THE IMPACT OF POPULATION PRESSURE ON AGRICULTURE: THE CASE OF MISHA WOREDA, HADIYA ZONE, SNNPR.

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This is to certify that the thesis prepared by Ersawo Bachore entitled: The Impact of Population Pressure on Agriculture: the case of Misha Woreda, Hadiya Zone, SNNPR. And submitted in Partial Fulfillment of the Requirements for the Degree of Masters of Art in Center for Regional and Local Development Studies complies with the regulations of the university and meets the accepted standard with respect to originality and quality.

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Abstract

The general objective of this study has been to investigate the relationship between the population pressure and agriculture in Misha woreda, Hadiya Zone, SNNP. Specially, this study was concerned with the examination of the impact of graving population on agriculture in view of Malthus, Neo-Malthusians and Boserupian theories. Some demographic, socio-economic and cultural aspects which determine agricultural activities were examined in the study. Qualitative and quantitative approaches for data analysis were used based on descriptive method to identify the population pressure that exerted on agricultural activities in the household level. Although the area is in high potential cereal zone, the analysis of the available data has seemingly revealed that the poor resource base as compared to the requirement of the present human and livestock population that characterize the study area. Based on the sample survey, the average land holding size is less than one hectare per households. The land fragmentation is also main problem in the area, it is highly fragmented among the households. The fact that farming tools and production techniques are traditional and lack of access to farming technology in the area. The application of farm inputs is very low with an average oxen possession of a half per households. Fertilizer application is too very low and limited the average is nearly one quintal per household and all these aspects taken together accounts for the low agricultural production in the area.

Key Words: Impact, Population, Pressure, Agriculture

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Acronyms

CSA	Central Statistics Agency
EEA	Ethiopian Economic Association
FAO	Food and Agriculture Organization
FHHs	Female households
FTC	Farmers Training Center
GDP	Gross Domestic Product
HFEDB	Hadiya Finance and Economic Development Bureau
HFEDB,	Hadiya Zone Finance and Economic Development Bureau.
HHs	Households
MOA	Ministry of Agriculture
MWARDO	Misha woreda Agriculture and Rural Development Office.
MWFEDO	Misha woreda Finance and Economic Development Office
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Development
SDPRP	Sustainable Development and Poverty Reduction Program
SNNPR	Southern Nations Nationalities and People Region.
SSA	Sub Saharan Africa
UNCTAD	United Nations Conference on Trade and Development
WAS	Woreda Administration Sector

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The link between population pressure and agriculture could be traced back to Malthus in 1798 who argued that there are diminishing returns to additional labor to land (Wilber, 1978; Ndalahwa, 2005). Malthus viewed that population increase causes decline in agricultural output and impoverishment of land resources. Boserup looked at population pressure as a driving force towards intensive land uses and technological change (Boserup, 1965). Boserup viewed population pressure as a force that stimulates adoption of new techniques that enable more frequent cultivation, hence, greater output. In Boserup's views increased population pressure is an impelling force to agricultural intensification.

However, Boserup hypothesis has been criticized for failing to consider the effects of inadequate public policy on agricultural development.(Ndalahwa,2005) argued that as the population grows and resources decline, the commons collapse and ends on common property resources.

The increase in population may lead to expansion of farmlands, decline of grazing land, and decline in agricultural productivity. Evidence with regard to these two positions is mixed. It seems that the pace of population growth and the role of agriculture are all important.

Ethiopia has been experienced fast population growth in its recent history. The country's population has increased from an estimated 19.6 million in 1950 to 70.7 million in 2003, an increase by 51.1 million people in a span of 53 years. If the current growth rate of 2.7%

continues, the population will reach 117.6 million by 2025, a mere 13 years away, and 173.3 million by 2050 (PRB 2004). In other words, Ethiopia will join the top ten most populous countries of the world by the middle of the current century. Even though the advantage of population as a resource is evident, rapid growth has tremendous implications for development, the capacity to provide basic services, attain the goals of food security and poverty reduction for a country with limited resources.

Ethiopia is one of the agrarian countries in the SSA where small- scale peasant producers dominate the production. About 85% of the total population lives in rural areas, 90% of which depend mainly on crop production for its livelihood. Household access to agricultural land has become a growing problem due to population growth. Average land holding seize is declining as plots are subdivided to accommodate newly married households while the number of landless households are also rising. Often, production takes place on small and fragmented farm plots, continues parceling, diminution of land holdings and landlessness are expected to increase under the prevailing rapidly growing population.

According to Population Reference Bureau,2004, the average farm size in the highlands was fragmented in to 2.3 plots, each with 0.35 hectares. Even though the process of further farm fragmentation has become less practical, the current level of farm fragmentation is high, especially considering together with existing farm sizes and level of land productivity.

1.2 Statement of the Problem

The impacts of population pressure on agriculture have been debated since the time of Malthus (1798) regarding the inability of agricultural production to keep pace with population growth have not come to pass in the industrialized nations, agricultural production per capita has fallen and poverty has increased in many developing countries like Ethiopia.

