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Climate Change Adaptation Needs/Priorities of Rural Women Farmers in Flood Plain Areas of Owerri Agricultural Zone of Imo State, Nigeria

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Abstract: *Adaptation is key to surviving the menace of climate change. This paper investigates adaptation needs/priorities of rural women farmers in Imo State, Nigeria. The specific objectives were to ascertain rural women farmers awareness of climate change, identify perceived effects of climate change on rural women farmers, examine adaptation needs of these women and determine adaptation strategies used by rural women. Data were collected with structured questionnaire from 180 rural women farmers randomly selected from a list of 1800 registered women farmers with the Owerri ADP office. Results showed that the rural women were very much aware of climate change as indicated by high mean responses to certain signs such as increase in temperature. M = 2.31), unpredictable heavy rainfall (M = 2.51), unpredictable heavy winds (M = 2.45) among others. Climate change affects rural women by increasing their work load, reducing their food portions, loss of farm assets, increase rate of diseases/illness. In adapting to climate change, the rural women farmers need as a matter of urgency to find alternative livelihood options (M = 2.68), safer areas to relocate (M = 3.31), access to credits/market (M = 3.34) among others. To adapt, they employ strategies such as crop rotation, planting early maturing crops, engage in off-farm activities, cooperative farming.*

Keywords*: climate change, temperature, adaptation, women, farmers*

Introduction

Climate change is perhaps the biggest challenge facing agriculture today. We are already seeing changes, both in long-term temperature and rainfall averages, and in the frequency and magnitude of droughts and floods (Adegoke *et al.,* 2014). According to the Intergovernmental Panel on Climate Change, Africa is the continent most vulnerable to climate change. One

estimate predicts that by 2050, without radical change, food availability in sub-Saharan Africa will drop by 500 calories per person – a decline of 21%.

Nigeria, Africa's most populous country and largest economy, is especially vulnerable because more than 70% of the population (100 million people) rely on agriculture for their livelihoods. Agriculture also accounts for almost 24% of the gross domestic product (GDP). Recent increases in droughts, floods, erosion, land degradation and other threats to agriculture – many of them linked to climate change – are predicted to accelerate in the coming decades. Without adequate preparation, the impacts will be huge. GDP over all sectors could shrink by up to 11% by 2020, and by 30% by 2050 (Adegoke *et al.,*2014). The cost of these estimated losses has been put at between 15 and 69 trillion Naira (US$100–460 billion). Because so many people depend on agriculture, and because food security is linked with national security, it is of paramount importance to do everything we can to prepare for climate change.

The impacts of a changing climate on the lives and livelihoods of the global poor become clearer with each passing year. Among agrarian populations, these impacts are particularly pronounced, as they contend with ever-more uncertain conditions in which to raise food and earn a living. While the impacts of climate change have effects, large and small, on all who rely on agriculture for their livelihoods, these effects are not uniformly felt. The contemporary literature on adaptation widely acknowledges that the patterns of vulnerability to climate change impacts we see today are largely, if not principally, shaped by roles, responsibilities, and entitlements associated with various markers of social status and expectation, including gender, class, and caste (Adger, 2006; Paavola and Adger, 2006; Pelling and High, 2005; Reid and Vogel, 2006).

The rural poor , mostly women in developing countries, many of whom are already food insecure, are likely to experience the most severe effects (IPCC, 2007) and are in greatest need of adaptation strategies and development assistance to cope with changing weather patterns (Keane *et al.,*2009).Yet, it is these poor, vulnerable, and marginalized women within these countries who have the least capacity or opportunity to prepare for the impacts of a changing climate given their limited resources (Nelson *et al*.,2010). Assets are important for the poor women because they can help them cope better with shocks, including climate shocks and the longer term impacts of climate extremes. But sadly women farmers do not have the assets needed to adapt to climate change menace. We do not also know what the rural women need in order to adapt, this thus makes this work inevitable. The specific objectives were to a). ascertain respondents awareness of climate change; b). Identify perceived effects of climate change on rural women farmers; c) examine perceived adaptation needs/priorities of respondents; d). determine adaptation strategies of respondents to climate change.

