THE IMPACT OF POPULATION GROWTH

ON

AGRICULTURAL DEVELOPMENT

THE IMPACT OF POPULATION GROWTH ON AGRICULTURAL DEVELOPMENT

BY

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DECLARATION.

This project is my own original work and to the best of my knowledge it has not been presented for a degree in any University or Educational Institution.

Signature.....
P.W.Chege (Mrs)

This project has been submitted for examination with my approval as University Supervisor.

Signature.....
B.O.KOYUGI

DATE January 25, 1994

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I am grateful to the ministry of Agriculture for awarding me this scholar ship that enabled me to undertake this course.

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DEDICATION.

This work is dedicated to my husband Dr. Chege Gitau, my three boys, Gitau, Kogi and Njogu.

ABSTRACT.

The study has looked into the impact of population growth on agricultural development in Bungoma and Kisumu district.

The background information of the two districts has been analysed to show their agricultural potential as well as their population densities.

Cross tabulations have been used to analyse the impact of population pressure on the land sizes, food productions capacity, economic status, fuelwood and water availability.

The findings shows that population pressure has a negative impact on food production capacity, land sizes and the economic status of the community. They also shows that the population pressure diminishes fuel wood and clean water supply.

The study concludes that population growth should be controlled to keep pace with agricultural development so that the two districts can achieve economic development.

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1.1 INTRODUCTION

Kenya is a country which has among the highest population growth rate in the world. Like in most other less developed countries, agriculture is the backbone of the economy providing the basis for the development of other sectors of the economy. The sector contributes the greatest share of the Gross domestic product as compared to other sectors. This is evident from 1964-1968,whereby the agricultural sector contributed 39.3% to the GDP as compared to the manufacturing sector which contributed 9.8%(Mweiga and Kabubo,1993). It is estimated that 80% of Kenya's population resides in the rural areas and about 75% of the labour force is directly or indirectly employed by the agricultural sector.This is typical of developing countries which depend wholly on agriculture for their economy.

Rapid population growth rate which is not accompanied by subsequent growth in the agriculture sector will have serious implications on any country. If the demand for food is not met by the supply from within a country has to import from outside using a lot of foreign resources.It is the aim of every country to be self sufficient in food production. Kenya's sessional paper number 4 of 1981 on food policy states that " For sustained growth of agricultural output the government aims at self sufficiency in food production".

In the current Government of Kenya development plan 1989-1993, the importance of the sector has emphasized the overall thrust of the agricultural policy to achieve internal self sufficiency in food production,generate export earnings as well as creating employment for the rapidly growing population.

Kenya's agricultural potential is determined by the climate(rainfall and temperature). From a total of 52 million hectares of arable land,only 6.8 million hectares can be considered high potential meaning that it receives enough rainfall to sustain crop production. The 1969 census revealed an average density of 103 persons per Km^2 for the arable land.The 1979 census revealed 208 per Km^2 and the Food and Agricultural report of 1978 estimated an average density of 231 persons per Km^2.

These average densities from 1969 show that from 1969 to 1979,the densities doubled.It is also estimated that arable land in the high potential areas has declined from 0.7 hectares per person i 1969 to 0.5 by 1979 and currently 0.2 hectares per person.This scenario is brought about by the population growth rate as a result of which farms are passed from father to son and are fragmented into smaller and smaller units.The reduction in per capital arable land brings about the problem of rural poverty manifested by low farm incomes and under-employment in the rural areas.

1.2 STATEMENT OF THE PROBLEM

Rapid population increase has serious implications on the expected growth and development of the economy of any country.In Kenya like in other less developed countries,agriculture remains the backbone of the economy providing the basis for the development of other sectors of the economy.It has to provide food security for a rapidly growing population,provide employment for the rapidly growing labour force and generate foreign exchange from exports.In Kenya,80 % of the population resides in the rural areas and depend indirectly or directly on agriculture.Land is the primary factor in the production of food,hence wise utilisation and management of this resource is fundamental to the realization of the political, social and economic goals of any country.Rapid population growth rate is continuously decreasing the sizes of household farms. This is because the culture of the Kenyan people and especially in those districts under this study(Bungoma and Kisumu) dictates that a father must sub-divide his land to his sons and the sons do likewise to the next generation.This practice causes fragmentation of the land sometimes to uneconomical units. Sometimes the fragmented land is so small that it cannot sustain any agricultural activity resulting in land shortage and landlessness.The constraints of land shortages are even more acute when one considers that it is in the high potential areas which are most densely populated and it is still in these regions which will

continue to experience sustained high fertility and accelerated population growth.(Ominde 1981)

Another factor of consideration is that landlessness will continue to increase as some of these farms will be fragmented to home-stead sizes leaving no land for cultivation at all. Population increase is exerting a lot of pressure on the land. This can be manifested in land degradation. Land degradation is a pressing problem facing Kenya today. Each year,hundreds of hectares of land undergoes land user changes, forests and grasslands are continuously being converted into pastoral and agricultural uses and rural land is becoming urbanised.Each change in land use that reduces the ground cover is a potential catalyst for soil erosion.This results in large quantities of fertile soils being taken by the rivers to the sea. If this is left unchecked, it would threaten the basic elements of life by decreasing the ability of Kenya's land resource to produce the food supply required. Destruction of forests interferes with the water catchment area causing streams and rivers to dry up resulting in water shortages.

Kenya's population growth rate is not keeping pace with the agricultural development. This has resulted in food shortages over the years and massive amounts of food imports have to be brought in which the country can ill afford.

The study therefore addresses itself to the problems caused by the rapidly growing population on agriculture. It analyses the density situations and incorporates the crucial element of decreasing land sizes. The study compares two districts,one which is an example of high potential district which is experiencing a high population density. The other district is of moderate potential which is experiencing rural urban migration.The study compares and contrasts the land use patterns, densities and agricultural potential of the two districts.

