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THE NIGERIAN JOURNAL OF RURAL EXTENSION AND DEVELOPMENT (NJRED)

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Fertiliser Subsidy Administration in Nigeria: Challenges and Prospects

Akin-Olagunju O. Asimiyu* and B. T. Omonona

Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria
*Corresponding author: E-mail: hashimakinolag@gmail.com

Abstract

Fertiliser subsidy is one of the policy instruments that the Nigerian government is using to make fertiliser available and affordable to farmers. However, in spite of the huge resources committed to the programme over the years, the desired results have not been achieved. This paper examines the efforts of the stakeholders and the challenges encountered. The review established that policy inconsistency, lack of political will on the part of implementers of the programme and restricted role of the private sector are the major factors responsible for the near-failure of the programme. The on-going Growth Enhancement Support Scheme (GESS) of the Agricultural Transformation Agenda (ATA) presents some hope in the light of the pilot scheme outcomes. It is thus recommended that government should adopt hands-off approach and allow the private sector to take over the procurement and distribution of fertilisers so that government can face its facilitating roles of infrastructural development, programme supervision and quality control. It should also create the right policy environment for sustainable private sector participation.

Keywords: Fertiliser subsidy, Input voucher, Private sector

INTRODUCTION

Fertilisers are important inputs in agricultural development due to their crucial role in maintaining soil productivity for the attainment of food security. They supply nutrients needed by crops thereby helping to produce more crops with better quality and improve the low fertility of soils which have been over-exploited (FAO, 2000). According to Federal Ministry of Agriculture and Rural Development FMARD (undated), fertiliser generally means any substance containing one or more recognised plant nutrients and is designed for use or claimed to have value in promoting plant growth. Specifically, mineral fertiliser means fertiliser produced by mineral processes or mined and derived from an organic substance or synthetic organic substance. Organic fertiliser means fertiliser derived from non-synthetic organic material, including sewage sludge, animal manures, and plant residues produced through the process of drying, cooking, composting, chopping, grinding, fermenting or other methods and makes a declaration of nutrient value on the label. Organic fertilisers create conducive conditions for the successful use of mineral fertilisers since they improve soil conditions, making it possible to obtain maximum results from the latter, which only provide plant nutrients (Akinyosoye, 2005). This paper however focuses on mineral fertiliser.

Although, fertiliser consumption in Nigeria falls below the recommended quantity by the Food and Agricultural Organization (FAO), Nigeria alone accounted for 23 percent of the entire fertiliser consumption in sub-Saharan Africa in 2008/2009. This compares to 23 percent of total demand from the rest of West Africa, 40 percent attributed to Kenya, Ethiopia, Tanzania, Zambia, and Malawi and 14 percent attributed to all the other countries in the region (Liverpool-Tasie, 2012a). The consequences of population growth: more people to be housed, dressed, and above all, fed; has made it imperative to manage the land available for agricultural production since up to 90 percent of the necessary increase in food production will have to come from fields already under cultivation (FAO, 2000). Land management practices like shifting cultivation, crop rotation and bush-fallowing are gradually fading away (Salimonu, 2008) because of pressure on land for alternative uses. The fragile

nature of tropical environment (IITA, 1993) also calls for improvement so that optimal result can be obtained from continuous cultivation of arable lands. This underscores the essence of fertiliser in Nigerian agriculture.

About 70% of the country's population resides in the rural areas with small-scale farming as their major livelihood enterprise. They represent 95 percent of the total food crop farming units in the country and produce about 90 percent of the total food output (Okuneye and Okuneye, 1988; as cited in Salman, 2012). The small scale farmer bears the burden of feeding the Nigerian population, providing foreign exchange earnings and providing raw materials for agro-industrialisation in textiles, food and beverages (Idachaba, 2000); yet, he has to make do with the barely adequate inputs. Agricultural productivity is often held back by inadequate use of modern inputs with insufficient plant nutrient in the farming system being a particularly constraining factor. Though, inorganic fertiliser is a technology that can be used at all scales of agricultural production to enhance productivity, poor farmers face high prices for fertiliser as well as important financial constraints in purchasing those fertilisers (Benson, Cunguara and Mogues 2012). Procurement of fertiliser has consistently been a bane of production to the farmers owing to non-availability and poor economic access. Governments have always tried to make it available and affordable to farmers through different intervention strategies. Fertiliser subsidies have been one of the major policy instruments used to increase agricultural productivity in Nigeria. Although fertiliser subsidies represent a significant part of the allocations to agriculture, this is still meager when the amount allocated to agriculture relative to other sectors is considered (Mogues *etal*, 2008; as cited in Hiroyuki, Nkonya and Deb 2012).

Thus, the fact that fertiliser subsidy accounts for a chunk of allocations to agriculture and its potential in lifting small scale farmers from doldrums of poverty which will make them have economic access to fertiliser for improved productivity, calls for this review. This paper sets out to examine how far the subsidy programme has served its purpose, the challenges encountered and the way those challenges could be tackled.

Theoretical basis for input subsidies

Farm input subsidies are policy instruments used to achieve specific policy objectives (Idachaba, 2006b) and are based on some theoretical considerations. It is a known fact that innovations provide a platform for increasing agricultural production (Akinyosoye, 2005) and this could be stimulated by putting reasonable price subsidies in place, especially at the farm gate (Idachaba, 2006b). To this, the underlying assumption is that there is an established demand for all the components of the innovations. However, observations in the Nigerian case show that there are some problems in bringing innovations to small-scale farmers. These include the inputs supply chain, which is dominated by government and heavily distorted to the extent that inputs are not easily accessible. Similarly, farmers are usually dissuaded from adopting innovation because of the 'learning process' that they undergo and the cost associated with adjustment to the new situation. These reasons are actually responsible for the perceived conservatism of the farmers; their caution in adopting innovation. Subsidies on the farm inputs, which are forms of innovation, are therefore seen as a way of minimizing these learning and adjustment costs in order to encourage the farmers (Idachaba, 2006b).

Some proponents like Sachs have actually supported call or rationale for government subsidies on fertiliser because low fertiliser use has been seen to be one of the factors explaining lagging agricultural growth in Africa (Morris, Kelly, Kopicki and Byerlee 2007). Subsidies are thus viewed as a way of encouraging fertiliser use for increased agricultural/food production and diversification of income earnings opportunities (Idachaba, 2006b). Furthermore, since traditional farmers do not spend money on the conventional inputs they use, subsidies are needed to encourage them to shift from traditional manual technology to the various forms of improved technologies that rely on modern inputs (Akinyosoye, 2005). Also, input subsidies are considered ways of compensating distortions by transferring some incomes to the rural population in most developing countries since they do not benefit from the regular upward review of minimum wages for workers (Akinyosoye, 2005 and Idachaba, 2006) but rather are victims of inflationary effect of such increments which have negative consequences on farm input cost.

Another argument for input subsidy is that agriculture should be considered as an 'infant industry' especially in developing countries where it employs a vast number of people (60-70%). It should therefore be given all incentives necessary to promote general economic development. Input subsidies also encourage entry of prospective farmers and massive

participation of current farmers in government programmes and projects (Idachaba, 2006b). Moreso, gains from agriculture in a labour surplus economy is more than from urban-based business organisations which enjoy several fiscal relieves. Input subsidies is also seen as a way of restoring equilibrium since farmers face exploitative market structures for their farm outputs as a result of defective rural markets, poor rural infrastructure, poorly developed and unfriendly rural financial markets, direct and indirect taxes which siphon resources out of agriculture (Akinyosoye, 2005).

Although the positive relationship between chemical fertiliser use and agricultural productivity has led to the promotion of fertiliser subsidies, it has been subjected to strong criticisms over the years (Liverpool-Tasie, 2012a). Opinions against subsidy are that the cost implication can be colossal and it creates a class of unintended beneficiaries who will want the subsidy scheme to continue in the face of a glaring irrelevance and waste. The inability of the government to properly monitor the subsidy programme makes the unintended beneficiaries divert the fertilisers meant for farmers (Idachaba, 2006a) thereby creating artificial scarcity. Thus, the real farmers are at the mercy of the unintended beneficiaries since they sell at their own prices which are usually higher than the normal market price. The increase in market prices for successive subsidy programmes is shown in figure 1 below.
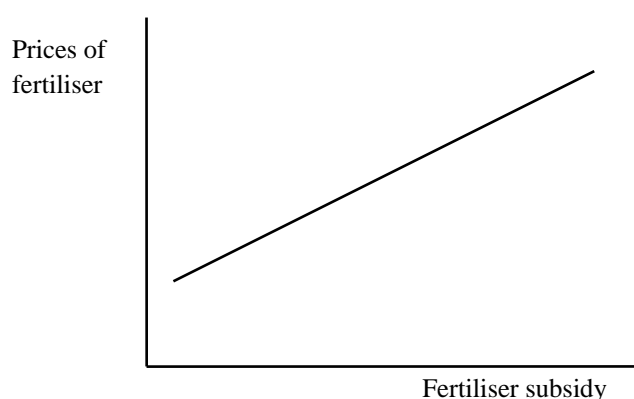

Figure 1: Graphical representation of the effect of subsidies on fertiliser prices

Subsidy programme is also accompanied by the appointment of the select few to import fertilisers thereby creating room for rent-seeking and corruption. Furthermore, fertiliser subsidies tend to limit private sector investment in fertiliser procurement and distribution, create distortions in the budget by crowding out the other more significant/structural needs of agriculture and other developmental projects with the real cost usually exceeding the nominal official subsidy because of the divergence between International Foreign Exchange Market (IFEM) and parallel foreign exchange rates (Idachaba, 2000; 2006a & b). Input subsidies makes the recipient farmers develop a dependency mentality where they come to see subsidies as a right (Akinyosoye, 2005; Idachaba, 2006b). It protects inefficient farmers and encourages resource misallocation and distortion in production patterns (Idachaba, 2006b). It cushions farmers and other beneficiaries from the reality of the market and divert the attention of policy makers from other areas which are likely to have more impact on farming households (Akinyosoye, 2005).

Efforts of government's participation in fertiliser subsidy

Akinyosoye (2005) and Idachaba (2006b) noted that before 1976, the various state governments in the country were responsible for the procurement and distribution of fertilisers. By the end of that year, the federal government had put in place, within the Federal Ministry of Agriculture and Water Resources, a Fertiliser Procurement and Distribution Unit to serve as a central organ for the procurement and distribution of the item in the country. Obasanjo administration initially introduced the fertiliser subsidy in 1976 (Idachaba 2000). Since then, governments at the federal and state levels have had a strong hold on the production, procurement and distribution of fertilisers. As fertiliser use increased, however, inadequacies of the public sector-controlled procurement and distribution system began to manifest in leakages and transit losses, late and non-deliveries of the products to designated depots, artificial scarcity and an unsustainable fertiliser subsidy burden.

Manyong *etal* (2005) and Idachaba (2006b) reported that the federal government subsidised total cost of fertilisers from importation up to when it reaches state warehouses to the tune of 75% while farmers paid the remaining 25% during 1976/77 – 1978/79. But in 1980, the federal government's share was reduced to 50 percent while the states were required to absorb the remaining 25 percent. However, the total percentage subsidy was subsequently reduced to 50 percent. The variation in subsidy rates is presented graphically in Figure 2. Both state and federal governments have also subsidised fertiliser, sometimes at rates as high as 95 percent (Nagy and Edun, 2002; as cited in Banful *etal*, 2010).

According to Akinyosoye (2005), since 1990, over two billion naira is being spent on fertiliser subsidy every year. The value of subsidy at its peak in 1992 was estimated at N6.8 billion (FMARD, 2012). Akinyosoye (2005) further submitted that the overbearing influence of government in the fertiliser supply system, coupled with the overwhelming negative impact of government control on the expected beneficiaries of fertiliser, made it to change its mind about its roles in fertiliser procurement and

distribution in late 1993. This led to a declaration that fertiliser procurement and distribution were to be privatised, which was never implemented. However, government started reforming fertiliser market the following year. By 1996, a fertiliser liberalisation policy was in place to improve on the production, procurement and distribution of fertiliser as well as ensure efficiency in the fertiliser market and allowed the private sector operators to handle procurement and distribution. The fertiliser subsidy policy however died in 1997 when it was denied political support by government (Idachaba, 2006a). Government, in addition, reduced import tariff on fertiliser from 10 percent to 5 percent in 1997 and zero percent in 2000. Value Added Tax (VAT) and excise duty payments were also abolished. Private sector and a number of states assumed greater responsibilities for production, procurement and other marketing activities as a result of the liberalisation. Manyong *etal* (2005) also observed that during deregulation, government disengaged itself from procurement and distribution of fertiliser (and other inputs) while market forces largely determined their market prices. Most input price subsidies were also withdrawn.
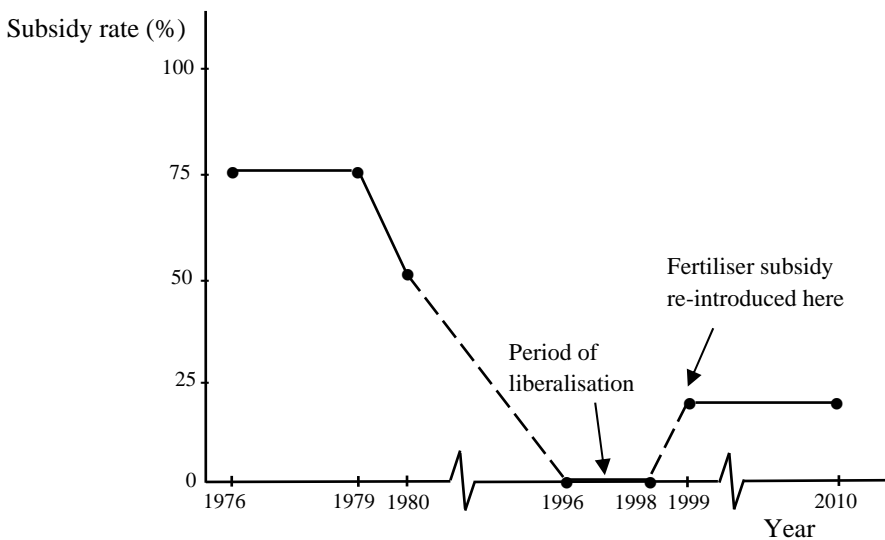
Figure 2: Graph showing successive variations in the subsidy level

NB: The dotted lines indicate (mathematical) discontinuity

Contrary to the intent of the government, liberalisation policy did not yield the expected results in terms of adequate and timely supply of fertiliser to farmers chiefly because of policy inconsistency. During the liberalisation, fertiliser subsidy was removed and private investors entered the market. By 1999, the federal government re-introduced the fertiliser subsidy and forced private suppliers to sell at a loss. By

2000, the federal government withdrew the subsidy again but at the same time, some state governments introduced the subsidy. The ill-prepared actions of government as to whether it would liberalise or not and whether it would remove subsidy or not generated instability in the policy environment, leading to inadequate investments in the establishment of appropriate distribution channels, capacity building and

promotional activities to handle the liberalisation. There was also a weak legal and regulatory framework to support the liberalisation and this caused a large flow of poor quality fertilisers into the market. Poor economic and institutional infrastructure also contributed immensely (Akinyosoye, 2005). Another cause of failure of the liberalisation, as noted by Nagy and Edun (2002) in Banful *etal* (2010), is that after the government's decades-long monopoly, the private fertiliser sector was inexperienced and undeveloped and therefore could not compensate for the federal government's sudden exit from the sector. This confirms the fear expressed by Idachaba (2006a) whether the transition vacuum created with exit of government will be filled appropriately by the private sector firms.

Idachaba (2000) observed that frequent changes were made in the modalities for operating the fertiliser subsidy scheme in the 1980s and 1990s, opining as follows on the changes, especially the re-introduction of the 25 percent fertiliser subsidy (Figure 2) by the Obasanjo administration: it creates harmful agricultural policy instability that sends confusing policy signals to key actors in the agricultural sector; it does not take into account the fact that farmers are more concerned about fertiliser availability at the time and place they need it most than they are about fertiliser subsidy; and gives impression that politics has had an upper hand over sound economic reasoning.

It is noteworthy also that huge amounts are still being allocated for fertiliser subsidy. In 2010, the federal government provided the sum of N22.30 billion as its 25 percent subsidy contribution to the procurement and distribution of 900,000 tonnes of fertiliser to the states and the Federal Capital Territory, valued at N89.31 billion. This represented the highest provision in any single year since the inception of the fertiliser subsidy programme i.e Fertiliser Market Stabilisation Policy (FMSP) in 1999 (CBN, 2010).

Problems encountered and the effects

In spite of the continued application of subsidy, total fertiliser use is far below the potential and economic demand. Presently, fertiliser use in Nigeria estimated at 13 kg/ha in 2009 by the Federal Ministry of Agriculture and Rural Development (just above the average for the African region estimated at 9kg/ha) is far lower than the 200kg/ha recommended by the United Nations Food and Agricultural Organization (FAO) (Jeminiwa, 2011). The

subsidy programme has not been able to achieve the level of fertiliser usage that will stimulate the level of productivity required to catapult Nigeria to its own green revolution as witnessed in Latin America and Asia. Banful and Olayide (2010) noted that the subsidy programmes had absorbed large proportions of the national budget, but the impact of the programmes on agricultural productivity has been mixed at best.

The subsidy programme has not been able to achieve the objectives for which it was instituted because of a myriad of problems. Massive abuse in terms of diversion of benefits to unintended beneficiaries, fiscal burden on the government, rent-seeking activities, wrong estimation of input demand, late arrivals of fertilisers months after due application dates, distribution inefficiencies and political interference are some of the identified problems (Idachaba, 2006a & b). It is quite unfortunate that small scale farmers that are responsible for the food production in the country have to compete with non-farmers before they could have access to fertilisers (Salimonu, 2008). Idachaba (2000) observed that while the small scale farmers were the intended beneficiaries of the fertiliser subsidy programme of the first regime of Obasanjo in 1976, the unintended beneficiaries (the real beneficiaries) turned out to be rent-seeking ministers, commissioners and public bureaucrats, fertiliser merchants and importers, fertiliser transporters, fertiliser middlemen and commission agents, and foreign fertiliser suppliers. In fact, there had been many probes into fertiliser distribution scandals over the years. Also, unrealistic levels of subsidies are usually announced as a statement of good intentions or means of gaining political leverage (Akinyosoye, 2005). In his study on the political economy of agricultural policy implementation in Nigeria, Yekinni (2007) noted that being members of ruling political party, being close relatives of political office holders, being close to influential politicians and being rich and influential makes an individual favoured to benefit from agricultural policies. Government tenders for the targeted subsidised fertilisers were usually late, so were the federal government's payments to fertiliser distributors and the states remittances to the federal government. Another problem concerns over invoicing by fertilisers importers profiting from the arbitrage situation that existed between the official and parallel exchange rate markets (Nagy and Edun, 2002; as cited in Jeminiwa, 2011).

As a result of the problems highlighted above, the subsidy programme was bedeviled with

scarcity and untimely distribution of fertilisers to the farmers. Most of the times, the farmers do not get it when it is needed; and whenever they get it, it is in inappropriate quantities and types (Banful *etal*, 2010; Idachaba, 2006b). Jeminiwa (2011), citing Nagy and Edun (2002), observed that problems with quality, arbitrage, and timeliness of fertiliser distribution have persisted throughout most of the period. In fact, farmers have learnt to buy fertilisers at extra cost in the absence of the subsidised fertilisers (Yekinni, 2007) and emphasis is shifting from need for fertiliser subsidies to timely availability. Some states are even prepared to trade off subsidies with adequate quantity and timely supply of fertilisers to farmers (Idachaba, 2006b).

Voucher-based approach to subsidy programme

In view of the problems encountered in administering fertiliser subsidy through the conventional government-dominated delivery system, the federal and state governments in conjunction with International Centre for Soil Fertility and Agricultural Development (IFDC) instituted a private sector-driven voucher-based approach to making fertiliser available to farmers. Input vouchers represent a flexible market development policy that gives holders the opportunity of purchasing pre-determined quantities and types of inputs from trained dealers who accept the voucher as payments; dealers can then redeem vouchers with the programme organisers (in this case government) with an agreed margin to cover their expenses and agreed level of profit (Gregory, 2006). The voucher programmes enable smallholder farmers to obtain quality agro-inputs in a timely manner using vouchers in lieu of cash. At the same time, the projects focused on building the professionalism of rural agro-dealers and strengthening a country's private sector fertiliser supply and distribution channels (IFDC, 2012).

Liverpool-Tasie (2012a) noted that agricultural input vouchers are increasingly being employed across developing countries to address problems of low agricultural productivity and food security by increasing the timely access to inputs. Minot and Benson (2009) observed that Malawi's voucher programme is the largest and the one most often cited as a smart subsidy success story. Vouchers have been used in Malawi fertiliser programme since 2000. Based on Malawi's success in stimulating maize output, a number of countries, including Kenya (2006), Ghana (2008), and Tanzania (2008) have launched voucher-based fertiliser subsidies. The voucher-based subsidy programme was introduced in some states in Nigeria in 2008 on pilot scale following government's announcement of its gradual withdrawal from direct fertiliser procurement and distribution to allow private sector take over the role (Jeminiwa, 2011). Liverpool-Tasie (2012a) submitted that the use of vouchers to provide federal and state government-subsidised fertiliser was piloted in few sites in two states (Kano and Bauchi) in 2004 and again between 2008 and 2010. However, 2009 was the first time that a voucher program was administered across all states in Nigeria.

A review of the 2009 programme in Kano and Taraba states presented some success stories. In Kano state, it appeared that one benefit of the voucher programme was that it developed links between rural farmers and input suppliers. Furthermore, where private fertiliser markets are weak, results indicated that there could be significant gains from the temporary use of voucher programmes to create links between input suppliers and farmers (Liverpool-Tasie, 2012a). Programme participants in both states received more bags of subsidised fertilisers than non-participants. They also paid significantly lower prices compared to those who purchased directly from the market (Liverpool-Tasie, 2012b). It is worthy of note that the voucher-based programme also presented some challenges. The study in the two states revealed that participating in the voucher programme did not improve the timeliness of fertiliser receipt and did not provide farmers with better quality fertiliser (Liverpool-Tasie *etal*, 2010; Liverpool-Tasie, 2012b)

Growth Enhancement Support Scheme (GESS)

Growth Enhancement Support Scheme is a new policy embarked upon by the government and represents a pragmatic shift within the existing Fertiliser Market Stabilization Programme (FMSP). It puts the resource-constrained farmers at its center through the provision of series of incentives to encourage the critical actors in the fertiliser value chain to work together to improve productivity, household food security and farmers' income. The goals of the scheme include targeting 5 million farmers in each year for 4 years who will receive GESS in their mobile phone directly, totaling 20 million at the end of 4 years; providing support directly to farmers to enable them procure agricultural inputs at affordable prices, at the right time and place; increasing productivity of farmers across the

length and breadth of the country through increased use of fertiliser; and changing the role of government from direct procurement and distribution of fertiliser to a facilitator of procurement, regulator of fertiliser quality and catalyst of active private sector participation in the fertiliser value chain (FMARD, 2012). The target of the federal government for the period between 2011 and 2015 is to expand the number of farmers getting fertilisers from 550,000 farmers to 20 million farmers by 2015 and move away from flat price subsidy to targeted support – Growth Enhancement Support – directly to reach 20 million farmers through private agro-dealers. This is to be achieved by providing incentives to encourage local manufacturing of fertilisers, drawing on the gas industrialisation policy and encourage private sector participation in the distribution system (NPC, 2011).

A pilot of the electronic voucher system based on mobile phone technology (e-wallet) was conducted in Taraba state. The private sector voucher programme reached 94 percent of the farmers (as against 11 percent of farmers under government distribution) and cost 50 percent less to administer. It also encouraged development of a strong private sector network (FMARD, 2012).

CONCLUSION

Many issues have emerged from the paper so far. It is the inability of the government to manage the resources meant for subsidy and untimely release of funds allocated to support the otherwise unrealistic level of subsidy that creates input shortages, the emergence of middlemen and benefits to unintended beneficiaries. Government is still involved in the supply and to worsen the situation, the middlemen and their cohorts are generally the implementers of the programme. Although the government has been giving private sector some opportunities for participation in the fertiliser supply system, this has not been effective because government still maintain tight grip. There had been policy inconsistencies and existence of dual market which has had 'crowding-out' effect on the private sector. Voucher-based subsidy programme has been relatively successful. Timeliness of delivery and quality of fertiliser still left much to be desired since these were still within the prerogative of the government. The pilot programme conducted in Taraba state under the recently-instituted Growth Enhancement Support Scheme (GESS) of the Federal government's Agricultural Transformation Agenda (ATA) presents some

improvements but it is too early to comment on the success or otherwise of the scheme.

From the foregoing, it is apparent that there is need to create right policy environment and maintain efficient, transparent and accountable bureaucratic setting for proper supervision and control. Government should follow up its word with action by implementing declarations on private sector involvement. It should adopt hands-off approach to procurement and distribution and face its facilitating roles of infrastructural development, programme supervision and quality control. There is need for greater involvement of the private sector in the procurement, supply and distribution of fertiliser. Fertiliser prices should be allowed to be determined by the market forces and if there is need for targeted price subsidies especially for those that cannot afford the market prices or those in remote areas where access is difficult, it should be done in a way that it does not hamper the functioning of competitive fertiliser markets. This is a clear exposition from the fertiliser policy document. The position is also supported by the result of the 1976 study conducted for federal government on cocoa pesticides (Idachaba, 2006a). The level of the subsidy should also be cut down in order to accommodate other agricultural programmes, especially those that will impact more positively on rural populace.

