

Full Length Research Paper

Women in post harvest management of food production in Nigeria

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Post harvest production management of food is arguably the most important aspect of the food production process besides harvesting, storage and preservation. Although women play a very important role in food production and post production food management, their efforts are largely unsupported and unaccounted for. This study reviewed women's involvement in post harvest management of food in three local government areas of Lagos state within five main markets, using the questionnaire along with structured oral interview. This was to ascertain the extent of women's involvement in post harvest food management. The purpose of the study included establishing the status of women and what can be done to give more recognition to women's participation as well as reduce post harvest loss. Data collected yielded a preferred mode of training by the women to facilitate better post harvest management of food by women. The resulting data was treated with frequency tables and the chi-square test was conducted on the hypothesis. The study further identified constraints to post harvest food management experienced by women and this provided the baseline information for the researchers to propose ways of reducing post harvest loss. In effect, the data analysed generated educational requirements for the women. The women's preference was mainly a special type of education that reflects and revolves around their dominant life pattern. Thus, a transformative re-education model was developed to integrate the women's education into their sustainable economic life endeavour. Based on the study's findings also, the researchers insisted that, since children of the women are also found to contribute heavily (up to 75% of the children) to post harvest activities, it was suggested that more schools be located in rural areas for proximity, among others.

Key words: Post harvest food management, adult teaching methods, market women.

INTRODUCTION

Hunger, inadequacy of food production, poor supply and starvation are heinous offshoots of poverty (Okunola et al., 2009). 'Tens of millions of Africans live at the edge of starvation' says the Bill and Bellinda Gates Foundation (BETA, 2008). This dire pronouncement becomes even more poignant when one considers that Africa seemingly produces a substantial percentage of the world's food; but serious challenges of food wastage or poor distribution of food through global supplies, among others, are responsible for this unfortunate condition. NOTORE, an

agro-allied and chemicals company is committed to helping Nigeria and the African continent to become self reliant in food production and economic wealth, this company has reported that Africa is the only place in the world where there is less food per person year after year. Perhaps this stirred BETA to embark upon a global development programme campaign in 2008 with a focus on increasing opportunities for over-coming hunger and poverty. The Foundation submitted that 2.5 billion people live on less than \$2 a day and more than 820 million suffer from chronic hunger.

It also maintains that three quarters of the 1.1 billion people living on less than \$1 a day live in rural areas and are found mostly in developing nations. These problems

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and many more, are not unrelated to the lack of food management capacity after production as many farmers labour under uncertainty about how to preserve in order to catch up with season-related opportunities. Since the Green Revolution in the 1940s, efforts to improve crop yield swept through much of Asia and the Latin Americas, helping small farmers to achieve a measure of food security for the first time ever. By the 1980s, the green revolution had helped to double the amount of food production in the developing world which was achieved through the introduction of improved seeds and the use of fertilizer. This, however, was not felt so much in Africa. It also creates the problem of what to do with surplus food production.

The study background

Arising from the challenges stated earlier is an increasing need to pay more attention to what happens after food is harvested in the face of improved modes of agricultural practices which have translated into better yields, thus the necessity to shine the research light more on post harvest food management practises. Post harvest production management of food is arguably the most important aspect of the food production process besides harvesting, storage and preservation. Processing behaviour as well as the marketing of food products depend on activities that must help reduce cost of post harvest loss. Between planting, harvesting and consumption (through sales outlets) are behaviours which Onyene (1998) referred to as food loss control. Food Security in Agriculture Organisation (FAO, 1978) launched a system aimed at preventing food loss, supported by the UNDP.

The Special Action Programme for the Prevention of Food Losses (PLF) was for the prevention of food losses and is to ensure that member nations are adequately updated with new research findings that help to minimise post harvest loss under financial assistance of the United Nations Development Program (UNDP), donor countries and the FAO Technical Corporation Program. The partners maintain that post production activities involve efforts of the producer down to the consumer and noted that women play a big part in this economic activity. The PFL model runs through this continuum that involves harvesting, storing, processing, marketing and cooking as well as the consumption habits.

PFL is very important because food is often produced in so large a quantity that cannot be possibly consumed at the time which requires prudent management stretching over a long period, so that there will not be famine. In essence, the efficient and effective post harvest management is required with integrated cooperation from agro-allied industries, agricultural engineering, farm management and marketing/ merchandising sectors of the economy.