In contrast to the direct predictions of the neo-Malthusian perspective, a more optimistic perspective has arisen in recent decades as well, following from work of Boserup (1965, 1981) had emphasized the responses of households, communities and societies to pressure induced by population growth, including reduction in fallow periods, intensified use of labor and capital per unit land, and labor intensive technologies, and institutional changes (such as development of more specific and individual property rights and development of market).

On the other hand, the problem of rising rural population and the intergenerational subdivision of agricultural land in the absence of major non-farm pull factors have resulted in growing rural poverty, decline in agricultural productivity and vulnerability.

In its sustainable development and poverty reduction program, the Ethiopian government singles out poverty reduction as its core objective, which aims to achieve by focusing on agriculture, which is the source of livelihood for about 85% of the population and it is the foundation of the country's economy, accounting for half of gross domestic product (GDP), 83.9% of exports, and 80% of total employment (PRB, 2004).

Yet agriculture forms the backbone of the national economy, 95% of total production coming from small producers. But small scale traditional production has come under pressure, questioning its capacity to cope with the problem of population pressure on farm fragmentation, small land size holding and shortage in grazing land. The average land holding size in the Ethiopian highlands would thus be insufficient to feed a family of five, even if production could be successfully increased three times using improved technologies (Masefield, 2000, cited in EEA, 2004; Samuel, 2006).

Similarly, agriculture is the primary economic activity in the study area. According to Hadiya Zone Finance and Economic Development Bureau,

around 85% of the population engaged in mixed farming (i.e.) crop production and livestock production. Most crops grown in the Hadiya Zone are in subsistence level for domestic consumption by rain fed farming system. The main seasons of crop production are the 'Meher' and 'Belg"; farmers are practicing traditional ways of farming as a result they were forced to produce lower agricultural output. Most farmers in the Hadiya Zone do rear livestock but shortage of grazing land makes large proportion of them to keep only a few and increasing livestock mortality. The shortage of cultivable and grazing land in combination with poor cultivation methods, shortage of modern farm inputs and other problems often make a rural population of Hadiya a food insecure (Solomon, 2008).

Misha woreda is one of the Hadiya Zone woredas that has been experienced the problem presented above. In Misha Woreda population density is high that is 431persons per square kilometer, land is scarce, land fragmentation is significant and rural poverty is deepening. This situation could have made the area more prone to rural out- migration and many households involve in migration.

There are many literatures written by many scholars in Ethiopia about the impact of population pressure. For instance, the impact of population pressure on land use/land lover change, agricultural system and in come diversification in (Maluneh, 2003.).

Therefore, this study is attempted to fill the gap in literature. Accordingly, this paper is specified on the impact of population pressure on agriculture only to identify the problems related to the population agriculture in the country level and in the study area.

1.3 Objectives of the Study

1.3.1 General objective

The general objective of the study was to assess the impact of population pressure on agriculture in the case of Misha Woreda, Hadiya Zone.

1.3.2 Specific Objectives

- To identify the impact of population pressure on crop production;
- To assess the impact of population pressure on livestock production;
- To examine the impact of production pressure on the structure agricultural land;

1.4 Research Questions

Depending on the objectives, the study will deal with the following research questions.

a) What are the impacts of population pressure on crop production in Misha Woreda?

b) What is the impact of population pressure on livestock production in Misha Woreda?

c) How population pressures affect the structure of agricultural land?

1.5 Significance of the Study

This study was designed with the expectation that its findings would benefit the following organizations in different way: -

1. The Hadiya Zone and Misha Woreda Agriculture and Rural Development Department and Finance and Economic Development Departments could benefit from this study and use the findings to

implement their policies in the study area in particular and in rural areas of similar demographic and agro – ecological conditions in general.

2. The study would give general information about the agriculture and population characteristics of the woreda.

3. The findings of the study would give concerned authorities some possible ways of information about the population of Misha Woreda and the level of agricultural productivity.

1.6 Limitation and Scope of the Study

There were several shortcomings to the current work that could be resolved through future research in the study area (Misha Woreda). The research would give more focus to the various responses to population growth at the KPAs level. To this end:-

1. The site of this study is restricted to a selected (KPAs) in Misha Woreda. Due to time and financial constraints, the researcher of this paper was forced to select only three (KPAs) due to time and financial constraints.

2. In order to obtain the information of agriculture, the researcher is intended to collect data only on structure of agricultural land, crop and livestock production in accordance with population pressure

3. This paper is the first work in Misha worda and it lacks access to references to help the work of the researcher for further understanding.

1.7 Organization of the Paper

This study was organized in to five chapters. The first chapter deals with the background of the study, statement of the problem, objectives of the study, significance of the study, limitation and scope of the study,

methodology, and procedure of the study. The second chapter presents the review of related literature. The third chapter presents a brief description of the study area. The fourth chapter presents the results and discussions on the survey data and chapter five summarizes the study results and concludes the study.