1.3 OBJECTIVES OF THE STUDY

Broad objectives

To investigate how population growth reduces agricultural production by reducing the land sizes and changing land use patterns in Bungoma and Kisumu districts.

Specific objectives.

1. To establish the effect of population density on land sizes per household in the study districts.
2. To determine the effect of population density on the future land holding per person in the study districts.
3. To establish the effect of population density on

agricultural production by decreasing land parcels in the study districts.

4. To investigate the effect of rapid population growth rate on water supply in the study district.

5. To assess the adequacy of average income from sale of food for purposes of supporting the family members in the study districts.

6. To establish the impact of rapid population growth rates on fuel wood supply in the study districts.

1.4 BACKGROUND OF THE STUDY DISTRICTS.

The relationship between agricultural development and population change in Africa has become a subject of increasing concern to scholars and policy makers. Economic planning cannot be successful without considering the balance between population and agricultural development. It is stated that in developed countries, industrialization was preceded by agricultural development.The frequent incidence of food shortages, declining agricultural production and famines on regional and local scales in developing country's has highlighted the worsening imbalance between agricultural development and population growth.

1.4.1 BUNGOMA DISTRICT PROFILE

Bungoma district is one of the four districts in western Kenya. It is situated on the southern slopes of Mt Elgon,the republic of Uganda to the North west,Trans-Nzoia district to the north,Kakamega district to the east and Busia to the west and south west.It occurs between latitude 0° and 10 .30' North of the equator.The district has an area of 3,074 sq.Km rising from 1,200 metres above sea level in the west and south west to over 4,000 metres to the north. There are two district land forms.Mt elgon slope and the low lands.The location of the district on the slopes of Mt Elgon influences rainfall and temperature. The mean annual temperatures are 21^{0} to 22^{0} C in the south and 5 - 10 C in the high altitude

(a) SOILS AND LAND USE

The district has a wide range of soils types

mountain soils-These soils are found on Mt Elgon and are derived from olive bassalts as volcanic ashes.They are rich in organic matter and vary from well drained stony clay loam to imperfectly drained. Volcanic foot ridges-These occur in the northern part of the district and are well drained.

Foot slope soils-These are well drained very deep brown soils of calcarean clays. They occur in the northern part above 1,800 metres.

Upper an lower middle level soils- These are extremely deep humic nitrosols. They are also well drained and deep which have developed on basic igneous rocks and granites. They occur in the western and north eastern parts.

Bottom land soils-These are infills from basement system rocks.They are poorly drained and occur in the North east, central and southern parts of the district.

(b) AGRICULTURAL PROFILE

Bungoma is regarded as a high potential district. The soils are good, well drained and fertile and very ideal for arable farming. The terrain is gentle slopes in most parts.It experiences a bimodal type of rainfall,long and short rains. The long rains is the heaviest and occurs between January and March.

Agro-ecological zones are temperate belts defined according to the maximum temperature limits within which crops in Kenya can flourish.

There are five broad agro-ecological zones in Bungoma. The tropical alpine zone is the highest elevated zone and starts from the Mt.Elgon mountain. It is mainly forest zone with cattle and sheep grazing.

Upper highland zones.

This zone is also mainly forest reserve because of steep slopes and valuable timber.

Lower highland zone

This is the tea and dairy zone with permanent cropping dividable in a long cropping season followed by a medium one.This zone has a

very good yield potential because of the adequate rainfall and good soils.The major crops grown are maize,cabbages,pyrethrum and a lot of horticulture crops.This area is also densely populated.

Upper midland zone

These are the coffee tea zones, with a very long cropping season and intermediate rains. this zone has very good yield potential and the major crops grown are mainly maize,finger millet,beans potatoes and horticultural crops

Lower midland zone

This zone is mainly the sugar cane and cotton zone.It has fairly good yield potential in the higher areas and fair yields in the lower areas. The major crops grown are maize, sorghum,groundnuts and horticultural crops.The cash crops are sugar-cane and cotton.The zone is densely populated.

(c) POPULATION PROFILE

The 1969 census gave a population figure of 345,226 persons raising to 503,935 by the 1979 census. This gave an intercensal growth rate of 3.85 %.

According to the district development plan 1989-93, it is projected that growth rate will average 3.65% per year.

The structure of the population according to the 1979 census revealed that 64 % of the population consisted of a young people below 19 years.This is a considerably high dependence ratio. It is a typical situation where the population growth rate is very rapid.

TABLE 1.0.1

POPULATION PER DIVISION 1979 CENSUS BUNGOMA DISTRICT

DIVISION	MALE	FEMALE	TOTAL	NO. HOUSEHOLD	DENSITY
SIRISIA	23219	24621	47840	7209	192
KANDUYI	81854	86233	168087	28068	203
KIMILILI	78497	81880	160377	25184	126
ELGON	38895	39278	78173	12220	220
TONGEREN	24376	25082	49458	6290	130
TOTAL	246841	257094	503935	78971	163

Source 1979 census

KISUMU DISTRICT PROFILE

Kisumu district is one of the five districts in the Nyanza province of Kenya.It lies within longitude 33^{0}.20'E, 35^{0}.20 E and latitude 0 .20'N and 0'. 50' S. It covers a total area of 266 sq.Km It borders south Nyanza to the south west,Kisii to the south Nandi district to the North east, Kericho to the east and kakamega and Siaya to the west. It lies in a depression part of a large lowland providing Lake Victoria.The district can be divided into three topographical zones, the Kano plains,the upland area of Nyamondo and the midland area of maseno.

