KNOWLEDGE, PERCEPTION AND ADAPTATION STRATEGIES TO CLIMATE CHANGE AMONG RICE AGRICULTURE WORKER

Dr.Lawal Mohammad Anka
Dr.Kamleshwer Lohana

ABSTRACT
        The aim of the study was to evaluate the level of knowledge, perception and adaptation techniques to climate change on rice agriculture worker in Hadeja and Kazaure Local-Government vicinity in Jigawa State of Nigeria. A total of 160 sample were selected and divided into two 80 samples per Local Government Area. Multi stage sample was used for selection of respondents. Data (primary) collected was made through the use of questionnaire. It was analyzed with the help of statistical tools (arithmetic mean, percentages and descriptive statistics) to draw up conclusions. Findings of the study were: Survey results regarding source of information of climate change shows that 20(25%) Hadeja and 30(37.5%). Regarding Climate change issue, information is relied on radio Kazaure. A total of 10(12.5%) and 9(11.2%) used extension agents. Majority of the respondents 33(41.2%) and 7(8.7%) used meteorological station to obtain their information. Perception of respondents regarding knowledge about climate change issues shows that 26(32.5%) Hadeja and 34(42.5%) Kazaure reported rising temperature. About 12(15%) and 9(11.5%) reported increase in pest attack and diseases. Opinion of respondents regarding adaptation measures revealed that 30(37.5%) Hadeja and 23(28.7%) Kazaure practiced enterprise diversification. While 8(10%) and 7(8.7%) adopted irrigation techniques. In view of above results, following recommendations are suggested. There is need to introduce new agricultural inputs and technology expansion of irrigational agriculture, involve NGOs on climate related issues, there is need on improving agriculture workers' knowledge to climate change through training, conferences and seminars. On the basis of above, therefore, H_O Null hypothesis is accepted and H_A alternate hypothesis is rejected.

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Keywords: Climate change, Knowledge/perception and Adaptation strategies.

INTRODUCTION
        Climate change is a Change in the statistical distribution of weather Pattern when that changes last for an extended period of time. The Consequences of climate change affects third world countries more due to

their reliance on naturally occurring Materials such as Coal, Fertile Land etc. People living in rural areas rely on agriculture and Livestock to earn a living. These show the high sensitivity to climate variability.

Adaptation is a response to global warming that seeks to reduce the Vulnerability. This reduces the Effects of Climate Change (Post, 2000). Adjustment is needed in natural or human systems in response to real or expected stimuli or their belongings which moderates harm or exploits helpful opportunities (IPCC, 2001). However, the end goal of all adaptation is to address climate risks, enhances resilience and reduces vulnerability.

With regards to better adaptation interventions for agriculturists, according to Gumm (2010) must be put in place. Furthermore, poverty alleviation programmes need to be initiated with energy at all levels of government aimed at empowering community particularly the agriculture worker, to increase their capacity to withstand the challenges and issues associated with climate change. Adaptive capacity of agricultural workers and fishermen is also essential to enhance. The source of their income generation and food of both workers is depended on agriculture sector only. In this regard, a mass level campaign or awareness movement is needed to sensitize the community. To address this problem of effective adaptation measures. Kuta (2011) emphasized collaborative national and international efforts and collaborations of research and development and strategic investment to get better agriculture and associated fields. Above all, the need of time is to get maximum coordination; effective planning and well- funded approach can only bring required results.

In terms of out- put and land area, the major staple food crop of Nigeria is Rice. In Jigawa State, western Nigeria, the major primary sources of cash income for agriculture workers is Millet production. There are changes in average global warming in temperature that can affect millet production, it is very important for crop scientists to regularly observe these changes so as to recommend remedial measures to be taken (Nwalieji and Onwubuya, 2012).

In the study area, it is observed that there is evidence of vulnerability in the production of rice to climate change. In view of the above, it is required to conduct research to investigate the farm level adaptation that agriculture workers make to decrease the effect of climate change in Hadeja and Kazaure Local Government Area in Jigawa State of Nigeria.

PROBLEM STATEMENT

In developing countries, there is insufficient water and increased temperature will cause agricultural lands unproductive. This shows that in such countries due to Agronomic models of climate sensitivity, raise in temperature are the real cause of harm to farming activities. Climate change is likely to affect poor people who lack the ability to adopt the changes in weather variability. They need to be educated on how to cope with the challenges of climate change.

