

Women Extension Agents' Effectiveness in Diffusion of Agricultural Innovation in Rivers State, Nigeria¹Tasie, C. M., ²Tasie, E. N. and ³Ajie, E. N.^{1,3}Department of Agriculture (Agricultural Economics/Extension Unit), Faculty of Vocational and Technical Education, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State, Nigeria.²Department of English Studies, School of Languages, Alvan Ikoku Federal College of Education, Owerri, Imo State, Nigeria.E-mail: tasiechimezie@gmail.com

Abstract: This study was conducted to evaluate the effectiveness of Women Extension Agents in the diffusion of innovation in Rivers State. Two sets of questionnaires were used. One was administered to contact farmers (CFs) and the other for Women Extension Agent (WEAs). The study findings showed that most of the WEAs (75%) are educated as they possess higher academic qualifications specializing in various fields of agriculture. The study also showed that majority (45%) of the WEAs are between 34 – 44 years, with a mean age of 42 years and all the WEAs are well experienced in agricultural extension/communication matters. The study further showed that the WEAs are effective in agricultural extension delivery services. Notable factors that affected the effectiveness of WEAs in the diffusion of agricultural innovation in the study area were: inadequate training, inadequate number of demonstration farms, social barriers and poor transportation. However, to enhance the effectiveness of WEAs, the following recommendation are proffered: rural farmers should be adequately sensitized on extension service delivery so as to make them accept agricultural innovations, demonstration farms should be established to encourage hand-on training in agricultural production needs of rural farmers, transportation facilities should be provided to facilitate access of the Women Extension Agent (WEAs) to their clients (contact farmers), the extension methodologies should be adjusted to incorporate women needs, as well as organize training seminars and trainings for women agents.

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Key words: Extension Agent, Effectiveness, Diffusion, Agricultural Innovation

Introduction

Rivers State Agricultural Development Programme was established to increase the agricultural productivity and income of small-holder farmers' and consequently, improve the living standards of the rural population. The Programme therefore emphasizes the development of technologies (innovation) for farmers in the areas of crops, livestock, fisheries, and agro-forestry and gender specific activities of the rural dwellers. Rural farm roads, mini water schemes and linkage with credit institutions schemes are some of the other activities of the ADP.

Agricultural Development Programme (ADP) plays the role of agricultural extension and delivery services. ADPs collaborate with the research institutes for improved technologies in order to effectively deliver services to the farmers. The problems that emanate from agriculture at grass roots level are identified by extension personnel and then related to the scientists for plausible solutions. The scientists then work on them to provide solutions in forms of improved technologies or innovations (Ogunsumi and Abegunde, 2011).

One of the most important functions of

agricultural extension is to bridge the gap between research centres and the farmers for introduction of improved methods of agriculture. In other words diffusion or communication is the main job of an extension worker. An extension agent's job does not end with merely informing the farmers about improved practices, he ensures practical application by the farmers of the result of research and field trials. Extension agent's effectiveness and efficiency can be measured (a) by the speed or quickness with which the gap between what is known and what is done by the farmers is bridged, (b) by the number of new practices adopted, and (c) by the number of farmers and communities that adopt the new practices. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a farming population. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. The characteristics of an innovation, as perceived by the members of a social system or farming community, determine its rate of adoption.

Agricultural extension is a service delivery system which assists farmers through educational procedures, in improving farming method and techniques, increasing production efficiency and income thereby improving their standard of living and lifting the social and educational standards of rural people (Williams, 1978 and Tasie, 2013). According to Chukwu (2013), it aims at providing farmers with the necessary education; skill and technical information to enable them take effective farm management decisions to enhance their daily practices to enhance food security. This can only be realized with effective extension delivery processes. This technical information could be referred to as an innovation which is described as an idea practice, or object that is perceived as a new or an improvement over the existing one by the individual or members of a social system or farming community. According to Swanson (1984) the process whereby information and improved farm practices spread from their originating source to thousands of ultimate users and adopters (farmers) is described as the diffusion process.