Rainfall

Mean annual rainfall varies with altitude between 1630 mm and 1000 mm in the lowlands. It has a bimodal type with long rains in August/september. The reliability of short rains are low. Altitude varies from 144 metres on the Kano plains to 1525 metres on the highlands. The mean temperature ranges from min.25 0 C and max 90C.

(a) SOILS AND LAND USE PATTERN

The soils are dominated by the former lake sediments, commonly sand and clay soils. In Kano plains,the soils are poorly drained. The dark cotton soils associated with swamps constitute more than 70 %

off all soil types found in the district. On the slightly elevated grounds are clay soils which are usually of moderate fertility.The north western part has terrasoils, acrisoils which have developed from granite and are of low fertility.

(b) AGRICULTURAL PROFILE.

The district can be considered to be of moderate potential.The soils are not very fertile as most of them are clays.

Small production by smallholders covers a total area of 36,000ha.The major crops are maize, sorghum and beans.

CASH CROPS

The most important cash crop is sugar cane which occupies about 74,279 ha. Cotton is another important cash crop and occupies approximately 700 ha.

Kisumu district has two major agro-ecological zones;

Upper midland zone

This zone is a typical marginal coffee zone characterised by a medium to long cropping season,intermediate rains and a short medium one. The yields potential are good to average and the major crops grown are maize and sorghum finger millet, beans, pineapples. Pigeon and cow peas

Lower midland zone

This is the sugar cane zone with a long cropping season, followed by a medium one with intermediate rain. The crops grown are just like in the upper midland the only difference is that the yield potential are lower. The cash crops grown are sugar-cane and cotton.

POPULATION PROFILE

The 1969 census gave a population of 400,643 while 1979 gave 536,754. This represented an increase of 3.4 % and the central bureau of statistics estimates a population of 830,000 by the year 1993.

The structure of the population according to the 1979 census revealed a total number of children below 14 years to be 257,911 representing a dependency ratio of about 60% (Kisumu Dev. plan 1989-93)

TABLE 1.0.2

POPULATION PER DIVISION 1979 CENSUS KISUMU DISTRICT

DIVISION	MALE	FEMALE	TOTAL	NO. HOUSEHOLD	DENSITY
MASENO	43341	49847	93188	18241	245
NYANDO	73733	81938	155671	29814	181
WINAM	15608	16697	32305	5173	223
MUHORONI	27638	20882	48520	11925	110
KISUMU MUNICIP	77722	74921	152643	32458	565
KISUMU DISTRICT	238042	244285	482327	97611	230

source 1979 census.

2. CHAPTER TWO

2.1 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The debate linking population and resources dates back to the sixteenth century. The view that man's capacity to reproduce was unlimited whereas that of producing his means of income was limited had already been proposed by such writers as Botero in the sixteenth century. Wallace writing around the middle of the 18th century drew attention to the relatively short periods in which population could double and contrasted it with the capacity for food production. A chinese writer Hung Liang Ching at the eighteenth century also noted that the increase in means of subsistence was not directly proportional to the population. He argued that while population can increase from fivefold to twenty fold, the means of subsistence cannot increase likewise because of limitations of the land area. Thomas Malthus presented these ideas most forcefully and consistently in his essays on the principle of population first published in 1798. He formulated the principle that man could increase his subsistence only in arithmetic progression whereas his capacity to reproduce himself was geometrical. He asserted that human population was necessarily limited by the means of subsistence. In general Malthus assumed diminishing returns from land while the ultimate check to population was lack of food which would result in famines and deaths. Some classical school of economics which emerged in the

19th century took a pessimistic view basing themselves on the Malthusian theory and the theory of diminishing returns. They argued that diminishing returns were typical of an agrarian economy only.

Ester Boserup (1965) takes a very optimistic approach. She argues that Malthusian doctrine of food production as a limiting factor for population growth is a very pessimistic approach because population growth is seen as the dependent variable determined by the preceding change in agricultural activity. Rather,she argues the approach should be based upon the assumption that population growth is seen as the independent variable which in its turn a major factor determining agricultural development. She stressed the need for a gradual population growth as a precondition for intensified agricultural production system. In her later writings in 1981, Boserup attributes the population problem of population density and food shortage to the difference technological levels between countries. Africa and Asia apply primitive technology in food production while the most developed countries use high technology to produce food. According to Boserup, developed countries are densely populated yet they do not experience food shortages. She concludes by saying population pressure is not the problem but rather the level of technology.

Kulkevin (1981 and 1983) says that the relationship between population and agricultural development is important not only because it concerns one of the human basic needs but because economic planning cannot be successful without considering a balance between population and agriculture. It is stated that in the developed world, industrialization was preceded by agricultural development hence the need for sound planning.

The Food and agricultural report of 1977 on population and development agrees with Kulkevin and states that in developing countries,agriculture is at the centre of population development scene because of the dominant economic position in the economic structure and demographic process. It states that all the social,economic and environmental Process are all woven around agriculture hence the constant challenge to meet the expanding needs of food production. It further points out that compounding the challenge are the increasing problem of rural urban migration and unemployment which are demographic related and conditioned by the pattern of agricultural development. Ness GD et. al (1984) writing on population planning in Asia puts it very well that the land is shrinking and the children keep on coming it is hard to breath. He was referring to the decreasing land holdings caused by the increasing population.

Cheng Hua (1972) writing on World Bank working papers noted that despite the dominant position occupied by the agricultural sector in a traditional economy, many planners of the developing world have continued to deny the sector adequate attention.He notes that for a primitive agrarian economy characterised by most developing countries, industrialization cannot succeed without prior development of the agricultural sector.

