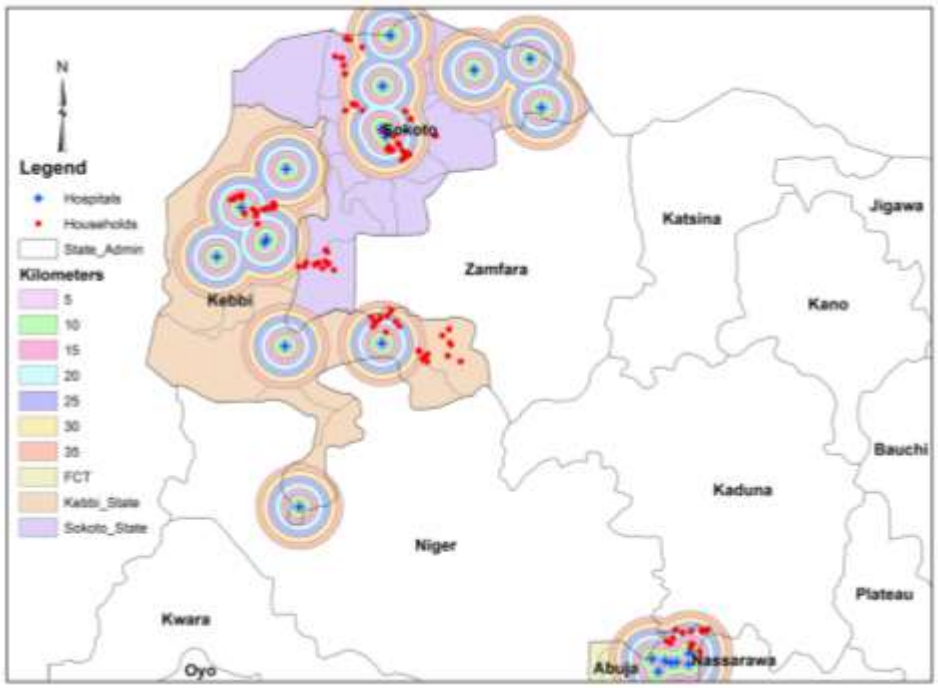

Fig.8. Distance analysis showing proximity of Households to major markets households to good health facilities

The concentric rings represent Euclidean distance (shortest distance) to major markets (yellow stars). If each ring is 5 kilometers, then majority of the households live more than 30 kilometers away from major markets. The cost of moving farm produce to markets is likely to be very high and a source of significant pressure on household income and savings. Similarly, good access to health facility has effect on wealth of the households. The map below shows that access to good hospital in the study area has a similar trend to access to major markets

CONCLUSION

The synoptic presentation of the results of the survey on maps provides access to hidden trends in the study area. It affords interested persons great access to information that are essential for further interventions. Areas where the current interventions were found to be ineffective and the reasons for the ineffectiveness were clearly depicted as such rectification can be made in future poverty alleviation projects. Rapid investigation of factors associated with poverty, malnutrition and children wasting was supported and accelerated substantially by the use of GIS. It was possible to trace areas where people are responding positively to poverty alleviation treatments especially locations with the highest adoption of technologies and wealth ranking. The paper concludes that GIS as a technology is highly relevant in designs of poverty eradication projects.

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REFERENCES

Abraham, T.W. and Fonta, W.M. (2018). Climate Change and Financing Adaptation by Farmers in Northern Nigeria. *Financ Innov* 4, 11 https://doi.org/10.1186/s40854-018-0094-0

Action Against Hunger (2021). Underlying Causes of Malnutrition: Poverty; Lack of Access to Food; Disease; Conflicts; Climate Change and Lack of Safe Drinking Water. Available online at http: //actionagainsthunger.ca/what- is – acute – malnutrition/underlying- causes- of malnutrition. Canadian Charity Registration Number 83363468R0001

Ahiuma-Young, V. (2017). Labour-markets/ ILO decries weak recovery in Youth Labour Markets https://www.vanguardngr.com/2017/11/ilo-decries-weak-recovery-youth-labour-markets/

Awe O.O. (2012). Causes and Effect of Diseases of Poverty on Scientific and Technological Development. *Journal of Science and Science Education*, Ondo 3(1), pp. 23 – 27, 19th November, 2012. Available online at http://www.josseo.org ISSN 0795135-3 ©2012

Bailey Sarah and Hedlund Kerren (2012). The Impact of Cash Transfers on Nutrition in Emergency and Transitional Contexts; A Review of Evidence. Humanitarian Policy Group. Odi.org/sites/odi.org.uk/files

British Broadcasting Corporation News- BBC News (2017). About 1.4 Million Children May Die In Nigeria, More Countries – UNICEF

Evans, c. (2005). Malnutrition in the elderly: a multifactorial failure to thrive. *The permanente journal* vol 9(3): pp 38-41.