In Africa, female extension agents make up only 7% of total number of extension agents (Madu, 2000). Similarly, an FAO Spread survey of 2007 by the Agricultural Extension Organization in their studies in 113 countries indicates that 31% of the field agricultural extension agents in Trinidad were female, 28% in Thailand, 14 % in Syria and 0.62% in Nigeria (FAO, 1989). The low involvement of women in extension delivery; could it be that they are not effective or competent enough to transfer agricultural innovations that could bring about better income, farm yield, increase in farm size and improved standard of living to their target audience (farmers)?

There is limited information on the activities of female extension agents as regards agricultural extension delivery in Rivers State. This study therefore tends to analyse the effectiveness of women agricultural extension agents in the diffusion of agricultural innovations that could bring about better results of their agricultural extension works in Rivers State. Three out of four poor people in the developing world live in rural areas, and most of them depend directly or indirectly on agriculture for their livelihoods (Tewodaj *et al*, 2009). Hence, in the Nigerian economy agriculture occupies a key position judging by its critical role of providing food security, provision of employment, revenue generation and provision of raw materials for industrial development (Ajala *et al.*, 2013).

The key to food security in Nigeria could be through agricultural extension activities. Since agricultural technologies and techniques are constantly changing, farmers need to be made aware of and know how to use agricultural innovations to increase

agricultural productivity. The performance of extension agents be they males or females as regards their service delivery is expected to increase if they have the relevant competencies. These competencies must be considered and upgraded and continuously assessed.

Several researchers (Chukwu, 2008; Onazi, 1975) have reported that women extension agents are less competent in the agricultural innovation diffusion process and this has been found to influence the adoption of agricultural technologies. Study by Chukwu (2007) confirmed Onazi (1975) assertion that male extension field workers are more in number and mainly found in the field than the females. He further stated that, not only that they are mainly used in extension services, they have proved more effective than their female counterparts in the discharge of their duties which includes the diffusion of agricultural innovation. This assertion has thus motivated this study to analyse the effectiveness of women extension agents involved in the agricultural innovation diffusion process in Rivers State. Three out of four poor people in the developing world live in rural areas, and most of them depend directly or indirectly on agriculture for their livelihoods (Tewodaj *et al*, 2009). Hence, in the Nigerian economy agriculture occupies a key position judging by its critical role of providing food security, provision of employment, revenue generation and provision of raw materials for industrial development (Ajala *et al.*, 2013).

The broad objective of this study was to analyse the effectiveness of women extension agents in the diffusion of agricultural innovation in Rivers State.

Materials and Methods

The study was conducted in Rivers State, South-south, Nigeria. Rivers State is made up of 23 Local Government Areas which are grouped into three agricultural zones. A multistage sampling technique was used. Multi-stage sampling technique involves a procedure whereby the selection of units into the sample is organized in stages. It usually involves a combination of sampling methods. All the three agricultural zones were covered in this study. In stage one; all the ADP contact farmers were identified. The lists of these farmers form the sampling frame. For stage two, one Local Government area was randomly selected from each agricultural zone. In the third stage, 30 farmers from each of the LGAs were randomly selected. This gave rise to 90 farmers. Also total of Twenty (20) Women Extension Agents (WEAs) were randomly selected during the Monthly Technological Review Meeting (MTRM). The Contact Farmers were used because of their direct contact with the female extension agents. The instrument used for data collection was the structured questionnaire. Two

separate structured questionnaires were designed. One described as the Contact Farmers Questionnaire was designed and distributed to the Contact Farmers, while the second described as the Women Extension Agents Questionnaire was designed and distributed to the Women Extension Agents (WEAs). These instruments were designed to elicit information on the effectiveness of Women Extension Agents (WEAs) diffusion of agricultural innovation in Rivers State, Nigeria. Data obtained were analyzed using simple statistical tools such as tables, percentages, frequency, mean and the Likert scale rating as used by Ibitoye and Onje (2011) and Chukwu (2013) in their separate studies. Other sources of information were publications in journals, textbooks, reports and seminar materials. The structured questionnaire for ADP contact farmers consists of twenty (20) items. The mean and pooled percentages as used by Ibitoye and Onje (2011) and Chukwu (2013) were used to analyze the data. The mean response to each item was calculated using the following formula.

$$\bar{X} = \frac{\sum (FX)}{N}$$

Where \bar{X} = mean response

\sum = Summation

F = Number of respondents choosing a particular scale point.