Mellor et.al.(1987) on a paper on accelerating food production in sub-sahara Africa stated that in the 1980s sub-sahara africa was the only major region of the world where population growth rate was still increasing as per capital food production was declining hence accelerating food production growth rate was the central issue in african development.

Killik (1981) writing on the economic development in Kenya notes that agriculture development must take into account the manner in which increasing productivity is connected with the structure of agriculture which must ensure increased output to meet the demand of the population. Kulkani 1981 seems to agree with Killick and observed that the challenge in less developed countries like Kenya is whether agricultural productivity will match the demographic requirements. However, Bondestand and Beriston(1981) does not seem to agree with the above writers. They observed that the imbalance of population growth and food production in Kenya can be blamed on the control of land. They stressed that population pressure on

land in Kenya has less to do with high birth rates but more with uneven ownership of land. These writers are referring to the fact that there are large scale farmers who own big tracts of land and do not use the land efficiently to produce food for the population.

Mureithi and Otieno(1975) pointed out that there is a likely imbalance in the next decade between agricultural production and population growth. They suggested that the problem can be solved from the demand side by reducing the population growth rate or from the supply side by increasing the agricultural production. The alternative is easier to effect. The former might be easier if we were to emphasize population control benefits to the people because the latter might be difficult because of the decreased sizes of land and lack of capital to improve the agricultural production technology.

Mukasa (1983) states that the country's rate of growth and the improvement in the standard of living will continue to depend for many years to come primarily on the development in the agricultural sector.

A World Bank paper 1981 entitled "Kenya's country economic memorandum", states that the high rate of Kenya's population means that agricultural development especially food production must achieve a growth rate exceeding that of population. This is in line with former writers who feel that growth in the agricultural

sector should supersede the population growth. There are other writers who feel that population growth rate should be controlled to keep pace with growth in the agricultural sector.

Ominde(1975) addressed the problem of population pressure in Kenya by using the ratio of arable land to population. He noted that there was scarcity of good agricultural land in the densely populated districts of Central, Nyanza, and Western provinces and observed that only arid and semi-arid lands like North eastern which had unused lands. Ominde 1981 also noted that africa's population increase have serious implications to the expected growth and development of agriculture and in particular its capacity to meet the basic needs of the population.

Bernard and Anzazi(1979) observed that population pressure emerges when humans and their activities exceed the carrying capacity of that region to feed enough and sustain them. They seemed to agree with Ominde that Kenya's population pressure especially in the high potential districts has exceeded the carrying capacity of those areas resulting in land degradation and migration.

Elkholm (1976) attributes much of the worlds present land deterioration to demands made by runaway population growth rate. He argues that most systems of africans land use possessed traditional protective devises against land degradation. This included fallow, mixed cropping, avoidance of steep slopes and forest preservation.

As the population pressure builds up all these systems are abandoned and what results is excessive soil erosion, depletion of valuable water catchment and desertification.

Kilewe and Thomas (1992) in their studies on land degradation in Kenya noted that land degradation through soil erosion is a pressing problem. They argued that each year, hundreds of hectares undergo land use changes where forests and grasslands are continuously converted to pastoral and agricultural land. This reduces the ground cover which is a potential catalyst to soil erosion. They concluded by saying that if this degradation of land resource is left unchecked, it would threaten the basic elements of life by decreasing the ability of Kenya's land resource to produce food supply that Kenya needs and lowers the quality of air and water.

The other problem which emerges because of population pressure is migration. People will move from the densely populated areas to the sparsely populated areas or to urban centres..According to the 1969 census (Ominde 1968), there were about 1.4 million people who had been born in a province other than the province in which they were residing. Rural to urban migration involve mainly young energetic people who move to towns to look for employment. They leave old people in the rural areas who cannot sustain agricultural development adequately.Oucho (1989) noted that there is an impressive labour migration to the agricultural wage sector in the

Kenya highland and coast province and western districts are the main source areas. Rural to rural migration especially from the high potential regions to the arid and semi arid regions may have serious consequences on the environment. This is because this areas are very delicate and can be degraded very fast and made into a desert.

Most writers seem to agree that rapid population growth rate will have a negative impact on the agricultural development especially in the developing countries which do not have enough capital to invest in modern technology. It is evidence that in the developed countries agricultural development proceeded industrialization, however fertility must be controlled so that economic development and population growth rate goes hand in hand.

2.2. THEORETICAL FRAMEWORK

From the literature review, it is evident that there are two schools of thought regarding the interaction between population and agriculture development. The argument which persists through out is that rapid population growth leads to land shortage, poverty and depressed living standards. This argument was initiated by Thomas Malthus in 1798 when he wrote in his essays that man's capacity to reproduce himself will always outstrips his means of subsistence and then positive checks such as famine, hunger,and disease sets in. How ever he overlooked mans capacity to improve his means of

subsistence by introducing modern technology and even migrating.

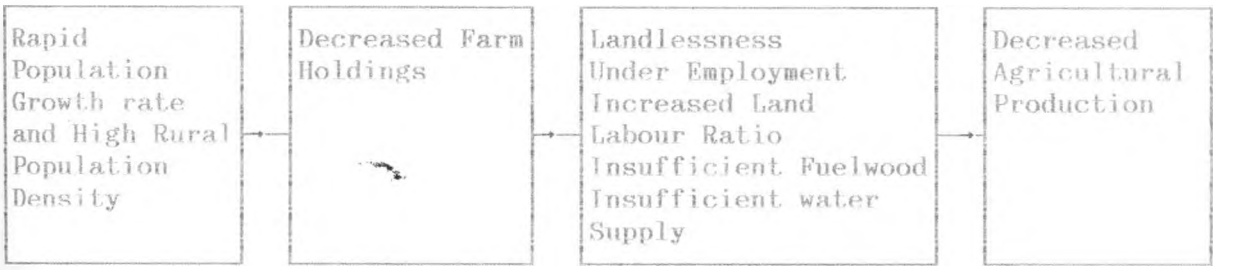
The other school of thought is led by Esther Boserup (1965, 1985) She argues that population growth forces cultivators to abandon traditional ways of subsistence farming and intensify land use with improved technology resulting in increased food production. In her later work Boserup's (1985) argues that population pressure is a driving to technological development. Boserup's theory may not hold for Kenya and other developing countries today because the demographic changes are so rapid that evolution of technology may not keep pace

Another problem is that Kenya like other developing countries lack capital to invest in this technological advancement.

