AGRICULTURAL AND AQUATIC ACTIVITIES THAT DISRUPT BIODIVERSITY AMONG ADULTS IN OGURUGU UZO-UWANI LGA OF ENUGU STATE

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Abstract

This study was embarked upon to find out the agricultural and aquatic activities that disrupt biodiversity among adults in OguruguUzo-uwani LGA of Enugu State. Four specific objectives with four corresponding research questions, and one null hypothesis guided the study. The study adopted the descriptive survey research design. The population for the study consisted of 2,665 adults in Ogurugu. The sample was 272 adult farmers selected through multi-stage sampling technique. Researcher's-designed valid and reliable questionnaire was used for data collection. Percentages were used to answer the research questions, while chi-square (x^2) statistic was used to test the null hypothesis at .05 level of significance. Results of the study among others indicate that high proportion of adults of Ogurugu engaged in agricultural (74.6%) and aquatic (73.5%) activities that disrupt biodiversity. Higher proportion of female adults (70.1%) engaged in agricultural activities that disrupt biodiversity more than the male adults (56.7%). Very high proportion of female adults (80.9%) engaged in aquatic activities that disrupt biodiversity more than the male adults (78.3%).Gender had significant

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influence on agricultural activities that disrupt biodiversity, but had no significant influence on aquatic activities that disrupt biodiversity among adults. Based on the findings, recommendations were made among which is that Environmental Health Officers and Environmental Protection Authority should take cue from the result of the study to focus attention on the need to extend their coverage especially in letting people know the health implication of their activities that could disrupt biodiversity.

Key words: Biodiversity, Agricultural Activities, Aquatic Activities, Disruption.

Introduction

The general decline in levels of biological diversity commonly known as biodiversity is an issue of global concern. Biodiversity provides the basis for ecosystems and the services they provide, upon which all people fundamentally depend. Human activities are responsible for most of the loss in biodiversity throughout the world. Biodiversity is a concept used to describe the variety of habitats and communities of different species of plants and animals that interact in a complex web of interdependent relationships (Gunningham& Young, 2012). For instance, animals breathe in oxygen during respiration and give out carbon (iv) oxide as waste products. Plants use such waste products in the production of carbohydrates which the animals feed on. Dickson (2009) stated that in the cycle of interaction, what the animals give out as waste do not constitute environmental hazards because the plants are there to convert and reconvert it to something useful both to the plants and the animals. This interaction leaves the environment neat and healthy, and it is essential in the maintenance of human life on earth. However, ongoing, and in many cases, accelerating declines and losses in biodiversity over the past two decades have decreased the capacity of many ecosystems to provide services, and have had profound negative impacts on opportunities for sustainable development around the planet. These impacts are particularly pronounced in the developing world, in large part due to the patterns of consumption and trade in the industrial world, which themselves is

not sustainable (Europabio, 2010).

Biodiversity loss can destabilize relationships of communities, and how the synergy of destructive environmental forces is dealt with may define people's co-existence in the future. The society (Pandey, 2002) seems to place greater priority on other problems such as terrorism and the economy than on biodiversity loss, and do not recognize the implications of biodiversity loss in exacerbating many problems which affect human health and economy. Brashares (2004) reported that a perfect ecological, economical, and political storm was brewing in West Africa because of the complex interplay of overfishing by both African and European nations offshore, the accelerating devastation of wildlife on land for bush meat, and periods of massive food shortages. Many of the factors leading to the accelerating loss of biodiversity are linked to the increasing use of energy by society. The decline of this diversity has considerable implications for their health, culture and livelihoods.