CHAPTER TWO

Review of Literature

The relation between population and agriculture has been one of the most debated issues. The impact of population growth on agriculture and the structure of the agricultural land has been a main concern of academics, government and NGOs. Different researchers have viewed the impacts of growing population on agriculture and the structure of agricultural land.

This part of the thesis has tried to provide a general overview of the literature on the major theories that relate population to agriculture. In focus of the major theories the implications and consequences of growing population pressure was considered. Empirical evidence conducted both form within and beyond Ethiopia has also been reviewed. Reviewing a broader range of empirical studies enriches the scope and depth of the research.

2.1 What is Population Pressure?

Various terms have been used to express the status of population in connection with agriculture. Amongst those that have been more commonly used are 'population pressure' and 'over population'. They are more regularly used in population-resource relationship related literature. Kay (1970) noted that widely accepted precise definition of 'over-population' and 'population pressure' does not exist. Each has been used differently in the context of different circumstances, and each has thus acquired a number of meanings. In most cases, however, the two terms have been used in connection with maladjustment between population numbers and either resources or production (Kay 1970; Muluneh 2003).

Over population is a mere mathematically conceived concept which refers to, as put forward by optimum theorists, a condition in which the population of a region exceeds the optimum and therefore cannot be adequately supported by the available resources and technology (Grigg; 1980, Rao et.al, 1995). People may talk about over population, in view of Thomas Mathus and those who tried to measure rural unemployment, respectively, when population growth causes output per head to fall to the subsistence level and when the marginal productivity of labor is zero and further notes that, regardless of differences in outlook, over population is a condition where a great number of people live on one unit of cultivated area than are required to work it or can possibly attain a decent living from it (Grigg, 1980).

According to World Population Guide (2012), over population is a generally undesirable condition where an organism's numbers exceed the caring capacity of its habitat. The term often refers to the relationship between the human population and its environment the earth or smaller geographical areas such as countries. Over population can result from an increase in births, a decline in mortality rates, an increase in migration, or unsustainable boom and depletion of resources.

On the other hand, the term 'population pressure', as a concept, may not be only thought of as a maladjustment between population size and resources, but it may be felt to be an effect of 'human-environmental crises' (Bernard, 1980) and a worsening balance between citizen of low income countries and the land which support them (Zelinsky, 1966;Muluneh 2003). Bernard (1980) defined population pressure as 'a long-term process of deteriorating physical and human conditions occurring at many scales as a result of excess numbers of humans and animals in relation to the ability of the land to support them (Bernard, 1980).

Likewise, in the context of Ethiopia, Wood (1990) thought of it as 'a situation where population growth, usually in combination with other related influences, makes it difficult for some, or all, of the population in an area to maintain their standard of living' (Wood, 1990;Muluneh 2003).

Although there is no universally accepted definition and indicator of population pressure, agronomic density a measure that relates the agricultural population to the cultivated area, is used by several researchers as an appropriate proxy indicator of the population pressure on agricultural land and other resources (Wood, 1990, Molla 1998; Muluneh, 2003). Despite all the inherent obstacles in the concept of population pressure, there is a consensus that population pressure exists and its effects can define its presence. In simple peasant societies where population growth occurs without adequate technological and institutional dynamics, population pressure results in land decrease and fragmentation, landlessness, an increase in land values and rents, increased agricultural labor, which makes the use of machinery uneconomic (Grigg, 1980).

Moreover, food shortage, use of marginal lands, increased erosion and declining crop yields, out migration, rural indebtedness, increased dependency ratio, changing crop emphasis, mal-and under-nutrition, and deteriorating human health were reported as symptoms of population pressure (Bernard, 1980;Grigg 1980). The above ideas revealed that, the imbalances between human needs and the capacity of the earth to fulfill their needs, which must be related to a growing population size and density. Holding other factors constant, population pressure (higher population density) is expected to cause higher labor intensity in agriculture, by increasing the availability, hence reducing the costs of labor relation to land (Boserup, 1965). Higher labour intensity of agriculture can take the form of production on more marginal lands, less use of fallow, adoption of more labour-intensive methods of cultivation

(Boserup, 1965; Nkonya.etal (2004).There are some arguments that population growth, depending up on the microeconomic environment, would have either one of the two effects or both.

2.2 Population and Agriculture in Malthus View

2.2.1 Malthus Theory

Thomas Robert Malthus (1798) published his new famous "Summary view of the principle of population". Malthus argued that population growth is the prime and inevitable causes of poverty, starvation and misery. The central tenet of Malthus theory focused, on two principles

1. Population, when unchecked, would increase geometrically
2. Production, from land which is the means of supporting population, would increase only in an arithmetic rate (Findlay, 1987 cited in Bekele, 2007).

For Malthus, population growth is a dependent variable determined by agricultural productivity. He argues that the provision of food for human beings is inelastic and that this lack of elasticity is the main factor determining the rateof population growth.