As mentioned above, unfavorable effects of climate change to the agriculture workers community of Jigawa state are detrimental. To address this issue of climate change in the area, awareness raising or information dissemination to the community on cause and effects of climate change along-with adaptive and contingency measures can be done through extension system as a climate change prevention strategy.

OBJECTIVES OF THE STUDY

The overall research objective of this paper is to review the need of knowledge, perception and adaptation strategies associated with climate change. This research will be conducted among selected rice agricultural workers in Hadejia and Kazaure Local Government Areas, Jigawa State of Nigeria. Following are the precise objectives:

i. To spot the information sources regarding climate change.
ii. To find out the understanding-level of knowledge of the research respondents about the climate change.
iii. To investigate the effective adaptation measures used to address climate change challenges.
iv. To recognize the problems faced by the selected- respondents in acclimatizing climate change effects.

HYPOTHESIS

The following hypothesis is presented as follows:

H_O Socio-economic characteristics of agriculture workers have no significant influence on their level of adaptation to climate change.

H_A Socio-economic characteristics of agriculture workers have significant influence on their level of adaptation to climate change.

H_O Characteristics of agriculture workers have no significant influence on the understanding-level of knowledge of research respondents regarding climate change phenomenon.

H_A Characteristics of agriculture workers have no significant influence on the understanding-level of knowledge of research respondents regarding climate change phenomenon.

REVIEW OF LITERATURE

The review of literature associated with the topic is presented as follows:

Salau *et.al.,* 2012 identified the perceived indicators of climate change included excessive high temperatures, low and irregular rainfall pattern and low crop yields among others. Adaptation strategies used by respondents included agro-forestry practices, crop diversification, use of organic manures, planting of early maturing and disease/drought resistant varieties.

It is economically viable if adaptation strategies are selected (Reilly, 1999). However, while identifying adaptation options, the empirical work value is non-existent. To improve the resilience of agricultural community to existing climate change situation, scientists and researchers need to identify adaptation strategy.

With regards to Anambra State of Nigeria, Nwalieji and Uzuegbunam (2012) explained the detrimental impact of climate change on rice production. This resulted reduction in crop yield and destruction of grain, high occurrence of weeds, disease due to pest, flow of infectious human life threatening diseases such as meningitis and others.

Gumm, 2010 investigates the rising temperature for the last 23 years which seriously affected yield performance by 10-20 %. Based on the above findings he suggested that we urgently need new rice strains that can resist higher temperatures.

Ajatomobi, *et.al.,* (2010) explained that climate change is result of drought, flash-floods, salt stress and increase in temperatures. These factors worsen the situation and make impact the rice production. This shows that in the rice producing areas of Anambra State climate change is creating problems.

Remire, (2010) notes that population growth as well as facing climate change issues are twofold challenges. He further explains that uncertain variations linked with global earth warming, carbon dioxide-emissions, heavy-rainfall is expected to impact on rice production, adversely.

Apata *et.al.,* (2009) concluded that agriculture has created a heavy toll on environment in terms of provision of food and fibre, while climate plays an important role in terms of agricultural productions. In particular case of Nigeria, use of land and energy biodiversity health and water resources are determinately affected by climate change.

Change in climate is a major barrier in the growth of agricultural sector of Africa and all around the world (Ziervogel, *et.al.,* 2006). In Africa, agricultural productivity decreased due to the natural climate

cycle and human activities. This is because agriculture is refined and hence fundamentally dependent on vagaries of weather.

The above review of literature shows specific research studies were carried out by various scholars on climate change. This review has provided opportunity to identify the areas that needed further exploration.

METHODOLOGY
Survey method and available data is used in this research.
Background Information about the Study Areas
i. **Jigawa State:** This state is located between latitude 11^A ON and $13A^ON$ and Longitudes $8A^0E$ and $10A^035E$ and a total of about 22,410sq.km is covered. State is surrounded on the West by Kano State on the East by Bauchi and Yobe Nigerian states. This state came into being on 27.11.1991, at that time, Federal-Government pronounced the creation of 09 additional states in the country to bring the total number of states to 30.

ii. **Kazaure:** This is Emirate and a local-government jurisdiction of Jigawa State of Nigeria. Its capital is in Kazaure city. It has a population of 161,494 people. The entire Kazaure Emirate has a population of 500,000 (2006 Census). It covers an area of 690sqm (1,780km²).

iii. **Population for the Study:** The population for this research consisted of Rice Agriculture workers in Hadejia and Kazaure Local Government Areas.