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Women and Power Transformation in Rural Households in Saki West Local Government Area of Oyo state

Adekoya A. E., O. E. Adelakun and Pipy O. Fawole
Department of Agricultural Extension and Rural Development
University of Ibadan, Ibadan, Nigeria

Abstract

Rural women contribute significantly to the national economy by their activities in terms of agricultural production, marketing, processing and domestic work. It is ironical that their contribution either have no or minimal part in the decision making power regarding agricultural development and household activities. The study presents the past and current trends in household power sharing in Saki West Local Government Area of Oyo state, Nigeria. Data were collected using structured questionnaires from 140 respondents. Results show that majority of the respondents (69.4%) were within the ages of 35-42years, 45% were illiterates, 51.5% were 15-20years in marriage, while 90.8% had 3-8 household size. The current trend is that women are making decisions on their land, children, when to have sex, and type of family planning to use. Women will be able to have more power with her level of education (p=0.035). Number of wives (p=0.123) and children (p= 0.316) had no effect on power transformation. Changes are occurring in women's economics status since they are in control of their finances and these are impacting their decision making power within household. Women should be empowered educationally and be more enlightened on the need for reduction in child bearing in order to reduce poverty rate.

Keywords: Power transformation, Decision making, Rural women, Rural household

INTRODUCTION

The transformation of gender relations since the beginning of the 20th century is one of the most rapid profound social changes in human history. For more than 7,000 years of human history since settled agricultural early states emerged, male domination has characterized the gender relations in these societies and their successors (Solomon and Adekoya, 2006). Even at the beginning of the 20th century, men and women were generally viewed as occupying sharply different roles in society. A woman's place was in the home as wife and mother; the man's place was in the public sphere. Men had legal powers over the lives of their wives and children and while wife beating was never strictly legal in the United State, its practical legal status was ambiguous and perpetrators of domestic violence rarely punished. In the family, gender roles restrict male participation in domestic chores and child-rearing while limiting women participation in decision making (Siyanbola and Adetowubo, 2004). While both men and women are income earners and agricultural producers, women also process and prepare food, and use their income for their children's benefit (Thomas, 1997). Women also provide the majority of care for their families, take their children to health services, and ensure a healthy environment – the very components of good nutrition (Levin et al,

1999). Yet women make these critical contributions with limited access to necessary resources, to decisions on allocation and use of those resources, and to the derived benefits (Johnson-Welch, 1999).

The gender gap that exists between men and women in rural household is an indicator that has negative impact on the overall development especially as it influences decision making and consequently, activities that may be undertaken on several issues. Women's low decision making power is more pronounced at rural household level especially in the developing countries. Men make decisions like type of house to build, number of children to have and when to have them, education of the children, reproductive health, finance, type of food to eat at home, even when men are talking women must keep quiet and women are not allowed to plant permanent crop. Gender based inequalities deprive women of their basic rights.

In Nigeria, local customs, traditions and tribal laws restriction often limit women to benefit from production initiative like financial incentives, land accessibility and credit, even though they contribute significantly to the national economy by their activities in terms of agricultural production, marketing, processing and domestic work.

Due to the roles of women towards development, promotion of gender equality is now globally accepted as a development strategy for reducing poverty among women and men, improving health, living standard and enhancing efficiency of public investment. Similarly the trite expression that when you educate a woman, you educate a nation has engendered the special attention being given to the women folk across the globe today (Simeh, 2008). Likewise Overseas Development Authority (1994) reported that supporting stronger networks of women will contribute to economic growth, improves child survival and is a helpful to overall family health. The attainment of gender equality is not only seen as an end itself and human right issues, but as prerequisite for the achievement of sustainable development (National Gender Policy, 2006).

With the adoption of the Millennium Development Goals by the United Nations in year 2000 more interest has been generated and a better attention paid to the pursuit of gender sensitive policies at both global and national levels. Specifically, the third goal, which is aimed at achieving gender equality and women empowerment, is both of intrinsic value and at the same time at the heart of the attainment of all the other goals (Kelly, 2013).

It is in line with this that the study assessed the role of women in the exercise of power in making strategic household decisions and access to productive resources in the past (before the adoption of MDGs) and present (after the adoption of MDGs) in rural communities of Saki West Local Government Area of Oyo State, Nigeria.

METHODOLOGY

The study was carried out in Saki West Local Government Area of Oyo State. Multi stage sampling technique was used in selecting respondents. The first stage involved the purposive selection of seven wards that are noted as rural areas out of eleven wards that made up Saki West LG. The following wards were considered as rural wards; {Igbooro}, {Eko kan}, {Ogidigbo}, {Oke-sebe}, {Okere}, {Sangota}, {Sepeteri}. Three villages were randomly selected from each ward to make a total of 21 villages. Systematic sampling was used to select 20 households from the three villages to give a total of 140 respondents. The target audience was women in rural households in Saki West LGA of Oyo State. Respondents were asked to indicate with yes or no their past and current experiences on decision making in their households. Their

level of satisfaction on decision making in the past and current trend was also determined. Data were analysed using descriptive and inferential statistics.

RESULTS AND DISCUSSION
Personal characteristics of the respondents

Table 1shows that majority of the respondents were Muslims (45.7%), about 38.6.0% were Christians while 15.7% while traditional worshipers. It further reveals that 45% of the respondents had no formal education while 35.7% had primary education. This implies that there is need to introduce adult education for rural women in order to improve their level of education, because high level of illiteracy can be traced to high level of poverty and inability to make decision among rural women in Nigeria. Enete *et.al* (2002) reported that educated women may be more aware of their rights and responsibilities in the household and may be more assertive about them than uneducated ones. . Majority of the women (51.5%) had spent 15 to 20 years in their husband's house while 24.3% had spent 8 to 14years. Duration of marital union determines the depth of experience and access to decision making in the household. It is also evident in the table that majority of the respondents (51.5%) had 2 to 3 wives in their households which is polygamous household while 24.3% of the respondents were the only wife in their households. The polygamous households have effect on decision making power of individual wife because the most loved wife takes decision that concerns the household. As most rural households in Saki practise polygamy, the respondents have different positions in their households. Also majority of the respondents were first wife (62.1%) while 21.4% of the respondents were second wife. These positions could affect their access to decision making and productive resource in their household. Majority of the respondents had 3-8 children (90.8%) while 4.2% of the respondents had 9-10 children. This is one of the factors facilitating poverty in rural households because when there is little resources and too many children definitely the available resource will not satisfy everyone and this could lead to chronic poverty. It is also observed that majority of the respondents (72.1%) took farming as their primary occupation, while 15.7% engaged in artisanship and about 10.0% engaged in trading.

Table 1: Distribution of respondents based on personal characteristicsn = 140

Characteristics	Freq	Percentage
Religion		
Christianity	54	38.6
Muslim	64	45.7
Traditional	21	15.7
Education		
No formal education	63	45.0
Primary education	50	35.7
Secondary education	21	15.0
Tertiary education	3	2.1
No response	3	2.1
Length of marriage		
8-14	34	24.3
15-20	70	51.5
21-26	20	14.2
Above 27	16	11.3
Number of wives		
1	34	24.3
2-3	72	51.5
4-5	27	19.3
6-7	6	4.3
No response	1	0.7
Position of wives		
First	87	62.1
Second	30	21.4
Third	15	10.7
Fourth	3	2.1
Fifth	4	2.9
Sixth	1	0.7
Number of children		
1-2	4	2.8
3-4	36	25.7
5-6	54	38.6
7-8	37	26.5
9-10	6	4.3
No response	3	2.1
Primary occupation		
Farming	101	72.1
Trading	14	10.0
Artisan	22	15.7
No response	3	2.1

Past and current trends on power transformation

Table 2a and b compares the past and current trends of decision making powers of rural women in households in Saki West Local Government. Majority of the respondents indicated that decisions on control of family land (82.9%), political party to belong (75.0%), when to visit in-law (66.4%) and finance (47.1%) were made by men in the past while in the current trend as suggested by majority of the respondents, decision on finance (55%) was controlled by the wife. However, decision making on number of children to have (70.0%), when to have sex (59.3%) and when to have children (58.6%) was

agreed on by both man and wife. The study reveals that there is a significant change in the past and current trend as most decisions were made by men in the past while the current trend shows that most decisions were taken by both husband and wife. Past studies have demonstrated that when women's power is increased, they use it to direct household resources toward improving their caring practices (Thomas, 1997; Kishor, 2000; Smith et al, 2003; Smith and Byron, 2005). This implies that there is likelihood that women's participation in household decision-making increase the family well being, self-sufficiency and enhance their productivity.

Perception of respondents to power transformation

Table 3 presents data on perception of respondents to power transformation. Result showsthat majority of the respondents (63.6%) were satisfied with the control of land, about 70.0% were satisfied with the control of finance and 90.0% were satisfied with the type of family planning they are using. According to current trends which indicate that men are still in charge of land control, women are in charge of their finance, but they both take decisions on type of family planning to adopt. Most women said they were satisfied because husband is the head of family. They depend on the portion of land given to them in their households.

A large proportion of the respondents (65.7%) were satisfied with decision on where to treat children, 75.0% were satisfied with decision on where to treat wife, also majority of the respondents (78.6%) were satisfied with decision on when to have sex. Majority of the respondents (70.7%) were satisfied with decision on number of children to have, 87.9% were satisfied with decision on when to have children, 86.4% were satisfied with decision on children school fees and 78.6% were satisfied with decision on children school. The current trends indicate that they both take decisions on the above and they were satisfied because they can not do it alone without their husband's idea.

Majority of the respondents (62.9%) were satisfied with decision on political party to belong, 62.1% were satisfied with decision on who to vote for, 90.0% were satisfied with decision on type of house to build and 78.6% were satisfied with decision on payment of house rent. The current trend reveals that it is only husband that determine political party to belong, who to vote for but they both determine type of house to build and payment of house rent.

Majority of the respondents (79.3%) were satisfied with decision on type of crop to plant, 75.7% were satisfied with decision on type of food to eat in the house, also 65.7% were satisfied with decision on when to visit in-law or relatives.

About 55.7% were satisfied with decision on permission to plant permanent crops, 79.3% were satisfied with type of clothes to wear. Also, 75.0% were satisfied with decision on type of friends to associate with.

Table 2a: Distribution of past trends on power transformation

Decisions	Husband		Wife		Both	
	F	%	F	%	F	%
Controls of family land	116	82.9	0	0	24	17.1
Finance	66	47.1	62	44.3	12	8.6
Type of family planning	80	57.1	15	10.7	45	32.1
Where to treat children	70	50.0	12	8.6	58	41.4
Where to treat your self	86	61.4	18	12.9	36	25.7
Number of children to have	47	33.6	4	2.9	88	62.9
When to have sex	60	42.9	8	5.7	71	50.7
When to have children	41	29.3	15	10.7	83	59.3
Children school fees	88	62.9	5	3.6	47	33.6
School for children	85	60.7	7	5.0	48	34.3
Political party to belong	105	75.0	10	7.1	25	17.9
Who to vote for	98	70.0	10	7.1	32	22.9
Type of house to build	77	55.0	4	2.9	59	31.4
Payment of house rent	87	62.1	3	2.1	44	31.4
Type of crop to plant	81	57.9	8	5.7	49	35.0
Type of food to eat	76	54.3	17	12.1	45	32.1
Visit in-law or relatives	93	66.4	16	11.4	30	21.4
Planting of permanent crops	112	80.0	2	1.4	26	18.6
Type of clothes to wear	67	47.9	28	20.0	45	32.1
Type of friends to associate with	83	59.3	21	15.0	36	25.7

Table 2b: Distribution of current trends on power transformation

Decisions	Husband		Wife		Both	
	F	%	F	%	F	%
Controls of family land	101	72.1	7	5.0	32	22.9
Controls of finance	47	33.6	77	55.0	16	11.4
Type of family planning	29	20.7	48	34.3	63	45.0
Where to treat children	50	35.7	24	17.1	65	46.4
Where to treat your self	49	35.0	32	22.9	54	38.6
Number of children to have	30	21.4	11	7.9	98	70.0
When to have sex	47	33.6	10	7.1	83	59.3
When to have children	22	15.7	35	25.0	82	58.6
Children school fees	58	41.4	16	11.4	65	46.4
School for children	52	37.1	10	7.1	75	53.6
Political party to belong	79	56.4	14	10.0	43	30.7
Who to vote for	75	53.6	19	13.6	42	30.0
Type of house to build	55	39.3	8	5.7	77	55.0
Payment of house rent	59	42.1	8	5.7	67	47.9
Type of crop to plant	40	28.6	44	31.4	55	39.3
Type of food to eat	36	25.7	42	30.0	57	40.7
Visit in-law or relatives	56	40.0	35	25.0	46	32.9
Planting of permanent crops	97	69.3	13	9.3	30	21.4
Type of clothes to wear	37	26.4	58	41.4	45	32.1
Type of friends to associate with	50	35.7	51	36.4	39	27.9

Table 3: Perception of respondents to power transformation

Decisions	Satisfied		Undecided		Unsatisfied	
	F	%	F	%	F	%
Controls of family land	89	63.6	1	0.7	50	35.7
Controls of finance	96	70.0	3	2.1	39	27.9
Type of family planning	126	90.0	5	3.5	9	6.4
Where to treat children	92	65.7	9	6.4	39	27.9
Where to treat your self	105	75.0	17	12.1	18	12.9
Number of children to have	99	70.7	21	15.0	20	14.0
When to have sex	110	78.6	4	2.9	26	18.6
When to have children	123	87.9	1	0.7	16	11.4
Children school fees	121	86.4	5	3.6	14	10.0
School for children	110	78.6	2	1.4	28	20.0
Political party to belong	88	62.9	12	8.6	40	28.8
Who to vote for	87	62.1	15	10.7	38	27.1
Type of house to build	126	90.0	4	2.9	10	7.1
Payment of house rent	110	78.6	4	2.9	24	17.1
Type of crop to plant	111	79.3	6	4.3	21	15.0
Type of food to eat	108	75.7	10	7.1	24	17.1
When to visit in-law or relatives	92	65.7	7	5.0	41	29.3
Planting of permanent crops	78	55.7	6	4.3	55	39.3
Type of clothes to wear	111	79.3	4	2.9	25	17.9
Type of friends to associate with	105	75.0	11	7.9	24	17.1

Test of hypotheses

Relationship between the personal characteristics of the women and power transformation

From table 4a, the chi-square analysis indicates that in the past trend education and religion do not have influence on power transformation while there is significant relationship between education and power transformation in the current trend as revealed in table 4b. This implies that education has effect on decision making power because the more educated a woman is in her household, the more likely she makes reasonable decision and contribution to the home. Education increases the upward socio-economic mobility of women; creates an opportunity for them to work outside the home; and enhances husband-wife communication.

Table 4a: Past Index Category

Variables	χ^2	Df	p-value	Remark	Decision
Religion	4.079	4	0.317	NS	Accept
Education	10.772	6	0.070	NS	Accept

Table 4b: Present Index Category

Variables	χ^2	Df	p-value	Remark	Decision
Religion	6.516	4	0.156	NS	Accept
Education	11.494	6	0.035	S	Reject

Pearson analysis on personal characteristics and power transformation

The result of PPMC analysis of personal characteristics of rural women and power transformation in table 6a showed thatthere is significant relationship between number of wives, number of children and power transformation in the past, this implies that number of wives, position of wife and number of children were very important and it determines the decision making power of the woman. The study agrees with the findings of Adekoya (2006) in which number of wives in the household contributes significantly to her participation in decisions on the number of children to have. The result in table 6b showed that there is no significant relationship between number of wives and power transformation in the current trend, so also the number of children and power transformation. This implies that the number of wives and number of children do not have effect on power transformation.

Table 6a: Past Power Index

Variable	r-value	p-value	Remark	Decision
Wives	-0.257	0.002	S	Rejected
Children	-0.154	0.031	S	Rejected

Table 6b: Current power index

Variable	r-value	p-value	Remark	Decision
Wives	0.131	0.123	Ns	Accepted
Children	0.086	0.316	Ns	Accepted

CONCLUSION AND RECOMMENDATION

This study compared the past and current trends of decision making power of women in rural households. It establishes that there are changes between the past and current decision making power of women. The current trends revealed that women are satisfied with the decision making power in their households indicating that decision making power of women has increased. It is clear that changes are occurring in women's economics status since they are in control of their finances and these are impacting their decision making power within household. The intra-household relationships are being reshaped and redefined. Nevertheless, men are still in control of some decisions and they are the heads of households and major decision makers.

The following recommendations are made from the findings of the study.

- The adult literacy class should be taken more serious in the rural area especially among the rural women because the level of education of a woman will determine the level her decision making power in her household.

- There should be improvement in women's access to basic economic resources such as land and they should be allow to plant permanent crops especially cash crops.

- Empowering rural women to have more access in decision making that relate to politics, also, women should be allowed to vote for any aspirant of their choices. Husbands should not dictate political party to belong and who to vote for.

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Rural Households' Willingness to Pay for Improved Healthcare Services in Oyo State, Nigeria: A Choice Experiment Approach

Oni O. A., Ojobe O. E. and Fashogbon A. E.

[1]Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria

Abstract

Limited health budget is a major challenge confronting provision of improved health care services in Nigeria and some other developing countries. This requires alternative innovative ways of raising fund to provide health care services in rural communities.. In this regard a user fee approach is proposed for Ido local government area of Oyo state, Nigeria. Multistage sampling technique was adopted to select 150 rural households from where one person per household was selected to constitute 150 respondents for the study. Data were collected through administration of structured questionnaire. This work further employed attribute-based choice valuation technique using six improved health care attributes; price, ambulance, medical doctor, night duty, drug and ownership. Result from the analysis using conditional logit revealed that individual members of the community were willing to pay for improved health care services per consultation. The mean Willingness to Pay (WTP) was estimated at ₦808.86. The paper suggests that adoption of users' fee is a good policy option for primary healthcare service in the rural communities.

Keywords: Willingness to pay, Choice experiment, Improved health care, users' fee

INTRODUCTION AND PROBLEM STATEMENT

Health is reviewed in Grossman's model as a durable capital stock that yields an output of health time. By investing in health, a household expects to increase the stock of available healthy time, which will increase the amount of time available for earning income or for producing consumption goods (John, 2009). Healthcare is a vital service that touches the lives of millions of people at significant and vulnerable times; birth, illness, and death (Federal Trade Commission, 2004). Every government in Nigeria holds the view that a healthy population is essential for rapid socio-economic development of the country hence healthcare is on the concurrent list in the Nigerian constitution and its allocation comes next to education and defence in the national budget (National Population Commission, 2003). The administrative framework of the health sector is from the cabinet to the federal ministry of health; down to the state ministry, then to the local governments and the political wards. The state of Health takes a great place among the Well-being indicators, in the development process of every country. Health can be appreciated not only as indicator of economic development, but also as a form of human Capital. Health is also an indicator of human poverty (Joachim *et al*, 2004). Primary healthcare delivery refers to provision of such preventive services as immunization, maternal and child healthcare, and control of locally endemic diseases including malaria, tuberculosis, polio, and prevention of HIV/AIDS infection. The focus is on the local government level because Nigeria's National Health Policy assigns responsibility for primary healthcare delivery to local governments with coordination and assistance of state governments (FMOH 2005).

Reviewed Literatures on willingness to pay for health care services in sub-Sahara African and Nigeria in particular shows the attitude of individuals to improvement in healthcare services. In spite of a well-structured health system, development of the Primary Health Care (PHC) has not improved the health experience of the population especially those in the rural area: The health sector's contribution to the national development remains a serious issue (Omoruan*et al* 2009). In many developing countries like Nigeria limited health budgets are a serious problem. (Ali *et al* 2004). While the World Bank in the 1990s deemphasised the use of the user fees system and promote the use of risk-sharing arrangements for health care financing, Nigeria

still lacks these structures and the rural poor do not have access to formal insurance schemes (Ataguba 2008). Funding has continued to be inadequate and has failed to meet the World Health Organisation (WHO), Abuja Declaration of 2001 and Macroeconomic Commission on Health targets. Out of pocket expenditure still accounts for 70% of health care financing in Nigeria, thus making healthcare services economically inaccessible especially to the populations in greatest need. The re-launched NHIS has the potential of increasing economic access to healthcare services but coverage still remains at less than 10% (NHC 2009). According to Khan (2001), a majority of rural households (more than 90%) in many developing countries do not only face limited access to health care but also endure poor quality water and unsafe sanitation. Therefore it is not surprising that compared to urban counterparts; rural households tend to suffer disproportionately from higher levels of ill health, mortality, malnutrition and inadequate health which are one of the factors perpetuating poverty (Gwatkin et al, 2005).

In response to concerns that user fees reduce access to health services among the poor, governments have implemented waiver and exemption mechanisms. However the mechanisms do not address informal fees and other cost incurred by clients and little information is available on the effectiveness of the mechanisms in increasing access to healthcare services (Suneeta et al, 2005). The belief by Nigerians that health is an essential commodity which must be provided free of cost by the government, making health services to be politicized has contributed to the poor state of the health system in the country (Campbell 2008).

Primary healthcare, which is the bedrock of Nigeria's health policy and identified as central to the healthcare delivery system remains prostrate. The level of government saddled with the responsibility of primary health care services provision (LGA) is the level least committed and with the least capacity (NHC 2009). How then can there be improvement in the delivery of service by primary health care based on willingness to pay for improved health care?

The need for this study is premised on the ground that it examined the areas where the delivery of services by primary health care is below expectation, and provide information on how much they are willing to pay for the desired services. Choice Experiment (CE) adopted in this study is increasingly being used and preferred in modelling of choice and appears to have some advantages over the Contingent Valuation (CV) method as it may minimize some sources of bias and provides the researcher with an opportunity to examine the individual impact of the characteristics that make up the good or service in question, hence increasing the amount of information obtained by the researcher. CE also has an advantage with respect to validation of economic theory not only the standard neoclassical economic theory but also others such as principal-agent theory and transaction cost theory (Trine, 2005). In contradistinction to the CV approach, the status quo and the hypothetical alternative differ with regard to several or all attributes rather than price only (Zweifel et al, 2009).

Arising from the foregoing, this study sought to achieve the following objectives: first, to identify and describe the kind of dissatisfaction experience from the existing healthcare services; and to estimate marginal mean willingness to pay for improved health care services.

Theoretical framework

The choice experiment method has its theoretical grounding in Lancaster's model of consumer choice (Lancaster, 1966), and its econometric basis in random utility theory (Luce, 1959; McFadden, 1974). Lancaster proposed that consumers derive satisfaction not from goods themselves but from the attributes they provide. To illustrate the basic model behind the choice experiment presented here, consider a local respondent's choice for improve health care service and assume that utility depends on choices made from a set *C*, i.e., a choice set, which includes all the possible improved health care service alternatives. The respondent is assumed to have a utility function of the form:

$$U_{ij} = V(Z_{ij}) + e(Z_{ij}) \ .... (1)$$

where for any respondent *i*, a given level of utility will be associated with any improve health care service alternative *j*. Utility derived from any of the improve health care service alternatives depends on its attributes (Z), such as the quantity and quality of improve health care provided. The random utility theory (RUT) is the theoretical basis for integrating behaviour with economic valuation in the choice experiment method. According to RUT, the utility of a choice is comprised of a deterministic component (*V*) and an error component (*e*), which is independent of the deterministic part and follows a predetermined distribution. This error component implies that predictions cannot be made with certainty.

Choices made between alternatives will be a function of the probability that the utility associated with a particular improve health care service option *j* is higher than those for other alternatives.

MATERIAL AND METHODS

The study was conducted in Ido local government of Oyo state. The study area is located in between the humid and sub-humid tropical climate. The mean annual rainfall ranges from 1,117.1 to 1,693.3mm. The rainfall pattern has a characteristic bimodal distribution with peaks usually in June or July and September and the period of low precipitation in August with four months of dry season (December–March). The annual temperature ranges from an average minimum of 24.6°C to average maximum of 31.5°C. The mean monthly relative humidity reaches a minimum of 52 percent in February and a maximum of 83 percent in August (IITA, 1993; FRIN, 1999; Erakhrumen *et al* 2010). It has an area 986km^2 and a population of 103,261 going by the 2006 census. Ido local government is made up of 10 wards, having about 15 primary health care centres across the wards. A multistage random sampling technique was adopted in this study. The first stage involved selecting randomly three wards out of the ten wards in the study area. The second stage was random selection of 150 households proportionate to size of the chosen three wards in the LGA. In the last stage, one person was selected per household for the interview through the use of interview schedule.