People seem to care more about their economy than the health of the environment. Gunningham and Young (2012) observed that about 17 million hectares of tropical forest are now being cleared annually as trees is cut for lumber or land cleared for agriculture or the other development. The authors further noted that scientists estimate that at these rates, roughly 5 to 10 per cent of tropical forest species may face extinction within the next 39 years. It is worth noting that apart from provision of foods, clothing and shelter, some of these plants and animals that are becoming extinct may hold the cures for diseases that besiege man. Some of the chemicals used by people end up in water and animals, and thereby are killed by oil spills. Research (Science Development Net, 2014) shows that modern agricultural techniques in both rich and poor countries are helping to undermine the natural resource base of the economies that depend upon it. The author further stated that industrial agriculture which requires fields to be leveled and hedgerows removed, in addition to the heavy use of pesticides

and chemical fertilizers tend to lead to major losses of biodiversity, particularly where land is managed in a way that is aimed primarily at maximizing agricultural productivity.

Humanity derives all its food and many medicines and industrial products from both domesticated and untamed components of biodiversity (Pandey, 2002; Sellner, Doucette, &kirkpatrick, 2003; Brashares, 2004). Biodiversity is significant in health fields because of its applicability to the wellbeing of the individual and the community as well as the support it offers to health and economy of different region. It provides basis for adaptation to changing environments such as global warming. For instance, as noted by Gunningham and Young (2012), bacterial biodiversity gives productive soils and clean water. An environment rich in biological diversity offers the broadest array of options for sustainable economic activity, nurturing human welfare, and for adapting to climate change.

Apart from the obvious benefits for national productivity and the long-term security of the ecosystems that support life on earth, there are also aesthetic and ethical arguments in favour of preserving biodiversity. According to Weprin (2007), the existence of natural landscapes, varieties of colourful insects perching from arrays of beautiful and sweet-smelling flowers, different species of birds 'chanting', the serenity of gentle flowing river and fishes swimming therein, an interlude of male monkey letting out sharp piercing sound to let the female ones far and wide know they are desperate to mate, the shade, coldness and fresh air that the abundant trees provide contributes to the emotional wellbeing of a society; offers many passive recreational benefits to people. Noyacek (2008) disclosed that without forests, bogs, and the plankton in the sea, the greenhouse effect would be even more serious leading to increased rate of global warming.

Human health is affected by changes in biodiversity and ecosystem services. Changes to the environment have altered disease patterns and human exposure to disease outbreaks.

In addition, current patterns of farming, based on high resource inputs (such as water and fertilizers) and agricultural intensification, are putting great strains on ecosystems, contributing to nutritional imbalances and reduced access to wild foods. People burn wide areas of bush while hunting or preparing for farming, thereby destroying the fauna and flora of that area (Brashares, 2004). In addition, excessive carbons are discharged into the atmosphere aiding the rate at which global warming occurs. Bush burning may also cause acid rain. Whitney (2009) noted that when bushes are burnt, sulfur, nitrogen, and carbon combine with oxygen to form compounds known as oxides. The author explained that when these oxides are released into the air, they react chemically with atmospheric water vapour, forming sulfuric acid, nitric acid, and carbonic acid respectively. These acid containing water vapours commonly known as acid rain enter the water cycle and can subsequently harm the biological quality of forests, soils, lakes, and streams. Acid rain also kills fishes and aquatic invertebrates, and increase soil acidity, which reduces forest growth and other ecosystems that lack limestone to neutralize the acid (Larocque et al, 2011).

Biodiversity forms the basis of agriculture, and enables the production of foods, both wild and cultivated, contributing to the health and nutrition of all people. Agricultural intensification and extensification have resulted in the loss of biodiversity and ecosystem services on farmland. Intensification is based on higher or more efficient use of inputs, such as more efficient breeds and crops, agro-chemicals, energy and water. Extensification requires converting increasing additional areas of land to cultivation (Europabio, 2010). Farming practices that disrupt biodiversity include plowing, mechanical weed control, artificial and organic fertilizer and pesticide use (Geiger, Bengtsson, &Berendse, 2010). The authors added that the use of pesticides negatively relate to species richness of plants, ground beetles and birds as well as to the biological control potential. The number of plant species is reduced by