Methodology

The study was carried out in Owerri Agricultural Zone of Imo State, Nigeria. The zone is located between Latitudes 4°45′ and 7°25′ north of the equator and Longitudes 6°5′ and 7°25′ east of the Meridian (IMSG,2000). Owerri Agricultural Zone is one of the three Agricultural Zones in Imo State. The zone was chosen because it has areas that are close in terms of distance to water bodies i.e. streams, rivers, lakes which are most vulnerable to flooding as a result of

influences emanating from the water bodies. Again it has areas with high land use intensity, with low relief areas and nearest to streams which are prone to high flooding. Areas that fit these description are Ohaji/Egbema, Oguta, Owerri North, Ikeduru and Ahiazu-Mbaise. It comprises eleven local Government Areas, namely: Aboh Mbaise, Ahiazu Mbaise, Ezinihitte Mbaise, Ikeduru, Mbaitoli, Ngor-okpuala, Ohaji/Egbema, Oguta, Owerri Municipal, Owerri North and Owerri West. It has a population of 1,763,361 in 2016 projected from 2006 national census figure (NPC, 2006). There are two main seasons in the zone dry and rainy seasons. The annual rainfall is between 1900mm and 2200mm while the mean annual temperature is between 200C with a relative humidity of about 75% annually (IMSG, 2000). The zone is richly endowed with fertile land suitable for growth of arable crops. Multi stage random sampling technique was used to sample the respondents. In the first stage, purposive sampling technique was used to select 5 of the LGAs which are areas with the most severe flood menace (Oguta, Ohaji/Egbema, Ikeduru, Ahiazu Mbaies and Owerri North). At the 2nd stage, 10 most affected communities were selected namely Opuoma, Obiakpu, Mmahu, Abacheke (Ohaji/Egbema), Orsu-Obodo, Ezi-Orsu, Nnebukwu (Oguta), Akabo (Ikeduru), Amuzi (Ahiazu Mbaise) and Egbu (Owerri North). The third stage involved the proportionate random selection of 180 women farmers from a list 1800 rural women affected by the flood from the Imo State office of National Emergency Management Agency (NEMA). The primary data were collected from field investigation or survey using structured questionnaires. Secondary data sources were utilized to provide background information and other necessary to achieve some objectives of the study.

Descriptive statistical tools such as mean and standard deviation were used to achieve the objectives of the study**.** Mean was computed on a 3-point Likert type rating scale of very much aware assigned values of 3,2,1 to capture women farmers awareness of climate change **(objective 1)**. The values were added and divided by 3 to get the discriminating mean value of 2.0. Any mean value equal to or above 2.0 was regarded as very much aware, while values less than 2.0 were regarded as not aware. Mean was computed on a 4-point Likert type rating scale of strongly agree, agree, disagree and strongly disagree assigned weight of 4,3,2,1 to capture the perceived effects of climate change on the respondents**(objective 2)**. The values were added and divided by 4 to get the discriminating mean value of 2.5. Any mean value equal to or above 2.5 was regarded as an effect on women, while values less than 2.5 were not regarded as an effect. Mean was also computed on a 13 statement 4-point Likert type rating scale of strongly agree, agree, disagree and strongly disagree assigned weight of 4,3,2,1 to capture the perceived climate change adaptation needs/priorities of the respondents**(objective 3)**. The values were added and divided by 4 to get the discriminating mean value of 2.5. Any mean value equal to or above 2.5 was regarded as an adaptation needs by the women, while values less than 2.5 were not regarded as adaptation needs. Mean was also computed on a 12 statement 4-point Likert type rating scale of very important strategy, important strategy,. Less important strategy and not important strategy assigned weight of 4,3,2,1 to capture the perceived climate change adaptation strategies of the respondents**(objective 4)**. The values were added and divided by 4 to get the discriminating mean value of 2.5. Any mean value equal to or above 2.5 was regarded as an adaptation strategy used by the women, while values less than 2.5 were not regarded as a strategy.