Experimental design

The data set used for this Choice Experiment (CE) comprises a representative sample of 150 individuals chosen randomly proportionate to size from Akinware, Odetola and Ido wards as representative sample of Ido local government area. The CE made use of factorial design. We made use of the orthogonal design to generate choice profiles. In the choice experiment, each respondent faced six choice sets. In each choice set, respondents were asked to choose between three alternatives. To reduce the hypothetical character of the choice experiment, the third alternative indicated the current situation in the study area. The third option of choosing none of the hypothetical alternative commonly called

status quo, shows there would be no changes in the health care service attributes in the area of study. Alternatives 1 and 2 were characterized by a change in the charges and health care service attributes in the study area with respect to the status quo alternatives. Based on the observed need for improvement in the primary health care services in the study area a monetary attribute, availability of ambulance, regular supply of drug, availability of medical personnel for night duty, presence of medical doctor, and ownership of the healthcare centre were chosen.

Data analysis

Conditional Logit was used to estimate willingness to pay for improved health care services and the mean willingness to pay for the attributes. The model assumes homogenous preferences for consumers and allows for a simple way to model a likelihood function that tells probability of individual n choosing alternatives i in choice set B of a choice experiment. The conditional logit model can be computed with maximum likelihood estimation and it yields parameter estimates that tell the consumers' relative preferences for the attributes in a choice set. In order to derive an exact formulation for the choice probability (1) based on the random utility theory, some further assumptions need to be made about the nature of the error term of the consumer's utility function. It is presumed to be independently and identically distributed (i.i.d.), and it is assumed to follow a double exponential extreme value distribution having the form F(e$_{ij}$)= exp(-exp(-e$_{ij}$)) (Bateman *et al*.2002, Loureiro and Umberger 2007, Train 2009). This type of error term characterisation is a common assumption in the context of choice experiments (Bateman *et al*. 2002, Holmes and Adamawitz, 2003). The extreme value distribution differs from the normal distribution in mathematical properties, but empirically its difference from a normal distribution is usually trivial (Train 2009). From this, however, it follows that the difference in the error terms function (2) has a logistic distribution (Loureiro and Umberger 2007). This allows for a simple and analytically practical form for the likelihood function that models the probability of an individual choosing alternative i in choice set B:

$$P\left(V_{ni} > V_{nj}\right) = \frac{\exp\left[\mu\left(\beta^{ASC_i} + \beta X_{ni}\right)\right]}{\sum_{j\varepsilon B}^{j} \exp\left[\mu\left(\beta^{ASC_j} + \beta X_{nj}\right)\right]} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

where μ is a scale factor that can be normalised to one and J is the total number of alternatives.

β is the vector of the coefficients for the attributes,

X_i is the vector of the exogenous levels of the attributes and the

$β^{ASC}$ are the vectors of the coefficients for the alternatives-specific constants (ASC) (Hu *et al*. 2004, Jaffry*et al*. 2004, Vermunt and Magidson 2005).

The alternative-specific constant are included in the model in order to consider the utility associated with the no-choice alternatives: they indicate the utility derived from the three alternatives so that there is a constant for each

The baseline model:

$V_{ni} = ASC + β_1Price_{ni} + β_2Ambulance_{ni} + β_3Medical\_doctor_{ni} + β_4Nightduty_{ni} + β_5Drug_{ni} + β_6Ownershipni$

Choice Model with socio-economic factors:

$V_{ni} = ASC + α_1Age_i* + α_2Sex_i* + α_3Eduyr_i* + α_4Income_i* + α_5Farming_i* + β_1Price_{ni} + β_2Ambulance_{ni} + β_3Medical\text{-}doctor_{ni} + β_4Night\text{-}duty_{ni} + β_5Drug_{ni} + β_6Ownership_{ni}$

Note: * on the socio economic characteristics means they've been interacted with ASC.

Where i = 0, 1, 2.......150; and n= 1, 2, 3

Where the variables are defined as:

Vni = Utility of the individual (0=non-choice option,1=choice option)

ASC= Alternate specific constant (1= if options 1 or 2 is chosen; 0, otherwise)

Price = Charges for healthcare services per consultation (at prices ₦300, ₦500 and ₦700 for improved options, otherwise =₦0 for the status quo.

Ambulance = Availability of ambulance (No=0, Yes=1)

Medical Doctor= Availability of medical doctor (None=0, twice a week=2, thrice a week=3, all through the week=7)

option (Adamowicz*et al*, 1998, Mtimet and Albisu 2006). In general, the ASCs are used to capture the effect of factors that are left outside the model but have a systematic impact on the utility (Adamowicz*et al*, 1998, Kasenius 2010).

In the Choice model (CM) analysis, two models were estimated. The first model considered the base line model option while the second model considered the baseline together with the selected socio-economic variable (Adamowicz and Bennett 1994). It is the role of the alternative specific constant (ASC) to take up any variation in choices that cannot be explained by either the attributes or the socio-economic variables.

Night Duties= Provision of personnel for night shift (No=0, Yes=1)

Drug= Presence of drug in the centres (irregular=0, regular=1)

Ownership= Management of the health care centre (Public=0, Private=1)

Age = age of respondent in years

Sex = gender (1=male, 0=female)

Eduyr = years spent in formal education

Income = monthly income of individual respondents in Naira

Farming = dummy variable for occupation of respondents (Farming=1 if occupation is farming, Farming=0 if otherwise).

The parameter estimates from the basic model are used to calculate the mean marginal willingness to pay given as:

$$\text{Mean WTP} = \frac{-β_{attribute}}{β_{price}} \text{---------- (3)}$$

RESULTS AND DISCUSSION
Socioeconomic description of respondents

Socioeconomic characteristics of respondents such as: sex, age, educational status, occupation and income of respondents in the study area are shown in Table 1. The result reveals that 51.3percent of the sampled respondents were males while 48.7percent were females. This result shows that majority of the respondents were within the age bracket 15-30 years. However, the mean age of the sample was 42 years with youngest and oldest respondents observed at 18 and 78 years respectively. About one-third (63.3 percent) of the sampled respondents in the rural

community didn't have minimum universal education level.

Furthermore, the result on Table 1, shows that majority of the sampled respondents were farmers which characterised rural communities in Nigeria. On the average, the study reveals that the rural community's household adult members earned about ₦17,428 in a month.

Dissatisfaction experiences from the present health care services

The results of responses on assessment of present primary health care facilities in the study area are profiled in Table 2. The results on

dissatisfaction experience reveals that 71.3 percent of the respondents reported they were not satisfied with the present state of irregular supply of drugs and 44.0 percent of the respondents indicated that they were not satisfied with irregular availability of medical personnel to attend to patients at their community primary health care centres. Furthermore, residents in the study area embrace the proposed improvement in health care services as a need at hand as 88.7 percent of the respondents indicated their choice for improved health care service. The implication of this result is that majority of the individual seek for improved health care service in the study area.

Table 1: Socioeconomic characteristic of respondents (n=150)

Variables	Frequency	Percentage	Mean	Standard deviation
Sex : Male	77	51.3		
Female	73	48.7		
Age : 15-30	53	35.3	41.72	16.19
31-45	44	29.3		
46-60	28	18.7		
61-75	22	14.7		
76-100	3	2.0		
Educational Status				
No formal Education	56	37.3		
Primary Education	39	26.0		
Secondary/Technical Education	31	20.7		
Tertiary Education	24	16.0		
Occupation				
Farming	72	49.3		
Trade	42	28.0		
Civil servant	7	4.7		
Student	7	4.7		
Artisan	20	13.3		
Income : ≤5000	33	22.0	17428	13673.04
5001-25000	88	58.7		
25001-45000	22	14.7		
45001-65000	5	3.3		
65001-85000	2	1.3		

Table 2: Level of dissatisfaction experience in the community

Response	Dissatisfied		Satisfied	
	Frequency	Percentage	Frequency	Percentage
Drug Supply	107	71.3	43	28.7
Medical Personnel Availability	66	44.0	84	56.0
Desire for Improved Health care services	17	11.3	133	88.7

Willingness to pay for improved health care services

The result of willingness to pay and choice of improved attributes of primary healthcare centres is presented in Table 3. The diagnostic statistics of the conditional logit regression model shows that the model is fit and having log likelihood value of -385.1449, LR test significant at 1% and pseudo R^2 of 0.77, meaning that 77 percent of the variations in the choice made for improved health care services was explained by the stated attributes. The basic model shows that price is highly significant and coefficient being negative is as expected since higher price reduces the utility derived by an individual. Attributes like ambulance, drug and ownership were significant with their coefficient being positive in agreement with a priory expectation since this will increase the respondents utility derived. Other attributes such as medical doctor and night duty were significant but with negative coefficient showing that there is lower willingness to choose

availability of medical doctor and availability of personnel for night duty. This is expected since this offer come at a higher cost.

Table 3: Result of conditional Logit model for basic and extended choice model

Variables	Basic model		Extended model	
	Coefficient	Standard error	Coefficient	Standard error
ASC	7.8737***	0.6625	7.4426***	0.8137
Price	-0.0106***	0.0013	-0.0105***	0.0014
Ambulance	8.3448***	0.4086	8.3389***	0.4098
Medical doctor	-0.2381***	0.0881	-0.2406***	0.0885
Night duty	-0.5317**	0.2663	-0.5287**	0.2673
Drug	0.4206*	0.2476	0.4209*	0.2478
Ownership	0.5782**	0.2383	0.5797**	0.2388
Age*			0.0073	0.0079
Sex*			0.0443	0.2199
Eduyr*			0.0144	0.0249
Income*			-0.0008	0.0082
Farming*			0.0114	0.2487
Number of obs.	2700		2700	
Pseudo R²	0.7733		0.7736	
Log likelihood	-385.1449		-384.6341	
Prob>chi²	0.0000		0.0000	

Note (*), (**), (***) denote significance at 10, 5 and 1 percent levels respectively.   (*) in front of the socio economic variables means it's been interacted with ASC.

Also the result shows the interactions between the socioeconomic variables and the ASC in the extended model. The interactions were found not to be significant in explaining the respondents' willingness to pay. This means that the socio economic variables do not have a significant impact on the respondents' choice of improved healthcare services and this justifies the choice of basic model above the extended model in this work.

Table 4 shows the estimated Mean Willingness To Pay (MWTP) for improved healthcare services obtained as the ratio of coefficients of the non-monetary and the monetary attributes. The estimated MWTP for the basic and extended model does not differ greatly, thus the estimated MWTP of the basic model is adopted for this work. The mean willingness to pay for ambulance is ₦787.25, implying that individuals on the average are willing to pay charge worth ₦787.25 for availability of ambulance during emergency. This could be linked to the need for safety that can be guaranteed by fast evacuation of patient to secondary and tertiary health facilities that are available in the close by city of Ibadan. Respondents are also willing to pay ₦39.68 for regular drug and ₦54.55 for private control.

The negative values for MWTP for doctor and night duty shows utility derived will be reduced in payment for these attributes which signifies that non willingness to pay for these attributes. The result on Table 4, of the estimated MWTP shows that individuals were willing to pay for availability of ambulance, regular drug and private clinic but the estimated MWTP for attributes, regular drug and private clinic were smaller than the least price bid presented to the respondent. On the average, the estimates reveals that the rural community are willing to pay ₦808.86 as user's fee per consultation for improved healthcare facilities.

Table 4: Mean willingness to pay values for the basic and extended model

Attributes	Basic model	Extended model
Ambulance	787.25	794.18
Medical doctor	(22.46)	(22.91)
Night duty	(50.16)	(50.35)
Drug	39.68	40.09
Ownership	54.55	55.21

Note ( ) shows that the values are negative.

CONCLUSION AND RECOMMENDATION

This study concludes from the findings of the work that respondents in the study area are not satisfied with the level of services at their primary health care centres; they desire greatly an improvement in areas of availability of drug and medical personnel at their health centres regularly. The residents are willing to pay for improved health care services to earn better wellness. The study therefore recommends from the observed high level of dissatisfaction in irregular availability of drug and medical personnel in the study area, that government should ensure that drugs are available at the primary health care centres and put in place monitoring team to ensure medical personnel are on their duty post. Users' fee is a probable policy prescription for the rural communities arising from their stated preference.

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Women Farmers' Attitudes Towards Agricultural Extension Services in Southwestern Nigeria

Adesiji. G. B., Kehinde. F. B. and Omotesho, K. F.

Department of Agricultural Extension and Rural Development, University of Ilorin, Kwara State, Nigeria
E-mail: drgbolaadesiji@yahoo.com

Abstract

Women farmers play a vital role in food production and food security despite their normal engagement in domestic chores. However, their access to extension services has not been given adequate recognition by many interventions .The study examined the women farmers' attitudes towards agricultural extension services in southwestern Nigeria. A multi-stage sampling design was used to select 120 women farmers from Osun and Ondo states while Pearson correlation and Chi-square were used for data analysis. Results indicate that majority (62.5%) of the women farmers were within active age 36-50 years of age, married (72.5%) and received information friends and neighbors (88.3%) and almost half (40.8%) had 11 to 15 years of farming experience. The result shows that women farmers were provided with less extension services as 49.2% had contact with extension agents once in a year. The majority (92.2%) of the respondents ranked bad road network as the major constraints facing extension services in the study area followed by male extension worker preference for male farmers (83.3%). Almost half of the respondent (45.0%) ranked lack of transportation as third most critical constraint while a minority (5.0%) ranked irregular service delivery. There was a significant relationship between the women farmers' attitude towards extension services rendered and their assessment of effectiveness of services (r =0.214). It is recommended that government should improve on rural infrastructures like road and provide incentives for extension agencies and agents to increase the effectiveness of the extension services delivery in improving the livelihood of the poor farmers.

Keywords: Women farmers, attitudes, Extension services

INTRODUCTION AND PROBLEM STATEMENT

Rural women face serious challenges across the globe especially in the developing economies. The situation has been worse in developing countries generally, despite the existence of plans and policies for integrating women into the developing process (Rousan, 2007). This is the case for women farmers in Nigeria. In every region in Nigeria, women work as farmers and farm workers and about 70% of the population derive their means of livelihood from agriculture (NEEDS, 2004). Therefore, rural women farmers play a vital role in food production and food security. They account for 70% of agricultural workers, 80% of food producers, and 100% of those who process basic foodstuffs; and undertake from 60% to 90% of the marketing (Fabiyi et al., 2007). However, in Nigeria and other developing countries, extension services had focused on men and their production needs. Extension education services is supposed to disseminate useful information necessary for change, counsel farmers on how to make wise decision in farm management, and be responsible in disseminating agricultural technologies to farmers; linked research and farmers, interpreting research findings to farmers in order to bring about changes in knowledge, attitude and skills which multiplier effect is improvement in agricultural production (Oladele, 2004).

Sustainable food production is the first pillar of food security, with large percentage of rural women involved. It is often stated that women play a significant role in many agricultural activities and are responsible for more than half the world's food production (Damisa et al., 2007). Overall, they produce up to 60-80% of basic foodstuff and account for 50% of the total labour force engaged in agriculture (Otieno, 2001). Yet, despite this high percentage, widespread assumptions that men and not women make the key farm management decision have prevailed. As a result of this, agricultural extension service

in Nigeria have traditionally been focused on men and their farm production needs, while neglecting the female half of the production force. However, despite women's major role in the economy of many developing countries such as Nigeria, women farmers have been by and large neglected by existing extension system, receiving about 5%-7% of extension services, due to their limited control over assets and decisions and systemic biases that are evident in agricultural institution throughout Africa and much of the world (Rousan, 2005).

Information and innovation which are intended to improve agricultural production should be disseminated to farmers (male and female) and ultimately meet their needs, however, variations in information needs of women farmers and lack of adequate access to extension service in Nigeria exist and have been demonstrated for southwestern states in Nigeria (Banmeke and Olowu, 2005; Sabo, 2007). Also, studies have confirmed that women farmers in southwestern Nigeria have low knowledge and skills in performing various farm operations to increase agriculture production due to lack of access to extension services and available technologies (Ajayi et al., 2003; Adesoji et al., 2006). Although women have prominent role in agriculture, they do not receive adequate agricultural advice; have little access to modern technology that could benefit them in their activities. The foregoing necessitated the need to assess the women farmers' attitude towards agricultural extension services in Southwestern Nigeria.

Objectives of the study
The general objective of this study was to examine the women farmers' attitudes towards agricultural extension services in South Western Nigeria. The specific objectives were to:
1. identify the personal characteristics of rural women farmers in South Western Nigeria
2. access the source of information available to the women farmers
3. examine the constraints facing extension services delivery in the study area
4. determine the attitude of farmers towards the extension services rendered by extension agents in south western Nigeria

METHODOLOGY
Southwestern Nigeria comprises of six states which are Lagos, Ogun, Osun, Oyo, Ekiti and Ondo states. Out of these states, Ondo and Osun states were randomly selected through simple random sampling technique. From these two states, four were randomly selected. Three villages were thereafter selected from each of the two local governments from each state. From each village, ten women farmers were randomly selected giving a total of 120 respondents. Data was collected through interview schedule involving meeting the respondent one after the other to obtain information on extension services rendered to women farmers. Variables measured include farmers' attitude towards the extension services provided, frequency of contact/access to extension services, method of extension services delivery and sources of information available to women. Respondents' attitudes towards extension services was measured using five- point scale with strongly disagreed, disagreed undecided, agreed and strongly agreed and were scored as 1, 2,3,4 and 5 respectively for all negative statements and in reverse order for all positive statements. Mean scores for each statement were calculated to categorise respondents to favorable and unfavourable attitudinal dispositions. . Data collected were subjected to statistical analyses using frequency, percentage, Pearson correlation and Chi-Square.

RESULTS AND DISCUSSION
Women farmers' personal and socio-economic characteristics
Table 1 shows data on the personal characteristics of women farmers. Results indicate that majority of women farmers (72.5%) were married with 62.5% falling within age range of 36-50 years. More than half (51.7%) were Christian while almost half (45.8%) had primary education. More than one-third of the respondents (40.8%) had 11- 15 years of practical farming experience. Almost half of the respondent (49.2%) had contacts with extension agents once in a year. This implies that women farmers have limited contact with extension agents. Regular access to extension agent can effectively change their impression and attitudes to the extension services and subsequently innovation being promoted. Of all the 120 women farmers' interview only 6.7% of them obtained information from extension agents, 88.3% depended on their husband/ friends and neighbor. This confirms the findings of and Rezvanfa et al., 2007, Yahaya (2002), Tologbonse et al. (2006) that rural households depend on friends and neighbors for information.

Table 1: Personal characteristics of women farmers

	Freq	Percent
Marital status		
Single	2	1.7
Married	87	72.5
Widowed	28	23.3
Divorced	1	0.8
Separated	2	1.7
Age(year)		
Below 35	22	18.4
36-50	75	62.5
51-65	23	19.1
Religion		
Christianity	62	51.7
Islam	58	48.3
Traditional	-	-
Educational level		
No formal education	3	2.5
Adult education	1	0.8
Primary education	55	45.8
Secondary education	45	37.5
No response	16	13.3
Source of information		
Radio	6	5.0
Husband/friends and neighbor	106	88.3
Extension agent	8	6.7
Farming Experience (years)		
Under 5	-	-
6-10	39	32.5
11-15	49	40.8
16-20	31	25.9
Above 20	1	0.8
Frequency of contact		
Once in two years	31	2.8
Once in two years	59	49.2
Thrice in a year	15	12.5
Four times in a year	14	11.7
More than four times in a year	1	0.8
More than four times in a year	120	100

Constraints facing extension service delivery among women farmers

Extension delivery in Nigeria has gone through many challenges. Of the 120 women farmers interviewed, the majority (92.2%) ranked bad access road as the major constraints followed by the preference the male extension workers have for male farmers (83.3%). Almost half of the respondent (45.0%) ranked lack of transportation as third most critical constraint they face while a minority (5.0%) ranked irregular extension service delivery. With the rapidly expanding population in Nigeria, the entire agricultural extension services delivery system to the farmers especially female farmers should be overhauled. This result implies that government should provide more female extension agents that will be attending to female farmers; this is likely to bridge the gap between the extension agents and the extension service providers thus limiting constraints. This has been achieved in Ghana, Ethiopia and India where more female extension agents were deployed to train female workers. Female farmers claimed they were more relaxed and secured in dealing with same sex with their challenges better addressed (World Bank, 2010).

Women farmers' attitude towards extension services

Farmers' attitude refers to the disposition they have towards services rendered to them by extension agents. Majority of the farmers agreed to the fact that knowledge gained from extension services had helped to improve their production capacity with a mean score value of 4.0 (Table 3). This implies that information gained improved farmers knowledge on farming systems thereby increasing their production. The mean score value of 2.4 indicate that most of the respondents disagreed that extension agents do not have respect for their indigenous knowledge of farming systems. This implies that farmers may resist adoption of technology which differs greatly to their indigenous knowledge. The mean score value of 3.9 showed that most of the respondents agreed that extension services rendered always meet their needs. This may be because services provided improved farmers productivity in the study area. The mean score value 1.9 indicated that most of the respondents disagreed that extension services is gender biased. This implies that both male and female respondents are involved in farming; hence, they need extension services that will improve their production. Farmers get more reliable information when they have more frequent contact with extension workers, as well as extension workers also become more credible with the farmers through regular reciprocal communication. However, this happened to be the case with male farmers in the study areas. Therefore, extension agents should give more priority to training the rural women farmers as they represent the backbone and majority in agricultural production.

Table 2: Constraints facing extension service delivery as indicated by respondents

Constraint	Frequency	Percentage	Rank
Bad access road	119	92.2	1
Lack of transportation	54	45	3
Irregular extension service delivery	6	5.0	4
Male extension worker preference for male farmers	100	83.3	2

Table 3: Women farmers' attitude towards extension services (n=120)

Statements	SA	A	U	D	SD	Mean score value
Knowledge gained has extension services helped me to improve my production capacity	2.5	95.8	1.7	-	-	4.0
Some extension services rendered are always tailored to my needs	-	6.7	69.2	24.2	-	2.8
Yield got from the use of information of extension agents is usually encouraging	31.7	49.2	17.5	1.7	-	4.1
Extension agents do not have respect for our indigenous knowledge of farming system	1.7	0.8	30.8	65.8	-	2.4
Services rendered is satisfactory	6.7	39.2	41.7	12.5	-	3.4
It appears that extension agent do not have adequate control of their subject considering their productivity	-	1.7	49.2	49.2	-	2.5
Extension agents are usually friendly in disseminating information	37.5	56.7	0.8	5.0	-	4.3
Extension agents do all the talking without listening to our problems	-	-	0.8	81.7	17.5	1.8
Information got from extension agents are always very clear	5.8	61.7	25.0	6.7	-	3.6
Extension services rendered are not always reliable	0.8	16.7	38.3	41.7	2.5	2.7
I always like to utilize information obtained from extension agents	0.8	39.2	52.5	5.8	-	3.3
Extension agents are very democratic in making decision on the farm with us	-	3.3	58.3	3.0	1.7	2.6
Extension agents do not usually give timely information on production	-	3.3	55.8	34.2	1.7	2.5
Extension agents do not care about our problems on the farm	-	0.8	1.7	87.5	9.2	1.9
Extension services rendered always meet our needs	3.3	90.0	3.3	3.3	-	3.9
Extension agents do not have good human relations	-	2.5	90.0	6.7	-	2.9
Extension agents are always ready to proffer solution to our problems	4.2	75.8	5.8	13.3	-	3.7
Extension agents always like to treat us as inferior	-	0.8	3.3	90.8	4.2	2.9
Extension agents always motivate or encourage our desire to learn	3.3	94.2	-	1.7	-	4.0

*Percentages are in parenthesis

Farmers' characteristics and their attitudes towards extension services

Data on the inferential statistical analysis of some characteristics of women farmers and their attitude towards extension services are as presented in Table 4. It reveals that whereas there was a significant relationship between women farmers' farm size (r=0.183; p < 0.05) and their attitudes towards extension services, there were no significant relationship between farmers' age (r =0.034; p<0.05), farming experience (r=0.109; p<0.05). Also, there were no also no significant relationship between respondents' marital status (X^2 =6.464; p<0.05), religion (X^2 =0.006; p<0.05)

and level of education (X^2 = 1.641; p=0.05) and their attitudes towards extension services. This implies that farmers' age, farming experience, religion, marital status and education do not have impact on their attitudes towards extension service, their farm size dictate what their disposition is to the extension service. The plausible explanation for this might be that, perhaps, some relatively large farm size holders have benefited from extension services and may have some favourable disposition compared to small scale farm size holders who may not have benefited much from the extension services

Table 4: Test of relationship between selected personal characteristics of women farmers and their attitudes towards extension services

Characteristics	r value	P value	Inference
Age	0.034	0.709	Not significant
Farming experience(yrs)	0.109	0.267	Not significant
Farm size (Ha)	0.183*	0.048	Significant
	χ^2 value	P value	Inference
Marital status	6.464	0.091	Not significant
Religion	0.006	0.941	Not significant
Level of Education	1.641	0.650	Not significant

SUMMARY AND CONCLUSIONS

The study provided information about women farmers' attitudes towards extension services, the source of information available to them, and the constraints facing extension service delivery to women in southwestern Nigeria. The findings of this study, based on women farmers' attitude towards agricultural extension services revealed that extension services rendered are not effective due to limited access to extension services, though such services were available in their community but majority of them agreed that such services are not tailored to their needs. Also, the sources of information available to women farmers in the study area are their husbands, friends and neighbours while the information from extension personnel and mass media were reported to be very low or inexistent.