X = Numerical value of the scale and

N = Total number of respondents.

The mean response to each item was interpreted using the concept of real limits of numbers. The numerical value of the scale points (Response modes) and their respective real limits are as follows:

Undecided (UND) = 1 point with real limits of 0.5-1.49

Not effective (NF) = 2 points with real limits of 1.50 – 2.49

Effective (EF) = 3 points with real limits of 2.50 – 3.49

Very effective (VEF) = 4 points with real limits of 3.50-4.49

Similarly, the pooled percentages (PP) were calculated as follows:

$$PP = \frac{\sum (FX) - N}{N(4-1)} \times 100$$

Where PP=Pooled Percentages

\sum =Summation

F=Number of respondents choosing particular scale point

X=Numerical value of the scale point

N=Total number of respondents

Results and Discussion

Results

Table 1: Socio-economic characteristics of the Contact farmers (CFs).

Variables	Response	No.-of Respondents	Percentage
Sex	Male	34	37.80
	Female	56	62.20
	Total	90	100.00
Age	25 – 34 years	24	26.70
	35 – 44 years	40	44.40
	45 years and above	26	28.90
	Total	90	100.00
Education	Illiterate	40	44.40
	Literate	50	55.60
	Total	90	100.00
Type of farming	Crop farming	61	67.80
	Livestock farming	29	32.20
	Total	90	100.00
Scale of farming	Small	59	65.60
	Medium	29	32.20
	Large	02	02.20
	Total	90	100.00

Source: Field Survey, 2015.

Table 2: Access to basic extension services by Contact farmers (CFs).

Criterion	Response	No.-of Respondents	Percentage
Access to Extension services	Yes	51	56.70
	No	39	43.30
	Total	90	100.00
Frequency of visits by Extension staff	Not at all	31	34.40
	Regularly	52	57.80
	Seldom	07	07.80
	Total	90	100.00
Demonstration of modern techniques	Yes	43	47.80
	No	47	52.20
	Total	90	100.00
Access to required agricultural knowledge through training	Yes	55	61.10
	No	35	38.90
	Total	90	100.00
Access to improved farm inputs, e.g. seeds, fertilizers, pesticides, etc.	Yes	50	55.60
	No	40	44.40
	Total	90	100.00
Access to subsidized improved farm inputs.	Yes	54	60.00
	No	36	40.00
	Total	90	100.00
Availability of veterinary services	Yes	39	43.30
	No	51	56.70
	Total	90	100.00
Provision of tractors for farm operations	Yes	29	32.20
	No	61	68.80
	Total	90	100.00
Advice for loan and credit facilities	Yes	63	70.00
	No	27	30.00
	Total	90	100.00
Type of extension method used	Individual method	28	31.10
	Group method	62	68.90
	Mass media	0	0.00
	Total	90	100.00

Source: Field Survey, 2015.

Table 3: Impact of Extension services on farmers' livelihood

Criterion	Response	No.-of Respondents	Percentage
Access to extension services improved farm yields	Yes	66	73.30
	No	24	26.70
	Total	90	100.00
Access to extension services improved farm income	Yes	70	77.80
	No	20	22.20
	Total	90	100.00
Access to extension services led to access to basic farm inputs	Yes	70	77.80
	No	20	22.20
	Total	90	100.00
Access to extension services led to improvement in socio-economic well-being	Yes	70	77.80
	No	20	22.20
	Total	90	100.00

Source: Field Survey, 2015.