THOMAS MALTHUS POPULATION LAND RESOURCES RELATIONSHIP

BOSERUP POPULATION LAND RESOURCES INTERACTION

CONCEPTUAL FRAMEWORK.



2.3 OPERATIONAL FRAMEWORK

As rural population increases, farm sizes decreases because farms are subdivided from father to son. This results in fragmentation into smaller and smaller units. This impacts upon farm income, land labour ratio and food supply.

It is hypothesized that,

1. Income per household decreases as the farm sizes decreases.

2. Under employment increases as the population density increases and land labour increases.

3. Food production capacity per household decreases as the household number increases and the land size decreases.

4. Feulwood supply decreases the population density increases.

5. Landlessness increases as the population density increases.

6. Water supply decreases as the population density increases.

CHAPTER THREE

3.0 METHODOLOGY

This chapter Covers source of data, reliability and quality of the data and method of data analysis. The study will use cross-tabulation technique in analysis together with percentages.

3.1 SOURCE OF DATA

The study has utilised secondary data from a study done in P.S.R.I. in 1989 by professor A.B.C Ocholla Ayayo and Dr Munganzi. The study was a baseline survey covering Ministry of Agriculture, Ministry of Culture Social Services and Ministry of Health. Its objective was to establish a background information System before embarking on population education programmes in these ministries.

The Survey administered a detailed 16 paged open and close ended questionnaire. The questionnaire was divided into three sections. The first section covered Ministry of Agriculture while the second section covered Ministry of Health and the last section covered Ministry of culture and social services.

The original survey had covered five districts but for this study two districts are covered Bungoma in Western Province and Kisumu in Nyanza province. The data is extracted is from the Ministry of Agriculture section and it covers the following

- Respondents characteristics eg Sex and age
- Respondents working history and his income
- Respondents house hold characteristic e.g the number of household members and land sizes.

- Awareness at the effects of population pressure on the available resources.

The total sample size from the two districts is 1968 respondents of which 1202 are from Kisumu and 757 and are from Bungoma district. There are a total 990 male respondents of which 588 are from Kisumu and 399 are from Bungoma. There are a total of 932 female respondents of which 585 are from Kisumu district and 343 from Bungoma district.

3.2 RELIABILITY AND QUALITY OF DATA.

It was not feasible to go out to the field and carry out empirical data survey for the study. The secondary data used is not free from various errors found in surveys. There are two variables omitted which would have been very useful to the study that is, Fertility trend of the household and the amount of food harvested by each household over a time period as compared to the changing land size of the household. These two variables would have given a good picture of the effects of fertility on the agricultural production as well as relating fertility and the land sizes as it affects food production. However most of the variables were appropriate to the study.

METHOD OF DATA ANALYSIS.

The study has used two methods of data analysis, cross tabulation method has been used to show the relationship between various variables. The method is simple to use compute and understand and very appropriate for comparison purposes. Percentages are used to compare the results from the two districts so that comparisons can be made between the two.

CHAPTER 4.

4. DATA ANALYSIS AND THE STUDY FINDINGS.

INTRODUCTION.

In this Chapter, the analysis of the data and the findings of the study are presented. The analysis is done mainly using cross tabulation method which shows the relationship between the variables of study interest. The percentages are used especially to show the differences between the two districts.

4.2.1 CURRENT POPULATION DENSITY AND THE FUTURE AVAILABILITY OF LAND.

The variable," what do you feel about the number of people in your community " is taken as a measure of the current population density. The respondents indicated three choices:-

1. Few - This is taken as an indication of Low density
2. Too many - is taken as an indication of very high density
3. Alright - is taken as an indication of moderate density.

TABLE 4.2.1

Percentage distributing of the current population density and the adequacy of land for the children

Children have enough land	Number of People in the Country.			Row Total
	Few	Too many	Alright	
yes R - Freq.	0	13	12	25
yes C - %	0	0.9%	3.3%	1.4
No - R - Freq	12	1381	356	1749
No - C - %	100%	99.1%	96.7%	98.6%
Column Total R-Freq	12	1394	368	1774
	0.7%	78.8%	20.1%	100%

Chi-Square = 11.53
Significant level = 0.003

Table 4.1 shows that of the 1774 respondents 99.1% agreed that the population density was too high yet the children did not have enough land to cultivate. It is also evident that only 1.4% agreed that there was enough land for the Children while 20.1% of the respondents felt that the population pressure was alright but the majority 87.8% agreed that the population density was too high. The significance level of this relationship is 0.003 and the CHI square of 11.5. This confirms the hypothesis that high population density will bring about land shortage especially for the future generations.

4.2.2 Current Population density and the current availability of land

The variable " is the amount of land enough to support all members of the Community " is taken as a measure of the current available land.