The major constraints facings extension services in order of severity includes bad access road, male extension workers preference for male farmers, lack of transportation and irregular extension services delivery. In conclusion therefore, extension agents are to consider women as equally important in agricultural production; having high or intermediate knowledge of agricultural practice. The study recommends provision of good road network, provision of women extension agents and constant enlightenment of extension agents on gender issues so as to eliminate gender bias in the discharge of their duties.

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Constraints to Cocoa Farmers Participation in Farmer Field School (FFS) in Abia state, Nigeria

Nwaobiala, C. U. and Odoemelam, L. E.
Department of Rural Sociology and Extension
Michael Okpara University of Agriculture Umudike, Abia State, Nigeria
E Mail:cunwaobiala@gmail.com

Abstract

The study analyzed constraints to cocoa farmers' participation in Farmer Field School approach in the three cocoa producing Local Government Areas of Abia State namely; Bende, Ikwuano and Umuahia North. Purposive and multistage random sampling techniques were used to select 120 cocoa farmers that participated in the programme. Instrument for data collection was through a structured questionnaire. Data were analyzed with descriptive statistics like frequencies, percentages, mean and standard deviation. Results indicate that farmers were actively involved in the training of cocoa technologies in agrochemical application ($\bar{x}$=3.77), pruning techniques ($\bar{x}$=3.75), fertilizer application ($\bar{x}$=3.60), cocoa marketing ($\bar{x}$=3.58), plantation establishment ($\bar{x}$=3.50), cocoa bean storage ($\bar{x}$=3.40), nursery establishment, and nursery establishment and cocoa bean processing ($\bar{x}$=3.20) respectively. Bad road network ($\bar{x}$=3.59), price fluctuation of dried cocoa beans ($\bar{x}$=3.47), inadequate land ($\bar{x}$=3.31), inadequate incentives ($\bar{x}$=3.22) and location of school ($\bar{x}$=3.13), were identified constraints to farmers participation in the programme. Policies aimed at providing rural infrastructures, subsidy on farm inputs, easy access to schools and group formation were advocated for effective farmers' participation and increased cocoa production.

Keywords: Constraints, Participation, Cocoa farmers, Farmer Field School

INTRODUCTION

A number of agricultural extension approaches have been used in Nigeria. The major differences in their characteristics are based on how the extension service systems are structured and organized. The relationship and linkage mechanisms amongst the extension service actors, particularly farmers, extension agents and researchers, the range of agricultural services contained in the technical package, types of extension methods that are used and the way the extension services are financed are constrained due to bureaucratic bottlenecks of the system (Ministry of Agriculture, 2008). In the early seventies, Nigeria operated many agricultural programmes. Despite all these programmes, the performance of agricultural sector has continually fallen below expectation, and the output from agricultural sector especially cocoa, is not making a significant impact on the nation's economy. Low productivity in cocoa has been blamed on poor farmer maintenance practices, planting low yielding varieties and incidence of pest and diseases (Anon and Abekoe, 1999).

Tree crop especially cocoa has the main stay of Nigerian economy before the advent of crude oil (Obatolu *et al.*, 2000). The National Planning commission (2006) observed that the agricultural sector accounted for 42.1% of Gross domestic product (GDP) in Nigeria while the National Bureau of Statistics (2005) indicated that it employed about 70 % of the working population. Agriculture has remained the largest non – oil export earner, employer of labour, a key contributor to wealth creation and poverty alleviation in Nigeria. Prior to the oil boom of the mid 70's cocoa was one of the highest foreign exchange earners in Nigeria and for a long time the crop has been generating substantial foreign earnings for the country (Onwumere and Alimba, 2010). The cocoa sector still offers a large sizable number of people employments both directly and

indirectly (Oluwale, 2004). Cocoa serves as a source of foreign exchange and employment (Olayemi, 1973; Abang, 1984; Folayan *et al*., 2006). Cocoa is used for drinks such as chocolate, for candies, cosmetics, soap and pharmaceuticals. Cocoa and its processed product like chocolate contain flavanol, which has a cardiovascular health benefit (Schroeter *et al*., 2006; Taubert *et al*., 2007). Agriculture is also the sole determinant of the income and welfare of the rural majority. Thus, it holds the key to the socioeconomic development of the rural areas (NPC, 2006). In-spite of the large labour force engaged in Agriculture in Nigeria, there is food deficit in the country. Most countries in Africa, including Nigeria imports food and with flood in most parts of Nigeria food crises are imminent. In Nigeria cocoa production has been hampered by the incidence of pest and diseases. Others are socioeconomic problem of poor extension services, weak farmer networks and low producer price in cocoa industry (Dormon, 2004). A prominent factor identified as being responsible for this ugly situation is unavailability of timely and appropriate information to users of agricultural information from research scientist, policy makers, planners, extension personnel and farmers (Aina, 1985).The vast store of information on agriculture has been built in the world over many years with the ultimate aim of increasing agricultural productivity (Kaaya, 1999). Thus, improved information flows to, from and within the agricultural sector is a prerequisite for development. Various categories of users or clients require information so as to carry out their services effectively. The end users are small holder farmers who depend on farming as a source of livelihood (Ebewore and Emuh, 2013).If, this is so, the question now arises: are there other sources where cocoa farmers can seek information in cocoa cultivation from research The main users of agricultural information include the followings: researchers, and research managers, extension workers, farmers, policy makers, trainers, consultants and bankers. In cocoa producing countries, institutions specializing in cocoa have typically been responsible for cocoa extension. However, with decline of many of these institutions, cocoa extension has turned to national extension systems that are overburdened with providing extension services for wide range of crops. The result is that, in most cocoa producing countries, cocoa extension is inadequate at two levels. On the other hand, there are too few extension agents to take on the task of providing extension advice

and moreover, few have specialized training on cocoa farming techniques Adesina (2012).

Farmers' participation is considered necessary to get community support for agricultural development projects (Cole, 2007). Aref (2010) identified lack of effective and strong government institutions as some barriers to participation by farmers. Active participation is often constrained by lack of information and knowledge. Knowledge of the decision making process is important if farmers are to take active part in agricultural planning (Cole, 2007). The World Bank recognized lack of participation in donor sponsored programmes as a reason to the failure of many development and poverty reduction strategies in developing countries (World Bank, 2012). Most of these programmes centre on community development approach rather than agricultural oriented strategies which have marginalized resource poor farmers thus causing them to be eluded from active participation in the programmes (Nwaobiala, 2013). Farshid (2010) observed that most farmers in developing countries have limitation to extension programmes for farm productivity and income. In addition, they do not have enough motivation for continuing their activities through support from relevant agencies, leading to poor participation. According to Ivanoic (2009), poor funding to this sector leaves farmers in the rural areas unable to sustain their production, coupled with and also neglect protecting these activities, farmers' participation becomes elusive. This has lead to weak knowledge based subsistence agricultural production systems, inadequate agricultural inputs and poor market infrastructure, weak backward and forward linkages between agriculture and other sectors, increased food insecurity, natural resources and environmental degradation, poor management of water resources and low irrigation infrastructure (ECA, 2006b). Cocoa production and foreign exchange earnings from its sales has suffered serious decline in Nigeria since the 1980s and this has affected effective participation of farmers, especially Abia State (STCP, 2006).

To revamp cocoa and stop declining trend in production, the country has taken bold step by setting up the National Cocoa Development Committee (NCDC) on 2nd December, 1999. The committee was to promote cocoa production through designing and implementation of programmes involving new planting stocks and rehabilitation of old plantation (STCP, 2006) Government through the National Cocoa Development Committee has adopted the Farmer Field School Approach as a vehicle for farm

extension delivery. Farmer Field School Approach (FFSA) is a participatory training approach that can be considered both as an extension tool and a form of adult education. It focuses on building farmers capacity to make well-informed crop management decision through increased knowledge and understanding of the agro-ecosystem (David *et al*., 2006). Farmers participation in Farmer Field School Approach in Abia State has not been properly documented due to the constraints faced by cocoa famers in the programme. In view of the above stated facts this paper examined constraints to cocoa farmers' participation in Farmer Field School Approach in Abia State, Nigeria.

The specific objectives were to;
1. describe socio-economic characteristics of cocoa farmers' in the study area.
2. ascertain levels of cocoa farmers' participation in Farmer Field School.
3. ascertain farmers constraints to participating in the programme.

METHODOLOGY

Multistage random sampling technique was used in selecting participating cocoa farmers.. First, Bende, Ikwuano and Umuahia North and Ikwuano Local Government Areas (LGA's) were purposively chosen because they were the major cocoa producing areas in the state. Two (2) Farmer Field Schools each were randomly selected out of the four (4) schools that make up the LGA's; Bende- (Okpooenyi and Isiala schools), Ikwuano- (Iberenta and Itunta schools) and Umuahia North- (Okweyi and Azueke schools). This gave a total of six (6) Farmer Field Schools. Finally, twenty (20) participating cocoa farmers each were randomly selected from the selected schools to give a total of one hundred and twenty (120) farmers. Data were collected on farmers' socioeconomic characteristics, participation in Farmer Field Schools and constraints they faced in their participation in Farmer Field Schools. Participation in Farmer Field School was measured on eight – item scale comprising types of training conducted amongst cocoa farmers in Farmer Field School in Abia State. Occasionally, Seldom, Never and were scored as 4, 3, 2 and 1 respectively. Constraints to farmers' participation in Farmer Field School were also measured in eight – item statement comprising list of possible constraints. It was operationalised; high, moderate, low and no constraint as scores of 4, 3, 2 and 1 were assigned respectively.

RESULTS AND DISCUSSION

Socio-economic characteristics of cocoa farmers' in the study area

Table 1 shows the socio economic characteristics of cocoa farmers in the study area. The result shows that the mean ages of Farmer Field School Cocoa farmers were 49.50years with a standard deviation of 10.41. Also, the cocoa farmers had mean farming experience of 18.50 years with a standard deviation of 4.17. Farming experience had been shown to enhance the participation and adoption of improved farming techniques, thereby increasing output (Nwaobiala *et al*., 2009). The Table also reveals that the mean farm size of Farmer Field School Cocoa farmers was 4.5 hectares with a standard deviation of 0.97. This result conforms to the findings of (Onwumere and Alimba, 2010). The mean farm income of FFSC farmers was N1.556m with a standard deviation of 231.02.

Table 1: Mean and Standard Deviation of Selected Socio-economic Characteristics of Farmer Field School Cocoa Farmers and Non Farmer Field School Cocoa in the Study Area.

Variables	Mean	Standard Deviation
Age (years)	49.50	10.41
Farming Experience (years)	18.50	4.17
Farm Size (Hectares)	4.5	0.97
Annual Farm Income (N)	1.556 (M)	231.02

Ascertaining levels of farmers' participation in farmer field school approach

The result in Table 2 shows the levels of farmers' participation in the programme technologies in the study area. The Table indicates that a moderate proportion of cocoa farmers ascribed training in chemical application (fungicide, herbicide among others) (29.12%) with mean rating of 3.77 as technology they occasionally participated. Also, training in pruning techniques (34.83%) and fertilizer application (23.33%) with mean ratings of 3.75 and 3.60 respectively were technologies farmers were actively involved. Williams *et al*., (1998) affirmed that application of fertilizer and Diuron against black pod infestation has proved to be effective. Pruning of cocoa branches and fertilizer application are important techniques in cocoa production that enhances cocoa output (Obatunde *et al*., 2003). Furthermore, the cocoa farmers participated in training on marketing (28.33%), plantation establishment (35.83%) and storage technologies (25.83%) with mean ratings of 3.58,

3.50 and 3.40 respectively. Finally, a moderate proportion of cocoa farmers 26.67 % and 21.67% always participated in processing and nursery technologies with mean ratings of 3.0. This implies that the farmers were actively involved in

the technology, since the mean is greater than 3.0. This result confirms that all the technologies disseminated by Farmer Field School facilitators were yield enhancing which increases cocoa production in the study area.

Table 2: Levels of Cocoa Farmers' Participation in Farmer Field School in Abia State, Nigeria

FFS Training Cocoa Technologies	Always	Often	Occasionally	Seldom	Never	TFFS	Mean
Training in Nursery Establishment/Techniques	85(17)	128(26.67)	132(36.67)	28(11.67)	13(10.83)	386	**3.20**
Training in Plantation Establishment	130(21.67)	140(35)	129(35.83)	20(8.33)	6(5)	425	**3.50**
Training in Agro Chemical Application	165(27.50)	164(34.17)	105(29.17)	16(6.67)	3(2.5)	453	**3.77**
Training in Pruning Techniques	165(27.50)	172(35.83)	90(25)	20(8.33)	4(3.33)	451	**3.75**
Training in Fertilizer Application	180(30)	112(23.33)	99(27.50)	32(13.33)	7(5.83)	430	**3.60**
Training in Cocoa Bean Storage	155(25.83)	116(24.17)	90(25)	36(15)	12(10)	409	**3.40**
Training in Cocoa Bean Processing	160(26.67)	92(19.17)	66(27.50)	50(20.83)	18(15)	386	**3.20**
Training in Cocoa Marketing	170(28.33)	128(26.67)	93(25.83)	32(13.33)	7(5.83)	430	**3.58**

Constraints to participation of cocoa farmers in the FFS programme in Abia State

The constraints to participation of cocoa farmers in the FFS programme are shown in Table 3. The results indicate that 77.50% of cocoa farmers complained of bad road network with mean of 3.59 as a major constraint. Asiabaka (2008) identified inadequate land and rural infrastructure (roads) as major constraints to farmers' participation in Nigeria agricultural programmes. Also, a good proportion of farmers (70.83%) and 53.33% claimed that price

fluctuation of processed cocoa bean and inadequate land with mean ratings of 3.47 and 3.31 respectively were constraints. Inadequate incentives (57.50%) such as defraying transportation costs to training venues, fertilizers and agrochemicals and among others and location of school (52.50%), with mean ratings of 3.22 and 3.13 respectively were also perceived constraints to effective participation of farmers in Farmer Field School Approach in the State. Eremie (2006) assert incentives to farmers' increases participation and ownership of their investments.

Table 3: Constraints to cocoa farmers' participation in Farmer Field School in Abia state, Nigeria

Constraint Items	High Constraint	Medium Constraint	Low Constraint	No Constraint	Total	Mean
Bad Road Network	372(77.50)	15(4.17)	44(36.67)	--(--)	431	**3.59*3.**
Location of School	252(52.50)	33(9.17)	90(37.50)	1(0.83)	376	**13***
Infrequent Visits by Facilitators	136(28.33)	120(33.33)	45(12.50)	20(16.67)	321	**2.67**
Inadequate Incentives	276(57.50)	54(15)	6(13.33)	10(8.33)	386	**3.22***
Poor Awareness of the Programme	176(36.67)	69(19.17)	84(35)	11(9.17)	340	**2.83**
Non Follow-up of Recommended Practices	84(17.50)	96(26.67)	48(20)	68(56.67)	296	**2.46**
Bad Perception on Past/ Similar Programme	196(40.83)	57(15.83)	68(28.33)	18(15)	339	**2.82**
Price Fluctuation	340(70.83)	27(7.5)	46(19.17)	3(2.5)	416	**3.47***
Inadequate Land	256(53.33)	69(19.17)	58(24.17)	14(11.67)	397	**3.31***

Values in parentheses are percentages.

CONCLUSION AND RECOMMENDATIONS

Despite the high level of participation in Farmer Field School activities by cocoa farmers in the study area, the study had shown that there are constraints hindering cocoa farmers in participating in the programme. Bad road network, price variation of cocoa bean and poor incentives were the major constraints identified in the study.

The study therefore recommends that;

1. The programme should subsidize farm inputs such as fertilizer, improved cocoa seedlings and herbicides and ensure timely supply of these inputs taking cognizance of the fact that farming is time bound.

2. Rural infrastructural facilities such as good feeder roads, electricity and pipe borne water, among others need to be provided by relevant agencies to curb youth rural-urban migration. These facilities would help to adding value to cocoa processing and in turn increased pricing.

3. Cocoa farmers should be encouraged to form groups in order to access credit and cocoa enhancing strategies such as value addition. This will help improve the quality of the product and increase in price.

4. Schools should be located close to participating farmers' residence. This is informed by the bad road network experienced in the area.

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Food Security Status Among Cooperative and Non Cooperative Farming Households in Rural Akinyele Local Government Area of Oyo State, Nigeria

Salman, K. K. and Akinbosoye, O. O.

Department of Agricultural Economics, University of Ibadan, Ibadan Nigeria
E-Mail: kksalmann@gmail.com

Abstract

Enabling policy environment that encourages farmers' cooperative groups towards enhancing their standard of living is not fully in place. Empirical evidence that could sensitise policy makers as well as farmers in this direction is therefore crucial. In comparative terms, food insecurity status of farming households who were members of cooperative society and those who were not was examined in this study. Using a well-structured questionnaire and 2-stage sampling techniques, primary data on household socio-economic and demographic characteristics as well as the quantity consumed per week of locally available food groups were collected from 55 cooperative farming households and 53 non cooperative farming households in Akinyele Local Government Area of Oyo State. Data were analysed using descriptive statistics, food security index, and probit model. Using food security index measured based on daily energy level of 2450kcalories, the food security line (Z) for all the farming households surveyed, co-operator and non-co-operators, was estimated at ₦141.0308 per day per adult equivalent (equivalent to ₦4,231.14 per month per adult). While 76.4% of the sampled cooperative farming households were food secure, only 56.6% of the non-cooperative farming households were food secure. Whereas age and household size were common significant determinants of food security among both cooperative and non cooperative farming households, education (0.0034) and monthly income (0.0043) were only significant for the co-operators. It is concluded that respondents belonging to cooperatives were relatively more food secured than non co-operators. It is therefore recommended that farmers be encouraged to form and join cooperative society and that cooperative activities should be assisted especially at their formative stage as this can serve as a hub to meeting the Millennium Development Goal (MDG) of a well-informed society, reducing poverty by half and ending hunger.

Keywords: Co-operators and Non co-operators, Food security, Farming households.

INTRODUCTION

Food is the most basic of human needs for survival, health and productivity. It is the basic necessity of life. However, in the present time, the availability, accessibility or utilization of this basic necessity of life is under the grip of crisis, as millions of people across the globe suffer from extreme hunger and malnutrition. This food crisis (or food insecurity) phenomenon is particularly alarming in developing countries especially in Africa.Food insecurity is referred to as deficits or shortfalls in actual per capita daily calorie intake below the minimum per calorie intake recommended by FAO and WHO for maintaining the human body-2450kcal/day (Riscopoulos *et al.*, 1988). Also, food insecurity exist when people are undernourished as a result of the physical unavailability of food, lack of social or economic access to food, and/or inadequate food utilization (Mohammed, 2003). Food security on the other hand is said to exist when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meet their dietary needs and food preferences for an active and healthy life (FAO, 2001).

More than 826 million people are suffering from malnutrition globally in which only a fraction (34 million) lives in the developed world compared to 792 million in the developing countries (FAO, 2001) and 235 million alone in sub-Saharan Africa (FAO, 2010). This shows that high proportion of people in developing countries, most especially in sub-Saharan Africa, is under nourished. Although 14% of the global population is undernourished, the proportion in Africa is

27.4% (FAO, 2002). Statistical estimates documented in literatures have further shown that the total population of people who are malnourished on the African continent have been rising over the past few decades from 111 million in the period 1969 to 1971, to 171 million in the period 1990 to 1992. This increased further to 204 million in the period 1999 to 2001. Nigeria is not left out in this crisis. Despite the abundant resources Nigeria is endowed with, the case of her food security status is particularly so worrisome that among the development problems facing the country, food insecurity ranks the topmost. Although agricultural sector in Nigeria employs about two-thirds of the country's total labour force, contributes about 40% of the Gross Domestic Products (GDP) and provides 88% of non-oil earnings with small farmers accounting for more than 90% of the country's total agricultural output (Oluwatayo, et al., 2008), it would naturally be expected that the food security status of the citizenry would be quite high; however, literature reveals that majority of Nigerians are food insecure (Olayemi, 1996; Omonona and Agoi, 2007; Babatunde et al., 2007 and Ayantoye et al., 2009; Ashagidigbi, 2012). In 1990, 18% of the population (14.4 million) was estimated to be critically food insecure; this increased to 36% (32.7 million) in 1992 and further increased to 40.7% in 1996. Besides this disturbing statistical trend of food insecurity situation in the country, the increased trend in food importation bill from 3.47 billion in 1990 to 113.63 billion in 2002, and then to 348 billion in 2007 (Okuneye 2002; Okunmadewa, 2003; Daily Trust, Tuesday, March 2008) further indicates clearly that the country is under severe threat of food insecurity.

In appreciation of the growing reality of food insecurity among its citizenry, Nigeria at the world food summit (1996), alongside 185 other countries of the world made a commitment to reduce the number of chronically undernourished persons by half in the year 2015. Notwithstanding this commitment of the Nigerian government to alleviate poverty and food insecurity among its citizenry, the food insecurity situation in the country has degenerated to a level that the country is included in the list of 42 "low-income, food - deficit countries". Nigeria was ranked 20th out of 42 African countries studied on the 2006 Global Hunger Index (Okunmadewa, 2003). The 2012 Global Hunger Index (GHI) ranking of World Health Organization revealed that Nigeria was among the developing countries with serious Global Hunger Index of 15.7. The cause of food insecurity in Nigeria is attributable to the high prevailing poverty level (which has been proved to be a phenomenon among rural dwellers), poor performance of the Nigerian agricultural system and poor implementation of intervention policies (Okunmadewa, 2003; Oyefara, 2005; Omonona, 2010).

Peasant farmers who make up a larger proportion of the work force have limited access to productive resources-financial (credit), land, improved agricultural technologies and various other productive inputs-which all constitute a factor that greatly limit their productivity, investment, savings and income. Moreover they face the problem of insecure farm tenancy, land fragmentation and small size of holdings, as well as lack of access to market (or have only partial engagement in market). These constraints have made it difficult for individual farmer to achieve any substantial improvement in his production capacity in the face of an increasing population of the country, with attendant increase in food demand. The consequence of this is that even the farmers themselves become predisposed to food insecurity. In fact, Okunmadewa (2001) reveals that one major characteristics of the farming populace of Nigeria is food insecurity. Specifically in 2004, National Bureau of Statistics (NBS) in its study on the relative poverty by occupation of household heads indicates that 67 percent of households whose heads engaged in agriculture were poor and by implication lack the means to secure access to sufficient food at all time. Most of food insecure households live in rural areas where food is produced; they are still net food buyers rather than sellers.

With a nexus between food insecurity and poverty been established, it could be said from the foregoing that poverty, besides poor implementation strategy of government policies, is a major constraint to rural farmers' access to food. Characteristically, rural poverty is not only related to food security but also to access to assets, services and market, income-earning opportunities and organizational and institutional means for achieving these needs (Ayantoye et al., 2011). In the midst of this crunching impoverishment and hunger, farmers resolved to a number of coping options to enhance their farm production and improve their general wellbeing. One of these options includes pooling their resources and working together as members of cooperative society. A cooperative society is an organization of persons who have voluntarily joined together to achieve a common end through the formation of a democratically controlled

organization, making equitable contribution to the capital required and accepting a fair share of the risk and benefits of the undertaking in which members actively participate (Jerry, 1989).Through the formation of farmers cooperatives, production output can be raised at minimal cost since the group would be able to take advantages of scale economics, overcome barrier to assets and manage available resources better, have access to larger piece of land either by pooling or leasing, have enhanced access to information delivery on agricultural production, especially information on market situation, have access to enriching educational and training programmes as well as attract financial resources from banks among others (Jerry,1989; Holloway *et al.,* 1999; Chambo, 2009). Since food insecurity is connected with poverty and low income, increased farm income through effective commercialization of produce by cooperative society will enable rural households meet their food consumption needs whether through expanded own production of food or purchase from the market. Also an effective cooperative structure put in place can eliminate the activities of middle-men who exploit farmers and reduce the price of agricultural produce at the farm gate (this has implication for the farmer's profit margin). This study seeks to know, through comparison, whether or not being a member of any cooperative society can enhance an individual's food security status.

Problem statement

In many African countries, food crises have assumed a disturbing dimension. In the sub-region of West Africa, about 16% of the people are undernourished. Although there was a decrease in undernourished population in Nigeria from 14.7 million in 1990-1992 to 10.8 million in 1995-1997, this figure increased to 12.5 million people in 2003-2005. Several intervention programmes such as Community Action Programme for Poverty Alleviation (CAPPA), National Food Security Programme, FADAMA, and National Poverty Eradication Programme have been put in place both in the urban and particularly in the rural sector to alleviate poverty and food insecurity but with marginal success as impact largely remained unfelt by the poor (Yusuf, 2008). This calls for a fundamental review of the past approaches and achievements to see what lessons can be learned (Oni *et al.,* 2011). The Federal Government earnestly seeks to re-strategize and develop an approach that will ensure that better progress is made towards

achieving the first Millennium Development Goal, particularly among the rural populace who constitute more than half of the country's population. It is documented in literature that in the midst of impoverishment and hunger, farmers resolved to a number of viable coping options to enhance their farm production and improve their general wellbeing (Reardon *et al.,* 2002; Salimonu *et al.,* 2006). One of these options includes pooling their resources and working together as members of cooperative society (Chambo, 2009). Though an age-long legal organization, Cooperatives are the only means to bring the poorest segment of society into an organizational fold as legally recognized entities, providing opportunity for employment and better income along with the needed support services (Prakash, 1999). Findings in food and policy literature have also proved that there is strong evidence that farm families and cooperatives can provide a decentralised system of food security and employment (Coldman, 2009). Although cooperatives have been in existence for long, it is pertinent to carry out an empirical study which seeks to examine the food security status of rural households who are cooperative society members relative to their non-cooperating counterparts in order to validate (or otherwise) the relevance of cooperative society as an approach that will ensure that better progress is made towards achieving the first Millennium Development Goal of halving the proportion of hungry people by 2015. In view of this, the study attempted to find answers to the following research questions: What is the expenditure of cooperative and non cooperative farming households on food? What is the food security status of cooperative farming households relative to their non cooperative counterpart? Does membership of any cooperative society necessarily make farming household food secure? What factors influences the food security status of cooperative and non cooperative farming households?