Results and Discussion

Awareness of climate change

Table 1 showed that the respondents were very much aware of climate change as shown by their high mean responses. They were aware of the changes in temperature (M = 2.31), unpredictable heavy rainfall (M=2.51), increased drought/dryness (M=2.07), delayed rainfall (M= 2.47), heavy flooding/soil erosion (M=2.37). Other changes seen in the climate by the respondents included soil degradation (M= 2.25), reduced crop yield (M= 2.35), unexpected death of crops in field (M= 2.45), loss of harvest (M= 2.44), increased diseases/pests outbreak (M= 2.51) and unpredictable heavy winds (M= 2.45).

Studies predict a probable increase of 3ºC/4ºC in the average temperature during all seasons in 2080–99 compared with 1980–99 for most of Africa. These figures are 1.5 times higher than the predicted global increases (IPCC, 2007). Burkina Faso, and the Sudanese zone in particular, will experience higher temperatures. This temperature increase will prompt a rise in the level of potential evapo-transpiration and an increase in the amount of water lost from seas and reservoirs. As a result, there will be less water available for human and animal consumption and irrigation. Economies that depend primarily on natural resources will be the hardest hit. **Reduced rain levels** have also been observed in the Sahel, where annual rainfall during the last 30 years fell by 20–40 per cent compared with rainfall for the period 1931 to 1969 (Hulmes et al., 2001). However, an increase in rainfall has also been observed since the end of the 1980s, and the 1996–2006 period showed an upward trend in the North-Sudanese and Sahelian zones of Burkina Faso and a downward trend in part of the South-Sudanese zone, particularly in the south west of the country (DANIDA,2008). According to a number of studies (IPCC, 2007) changes in the rain cycle affect soil humidity, aquifer regeneration and agricultural soil quality, but also cause extreme phenomena such as droughts and floods, the frequency and intensity of which are expected to increase (IPCC, 2007).

Table 1: Women farmer's awareness of climate change

Climate change signs	Mean	SD
Increase in temperature	2.31	0.672
Unpredictable heavy rainfall	2.51	0.523
Increased drought/dryness	2.07	0.710
Delayed rainfall	2.47	0.567
Heavy flooding/soil erosion	2.37	0.567
Soil degradation	2.25	0.684
Reduced crop yields	2.35	0.574

Unexpected death of crops in field	2.45	0.744
Loss of harvest	2.44	0.732
Increased diseases/pests outbreak	2.51	1.564
Unpredictable heavy winds	2.45	0.560

Field survey data, 2016 Mean of 2.0 and above signifies awareness

Effects of climate change on women farmers

Women farmers are unfortunate victims of climate changes menace in the study area. Table 2 showed that the negative effects of climate change on the respondents were numerous. Climate change increased the workload of women farmers with mean response of 2.61, reduces food portions of women farmers (M= 3.52), and leads to loss of farm assets/bad harvests (M= 2.69). Climate change slows down girl child/women education opportunities (M=2.98) and leads to destruction of productive resources of women (M= 2.94). Other negative effects included higher rates of malnutrition due to food shortages (M= 2.78), increase heat related mortality/morbidity (M=3.35), increased rate of respiratory-related diseases (M=3.44), increased rate of water borne infections (M= 3. 07), exposure to sexual harassment/assaults (M= 3.20), exposure of women to attacks by dangerous animals (M= 3.50) and loss of women gainful employment opportunities (M=2.97).

The main impact of climate change on women is the increase in their workload. Droughts, floods and a lack of rain, damage cereal harvests, meaning that many families will not have sufficient quantities of cereals to feed themselves. As a result, women have to redouble their efforts to find alternative activities and obtain income with which to buy the food they need, since they are responsible for providing food. In addition to this, women must invest more time and effort in finding water and wood, because these have become scarcer as a result of desertification and over-exploitation (Campbell *et al*., 2009).