Malthus asserts that there was checked to curb population growth, which otherwise rapidly out paces the means of subsistence even at a subsistence level. He proposed two types of checks, preventive and positive checks (Findlay, 1987 in Bekele, 2007). The preventive checks include abstinence from marriage or delayed marriage in order to reduce fertility rate. The positive checks include disease, famine, war and misery.

In Malthus's view the increase in population, which is not in harmony with the carrying capacity of land (the chronic imbalance between

population and physical resources, results in the elimination of the surplus population, either by direct starvation or by other positive checks.

After Malthus, many researchers began to express their thoughts and one such writer was David Ricardo, who supported Malthus and tried to answer the question of how the growth in food production trails after growth in population.

Furthermore, the population growth around the world affects all people through its impacts on national economics, environmental safety and health and habitat ability of the world. Also, the causes and consequences of population pressure influence many areas of human affairs, the issue is not only food security, health, environment quality and economic growth, but all these and more (Engelmann, 1997). As it is seen among subsistence oriented economies, Neo-Malthusians have negative expectation and consider that population has the potential to out-strip the gains of agriculture change, including-environmental degradation, land diminution and fragmentation. Further their views depict population as the dangerous forcing factor in the relationship between people and the environment and economic development (Muluneh, 2003:12).

Ghani (2005) argued that in Malthusians, natural resources are limited and sooner or later the human population will exceed the carrying capacity of the planet. The primary focus of this group is to reduce population growth rates in rapidly increasing population regions of developing countries. For the Malthusians, the population densities and high growth rates within these densely populated areas with a high population increase. The reason is that due to the rapid growth of population, adjustment time is too short for new technology to be

adapted. The result is continuous degradation of the natural environment.

They may not agree with the original Malthusian thesis presented in 1798 by Thomas Malthus, which stated that the population grows at exponential rate where as food supply growth in a linear progression. However, Malthusians do believe that the carrying capacity is finite and decreasing. As the result, they see population growth anywhere beyond this carrying capacity may have direct consequences for everyone (Ghani, 2005).

According to Serviastaval (2004, cited in Adane 2008), the Malthusian arguments are population and the demand of food increase over time but natural resources specially arable land are limited in supply. Malthus considers population as dependent variable and environment and technology as independent variable that determine the size of population that could survive in a given environment. The implication of this view is that saturation acts as natural check on population growth, with famine maintaining equilibrium between the need for food and food supply

2.3.2 Neo-Malthusian Theories

In view of Neo-Malthusian, Malthus (1826:13) was the first to address food scarcity as an issue and defended the hypothesis that growing global population will eventually obscure the earth's capacity to feed it. "The power of population is indefinitely greater than the power in the earth to produce subsistence for man." Erlich 2009 extended Malthus' theory on population growth by asserting that humans were going to fail in the battle against hunger. Despite his predictions Erich 2009 recognized that the sum societal shifts have occurred that indicated at least some populations were slowing their growth. For instance, fertility rates in most developed nations have dropped to less than replacement

level and the Green Revolution had a larger impact than expected (Erlich, 2009).

The widely held pessimistic land doom-laden view of neo-Malthusians is that management of the environment. As noted in the preceding section, it is influenced, knowingly or not, by the Malthusian proposition that resources are limited. Neo-Malthusians argue that population growth is a major threat to the world economy, environment and political stability. Therefore, more people anywhere, mean disaster. This contention has intellectual roots in the work of (Malthus 1830).

Scholars as Hopfenberg (2003) have supported Malthus's hypothesis. Hopfenberg (2003) determine earth's carrying capacity by studying the dynamics between food production and agriculture. He estimated future population numbers by using past food productions, which were similar to those estimated by (FAO, 2003).

According to Hopfenberg (2003) Malthus understood that in the absence of limitations of resources such space and food population will grow exponentially. If resources are limited the growth rate will decline as the population riches the maximum that the environment can support. Although Hopfenberg (2003) hypothesis have strong biological foundations, they do not seem to maintain when confronted with cases such as Africa, where population sizes have continued to increase despite declining food production on the continent as expected by the Malthusian model. Currently, African nations such as Liberia (4.1%), Nigeria (3.49%) and Uganda (3.24%) have among the highest population growth in the world (Guzman, 2011).

For Neo-Malthusians, they have further evidence that food insecurity is inevitable consequence of over population and out striping the world's finite resources. And the Neo-Malthusian position here is, population growth and economic development contribute somewhat to price

increases, but there are few structural resource based impediments to increasing aggregate agricultural production (Hendrix, 2011).

2.2.4 Critique of Malthus

Malthus argument regarding the relationship between population growth and production capacity has been subjected to considerable criticism. Furthermore, economists began to look for alternative explanations, attempting to close the gap between Malthus prediction and the realty that has been revealed to them.

Malthus claimed that with a fixed amount of land and a growing population, diminishing marginal productivity would result in individuals living constantly at a subsistence level. A frequently heard critique is that he ignored the possibility that technological improvements and capital accumulation are strong enough forces and may relax the population pressure and improve the condition of individuals, even in the presence of a growing population.