the use of herbicides and insecticides

In order to increase crop yield, people embark on agricultural practices which involve mechanization and application of agro-chemicals such as herbicide, pesticide, and fertilizer which severely affect biodiversity. This is why modern intensive agriculture is described as unsustainable (Pfeiffer, 2004). The author added that technologically-enhanced agriculture has increased soil erosion, polluted and overdrawn groundwater and surface water, and even caused serious public health and environmental problems. In modern agriculture, more hydrocarbon-based fertilizers are applied along with pesticides. In addition to water pollution, some nitrogen-based fertilizer emits large volumes of nitrous oxide (a green house gas that contribute to global warming) into the atmosphere (Mastrandrea& Schneider, 2009). Also, application of agro-chemicals may lead to eutrophication which is the process by which a body of water becomes rich in dissolved nutrients from fertilizers or sewage, thereby encouraging the growth and decomposition of oxygen-depleting plant life and resulting in harmful effects to other organisms. Sellner, Doucette, and Kirkpatrick (2003) noted that the large scale eutrophication in many coastal regions of the world has resulted in hazard environments deadly to marine fish and plants and very harmful to humans. People tend to apply chemicals to the river in order to harvest more fish instead of using hooks or nets. Engelking (2009) asserted that polluted river and lake may kill animals and plants living in it immediately or it may injure them slowly. The author added that people who feed on these fishes are exposed to very high levels of hazardous substances which may damage their health.

Riverine dwellers often wash their clothes, dishes among others in the river where they may also fetch water for their domestic use. As a result of the insufficient or lack of toilet facilities, excreta are passed indiscriminately, which flood eventually carries into the river. Some people also defaecate directly into the river. These practices are typical of rural riverine population, and it has

negative implication on their total health. Faeco-oral diseases such as typhoid, water and air-borne diseases such as cholera among others are prevalent in such location (Engelking, 2009). Some of the practices that disrupt biodiversity may be influenced by gender difference. Women and men have different interests and needs, and are obliged to acquire different capacities and knowledge including that of biodiversity.Females usually display less extensive environmental knowledge than males, but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change (Ajah, 2012). Disrupting biodiversity may depend on certain socio-demographic factors which include gender differences.

Women and men have different interests and needs, and are obliged to acquire different capacities and knowledge including that of biological diversity.Females usually display less extensive environmental knowledge than males, but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change (Ajah, 2012). It is hoped that data generated will inform the need to develop and apply gender-sensitive criteria in activities that disrupt biodiversity and policies both at local, national and international level. Environmental Health Officers and Environmental Protection Authority will take cue from the result of the study to focus attention on the need to extend their coverage especially in letting people know the health implication of their activities.

Due to the increase in land cultivation, population growth and other environmental pressures, the diversity of plant and animal life is at risk. Across the globe, natural systems that support economies, lives and livelihoods are at risk of rapid degradation, with significant further loss of biodiversity becoming increasing likely. Loss of biodiversity affects both material and non-material human well-being. Both the continued loss of biodiversity and the disruption of cultural integrity represent

obstacles towards the attainment of the Millennium Development Goals (MDGs). Biodiversity loss continues because current policies and economic systems do not incorporate the values of biodiversity effectively in either the political or the market systems, and many current policies are not fully implemented. OguruguUzo-uwani Enugu State where this study was conducted is a rural, riverine and agrarian community which produces and supplies copious quantities of varieties of food stuffs, bush meat, fresh and dried fish to the neighbouring urban communities. Their income depends mainly on sales of the proceeds from fishing, hunting and farming. Observation by the researchers showed that there has been steady decline in the quality and quantity of food items supplied by the inhabitants. There is also a report that some species of fish such as 'Asa' in local parlance and other animals are hardly found. These are some of the features of threatened biodiversity. These prompted worries in the researchers concerning the status of biological diversity in the area of study considering the fact that the procedures in which fishing, hunting, farming and other river-related activities are carried out determine the health of the ecosystem, especially humans. The inspiration of this paper arose given the established dangers associated with biodiversity loss. However, there are no published studies that have sought to find out the various activities of adults of OguruguUzo-uwani LGA of Enugu State which are likely to disrupt biodiversity. This is the main thrust of this study.