Table 4: Socio-economic characteristics of the Women Extension Agents (WEAs).

Variable	Response	No. of Respondents	Percentage
Age	25 – 34 years	4	20.00
	35 – 44 years	9	45.00
	45 years and above	7	35.00
	Total	20	100.00
Educational Status	Graduate Extension agents	15	75.00
	Non- Graduate Extension agent	5	25.00
	Total	20	100.00
Years of experience on the job	5 – 10 years	2	10.00
	11 – 15 years	5	25.00
	16 – 20 years	3	15.00
	21 – 25 years	3	15.00
	26 years and above	7	35.00
	Total	20	100.00
Marital Status	Single	3	15.00
	Married	13	65.00
	Divorced	1	5.00
	Widow	3	15.00
	Total	20	100.00

Source: Field Survey, 2015.

Table 5: Effectiveness of Extension Service Delivery by Women Extension Agents (WEAs)

Criterion	Response	No.-of Respondents	Percentage
Acquisition of required experience to transfer agricultural innovation	Yes	18	90.00
	No	02	10.00
	Total	20	100.00
Being discriminated by clients because of my gender	Yes	12	60.00
	No	8	40.00
	Total	20	100.00
Availability of transport facilities to reach contact farmers	Yes	3	15.00
	No	17	85.00
	Total	20	100.00
Adequacy of extension staff and contact farmer ratio	Yes	11	55.00
	No	9	45.00
	Total	20	100.00
Adequacy of training in extension and communication skills	Yes	18	90.00
	No	02	10.00
	Total	20	100.00
Adequate practical training in agricultural innovation transfer	Yes	13	65.00
	No	07	35.00
	Total	20	100.00
Availability of demonstration materials for agricultural innovation transfer	Yes	12	60.00
	No	8	40.00
	Total	20	100.00
Possession of technical competence for agricultural innovation transfer	Yes	12	60.00
	No	8	40.00
	Total	20	100.00
Ability to proffer solution to farmers problems	Yes	15	75.00
	No	5	25.00
	Total	20	100.00
Prompt response to assist farmers during problems	Yes	16	80.00
	No	4	20.00
	Total	20	100.00
Ability to sort out conflicting agricultural information	Yes	13	65.00
	No	7	35.00
	Total	20	100.00

Source: Field Survey, 2015.

Table 6. Distribution of farmers on WEA effectiveness in the Diffusion of Innovation

ITEM (S)	VEF	EF	NEF	UND	TOT	PP	REMARK
Human Relation quality	52	30	6	3	90	82.59	Accept
Communication quality	45	40	3	2	90	80.74	Accept
Ability to carry out method demonstration	49	38	3	0	90	85.92	Accept
Ability to Explain a given innovation	44	41	4	1	90	80.74	Accept
Ability to proffer solutions to farmer's problems	37	35	11	7	90	71.11	Accept
Advisory Quality	42	37	6	5	90	99.52	Accept
Ability to carry out result demonstration	45	36	8	1	90	79.63	Accept
Ability to persuade clients to adopt an innovation	36	41	10	3	90	74.07	Accept
Motivational quality	40	39	7	4	90	75.93	Accept
Technically Competency	50	35	4	1	90	82.96	Accept
Teaching based on field experience	48	38	3	1	90	82.59	Accept
Organization of field trips with clients	41	35	10	4	90	75.19	Accept
Provision of current information	40	45	3	2	90	78.89	Accept
Respond to request for assistance by farmers	39	31	13	7	90	71.11	Accept
Knowledge application	43	35	7	5	90	76.30	Accept
Development of programs for special clientele	30	39	11	10	90	66.30	Accept
Provision of accurate information	40	35	8	7	90	73.33	Accept
Provision of practical information	41	31	10	8	90	72.22	Accept
Ability to clarify conflicting agricultural information	38	41	9	2	90	75.93	Accept
Provision of rich agricultural extension programs	49	37	3	1	90	82.96	Accept
General rating of WEA effectiveness	42	40	6	2	90	78.52	Accept
Total	891	779	150	75	1890	77.35	Accept