In the case of extreme phenomena such as floods, women work together with men to rebuild their homes and recover their livelihood. They combine their usual tasks within the home with productive activities in order to raise enough money to buy food and replace dead animals. Moreover, if a member of the family falls ill (elderly people and children are worst affected by high temperatures), it is up to the women to look after them (Romero-Gonzalez *et al.,* 2011). If there is a lack of food caused due to bad harvests as a result of climate change, it is the women who reduce their food portions, despite the physical work they do, which increases malnutrition. Insufficient food, an excessive workload and breastfeeding mean that malnutrition is more prevalent among mothers and young children. The increased workload leaves women with very little time to dedicate to income generating activities or take part in the life of the community.

One of the primary reasons that women are more vulnerable to the effects of climate change is that they are disproportionately dependent on threatened natural resources. A recent report by the UN Intergovernmental Panel on Climate Change (IPCC, 2007), 'Impacts,

adaptation and vulnerability', predicts that yields from rain-fed agriculture in sub-Saharan Africa could be reduced by as much as 50% by 2020. Such a strain on food production will certainly translate into increased hardship for women, who often carry out the majority of farming activities. In fact, women are responsible for approximately 75% of household food production in sub-Saharan Africa, 65% in Asia, and 45% in Latin America (Stoparic, 2007). As crop yields decline and resources become scarcer, women's workloads will expand, jeopardizing their chances to work outside the home or attend school. In times of drought, they will also have to spend more time performing another typical female responsibility — carrying, purifying and supplying the family's water (COP 10, 2004).

As water- and heat-related diseases increase because of climate change, women will bear the extra burden of increased care giving and increased threats to their own health. The World Health Organisation (2007) states that, "Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases, and to alter their geographic range, potentially bringing them to regions that lack population immunity and/or a strong public health infrastructure. Malaria is one example a vector-borne disease that will likely increase due to climate change, particularly as a result of increased temperatures and rainfall. Pregnant women are particularly vulnerable because they attract malaria-carrying mosquitoes at twice the rate of non-pregnant women. Moreover, pregnancy reduces a woman's immunity to malaria, making her more susceptible to infection and increasing her risk of illness, severe anaemia and death. Maternal malaria increases the risk of spontaneous abortion, premature delivery, stillbirth and low birth weight – a leading cause of child mortality.

Table 2: **Effects of Climate Changes on Women farmers**

Effects on Rural Women	**Mean**	**SD**
Increase workload of women farmers	2.61	0.83
Reduces food portions of women farmers	3.52	0.87
Destruction of productive resources of women	2.94	1.02
Loss of farm assets/bad harvest	2.69	0.74
Slows down girl child education opportunity	2.98	0.96
Higher rate of malnutrition due to food shortage	2.78	0.76
Increase in heat-related mortality/morbidity	3.35	0.71
Increase rate of respiratory-related illnesses	3.44	0.66
Increase rate of water-borne diseases/infections	3.57	0.78
Exposure to sexual harassment/assaults	3.20	1.57

Loss of women's gainful employment opportunity	2.97	0.560
Exposure to attacks by dangerous animals	3.50	1.25

Field survey data, 2016 Mean values 2.50 shows strong effect

Climate Changer Adaptation Needs/Priorities

Table 3 showed clearly what the respondents wanted in order to adapt to climate change menace. Therefore, in order to adapt, the respondents need to relocate communities to safer areas (M=3.04), improved transport facilities during flood seasons (M=3.04), improved access to credit and markets (M=3.34), develop skills for alternative livelihoods (M=3.15), access to short term crop varieties (M= 3.30). Other adaptation needs of rural women were finding alternative livelihood options (M=2.68), solid shelters for themselves (M= 2.76), provision of permanent medical/veterinary services (M=2.64), preserve and reviving of marginal lands (M=2.75), land for practice of multiple/intercropping (M=2.88), best practices to reduce farm risk (M=2.33), training and education (M=2.96), sharpen knowledge on best farming skills (M=2.87).

