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IMPACT OF POPULATION INCREASE ON AGRICULTURAL PRODUCTIVITY IN KWALI AREA COUNCIL-ABUJA, NIGERIA (2007-2016)

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ABSTRACT

The research examined the impact of population increase on agricultural productivity in Kwali Area Council between the periods of 2007-2016. The objectives of the research include; to examine the demographic characteristics of people living in Kwali Area Council; the causes of population increase in the area; to show the trends of agricultural productivity between 2007 -2016; to examine the relationship between population increase and agricultural productivity in the study area, as well as the effect of population change on agricultural productivity in the area. Data was sourced from both primary and secondary sources. Questionnaire was the major source of data while respondents were selected through systematic sampling technique. The data was analyzed using descriptive statistics such as frequency tables, percentages and charts among others graphs. Relationships were tested using the student T-test. The findings reveal that there exists a consistent increase in population size leading to the decline in agricultural productivity in the study area. Illiteracy, high fertility, improved medical facilities, presence of industries and basic amenities as well as good security network over the years were found to be the main reasons behind the increase in population. Some of the problems identified and threatening the existence of the area include; loss of agricultural land which led to decrease in food supply, hunger and poverty. Recommendations were proffered which include; placing restriction and curbing migration into the study area to check population as well as enforcing sanctions on land use abusers that convert agricultural lands to other land use in Kwali Area Council.

General Terms: Population growth; Agricultural productivity

Keywords: Food supply; Family planning; Birth control; Soil impoverishment; Farm yields; Farm produce; Hunger and poverty; Farm sizes; Agricultural productivity; Population Growth; Kwali Area Council.

1.   INTRODUCTION

Annually, states in Nigeria encounter a massive loss of arable farmland caused by erosion as a result of heavy precipitation. In lined with this, prolonged drought and the pressure of animals grazing on the land is on its daily increase in the northern deserts while in the Niger delta region, oil spill and severe land degradation daily pollutes and renders hectares of arable farmlands infertile and this

contributes immensely to about 80% of loss of biological diversity (Chakir, 2010). The rise in population has resulted in marginal rainfall areas being vulnerable to drought and more bare lands as a result of the decline in vegetative cover resulting from the intensive anthropogenic activities by humans, higher rates of animal grazing, deforestation for building and fuel needs, thereby exposing the soil to the ravages of wind and water erosion (Chakir, 2010).

The high rate of population growth in Nigeria has resulted in the unsustainable use of natural resources which is the basic foundation for livelihood without having concern for the future. This has led to tremendous effects on our natural ecosystem. The provisioning, regulatory, cultural and supporting services which are derived from the ecosystem are put at a high risk due to the harsh use of these natural resources (Allen, 2014). Over the years, there have been several symptoms of ecological stress like the deteriorating nature of the grass land areas, very low crop yield, soil erosion which has forced so many migration activities to the cities and low standard of living by the poor. All these effects can produce long-term, possibly permanent damage to the environment which in turn would have a huge negative effect on agricultural production in Kwali Area Council (Wassmer, 2012). Kwali Area Council land is now being converted to other uses such as residential to meet the housing demand of the increasing population as well as commercial and industrial functions. The 200-2006 demolition exercise carried out by Mallam Nasir El-rufai, the then minister of the FCT forced lots of people to relocate from the city centers to its suburban in which Kwali was not left out. These created pressure on available resources in Kwali Area Council and led to reduction of farm sizes and consequently decline in the volume of agricultural products (Ejaro, 2013).