Source: Field Survey, 2015

Key: Very Effective (VEF); Effective (EF); Not Effective (NEF); Undecided (UND)

Discussion

Table 1 shows the socio-economic characteristics of the Contact Farmers (CFs) expressed in percentages. It revealed that a greater proportion of the persons involved in farming were females (62.20%) as against males (37.80%). This is in agreement with the fact that in the rural areas, farmers exercise a stricter gender division of labour, where men owned and controlled all land and property and women engaged in additional burden of household work, processing and trading activities (Ajala, *et al.*, 2013). Out of these Contact Farmers engaged in this study, the highest numbers (44.40%) were within the age brackets of 35 – 44 years. Similarly, the Contact Farmers interviewed during the survey comprised of 44.40% illiterates and 55.60% literates (those that can at least read and write). This may serve as an impetus to effectiveness of improved technologies, because according to Jibowo (2000), it is always easier for an educated person to be favourably disposed towards improved technologies because such a person could give a reasonable consideration to its adoption. This study revealed that the majority (67.80%) of the farmers in Rivers State were involved in crop farming, while 32.20% of the farmers were involved in livestock farming. The survey of the scale of farming operation of Contact

Farmers revealed that small-scale farmers (65.60%) were more than medium and large scale farmers (32.20%) and (02.20%) respectively. This is in agreement with Nworgu (2006), who also reported that small-scale farmers are more in number than other categories of farmers.

Table 2 shows the access to basic extension services rendered by Women Extension Agents (WEAs) to Contact farmers (CFs) in Rivers State. Majority (56.70%) of the farmers in the study area revealed that farmers have access to extension services. It went further to show that farmers are visited regularly (57.80%). However, modern agricultural techniques are not properly demonstrated as revealed by 52.20% of the respondents. This will hamper the transfer of the needed technology as revealed by the responses of the contact farmers. This situation experienced may be attributed to the lack of competence of the Women Extension Agents to carry out the demonstration of techniques to transfer modern agricultural innovations. This observation is in agreement with reports by Chukwu (2008) who explained that Women Extension Agents are less competent in technology transfer which has been found to influence the adoption of technologies. The contact farmers (61.10%) agreed that they have access

to required agricultural knowledge through training. The farmers also agreed that they have access to improved farm inputs, e.g. seeds, fertilizers, pesticides, etc, and subsidized improved farm inputs (50.60% and 60.00% respectively) through the women extension agents. This result supports Adams (1982) and Williams *et al.*, (1984) who opined that the extension worker must be capable of giving farmers practical field demonstrations of appropriate improved techniques, help them to locate farm supplies and equipment, involving ADP and other relevant organisations. Majority (56.70% and 68.80%) disagree that Women Extension Agents provide veterinary services and tractors for their farmers. Also, 70% of the farmers agree that women extension agents give advice on how to get credit facilities and the sources of credit. This finding is in line with the finding by Adams (1982) and Williams *et al.*, (1984) who opined that the extension workers are capable of advising farmers on the sources and provision of credit as well as follow up their requests with the organizations involved. However, Most of the respondents (68.90%) revealed that the extension method adopted for the transfer of agricultural innovation by the women extension agents in Rivers State is the group method. This method has been adopted because extension agents will not be able to serve individual farmers at all times, hence this method has been utilized by the Women Extension Agents to enhance the reach of extension services (Manfre, *et al.*, 2013).

Table 3 shows the impact of extension services on farmers' livelihood. Majority (73.30% and 77.80%) of the contact farmers in Rivers State agree that they have access to extension services and this had improved their farm yields and incomes respectively. Furthermore, 77.80% of the farmers agreed that their access to extension services has enabled them access some basic farm inputs as well as improved their social wellbeing.