iv. **Sample Selection:** In this research, technique of multi stage sampling is used to select 160 rice agricultural workers in Hadejia and Kazaure Local Government Areas of Jigawa State of Nigeria. In phase I, 2 (two) local- Governments area were selected. In phase II, 8 (eight) communities were selected randomly. In last phase, 10 (ten) rice agricultural workers are equally and randomly selected from each of the agricultural-communities. This will become a total of 160 agricultural workers.

v. **Data Collection:** Data was collected on the basis of socio - economic background. i.e. Age, gender, years of working as agricultural worker, basic-education, Farm size, Household size, No. of Extension visit per year, No. of social organization belong Annual income amount of credit received in the past five (5) years and land tenure system being practiced by sample respondents.

vi. **Data Analysis:** In this research descriptive statistics is employed. In this analysis, arithmetic mean and simple percentages are used to achieve the above mentioned objectives of the research. The results

of this research work are interpreted to draw up conclusions, concisely.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Rice Agriculture Workers N=160 Divided in Two Local Government Areas: Age Data presented in Table 4.1.1 revealed that, 24(30%) respondents from Hadejia and 18(22.5%) from Kazaure are in the age group 21 – 30. Majority of the respondents 30(37.5%) Hadejia and 25(31.2%) belong to the age group 31-40. Similarly, 12(15%) Hadejia and 23(28.7%) Kazaure are in the age group 41-50. A total of 10(12.5%) Hadejia and 2(2.5%) Kazaure belong to the age group 51-60. The smallest number of respondents 4(5%) Hadejia and 12(15%) Kazaure are in the age group of 60 years and above.

Gender: According to information presented in Table 4.1.2. The results show that 58(72.5%) respondents in Hadejia and 65(81.2%) Kazaure are male. While 22(27.5%) and 15(18.7%) in Hadejia and Kazaure respectively are female respondents in the study areas.

Years of Farming Experience: Perception of respondents regarding years of farming experience is presented in Table 4.1.3. The results revealed that 14(17.5%) Hadejia and 30(37.5%) Kazaure have between 1 – 10 years faming experience. While 20(25%) Hadejia and 32(40%) Kazaure possessed between 11 – 20 years experience. Similarly, 30(37.5%) and 8(10%) Hadejia and Kazaure respectively have between 21 – 30 years farming experience. About 10(12.5%) and 5(6.2%) possessed between 31-40 years. The lowest percentage of respondents 6(7.5%) and 5(6.2%) have 40 years and above farming experience. This shows that most of the agricultural workers in the study areas are not new participant in the farming profession. It is clear that they are knowledgeable on climate change issues and must have developed so many adaptation strategies to cope with the effects.

Educational Qualification: Data presented in Table 4.1.4 revealed that, 35(43.5%) Hadejia and 40(50%) Kazaure are Adult educated. This means they can read and write. About 28(35%) and 32(40%) are primary school graduates. A total of 13(16.2%) and 5(6.2%) are secondary school graduates. The lowest number of respondents 4(5%) and 3(3.7%) in Hadejia and Kazaure respectively are University graduates. In view of above, key-findings are in accordance with Salau, *et.al.,* (2012) who notes that a larger proportion (38%) of the respondents had no formal education, while 36.6% had primary education. About 9.33% were educated up to tertiary level of education. This shows that a good percent age of agriculture workers in the area are educated.

Farm Size: Survey results presented in Table 4.1.5 shows that 68 (85%) of the respondents in Hadejia and 74(92.5%) Kazaure Farm size is between 1 – 5ha of land. Similarly 12(15%) and 6(7.5%) farm size is between 6-10ha in the two local government areas respectively.

Household Size: Opinion of respondents regarding household size is presented in Table 4.1.6. The results revealed that 25(31.2%) Hadejia and 18(22.5%) Kazaure household size is between 1-10. Majority of the respondents 37(46.2%) and 24(30%) household size is between 11-20. A total of 13(16.2% and 22(27.5%) are in between 21-30 people. The smallest percentage of respondents 5(6.2%) and 16(20%) are in the range of 31 – 40 people in both the two Local Government Areas.

Extension Visits per Year: Perception of respondents regarding extension visit being carried in a year. This data is illustrated in Table 4.1.7. As shown in table-4.1.7, 33(41.2%) Hadejia and 50(62.5%) Kazaure had extension visits between 1-20. Majority of the respondents in the study areas 40(50%) and 20(25%) had extension visit carried out between 21-40 per year. The smallest number of respondents 7(8.7%) and 10(12.5%) reported between 41-60 visit in a year. Above findings are in accordance with Salau, et al (2012). He notes that the mean number of agriculture-extension field-visits per year was 29. This clearly shows that agricultural workers in the research locations had two extension visit/ month. This finding is in accordance with the recommended practices, globally. The frequency of extension visit assists in successful implementation of recommended best practices and enhances the adoption capacity of the agricultural worker.