One kind of criticism emphasized potential positive consequences of population growth in the long run ignored by Malthus. Ester Boserup, for instance, suggested that, Malthus augments displaya reverse causation. According to her, population growth is an autonomous factor, which affects agricultural productivity rather than being affected by it, as suggested by the Malthusian school. Boserup claimed that Malthus' assumption of diminishing returns to labor need not hold in the long run, as higher population may lead to a more efficient division of labor as well as to improved agricultural practice (Signaled by the frequency of copping). She concluded that soil fertility should not be viewed as fixed and given by nature, but instead can be improved by manage to survive the agricultural technology to a better one, which is likely to be a result of an increase in population.

Another critic of the Malthusian reasoning, emphasizing the long run benefits of population growth (Simon, 2000). Simon claims that whereas population growth has negative effect on living standards in the short run due to diminishing returns and the temporary burden it poses on society, it has positive effects on living standards in the long run due to knowledge advances and economies of scale. Employing a simulation model, Simon finds that in the long run, (after 30 to 100 years) and when compared to constant size population, moderate population growth improves standards of living both in more developed and in less developed countries. Simon held that, in the long run, a growing population tends to advance knowledge, which in turn increases, productivity and output at a higher rate than of population growth.

The main idea behind subsequent theories and views is that they mainly concern countries with low population densities that often have severe hunger problem (Primavera, 2005). "However, in a few countries, such as Ghana and Kenya, population land ratios are quite high but malnutrition problems are also acute (Primavera, 2005). Consequently, different regions need to be compared instead of looking at low population density areas, we should also look at high density areas in the low agricultural sustainability develops there.

Other proponents argued that various regions of the world were departed from the Malthusian trap and initially experienced a considerable rise in the growth rates of income per capita and population. Unlike episodes of technological progress in the pre-industrial revolution era that failed to generate sustained economic growth the increasing role of human capital in the production process in the second phase of industrialization ultimately promoted a demographic transition, liberating the gains in productivity from counter balancing effects of population growth (Ashraf and Galore, 2008).

The transition from Malthusian stagnation to modern growth has been the subject of intensive research. In the growth of literature in recent years, as it has become apparent that a comprehensive understanding the hurdles faced by less developed economies in reaching a state of sustained economic growth would be futile. The factor that prompted the transition of the currently developed economies into a state of sustained economic growth could be identified and their implication modified to account for the differences in the growth structure of less developed economies in an interdependent world (Ashraf and Galor, 2008).

Michalopolous 2006; cited in Galor (2008), viewed that the composition of the population accelerated the speed of technological progress, and eventually brought about an industrial demand for human capital. Human capital formation and thus further technological progress triggered a demographic transition, enabling economies to convert a larger share of the fruit of factor accumulation and technological progress into growth of per capita. Moreover, the theory suggested that differences in the timing of the takeoff from stagnation to growth across countries contributed significantly to the great divergence and to the emergence of convergence clubs.

2.3.3 Boserup Theory on Agriculture

In contrast, the Malthusian view, Boserup, a Danish political economist postulated in 1965 a more optimistic hypothesis regarding the relation between population and physical resources. She has suggested that population growth, is actually a pre-condition for agricultural development. Her hypothesis is formulated on the basis of a close examination of the history of agriculture in general and the evidence of prevailing third world agricultural practices in particular. Her thesis was, however, confined to subsistence economy and was further elaborated in 1981.

On the basis of close observation of the history of agriculture in tropical subsistence economies, Boserup strongly maintained that population is not a dependent variable that can enhance the change of agricultural development. Boserup argued that an increase in population results in scarcity of subsistence and increased demand for food, which consequently leads to agricultural intensification.

Boserup centered that a growing population density, being a determinant of the farming system and farming technology, forces farmers to adopt more intensive system of cultivation to improve their tools to employ animals and subsequently machines in order to extend the range and improve the yield of crops, to improve productivity of farm animals and to specialize in production and marketing (Dagnachew, 1999: Muluneh, 2003).

Moreover, Boserup explained that an increase in food supply is achieved by intensification in production obtained in two ways:

1) The reduction of fallow interval, as population densities rise; a series of stages in land occurs: forest fallow, bush fallow, annual cropping, and finally multiple cropping in the length of time of the fallow drops from years to a negligible period.

2) As the fallow period is reduced, change in the farming method is enforced to maintain or increase yields; the axe and digging stick are supplemented by the hoe and then replaced by the plough. In the early stage of forest fallow little or no weeding is done, no manure is used and the labor input is minimal. But with increasing density more manure is used, land is weeded more frequently, and in the final stage it is terraced and irrigated so that labor input increases. Thus output per hectare increases, output per head is only maintained (Boserup, 1965).