2.   THE STUDY AREA

Kwali is situated on the south-eastern wings of the FCT. It is located within latitude 08o10' North and 08o49' North and longitude 07o03' East. Kwali is bounded by the Sukuku mountain ranges to the south and east. River Gurara to the west, and river Usman to the North. It is located at about 74km drive to the FCT centre, with a total land mass of about 1,206 kilometer square (National Population Commission (NPC), 2016). Kwali Area Council is also bounded to the North by Gwagwalada Area Council, South by Abaji Area Council, East by Kuje Area Council and west by Suleja Hills, the land area translates to about 4,850 hectares (Ejaro, 2013).
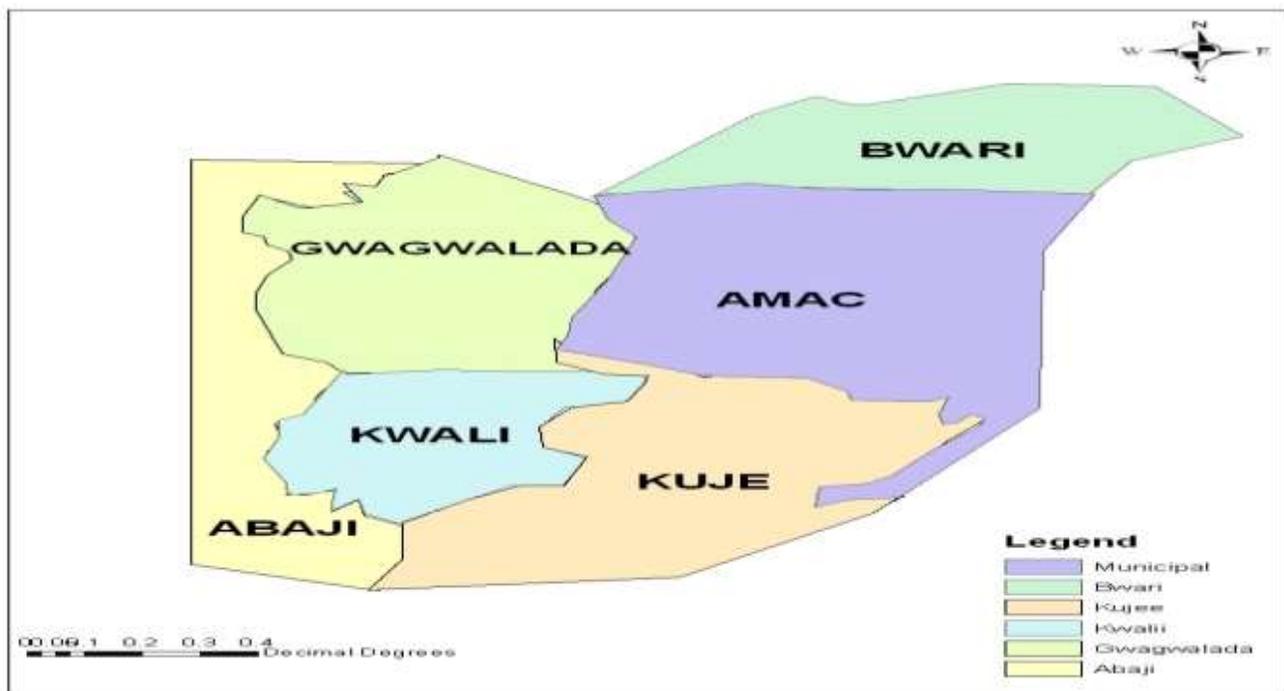

Fig.1: Map of FCT Showing Kwali Area Council.

Source: Department of Land use Administration, Kwali Area Council (2018)

Fig.2: Map of Kwali Area Council showing the various wards.
Source: Department of Land use Administration, Kwali Area Council (2018)

3.   LITERATURE REVIEW

3.1 Concept of Agricultural Productivity

Agricultural productivity is measured as the ratio of agricultural outputs to agricultural inputs. Agricultural productivity is not a synonym of fertility. It is generally use to express the power of agriculture in a particular region to produce crops without regard to whether that power is due to the bounty of nature or to the efforts of the man. Productivity like disparity is a relative concept. The term productivity has been used in different meanings and has aroused many conflicting interpretations. Some time it is considered as the overall efficiency with which a production system works, while others it is defined as a ratio of output to resources expended separately, or collectively. This term has also incorrectly and interchangeably been used with production. In reality, production refers to the volume of output while productivity signifies the output in relation to resource expended. Production can be increased by employing more resources without increasing productivity. On the other hand, productivity can be increased without increasing production by employing less input for the same production level. But it is commonly agreed that productivity is the ability of a production system to produce more economically and efficiently. Therefore, agricultural productivity can be defined as a measure of efficiency with which an agricultural production system employs land, labour, capital and other resources. In recent years many attempt have been made to define the connotation of agricultural productivity (Ildephonse, 2016).

Daniel (2015) explains it as, "Productivity expresses the varying relationship between agricultural output and one of the major inputs, like land or labour or capital, other complimentary factors remaining the same..." It may be born in mind that productivity is physical rather than a value concept. The connotation of agricultural productivity engaged the attention of many an economist at the 23rd annual conference of the Indian society of agricultural economics, some economists suggested that the yield per acre should be considered to indicate agricultural productivity. A number of objections were raised against this view because it considered only land which is just one factor of production while other factors are also responsible, and therefore it was arbitrary to attribute productivity entirely to land and express it per acre of land. It was suggested, for instance, that productivity could also be measured in terms of per unit of labor and

different regions compared on that basis. After a thorough discussion, it was generally agreed that the yield per acre may be considered to represent the agricultural productivity in a particular region and that other factors of production be considered as the possible cause for the variation while comparing it with the other regions (Daniel, 2015).

