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## Income and Energy Sources among Agrarian Households in Nigeria: Implications for Low Carbon Development in Africa Mkpado, M., Joel N. Nweze, E.M.Igbokwe, Noble J. Nweze

### Introduction

- Agriculture is very important in Africa and rural economy.
- Greenhouse gases are emitted by agricultural activities and farming households through consumption and physiological processes.
- Agricultural production is estimated to be responsible for 28% of global GHG emissions.
- Small holder farmers in Africa are poor and lack the capacity to adopt cleaner energy sources on their own.
- Inefficient use of energy by farmers will result in depletion of forests which are one of carbon sinks and air purifiers.
- Production and use of efficient energy sources can offer employment to the youth, create wealth and reduce poverty.
- Improving the livelihood and welfare of African agrarian households will increase the pace of attaining MDGs goals.

### Results and Discussion

- Average annual income of agrarian households from different sources such as crop farming, livestock farming, petty trading, forest exploitation, remittance and labour per day were below the poverty line of \$1 per day.
- The study found significant correlations between use of electric generators with crop income, petty trading, remittance from Nigeria and abroad, respectively. Use of gas cookers was significantly correlated with petty trading, and total income. Use of kerosene stoves was significantly correlated with livestock income, petty trading.
- Use of hydro electric power had the highest number of correlations with different income sources. This showed a heavy demand and reliance on hydro energy. Such heavy reliance on water resources is no longer desirable because of emerging stress on water resources by climate change. Hence the need to look for alternative energy sources; such as gas turbine, windmill and solar energy.
- Given that small holder farmers are poor, they can pool resources as farmers groups to attract a grant or by equity financing to build wind mills for irrigation or develop other energy sources. The fadama programme provides grants for provision of agricultural inputs and machineries. In Nigeria the fadama programme has helped a number of groups with irrigation pumps.
- In Malawi's southern region, the Smallholder Irrigation Project is helping farmers cope with effects of changing rainfall patterns.
- The result of multinomial regression showed that income, age, education and household size affect choice of certain energy sources. For instance total income is a major determinant of use of electric generators and gas cookers. The relationship between total income and use of gas cookers indicates that sources of gas should be developed. Current trends in development of biogas should be encouraged by improving capacity of farmers to produce adequate quantities of cereals. Farmers will need inputs, funds and technical assistance to meet the growing need of cereals for food and biogas production. It is important to train these end users in the best possible management procedure for optimized gas yield. This can provide employment opportunities for the youth to acquire skills in biogas production and uses.
- Increasing level of education and income respectively increases the probability to use kerosene stoves and electric generators; this calls for provision of more efficient kerosene stoves and improved refinement of petroleum resources and use of less sulphur petroleum resources. In order to encourage people to preserve forest resources, their income needs to be cushioned or the fuel pump price subsidized. The option with greater possibility is subsidizing of pump prices. This is in line with the concept of poverty reduction by providing subsidies on resources the poor consume. Advancement in age increases the probability to use firewood or charcoal. It is possible that increase in age is related to use of firewood and charcoal because most aged people return to their villages which are the rural areas close to forest resources where firewood and charcoal can easily be obtained, besides agriculture which is the occupation under consideration and majority of the farmers live in the rural area. Involvement of youth in alternative energy production and use can help to readdress the issue.

### Objectives, hypothesis and method

- Main objective was to examine Income and Energy Sources among Agrarian Households in Nigeria: Implications for Low Carbon Development in Africa. Specific Objectives were to examine:
  - available energy sources used by farmers and determinants of the choice.
  - options for pooling resources to fund more efficient energy sources to encourage low carbon energy development.
- It was hypothesised that income, education and age do not affect choice of access to energy sources.
- Data were collected from Community Based Monitoring System (CBMS) Nigeria
- Data analysis involved descriptive statistics, correlations and multinomial logistic regression analysis.

### key conclusions/ key messages

### Policy recommendations

- Use energy efficient bulbs to reduce CO<sub>2</sub> emissions and efficient wood and kerosene stoves for rural women should be encouraged.
- Gas turbine, solar energy and wind mills should be developed as alternative sources of energy to reduce stress on hydro power.
- The production and use of biogas should be developed as an integral aspect of agribusiness to provide employment to the youth.

### Implementation steps

- Creating awareness to the rural dwellers of the need to use more efficient bulbs and kerosene stoves through workshops and media
- Government, philanthropists and NGOs should increase finance to encourage production and distribution of energy efficient bulbs and kerosene stoves among rural dwellers and solar energy should be used for street lighting while biogas should be developed as an agribusiness enterprise to provide employment to the youth via definite programmes and projects.
- Farmers should pool their resources to form groups in order to access more efficient energy sources like wind mills and solar energy also, governments and other organizations funding agriculture should endeavour to fund farmers groups.



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