Although, her original evidence in support of her thesis of the positive relationship between population pressure and agricultural intensity was drawn mainly from studies of tropical subsistence agricultures in sub-Saharan Africa, her more recent work examines the evidence of the relationship between population density and agricultural technology changes in several developing as well as developed economies. (Boserup, 1981). She puts forward that current population growth rates are much higher in sub-Saharan Africa. As a result, agricultural intensification must have taken place more quickly.

However, it had not resulted in rapid intensification of agriculture and technological change, definitely, food production has consequently fallen. She has proposed three factors that prevented rapid agricultural intensification first; there was lack of investment in rural infrastructure, like roads and agricultural input. Second, the new systems of land use may entail land reform that lead to disputes over land rights. Third, dependence on food imports to meet the gap between the food needs, growing population and production has undercut the pressure for domestic intensification of agriculture.

Boserup's thesis is based on the premise that subsistence farmers are labor-efficient and will choose to intensify cultivation that will satisfy their agricultural needs with the least amount of work. Extensive systems of agriculture maximize labor efficiency in circumstances of low population density. Due to the fact that total production in such systems is low, extensive cultivation cannot support high-population densities. Hence, Boserup advocates that an increase in population pressure is the key factor that governs a shift from extensive to intensive systems of cultivation.

2.2.5. Some Criticisms of Boserup's Model

Ester Boserup of with here theory of agricultural intensification, Boserup, (1965).Here's is still the more general theory explaining how human populations can continue to grow despite apparent environmental limits. According to Boserup, as human populations increases, they adopt more productive technologies (e.g. agriculture and other systems of ecosystem engineering), increasing the carrying capacity of human environments as needed. Boserup does not imply that new technologies make life better, or that technologies are developed because they are needed. Boserup merely posits that when people need to sustain themselves, they will do whatever this means using more labor or other resources, (Zhang, et al., 2011).

Boserups's theory of intensification has been challenged over the years but has stood as the core theory of agricultural land use (Turner, 2010) better still, Boserupian theory. Boserupian intensification has helped land clearing even in deep past (Ruddiman and Ellis,2009).At present ,as human populations are growing and urbanizing ,agricultural demand has increased so much that the most intensive agricultural systems are becoming dominant. The good news is that the most intensive systems tend to focus on the most productive land, marginal-lands are increasingly abandoned and left to regenerate (Rudel et. al, 2009). So, even as we go off the end of Boserup's chart, disaster is not the result and intensification continues through the planet has now transformed the planet for the long term (Ellis et.al, 2010).

Most archeologists confuse labor intensive agriculture (high production yield with diminishing returns for labor invested per unit area of farm land) with intensive agriculture continuously farming units of land with short or fallow periods. Many intensive agricultural systems (as defined by Boserup) are not necessarily labor intensive over the short or long

term. In addition, the concept of agricultural intensification is often confused with agricultural expansion or intensification (Erickson, 2006).

According to Kowolski, (2010), Boserup's thesis was not well developed regarding qualitative shifts in technology (eg. to fossil fuels) that fundamentally change land labor and thus, structural relationships in the society. Boserup did trace the broad strokes of industrial technology on agriculture in sparsely populated and under developed lands and argued that it was not applicable to some subsistence farmers because the relative cost of labor versus industrial based foods favored non adoption. This concern, however, were not explicitly inserted in to her base thesis. Boserup's early work was disputed assumptions about farming behavior applied in development. She argued that the behavior of subsistence farmers differed from commercial once. Subsistence farmers responded to household consumption more than market demand and sought to minimize gain, affecting the allocation of land, labor and capital (Kowalski, 2010).

(Wood 1990 as cited in Muluneh, 2003), also reports that although some intensification did occur in the northern highlands of Ethiopia through reduction of the fallow interval, because of the land tenure and societal situation, increased investment of labor in conservation works did not take place and a cycle of environment degradation developed in many areas. Hence, Wood asserts, 'the positive cycle of agricultural intensification, which Boserup suggests, did not occur in Northern Ethiopia (Muluneh, 2003:19).

2.2.6 Empirical Evidence on Malthusian (Neo-Malthusian) and Boserup Hypothesis

2.2.6.1. Cross-Country Evidence

According to the Malthusian theory, during the Malthusian epoch that had characterized most of human history, humans were subjected to a persistent struggle for existence. The rate of technological progress was insignificant by modern standards and resources generated by technological progress and land expansion were channeled primarily towards an increase in population size, with negligible long run effects on income per capita. The positive effect of the standard of living on population growth along with diminishing labor productivity kept income per capita in the proximity of a subsistence labor (Ashraf and Galor, 2008).

Periods marked by the absence of changes in the level of technology or in the availability of land were characterized by a stable population size as well as a constant income per capita, whereas periods characterized by improvements in technological environment or in the availability of land generated only temporary gains in the technological environment or in the availability of land generated only temporary gains in income per capita, eventually leading a larger but not richer population. Technologically superior economies ultimately had denser populations but their standard of living did not reflect the degree of their technological advancement (Ashraf and Galor, 2008).