Number of Social Organization Belong: According to information presented in Table 4.1.8 regarding membership of social organization, it shows that majority of the respondents 48(96%) Hadejia and 32(40%) did not belong to any organization. About 26(32.5%) and 40(50%) are members of 1-20 organizations. While 4(5%) and 5(6.2%) are members of 2-4. Similarly, the smallest number of respondents 2(2.5%) and 3(3.7%) belong to 3 to 4 organizations only. This shows that majority of the agricultural workers regularly participated in the activities of extension organizations that are aimed at capacity building of agriculture workers in the study areas.

Annual Income: According to Data presented in Table 4.1.9 regarding Annual Income of respondents in the study areas. The table revealed that 66(82.5%) and 58(72.5%) had below N500,000 as their annual income. A total of 10(12.5%) and 17(21.2%) had income between N500,000 – N100,000 and 4(5%) and 5(6.2%) annual income above

N100,000 in both Hadejia and Kazaure Local Government areas respectively.

Amount of Credit Received in the Past 5 Years: Opinion of respondents regarding credit received. The results show that majority of respondents 64(80%) Hadejia and 57(71.2%) Kazaure received between N1,000 to N500,000. Similarly, 12(15%) and 16(20%) received between N501,000 to N1,000,000. A total of 4(5%) and 7(8.7%) received above N1,000,000 in both Hadejia and Kazaure from credit agencies in order to boast farming in the areas.

Land Tenure System: Perception of respondents regarding Land Tenure System is presented in Table 4.1.11. The results revealed that 40(50%) Hadejia and 32(40%) Kazaure inherited their lands. About 6(7.5%) and 18(22.5%) purchased their lands. While 7(8.7%) and 4(5%) got it on lease. A small proportion of respondents 2(2.5%) and 6(7.5%) hired their lands and finally 25(31.2%) and 20(25%) reported the land belong to Family/community in both Hadejia and Kazaure Local Government Areas.

Age Socio Economic Characteristics of Respondents	Freq. Hadejia	%	Freq. Kazaure	%
21 – 30	24	30	18	22.5
31 – 40	30	37.5	25	31.2
41 – 50	12	15	23	28.7
51 – 60	10	12.5	2	2.5
60 and above	4	5	12	15
GENDER				
Male	58	72.5	65	81.2
Female	22	27.5	15	18.8
YEARS OF FARMING EXPERIENCE				
1 – 10	14	17.5	30	37.5
11 – 20	20	25	32	40
21 – 30	30	37.5	8	10
31 – 40	10	12.5	5	6.2
ABOVE 40	6	7.5	5	6.2
LEVEL OF EDUCATION				
Adult education	35	43.7	40	50
Primary	28	35	32	40
Secondary	13	16.2	5	6.2
Tertiary	4	5	3	3.7

FARM SIZE				
1 – 5ha	68	85	74	92.5
6 – 10ha	12	15	6	7.5
HOUSEHOLD SIZE				
1 – 10	25	31.2	18	22.5
11 – 20	37	46.2	24	30
21 – 30	13	16.2	22	27.5
31 – 40	5	6.2	16	20
No. OF EXTENSION VISITS PER YEAR				
1 – 20	33	41.2	50	62.5
21 – 40	40	50	20	25
41 – 60	7	8.7	10	12.5
No. OF SOCIAL ORGANIZATION BELONG				
None				
1 – 2	48	96	32	40
2 – 4	26	32.5	40	50
3 – 4	4	5	5	6.2
Above 4	2	2.5	3	3.7
ANNUAL INCOME LEVEL				
Below N500,000	66	82.5	58	72.5
N500,000 – N100,000	10	12.5	17	21.2
Above N100,000	4	5	5	6.2
AMOUNT OF CREDIT RECEIVED IN PAST 5 YEARS				
N100,000 – N500,000	64	80	57	71.2
N501,000 – N1,000,000	12	15	16	20
ABOVE N1,000,000	4	5	7	8.7
LAND TENURE SYSTEM				
Inherited	40	50	32	40
Purchased	6	7.5	18	22.5
Leased	7	8.7	4	5
Hired	2	2.5	6	7.5
Family/Community	25	31.2	20	25

