Perceived Role of Extension Education in Promoting the Use of Biogas for Sustainable Agricultural Development in Nigeria

N J Igwe¹ U Ogwo² and O I Abbah³

¹Department of Adult Education and Extra Mural Studies, University of Nigeria, Nsukka;
²National Centre for Energy and Research Development, University of Nigeria, Nsukka;
³Department of Human Kinetics and Health Education, University of Nigeria, Nsukka.

Corresponding author Email: ngozi.justina.igwe@unn.edu.ng.; uzoamaka.ogwo@unn.edu.ng.; oliver.abbah@unn.edu.ng

Abstract. Biomass technology is a renewable energy source that is significantly used for cooking and heating, which when explored can reduce the use of fossil fuel. This study investigated the perceived role of extension education in promoting biomass technology for sustainable agriculture development in Nigeria. The study adopted the descriptive survey research design. Data were collected from 268 registered members of All Nigeria Farmers Association, Nsukka; and 22 Agriculture extension agents in Nsukka Local Government Area. Researchers-designed questionnaire which was validated by three experts was used for data collection. Mean and standard deviation were used for data analysis. Findings showed that sensitization of farmers on acceptability of use of farm wastes for biogas production; dissemination of information on renewable energy techniques to the farmers and sensitization of farmers on use of farm wastes for biogas production are perceived roles of extension education in promoting the use of farm wastes for renewable energy. Other perceived roles reported by the respondents include motivation of farmers on issues of renewable energy and provision of energy management advice to the farmers. The researchers recommended that efforts should be made to create awareness among the farmers on the use of farm wastes for biogas for renewable energy.

Keywords: Biomass, Renewable Energy, Extension Education

1.0 Introduction

The increasing demand for energy and the need for clean and affordable energy in Nigeria have necessitated the need for promoting renewable energy resource development and utilization in Nigeria. Fossil fuels account for 80 per cent of the world’s total energy consumption [1]. In Nigeria, 86 per cent of rural and 42 per cent of urban households depend on fuel wood as their primary source of energy with about 94 per cent of them using open fire or stove without chimney [2]. This contributes significantly to the climate change with its effect on humanity.

The effect of the use of traditional fuels for cooking and other domestic purposes cannot be over-emphasized. Reports [3] show that household air pollution caused by the indoor use of solid
fuels for cooking has resulted in the premature death of millions of people in the world mostly women and children. Also, [4] stated that 2.7 per cent of the global burden of disease in 2002 was attributed to indoor combustion of solid fuels. The implication of this according to [5] is that solution should concentrate on emission reduction or elimination instead of routing smoke out of the house to the atmosphere. This calls for the need to explore alternative energy sources or renewable energy.

The term renewable energy is energy generated from natural resources such as sunlight, wind, rain tides, and geothermal heat which are naturally replenished. It is energy produced from sources that do not deplete or can be replenished within a human’s life time [6]. In other words, it is energy derived from natural processes that can be replenished. Types of renewable energy programmes in Nigeria include photovoltaic, biomass technology, small hydropower, solar thermal, wind electricity and meteorology [7].

Biomass technology is a renewable energy programme that is significantly used for cooking and heating, which when explored can reduce the use of fossil fuel. The technology is relatively new in Nigeria compared with what is obtainable in other countries such India, Brazil etc. Nigeria by virtue of its geographical location is blessed with abundant biomass resources as well as human and animal resources needed for biomass technology to flourish. According to [7] the biomass potential of Nigeria consists of human and farm animal wastes, crop residues, and waste from forestry, agricultural, municipal and industrial activities as well as aquatic plants like water hyacinth. Nigeria generates about 2.4 million tons of municipal solid wastes per year [8]. This according to [7] is capable of generating about 0.63 million cubic metres of biogas in a day capable of providing cooking energy for several people. Also, [9] stated that Nigeria produces about 227,500 tons of fresh animal wastes daily. With 1 kg of fresh animal wastes producing 0.03 m³ of gas, it implies that about 6.8 million m³ of biogas can be produced daily in Nigeria, they further stated. This is not however, utilized in Nigeria. The level of integration of renewable energy technology in domestic, industrial and national energy mix in Nigeria according to [10] is low due to lack of serious awareness of renewable energy potentials among the citizenry.

The creation of awareness among the citizenry can be significantly achieved through extension education. Extension education is a crucial role player in promoting renewable energy for sustainable agriculture. Extension services in the agricultural sector performs educational function with the cardinal principle of providing information which improve the knowledge, skills and positive attitudinal change towards agricultural innovations [11]. Also, [12] stated that agricultural extension work is a partner to all stakeholders, organizations and interested groups that support, facilitates and assist the farming communities involved in agricultural production.[13] Reported that extension officers are change agents whose roles include catalyst, process helper, resource linker and solution giver. In an earlier study, [14] found no significant difference in the comparison of farmers and agents’ perception of role of agricultural extension.