Objectives of the Study

The purpose of the study was to find out the agricultural and aquatic activities that disrupt biodiversity among adults of OguruguUzo-uwani LGA in Enugu State. Specifically, the study found out the:

1. agricultural activities that disrupt biodiversity among adults;
2. aquatic activities that disrupt biodiversity among adults;
3. agricultural activities that disrupt biodiversity among adults based on gender; and
4. aquatic activities that disrupt biodiversity among adults based on

gender.

Research Questions

Five research questions were posed to guide the study.

1. What are the agricultural activities that disrupt biodiversity among adults?
2. What are the aquatic activities that disrupt biodiversity among adults?
3. What are the agricultural activities that disrupt biodiversity among adults based on gender?
4. What are the aquatic activities that disrupt biodiversity among adults based on gender?

Hypothesis

HO_1) There is no significant difference in the percentage responses of male and female adults of Ogurugu on activities that disrupt biodiversity ($p<.05$).

Methods

This study adopted the descriptive survey research design. The population for the study comprised 2,665 adults (1,197 males and 1,468 females) adults of Ogurugu. The multi-stage sampling technique was employed to draw the sample for the study. The first stage involved drawing the eight (8) villages that make up Ogurugu community. The second stage involved purposive random sampling of 15 male adult farmers from each of the 8 villages, which gave 120; and 19 female adult farmers from each of the 8 villages, which gave 152. These brought the total sample size to 272 adult farmers in OguruguUzo-uwani LGA of Enugu State.

A researcher's-designed 16-item questionnaire served as the instrument for data collection. The questionnaire was validated by three experts from the Department of Health and Physical Education, University of Nigeria, Nsukka. The reliability of the instrument was established using split half method, and a correlation coefficient of .82 was obtained with the Spearman's Brown correlation formula, which was adjured reliable for embarking on the study. The instrument was administered and retrieved after completion by the researchers. Out of the 272 copies of the questionnaire administered, only

264 copies duly filled out were used for data analysis. Percentages were used to answer the research questions, while chi-square (x^2) statistic was used to test the null hypotheses at .05 level of significance. A proportion of 0-9% interpreted as very low, 10-39% as low, 40-59% as moderate or average, 60 -79% as high, and 80% and above as very high were used for the interpretations of the research questions.

Results

Table 1: Agricultural Activities That Disrupt Biodiversity Among Adults (n=264).

S/N	Agricultural activities	f	%	Decision
1	Killing grasses with herbicide	242	91.7	Very High
2	Bush burning while preparing for farming	263	99.6	Very High
3	Devastation of wildlife on land for bush meat	106	40.2	Low
4	Destruction of forests for agricultural use	158	59.8	Moderate
5	Mechanization and application of pesticide and fertilizer	254	96.2	Very High
6	Plowing	119	45.1	Moderate
7	Mechanical weed control	249	94.3	Very High
8	Converting increasing additional areas of land for cultivation	185	70.1	High
	Overall percentage		**74.6**	**High**

Table 1 shows that very high proportion of adults practised bush burning while preparing for farming (99.6%), mechanization and application of pesticide and fertilizer (96.2%), mechanical wed control (94.3%), and killing grasses with herbicide (91.7%); while high proportion converted increasing additional areas of land for cultivation (70.1%). The table also shows that moderate proportion of adults practised destruction of forests for agricultural use (59.8%) and plowing (45.1%); while low proportion devastated wildlife on land for bush meat (40.2%). The overall percentage shows that high proportion of adults of Ogurugu engaged in agricultural activities that disrupt biodiversity (74.6%).

Table 2: Aquatic Activities That Disrupt Biodiversity Among Adults (n=264).