Source of Information on Climate Change: According to information presented in Table 2. The above results show that 20(25%) Hadejia and 30(37.5%) Kazaure shows that both radio and television were the major source of information on climate change issues. About 8(10%) and 6(7.5%) used television as a source of information. A total of 10(12.5%) and 9(11.2%) used extension agents. Similarly, 7(8.7%) and 24(30%) used Internet as their source of information. While majority of the respondents 33(41.2%) and 7(8.7%) made the best use of

meteorological station to obtain their information. It was observed that a very small percentage of the respondents used the media 2(2.5%) and 4(5%). This shows that print media and internet were poorly patronized to obtain information on climate change issues in Hadejia and Kazaure Local Government Areas. The above findings are in line with Anka, 2015 who reported 22(24.4%) of the respondents source of information was radio, while 5(5.5%) from fellow extension workers. About 20(22.2%) was through television.

TABLE-2
DISTRIBUTION OF RESPONDENTS BASED ON SOURCE OF INFORMATION ON CLIMATE CHANGE

Source of Information	Freq. Hadejia	%	Freq. Kazaure	%
Radio	20	25	30	37.5
Television	8	10	6	7.5
Extension Agents	10	12.5	9	11.2
Internet	7	8.7	24	30
Meteorological Station	33	41.2	7	8.7
Print Media	2	2.5	4	5

Source: Survey Data, 2016

Knowledge/Perception of Climate Change by Respondents: Perception of respondents regarding knowledge/ perception climate change issues is presented in table 3. The results show that 26(32.5%) Hadejia and 34(42.5%) Kazaure respondents reported rising temperatures. While 34(42.5%) and 28(35%) agreed on Erratic rainfall. Similarly, 8(10%) and 9(11.2%) reported rising level of floods in the area. Finally, 12(15%) and 9(11.2%) also reported increase of pest and diseases. The above climate change indicators identified by respondents in Hadejia and Kazaure are capable of reducing farm yields and adding to the production cost. According to expert opinion, the reason of increased pest and disease infestation could be a result of increased rain-fall as well as high level of humid environment. Additionally, due increased insects invasion on their crops will help them to find a lasting solution.

TABLE-3
DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR
KNOWLEDGE AND PERCEPTION ON CLIMATE CHANGE INDICATORS

Indicators of Climate Change	Freq. Hadejia	%	Freq. Kazaure	%
High Temperature	26	32.5	34	42.5
Erratic Rainfall	34	42.5	28	35
Rising Level of Floods	8	10	9	11.2
Increase of Pest and Diseases	12	15	9	11.2
Total	**80**	**100**	**80**	**100**

Source: Survey Data, 2016

Types of Adaptation Measures: As shown in Table 4, the data regarding adaptation measures used by respondents in the study areas shows that 30(37.5%) Hadejia and 23(28.7%) Kazaure practiced enterprise diversification. About 22(27.5%) and 35(43.7%) agreed on early planting of crops. Similarly, 3(3.7%) and 2(2.5%) reported using minimum tillage. While 13(16.2%) and 3(3.7%) decided to go for farm insurance. A total of 4(5%) and 10(12.5%) agreed to plant early maturing varieties and finally, 8(10%) and 7(8.7%) adopted irrigation techniques. These measures are helpful in achieving a better yield to ensure Food Security in the Study area. The above findings are concurrence with those reported by Ugwoke *et.al.,* (2012) who stated that (66.67%) of the agricultural workers adopt variegation of agricultural activities as one of the strategy of adaptation. strategy. Adjustment to planting dates (60.83%) and non-farm activities engagements (53.3%) can be other alternate strategies.

TABLE-4
DISTRIBUTION OF RESPONDENTS ACCORDING TO ADAPTATION MEASURES

Types of Adaptation Measures	Freq. Hadejia	%	Freq. Kazaure	%
Enterprise diversification	30	37.5	23	28.7
Early Planting of Crops	22	27.5	35	43.7
Minimum Soil Tillage	3	3.7	2	2.5
Farm Insurance	13	16.2	3	3.7
Planting Early Maturing Varieties	4	5	10	12.5
Adoption of Irrigation Techniques	8	10	7	8.7
Total	**80**	**100**	**80**	**100**