Table 4 presents the socio-economic characteristics of the Women Extension Agents (WEAs) in Rivers State. It shows that majority of the Women Extension Agents (WEAs) (45%) are within the age range of 35- 44 years. This finding is in agreement with that of Nnadi, *et al.* (2012) for female extension agents in Owerri-West and North Area of Imo State, Nigeria who posited that most of the female extension agents are between 36 – 47 years of age. This implies that majority of the women extension agents are young and active in Rivers State, hence, they are expected to be alert to their duties as change agents since their performance as well may likely be a product of their age (Nnadi, *et al.*, 2012). It was also observed that a good number of the Women Extension Agents (WEAs) 75% are educated and graduates. This means that they have HND/Bachelors degree. This

level of education attained will help them in handling their work effectively as it is believed that they know the rudiments of their profession very well (Nnadi, *et al.*, 2012). A greater proportion (35.00%) of the Women Extension Agents (WEAs) has the highest years of work experience (26 years and above). The work experiences of these workers corroborates with the impact of their services on their contact farmers earlier reported. The study reveals also that 65.00% of the female extension agents are married, while 5.00%, 15.00%, and 15.00% are divorced, single and widowed respectively.

Table 5 shows the effectiveness of extension service delivery by Women Extension Agents (WEAs) in Rivers State. The study revealed that Women Extension Agents (WEAs) (90%) agreed that they possess the requisite experiences to transfer agricultural innovations in their areas of operation. This is true because they possess higher certificates in agricultural science as subject matter specialists as well as the years of experience in the job as earlier revealed. This can enable them adjust easily to changing situations and culture as well given them the ability to easily identify with local farmers in their concerns and interests (Nnadi, *et al.*, 2012). The Women Extension Agents (WEAs) were discriminated upon by their clients (especially male contact farmers). This may be attributed to certain social barriers. On the contrary communication with women farmers is generally enhanced when female extension agents are used (Evans, 1984). The Women Extension Agents (WEAs) do not have transport facilities to reach their contact farmers. This can affect the job performance or effectiveness of the extension agents (Nnadi, *et al.*, 2012). Majority (55.00%) of the Women Extension Agents (WEAs) revealed that the extension staff and contact farmer ratio is adequate. This implies that female extension agents are not overloaded, thereby enabling regular visits and communication to their clients (farmers). This corroborates the earlier results in terms of improved farm yields and income reported by the contact farmers. Most of the Women Extension Agents (WEAs) (90.00%, 70.00%, 75.00%, 75.00% and 65.00%) agreed that they possess adequate training in extension and communication skills, technical competence for improved agricultural innovation transfer, ability to proffer solution to farmer's problems and sort out conflicting agricultural information respectively. Majority (65.00% and 60.00%) also agree that there is adequate practical training as well as the availability of demonstration materials for the dissemination of agricultural innovation respectively.

Conclusion and Recommendation

Rivers State has a good number of Women Extension Agents who are young, energetic and educated and are specialists in various fields of agriculture and work in various capacities. They visited the contact farmers within their extension circle on regular basis to create awareness, trained and educated them on agricultural innovation and technology as well as monitored and supervised various extension programmes that have brought about increased productivity and better income.

To enhance the effectiveness of the women extension agents', the following recommendations are proffered: Women extension agents' should be adequately equipped with the aim of promoting knowledge acquisition, technology transfer and development and improvement among farmers for enhanced agricultural production efficiency, rural farmers should be adequately sensitized on extension packages and programmes to facilitate the adoption of agricultural technology, demonstration farms should be established to encourage and stimulate adoption agricultural innovation, means of transportation should be provided to facilitate access of the Women Extension Agents (WEAs) to their clientele (contact farmers).

Corresponding Author

Tasie, C. M.

Department of Agriculture

Faculty of Vocational and Technical Education

Ignatius Ajuru University of Education,

Rumuolumeni, Port Harcourt,

Rivers State, Nigeria.

E-mail: tasiechimezie@gmail.com

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