S/N	Aquatic activities	f	%	Decision
1	Using chemicals for fishing in rivers and streams	173	65.5	High
2	Washing of body and articles in rivers and streams	257	97.3	Very High
3	Planting vegetables on the river bank	98	37.1	Low
4	Overfishing in rivers and streams	219	82.9	Very High
5	Disposing sewage and agricultural wastes into rivers and streams	221	83.7	Very High
6	Disruption of water flow patterns	196	74.2	High
	Overall percentage		**73.5**	**High**

Table 2 shows that very high proportion of adultspractised washing of body and articles in rivers and streams (97.3%), disposing sewage and agricultural wastes into rivers and streams (83.7%), and overfishing in rivers and streams (82.9%). The table also shows that high proportion of adults disrupted water flow patterns (74.2%) and using chemicals for fishing in rivers and streams (65.5%); while low proportion planted vegetables on the river bank (37.1%). The overall percentage shows that high proportion of adults of Ogurugu engaged in aquatic activities that disrupt biodiversity (73.5%).

Table 3:Agricultural Activities That Disrupt Biodiversity Among Adults Based on Gender (n=264).

S/n	Agricultural activities	Male (n=119)			Female (n=145)		
		F	%	Decision	F	%	Decision
1.	Killing of grasses with herbicide	87	73.1	High	127	87.6	Very High
2.	Bush burning while preparing for farming	93	78.2	High	133	91.7	Very High
3.	Devastation of wildlife on land for bush meat	58	48.7	Moderate	97	66.9	High
4.	Destruction of forests for agricultural use	62	52.1	Moderate	81	55.9	Moderate
5.	Mechanization and application of pesticide and fertilizer	56	47.1	Moderate	92	63.4	High
6.	Plowing	49	41.2	Moderate	88	60.7	High
7.	Mechanical weed control	64	53.8	Moderate	94	64.8	High
8.	Converting increasing additional areas of land for cultivation	71	59.7	Moderate	101	69.7	High
	Overall percentage		**56.7**	**Moderate**		**70.1**	**High**

Table 3 shows that high proportion of female adults (70.1%) and moderate proportion of male adults (56.7%) engaged in agricultural activities that disrupt biodiversity. This implies that female adults had higher proportion of responses than the male adults, showing that females disrupt biodiversity through agricultural activities more than the males.

Table 4: Aquatic Activities That Disrupt Biodiversity Among Adults Based on Gender (n=264).

S/n	Aquatic activities	Male (n=119)			Female (n=145)		
		F	%	Decision	F	%	Decision
1.	Using chemicals for fishing in rivers and streams	96	80.7	Very High	125	86.2	Very High
2.	Washing of body and articles in rivers and streams	109	91.6	Very High	137	94.5	Very High
3.	Planting vegetables on the river bank	81	68.1	High	101	69.7	High
4.	Overfishing in rivers and streams	92	77.3	High	115	79.3	High
5.	Disposing sewage and agricultural wastes into rivers and streams	103	86.6	Very High	127	87.6	Very High
6.	Disruption of water flow patterns	78	65.5	High	99	68.3	High
	Overall percentage		**78.3**	**High**		**80.9**	**Very High**

Table 4 shows that very high proportion of female adults (80.9%) and high proportion of male adults (78.3%) engaged in aquatic activities that disrupt biodiversity. This implies that female adults had slightly higher proportion of responses than the male adults, showing that females disrupt biodiversity through aquatic activities more than the males.

Table 5: Summary Of Chi-Square (X^2) Analysis of No Significant Difference in the Percentage Responses of Male and Female Adults of Ogurugu on Activities That Disrupt Biodiversity

	Male (n=119)				Female (n=145)						
	Yes		No		Yes		No		$X^{2\text{-cal}}$	df	$X^{2\text{-crit}}$
Activities	O	E	O	E	O	E	O	E			
Agricultural	68(76.6)		51(42.4)		102(93.4)		43(51.6)		4.94	1	3.84*
Aquatic	93(94.7)		26(24.3)		117(115.3)		28(29.7)		.272	1	3.84**

***Significant**

Table 5 shows that the calculated chi-square (x^2) value was greater than the critical (table) value for agricultural activities ($x^{2\text{-cal}} = 4.94 > x^{2\text{-crit}} = 3.84$). Therefore, the null hypothesis was rejected for agricultural activities. This implies that there was a significant difference in agricultural activities of male and female adults that disrupt biodiversity. The table also shows that the calculated chi-square (x^2) value was less than the critical (table) value for aquatic activities ($x^{2\text{-cal}} = .272 < x^{2\text{-crit}} = 3.84$). Therefore, the null hypothesis was accepted for aquatic activities. This implies that there was no significant difference in aquatic activities of male and female adults that disrupt biodiversity.