Table 4.2.2

Percentage distributions of the current population density and the current available land:

Amount of land enough to support all members		Number of People in the community			Row Total
		few	Too many	Alright	
yes	R.freq.		17	16	33
	C.%	-	1.3%	4.0%	1.9%
No	R.freq.	10	1334	380	1724
	C.%	100%	98.7%	96.0%	98.1%
Column Total		10	1351	396	1757
		0.6%	76.9%	22.5%	100%

Chi square = 13.05
Significance level = 0.001

Table 4.2.2 shows that the majority of respondents felt that there were too many people in the community yet there was not

enough land to support all the current members of the community. 0.6% of the respondents felt the population density was low. The significance level of the relationship is 0.001 and this also confirms the hypothesis that high population density is responsible for the current land shortage in the area.

4.2.3 Population density and migration.

The variable " Do people leave this community and settle elsewhere is taken as a measure of migration. The value 'Yes' is taken to mean that migration occurs while "No" is taken to mean no migration occurs.

Table 4.2.3

Percentages distribution of population density and people leaving the community to settle elsewhere.

People leaving this community		Number of people in the community			Row Total
		Few	Too many	Alright	
Yes	R.freq.	3	584	123	710
	C%	25.0%	41.3%	33.3%	395%
No	R.freq.	9	831	246	1086
	C.%	75.0%	58.7%	66.7%	60.5%
Column Total		12	1415	369	1796
		0.7%	78.8%	20.5%	100%

Chi - Square = 8.7
Significance level = 0.01

Table 4.2.3 shows that 39.5% of the respondents felt that the people from that community migrate and settle elsewhere while 60.56% did not think so. 41.3% of the respondents felt that the density was to high and also felt that people were migrating to other areas. The significance level is 0.01 and this means that there is a relationship between the population

density and migrating. However it does not confirm the hypothesis that high population density may cause some level of migration.

4.2.4 Population density and food production.

The variable "Do people in the village harvest enough" is taken as a measure of food production capacity.

Table 4.2.4

Percentages distribution of population density and the food production capacity.

People in the village harvest enough		Number of people in the community			Row Total
		few	too many	alright	
Yes	R.freq.	4 33.3%	284 22.6%	89 23.4%	377 22.9%
No	R.freq.	8 66.7%	970 77.4%	292 76.6%	1270 77.1%
Column total		12 0.7%	1254 76.1%	381 23%	1647 100%

Chi - square 0.8
Significance level - 0.6

Majority of the respondents in Table 4.2.4 feels that people in the village are not harvesting enough food for the population in the village. They also feel that the people in the community are too many (high density) However only 22.9% of the respondents felt that there was enough food harvested in the village.

The significance level is 0.6 while the chi square is 0.8. This shows that the relationship is not significant and the hypothesis that high population density reduces amount of food harvested requires a lot further research to ascertain.

However from the percentages it is evident that majority of the respondents feels that the population density is quite high yet people do not harvest enough food to cater for the population.

4.2.5 Population pressure and decreased land sizes.

The variable " Have you more or less land as your father" is used here to give a measure of decrease or increase land size per new household.

The hypothesis which is being tested here is whether population increase causes decrease in farm holding sizes.

Table 4.2.5

Percentage distribution of population pressure and the changes in land sizes.

Have you more or less land as you father	How do you feel about the number of people in your community			Row Total
	few	too many	alright	
more R.freq.	0	20	7	27
more C%	0%	1.4%	1.7%	1.5%
Equal R -freq	4	297	127	428
Equal C%	33.3%	21.1%	31.4%	23.5%
less R - freq	8	1089	271	1368
less C%	66.7%	77.5%	66.9%	75.0%
Column Total	12	1406	405	1823
	0.7%	77.1%	22.2%	100%

Chi square - 19.6
Significance level - 0.005

Table 4.2.5 shows that only 1.5% of the respondents had more land than their fathers while 75% had less land than their fathers. 77.5% of the respondents had less land than their fathers and they also felt that the population density was too

high . The culture of the people of the two districts dictates that a father must sub divide his land among his sons. So it is obvious that the sons land will be less than his father and as this fragmentation can continue until there is no more land to till the only land available will be to put up a homestead . The significance level of this relationship is quite high and this confirms our hypothesis that population pressure causes fragmentation of land into smaller and smaller units.

4.2.6 Population pressure and poverty.

The variable whether people are wealthier or poorer than ten years is taken as a measure of economic status of the community.

Table 4.2.6
Percentage of people wealthier/ poor as 10 years ago and number of people in the community.

Are people weather poorer as 10 yrs ago		Number of People in the community			Row
		few	Too many	alright	Total
Wealthier	R.freq Colm %	0	61 4.4%	11 2.7%	72 4.0%
Same	R.freq C%	2 16.7%	395 28.4%	86 21.0%	483 26.6%
Poorer	R freq	10 83.3%	936 67.2%	312 76.3%	1258 69.4
Column Total		12 0.7%	1392 76.8%	409 22.6%	1813 100%

Chi square - 13.6
Significance - 0.008

It is evident that majority of the respondents felt that people are poorer than they were 10 years ago (69.4%) majority of the respondents who agreed that people were too many also felt that people were poorer than 10 year ago. The

significance level is 0.008 and this shows that there is a very high association of the relationship. This also confirms the stated hypothesis that population pressure can reduce the economic status of a community causing poverty. This is true in most of the developing countries which do not have other resources to exploit and depend primarily on Agriculture for the basis of their economy. As the people increases the Land labour ratio increases and under employment results which depresses the economy further.

4.2.7 Population density and food requirement.

The variable " How the community obtain its food for Consumption " whether they harvest enough or buy to meet their food consumption requirement is taken as a measure of food sufficiency.