Ildephonse (2016) has expressed the connotation of productivity in these wards." Productivity is defined in economics as the output per unit of input… the art of securing an increase in output from some input or of getting the same output from a smaller input." He further suggests that increases in productivity, Whether in industry or agriculture, is generally the result of a more efficient use of some or all the factors of production, viz. land,labour and capital Saxon incorporates the productivity as a physical relationship between output and the input which gives rise tothat output. Ildephonse (2016) considers productivity in broad terms, to denote the ratio of output to any or all associated inputs in real term.

3.2 Measurement of Agricultural Productivity

The assessment of agricultural productivity has engaged the attention of scholars working in different disciplines like geography, economics and agricultural science for a land time; many attempts have been made to measure and quantify agricultural productivity in India as well as in other countries of the world. The measurement of agricultural productivity is not a simple task as it involves a relationship between inputs and outputs in agricultural production Input itself is a complex thing which governs farming efficiency. Stamp while attempting to measure crop productivity per unit area emphasized that a real difference in crop productivity are the results partly of natural advantages of soil and climate and partly of farming efficiency. Farming efficiency refers to the properties and quantities of various inputs. The manner in which they are combined and utilized for production and effective market demands for the output (Okezie, 2012).

There is a substantial literature relating to methodological procedures for measuring productivity in agriculture. The measures of agricultural productivity which are most frequently used are those of partial productivity and refer to the relation of a single input or a group of inputs to the total output or to a part there of (yield per hectare, output per man hour, Output per unit of capital) The data required to measure the productivity of a single input are more likely to be available than those required for measures of overall productivity, besides the aggregate of total inputs may tend to obscure the effect of changes in their composition. Owing to the multitudinous utility, experts of agricultural geography have developed techniques, suitable for measurement of agricultural productivity and efficiency (Okezie, 2012).

Okezie (2012) while measuring the relative productivity of British and Danish farming emphasized and expressed it in terms of gross output of crops and livestock. He considered seven parameters. They are: The yield per acre of crops; the livestock per 100 acres; the gross production or output per 100 acres; the proportion of arable land; the number of persons employed; the cost of production expressed in terms of wages and labour costs; prices relative profitability and general economic conditions.

Kendall (2009) taking the acre yield of ten leading crops in each of the forty eight administrative counties in England for four selected years, tried on four coefficients, Productivity, Ranking, Money value and starch equivalent or energy, of the four coefficients, The ranking coefficient is probably the easiest to calculate and gives a reasonable the ranking of countries in order of productivity, To obtain the ranking coefficient, Kendall ranked each of the ten crops in the forty eight counties in order of their yield, then the sum of the ranks occupied by the unit was divided by the number of the crops considered to obtain the average rank of the unit. Kendall's money value coefficient was based on the value of crop production of each country (which was obtained by multiplying the volume of production of particular crop by the price) and the results of ten crops for each county were added together and the total was divided by the total acre age in the county under the ten crops. Kendall's energy coefficient is based on the total energy value of various arable crops expressed as starch after adding the proportions assignable to products and the energy index was constructed by ascertaining the production of energy per acre under crops on the basis of a prepared table showing the energy value of various crops.

Kendall's money value coefficient poses one major difficulty that data for certain crops are not available, for example, there are many vegetables and beans which are grown mostly for the consumption on the forms and their price data are not recorded in contrast to cereal crops whose data are adequate. While determining the money value coefficient, another difficulty arises with regard to the prices for example the prices prevailing in the area should be adopted, or those prevailing in the region or in the country as a whole, in addition to the local variations in the prices which depend on circumstances like, proximity to the market or the relative nutritive character of the product. Significant differences in prices per tonne between the crops affect the final result heavily in favour of the higher priced commodity. In this method, the crop production of each unit area is valued by multiplying the volume of production of a particular crop by the price and then added the results for the selected number of crops together. The total is divided by the total acreage in the unit area under the total selected crops. The result gives for each unit area a figure of money value per acre / hectare under the crops considered. So for as energy coefficient is concerned as index based on nutritional factor ignores local variations because of the absence of data. Kendall, therefore, suggests starch equivalent as the most suitable unit. While calculation a coefficient based on starch equivalent it should be decided (a) Whether a gross or

net digestible energy figure is to be taken (b) Whether any allowance is to be made for by product, such as Wheat and Barley straws or the green stalks of Maize, Jowar and Bajra, and (c) Whether any account should be taken of the fact that the energy in certain foods has first to be fed to livestock and then wheat and milk is used for human consumption. The basic question that arises in this technique is whether the gross starch equivalent of the various crops should be considered or the net equivalent. Net energy refers to the amount of energy for work and body building whereas, a gross figure includes the energy employed in the digestive process of the consuming animal and similar non-realizable forms. Kendall suggested that production of energy be preferred as the gross figures.