Objectives of the study

The main objective of this study was to compare the food security status of cooperative and non cooperative farming households in rural Akinyele Local Government Area of Oyo State. The specific objectives were to:
- establish a food security line for the farming households
- profile the food security status of cooperative and non cooperative farming households, and categorise respondents into food secure and non-food secure group

- identify the socio-economic characteristics of the rural farmers that influence their food security status.

Literature review and conceptual framework
The concept of cooperation:

Cooperation has existed ever since the first two men discovered that by working together they can accomplish their work more efficiently (khols and Downey, 1972). The Department For International Development (DFID) defined cooperative, building its the definition on four major catch words: First, they are formed by groups of people who have a specified need or problem; Secondly, the organization is formed freely by members after contributing to its assets. Thirdly, the organization formed is governed democratically in order to achieve desired objectives on equitable norm. Fourthly, it is an independent enterprise promoted, owned and controlled by people to meet their needs (DFID, 2008). Cooperatives are the only means to bring the poorest segment of society into an organizational fold as legally recognized entities, providing opportunity for employment and better income along with the needed support services (Prakash, 1999); they are organizations that have come to be recognised as a legal institution that provides a veritable strategy to meeting income and production shortfalls. In relation to the provision of credit facilities to farmer members, cooperative has been identified to be a better channel of credit delivery to farmers than the NGO's not only in term of its ability to sustain the loan delivery function but also in terms of its promptness in doing the same (Alufohai, 2006). Okwocha *et al*, 2012 carried out a study to evaluate agricultural credit utilization by cooperative farmers in Benue State of Nigeria. The result of analysis showed that 88.5% of the respondents sourced their credit from non-institutional sources, more than 87.7% of the respondent utilized credit for the purpose of Agricultural production and that the loan acquired by the respondents had significant impact on their output and income. Farmers do request credit loans not only to meet increased agricultural production needs but also to augment household income in order to adequately meet food consumption needs and so avert or at least reduce the negative impact of food insecurity on their households. In connection with marketing, farmers are more willing to accept productivity enhancing measures if they are sure of the market and the price for the increased produce. Tanguy *et al.,* (2008) working on the commercialization

behaviour of cereal producing smallholders in Ethiopia found that cooperatives obtained higher prices for their members though they were not associated with a significant increase in overall share of cereal production sold commercially by their members. Orthman *et al.,* (2009) noted that agricultural cooperatives are responsible for stimulating poor farmers to make entry into markets, enhancing demand for standard and grades for perishable commodities.

The concept of food security/insecurity

The term food security is understood and used in multiple ways at the level of individual, household, community, regional, national and world. According to World Food Summit (1996), food security exists when all people, at all times, have both physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996).Within the context of this definition four salient variables are central to the definition of food security. These distinct variables include; food availability, food access, food utilization and, sustainability of access to food (Bonnard, 2001). Access represents the household's capacity to fulfill nutritional requirements. It is ensured when all households and all individuals within those households have sufficient resources to obtain appropriate foods (through production, purchase or donation) for a nutritional diet. Availability is achieved if adequate food is readily available at people's disposal. It means sufficient quantities of appropriate, necessary types of domestically produced food, commercial imports or food aid are consistently available to individuals or are within reasonable proximity to them (Von Braun *et al.*, 1992). Acceptability addresses access to culturally acceptable food, produced and obtained in ways that do not compromise people's dignity, self-respect or human right. Utilization includes both food factors, and dietary intake, and health factors that influence child and maternal nutritional status. Adequate food utilization is realised when food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist (Obamiro, 2005). Babatunde *et al.,* (2007) who worked on the socio-economic characteristics and food security status of farming households in Kwara State of Nigeria, using recommended daily calorie required approach to determine the food security status of 94 sampled farming households found

that 36 percent and 64 percent of the households in the study area were food secure and food insecure respectively. Using two stage sampling procedure to obtain 160 farm households in selected across 16 villages in the two Agricultural Development Project (ADP) zones of Ekiti State, Fakayode *et al.,* (2009) found that 12.2% of farm households were food secure, 43.6% were food insecure without hunger, 35.9% were food insecure with hunger (moderate) and 8.3% were food secure with hunger (severe). Obayelu, 2010 classified households in the North central Nigeria into food security status based on certain demographical characteristics using the Rasch model. The result of analysis of the cross sectional data obtained from 396 household heads from two selected areas in the North central showed that only 23.7% households were food secure in the study area. In a study on the effect of social capital dimensions on food security among farming households in Odeda LGA of Ogun State of Nigeria using data collected from 116 farming households, Oni *et al* (2011) found that 45% of the farm households were food secure while 55% were food insecure. Education, income of household head and household size were found to be significant determinants of food security status of farming households in the study area.

METHODOLOGY

The study area was Akinyele Local Government Area of Oyo State. It is one of the eleven local governments that make up Ibadan metropolis. Its headquarters are at Moniya. Akinyele local government area was created in 1976 and it shares boundaries with Afijio Local Government to the north, Lagelu Local Government Area to the east, Ido Local Government Area to the west and Ibadan North Local Government Area to the south. It occupies a land area of 464.892 square kilometers with a population density of 516 persons per square kilometer[1]. Akinyele local government area is subdivided into 12 wards with thirty villages in total. Akinyele was chosen as the study area because of the predominance of farming activity in the area. Besides, there have not been many studies in the area that investigate, in comparative terms, the food security status of co-operators and non co-operators. This study attempted to fill this research gap and so further provide a basis for this study.

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[1] Source: http://ibadanland.net/stake-holders-local-government-akinyele.htm

Data sources, sampling procedure and sample size

Primary data were used for the study. Respondents were selected using 2-stage sampling procedure. The first stage involves random selection of five villages out of the twelve (12) wards in the LGA under study. The villages include, Ajibode, Laniba, Alabata, Mele, and Arulogun. The second stage involved a random selection of 60 cooperative farming households and 60 non cooperative farming households from whom primary data were collected with the aid of a well structured questionnaire. Information from 55 cooperative farming households and 53 non cooperative farming households were eventually used in the analysis. Data collected included socio-economic and demographic characteristics, average monthly income received from primary and secondary occupation, educational attainment, average amount spent on food and non food items per month, sources of credit for farm work and/or related, the quantity purchase and consumed per week of five locally available and consumed food groups; protein (inclusive of both plant and animal protein), carbohydrate, fat and oil, vegetables, fruits, and beverages.

Method of data analysis

Statistical tools employed for the study include descriptive statistics and Probit regression. Descriptive tools such as frequency counts, mean, percentages were employed to summarise the socio-economic characteristics of households (co-operative and non co-operative farmers) while probit model was used to analyse food security status by socio-economic variables of respondents. In addition food security and surplus indices were constructed.

Food security index

Based on the recommended daily calorie requirement, the food security index was computed using the Cost of Calorie function as given in equation and 1 and 2 below (proposed by Greer and Thorbecke, 1986). This method was used because of its simplicity. Households whose daily per capita calorie intake was up to 2450 kcal and above were regarded as food secure while those below 2450 kcal were regarded as food insecure households (FAO, 2007).

$$Ln\ X = a + bC \ldots\ldots\ldots\ldots\ldots\ldots\ldots ..(1)$$
Where
X = Food Expenditure (N)
C = Calorie Consumption (kcal)
$$Z = e^{(a+bL)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(2)$$

Where

Z = Cost of minimum recommended energy level (₦); Food security line for the study area

L = Recommended daily energy level (2450 kcal)

a = Intercept

b = Coefficient of Calorie Consumption

e = A mathematical constant (2.71828)

A household whose average cost of daily calorie consumption is equal to or more than Z is said to be food secure while any household with average cost of daily calorie consumption lower than Z is said to be food insecure.

Surplus/Shortfall Index

The Index is given as:

$$P = 1/N\sum_{j=1}^{m} G_J \ldots\ldots\ldots\ldots\ldots(3)$$

$$G_J = (X_J - L)/L \ldots\ldots\ldots\ldots(4)$$

Where

P = Surplus/Shortfall Index;

L = Recommended daily per capita requirements (2450Kcal.);

G_J = Calorie deficiency faced by household;

X_J = Per capita food consumption available to household

N = Number of households that are food secure (for Surplus index) or food insecure (for Shortfall index). This index measured the extent to which households were food secure or insecure.

The Probit Regression Technique

This was used to estimate the food security status of households as a function of some independent variables. Probit model constrains estimated probabilities to be between 0 and 1; and relaxes the constraint that the effect of independent variable is constant across different predicted values of the dependent variable. This is normally experienced with linear probability model (LPM) (Sobepetji and Belete, 2009). The probit model assumes only the values of 0 and 1 for the variable Y, there is a latent unobserved continuous variable Y^* that determines the value of Y. The other advantages of probit model include believable error term distribution as well as realistic probabilities (Nagler, 1994). We assume that Y^* can be specified as follows:

$$Y^* = X^{'}\beta + \varepsilon$$

Where $\varepsilon \sim N(0, 1)$.

Then Y can be viewed as an indicator for whether this latent variable is positive:

$$Y = 1_{(Y^* > 0)} = \begin{cases} 1 & \text{if } Y^* > 0 \text{ i.e. } -\varepsilon < X^{'}\beta, \\ 0 & \text{otherwise.} \end{cases}$$

Where

Y = Vector of dependent variable (1 for food secure households; 0 for food insecure households);

X = Vector of explanatory variables;

β = coefficient

ε= Random error

The determinant /explanatory variables included in the model are:

X_1 = Age of household head (Years)

X_2 = Marital Status (Married=1, otherwise= 0)

X_3 = Educational Level (Years)

X_4 = Household Size

X_5 = Sex of Household Head (Male 1, Female 0)

X_6 = Primary Occupation (Farming=1, Non Farming=0)

X_7 = Farming Experience (years)

X_8 = Average income (Naira)

B_i = Coefficients

ε = Error term/Random error

RESULT AND DISCUSSIONS

Socio-economic and demographic characteristics of cooperative and non cooperative farming households

The Table 1 below shows the categorisation of cooperative and non cooperative farming households in the area under study based on socio-economic and demographic characteristics. The characteristics considered here included age, household size, marital status, educational level, average monthly income, gender, and farming experience of the respondents. The Table reveals that the households exhibit quite dissimilar characteristics for most of the variables considered except for age and sex of the household head which exhibit almost similar characteristics. More married persons were into cooperative (78%) than there were in non-cooperative activity (68%). The percentage of people who had less than or equal to primary education was more for the non co-operators (64.1%) than co-operators (43.3%), implying that more co-operators than non co-operators have educational status higher than the primary. Low education is strongly correlated with being conservative and averse to change, especially adoption of new way of doing things. The significance of the education level of household heads to food security is supported by Agbola (2005) and Babatunde et al., (2007). Both explained that the level of education of household head has significant effect on the probability of household to be food secure. A significant observation is also noticed for household size where the non cooperative farmers had a larger

household size (8) than their cooperative farmer colleagues (6). Babatunde *et al.,* (2007) and Oluyole *et al.,* (2009) observed that household food security decreases with increasing household size. Therefore, in relation to household size, cooperative farmers are more likely to be food secure than non cooperative farmers. Furthermore, non cooperative farming households had higher farming experience in terms of the number of years put into farming (32.4%) than the co-operators (26.5%). In relation to the primary occupation, majority of the households were into farming as a primary occupation. More non co-operators (58.7%) than co-operators (50.9) take farming as a primary occupation.

Table 1: Socio-economic and demographic characteristics of cooperative and non-cooperative farming households

Household Characteristics	Co-operators (n = 55)	Non co-operator (n = 53)
Age (years)	54.4	56.7
Sex (percentage male)	93	91
Marital status (percentage married)	78	68
Educational level(percentage less than or equal to primary education)	43.3	64.1
Household size	6	8
Farming experience (years)	26.5	32.4
Primary occupation(Farming)	50.9	58.7
Monthly income	₦29,876	₦23,637

Food security status of respondents

The food security index is measured based on daily energy level of 2450kcalories (FAO, 2006). The food security line (Z) for all the farming households surveyed- co-operator or otherwise was estimated at ₦141.0308 per day per adult equivalent (₦4,231.14 per month per adult equivalent). (Table 2). The result of the analysis shows that 76.4% of the sampled cooperative farming households in the study area was able to meet the recommended daily calorie intake of 2450kcalories per capita per day (implying that about 23.6% were food insecure, subsisting on less than the recommended daily per capita calorie requirement of 2450kcalorie). However, only 56.6% of the non-cooperative farming households were able meet the same recommended daily calorie intake (implying 43.4% were food insecure, subsisting on less than the recommended daily per capita calorie requirement of 2450kcalorie).

Table 2: Food security indices: comparative analysis

Variables	Values	
Cost of calorie equation	In X = a+bc	
Constant	4.543557	
Slope coefficient	0.0001655	
Recommended daily energy levels	2450kcal	
Food security line Z: cost of minimum daily energy requirements per		
Adult equivalent	₦141.0308 (per day)	
	₦4,231.14 (per month)	
	Co-operator	**Non co-operators**
Percentage of households:		
Food secure household	76.4%	56.6%
Food insecure household	23.6%	43.4%

Determinants of food security status among co-operators and non co-operators

The determinants of food security status among farming households have been considered for members of co-operative society on one hand and non members (of co-operatives) on the other as well as the whole farming households composed of both co-operators and non co-operators. This analysis was carried out with the use of probit model. Of the seven variables hypothesized as determinants of food security among co-operative and non cooperative farmers, only four and three were found to be significant at various levels for the co-operators and non co-operators respectively. Result from table 3 shows that while both age and household size were statistically significant for both cooperative (-0.0334 and -0.1633) and non cooperative members(-0.2312 and -0.2312), education (0.0034 and monthly income (0.0043) were statistically significant only for the co-operator. In line with a priori, all significant variables had the expected signs which depict the effect they have on the food security status of the respondents. Age was a significant and negative determinant of households' food security for both co-operators and non co-operators with t-values 1.80and 2.98, significant at 10% and 1% respectively. While the co-operators had a marginal value of -0.0334 meaning that 1% increase in the age of household head will decrease the probability of the cooperative farmers to be food secure by 3%, the non co-operators had a marginal value of -0.23121 implying that 1% increase in the age of household head will decrease the probability of cooperative farmers to be food secure by 23%. The reason for this negative relationship is that the productivity of household head will likely reduce by age, which ultimately would have adverse effect on the households' foods security status. This result falls in line with the findings of Babatunde *et al*, (2007) and Oni *et al.,* (2011) who worked on social capital and food security and revealed that as respondents' age increases, the probability of household being food secure reduces.

Household size was a significant and negative determinant of food security for both cooperative and non cooperative farming households (t-value for co-operators and non co-operators were -2.62 and -3.09 respectively and both were significant at 1%). Marginal values of -0.1633 and -0.2312 were estimated for co-operators and non co-operators respectively.

The implication of the marginal value is that is that a unit increase in household size will reduce the probability of household to be food secure by 16% and 23% for both co-operators and non-co-operators respectively. This is because as household size increases, income per head declines and the less food secure the household becomes. This result is in line with findings from Olayemi (1998), Oluyole *et al.,* (2009), Oni *et al.,* (2011). Moreover, comparison of the marginal values, in percentage, of cooperative and non cooperative members shows that the non co-operators are more food insecure than their co-operator counterpart with unit increase in household size. Educational level and average monthly income were significant and positive determinants of food security only for the co-operators (t-value = 2.84, significant at 1 % and t-value =2.10, significant at 5% respectively). Marginal value of 0.0034 for educational status implies that a 1% increase in the year of education of household head will increase their probability of being food secure by 0.34% and also the probability that a household would be food secure is increased by 0.43% as the average monthly income of the co-operators increase by 1%. The result of the pooled data shows that that age, household size and average monthly income were statistically significant for all the sampled farming households.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The study showed that food insecurity still overwhelmingly plagues rural populace in the country with food insecurity incidence higher for households that did not participate in cooperative activities relative to those farmers who were members of one form of cooperative society or the other. This has shown that cooperative societies or similar groups among farmers would be a veritable tool in improving the food security of farmers among other means. Education and income was also discovered to contribute to improved food security status among the farmers. It is therefore recommended that the following policy measures be pursue

- Income smoothening policy option probably in form of credit access and input subsidy should be adopted as farmers with higher income are found to be more food secure in the study area.
- Since cooperative society has the capacity to improve the food security status of member co-operators, enabling policy environment

should be put in place to encourage farmers, especially in the rural locality, to join cooperative society.

- Having found that higher education positively influences households' food

security especially among cooperative members, human capital development through education should be made a priority in policy formulation not only for the co-operators but for all farmers.

Table 3: Determinants of food security status among cooperative and non Cooperative members

Variable	Co-operators		Non-cooperators		Pooled	
	Co-efficient	Marginal effects	Co-efficient	Marginal effects	Co-efficient	Marginal effects
Age	-0.4545 (1.80)[*]	-0.0334	-0.4770 (2.98)***	-0.2312	-0.4779 (-2.98)***	-0.2654
Sex	5.4159 (1.37)	0.1521	0.033 (0.41)	0.0723	-0.4507 (-0.51)	-0.0134
Marital status	-8.9779 (-1.10)	-0.1412	-0.7060 (0.82)	-0.0237	-0.5675 (-1.09)	-0.0165
Educational level	1.6342 (2.39)***	0.0034	0.1633 (1.51)	0.0118	-0.4008 (-0.72)	-0.0056
Household size	-0.3328 (-2.62)***	-0.1633	-1.1124 (-3.09)***	-0.2312	-1.3013 (-5.22)***	-0.0185
Farming experience	0.3374 (0.80)	0.0013	0.02630 (0.596)	0.0034	0.0352 (1.12)	0.0045
Primary occupation	6.0291 (-0.93)	0.1611	0.316 (0.36)	0.2693	0.5469 (0.92)	0.0184
Monthly income	0.5422 (2.10)**	0.0043	0.0216 (0.32)	0.0029	0.0005 (1.25)**	0.2657
Constant	30.5492 (21.7956)		3.0130 (0.391)		5.21613 (2.34)	
Sample size	55		53		108	
Pseudo R[2]	0.5642		0.4541		0.5231	
Chi-square	46.06		50.46		66.76	
Log likelihood	-15.4312		-5.8208		-30.4303	

***significant at 1%, **significant at 5%,

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Enhancing Natural Rubber (*Hevea brasiliensis*) Technology Transfer through On-Farm Adaptive Research (OFAR) and Farmers Field days in the Rubber Belt of Nigeria

D. Y. Giroh[1], Henry Ornan[2] and A. B. Nudamatiya[3]

[1]Department of Agricultural Economics and Extension, Modibbo Adama University of Technology
P.M.B 2076, Yola, Nigeria
[2]Adamawa State Polytechnic, P.M.B 2146, Yola, Nigeria
[3]Adamawa Community and Social Development Agency, P.M.B2110   Yola, Nigeria
E-Mail: girohdengleyuniyus@yahoo.com

Abstract

Enhancing natural rubber (Hevea brasiliensis Muell Arg) through On-Farm Adaptive Research (OFAR) and farmers Field days   in the rubber belt of Nigeria was studied by selecting 146 contact rubber farmers through a simple random sampling technique. Data collected were analyzed using descriptive and inferential statistics (Chi – square). Results indicate that all of the farmers were literate and had one form of formal education or the other. Majority of farmers (82.98%) cultivated between ≤ 2.4 to 7.99 with a mean of 2.50 hectares. Farmers' awareness on technology transfer methods was high. Rubber intercropping combinations were with cassava (27.3%); maize (27.3%), plantain (23.2%), cowpea and yam (27.3%). Rubber Research Institute of Nigeria (RRIN) and Agricultural Development Programme (ADP) were indicated by 36.9% and 17.1% respectively as sources of awareness on technology transfer activities. Chi- square analysis reveals that awareness ($\chi^2 =23.08$), attendance at farmers' field days ($\chi^2= 28.09$), education ($\chi^2=29.6$), OFAR activities ($\chi^2=5.6$) and farm size ($\chi^2=4.07$) were statistically significant with the adoption of improved farm practices. It is thus recommended that technology transfer activities be sustained through increased funding of research and the resuscitation of the presidential initiative on natural rubber production to enhance natural rubber technology adoption by rubber farmers.

Keywords: Rubber belt, capacity building, contact farmers, Technology transfer

INTRODUCTION

Natural rubber tree belongs to the   family of latex producing plant called *Euphorbiaceae.* The rubber tree is one of the genus *Hevea* of which eleven species have been documented. Among these species, *Hevea brasiliensis* Muell Arg is the major source of natural rubber. This is as a result of superior latex yield over other species of *Hevea*. The early plantations were raised from unselected seeds with latex yield of 300 – 400 kg/ha/yr. Genetic improvement of *Hevea brasiliensis* commenced in Nigeria in 1960s following the establishment of Rubber Research Station (RRS) in 1961 and became the Rubber Research Institute of Nigeria in 1973 with the mandate of genetic improvement of natural rubber and other latex producing plants of economic importance. Germplasm collection for the purpose of genetic improvement started in 1960s with the importation of primary and improved hybrid clones from Malaysia and Sri - Lanka. The improvements resulted in the breeding of high yielding clones of rubber with latex yield of 2000 – 3500 kg/ha/yr in Nigeria (Omokhafe & Nasiru, 2004). Other improved practices such as the introduction of intercropping and mini-livestock integration in immature and mature rubber plantation were made and   aimed at value addition at the downstream sector of the industry.

Agriculture has witnessed scientific revolution that makes the process of technical change much more knowledge intensive and calls for transforming farmers through education and other capacity building activities that are catalysts in technology adoption. Capacity is the ability of people, organization and society as a whole to manage their affairs to achieve set goals. The existence of capacity is indicated by functional presence of a combination of most of the following; viable institution, financial and

material resources and skilled human resources (Giroh *et al.,* 2007). Capacity building for agriculture may be required for individual activity, nongovernmental group activities and institutional and policy actors. The major benefit of capacity building for farmers is improved performance brought about by increasing the farmers' potentials in terms of resources (skills, finance, technology, management) networks and linkages. Capacity building of farmers helps enhance wasteful resource allocation, improved access to extension services (World Bank, 2004). World Bank support to Federal Government of Nigeria for capacity in agricultural extension in 1970s led to establishment of Agricultural Development Programmes (ADPs), supported by the National Agricultural Research Projects (NARP) and Research-Extension-Farmers-Input Linkage Systems (REFILS). The multi stage Agricultural Development Projects (MSADP) also characterized the Train and Visit (T&V) extension approach (World Bank, 2004). Training is firmly rooted in the level of technological complexities that characterized agriculture. The need for training for capacity development subsumes a deficit situation in the knowledge, status and skill level of the practicing farmers as well as the availability of appropriate applicable information, the utilization of which will correct the problem situation. An effort to achieve the objectives of capacity building can best be judged in terms of acceptance of the information on the improved practice and adoption or utilization by the farmers.

On Farm Adaptive Research (OFAR) and field days have been recognized as one of the vehicles for technology delivery among farmers. Lead or contact farmers are often used with a view that through them technology could trickle down to other farmers. Okwu and Ejembi (2005) stress the need for availability of necessary physical facilities and infrastructures (classroom, demonstration plots, equipment teaching aids in enhancing adoption process of farmers. The contribution of OFAR and field days activities as they enhance natural rubber technology transfer is yet to be investigated. This study was therefore undertaken to examine OFAR and Field days as strategy for technology transfer as it affects natural rubber production.

Materials andmethods

Data on 150 rubber contact farmers were collected with the aid of interview schedule. The respondents were drawn from the traditional rubber growing and the marginal areas of

Southern Kaduna, Kaduna State and Taraba State, respectively. Out of this sample, 146 (109 from the traditional rubber belt and 37 from marginal areas of Southern Kaduna, Kaduna State) were returned and used for analysis. Data collected were analyzed using descriptive statistics and Chi – square test statistics at 5% probability level. Yates correction factor was used in the computation of variables in the Chi – square analysis (Giroh *etal.,* 2007).