Women's input

In these days of environmental change and consciousness, and not in the least in the equation – women; have dominated the food production sector as well as food consumption control, the gender scale is continually tilting to expose them to sustainability hazards. The UNDP insists that women play a dominant role in agriculture in Nigeria and are believed to make up to 60 to 80% of the agricultural work force in Nigeria, depending on the region. In Benin Republic, the FAO reports that about 70% of women live in the rural areas, 60 to 80% carry on agricultural work and do about 44% of the work needed to feed the family. More women in developing countries do more of the planting, harvesting and processing. They produce and also prepare the food for their families, yet women farmers receive only 5% of extension services. They are under-represented in training programmes and only few of them are in agricultural research and policy making positions (Onyene and Bakare, 2009). Efforts and strategies to agricultural development are found to be more effective when they account for women's needs (BETA, 2008).

Predominantly, Nigerian women live and operate in rural areas, even when they live in urban centres they are largely found in the slum areas (Bakare, 2006), which exposes them to precarious actions or inaction of rural policy makers. There is no doubt that women's contribution to agriculture is severely underrated and unrecognised by experts in the field even as women continue, to play a crucial role in farming, post production activities, marketing, food security as well as in food preparation. Onyene (1998) had noted that domestic strings tying women to house working status is to them a by the way factor. Gender disparity, which unfortunately still exists in agriculture, is therefore ridiculous as women form the core of agriculture production and sales. To keep describing women's role in food production as secondary can only be a disservice and an implicit perpetuation of female exploitation as they are directly involved in the farming process as well as in the post harvest management. The efforts of women however, go unrecognised by agricultural scientists, policy makers, mainstream economy experts and other experts in the field. Women form the key elements in solving the food challenges but have hitherto been sidelined in most decisions involving the food process. Women in developed countries, especially in Africa as ILO reported, dominate agricultural, commerce and services of the labour force in the informal sector of the economy. Unfortunately, women's input is considered to make very little contribution to the GDP because it is viewed as being generally weakly productive. This may contribute to their efforts remaining largely unrecognised.

Furthermore, (Charmas, 2000) women's activities in manufacturing and food processing remain underestimated because most of their activities are undertaken

as secondary activities generally hidden behind subsistence agriculture. Of course, post harvest production, trading or selling of consumer crops is often the final stage of diversified female activities beginning with growing or gathering natural products and processing them such as baskets, textiles etc. Unfortunately, it is usually only the first or last stages is captured thereby underestimating the value added. Charmas reiterated the need to further consider women's contribution in food processing, give it better estimation as economic inputs to the economy in order to encourage the design of more appropriate policy measures to help their empowerment. One of such that this study sets out to do is to uphold the place of women education for better micro entrepreneurship.

Food and nutrition education

Food and nutrition education is very important in the process of achieving the MDGs. Different aspects of diet and malnutrition education include the practice of educating, teaching, training and imparting knowledge, ideas and skills to people about diet, nutrition, food safety, disease, under nourishment and malnutrition, etc to improve quality of life. According to the Wiser Earth Organization, food and nourishment include right to quality food, access and food production as well as education about food, but more importantly the right of human beings to be free from hunger. Food literacy – deals with how to obtain process and understand basic information about food, so as to make appropriate health choices. Women in Nigeria still generally receive minimal information and assistance from necessary sources and most extension work still target the male. There is no doubt that the issue of women in agriculture and other gender related deficiencies in extension programmes must be addressed.

Problem of the study

Until recently, the term 'farmer' was thought to refer exclusively to men's work. Nigerian women still largely lack the opportunities of the men according to a World Bank Group report. The Nigerian female farmers are among the voiceless, especially in influencing policies and projects even though they continue to help to reduce hunger and achieve food security on the continent. Food wastage is possible if proper care is not taken to preserve food which may eventually lead to famine and lack of food security. The problem of the study is that women's involvement in post harvest food management is hindered by lack of access to appropriate technological tools, financial back up and access to relevant training.

The study assumption here is that if the world produces more or enough food than is consumed, there is the need

to effect reduction if not the eradication of post harvest loss using women's input. This study therefore evaluates Nigerian women's post harvest management behaviour, potentials and constraints in order to ascertain their contribution to agriculture (paid or unpaid; their preservation tendencies; training need; institutional government and non-governmental involvement; as well as their preferred type of education, given the nature of their work.