Safety is a major concern for all, but especially for women in their role as carers. In Bangladesh, women living in one of the villages that had recently formed a char (where erosion along the river caused the village to become cut off as an island in the river) felt that they were not safe as long as they lived there. For them, the first adaptation priority was to relocate the community to an area within the embankment where they could live safely and cultivate land. Other groups prioritized adaptation *in situ*, through the construction of solid houses with higher plinth levels (Mitchel, *et al.,* 2007). Several women also mentioned the need to build flood shelters – a place within the community where poor people could go, but also a place that would be safe for their animals and that they could use to store seeds, animal fodder and food. Access to doctors, pharmacists, vets and agricultural extension services appear as an important aspect of women's wellbeing and livelihoods. During times of flood, roads are often inundated and communities are deprived of these services. In a scenario of increased flooding, women felt that it was vital to improve their access to the services and markets on which their livelihoods depend during the flood season.

Table 3: Climate Changer Adaptation Needs/Priorities

Adaptation Needs/Priorities	Mean	SD
Finding alternative livelihood options	2.68	1.370
Relocate communities to safer areas	3.31	0.92
Build solid community shelters for themselves	2.76	1.12
Provide permanent medical/veterinary service	2.64	1.09

Improper transport facilities during flood seasons	3.04	0.98
Improper access to credits and markets	3.34	0.89
Preserve and revive marginal land to hold water	2.75	1.16
Develop skills for alternative livelihoods	3.15	1.08
Practice multiple cropping/intercropping	2.88	0.84
Best practice to reduce farm risk	2.93	0.77
Access to improve short term crops	3.30	0.94
Sharpen knowledge on best farming skills	2.87	1.27
Training and education	2.96	1.08

Field survey data, 2016 Mean values 2.50 signifies adaptation needs

Climate Change Adaptation Strategies

Table 4 showed that the respondents survived the menace of climate change by employing the following adaptation Strategies:- practice of crop rotation (M= 2.98), planting early maturing crop varieties (M= 2.73), changing of planting dates (M=2.78), engaging in off-farm activities (M= 2.57), mixed cropping/farming (M= 3.30), use of diseases-resistant crop varieties (M= 3.41), sales of crops produced before damage (M= 2.65), practice of cooperative farming (M= 2.87), delayed late land preparation (M= 2.68), use of local knowledge to diversity crops (M= 2.96), and use of indigenous knowledge to prevent diseases/pest attack (M= 3.38). The above findings agrees with the situation of women in Bangladesh. According to Mitchell *et al.,*2007) when the water level in Bangladesh rises, some women move to the nearest high location and make temporary shelters to ensure their safety and that of their families. Others find refuge in the houses of relatives or friends on higher ground. Those who have the necessary resources increase the plinth level of their houses or their homestead, allowing them to protect some of their belongings. To protect their assets and livelihoods, women try to store seeds in high places within the house before the floods come. Livestock is sometimes taken to higher ground, but safe places to keep cattle are often hard to get to. To cope with the resulting lack of food and assets, women borrow money or sell their livestock or other goods. To reduce losses resulting from crops rotting in inundated fields, some people have switched to cultivating crops that can be harvested before the flood season, or varieties of rice that will grow high enough to remain above water when the floods come

Table 4: Climate Change Adaptation Strategies

Adaptation Strategies	Mean	SD
Practice of crop rotation	2.98	0.94
Planting early maturing crop varieties	2.73	1.09
Changing of planting dates	2.78	0.96
Engaging in off-farm activities	2.57	0.81
Mixed cropping/farming	3.30	0.92
Use of diseases-resistant crop varieties	3.41	0.78
Sales of crops produces before damage	2.65	1.10
Practice of cooperative farming	2.87	1.28
Delayed late land preparation	2.68	0.78
Use of local knowledge to diversity crops	2.96	1.05
Use of indigenous knowledge to prevent diseases	3.38	0.91