3.3 Causes of population growth in Nigeria

The world`s population today has been one of the growing concern amongst nations as it has hindered development to some countries. Population dynamics is one of the key issues to think about in developmental process (UN, 2016). 2000 years ago, human population was just 300 million which has been estimated to be the United States population. The world population in recent time has exceeded six billion and is still growing at an alarming rate annually. This trend in population will continue on the higher side and the earth would reach or even exceed its carrying capacity if not properly checked. Certain factors such as high birth rate, low death rate, improved medical care, technology increase etc., have contributed immensely to an average rise in life expectancy which has benefitted the rise in human population. In Nigeria today, there has been a rapid increase in population due to polygamous activities of the people as a result of higher fertility rate. This is because the traditional belief of many ethnic groups is that children are blessings from God and also that the more children one has, the more hands he has in producing food and someday would receive a traditional tittle based on the kind of food he produces. Furthermore, ignorance of family planning and birth control devices, improved medical care, population reduction factors like violence, war and epidemics has been on the decrease, and all these has resulted in the rise of the country's population (UN, 2016). In the FCT, the population is also on the increase as it has been projected to rise with 10% annually (National population Commission, 2015).

(i)   **Ignorance of Family planning and birth control**

Ignorance of family planning and lack of birth control programs contributes to the exponential growth in the world population crises. Family planning is a tough decision made in a family towards the use of its human and material resources for the benefit of all categories of its members. The citizen lack of interest in family planning programs, birth control devices, (such as contraceptives, condoms, sterilization) has led to the increase in the population of Kwali Area Council as well as the entire FCT (Mundi, 2011).

(ii)   **Improved medical care**

Increased and improved medical services which have been put in place over the past years as a result of the advancement in the knowledge of sciences and human anatomy has led to the development of curative medicines for human use. This as a result has led to the increase in the use of safer and cleaner sanitation, building of medical centers, antenatal and pre-natal care, immunization exercises, proper waste disposal facilities, clean water among others, and thus has contributed to population increase. This is true because the amount of deaths recorded over the past years as a result of different illnesses such as small pox, chicken pox, typhoid fever, yellow fever and so many other communicable diseases has been drastically reduced presently and has been attributed following the invention of the above mentioned factors (Elekwa, 2012). In years back, 40-50yrs ago, the health of the population was so bad due to lack of medical professionals and improved medical care which resulted in loss of several lives. As compared to the recent times, the number of health care professional especially indigenous medical experts and facilities has increased tremendously to take care of the growing population's medical needs. In addition, adequate medical care is also received from private practitioners both locally and oversees as a result of improvement in the financial background of the population. Most people now can afford adequate food which helps in nourishing the body tissues and therefore keeps the body in a good nutritional

balance and thus extends people`s lives (Elekwa, 2012).

(iii)   **Decreased Mortality**

The decrease in the number of death of individuals has led to the fundamental increase in the rise in the number of humans. This is a sure fact owing to the improvement of medicine; humans have found curative measure to different diseases that could result to death. This has caused the increase in life expectancy of individuals thereby reducing mortality rate which has led to the fast growing rate of the population (Elekwa, 2012).

(iv)   **Lack of Education**

Illiteracy amongst the people has been of immense factor that has projected the number of people living in this area. Due to lack of education, they fail to understand the resultant effect of over population as they are not interested in the controlled system of family reproduction (Family planning and birth control measures) (Elekwa, 2012).

(v)   **Advancement in science and Technology**

With an improvement in transport system, there is a progressive decline in road accident owing to the construction and maintenance of durable and pliable roads in Nigeria and other part of the world compared to Centuries ago (Elekwa, 2012). Science has also improved other areas of man's dependence such as food, clothing, shelter, communication, education among others. These contributed largely to longer lives and comfortable living (Elekwa, 2012).