Purpose of the study

This study aims at achieving the following purpose:

- 1) To determine women's involvement in post harvest production of food;
- 2) To examine women's propensity to the use of technology in food preservation after harvest;
- 3) To identify the extent of government's involvement and/or otherwise in such scale-up efforts;
- 4) To ascertain women's interest in training and method preferences for post-harvest food management practices;
- 5) To highlight overt constraints to post-harvest management of food; and
- 6) To generate re-educative model for improved practices in food management for sustainable Nigerian society.

Research questions

- 1) To what extent are women food sellers involved in the food production process – through farming?
- 2) How do women food sellers preserve their food items?
- 3) Have you ever been exposed to any level of training by either the government, NGO, or other organisations on how to keep you food crops?
- 4) What are possible constraints? What are the effects on women's post harvest food management behaviour?
- 5) What type of education can be used to bridge the knowledge gap in post harvest food management?

Ho: The method of training will not significantly influence the adoption of post harvest food preservation practices.

Overview of related empirical study

The Nigerian stored products research institute (NSPRI)

The Nigerian Stored Products Research Institute (NSPRI) established in 1948 is a parastatal under the Federal Ministry of Agriculture, interested in the conservation of food supplies and methods of quality improvement and works towards increasing Nigeria's agricultural self-reliance through the dissemination of research findings

and other information in order to ensure adequate post harvest loss prevention. It oversees the care of grains, tomatoes etc by handing out fliers containing information on best practice procedures among others. It is interested in enhancing food preservation to reduce wastage. The Institute's mandate includes conducting research into improving the quality of agricultural produce, studying stored products pest problems and pesticides and conducting training and giving advice on problems associated with stored products (materials, storage structures, new insecticides as well as new equipments and techniques. It also does pest control services, specialised training in storage technology and pest control.

The Institute conducts researches into bulk storage facilities of local (cereal, pulses and tubers) and export commodities for bulk storage and special studies of stored product pests etc. NSPRI also disseminates information through her extension workers, and also undertakes the training of extension workers in problems associated with storage generally and recommends best storage practices. NSPRI's primary function is basically extension work in the area of storage of agricultural products. The Institute has counted a multipurpose dryer as well as evaporative coolant/water for fruits and the jute-lined cane basket for preserving vegetables as part of its major achievements. The Institute contributes to women's food preservation and management by organising Workshop for women who are into agriculture, using the participatory method to train them. If the MDGs are to be achieved in record time as planned, especially to reduce the number of people living below the poverty line and to ensure full employment of women, among others, the issue of post harvest management of food by women must be addressed. Post harvest management of food is important as, in most cases we cannot possibly consume quantities produced, and there is always the need to find effective and efficient ways to stretch food over time in order to prevent famine.

Conceptual framework

Factors that have contributed to the unenabling circumstances of women's involvement in post harvest management include the lack of appropriate technology, exacerbated by the lack of access to commensurate technology or other empowering education (formal or otherwise) and the technology for food processing, packaging and transportation. In as much as women are confirmed to be key actors in solving the food problem they have hitherto been sidelined in the development process, the study is therefore operating under the premise of the interlink in the post harvest operations and women's involvement, as well as the problems encountered in order to clarify and locate areas of possible intervention in post harvest management.

Determine women's level and help them compete on a larger scale, as the majority of agricultural research and technology do not reach or benefit women in the developing world.

In Sub-Saharan Africa, agriculture employs two thirds of the population but accounts for only 4% of government spending. Women can certainly help in achieving at least the 1st and 2nd agenda of the MDGs:

1. Eradicate extreme poverty and hunger;
2. Promote gender equality and empower women - The process needs the cooperation of the agro-allied industries, agricultural engineers, farm management and marketing sectors of the economy with the woman firmly involved.

There is need to achieve food security, so that there will be less anxiety over food lasting all the year round and lead to the prevention of famine and hunger. Earlier indices have been gender-blind in the acknowledgment of the contribution of women to development.

Significance of the study

It is hoped that the result of this study will bring into appreciable limelight women's active involvement in hunger elimination projects. This will ginger regulatory framework that will mainstream their practice into real sphere of the economy. It will also encourage better awareness of the importance and use of technological tools in food preservation, as well as the need for proper training in food preservation methods. The study's outcome should also alert stakeholders in poverty alleviation and other proponents of the MDGs of the extent to which the Nigeria's domestic sphere is going to alleviate basic needs. It will help to achieve better food preservation and post harvest food management practices. Thus, social education will be planned to replace crude methods and supply practitioners with facts while contributing to literature on the subject.