RESULTS AND DISCUSSION
Socio-economic characteristics of respondents and rubber growing ecology

Data in Table 1 shows that majority (55.48 %) were aged 35 to 50 years with a mean age of 47 years. They are active and their productivity is expected to increase. Studies conducted by Windapo (2002) indicated that farmers in their mid ages constituted the bulk of contact farmers. This implies that other farmers can equally learn from them thereby enhancing the adoption of rubber production technologies. All (100.0) of the contact farmers were educated as they had one form of education or the other. Education has been found to be a catalyst in farmers' adoption and productivity. Furthermore, 82.98 % of the respondents cultivated between $\leq$ 2.44 and 7.99 hectares with a mean holding of 2.50 hectares. Out of this number, 45.78% were classified as medium scale producers while the balance of 54.2% was small scale with a mean farm size of 1. 2 ha. Studies on the production of natural rubber in Nigeria revealed that production is mainly by smallholder plantation owners which were reported to account for 70% while the balance was by estates. Similarly, farmers had a mean experience of 9 years in rubber farming with majority of them (53.42%) having between 5 and 10 years experience in rubber production . Rubber farmers are characterized by large family sizes with a mean family size of 9 people, a repository of labour for production activities.

Also, 74.6 % and 25.3% of the contact farmers were from the traditional rubber belt and marginal areas of Nigeria. The traditional rubber comprised of Edo, Delta, Abia, Ogun, Akwa Ibom, Rivers and Cross River States. The introduction of the Presidential Initiative on Natural Rubber in 2006 by the Federal Government of Nigeria was the propelling factor for the introduction and production of natural rubber in the marginal areas of Kaduna and Taraba States in Northern Nigeria (Giroh *et al.,* 2008).

Table 1: Socio-economic characteristics and rubber ecology distribution of respondents

Variable	Frequency	Percentage
Age (years)		
≤ 35	19	13.01
35 – 50	81	55.48
51 and above	46	31.51
Education		
Primary	46	31.51
Secondary	62	42.47
OND	22	15.07
HND/B.Sc	16	10.95
Household size		
≤ 5	34	23.29
6 – 10	87	59.58
> 10	25	17.12
Experience (years)		
≤ 5	59	40.41
6 –10	19	13.01
> 11	68	46.58
Farm size (hectares)		
≤ 2.4	81	55.48
2.5 – 4.99	28	19.18
5.0 – 7.99	12	8.22
> 8	25	17.12
Occupation		
Farming	71	48.63
Business	19	13.01
Civil servants	40	27.39
Pensioner	12	8.22
Lecturing	4	2.73
Rubber growing ecology		
Traditional rubber belt	109	74.66
Non-traditional rubber belt	37	25.34

Awareness on technology transfer activities and influence of some selected variables on improved farm practices

The awareness on technology transfer activities and their sources is presented in Table 2. The awareness was high and a positive signal that could trigger interest among respondents. On the basis of the sources of awareness, it reveals that Rubber Research Institute of Nigeria (RRIN) was the major source of awareness (36.9%) followed by ADP (17.1%) and tree crops unit (TCU) (13.0%).

Adoption of intercrop combination

The adoption of intercropping was high (Table 3). Immature rubber plantations were intercropped with cassava (27.3%); maize (27.3%), plantain (23.2%), cowpea and yam (27.3%). This would lead to efficient utilization of labour and land. Farmers derive maximum economic benefits from this combination in the forms of yields and income from the sales of the crops while they wait for the plantations to mature for tapping. Researches in many rubber-producing countries have advocated for the use of farming systems to encourage smallholders to sustain production. Multiple cropping have also been found to increase rubber girths and with no negative effects on immature plantation in many rubber producing countries of the world (Esekhade *et al.,* 1996; Rodrigo *et al.,* 2001).

Table 2: Distribution based on technology transfer activities and sources of awareness

Variable	Frequency	Percentage
Technology transfer activities		
Demonstration plots	121	82.87
OFAR	75	51.36
Training workshop	118	80.85
Agricultural shows	118	80.85
Farmers field days	146	100.00
Sources of awareness		
Min of Agric &Nat. Resources	12	8.22
Rubber Research Institute of Nigeria (RRIN)	54	36.98
Agricultural Development Program (ADP)	25	17.12
Michelin	9	6.16
Tree Crops Units(TCU)	6	4.11
Friends / Relatives	19	13.01
Newspaper	9	6.16
Radio/ Television	9	6.16

Table 3: Distribution of respondents by adoption of intercrop combination

Variable	Frequency	Percentage
Intercrop combination		
Rubber + cowpea	12	8.22
Rubber + melon	36	24.66
Rubber + cassava	40	27.39
Rubber + maize	40	27.39
Rubber + plantain	34	23.29
Rubber + pineapple	19	13.01
Rubber + yam	40	27.39

Farmers' selected personal characteristics and adoption of improved practices

Chi–square test for relationship between selected variables and implementation of improved practices revealed that awareness (χ^2 =23.08), attendance at farmers' field days (χ^2= 28.09), education (χ^2=29.6), OFAR activities (χ^2=5.6) and farm size (χ^2=4.07) werestatistically significant with the adoption of improved farm practices displayed during the field days (Table 4). Attending field days by farmers and observing method demonstration offered the farmers the opportunity to learn by doing thereby stimulating interest and propelled them to adopt innovations displayed. The result is in conformity with earlier works conducted by Okwoche *et al.*(2007). Farm size and education are critical in innovation adoption by farmers.

Table 4: Chi – square test of relationship between selected variables and implementation of improved practices

Variable	Df	χ^2_{Cal}	Remarks
Attendance at field days			
Awareness	1	28.09	Significant
Education	1	23.08	Significant
Farm size	1	29.68	Significant
On farm adaptive	2	4.07	Significant
research(OFAR)	1	5.67	Significant

CONCLUSION AND RECOMMENDATION

The study examined enhancing natural rubber technology transfer through OFAR and farmers field days in the rubber belt of Nigeria. Adoption of intercropping was high among contact farmers. Rubber Research Institute of Nigeria dominated sources of information on awareness on technology delivery mechanisms. Field days attendance, education, farm size and awareness and OFAR have significant effects on adoption of improved practices. Technology transfer methods should be sustained through increased funding of research by the Federal Government of Nigeria. There is also the need for the resuscitation of the presidential initiative on natural rubber to boost rubber production in Nigeria. Farmers are encouraged to form cooperative societies to enable them benefit from credit facilities from commercial banks and the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB).

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Biotechnology knowledge and perceptions issues among students in the Faculty of Agriculture and Forestry, University of Ibadan

Fawole, O. P.

Department of Agricultural Extension and Rural Development, University of Ibadan. Ibadan.

Abstract

This study investigated agricultural students' knowledge and perception of biotechnology issues. The study was carried out at the Faculty of Agriculture and Forestry of the University of Ibadan. Proportionate sampling method was used to select a sample size of two hundred and sixty four (264) respondents. Variables measured included respondents' demographics, biotechnology information sources, knowledge and perception. The data were analyzed using frequencies, percentages and mean for descriptive analysis while Chi-square analysis, Pearson Product Moment correlation and analysis of variance were used for inferential analysis. Findings reveal that 54.5% of the respondents were female, 56.1% of the respondents had negative perceptions towards biotechnology issues while 82.2% of the respondents had average knowledge level on biotechnology issue. A significant relationship exists between each of respondents' years of formal education, (r = 0.122, p = 0.047), religion, (χ^2= 8.015, p = 0.018) department (χ^2 = 23.498, p = 0.024) and their knowledge of biotechnology. Significant difference exists between the knowledge level of the respondents across the sampled departments (F = 3.446, p=0.003). It was concluded that most of the respondents had unfavorable perception and an average knowledge level on biotechnology issues. The study recommends that learning should not be limited to classroom setting alone. Visits to research institute or private firms who are into research on biotechnology should be arranged for students of faculty of agriculture.

Keywords: Biotechnology, Knowledge, Perception, Agricultural students

INTRODUCTION

Agricultural biotechnology is a new and rapidly emerging area of science and technology. It promises new ways to harness and improve the biological potentials of crops, livestock, fish, and trees, and improved ways to diagnose and control the pests and pathogens that damage them (Serageldin and Persley, 2000). However, students tend to have poor understanding of biotechnology issues, though the impact of these technologies on peoples' everyday lives is increasing daily. Students are an important audience in the biotechnology discourse. It is pertinent that students in the Faculty of Agriculture and Forestry who are future scientists and advocates are knowledgeable about biotechnology issue.

Generally literature is replete with knowledge and perception studies relating to biotechnology. Early studies of biotechnology and students, suggested lack of understanding of the scientific and science principles not only by the researchers but also by students, many of whom are expected to be future advocates of the processes and applications of biotechnology (Labov, 2003 and Wingenbach *et al* 2002). Current trend still indicates that lack of knowledge about biotechnology and remain the primary reason for anxiety about Genetically Modified Organism (GMO) (Tegegne, Aziz, Bhavsar and Wiemers, 2013 and Lamanaukas, 2008).

The lack of knowledge of biotechnology widely reported among student may be attributed to the inability of scientists to explain biotechnology breakthrough in simple terms. This, may be seen as an information and education gap, which may be due to lack of understanding the technical science behind biotechnology (Wingenbach *et al* 2002). Contributing to this misinformation on biotechnology is the low knowledge of students on basic agricultural and biological sciences. This lack of understanding generates concern. Results emanating from surveys indicate that provision of factual information increases audience acceptance (Hoban, 2003).

Scientists remain a major source of information to the student audience despite the

use of complex of scientific language in providing biotechnology breakthrough. Goodrum *et al* (2001) point to scientific literacy as a key element in scientific discourse as it helps students to develop deeper understanding of the world around them and enable them participate meaningfully to relevant discourse about everyday life activities. Biotechnology represents a typical scientific discourse (Sturgis *et al,* 2005) and scientific literacy helps individual to be knowledgeable about science content and ability to critique scientific debates (Coll *et al* 2008). Students are a part of the biotechnology discourse and their lack of knowledge and poor perceptions of biotechnology issues continues to generate interest among researchers and hence remains the focus of numerous studies.

Researchers concerns about lack of biotechnology knowledge among students undermine the expectation that they become future campaigners of the concept and processes and applications of biotechnology (Alberts and Labov, 2003). It also complicates the desire for students who are major stakeholder in the biotechnology discourse that are expected to understand the basics of biotechnology and its implications in agricultural development, environment, personal and public health. Investigating students' knowledge and perception of biotechnology in the faculty of agriculture and forestry is critical to educating them in biotechnology.

Overall, agricultural biotechnology and perceptions are based on information source, cultural preferences and confidence in governmental safeguards (Hoban, 2003). He also argued that lack of knowledge and experience of a topic can lead to inaccurate perception and providing factual information improves acceptance and hence perception. Furthermore, students often struggle to translate information from scientists about biotechnological breakthroughs as a result of the complexity of the language (Doerfert, Faberston, Akers and Kister, 2005). Biotechnology issues relating to students knowledge and perception can be viewed along these lines of thought. Can the same be said for students of the Faculty of Agriculture and Forestry who have opportunities to become engaged in science classes, laboratories and dialogue with university scientists and lecturers? This study thus determined respondents' personal characteristics, information sources, assess their perception and knowledge of biotechnology and the influence of the various departments on their knowledge of biotechnology. Also relationships between respondents' personal characteristics and their biotechnology knowledge, perception, information sources, and influence of departments on their knowledge of biotechnology were investigated.

METHOD

The study was conducted in the Faculty of Agriculture and Forestry, University of Ibadan, Nigeria. This Faculty is made up of eight departments; Animal Science, Agricultural Extension and Rural Development, Agricultural Economics, Agronomy, Forestry Resource Management, Fisheries and Aquaculture, Wildlife and Ecotourism, and Crop Protection and Agricultural Biology. The target population consisted of all 300, 400, and 500 students in the eight departments. Stratified and proportionate random sampling techniques were used to select 40% students from 300, 400 and 500 levels from the eight departments which resulted in a total of 264 students. The 100 and 200 level students were not included in the study because they only take courses at the faculty level and have not been assigned to departments in the Faculty.

A well structured questionnaire based on the research objectives and hypotheses developed for the study was used to collect data. Information was collected on knowledge, perception, sources of information and personal characteristics of the respondents. Descriptive statistics and inferential statistics such as chi-square, ANOVA and correlation were used to analyze the data collected.

Measurement of variables

A series of 28 items and 30 statements were used to measure their biotechnology perception and knowledge.

a) Knowledge of biotechnology: Students were asked to respond to 30 statements, half positively worded and half negatively worded. They were asked to provide a yes (1) or no (0) answers. Maximum and minimum scores of 30 and zero were possible. Overall, knowledge scores were categorized into high, average and low.

b) Perception of biotechnology: Students responded to 28 statements on a five point Likert scale with the following ratings: strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1). Negatively worded items were reversed before summing the score. Maximum and minimum scores of140 and 28 were possible. Finally, overall perception scores were

categorized into favourable (74-148) and unfavourable (less than 74).

RESULTS AND DISCUSSION
Respondents' personal characteristics

Table 1 shows that respondents were a mix of female (54.5%), and male (45.5%), aged between 21-25years. Results also show that many respondents had early education in private primary (65.9%) and public secondary (56.8%) schools respectively, had between 3-5 years university education. Averagely they have had 15-19 years of formal education which is considered to have some influence on their knowledge and perception of biotechnology and related issues. However, religious affiliation indicates that majority are Christians (68.2%).

Table 1: Personal characteristics respondents'

Variables	Frequency	Percentage
Gender		
Male	120	45.5
Female	144	54.5
Age		
16-20	39	14.8
21-25	175	66.5
26-30	44	16.7
31-35	4	1.50
Above 35	1	0.40
Religion		
Islam	83	31.4
Christianity	180	68.2
Traditional religion	1	0.40
Primary school attended		
Private	174	65.9
Public	90	34.1
Secondary school attended		
Private	114	43.2
Public	150	56.8
Respondents Department		
Agricultural Extension	34	12.9
Agricultural Economics	65	24.6
Agronomy	37	14.0
Animal Science	42	15.9
Crop protection & Environmental Biology	17	6.40
Forestry	25	9.50
Wildlife and fisheries	44	16.7
Years of formal education		
10-14	52	19.5
15-19	197	74.7
20-25	15	5.80

Respondents' knowledge of biotechnology

Table 2a presents the result of respondents' knowledge of biotechnology. The results on respondents' knowledge of biotechnology show that respondents' knowledge was high on issues relating to the fact that biotechnology is the genetic manipulation of living things ($\bar{x} = 0.898$), being a practical application of genetically modified plants to increase productivity and resistance against diseases ($\bar{x} = 0.754$). Many (82.2%) of the respondents' were averagely knowledgeable about biotechnology while only 17.0% had high knowledge (Table 2b). This finding negate previous reports of poor biotechnology knowledge among students (Chad *et al* 2010; Wingenbach *et al* 2002; and Hallman, Adelaja, and Schilling 2002).

Table 2a: Distribution of respondents by knowledge on biotechnology issues.

S/N	Knowledge statements	Mean Score
1.	Biotechnology is the genetic manipulation of living things.	0.898
2.	Mutation is a genetic aberration.	0.799
3.	All lethal genes are harmful.	0.487
4.	Engineered microbes have any long-term effects on the environment.	0.652
5.	Biotechnology contribute to erosion of rural values	0.546
6.	GMOs do not pose any threat to the environment	0.542
7.	Genetically modified crops present health hazards to humans.	0.538
8.	Biotechnology is the genetic manipulation of living things for the benefit of human health.	0.250
9.	Could biotechnologically engineered crops invade sensitive habitats and become a threat to native plants.	0.549
10	Genes are consequences of nucleotide on chromosomes.	0.724
11.	Bacterial genes from yoghurt that can be consumed can be incorporated into cell in human organism.	0.367
12.	Recessive genes are never expressed.	0.508
13.	Hybrid seeds cannot be saved, so purchasing new seed every year.	0.508
14.	Hereditary materials in plants can be changed to make them resistant to plants and disease.	0.727
15.	Practical application of GM plants may increase productivity and resistance of plants against diseases.	0.776
16.	Application of GM methods on animals can increase animal resistance against identical.	0.754
17.	Genetically modified or cloned animals are always bigger than ordinary ones.	0.398
18.	It is possible to transfer animal genes into plants because DNA is chemically identical.	0.458
19.	By eating a genetically modified fruits, a person genes could become modified.	0.629
20.	Propagation of plants by cutting cloning.	0.489
21.	Genes are not normally transmitted from species to species in nature.	0.439
22.	Bread rising is a biotechnological process.	0.595
23.	Before application of GM plants, It is obligatory to perform a risk assessment about possible harmful influences of GM plants on the health of people animals (other organism) and the environment.	0.705
24.	Genetical modification to plants can increase nutritional quality and flavour of fruits and develops traits to withstand shipping process.	0.701
25.	Foods with increasing nutritional value and vitamins can be created through genetic modification.	0.716
26.	Genetic modification is painful for animals.	0.587
27.	Recombinant bovine somatotrpine is an animal drug that increases milk produced by dairy cows.	0.564
28.	Consumption of GM food can destroy human genes.	0.572
29.	GM crops are sterile.	0.553
30.	Mutations are result of cloning.	0.523
	Overall Mean Score for 30 items	0.585

Table 3: Biotechnology knowledge among respondents

Knowledge	Frequency	Percentage
High	45	17.0
Average	217	82.2
Low	2	0.8

Respondents' perception of biotechnology

Information on respondents' perception of biotechnology (Table 3a) reveals that respondents' were somewhat supportive of biotechnology practices for developing crops to be more resistant to insect attack thereby reduce pesticide application ($\bar{x}$ = 4.25). Also respondents' were interested to know more about genetically engineered foods ($\bar{x}$ = 4.19), but also agreed with the use of plants in which genes

increasing the quality and productivity are inserted ($\bar{x}$ = 4.00). Respondents generally agreed to the use, consumption, and support for biotechnology practices ($\bar{x}$ = 4.25 - 3.50). Overall, 56.1% of the students had unfavorable perception to biotechnology issues while 43.9% had positive perception (Table 3b). This implies that most of them are unfavorably disposed to biotechnology issues despite their average to high knowledge of biotechnology (Table 3a). Additional information may be a key to improving biotechnology knowledge among respondents because Lewis and Leach (2006) noted that additional knowledge influences the ability to identify key issues and enhance understanding.

Table 3a: Distribution of respondents by perception on biotechnology issues(N = 264)

Perception statements	Mean Score
1. Altering the genes in fruit to improve their taste is not acceptable to me	3.26
2. I am against altering the genes of fruits and vegetables to make them stay fresh longer.	2.97
3. Consumption of genetically modified food is risky	3.20
4. I would not give Gm Food to children.	3.16
5. I agree with the use of genetic engineering if it helps with therapy of genetically determined diseases.	3.97
6. I support the use of food biotechnology to modify plant's genetic structure to be more resistant to damage by insects, thereby reducing pesticide applications	4.25
7. Altering the genes of plants so that they will grow better in salty soils is acceptable to me	3.67
8. I agree with the use of plants in which genes increasing quality and productivity were inserted.	4.00
9. I want to know more about genetically engineered foods.	4.19
10. I trust the food industry to take necessary actions to provide safe genetically engineered foods.	3.81
11. I think the current governmental regulations are sufficient to protect the public from risks associated with genetically engineered foods.	3.10
12. Public is sufficiently informed about risks associated with genetically engineered foods.	2.84
13. Genetically modified food does not influence human health	2.95
14. I would eat genetically modified tomatoes.	3.47
15. I think that genetically modified products taste better.	3.11
16. If I find that the product is made from genetically modified stuff, I will buy it	3.46
17. Inserting genes from human cells into the fertilized eggs of sheep is acceptable to me.	2.52
18. I support changing the genes in cattle to make their meat more nutritious to eat.	3.39
19. I am opposed to transfer of genetic material between plants and animals.	3.38
20. Manipulation with DNA are unethical	3.50
21. Men do not have rights to intervene to DNA, it is against nature.	3.06
22. We should not alter the genes in plants to get them to make more oils useful in manufacturing.	3.07
23. Genetic manipulations disturb ecological relationships.	3.30
24. There is threat of hybridization between genetically modified and normal plant which would endanger original genetic resources of wild plant.	3.50
25. I would support a ban on the production and purchase of genetically engineered products	3.17
26. Use of GM microbes to decomposing human sewage is acceptable to me.	3.82
27. I support the use of genetic engineering for non food purpose such as production of human medicines.	3.60
28. I agree with production of insulin with using genetically modified microbes.	3.62
Overall mean score for all 28 items	**3.41**

Table 3b: Respondents' overall perception of Biotechnology

Perception	Frequency	Percentage
Unfavorable	148	56.1
Favorable	116	43.9
Total	234	100

Respondents' selected demographics and perception of biotechnology

Results in Table 4 indicate that significant relationship existed between respondents' religion and their perception of biotechnology (χ^2 =8.015, p = 0.018). This result is consistent with previous finding which reported that consumer acceptance and approval of genetically modified foods and crops are influenced by religious values (Biel and Nilsson, 2005; Hossain *et al,* 2003 and Evensen, Hoban and Woodrum, 2000). It is expected that respondents who hold religious views would have lower support for biotechnology applications than those who are less religious. However, there was no significant relationship between respondents' gender and perception of biotechnology (χ^2 = .320, p = 0.018). Prokop *et al* (2007) reported that not all dimensions of attitudes are expected to be influenced by gender. Similarly, no significant relationship was found between level of study among respondents (χ^2 = 2.090, p = 0.353), department (χ^2 = 4.120, p = 0.660), ethnicity (χ^2 = 7.820, p = 0.252) and possession of agricultural property (χ^2 = 0.331, p = 0.252) and knowledge of biotechnology.

Table 4:Chi-square analysis of respondents selected demographics and biotechnology perception

Variables	χ^2	Df	P value	Decision
Gender	0.320	1	0.619	Not significant
Level of study	2.090	2	0.352	Not significant
Department	4.120	6	0.660	Not significant
Religion	8.015	2	0.018	Significant
Ethnicity	7.820	6	0.252	Not significant
Possession of Agric. property	0.331	1	0.565	Not significant

Respondents age, years of formal education and knowledge of biotechnology

Results on Table 5, show that significant relationship existed between respondents' years of formal education and their knowledge of biotechnology (r = -.0.122, p = 0.047), however, respondents' age (r= -0.43; p = 0.488) had no significant relationship with their knowledge of biotechnology issues. This result implies that years of formal education is a significant factor on the biotechnology knowledge while age is not a significant factor. This finding match those of previous age and education related studies which reported relatively poor understanding of biotechnology among lower grade students (Dawson 2007; and Chen and Raffen 1999).

Table 5: Correlation analysis showing the relationship between respondents' age, formal education and knowledge of biotechnology

Variable	r	P	Decision
Age	-0.43	0.488	Not significant
Years of formal education	0.122	0.047	Significant

Biotechnology knowledge among students across departments

An interesting outcome of the analysis (Table 6) reveals a significant and positive difference in the biotechnology knowledge of students across the eight departments in the Faculty of Agriculture and Forestry (F = 3.446, p = 0.003). It means that departments to which respondents belong has influence on their knowledge about biotechnology. Interestingly, most (24.6%) of the respondents' were from Agricultural Economics Department which is social science based. This result negates findings of Tegegne *et al* (2013) that social science students claim less knowledge about biotechnology compared to those in biological science.

Table 6: Analysis of variance and respondents' knowledge of biotechnology across departments

Variable	Df	Mean square	F	Sig.	Decision
Knowledge level	6	31.05	3.446	0.003	S

CONCLUSION AND RECOMMENDATION

Based on the findings, the following conclusion can be drawn: Most of the students were female, young and of Christian faith. Most were in their third year of study and are studying Agricultural Economics. Most of the respondents have unfavorable perception to biotechnology issues and average knowledge on biotechnology issues. Students' years of formal education and department are significant factors to their knowledge of biotechnology issues. Religion influenced respondents' perception to biotechnology issues across the sampled departments.

The study recommends that

- Since knowledge and experience increase the likelihood informed, unbiased opinion and perceptions, students should be engaged in meaningful discussions about the science of biotechnology and current issues in biotechnology.
- More research should be carried out across the eight departments in the faculty of Agriculture and Forestry.
- Learning should not be limited to classroom alone. Agricultural students should be made to visit research institute or private firms that are into biotechnology research. This will help improve their experiences and in turn their ability in using them to form perceptions about biotechnology.

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Perception of Rural Dwellers on Girl - Child Education in Saki East Local Government Area of Oyo State

Adebisi G. L.[1], Oyebode L. A. [2] and Balogun O. T. [3]

[1]Department of Agricultural Extension and Management, Federal College of Animal Health and Production Technology, Oyo state.
[2]College of Agriculture Food Science and Technology, Wesley University of Science and Technology, Ondo, Ondo state.
[3] Department Of Agricultural Extension and Rural Development, University of Ibadan.
abiodunoyebode @gmail.com.

Abstract

This study examined perception of rural dwellers on girl-child education in Saki East local government area of Oyo state. A multi-stage sampling procedure was used to select the respondents, resulting in a total number of 120 household heads used for this study. Primary data on the perception of rural dwellers on girl-child education was collected using interview schedule and were analyzed using descriptive and inferential statistics. Results reveal that majority (75.8%) of the respondents were male, within 41-50 years of age and were aware of girl-child education through the use of the radio (81.7%). Further results show that majority (85.0%) of the respondents had favorable perception of girl-child education. Chi-square analysis of the result shows that there was a significant relationship between the level of education of the respondents (χ^2 = 4.379, p = 0.002), awareness on girl-child education (χ^2 = 5.441, p = 0.020) and their perception of girl-child education. Further results of correlation analysis revealed that there existed a correlation between income (r = -0.592, p= 0.000), the constraints facing rural dwellers on girls' education (r = -0.465, p = 0.000) and their perception on girl-child education. Based on these findings, the study recommended that adult literacy should be encouraged and the cost of acquiring formal education should be subsidized.