4.   MATERIALS AND METHODS

The research employed both Primary data source and Secondary data source. The nature of the primary data is dependent on the Structure of the questionnaire and other Primary source of data such as field observation. Secondary source of data is dependent on already existing records from established as well as authorized firms or institution. The information collected from this source include characteristic of respondents, causes and effects of population increase, and the quantity of Agricultural produce. Data from Ministry of Agriculture and Rural Development on quantity of Agricultural produce as well as data from National Population Commission from 2007 to 2016. The data were integrated to give a detailed analysis between the population changes and the quantity of Agricultural Produce from 2007 to 2016.

4.1   Sampling procedure and Sample Size selection

The sample frame is used as a tool to determine the number of questionnaire to be administered in each of the locations in Kwali Area Council. The research adopts a systematic sampling technique of questionnaire administration. The questionnaires were administered among the ten wards of Kwali Area Council, covering the entire settlements in a systematic order. A total of 134 settlements covering the entire Kwali Area Council were visited in accordance to the mapped out questionnaires allocated for the wards.

With a projected population of 128,283 for 2016, a total number of 377 questionnaires were administered by adopting the Krejcie method of sample determination.

Krejcie model for Sample size determination were adopted and postulated below for the study; $S = \dfrac{x^2\,NP\,(1-P)}{d^2(N-1)+x^2P(1-P)}$

Where,

S   =   required sample size

X_2 =   the table of value for 1 degree of freedom at the desired confidence level (3.841)

N =   the population size

P =   the population proportion (assumed to be 0.50) since this would provide the maximum sample size)

d =   the degree of accuracy expressed as a proportion (0.05)

Hence, at 21,377 household mean the sample size is 377.

Table 1 : Sample size Selection

S/N	LOCATION (WARDS)	POPULATION 2006 (NPC)	POPULATION PROJECTION (2016)	NUMBER OF QUESTIONNIARE/ SAMPLE SIZE
1	Ahara	5890	8806	25
2	Dafa	9461	14145	41
3	Gumbo	7185	10742	31
4	Kilankwa	7363	11008	32
5	Kundu	8167	12210	35
6	Kwali	16291	24356	71
7	Pai	9596	14347	42
8	Wako	3927	5871	17
9	Yangoji	11049	16519	48
10	Yebu	6908	10279	35
	Total	85,837	128,283	377

Source: Author Survey, 2018

4.2   Method of Data Analysis

Descriptive statistics such as frequency tables, percentages, charts, mean and standard deviation were used in analyzing the data collected from the field. Furthermore, inferential statistics; T-test was used in verifying the hypothesis of the study. The arithmetic mean statistic will be used alongside the student T-test to test the hypothesis.

This is expressed mathematically as: Mean $(x) = \Sigma\overline{x}/ N$

Where: ΣX = summation of the variables, N = total numbers of sets of variables, Σ = summation, X = mean of the set

The T-test was used to verify the hypothesis.

It is expressed mathematically as:

$$t = \frac{/\overline{X_1} - \overline{X_2}/}{\sqrt{(6^2_1/ N_1 + 6^2_2 / N_2)}}$$

Where:

$\overline{X_1}$ and $\overline{X_2}$ are the means of the two sets of data, S_1 and S_2 are their Standard deviations, N_1 and N_2 are the number of observations.

5.   RESULTS AND DISCUSSION

5.1   Causes of Population Increase in Kwali Area Council

This section analyses the factors causing increase in population in the study area.

Table 2: shows the factors responsible for Population increase in the study area

Causes of population increase in Kwali Area Council	(%) SA	(%) A	(%) D	(%) SD
Lack of family planning and birth control	72	18	8	2
Improvements in medical care and health facilities	56	22	18	4
Decrease in mortality rate	90	9	1	0
Illiteracy	68	21	8	3
Advancement in Science and Technology	45	21	18	16
Abundance of amenities	72	13	14	1
Presence of Industries	37	36	15	12
Good Security network	84	11	4	1
Availability of jobs	95	4	1	0

Source: Field Survey, 2018.