Critics, going from the obvious point that population is not the only factor driving change, to charges that Boserup denigrates other key processes, misconstrues data, misuses synchronic comparisons and obscures ecological problems in the developing world (Devis, 2001). Yet the fact remain that the relationship Boserup described is a key element

in the variability in non-industrialized agriculture. Rising population pressure on resources, with in a constrained area frequently does force farmers to alter their production tactics, often demanding greater inputs in the process is predictable. Boserupian model cannot account for all of the complexity in intensification was obvious from the beginning. The model is partly over simplified as are all general models including demographic transition, biological evolution, the psyche, the economy, planetary motion, and atom (Devis, 2001). However, in simplifying she provides an invaluable framework for isolating the other variables in the intricate process of agricultural change.

For most of human history a Malthusain relationship appears to have held between population and income, leading to stagnant living standards (Vollrath, 2010). However, as Clark (2007) and Voth et. al (2009) point out that stagnation does not imply the output per capita must be at minimum subsistence levels. One implication of this is that Malthusian equilibriums across regions need not be homogeneous, and this is in fact what we see in data from the period prior to industrial revolution.

In particular, pre-industrial Europe had relatively high per capita income compared to Asian countries such as China or India. The difference appears to be between a to two-four fold advantage by 1800, but there is evidence of a European edge in living standards and urbanization for several centuries prior to that as well (Clark, 2007). A significant part of this advantage was the high labor productivity in agriculture in Europe, with each worker producing between 30-100% more than their Asian equivalent around 1800 Vollrath(2010), freeing time and labor in Europe for the production of nonagricultural goods.

Research on the population-agricultural practice nexus has been dominated by the Malthus (1960) and neo-Malthusian views analyze

population growth has a threat to the inherent limit of arable land to private food, shelter, and subsistence. It argues that food production can grow only at a liner rate while population tends to grow geometrically. Thus, population growth ultimately outstrips the capability of the economy to meet the rising needs for food, due to the ecological constraints imposed by natural resources. It postulates that if preventive measures or checks are not put in place (especially fertility control), poverty, disease, famine, and war, called "positive" checks," would automatically place a check on population growth (Codjoe, et. al 2000).As the degradation path way, state that increasing population exerts pressure on limited resources, destroying the carrying capacity, and subsequently lowering the standards of living (Codjoe, et. al., 2011). In Africa especially high population growth has been argues to have adversely affected the environment (Codjoe, et.al., 2011).

Proponents of the alternative view (Mortimore 1993) draw on Boserup's (1965) intensification thesis. Writing a after the agricultural and industrial revolutions (almost two centuries after Malthus), Boserup suggests that increasing population density can stimulate technological innovations that increased land use intensity Mortimore, et. al., 2005) and study of the Machalkos district (Kenya) beginning in the 1930's and spanning about sixty years demonstrated that an increase in population resulted in farm and livestock output, culminating in food security and agricultural intensification, including fertilizers as well as soil and water conservation techniques.

The approach of Boserup, is akin to induced innovation theory, which focuses on how economic and market-related opportunities and policy could simulate the innovations described by Chowdhury and Turner 2006).A part from these theories which have dominated the population-agriculture-environment nexus debate over many years, Davis (1963)

theory of the multiphase response has provided a broader perspective to the debate.

According to Davis, when population grows and is manifested in larger household sizes, families need to respond to avoid a decline, in their standard of living. This response could be in the form of marriage postponement, fertility reduction within marriage, or migration to seek greener pastures to support the family. It should be pointed out that existing empirical work examining the relationships between population and agriculture from the Malthusian-Boserupian and especially Malthusian response perspectives has been mainly at the macro or country level (Carr, et al., 2006).

On the other hand, in ten case studies made in connection with population growth and agriculture in sub-Saharan Africa, the farmers responded to the pressures through cultivated land expansion, economic diversification and dietary change (Hyden et. al; 1993 in Muluneh2003). It was speculated that increasing population pressure led diversification in labour use or promoted market oriented production, it encouraged capital investment in agriculture and the a adoption of modern multi-pectoral economy in which per capita food production and materials well-being improved (Hayden et al.)1993 in Mulneh, 2003).

2.2.6.2 The Ethiopian Case

Ethiopia is one of the countries in sub Saharan Africa experiencing a rapid growing population and persistently declining per capita food production. "In fact, the agricultural sector is not able to produce sufficient food for a large and fast growing population in spite of the adequacy of its potential resources" (Mesfin 1991; Tadesse 1989; Degefa 1996; Muluneh 2003).

With nearly 12 million people at risk of starvation in a region whose population has doubled in the past 25 years one might assume that these factors are causally related in the horn of Africa. Ever since the British professor Tomas Malthus wrote "An essay on principle of population" in 1798, we have been concerned that human growth will outstrip the available food supply while the current crisis in Somalia Ethiopia and Kenya would appear to be perfect proof of the Malthusian scenario, we must be careful not to make over simplistic assumptions (Moseley G., 2011).