Keywords: Perception, rural dwellers, Girl-child education.

INTRODUCTION

Within the context of the Nigerian environment, several definitions of the girl-child exist. The national child welfare (1989) as cited by Ada (2007) defines the girl-child as a person below 14years of age. Oxford advanced learner's dictionary defines the girl-child as a female child of 6-8years of age which is the age before one can become a young adult and the period covers the crèche, nursery and early childhood. Offorma (2009) defines the girl-child as a biological female offspring from birth to 18years of age. This period is made up of infancy, childhood, early and late adolescent stage of development. The girl-child is seen as a young female person who would eventually grow into a woman and marry. An adolescent girl stands at the doorway of adulthood (Catherine, 2012). In that moment much is decided. If she stays in school, remains healthy and gains real skills, she will marry later, have fewer and healthier children and earn an

income she will invest back into her family (Catherine, 2012). She is conditioned to look after the young ones, the home and the elderly. (Catherine, 2012). She is taught to be obedient and internalize the notion that she is someone's property and responsibility. She is her parents' property at childhood and her husband's in adulthood. The gender apartheid places her in a disadvantaged position. Her potential is suppressed and self-actualization is not realized (Goodluck and Osayande, 2011).

Education has been described as the most important aspect of human development and a key to successful living. According to Ocho (2005), education is the process through which individuals are made functional members of the society; it is the process of acquiring knowledge and realizing potentials for self-actualization. Rural adolescent girls are the backbone of virtually every rural family, making economic and social contribution to the family. Denying the

girl child access to education implies making her a dysfunctional member of the society. Girl education is a vital tool for empowerment that allows for meaningful contributions to the society. According to UNICEF (2007), girls' education does not only bring the immediate benefit of empowering girls, but is seen as the best investment in a country's development. This is further stressed by a popular adage, train a boy and train a person, but train a girl and build a nation. Furthermore, the role of girls' education cannot be over-emphasized due to its contribution in helping girls to develop life-changing skills including self-confidence, ability to participate effectively in the society and protect themselves from HIV/AIDS and other self-exploitation.

UNICEF (2007) further asserted that girls education helps in cutting children and maternal mortality rates, contributing to national wealth, controlling diseases and improving health status. In most African traditional societies, experience shows that women and girls have been abused, marginalized, discriminated against and denied their rights in most spheres of human endeavor (Eniola *et al.*, 2010). Women and girls living in the rural areas of the developing world play a vital, yet unrecognized role as agricultural producers and hold the potentials to be agents of food and nutritional security and economic growth (Catherine, 2012). It is evident that without educating the girl-child, sustainable development cannot be achieved especially now that the world is clamoring for rural development. Education is a tool with which girls can attain sustainability, development and be made functional members of the society.

The best way to break the vicious cycle of poverty is to keep the rural girl off the part of school dropout, early marriage, early child birth and vulnerability to sexual violence. An extra year of primary school boosts girls' eventual wage by 10% to 20% (Catherine, 2012)

Despite the crucial importance of girl-child education to the nutritional security and economic growth, illiteracy among rural girls is still very high. UNICEF (2007) estimated the global figure for out-of-school children at 121million, 65million are girls with over 80 percent of these girls living in sub-Saharan Africa, Nigeria inclusive. Okeke, *et al* (2008) identify child labour, poverty, lack of sponsorship, quest for wealth, bereavement, truancy and broken homes as factors inhibiting girls access to education in Nigeria. Although there is a policy of free primary and secondary education in Nigeria, data suggests that there are still significant disparities between girls and boys education in Nigeria. British Broadcasting Corporation (2006) reported that the African societal viewpoint favors boys over girls because boys maintain the family lineage. That their mothers were not educated is another reason that makes them feel that their daughters do not need education. Despite the benefits which girls' education is capable of rendering to the society, it is observed that the girl child's enrollment in schools in this is still very low study area is still low which justified the need for this research work.

Objectives of the study

The general objective of this study was to explore rural dwellers perception of girl child education in Saki east local government area of Oyo State.

Specific objectives of the study were to:

1. describe the socio-economic characteristics of rural dwellers.
2. ascertain the awareness rural dwellers have on girl-child education.
3. assess the rural dwellers perception of girl-child education.
4. identify the constraints rural dwellers are facing to give girl-child education.

METHODOLOGY

The study was carried out in Saki east local government area of Oyo state. The local government was created on December, 1996. It has a land area of $1,569km^2$ and population of 110,223 as at 2006 census. The study population consist of the rural household heads in Saki east local government area. Multistage sampling was used for this study. The first stage involved the selection of twenty villages out of the thirty – three villages in Saki east local government using simple random technique. In the second stage, six households from each village were systematically selected. From each household, one household head was interviewed to give a total sample size of 120 respondents.

Measurement of variables

The independent variables for this study include rural dwellers socio-economic characteristics (age, sex, marital status, educational level, occupation etc.), awareness of girl-child education which was elicited by asking respondents to state if they are aware of girl child education or not by giving a yes or no response option, they were also asked to state their source of information from a list of sources listed and constraints faced by the respondents in a bid to

offer girl-child education with the following response options not a constraint, minor constraint and major constraint which was scored and ranked, while the dependent variable of the study was the perception of rural dwellers on girl child education, this was captured by asking the opinion of respondents from a set of perception statements which was measured using a 5-point Likert-type scale.

RESULTS AND DISCUSSION
Respondents' socio-economic characteristics

Age distribution as shown in Table 1 reveals that 5.0% of the respondents were between the ages of 21 to 30 years, 15.0% were between 31 and 40 years, 31.7% were within 41-50 years. From the analysis, it could be deduced that, the respondents are still in their productive years hence they will not be able to seek for viable information on girl-child education and will not be able to take risk in that regard. Also most of the respondents (75.8%) were male while only few (24.2%) were female. This reveals that the major decision about girl child education still emanates from the males. As shown in Table 1, 86.7% were married, 3.3% divorced while 10.0% of the respondents were widowed. This means that majority of the respondents were married and therefore had families to cater for. It should be noted the wide disparity between the married respondents and other categories may largely be attributed to the respect for family as a social institution in Africa. Available data in Table 1 further shows that 41.7% had between 5 and 8 persons in their families, while 19.2% of the respondents had above 12 persons in their families. This shows that the rural household heads have rather large families to cater for. Household size has a great role to play in family labour provision in the agricultural sector (Sule, Ogunwale and Atala 2002). Findings also show that 53.3% of the respondents had no formal education, 22.5% had primary education, 7.5% had secondary education and 16.7% had tertiary education. This means that majority of the respondents have no formal education and as such will affect their decision on girl education. This is supported by (Ocho, 2005) that majority of the rural dwellers are illiterate and as such do not see the need for educating their children because they are not educated themselves.

Table 1 Distribution of respondents according to their socio-economic characteristics (n= 120)

Variables	Frequency	Percentage (%)
Age (Years) *(Mean = 51 Years)*		
21 – 30	6	5.0
31 – 40	18	15.0
41 – 50	38	31.7
51 – 60	28	23.3
61 – 70	17	14.2
Above 70	13	10.8
Sex		
Male	91	75.8
Female	29	24.2
Marital Status		
Married	104	86.7
Divorced	4	3.3
Widowed	12	10.0
Religion		
Islam	56	46.7
Christianity	57	47.5
Traditional	7	5.8
Household Size *(Mean = 9 Persons)*		
1 – 4	10	8.3
5 – 8	50	41.7
9 – 12	37	30.8
Above 12	23	19.2
Educational Attainment		
No formal education	64	53.3
Primary education	27	22.5
Secondary education	9	7.5
Tertiary education	16.7	16.7

Respondents' awareness of girl-child education

Table 2 shows that majority (95.8%) of the respondents were aware of girl- child education while only 4.2% said they were not aware. This means that most of the respondents at least know what girl-child education is about. Furthermore, on means of awareness, 81.7% had radio as their source of awareness on girl-child education, 33.3% prompted television as means of awareness. This corroborates the findings of Eniola *et al* (2010) that radio is the rural dwellers' main source of getting informed as there is no electricity to operate television. Only 20.0% of the respondents had newspaper as their means of awareness. Majority, (48.3%) of the respondents had been aware of girls' education for over 16 years, 33.3% had been aware between 6 and 10years, 9.2% had been aware for 11-15 years. The trend observe in this report could be attributed to the mass sensitization going on for quite a while about the benefits of girl-child education.

Table 2: Distribution of Respondents According to their Awareness on girl-child education (n = 120)

Variables	Frequency	Percentage
Awareness	115	95.8
Means of awareness		
Radio	98	81.7
Television	40	33.3
Newspaper	24	20.0
Family	96	80.0
Friends	94	78.3
NGOs	14	11.7
Extension agents	18	15.0
Campaign bill boards	14	11.7
Duration Of Awareness (Mean = 11 Years)		
Not aware	5	4.2
1 – 5 years	6	5.0
6 – 10 years	40	33.3
11 – 15 years	11	9.2
16 years and above	58	48.3

Respondents' perception of girl-child education

Majority of the respondents (62.5%) affirmed that girls education improves family health, 75% are also of the opinion t that it reduces poverty. This is in line with the findings of Ocho (2005) that for every additional year of education a girl receives, it boosts her income by 20%. Also evident is that over 85% of the respondents agreed that girls' education delays age of marriage, 79.2% are of the opinion that it delays the onset of child bearing, it is viewed that the girl will be engrossed with her study and rarely think of marriage until she is through with school which is considered by them as late age for marriage.

Majority (76.7%) also agreed that girl-child education leads to reduction in tradition and culture in the sense that with more civilization comes increased decadence in moral, cultural and traditional belief.

Table 4   Perception of the Respondents on Girl Child-Education

STATEMENTS	SA	A	U	D	SD	*Mean*
Lowers rate of child mortality	35(29.2)	45(37.5)	13(10.8)	21(17.5)	6(5.0)	*3.68*
Girls education improves family health	45(37.5)	30(25.0)	20(16.7)	22(18.3)	3(2.5)	*3.77*
It helps the girls to manage their marital life	48(40.0)	39(32.5)	7(5.8)	22(18.3)	4(3.7)	*3.88*
Girl–child education improves the worth and self-esteem of the girl child	51(42.5)	33(27.5)	14(11.7)	18(15.0)	4(3.3)	*3.91*
It reduces poverty	47(39.2)	43(35.8)	10(8.3)	18(15.0)	2(1.7)	*3.96*
Prevents sickness and diseases	38(31.7)	50(41.7)	13(10.8)	17(14.2)	2(1.7)	*3.88*
Girl – child education helps them to make decision and influence community change in key areas	48(40.0)	36(30.00)	14(11.7)	20(16.7)	2(1.7)	*3.90*
Girl education lowers rate of malnutrition	38(31.7)	46(38.3)	15(12.5)	16(13.3)	5(4.2)	*3.80*
Girls education delays age of marriage	70(58.3)	33(27.5)	9(7.5)	4(3.3)	4(3.3)	*1.66*
It delays onset of child bearing	60(50.0)	35(29.2)	12(10.0)	10(8.3)	3(2.5)	*1.84*
Girl – child education reduces my income	56(46.7)	29(24.2)	7(5.8)	16(13.3)	12(10.0)	*2.16*
Girls educations leads to early sexual desire	59(49.2)	19(15.8)	13(10.8)	19(15.8)	10(8.3)	*2.18*
It also leads early exposure to reproductive risk	38(31.7)	26(21.7)	19(15.8)	31(25.8)	6(5.0)	*2.51*
Girls educations leads to reduction in tradition and culture	60(50.0)	32(26.7)	12(10.0)	12(10.0)	4(3.3)	*1.90*
Leads to early and unwanted pregnancy	33(27.5)	23(19.2)	23(19.2)	33(27.5)	8(6.7)	*2.67*
Girl – child education prevents the girls from being submissive to their husbands therefore leads to divorce and broken homes	49(40.8)	25(20.8)	12(10.0)	22(18.3)	12(10.0)	2.36

Constraints of rural dwellers on girl child education

Table 5 shows that, majority of the respondents (84.2%) were constrained by insufficient fund to send their girl-child to school. This is in line with Sheldon (2010) who asserts that majority of the rural dwellers are poor and therefore, cannot afford the associated cost of

school fees, school uniforms, notebooks, textbooks, school shoes, stationeries and other bills associated with acquiring formal education.

Surprisingly, the rural dwellers too were concerned with the high level of unemployment in the country as 80.8% of the respondents chose national unemployment as a major constraint. About 74.0% of the respondents opined that government policy and implementation was a major constraint. Lack of a precise demographic rural definition frustrates those who work in setting education policy (Hobart 2005). It is a common knowledge that the Nigeria government is all promises and no action by not implementing most of the policies formulated on education.

Findings further reveal that 58.3% of the respondents prompted large families as a result of many wives and children as a major constraint to them while 66.7% had limited resources to cater for many wives and children. This implies that the rural dwellers have large families to aid them on the farm and as a result find it difficult to cater for them with the high level of poverty in the country.

Table 5: Distribution of respondents according to constraints facing rural dwellers on girl-child education

Constraints	Major Constraints (%)	Minor Constraints (%)	Not a Constraints (%)	Weighted Score (%)	Mean	*Rank*
High cost of education	79(65.8)	39(32.5)	2(1.7)	317	2.64	*4th*
Insufficient fund	101(84.2)	16(13.3)	3(2.5)	338	2.82	*1st*
National unemployment	97(80.8)	12(10.0)	11(9.2)	326	2.72	*2nd*
Religious bias on girl child	45(37.5)	16(13.3)	59(49.2)	226	1.88	*9th*
Gender bias on girl child	56(46.7)	25(20.8)	39(32.5)	257	2.14	*8th*
Cultural bias on girl child	32(26.7)	34(28.3)	54(45.0)	184	1.53	*11th*
Sexual molestation and harassment	57(47.5)	39(32.5)	24(20.0)	218	1.82	*10th*
Long distance of school from home	67(55.8)	28(23.3)	25(20.8)	282	2.35	*7th*
Government policy and implementation	89(74.2)	21(17.5)	10(8.3)	319	2.66	*3rd*
Large families as a result of many wives and children	70(58.3)	26(21.7)	24(20.0)	286	2.38	*6th*
Limited resources to cater for many wives and children	80(66.7)	22(18.3)	18(16.0)	302	2.52	5th

Relationship between respondents' socioeconomic characteristics and perception of girl-child education

The result of correlation analysis as revealed by table 6 shows that income (r= -0.592; p= 0.000) was significant to rural dwellers' perception of girl child education. This implies that the level of income will determine whether they will have a favourable or unfavourable perception of girl child education. It is tenable to conclude that the extent of education rural dwellers will give their girls is measured in terms of income level.

Table 6: Chi-square result of socio economic characteristics and perception of the respondents on girl-child child education.

Variables	χ^2	Df	P	Decision
Sex	1.061	1	0.303	NS
Marital status	3.048	2	0.218	NS
Religion	2.657	2	0.265	NS
Level of education	4.379	3	0.022	S
Awareness of girls education	5.441	1	0.020	S

Similarly in table 7, the level of education ($\chi2= 4.379$, p= 0.002) and awareness of the respondents on girl's education ($\chi2= 5.441$, p= 0.020) were significant to rural dwellers perception on girl-child education. This means that level of education and awareness on girl child education of the respondents affected their decision on girl's education. If they are educated and aware of girl child education, they would have a favourable perception of girl child education and of course will be ready to educate their girls. This view is supported by Yahaya (2003) who posited that people with better education take advantage of education than those that are less educated.

Table 7: Result of correlation analysis of the relationship between the socio economic characteristics and perception of respondents on girl child education.

Variables	r – value	p – value	Decision
Age	0.112	0.222	NS
Household size	0.066	0.474	NS
Income	0.592	0.000	S

Result in Table 8 indicates that there was a positive correlation between constraints facing rural dwellers on girl child education and their perception on girl child education (r= -0.465; p=0.000). This means that, constraints on girl child education has effect on rural dwellers' perception of girl child education. The constraints faced in a bid to educate girl child determine to a great extent their perception on girl child education.

Table 8: Result of correlation analysis of constraints and perception of the respondents on girl-child child education.

VARIABLES	r – VALUE	p – VALUE	*DECISION*
Constraints index	- 0.465	0.000	*S*

CONCLUSION

This study attempted an examination on the perception of rural dwellers on girl-child education in Saki east local government and it was revealed that majority of the respondents are male, are not in their productive years, had no formal education, are aware of girl – child education and agree that girl – child education improves health and reduce poverty. Insufficient funds and the present high level of unemployment was revealed as the major constraints to girl – child education. Significant relationship exist between income, educational attainment, awareness of girl education, constraints and perception of rural dwellers on girl child education.

Recommendations

Based on the findings of the study, the following recommendations were made;
- Adult literacy should be encouraged in the rural areas as these will guide parents to make informed choices as regard girl – child education
- Government should subsidize the cost of getting formal education in rural areas and can also provide scholarship and bursary awards to students as these will help parents with associated costs of textbooks, notebooks, school uniforms, sandals etc in the bid to acquire formal education.
- Government should try and implement the educational policies formulated.

- Government should create more job opportunities as this will encourage others to acquire formal education.
- Enlightenment programmes on the need for girl – child education by government and non-governmental organizations should be intensified.

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Carcass Characteristics and Gut Histomorphology of Marshall Broilers Fed Maxigrain Supplemented Diets

G. O. Adeyemo, K. T. Oyinlola and O. G. Longe

Department of Animal Science, Faculty of Agriculture and Forestry, University of Ibadan, Nigeria
Email: gbemiadeyemo@yahoo.com

Abstract

One hundred and forty four day-old Marshall Chicks were randomly assigned to six dietary treatments to assess the influence of a cocktail enzyme (maxigrain) on the carcass characteristics, visceral organ weights and gut morphology of Marshall Broilers. Completely randomised design was used for the study consisting six diets. Diet 1 was the control diet without enzyme, Diet 2; control diet with 0.1% Maxigrain inclusion, Diet 3; 5% energy reduction without enzyme, Diet 4; 5% energy reduction with 0.1% Maxigrain, Diet 5; 5% protein reduction without enzyme and Diet 6; 5% protein reduction with 0.1% Maxigrain. Diets were replicated four times with each replicate having 6 birds. Completely Radomised Design was used while the level of significance employed was p≤0.05 Results indicates that carcass characteristics observed show that only drumsticks were significantly influenced by enzyme supplementation (p<0.05). Gizzard, (3.80g) spleen (0.20g) and abdominal fat (1.60g)were also significantly affected by Maxigrain supplementation. Values obtained for gut morphological assessment of the ileum and jejunum showed significant improvements (P<0.05) in the crypt depth, 130.30µm, 136.26µm villus height 1111.80µm, 1426.90µm and villus to crypt ratio 12.82, 13.35 respectively, as a result of Maxigrain supplementation.

Keywords: Gut morphology, Marshall Broilers and Maxigrain

INTRODUCTION

Consumer preference for tender and white meat containing low contents of fat and cholesterol seems to act as catalyst engendering increased broiler production not only at festive periods but all the year round. However, dietary protein and energy provision is an expensive part of diet formulation and recently attempts have been made to reduce dietary protein and energy without a decline in broiler performance. The two main nutrients required are energy and protein, in which energy is required for growth, egg production, vital activities and body temperature maintenance which are provided from carbohydrate, lipids and protein metabolism and protein utilization is based on diet's amino acids and biological usability of them (Leeson and Summers, 2001).

The use of exogenous enzyme as a cost effective means of improving feed efficiency, poultry performance and environmental quality is already relatively commonplace. The efficacy of exogenous enzymes however depends on several factors such as the chemical characteristics of the ingredient and diet being evaluated, the microbial population in the gut (and consequently, the age of the bird), the characteristics and amounts of the enzymes used (Sarmiento-Franco *et al.,* 2003), feeding regimes and feed processing methods, and dietary nutrition levels. To be fully functional in the digestive tract, exogenous enzymes should be resistant to attack of protease in the small intestine and able to exhibit catalytic activity in the pH range 6 to 8 (Wang and Hsu, 2006).

There is however a mixed consensus on the form in which enzymes are produced either as mono-component enzymes or multi-enzymes and their efficacy in not only reducing the effects of non-starch polysaccharide, but also improving the utilization of nutrients by the animal. Thus the objective of this study was to evaluate a multi-enzyme (maxigrain) on the carcass characteristics and gut histo-morphological assessment of broilers.

MATERIALS AND METHODS
Experimental site

The study was carried out at the poultry Unit of the Teaching and Research farm, University of Ibadan, Nigeria. The experimental pens were

thoroughly cleaned, washed and disinfected. The condition of housing and management of birds were the same in all groups.

Management of birds

One hundred and forty four (144) day-old Marshall Broiler chicks were purchased from a commercial hatchery in Ibadan and randomly allotted to six (6) dietary treatments in a completely randomized design with each treatment having four replicates and six (6) birds each. Each replicate was housed in a pen fitted with all drinking and feeding facilities. Feed and water were provided *ad libitum* and all required medications and management practices were adhered to as recommended by the breeder. The experiment covered a period of seven weeks.

Experimental diets

Six experimental diets were formulated, with a cocktail enzyme (maxigrain) incorporated into the diet at the rate of 100g/tonne of feed for both starter and finisher diets. The diets are Diet 1 (control diet without enzyme), Diet 2 (basal diet with 0.1% maxigrain inclusion), Diet 3 (5% energy reduction without enzyme), Diet 4 (5% energy reduction with 0.1% Maxigrain), Diet 5 (5% protein reduction without enzyme) and Diet 6 (5% protein reduction with 0.1% Maxigrain).

Carcass evaluation

At the end of the eighth weeks of the feeding trial, one bird from each replicate was randomly selected and weighed. The selected birds were fasted overnight and slaughtered by severing the jugular vein for carcass evaluation. The live weight and the relative weights of different cut parts as well as the visceral organs were recorded.

Gut-histomorphology

Examinations of intestinal morphology were carried out according to the method of Iji*et al*. (2001). Intestine samples from each section were fixed in 10% buffered formalin until they were analyzed. Each segment was embedded in paraffin. A 5-μm section of each sample was placed onto a glass slide and stained with alcian blue/haematoxylin and eosin for examination with a light microscope. Villus height and crypt depth were measured at 100×magnification using computer software (Sigma Scan, Jandel Scientific, San Rafael, CA, USA), and then the ratio of villus height to crypt depth was calculated.

Proximate analysis

Samples of the feed ingredient were taken and proximate analysis carried out according to the methods of A.O.A.C (1990). This analysis was carried out to determine the nutrient composition (crude protein, ether extract, dry matter, crude fibre and ash) of the diets in order to permit usage for poultry rations formulations.

Statistical analysis

Data generated were statistically analysed using Analysis of Variance (ANOVA) tool Significant means were separated at p<0.05 using Duncan Multiple Range Test.

RESULTS

Carcass and visceral organ weights

A summary of the different parts of broiler carcass and organ weights expressed as percentages of live weight are presented in table 1. The dressed weight and all other carcass parts expressed as percentage live weight, revealed there were no significant (p>0.05) differences between the diets except for the drumstick weights which was significantly influenced by enzyme supplementation (p<0.05), with diet 2 (control/0.1% enzyme) having the lowest value (10.16 % of Live weight, LW) while the highest weight (12.29 % LW) was on diet 3 (5% energy reduction/no enzyme). Organ weights (Table 2) also showed that only gizzard, spleen and abdominal fat were significantly affected (p<0.05) by the treatments. Diet 6 (5% protein reduction/0.1% enzyme) produced the lowest spleen weight (0.10% LW), while weights for gizzard and abdominal fat were the highest on the same diet.