PROCEDURE

The study is descriptive survey in nature. It examined the involvement of women in post harvest management of food in three Local Government Areas (LGA) of Lagos State. The three LGAs were selected according to convenient educational zones (South, Central and West). A twenty-item interview schedule was structured alongside a 28 item questionnaire and served to 240 women who were randomly selected from 5 main markets in Lagos State (Somolu, Sabo, Bariga, Oyingbo and Olaleye Markets). 48 respondents were selected from each market comprising food sellers from the classifications of Grain, Fruits/Vegetable, Tubers, Cereals, Fish/Meat etc. Data collected were collated using frequency tables, they were later analysed using the chi-square test to ascertain levels of significance.

Table 1. Women involvement in local farming food production.

Parameter		Frequency	Percent	Valid percent	Cumulative percent
Valid	Fully	31	12.9	13.1	13.1
	Not at all	205	85.4	86.9	100.0
	Total	236	98.3	100.0	
Missing	System	4	1.7		
	Total	240	100.0		

Table 2. Mode of acquisition of present food preservation methods.

Parameter		Frequency	Percent	Valid percent	Cumulative percent
Valid	Formal training	5	2.1	2.1	2.1
	Observing and copying others	711	71.3	72.2	74.3
	Friends and Family	61	25.4	25.7	100.0
	Total	237	98.8	100.0	
Missing	System	3	1.3		
	Total	240	100.0		

Table 3. Level of training of respondents.

Parameter		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	83	36.7	36.7	36.7
	No	152	63.3	63.3	100.0
	Total	240	100.0	100.0	

RESULTS

The analyses revealed the following results:

1. Women's contribution to post harvest management in Nigeria is still under rated and their children contribute up to 75% involvement in the post harvest food management practices, as they help their mothers before and after school with the preservation activities;
2. There is a huge gap between the availability of technological tools and food preservation by women;
3. Government's involvement in training for post harvest food preservation for women is very low;
4. The traders prefer on-the-job type of training, especially using radio as media for the dissemination of information or weekend courses as training methods to bridge the knowledge gap and ensure up-to-date food preservation methods.

Table 1 addresses the extent to which women food sellers are involved in the food production process through farming. A large number of the women food

sellers (85.4%) were not involved in actual farming process. While only 12.9% were fully involved. Research question 2 dealt with how women food sellers preserve their food items and their responses are presented in Table 2. This table addresses the mode of acquisition of knowledge of food preservation by the respondents. Majority of the women (71.3%) have learnt their present food preservation practice by observing and copying others or from friends and family. Table 3 addresses the issue of training for the market women. This table looks into the respondents' level of exposure to post harvest food preservation training by either the government, NGO, or other organisations on how to keep their food crops. Table 4 looks into the respondents' level of exposure to post harvest food preservation training by either the government, NGO, or other organisations on how to keep their food crops.

63.3% of the respondents have not been exposed to any kind of formal training as Table 2 corroborates and most of their knowledge comes from observing and copying other family members and friends. The 4th research question is about the respondents' view of what

Table 4. Access to micro credit facilities.

Parameter	Frequency	Percent	Valid percent	Cumulative percent
Valid	Very low	164	68.3	68.3
	Low	35	14.6	82.9
	High	41	17.1	100.0
	Total	240	100.0	100.0