Field survey data, 2016 Mean 2.50 shows accepted strategies

Conclusion

Climate change is a global problem known to all as people see signs of its occurrence on a daily basis. Such signs as increase temperature, heavy rainfall, heavy winds and others. These have adverse effects on women who work both in farm and at home as their work load is increased leading to several health challenges. However, women need certain conditions to adapt. These include alternative livelihood, good shelter, safer transportation/movement and credit/loans among others. They practice crop rotation**.**

References

Adger, W. N. (2006). Vulnerability. *Global Environmental Change 16 (3), pp.268–281.*

Campbell, B., Mitchell S., and Blackett M. (2009). ' Responding to Climate Change in Vietnam. Opportunities for Improving Gender Equality'. OxfamUNDPVietnam.Hanoihttp://www.oxfam.org.uk/resources/policy/climate_change/climate-change-gender-equalityvietnam.Html

COP 10 (2004) Mainstreaming Gender into the Climate Change Regime, 14 December Buenos Aires

DANIDA. (2008). Appréciation des Impacts des Changements Climatiques sur les Programmes de Développement de la Coopération Danoise au Burkina Faso. Programme d'Action

Climat et Développement. 104. Dan.4-52-9-2, June 2008.

Hulme, M., Conway, D., Kelly, P., Subaks, S., and Dowing, T. 2001. 'The Impacts of Climate Change on Africa'. Centre for Social and Economic Research on the Global Environment (CSERGE). University of East Anglia and University of Oxford. Oxford

IPCC. (2007a). Contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: Intergovernmental Panel on Climate Change. Availabl http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html. (Accessed 17 Aug 2011)

IPCC (2007b): *Summary for Policymakers*. Climate change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F Canziani, J.P Palutikof, P.J. van der Linden and C.E. Hanson, Eds, 7-22

Keane, J., S. Page, A. Kergna, and J. Kennan. (2009). Climate change and developing country agriculture: An overview of expected impacts, adaptation and mitigation challenges, and funding requirements. ICTSD–IPC Platform on Climate Change, Agriculture and Trade, Issue Brief No.2. Geneva, Switzerland: International Centre for Trade and Sustainable Development, and Washington, D.C.: International Food and Agricultural Trade Policy Council. Available at: http://www.agritrade.org/Publications/documents/JKEANEweb_FINAL.pdf. (Accessed 17 Aug 2011)

Mitchell, T., Tanner, T. and Lussier, K., (2007), "We know what we need!" South Asian women speak out on climate change adaptation, Action Aid International, London and the Institute of Development Studies (IDS).

Nelson, G.C., et al. (2010). Food security, farming, and climate change to 2050: Scenarios, results, policy options. Washington, D.C.: International Food Policy Research Institute. Available at http://www.ifpri.org/sites/default/files/publications/ib66.pdf. (Accessed 17 Aug 2011)

Paavola, J. and Adger, W. N. (2006). Fair adaptation to climate change. Ecological Economics 56 (4), pp. 594–609. [Online]. Retrieved on 12 February 2013 from: http://dx.doi.org/10.1016/j.ecolecon.2005.03.015.

Pelling, M. and High, C. (2005). Understanding adaptation: what can social capital offer assessments of adaptive capacity? Global Environmental Change 15, pp. 308–319.

Reid, P. and Vogel, C. (2006). Living and responding to multiple stressors in South Africa – glimpses from KwaZulu- Natal. Global Environmental Change 16 (2), pp. 195–206.

Romero-Gonzalez, A., Belemvire, A. and Saulière, S..(2011). Climate Change And Women Farmers In Burkina Faso Impact And Adaptation Policies And Practicesoxfam Gb For Oxfam International Uk.

Stoparic, B. (2007) *Climate Change Is a Women's Issue.* Women's eNews, April 8. http://www.alternet.org/story/38659

World Health Organization (2007) Fact sheet N°266, Climate and Health. August http://www.who.int/mediacentre/factsheets/fs266/en/index.html