Table 1: Carcass characteristics of broilers fed maxigrain supplemented diets treatments (% Live Weight)

Parameter	1	2	3	4	5	6	SEM
Dressed weight	70.30	65.52	66.18	68.19	67.81	66.96	0.81
Thigh	10.89	10.14	10.60	10.33	11.08	10.22	0.18
Drumstick	10.76[ab]	10.16[b]	12.29[a]	10.28[b]	10.94[ab]	10.51[ab]	0.30
Breast	16.80	15.04	16.31	16.62	15.93	16.59	0.41
Back	14.40	14.16	13.54	13.2	13.67	14.57	0.40
Wing	7.19	8.81	9.12	9.27	9.14	9.18	0.22
Head	3.13	2.43	3.26	2.61	2.71	2.90	0.12
Neck	5.57	5.74	6.40	4.95	5.44	5.94	0.36
Shank	5.22	4.28	5.45	5.10	5.10	5.04	0.22

[a,b] – means with different superscripts within the same row are significantly different
1 - Control diet without enzyme   4 - 5% energy reduction with 0.1% maxigrain
2 – Control diet with 0.1% maxigrain   5 - 5% protein reduction without enzyme
3 - 5% energy reduction without enzyme 6 - 5% protein reduction with 0.1% maxigrain

Table 2: Visceral organ weights of broilers fed maxigrain supplemented diets treatments (% of live weight)

Parameter	1	2	3	4	5	6	SEM
Heart	0.53	0.55	0.47	0.55	0.47	0.55	0.02
Spleen	0.15[ab]	0.20[a]	0.12[ab]	0.15[ab]	0.14[ab]	0.10[b]	0.01
Liver	2.42	2.48	2.14	2.50	2.40	2.43	0.09
Gizzard	3.15[b]	3.40[ab]	3.03[b]	3.80[a]	2.92[b]	3.42[ab]	0.10
Pancreas	0.27	0.26	0.25	0.25	0.28	0.24	0.02
Kidney	0.70	0.79	0.74	0.72	0.63	0.58	0.04
Lungs	0.56	0.55	0.48	0.52	0.50	0.56	0.02
Abdominal fat	1.39[a]	1.54[a]	0.18[b]	1.20[a]	1.60[a]	1.81[a]	0.14

[a,b] – means with different superscripts within the same row are significantly different
1 - Control diet without enzyme   4 - 5% energy reduction with 0.1% maxigrain
2 – Control diet with 0.1% maxigrain   5 - 5% protein reduction without enzyme
3 - 5% energy reduction without enzyme 6 - 5% protein reduction with 0.1% maxigrain

Gut-histomorphological measurements

Results of the histomorpholigical measurements of the ileum presented in Table 3 showed that the crypt depth, villus height and villus:crypt ratio were significantly affected by enzyme supplementation ($p < 0.05$). Values for crypt depth were highest on diet 6 and lowest on diet 4. Inversely villus height was highest on diet 4 and lowest on diet 6. This trend was also observed for the villus:crypt ratio ($p < 0.05$), which was highest on diet 4 and lowest on diet 6. Also morphological measurements for the jejunum presented in Table 3 showed that crypt depth and villus height were significantly influenced by the diets ($p < 0.05$), villus:crypt ratio was however not influenced by the treatment diets ($p > 0.05$).

Table 3: Gut histomorphology of broilers fed maxigrain supplemented diets treatments (μm)

Parameter	1	2	3	4	5	6	SEM
Ileum							
crypt depth	124.49[a]	110.80[ab]	115.23[ab]	80.40[b]	92.37[ab]	130.30[a]	6.44
villus height	865.00[ab]	910.80[ab]	1007.90[ab]	1111.80[a]	1014.50[ab]	791.90[b]	38.67
v/c ratio	8.03[ab]	8.54[ab]	9.01[ab]	12.82[a]	8.97[ab]	6.83[b]	0.76
Jejunum							
crypt depth	136.26[a]	93.79[c]	129.0[a]	128.55[a]	111.80[b]	107.71[bc]	2.64
villus height	1415.43[a]	1102.65[c]	1426.90[a]	1246.37[b]	986.72[d]	1344.91[ab]	20.05
v/c ratio	11.44	10.90	13.35	10.67	8.93	11.68	0.75

[a,b] – means with different superscripts within the same row are significantly different
1 - Control diet without enzyme   4 - 5% energy reduction with 0.1% maxigrain
2 – Control diet with 0.1% maxigrain   5 - 5% protein reduction without enzyme
3 - 5% energy reduction without enzyme 6 - 5% protein reduction with 0.1% maxigrain

DISCUSSION

Numerous studies of exogenous enzyme supplementation in broiler diets have been conducted and improvements of the performance of broiler chicks and nutrient availability have been well documented. Supplementation with enzyme can help to eliminate the effects of anti-nutritional factors and improve the utilization of dietary energy and amino acids resulting in improved performance of chicks (Fuente *et al.*, 1995; Cowan *et al.*, 1996; Yu et al., 2007).

Positive growth performance response has been recorded in some studies when corn based diets were supplemented with enzymes, either multiple enzymes which contained xylanase, protease and amylase or single protease enzyme (Zanelle *et al.*, 1999; Ghazi *et al.*, 2002; Yu *et al.*, 2007). Results for carcass cuts measured revealed that altering the energy or protein levels and or maxigrain supplementation had no effect on cut weights. However it was observed that drumstick weights were significantly lower when maxigrain

was supplemented in the control and 5% energy reduced diets compared with to negative energy control diet. While this could not be explained, it could be that muscle deposition was diverted to other parts of the carcass, even though no trend was observed for other carcass cuts. Also there could be a correlation between the thigh weights and dressed weight; which could be inferred from the observation that the lowest numerical value for dressed weight was on the un-supplemented negative energy control. Work done by Panda *et al*. (2012) showed that there was no significant difference in the carcass characteristics among dietary groups except the abdominal fat content. This was also in agreement with Meng*et et al*. (2000), Slominsk*et al*. (2006), Jia *et al.* (2008), who reported that multi-carbohydrase enzymes improved fat digestibility and apparent metabolisable energy contents of diets containing oil seeds. Though Panda *et al*. (2013) reported a low abdominal fat content in low AME (apparent metabolisable energy) diet supplemented with multi-carbohydrase enzyme.

It was observed that visceral organ weights were numerically lower on the un-supplemented diets and this was significantly reflected for the gizzard, spleen and abdominal fat. In general, enzyme supplementation increased the relative size of digestive organs which was in agreement with Hajati*et al*.(2009), who observed higher organ weights when feeding diets supplemented with enzymes.

Gut histomorphological measurement showed that the villi height values for ileum were significant influenced (p<0.05) by enzyme supplementation; this improvement may be due to the degrading effect of the enzyme on possible NSPs (non-starch polysaccharides) present, which ensure there is low amount of substrate available for bacterial growth especially in the distal part of the intestine. This was in agreement with the findings of Oliveira *et al*. (2008) who reported that enzyme based diets caused a higher effect upon the perimeter area and villi height of ileal mucosa as a result of their ability to quantitatively lower the substrate available for bacterial growth. Alternatively, villi height values for jejunum were significantly reduced (p>0.05) on diets without enzyme supplementation compared with treatment with enzyme.

The crypt depth values of the treatment with enzyme supplementation at both the ileum and jejunum section were observed to decrease significantly (p<0.05) when compared to the diets without enzyme except on the reduced protein diet (Diet 5).This agreed with Wu *et al*. (2004) which

stated the addition of xylanase in wheat based broiler diet decrease crypt depth in the jejunum and ileum. However, the consistent reduction in the crypt was compensated for by the increase in villi height. Tiago *et al*. (2012) observed that the crypt is responsible for the production of enterocytes which will compose the intestinal villi and their depth reflects the degree of exigency of the synthesis of these cells. It was also stressed that the more the crypt is demanded in terms of cell renewal, the greater the depth. It could be opined that the lower the crypt depth values observed in the enzyme supplemented diets was a result of the enzyme being able to liberate more nutrients through degradation of NSP (non-starch polysaccharides) present in the feed. Though the villus: crypt ratio was significantly influence enzyme supplementation, at the jejunum there was no significant effect of diet on values. The villus crypt ratio is known to affect the overall performance of broilers and is an indicator of good intestinal health (Tiago *et al*., 2012).

CONCLUSION

This study has demonstrated the influence of enzyme (maxigrain) inclusion on the carcass and gut histomorphology of broiler chicken**.** Maxigrain enzyme was effective in releasing sufficient nutrients to meet the requirement of the birds, while at the same time influencing carcass and organ weights. Also enzyme supplementation was observed to significantly influence crypt depth, increase villus height and ratio of villus height to crypt depth at the ileum and the jejunum. Improvement in performance could be attributed to increase in the area of absorption of nutrients in the small intestine as also the improvement in the small intestine morphology adapted to the increase nutrients in the small intestine. Maxigrain a multi-enzyme supplementation helped in the elimination of anti-nutritional factors and as well improve nutrient utilization.

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Participation of Enclave Dwellers in Non-Governmental Organization Activities in Omo-Forest, Ogun State

Mojisola F. Oyewole

Department of Agricultural Extension & Rural Development, University of Ibadan, Ibadan, Nigeria
Email: oyemojidola2@yahoo.com

Abstract

This study assessed the level of participation of enclave dwellers in Non-Governmental Organizations' conservation practices in Omo-forest , Ogun state. Multi stage sampling method was used to select respondents for this study. The study site was stratified into three blocks considering the nearness of enclaves to each others. Fifty percent of enclaves in each stratum were purposefully selected based on the activities of the NGOs. Twenty respondents were randomly selected in each of these eight enclaves. which includes: Abeku1, Abeku2, Tamitami, Eseke,Sojukodoro, J4 area, Osoko and Etemi. The total of 150 respondents was sampled. Data was collected using interview schedule while descriptive and inferential statistics were used for data analysis. Results indicate that average age of the respondents was 33±8.69 years. Majorities (75.3%) of the respondents were male, married (86.0%) had no formal education (48.7%) and were engaged in farming (63.1%). Findings from the study further show that 88.0% and 85.3% of the respondents benefited from conservation education and environmental education respectively. Less than half (46.7%) of the respondents indicated high level of participation in the activities of the NGOs. Significant relationship existed between educational qualification ($\chi^2 = 4.643$, $p \leq 0.05$), benefit derived from NGOs activities ($r = 0.238$, $p \leq 0.05$), constraints faced by respondents ($r = - 0.276$, $p \leq 0.05$) and participation in NGOs conservation activities.. Though, participation of enclaves dwellers is relatively fair however, the constraint facing respondents in participating in NGOs activities is technicality, therefore NGOs should intensify efforts in educating them on conservation practices.

Key words: *Enclave dwellers, Non- Governmental Organization, Conservation practices.*

INTRODUCTION

In the past, some communities conserved forest within their settlement purposely for hunting expeditions while others establish sacred grooves for the worship of their traditional deities. In other cases, individual plant or animals species valued for a particular purpose such as medicine, shade or food were preserved through taboos (Aminu and Marguba 2002). However, with the increasing population, the pressure on natural resources has grown so high and these has led to the establishment of national parks, game reserve, forest reserve and wildlife sanctuaries. A substantial loss of species diversity (intra and infra-specific) is due to habitat destruction resulting from land clearance for various uses. Forest exploitation and vegetation clearance are the major causes of natural gene-pool loss as is occurring in many species including i*rvingia gobanensis* and *I. Wombulu* in the rainforest and Niger Delta. Most species that were originally diverse in Nigeria are becoming rare (David, et al.,2013). Natural and man-made threats, socio-cultural problems as well as direct and indirect consequences of socio-economic development have contributed to the erosion of biodiversity at all levels. Within the last 25 years, it is believed that about 43% of the forest ecosystem has been lost through human activities.

Nigeria with a population of over 140 million people constitutes nearly a quarter of the total population of sub-Saharan Africa. A population growth rate of more than 3% and increasing poverty (especially in rural areas) has put severe

demand on the country's natural resources, the institutional structures and the resources available to manage them. There has been a general institutional weakness and lack of technical capacity to effectively tackle the nation's environmental issues, including threat to biological diversity (FEPA 2010).

Indiscriminate hunting of wildlife for food to compliment subsistence farming and bush burning leads to loss of biodiversity and also depletes the ecosystem by causing death of wildlife; destruction of eggs and plant species, while illegal grazing of livestock in game reserves constitutes a threat to wildlife itself. Available evidence shows that biodiversity is being lost at a disturbing rate in Nigeria. The causes of biodiversity loss are largely related to human factors. These are due to interaction with the environment for development, improved quality of life resulting from industrialization, technological advancement and rapid growth in urbanization. The indirect causes of biodiversity loss in Nigeria include economic policies, rising demand for forest products, cultural practices, poor law enforcement and weak laws. Factors such as rapid urbanization, increasing human population and trade in forest products have collectively increased the demands for forest products. For example, increased export demands for primates and birds for research and trade in timber and non-timber species are indirect causes of biodiversity loss in various parts of the country. Low budgetary allocation to the forestry sub-sector has curtailed national efforts to reforest large areas that have been deforested. Consequently, the allowable timber cuts are not replaced hence sustained yield of the forests cannot be attained. Continued timber cut without replacement indirectly leads to biodiversity loss. Cultural practices that encourage the use of specific species for festivals often limit the population of species particularly occurring under narrow ecological range. Moreover, most of the laws that control the management of several species are outdated, and their enforcement is inadequate. This in turn leads to overexploitation of resources and subsequent loss of biodiversity. Awareness needs to be raised towards protection of the ecosystem considering its implication on man and the environment. Odun and Odun (1999) reported that the state government and federal government have been managing the resources for the people which have led to little or no result. This brought about the involvement of Non-governmental organizations to serve as a bridge between the government and the people so as to sensitize the people on ways to conserve the environment and the benefits of conservation. The NGOs present in the study site are Nigerian Conservation Foundation (NCF) and Pro-natural International (PNI). The aim of NGOs present in the study site are to conserve these resources by raising conservation awareness among inhabitant of the sites generally and also focus on improving the enclave dwellers' livelihood such that attention will be shifted from illegal exploitation of these resources. The activities of these NGOs re aimed at improving conservation practices of enclave dwellers. These NGOs achieve their aim through different activities which includes poverty reduction programme, environmental education, policy advocacy, mitigating environmental pollution, training, provision of incentives, skill acquisition. Each of these activities is geared towards ensuring effective conservation of resources by improving conservation practices of enclave dwellers so that consciousness is built in them to live in harmony with nature. There is however a need to assess the awareness and level of participation of enclave dwellers in Omo forest reserve on the activities of these NGOs The study objectives includes:

Objectives

The general objective is to assess the level of participation of enclave dwellers in NGOS conservation activities.

The specific objectives are to;

(1) determine the personal characteristics of enclave dwellers in Omo forest reserve
(2) identify the activities of the NGO benefited by enclave dwellers in Omo forest reserve
(3) examine the attitude of enclave dwellers toward NGOs activities
(4) ascertain enclave dwellers level of participation in these activities
(5) to ascertain the constraints of the enclave dwellers in participation in these activities

METHODOLOGY

The study was carried out in Omo forest reserve in Ogun state, southwest region of Nigeria. Omo forest reserve is rich in biodiversity and contains various species of wildlife, trees, insects and birds. Omo forest reserve is the largest biosphere reserve and the first strict nature reserve in Nigeria (Tayo and Tayo, 2007). The reserve is covering about 1368.06km and forms parts of Ijebu North and Ijebu East Local Government Areas of Ogun state. The common tree species found in this site includes, *Brachystegia nigerica, Khaya invorensis, Sterculiarhinopetala,*

Strombosapustulata, Triplochton scleroxylon and *Cordial milleria*.

Multi stage sampling method was used to select respondents for this study. The study site was stratified into three blocks considering the nearness of enclaves to each others. Block A includes Abeku1, Abeku2, Idi Opepe, Aba balee, Block B includes: Tamitami, Eseke, Sojukuro, Gbonpa, Esiri ,Block C includes: J4 area, Osoko, Etemi, Imoba, Ori Apata, Ologuna. Fifty percent of enclaves in each stratumwere purposefully selected based on the activities of the NGOs. Two enclaves in strata A, three enclaves in strata B, and three enclaves in C, giving total of 8 enclaves. The names of the enclaves assessed were: Abeku1, Abeku2, Tamitami, Eseke, Sojukodoro, J4 area, Osoko, and Etemi. Twenty respondents were randomly selected in each of these enclaves except Eseke in srata B where 10 respondents were randomly selected because the enclave is a smaller one with few dwellers. The total of 150 respondents was sampled. Data was collected using interview schedule while descriptive and inferential statistics were used in data analyses and and interpretation

RESULTS AND DISCUSSIONS
Personal characteristics of respondents

The age of respondents as shown in table 1 reveals that majority (68.0%) were within the age group of 21-40 years, 22.7% were within the age of 41-50 years of while 9.3% were above 50 years. This implies that young and middle age are of higher percentage. This can be traced to the fact that majority of these enclave dwellers are active farmers. This is in line with Akinbile 2007 that individuals within the ages of 21-40 years constitute the active work force. Majority of respondents were male (75.3%) while 24.7% of respondents were female. This finding corroborates Saker *et al* (2011) who reported that men are more than women in enclaves. Majority (86.0%) of farmers were married, 10.7%, 1.3% and 2.0% were single, divordec and widowed respectively. This implies that majority of the respondents have responsibilities, thus they engage in livelihood activities to meet their needs. This is in line with Akinbile *et al* (2008) that marriage confers responsibilities. The educational level of respondents in the study area as shown inTable 1 reveals that 48.7% of respondent had no formal education, while only 6.0% had tertiary. This implies that most of the respondents with low level of education will acquire a relatively low level of knowledge of conservation practices. This will also affect their level of adoption and

their understanding on practices disseminated by the NGOs. This relates to the study of Osuji (2000) who reported that the lower the level of education of an individual, the lesser the level of knowledge acquired. Also it was revealed in table 1 that the respondents' major occupation (63.1%) was farming This is in line with Ojo (1999) who reported that farming is the major occupation of respondents in enclaves in the study site. The finding also corroborates Newmark *et. al*(1999) that residents of enclaves in protected areas depend mostly on agriculture.

Table 1: Personal characteristics of respondents

Variable	Frequency	Percent (%)
Age		
21-30	36	24.0
31-40	66	44.0
41-50	34	22.7
51-60	14	9.3
Sex		
Male	113	75.3
Female	37	24.7
Marital status		
Single	16	10.7
Married	129	86.0
Divorced	02	1.3
Widowed	03	2.0
Educational status		
Non-formal	73	48.7
Adult education	10	6.7
Primary	40	26.7
Secondary	18	12.0
Tertiary	09	6.0
Occupation		
Farming	95	63.1
Trade	26	17.0
Artisans	01	0.7
Loggers	15	10.0
Teachers	13	9.2

Programmes benefited from NGOs activities

Table 2 explains the programmes of the NGOs that respondents benefit from and the period which they benefited from these activities. The result shows that 88.0% of the respondents benefited from conservation education from NCF and 85.3% benefited from environmental education from NCF. This suggests that majority of the respondents benefited from conservation education and environmental education. This finding is in line with Owusu (2001) who asserted that guaranteed support of local people in conservation will depend on how conservation actions are package in conservation and environmental education programmes. Table 2

also reveals that majority of the respondents (70.0%) benefited from conservation education and environmental education (72.0%) from PNI, while 55.0% of the respondents benefited from provision of incentives from PNI.

Comparing the two NGOs, it was discovered that most of the respondents benefited from conservation education (88.0%) and environmental education (85.5%) from NCF

compared to PNI's 70.0% and 72.0% respectively. Table 2 further shows that most of the capacity building activities were carried out by PNI as most of the respondents reported that they benefited from PNI's skill acquisition, training, provision of alternative livelihood provision of incentives with 28%, 16%, 55%, and 37.3% respectively.

Table 2 Activities Benefited from and period of the year that respondents benefit from NGO's activitiesN=150.

	NCF								PNI							
	Freq.	%	Yearly		Monthly		Anytime		Freq.	%	Yearly		Monthly		Anytime	
	F	%	f	%	f	%	f	%			f	%	f	%	f	%
CONSERVATION EDUCATION	132	88	30	20	64	42.7	56	37.3	105	70	75	50.3	36	23.7	39	26
Skill Acquisition	22	14.7	36	24	2	1.4	112	74.7	42	28	130	86.7	-	-	20	13.3
Environmental Education	128	85.3	30	20	120	80	-	-	109	72.7	58	38.7	75	50	1	
Community based conservation	52	34.7	15	10	-	-	135	90	56	37.3	115	76.7	-	-	35	23.3
Training	37	24.7	30	20	-	-	120	80	42	28.0	60	40		-	90	60
Provision of alternative livelihood	20	13.3	3	2.0	-	-	147	98	24	16	6	4	-	-	144	96
Provision of incentives	62	41.3	5	3.3	1	0.7	144	96	82	55	11	7	-	-	139	93

Respondents' level of participation in NGOs activities

Table 3a shows that 36.7% of respondents participated regularly in conservation education, 28.7% rarely participated. However, majority of the respondents never participated in activities that involve provision of alternative livelihood (81.3%) and provision of incentives (59.3%) respectively. This implies that the enclave dwellers level of participation in NGOs conservation education activities is regular compared to other activities in the study area.

Respondents' overall level of participation in NGOs activities

Table 3b shows that less than half (46.7%) of the respondents had an overall high participation in all the NGOs activities , 28.7 % had low participation while reported that they did not participate in any of the NGOs activities. This suggests that NGOs need to sensitize the enclave dwellers on their activities.

Table 3 a: Distribution of respondents based on level of participation in NGOs activities N=150

Activities	Regularly		Rarely		Never		Mean	Rank
	F	(%)	F	(%)	F	(%)		
Conservation education	55	36.7	43	28.7	52	34.7	1.5267	1
Skill acquisition	21	14	33	22	96	64.0	0.7933	3
Community based conservation	12	8	43	28.7	34.7	63.3	1.3000	2
Training	8	5.3	30	20.0	112	74.7	0.6867	4
Provision of alternative livelihood	7	4.7	20	15	122	81.3		
Provision of incentives	15	10	46	31.7	89	59.3		
Environmental education	35	23.3	54	36	61	40.7		

Table 3b: Distribution of respondents' level of participation in NGOs activities

Category	Frequency	(%)	Minimum	Maximum	Mean	Standard deviation
No participation	38	25.5				
Low participation	42	28.7	37	120	5.8865	5.18
High participation	70	46.7				

Constraints to participation in NGOs activities

Table 4 shows that most (71.3%) of the respondents indicated technicality of conservation practices as constraint militating against their participation in NGOs conservation activities. This can be traced to their low level of education because level of education affects the rate at which an individual adopts new technology. Time is also a major constraint faced by respondents in the study area (71.3%). This may be due to the nature of their job since majority of them are farmers and would need to rest after their daily activities. Lack of knowledge and political instability were also constraints to participation. The table also shows that cultural(51.3%) and religious beliefs (25,3%) are the least ranked constraints to participation.

Table 5: Distribution of respondents' constraints to participation in NGOs activities (n=150)

Items	Frequency	(%)	Mean	Rank
Language barrier	54	36.0	0.3600	7
Technical know-how of conservation practices	107	71.3	0.7133	1
Cultural belief	77	51.3	0.513	6
Time consuming	107	71.3	0.7133	1
Political instability	90	60.0	0.600	3
Lack of knowledge of conservation practices	90	60.0	0.600	3
Financial constraints	80	54.7	0.5467	5
Religious beliefs	38	25.3	0.25303	9
Unfriendly attitudes of officials	48	32.0	0.3200	8

Relationship between personal characteristics of respondents and their participation in NGOs activities

Table 6 reveals that there was no significant relationship between respondents' age (χ^2=0.137, p > 0.05), sex (χ^2 = 0.589, p >0.05), occupation (χ^2 = 7.956,p> 0.05), marital status (χ^2 = p> 0.05) and their participation in NGO activities. This implies that the respondents' age, sex, occupation and marital status of do not influence the participation of enclave farmers in NGOs conservation activities. However, there was a significant relationship between respondents' educational qualification (χ^2 = 4.643, p≤ 0.05) and their participation in NGO activities.

Data on Table 7 shows that there was a positive correlation between the benefit derived from NGOs conservation activities (r = 0.238, p≤ 0.05) and respondents' level of participation in NGOs activities. The positive correlation suggests that the more the benefit derived by enclave dwellers in NGOs conservation activities, the more they will be willing to participate in NGOs activities. Also, there was a correlation between constraints (r = - 0.276, p≤ 0.05) faced by the respondents in participating in NGOs activities and their level of participation. This implies that the level of constraints faced by the respondents was sufficient enough to limit their participation in NGOs conservation activities.

Table 6: Relationship between personal characteristics of respondents and their participation in NGOs activities

Variable	χ^2	Df	p-value	Decision	Remark
Age	.137	3	.094	Accept Ho	Not Significant
Sex	0.589	1	0.443	Accept Ho	Not Significant
Educational level	3.740	4	0.042	Reject Ho	Significant
Major occupation	7..956	6	0.241	Accept Ho	Not Significant
Marital status	4.643	3	0.200	Accept Ho	Not Significant

Table 7: Correlation analysis between benefits derived, constraint to participation and respondents' participation in NGOs conservation activities

Variable	r-Value	P-Value	Decision	Remark
Benefit	0.238	0.001	Reject Ho	Significant
Constraints	-0.276	0.000	Reject Ho	Significant

CONCLUSION

It is concluded that the enclave dwellers are mostly males, middle aged, married, with no formal education and engaged in farming as their primary occupation. Most of the enclave dwellers benefited from conservation education and environmental education on a monthly basis and considerably participated in NGOs conservation practice. Technicality of conservation practices and time were major constraints militating against enclave dwellers participation in NGOs conservation practices. Educational qualification, benefit derived from conservation practices and constraints faced in participating in conservation practices have influence on the level of participation in NGOs conservation activities among enclave dwellers.

RECOMMENDATION

Based on the conclusions drawn in this study, it is recommended that;

- NGOs should sensitize the female enclave dwellers on the need to participate in conservation practice activities.
- NGOs should simplify conservation practices such that it will be easy for the enclave dwellers to understand and to adopt.
- NGOs should ensure that their activities gets to all the enclaves in the forest so some people will not feel left out. These will increase participation level of the people.

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