Table 4.2.7 Percentage distribution of population density and the mode of obtaining food requirement

How do the people get their food requirements		Number of people in the Community			Row Total
		few	Too many	Alright	
Buy	R - freq	4	93	40	137
	C - %	40%	8.8%	13.6%	10%
Harvest	R - Frq	6	958	254	1218
	C - %	60%	91.2%	86.4%	89%
Column Total	%	0.7%	77%	21%	100%

Chi square - 15.6
Significance - 0.0004

The results shows that 10% of the respondents buy food to supplement what they harvest to sustain their families. This is because may be the land they have may be too small to produce enough food for the family. However 91.2% of the respondents felt that the population density was too high yet

they were obtaining their food from harvesting in their land. The significance level is very high and this means that there is a strong relationship between the mode of obtaining food for home consumption and the population density. Most depend harvests irrespective of population pressure.

4.2.8 Population density and fuel wood sufficiency.

Most of the population in the rural areas and especially in the two districts under this study use mainly fuel wood as their source of fuel for cooking purposes.

Table 4.2.8
Percentage distribution of population density and fuel wood sufficiency

Is the supply of fuelwood sufficient		Number of the people in the community			Row Total
Yes	R - freq	5	484	166	655
	C%	41.7%	33.8%	40.3%	35.3%
No	R -fre	7	949	246	1202
	C%	58.3%	66.2%	59.7%	64.7%
Column Total	fr	12	1433	412	1857
	%	0.6%	77.2%	22.2%	100%

Chi square 6.1
Significance level 0.04

The results shows that majority of the respondents felt that the supply of fuelwood was not sufficient in their villages. Fuelwood is a very important commodity in the rural areas because it is the major source of fuel for cooking.

As the population increases, trees are cut down to give way to food cultivation and few are replaced this is causing fuelwood shortage because the rate of cutting down the trees can not keep pace with the growth. The significance level is quite low

and this shows that there is a strong relationship between the two variables. This also confirms the hypothesis that population pressure causes fuelwood shortage in the long run.

4.2.9 Population pressure and clean water availability.

Table 4.2.9

Percentage distribution of population pressure and clean water for everyone.

Is there clean water enough for everyone		Number of people in the the community			Row Total
		few	too many	alright	
Yes	R-freq	9	668	202	879
	C%	75.0%	46.6%	48.8%	47.3%
No	R-freq	3	766	212	981
	C%	25%	534%	51.2%	52.7%
Column Total	freq	12	14341	414	1860
	%	0.6%	77.1%	22.3%	100%

Chi square 4.3
Significant level 0.1

Table 4.2.9 shows that 53.4 % of the respondents felt that the population pressure was too high yet there was not enough clean water for everyone.

As the population increases, it encroaches the water catchment areas and this causes the drying of these catchment swamps. Clearing of forests and overgrazing can also cause land degradation and this can reduce the amount of rainfall. The relationship is not statistically significant and this means that the relationship between the two variables is not strong. Further research is required to establish whether high population density can reduce clean water availability however majority of the respondents felt that the density was high and clean water was inadequate.

4.2.10 Current and future land shortage.

Table is obtained by cross - tabulating " Have you less or more land as your father". By" do children have enough land" to establish the current and future land availability problem.

TABLE 4.2.10 Percentage Distribution of Current and future land shortage.

Have you more or less land as your father		Do children have enough land		Row Total
		Yes	No	
No	R - freq	5	22	27
	C%	17.2%	1.3%	1.5%
Equal	R - freq	12	375	387
		41.4%	21.5%	21.9%
Less	R -freq	12	1344	1356
	C%	41.4%	77.2%	76.6%
Column Total	freq	29	1741	1770
	%	1.6%	98.4%	100%

Chi square - 57.6
Significance - 0.0000

From Table 4.2.10, it is evident that 98.4% of the respondents felt that children do not have enough land hence there will be land shortage in future. Majority (76.6%) also felt that they currently have less land then their fathers, however 72.2% felt that they had less land than their fathers and they also agreed that children will not have enough land. The relationship is statistically significant. This shows that there is a strong relationship between the two variables. This also confirms the stated hypothesis that population density will cause land shortage and landlessness.

CHAPTER FIVE.

5.0 SUMMARY AND CONCLUSIONS.

5.1 SUMMARY OF THE FINDINGS

The objectives of this study was to determine the impact of population pressure on agricultural development in Kisumu and Bungoma districts in the western part of Kenya.

The findings of this study reveals that population pressure has a negative impact on the agricultural development of the two districts. The current available land is not sufficient for the population. This has caused land shortage and landlessness because the culture of the people dictates that a father must subdivide his land to his sons and this has brought about excessive fragmentation of the arable land.

The findings leads to support the hypothesis that population pressure decreases food production.It was evident that people were not harvesting enough food from their land to sustain their families and were resulting to buying to supplement what they were harvesting. The reason for this was because of the high population pressure and the decreased farm sizes.

Population pressure has decreased the economic status of the people. The data reveals that the people are poorer than they were ten years ago. This is because majority of them depend on agriculture for their livelihood and as the population increases and the land labour ratio and unemployment increases, their economic status is depressed.

Clean water is essential for every community. The findings shows that population pressure has decreased clean water availability. As the population increases, forest are cleared to give way to crop cultivation and water catchment areas are encroached and destroyed decreasing clean water availability.

Fuelwood is a very essential commodity in the rural areas because it is the main source of fuel for cooking. The findings shows that population pressure has decreased the fuelwood supply in the two districts. As the population increases, the demand for firewood increases and forests, thickets are cleared to give way to crop cultivation.

5.1 CONCLUSION.

This study concludes therefore that rapid population growth rate has a negative impact on agricultural development in the two districts. The population pressure is continuing creating a demand for arable land which is resulting in subdivision of farms into small holdings which can not sustain the household food requirement. The growing population of young people with insufficient employment opportunities in the non farm sectors of the economy will continue to depend on the agriculture sector for support in achieving a reasonable standard of living. However population should be controlled to keep pace with agricultural growth so that a reasonable economic growth can be achieved.