The advantages of the possible roles of extension education in promoting renewable energy for sustainable agricultural development notwithstanding, farmers in Nsukka Local Government Area are still engrossed in the use of fossil fuel and electricity for domestic and farm use. Wastes from their farms such as animal dung, poultry droppings, cassava peels and other farm wastes which should have been used to generate biogas for domestic and farm use, are sold off at giveaway prices. Though extension education is capable of promoting the use of these wastes for
renewable energy among these farmers, intervention in this area is very minimal if at all it exists. This therefore necessitated this study on the perceived role of extension education in promoting the use of biogas for sustainable agriculture development.

2.0 Purpose of the Study
The main purpose of this study was to investigate the perceived role of extension education in promoting biomass technology for sustainable agriculture development in Nigeria. Specifically, the study sought to:

1. Determine the perceived role of extension education in promoting the production of farm wastes for renewable energy among farmers in Nsukka Local Government Area of Enugu State;
2. Determine the perceived role of extension education in promoting the production of farm wastes for renewable energy among farmers in Nsukka Local Government Area of Enugu State based on selected demographic variables (gender and status).

Research Questions
1. What are the perceived roles of extension education in promoting the production of farm wastes for renewable energy among farmers in Nsukka Local Government Area of Enugu State?
2. What are the perceived roles of extension education in promoting the production of farm wastes for renewable energy among farmers in Nsukka Local Government Area of Enugu State based on selected demographic variables (gender and status)?

3.0 Methodology
The study adopted the descriptive survey research design. The population for the study consisted of 268 registered members of All Nigeria Farmers Association, Nsukka; and 22 Agriculture extension agents in Nsukka Local Government Area of Enugu State. There was no sampling because the entire population of the study was used, since it was a manageable population. A structured questionnaire designed by the researchers was the instrument used for data collection. Responses to the items in the questionnaire were based on a four-point Likert type rating scale, ranging from Strongly agree (SA) (4 points), to Agree (A) (3 points), Disagree (D) (2 points), and Strongly disagree (SD) (1 points). The instrument was validated by three experts – one from Energy Research Centre, Nsukka, one from the department of Adult Education and Extra Mural Studies and one from Agricultural Extension, University of Nigeria, Nsukka. Analysis of data was carried out using mean and standard deviation. The cut-off point for the weighted mean was 2.50. This was accrued from the four point response options presented to the respondents. As a result, any item that weighed 2.50 and above was considered as accepted, while any item with a mean below 2.50 was considered as unaccepted. These results are presented and analysed using graphical representations and charts plotted in MS Excel spread sheet.
4.0 Results and data analysis

Mean rating of respondents on the perceived roles of extension education in promoting the use of farm wastes for renewable energy

Figure 1: Mean ratings of respondents on the perceived roles of extension education in promoting the use of farm wastes for renewable energy

Figure 1 above showed that respondents accepted that sensitization of farmers on acceptability of use of farm wastes for biogas production, dissemination of information on renewable energy techniques to the farmers and sensitization of farmers on use of farm wastes for biogas production as perceived roles of extension education in promoting the use of farm wastes for renewable energy. Other roles as reported in Figure 1 above include motivation of farmers on issues of renewable energy and provision of energy management advice to farmers.
Figure 2: Mean ratings on the perceived roles of Extension Education in promoting the use of farm wastes for renewable energy based on selected demographic variables.

Figure 2 shows the result of the mean rating of respondents on the perceived roles of extension education in promoting the use of farm wastes for renewable energy based on selected demographic variables of gender and status of respondents. The result showed that there was no deviation between male and female respondents in the perceived roles of extension education in promoting the use of farm wastes for renewable energy.

Results in Figure 2 also showed a slight difference between the perceived roles of extension agents as reported by farmers and the agents. The table showed that provision of facilities for demonstration of biogas energy resources which ranked first for the agents (X = 3.99, SD = 0.552); while it was not accepted by the farmers as one of the perceived roles of extension agents.

5.0 Discussion of Results
Findings showed that respondents accepted sensitization of farmers on acceptability of use of farm wastes for biogas production; dissemination of information on renewable energy techniques to the farmers; sensitization of farmers on use of farm wastes for biogas production, motivation of farmers on issues of renewable energy and provision of energy management advice to the farmers as perceived roles of extension education in promoting the use of farm wastes for renewable energy. This is not surprising as there have been so many collaborations between farmers and extension agents on agricultural practices. This is in line with the findings of [13] who reported the extension officer as a change agent to include a catalyst, process helper, resource linker and solution giver.
Results of the study also indicated that both male and female respondents accepted the same roles of extension education in the promotion of the use of farm wastes for renewable energy. In other words there was no deviation between male and female respondents in the perceived roles as identified in the results. This is also not surprising but expected, because both gender are exposed to the same awareness programmes on agricultural production and practices.

Figure 2 also showed a slight difference reported by farmers and agents on the perceived roles of extension agents. Findings showed that provision of facilities for demonstration of biogas energy resources which ranked first for the agents was not accepted by the farmers as one of the perceived roles of extension agents. This is not significant and could be attributed to the knowledge of what should constitute the job description of the agents. Definitely the agents should be more knowledgeable on this than the farmers. This is in line with findings of [14] who reported no significant difference in the comparison of farmers and agents’ perception of role of agricultural extension.

6.0 References

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