Analysis of table 2 showed that 90% of the respondents are of the opinion that, lack of family planning and birth control is a factor responsible for the increase in population in the study area, leading to a reduction in farm sizes and consequent reduction in agricultural productivity. Population explosion over the years has strongly contributed to high rate employment in the area. As resettlement of towns within the Federal Capital Territory, Immigrants from rural areas as well as those affected by the Mallam Nasir El-Rufia demolition exercise of 2004-2006 in the Federal Capital territory of illegal structures for development, Kwali Area Council have gained massive population. 78% of the respondents are of the view that improvements in medical care and health facilities are largely responsible for the increase in population in the area. People tend to migrate to areas with good medical facilities and health care. The table reveal that 99% of the respondents attest to decrease in mortality rate, as a factor chiefly responsible for the increase in population in the study area. As less people dies and more people are born, population increases geometrically over time, hence posing a threat towards agricultural productivity. 89% of the respondents attest that illiteracy and lack of formal education has indirectly caused population to grow in the study area. Without proper education, people do not know the consequence of having many children and depriving them proper education, hence impacting negatively in the area. 66% of the respondents are of the opinion that the advancement in Science and technology in the area has led to the increase in population. People tend to migrate to areas with advance facilities, 34% of the respondent refuted this assertion. 85% of the respondents are of the opinion that the abundance of amenities in the area has attracted population. 73% of the respondents are of the opinion that the Presence of Industries has attracted population to the area. These industries include; small, medium and large scale industries which deal on both local and advance products in the area. 95% of the respondents attributed the increase in population in the area to good Security network. People feel secured living in regions with maximum security network such as Kwali Area Council, while 99% opines that improvement in jobs and standard of living has attracted population in the area and subsequently put pressure on available farm lands and agricultural productivity in the area.

5.2   Implications of Population Increase on Agricultural Productivity in Kwali Area Council

Table 3: shows the implication of population increase on Agricultural productivity

Implication of population increase on agricultural productivity in Kwali Area Council	(%) SA	(%) A	(%) D	(%) SD
Decrease in food supply	42	40	15	3
Soil impoverishment due to continuous cropping	66	20	14	0
Decrease crop yield/output due to pressure on farm lands	38	51	7	4
Hunger and Poverty due to reduction in yields	56	38	6	0
Loss of Agricultural land to other land uses	28	43	20	9
High cost of Agricultural produce	40	52	6	2

Source: Field Survey, 2018

Table 3 shows that 82% of the respondents attest that a reduction in farm size has led to a decrease in food supply in Kwali Area Council. As more people continue to migrate into the study area, there is constant pressure on farms to meet the demand of this population; consequently, a decrease in the supply of food becomes inevitable. 86% of the respondent agreed that a reduction in farm land has led to soil impoverishment due to consistent cropping on available lands, whereas 14% of the respondent refuted this claim but opines to the use of farm supplements such as manure and fertilizers to improve crop yields and farm performance. 89% of the respondents are of the view that decrease in crop yield/output are due to pressure on farm land in the area. 94% attest that reduction of farm sizes in the area has led to hunger and poverty. Without lands to cultivate, hunger and poverty becomes eminent; hence poverty creeps in with time. 71% of the respondent believes that loss of Agricultural land to other land uses in the study area is as a result of high fragmentation of farm lands. 92% of the respondents opine that the reduction in farm size in the study area has led to high cost of farm produce in the local markets. High cost of farm produce give rise to hunger and poverty and high crime wave in the area, as people tend to engage in malicious acts such as stealing.

5.3 Trend of agricultural productivity in Kwali Area Council from 2007 to 2016

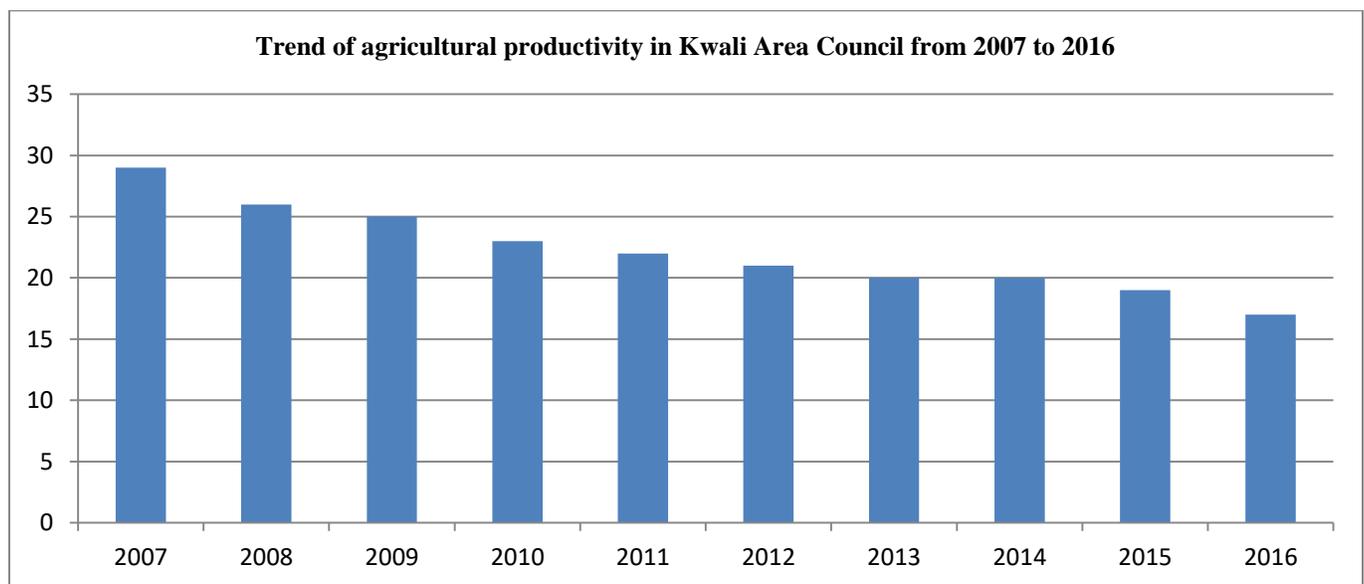This sub-section discusses the trend of agricultural productivity in Kwali Area Council from 2007 to 2016