Available online at https://www.ncbi.nlm.nih.gov/pmc/articles/pmc3396084/

FAO/IFAD/WFP (2002). Reducing Poverty and Hunger: The Critical Role of Financing for Food, Agriculture and Rural Development. Available online at http://www.fao.org/3/Y6265e/y6265e00.htm#TopOfPage.

FAO (2017). The Future of food and Agriculture Organization. Trends and Challenges, Food and Agriculture Organization of the United Nations, Rome, Italy. Available online at http://fao.org/3/i6583e/i6583e.pdf.

Feed the Future Annual Report (2015). Feed the Future Agriculture Policy Support Project. USAID, Ghana Annual Report (October 2914 – September 2015) Project year 2, Quarter 4. Available online at http://ghanalinks.org/documents/190376/199081/USAID/

Feed the Children (2020). Hunger Facts and Figures. Available online at https://www.feedthechildren.org/our-work/hunger-facts/

Fiorentino, M., Sophonneary, P., Laillou, A., Whitney, S., de Groot, R., Perignon, M., Kuong, K., Berger, J. and Wieringa, F.T. (2016). Current MUAC Cut-offs to Screen for Acute Malnutrition need to be Adapted to Gender and Age: The Example of Cambodia. PLoS ONE 11(2): e0146442. doi:10.1371/journal.pone.0146442.

Gibson, J. and Rozelle, S. 2002. Poverty an Access to Infrastructure in Paupa New Guinea. http://ageconsearch.umm.edu/bitstream/1944/1/wp02-008.pdf

Global Report on Food Crisis (2020). Joint Analysis for Better Decisions. Available online at hhttp://fsinplatform.org/sites/default/files/resources/files/GRFC_2020_ONLINE_200420.pdf

Jay Krisna Thakur, Sudhir Kuman Singh and Vicky Ekanthal (2016). Integrating Remote Sensing, Geographic Information Systems and Global Positioning System Techniques with Hydrological Modeling. Journal of Applied Water Science, 7, 1595 -1608. Springer Link

Jaiyeola, A.O. and Choga, I. (2021) Assessment of Poverty Incidence in Northern Nigeria, Journal of Poverty, 25:2, 155-172, DOI: 10.1080/10875549.2020.1783424

Khan, A., & Cheri, L. (2016). An Examination of Poverty as the Foundation of Crisis in Northern Nigeria. *Insight on Africa*, Vol 8(1), pp 59–71. doi:10.1177/0975087815612283

Laurie DeRose, Ellen Messer and Sara Millman (1998). Who's Hungry? And how do we know? Food Shortage, Poverty and Deprovation. Published by United Nations University Press. Tokyo – Newyork – Paris. Available online at http://www.unu.edu

Madea B. (2014) Starvation, Malnutrition, Dehydration, and Fatal Neglect. In: Collins K., Byard R. (eds) Forensic Pathology of Infancy and Childhood. Springer, New York, NY. https://doi.org/10.1007/978-1-61779-403-2_17

OECD (2020). Developing Countries and Development Co-operation:What is at stake? http://www.oecd.org/coronavirus/policy-responses/developing-countries-and-development-co-operation-what-is-at-stake-50e97915/

Report Africa, (2020). Violence in Nigeria's NorthWest: Rolling Back the Mayhem. Report No 288/ Africa. 18th May, 2020. International Crisis Group. Available online at https://www.crisisgroup.org/africa/west-africa/nigeria/288-violence-nigerias-north-west-rolling-back-mayhem

Terrence, L, (2018). Why have food security projects failed in rural Africa? Business, Economics and Politics Report. http://thebigq.org/2018/04/09/why-are-africans-still-humgry/

Uche M. Ozughalu Fidelis O. Ogwumike (2013). Vulnerability to Food Poverty in Nigeria *African Development Review* 25(3):243-255 https://doi.org/10.1111/j.1467-8268.2013.12027.x

WHO, (2018). Global Hunger Continues to Rise, New UN report says. https://www.who.int/news/item/11-09-2018-global-hunger-continues-to-rise---new-un-report-says.

WHO, (2020). Children: improving survival and well-being. https://www.who.int/news-room/fact-sheets/detail/children-reducing-mortality

World Bank, (020). How do we design cash transfer programs? Available online at http://www.blogs.worldbank.org/developmenttalk/

Yusuf, O.B., Adeoye, B.W., Oladepo, O.O. *et al.* (2010). Poverty and Fever Vulnerability in Nigeria: a Multilevel Analysis. *Malar J* **9,** 235 https://doi.org/10.1186/1475-2875-9-235.