5.3 RECOMMENDATIONS FOR POLICY MAKERS.

The findings of this study support the hypothesis that population density decreases food production capacity, clean water availability and fuelwood supply.

In the light of the above problems this study recommends that ;

Where the land is small and further subdivision can lead to uneconomical farming, households can be encouraged to farm the whole farm as a company where by every member is a shareholder and the farm can be utilized intensively as one unit to give maximum returns to all members.

The findings shows that majority of the people depend on agriculture for their livelihood. They depend on the food they harvest to meet their food requirements and will result to buying when they have not harvested enough. The government should ensure that the farmers pursue a profitable self employment agriculture using low cost and high yielding farming methods. Low cost technologies should be made available to the farmers so that they can get maximum output from their farms.

The government should protect water catchment areas so that they are not destroyed. The people should be made aware the importance of preserving this catchment areas so that they become responsible for them.

People should be encouraged to plant more trees. Trees nurseries should be set up in the villages so that the people can have easy access to them.

5.4 RECOMMENDATIONS FOR FURTHER RESEARCH.

There have been very little studies done on the relationship between population and agricultural production. A further research should be done on the relationship between fertility and agricultural production to find out how agricultural production influences fertility levels at the household.

Another area for further research is the migration patterns and the agricultural potential.

The impact of population pressure on land degradation is another very important area of research.

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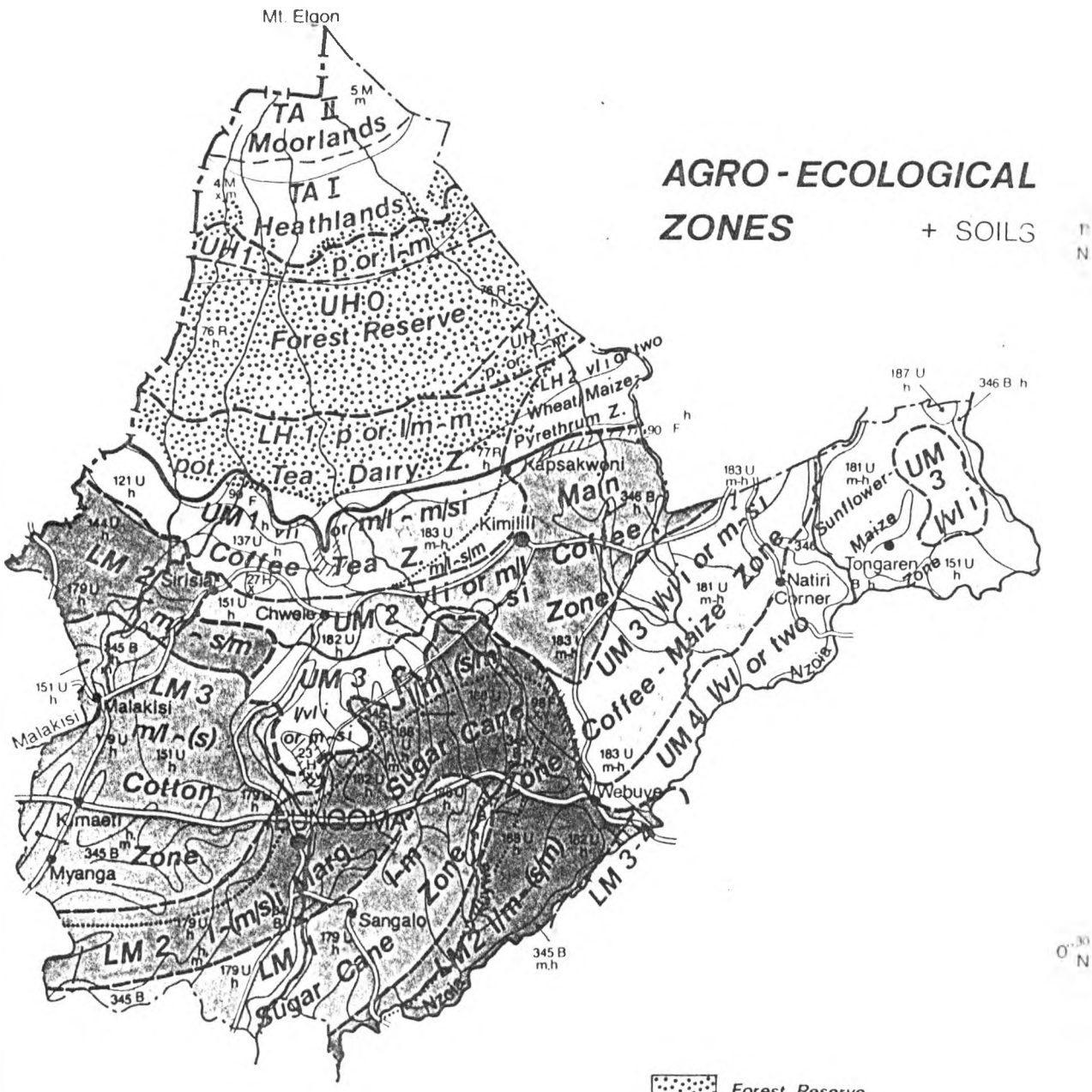
34° 30 E

35° E

BUNGOMA



AGRO - ECOLOGICAL ZONES + SOILS

N

Forest Reserve

Steep slopes, unsuit. for cultivation (not marked in For. Res.)

Belt of A.E. Zones ——— — — Broken zonal boundaries
A E Zones ——— — — are uncertain or mean transitional strips
Subzones .....

Climatic data for AEZ formulas see table I and II

0 5 10 15 20 25 km

AEZ R Jatzold '81 Soils KSS

Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES + SOILS

KISUMU