Discussion

The findings of the study in Table 1 show that very high proportion of adults practised bush burning while preparing for farming (99.6%), mechanization and application of pesticide and fertilizer (96.2%), mechanical wed control (94.3%), and killing grasses with herbicide (91.7%); while high proportion converted increasing additional areas of land for cultivation (70.1%). The table also shows that moderate proportion of adults practised destruction of forests for agricultural use (59.8%) and plowing (45.1%); while low proportion devastated wildlife on land for bush meat (40.2%). The findings were expected and therefore

not surprising because modern agricultural techniques in both rich and poor countries are helping to undermine the natural resource base of the economies that depend upon it. These findings were in line with the assertions ofBrashares (2004) who asserted that people burn wide areas of bush while hunting or preparing for farming, thereby destroying the fauna and flora of that area. Excessive carbons are discharged into the atmosphere aiding the rate at which global warming occurs. Bush burning may also cause acid rain. The findings were also in agreement with the revelation of Whitney (2009) who revealed that when bushes are burnt, sulfur, nitrogen, and carbon combine with oxygen to form compounds known as oxides. When these oxides are released into the air, they react chemically with atmospheric water vapour, forming sulfuric acid, nitric acid, and carbonic acid respectively. These acid containing water vapours commonly known as acid rain enter the water cycle and can subsequently harm the biological quality of forests, soils, lakes, and streams. Acid rain also kills fishes and aquatic invertebrates, and increase soil acidity, which reduces forest growth and other ecosystems. The findings also agrees with the affirmation of Geiger, Bengtsson, and Berendse (2010) who disclosed that farming practices that disconcert biodiversity include plowing, mechanical weed control, artificial and organic fertilizer and pesticide use, and added that the use of pesticides negatively relate to species richness of plants, ground beetles and birds as well as to the biological control potential. The number of plant species is reduced by the use of herbicide and insecticides. The finding on mechanization and application of pesticides and fertilizer agrees with the position of Pfeiffer (2004) who noted that in order to increase crop yield, people embark on agricultural practices which involve mechanization and application of agro-chemical such as herbicide, pesticide, and fertilizer which severely affect biodiversity.

The finding on destruction of forests for agricultural use was in line with the findings of Gunningham and Young (2012) who observed that about 17 million hectares of tropical forest are now being cleared annually as trees are

cut for lumber or land cleared for agriculture or the other development. It is worth noting that apart from provision of foods, clothing and shelter, some of these plants and animals that are becoming extinct may hold the cures for diseases that besiege man. These findings may be as a result of inadequate sensitization on activities that pose threat against biodiversity. These findings have implications for sensitizing local farmers about activities that preserve biological diversity.

The findings of the study in Table 2 show that very high proportion of adults practised washing of body and articles in rivers and streams (97.3%), disposing sewage and agricultural wastes into rivers and streams (83.7%), and overfishing in rivers and streams (82.9%). The table also shows that high proportion of adults disrupted water flow patterns (74.2%) and using chemicals for fishing in rivers and streams (65.5%); while low proportion planted vegetables on the river bank (37.1%). These findings were expected and therefore not surprising because it is a well known fact that climate change is caused by both human activities and nature; therefore undergraduates supposed to have basic knowledge of its causes.The findings were in line with the findings of Brashares (2004) who reported that a perfect ecological, economical, and political storm was brewing in West Africa because of the complex interplay of overfishing by both African and European nations offshore, the accelerating devastation of wildlife on land for bush meat, and periods of massive food shortages. The findings were also in line with the assertion ofMastrandrea and Schneider (2009) who asserted that application of agro-chemicals may lead to eutrophication which is the process by which a body of water becomes rich in dissolved nutrients from fertilizers or sewage, thereby encouraging the growth and decomposition of oxygen-depleting plant life and resulting in harmful effects to other organisms.Polluted river and lake may kill animals and plants living in it immediately or it may injure them slowly. Equally, people who feed on these fishes are exposed to very high levels of hazardous