Figure 3: Trend of agricultural productivity in Kwali Area Council from 2007 to 2016
Source: Field Survey 2018

Table 4: showing the trend agricultural productivity in Kwali Area Council from 2007 to 2016

Year	AGRICULTURAL PRODUCTIVITY (1,000) (TONNES)
2007	28.64
2008	26.12
2009	25.09
2010	23.57
2011	22.63
2012	21.06
2013	20.47
2014	20.43
2015	19.39
2016	17.86

Source; Federal Ministry of Agriculture and Rural Development, 2018

Table 4 reported that in 2007, agricultural productivity stood at 28.64 tonnes in Kwali Area Council. In 2008, agricultural productivity recorded 26.12 tonnes. In 2009, agricultural productivity stood at 25.09 tonnes. In 2010, agricultural productivity stood at 23.57 tonnes. In 2011, agricultural productivity recorded 22.63 tonnes. In 2012, agricultural productivity stood at 21.06 tonnes. In 2013, agricultural productivity recorded 20.47 tonnes. In 2014, agricultural productivity stood at 20.43 tonnes. In 2015, agricultural productivity recorded 19.39 tonnes. While in 2016, agricultural productivity stood at 17.86 tonnes. This trend shows a consistent decline in the annual productivity between 2007 and 2016. The bar graph in figure in 4.6 above gives a clear illustration of the decline in agricultural productivity in the study area between 2007 and 2016.

5.4 Relationship between population increase and agricultural productivity in Kwali Area Council between 2007 and 2016

This sub section discusses the relationship between population increase and agricultural productivity in Kwali Area Council from 2007 to 2016.

Table 5: Relationship between population increase and agricultural productivity in Kwali Area Council from 2007 to 2016

Year	(i) Population of Kwali Area Council	(ii) Agricultural productivity (1,000) (tonnes)
2007	86,552	28.64
2008	89,829	26.12
2009	95,713	25.09
2010	98,790	23.57
2011	100,498	22.63
2012	108,345	21.06
2013	110,768	20.47
2014	115,346	20.43
2015	119,324	19.39
2016	128,283	17.86

Source: (I) National Population Commission, 2018.
(II)Federal Ministry of Agriculture and Rural Development, 2018

Table 5 shows that in 2007 while population of the study area stood at 86,552, agricultural productivity recorded 28.64 tonnes. In 2008 the population of the study area stood at 89,829, agricultural productivity recorded 26.12 tonnes. In 2009, population of the study area stood at 95,713, agricultural productivity recorded 25.09 tonnes. In 2010, population of the study area stood at 98,790, agricultural productivity recorded 23.57 tonnes. 2011 depicted population of the study area standing at 100,498, and agricultural productivity recording 22.63 tonnes. In 2012, population of the study area stood at 108,345, agricultural productivity recorded 21.06 tonnes. While population of the study area in 2013 recorded 110,768, agricultural productivity records 20.47 tonnes. In 2014 population of the study area stood at

115,436, agricultural productivity recorded 20.43 tonnes. Population of the area in 2015 recorded 119,324 while agricultural productivity stood at 19.39 tonnes. Finally, in 2016 population of the study area stood at 128,283, agricultural productivity recorded 17.86 tonnes. This shows a negative correlation between population growth and agricultural productivity in the study area. As population continue to increase in the study area, agricultural productivity diminishes as well, implying that in the coming year Kwali Area Council will experience a severe consequence of hunger resulting from little or no yield to cope with the increasing population.

5.5   Hypothesis Verification

(H_o): There is no significant relationship between population increase and Agricultural productivity from 2007-2016 in Kwali Area Council.