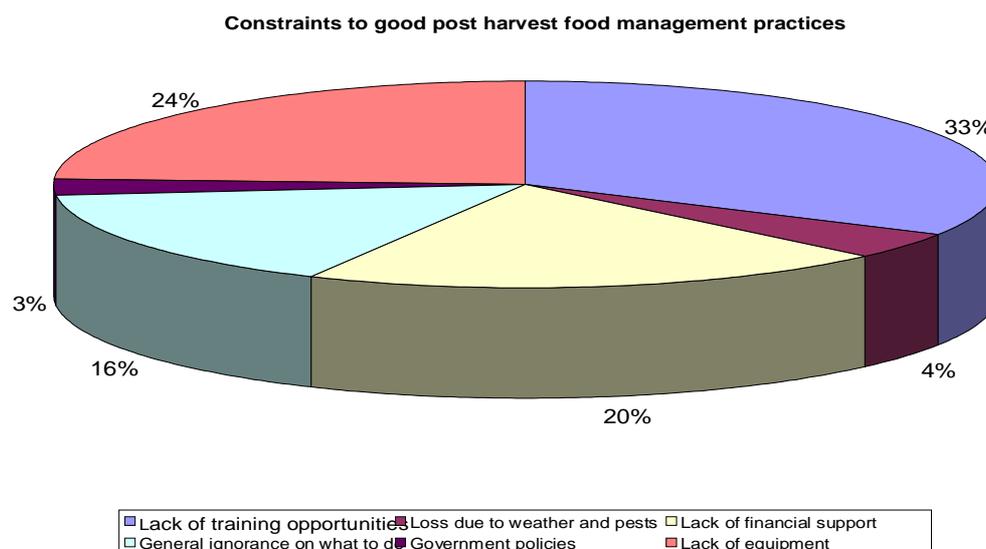


Figure 1. Constraints to good post harvest food management practices.

Table 5. Government's involvement.

Parameter	Frequency	Percent	Valid percent	Cumulative percent
Valid	Very low	73	30.4	30.4
	Low	150	62.5	92.9
	High	11	4.6	97.5
	Very High	6	2.5	100.0
	Total	204	100.0	100.0

constitutes possible constraints to better post harvest preservation practices in their trade. The respondents rate lack of training highest in their list of constraints to effective post harvest food management practices. Other constraints include loss due to weather/pests and lack of financial backing as shown in Figure 1. The figure shows lack of proper training as the biggest challenge for the women (33%), followed by the lack of equipment (24%). The next research question centred on financial activities or micro-credit to support the respondents' trading. The women were asked to rate their access to micro credit facilities for their work and responses as shown in Table 4. 67.9% of the women are not familiar with the rural

women credit scheme nor have they been beneficiaries. 68% of respondents claim that access to micro credit is very low. The next research question dealt with government's provision of training programs for food management facilities through extension programmes for the women. The respondents were asked to rate the level of government's involvement in training and the table shows level of government's provision of training programmes to women for post harvest food management. 62.5 believe that the government's training activities is very low. Table 5 generally indicates that government's training programmes are inadequate.

The next research question sought the women's

Table 6. Government's recognition of women's contribution to post harvest activities.

Parameter		Frequency	Percent	Valid percent	Cumulative percent
Valid	Very low	60	25.0	25.0	25.0
	Low	180	75.0	75.0	100.0
	Total	240	100.0	100.0	

Table 7. Result of the chi square test.

		Extent of familiarity with food preservation		Total	
		Yes	No		
Have you had any type of food preservation training?	Yes	Count	64	13	77
		Expected count	41.7	35.3	77.0
		% within Have you had any type of food preservation training?	83.1%	16.9%	100.0%
	No	Count	60	92	152
		Expected count	82.3	69.7	152.0
		% within Have you had any type of food preservation training?	39.5%	60.5%	100.0%
Total	Count	124	105	229	
	Expected count	124.0	105.0	229.0	
	% within Have you had any type of food preservation training?	54.1%	45.9%	100.0%	

opinion on the level of recognition that the government accords the contribution of women to post harvest food preservation practices and their responses are presented in Table 6. Table 6 shows the respondents' opinion on the level of government's recognition of women's contribution to food preservation. The majority at 75% believe that the government's recognition of women's effort is low. Obviously, all of these have effect on women's post harvest food management behaviour. They do not make for effective post harvest food management. The last research question considers the type of education that will be used to bridge the knowledge gap in post harvest food management. Table 7 shows the preferred type of educational activities to learn about the handling of post harvest food preservation. Figure 2 shows an overwhelming response of the preferred method of training by the women to be through on-the-job training. This means that the respondents, as would any adult with a full time job, wish for a training method that will not deprive them of their normal daily activities.

The single hypothesis tested sought the relationship between food preservation and training. A chi square test was conducted to see whether the mode of training significantly influences food preservation methods. The significant value was found to be less than 0.05, which suggests that there is a significant relationship between training and the familiarity with food preservation methods. The Pearson chi square test yielded a value of

39.210 with degree of freedom 1 and significance of 0.000. Because this is less than 0.05, the decision rule is that there is a significant difference in the variables and so the null hypothesis was rejected. This suggests that the mode of training affects the adoption of post harvest food preservation practices.