Source: Survey Data, 2016

Factors Militating Respondents Adoptive Capacity: Opinion regarding factors militating against adoptive capacity is presented in Table 5. The results revealed that 27(33.7%) Hadejia and 29(36.2%) Kazaure respondents reported Low Income Level. While 8(10%) and 16(20%) agreed on poor technology. About 7(8.7%) and 6(7.5%) reported Low level of education. Similarly, 4(5%) and 10(12.5%) is poor extension service as a factor. A total of 2(2.5%) and 14(17.5%) agreed inadequate information is responsible and finally 32(40%) and 5(6.2%) reported lack of Government support is responsible as factors militating against adaptive capacity by respondents in both Hadejia and Kazaure Local Government Areas respectively. Salau *et.al.,* (2012) reported that agricultural workers in the study area are poor with low level of education and lack of adequate resources and farm inputs to overcome climate change challenges especially those requiring huge capital investment and high technical skills. The above findings are also supported by Nwalieji and Uzuegbunam (2012) who reported crop loss due to floods, Income loss , exacerbate of poverty, soil-erosion are identified factors accountable against adaptive capacity in this research.

TABLE-5
DISTRIBUTION OF RESPONDENTS ACCORDING TO FACTORS MILITATING AGAINST THEIR ADAPTIVE CAPACITY

Factors Against Adaptive Capacity	Freq. Hadejia	%	Freq. Kazaure	%
Low Income Level	27	33.7	29	36.2
Poor Technology	8	10	16	20
Low Level of Education	7	8.7	6	7.5
Poor Extension Services	4	5	10	12.5
Inadequate Information	2	2.5	14	17.5
No Government Support	32	40	5	6.2
Total	**80**	**100**	**80**	**100**

Source: Survey Data, 2016

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The overall objectives of this research paper was to evaluate the knowledge, perception and adaptive-strategies associated with the change in climate among rice agricultural workers in Hadejia and Kazaure local government Areas in Jigawa State of Nigeria. A sample of one hundred and sixty was chosen. This sample was divided into two, 80 samples per Local Government Area. Multistage sampling was used for selection of respondents. Data was collected through a questionnaire by authors of

this research to have direct access to reliable data from sample respondents. Data was analyzed using arithmetic mean, percentage and Descriptive statistics. To achieve the above research-objectives, results of this research were elucidated to draw up conclusions.

CONCLUSIONS

Following are conclusions of this research paper:

i) Survey results regarding source of information on climate change shows that 20(25%) Hadejia and 30(37.5%) Kazaure reported that they rely on radio to obtain information on climate related issues. About 8(10%) and 6(7.5%) used television. A total of 10(12.5%) and 9(11.2%) used extension agents. Similarly, majority of the respondents used meteorological station to obtain their information. The lowest percentage used media and internet.

ii) Perception of respondents regarding knowledge/perception on climate change issues shows that 26(32.5%) Hadejia and 34(42.5%) Kazaure respondents reported rising temperatures. While 34(42.5%) and 28(35%) agreed on erratic rainfall. Similarly, 8(10%) and 9(11.2%) reported rising level of floods in the study areas. Finally, 12(15%) and 9(11.2%) also reported increase in pest attack and diseases.

iii) Data generated on the basis of respondents opinion regarding adaptation measures revealed that 30(37.5%) Hadejia and 23(28.7%) Kazaure practiced enterprise diversification. About 22(27.5%) and 35(43.7%) agreed on early planting of crops. Similarly, 3(3.7%) and 2(2.5%) reported using minimum tillage. While 13(16.2%) and 3(3.7%) decided to go for farm insurance and finally, 8(10%) and 7(8.7%) adopted irrigation techniques.

RESULTS OF HYPOTHESIS TESTING

The results of the study have proved the entire hypothesis presented. On the basis of the above, therefore, Ho Null hypothesis is accepted and Alternate hypothesis H_A is rejected.

RECOMMENDATIONS

In view of above drawn conclusions, recommendations are summarized as below:

i. Efforts should be made by all stakeholders to focus on improving the community's knowledge to climate change through training, conferences, extension services and mass media sources.

ii. Participating sample Local Government Areas Hadejia and Kazaure should be involved in environmental conservation programmes,

diversifying the livelihoods of agriculture workers. Introducing new agricultural inputs and technologies, expansion of irrigational Agriculture will immensely help in adaptation capacity of the study areas.

iii. Involving NGOs on climate related issues will improve and establishing independent climate institution and allocating budget increase the adaptation capacity of the two Local Government Areas.

iv. Government should assist agricultural workers with Agricultural Credit. This need to be Interest-free so as to cope with the problems and Challenges of climate change.

v. There is need for advance research to find out Creative ways to address climate Change Issues. The result of this research must be implemented with honesty to find out lasting solution.

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