(H_1): There is a significant relationship between population increase and Agricultural productivity from 2007-2016 in Kwali Area Council.

Table 6: Hypothesis table showing the relationship between population increase and agricultural productivity in Kwali Area Council from 2007 to 2016

Year	(i) Population of Kwali Area Council	(ii) Agricultural Productivity (1,000) (tonnes)
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2015	119,324	19.39
2016	128,283	17.86

Source: (I) National Population Commission, 2018.
(II)Federal Ministry of Agriculture and Rural Development, 2018

S/N	$A_1(x_1)$	$/(x_1 - \overline{x_1})/$	$(x_1-\overline{x_1})^2$	$A_2(x_2)$	$/(x_2-\overline{x_2})/$	$(x_2 - \overline{x_2})^2$
1	86,552	18,792.8	353169332	28.64	6.14	37.70
2	89,829	15,515.8	240740050	26.12	3.62	13.10
3	95,713	9,631.8	92771571	25.09	2.59	6.71
4	98,790	6,554.8	42965403	23.57	1.07	1.15
5	100,498	4,846.8	23491470	22.63	0.13	0.02
6	108,345	3,000.2	9001200	21.06	1.44	2.07
7	110,768	5,423.2	29411098	20.47	2.03	4.12
8	115,346	10,001.2	100024001	20.43	2.07	4.28
9	119,324	13,979.2	195418033	19.39	3.11	9.67
10	128,283	22,938.2	526161019	17.86	4.64	21.53
	$\sum A1=$ **1,053,448**		$\sum(x_1-\overline{x_1})^2=$ **1,613,153,177**	$\sum B1=$ **225.26**		$\sum(x_2-\overline{x_2})^2=$ **100.35**

$\overline{X_1}$ = **105,344.8**, $\overline{X_2}$ = **22.5**, 6_1 = **179,239,241.9**, 6_2= **11.15**, ∴ t = **6.10,** Degree of freedom (v) = $N_1 + N_2 - 2 = $ **18**

From the table of the student "t" distribution, the critical value of "t" at 0.05 confidence level is 1.74, while the calculated "t" value is 6.1. Since the calculated "t" value 6.10 is greater than the table value 1.74, the null hypothesis is rejected. Hence, there is significant relationship between population increase and agricultural productivity from 2007-2016 in Kwali Area Council. The test indicates clearly that as population continue to grow in the study area; it continues to exert pressure on agricultural productivity. This result to serious socio-economic impacts on the people such as: hunger and poverty, loss of agricultural lands, congestion and overcrowding, pollution of water bodies amongst others.

6. SUMMARY AND CONCLUSION

Findings revealed that rapid population growth is responsible for the decline in agricultural productivity in the area. The improvements in basic amenities and infrastructural development in the study area has also contributed to population growth in the area which resulted to increased fertility and lower mortality rate. Improvement in health facilities has equally caused the study area to become favorite region to dwell and receive medical attention. Others include; the establishment of industries. These industries and factories have continued to act as pull factors to job seekers. Improvement in standard of living and housing quality has also resulted in population of the area and the good security network provided has pulled people to the area for safety leading to expansion of the study area to accommodate the immigrants.

Analysis also revealed that the study area is fraught with a decrease in food supply, hunger and poverty, high cost of farm produce due to reduction in yields. There is also a record of Soil impoverishment due to continuous cropping. The relationship between the population growth and agricultural productivity as evaluated showed that as people migrate into the study area, the amount of yield over same year also decreases due to pressure on farm.

7. RECOMMENDATIONS

Farmers should be encouraged through loans and subsidies to boost agricultural sector. More lands should be allocated for agricultural practice against other land uses. Extension workers should be encouraged and properly paid duly to motivate them. A healthy partnership should exist between the government and the farmers to establish a cordial relationship and enabling environment. Government should adopt policy of decentralization of the agricultural sector to increase employment generation in the agricultural sector in Kwali Area Council.

There should be strict laws passed to tackle agricultural land use conversion, this will ensure that agricultural land is not tampered. Awareness should also be created on the implication of agricultural land use conversion to other uses. Laws regarding agricultural land use violation should be made strict with offenders sanctioned. Agricultural land use violators should be made to pay huge fines as penalty for their offence. Farmers should be trained in the use of some agricultural technology through extension workers and exposed to improve and modern practice. Government should invest in the agricultural sector this will lead to increase in capital formation and Growth of small and medium scale industries that has the potential to employ in Kwali Area Council.

8. ACKNOWLEDGEMENT

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