DISCUSSION

The implication from Table 1 is that something as important and that can affect lives like food preservation should not be left to casual learning like informal education like watching and copying others. There is also the issue of government's low level of involvement with financial support to supplement the women's post harvest efforts. Another incidental outcome of the research is the large level of involvement of the respondents' children in food management activities. The finding agrees with the findings of Onyene and Bakare. (2008) that children also feature predominantly in all the activities. The study reveals that women are more involved in the post harvest management of food than in the actual farming which supports INSPRI's mission. A very large percentage (78%) claim to preserve their food the traditional or local way (which is largely leaving it to the elements). 89% have not been exposed to any kind of training and only a handful 35% say that they have had any kind of training

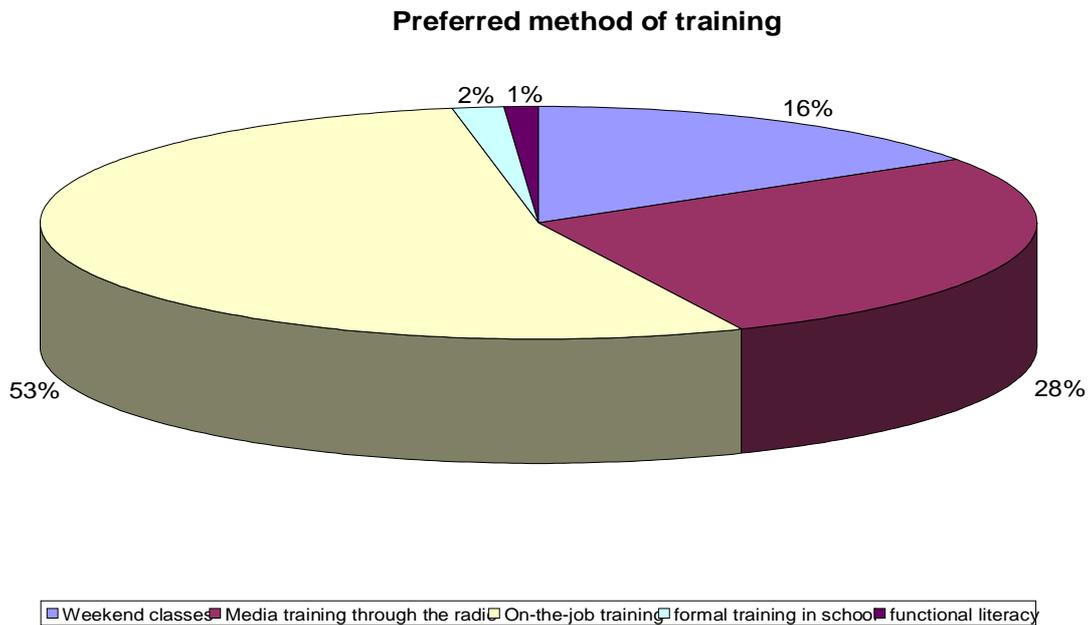


Figure 2. Field data on women's preferred method of training.

in food management and preservation and almost all respondents (96%) learnt their preservation method by observing others and from friends and family.

The major constraint is financial as 85% have been financing their preservation efforts themselves. The most recommended type of education is one that will fit into their present way of life so as not to disrupt their normal routine and the largest percentage 68, 70 and 89% chose the weekend classes, on-the-job training and food literacy through media techniques as their ideal type of education (the implication is that something that is this vital to life and the economy, should not be left to casual learning) so there is the need for government to intensify any effort to spread food literacy especially through the media. No matter which type of education was selected, there is no doubt that the government needs to pay more attention to women's effort for food preservation as they are the primary handlers of food. This will invariably impact on the effort to fulfil the 4th MDG and cure the world of hunger. None of the respondents had heard of any micro scheme and none had benefited. Only 1% had heard about the solar cooker project (never seen it though). All these imply that that there is scanty information out there about new technology. The researchers have therefore proposed a possible system of integrated education.

Proposed method of education

This proposed system of education for the women involves the government through all the tiers and describes the method to be used, as well as what is

expected of them in terms of educational provision to enhance post harvest food management practices by women. Figure 3 identifies the different responsibilities of all the tiers and also indicates expected outcomes. It is hoped that if this method or approach is used there will be an improvement in socio-economic terms.