substances which may damage their health. The findings have implications for policy makers to make policies both at local, national, and international level that would improve and protect the environment from degradation due to some activities that disrupt biodiversity; and the Federal Ministry of Education in knowing the aspect of the activities that disrupt biodiversity to place more emphasis on.

The findings of the study in Tables 3 and 4 shows that high proportion of female adults (70.1%) and moderate proportion of male adults (56.7%) engaged in agricultural activities that disrupt biodiversity, and very high proportion of female adults (80.9%) and high proportion of male adults (78.3%) engaged in aquatic activities that disrupt biodiversity respectively. These findings were expected and therefore not surprising because women and men have different interests and needs, and is obliged to acquire different capacities and knowledge including that of biological diversity.The findings conform to the assertion of Ajah (2012) that females usually display less extensive environmental knowledge than males, but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change. These findings have implications for reducing the misery caused by disrupting biological diversity in the ecosystem. Environmental Health Officers and Environmental Protection Authority will take cue from the result of the study to focus attention on the need to extend their coverage especially in letting people know the health implication of their activities that mostly disrupt biodiversity.

The summary of chi-square analysis in Table 5 shows thatthe calculated chi-square (x^2) value was greater than the critical (table) value for agricultural activities ($x^{2\text{-cal}} = 4.94 > x^{2\text{-crit}} = 3.84$). Therefore, the null hypothesis was rejected for agricultural activities. This implies that there was a significant difference in agricultural activities of male and female adults that disrupt biodiversity. The table also shows that the calculated chi-square

(x^2) value was less than the critical (table) value for aquatic activities ($x^{2\text{-cal}} = .272 < x^{2\text{-crit}} = 3.84$). Therefore, the null hypothesis was accepted for aquatic activities. This implies that there was no significant difference in aquatic activities of male and female adults that disrupt biodiversity.These findings wereanticipated and therefore were not surprising because it is a well established fact that women and men have different interests and needs, and are obliged to engage in diverse activities in the ecosystem with significant knowledge.

Conclusions

Based on the findings and discussion, the following conclusions were reached. High proportion of adults of Ogurugu engaged in agricultural and aquatic activities that disrupt biodiversity. High proportion of female adults and moderate proportion of male adults engaged in agricultural activities that disrupt biodiversity, but female adults had higher proportion of responses than the male adults, showing that females disrupt biodiversity through agricultural activities more than the males.Very high proportion of female adults and high proportion of male adults engaged in aquatic activities that disrupt biodiversity, but female adults had slightly higher proportion of responses than the male adults, showing that females disrupt biodiversity through aquatic activities more than the males.Gender had significant influence on agricultural activities that disrupt biodiversity, but had no significant influence on aquatic activities that disrupt biodiversity among adults.

Recommendations

Based on the findings, discussion and conclusions drawn, the following recommendations were made:

1. Farmers should support biodiversity through careful farming methods other than engaging in activities that disrupt biodiversity. This could be done through sensitizations and organizing seminars on the issue.
2. The Federal Ministry of Agriculture in collaboration with the Federal Ministry of Environment should disseminate appropriate knowledge, skills and practices to farmers and young generation that may have to

combat with more effects of global warming due to human activities on the environment.

3. Environmental Health Officers and Environmental Protection Authority should take cue from the result of the study to focus attention on the need to extend their coverage especially in letting people know the health implication of their activities that could disrupt biodiversity.

4. Check should be on agricultural intensification and extensification that have resulted in the loss of biodiversity and ecosystem services on farmland. People especially farmers should care more about their economy than the health of the environment.

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