RECOMMENDATIONS

- 1) Government should use training schools like NSPRI to disseminate their research findings on food preservation methods publicly. This type of institution is rich in research information but is grossly underutilised;
- 2) There must be intensified efforts to train women on post harvest food management to discourage waste and famine;
- 3) Funding should be liberalised, whether it is in the form of soft loans through banks as micro credits or in the donation of food preservation gadgets;
- 4) There should be more government support as this is necessary, for post harvest food management, so that they can encourage women and there will be food all year round and in good condition.

There is the need for more female extension agents. It is also necessary to change policies and social norms, which may need tenacity of efforts. There is again the need for more technological support as well as micro finance from banks. The researchers are calling for an energetic, committed and local women leaders with mobilization skills to unite people of common concern in

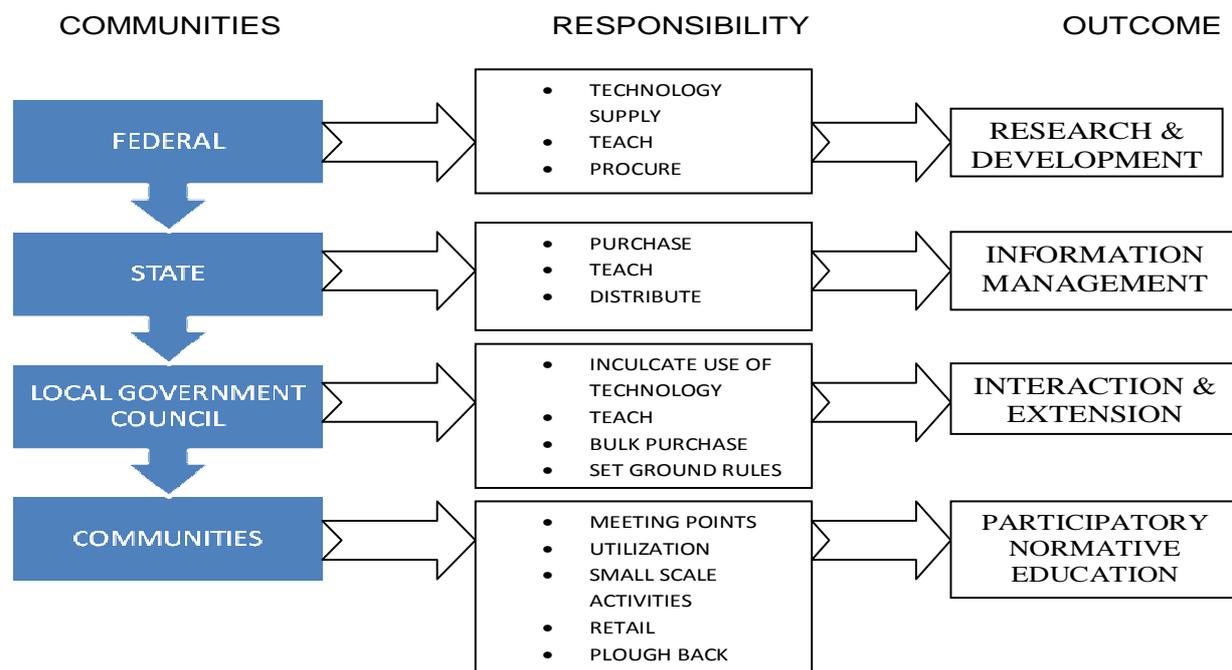


Figure 3. Model of education for women in post harvest food management (proposed). Source: Field survey (Onyene and Bakare, 2011).

order to gain the ability to lobby for leverage and build coalition to achieve change. Since preservation is necessary for their livelihood, women need every assistance so that food can go round the year and we can forestall famine and wastage. An institution like NSPRI obviously has a lot to offer and can help extend its findings to market women through appropriate and convenient training for market women. There is the necessity to develop useful out of school participatory reformation matrix education programmes, to facilitate better post harvest management of food. NSPRI is one of many research based institutions who should widen their reach and get more involved in training of market women. Education will empower the women traders and empowered individuals are more likely to participate in things that will further promote empowerment. NSPRI can help to train market women.

Another significant finding is the level of involvement of children in the post-harvest activities, as it was discovered that they help their mothers before going to their schools and resume as soon as they return, especially in the rural areas. It is therefore further recommended that efforts should be made to ensure proximity to their local schools, so that they can continue to make meaningful contribution to their family's source of livelihood. There is no doubt that the present state of food management practices, especially by rural women in Nigeria raises serious concerns and there is the need for a more concerted effort by all stakeholders to contribute their quota for ultimate development.

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