Ethiopia is an agrarian country where around 95 percent of country's agricultural output is produced by small holder farmers (MoARD, 2010). The contribution of Agriculture to national GDP is 44%, employment 85% export earning 90% and supply of industrial raw material 70% has remained high (World Bank, 2010). Hence, the ability of the nation to address food and nutritional insecurity, poverty and to stimulate and sustain national economic growth and development is highly dependent on the performance of agriculture. Yet achieving higher and sustained agricultural productivity growth remains one of the greatest challenges facing the nation (Spielman et. al., 2010). Similarly according to the United Nations Conference on Trade and Development (UNCTAD, 2010), in many countries in sub-Saharan Africa (SSA) decades of concerted efforts by national governments donors, international and national development organizations has not yet led to sustainable agricultural productivity growth.

Ethiopia has been experiencing unprecedented population growth in its recent history. The countries population has increased from an estimated 19.6 million in 1950 to 70.7 million in 2003, an increase by 51.1 million people in a span of 53 years. If the current growth rate of 2.7% continues, the population will reach 117.6 million by 2050 (PRB, 2003). In other words Ethiopia will join the top ten most populous countries of

the world by the middle of the current century. Even though the advantage of population as a resource is evident, rapid growth has tremendous implications for development, the capacity to provide basic services, attain the goals of food security and poverty reduction for a country with limited resources.

2.3. Consequences of Population Growth on Agriculture

2.3.1. Land Holding Size

About 11.7 million smallholder households account for approximately 95 percent of agricultural GDP and 85 percent of employment. With a total area of about 1.13 million Km2 and about 51.3 Million hectares of arable land, Ethiopia has tremendous potential for agricultural development. Only about 11.7 Million hectares of land, however, are currently being cultivated; just over 20 percent of the total arable area. Nearly 55 percent of all smallholder farmers operate on one hectare or less (MoARD, 2010).

Such small farms are fragmented in to an average of 2.3 plots. A study by (Nega et al. 2003; Samuel, 2006) shows that land holding is one of the factors that constrains farm income and the level of household food security. As land holding declines, per capita food production and farm income also decline, indicating that extremely small sized farms cannot be made productive even with improved technology and certainly not enough to address rural poverty issues by the extension programs that primarily focus on technology diffusion. Such farmers have little or no surplus for investment and input purchase.

The average farm size is considered by many to be small to allow sustainable intensification of smallholder agriculture. Empirical research show that the probability of adopting fertilizer and improved seeds decreases with decline in farm size (Mulat 1999; Samuel 2006). The diminishing farm size has not only affected the profitability and level of

technology use, but also the sustainability of rural livelihoods. According to, (EEA, 2004) at national level, for instance, indicates recently that, the average farm size can generate only about 50% of the minimum income required for the average farm households to lead a life out of poverty, if current level of farm productivity and price structure remain constant. The average land holding size in Ethiopia highlands would thus be insufficient to feed a family of five even if production could be successfully increased three times using improved technologies (EEA, 2004).

2.3.2. Farm Fragmentation

Farm fragmentation as increasingly emerged as one of the key problems of subsistence farming of Ethiopia. Farm fragmentation has been one of the principal causes for insufficiency and wastages in peasant agricultural production. It results in many problems such as wastage of time in moving from one plot to the other one, inconvenience in using modern machinery, and uneconomic use of both manpower and land resources (Samuel, 2006).The negative influences of land fragmentation on agricultural production are associated with the problems using irrigation, weed and pest control, crop production and other agricultural innovations. Other problems raised by farm fragmentation are that the increase in distance of farm plots from the peasant homestead. According to some national surveys, the average farm size in highlands (in 2004) was fragmented in to 2.3 plots, each plot with 0.35 hectares. About one third of surveyed farms were 3 or more plots. This implies that small holders reach to point where they cannot redistribute their already miniscule and fragmented lands to the growing labor with in their family (Samuel 2006).

2.3.3. Crop Production

According to the World Development Report (2008:90) "the vast majority of farmers in developing countries are small holders, and an estimated 85% of them are farmers of less than 2 hectares. 95% of farmers in Bangladesh, China, Egypt and Malawi, farm less than 2 hectares." The declining trend in farm size is the result of population pressure and the effect of land fragmentation. Studies have shown that average farm size is persistently decreasing in many densely populated areas in Africa resulting in social conflicts and civil conflicts (NDR (2008:90, Addisalem, 2010).

Globally slow growth is expected for most crops, especially oil seeds and coarse grains, which face higher production costs and slowing productivity growth. Food production can be increased extensively through expansion of areas under cultivation, and intensively by increasing cropping intensity or through increasing agricultural productivity. Crop area harvested and productivity is expected to grow slowly mainly due to land degradation. Degradation leads to reduction in crop yields and may reduce total factor productivity by requiring the use of higher input levels to maintain yields (OECD-FAO (2011).

Ethiopia's crop agriculture is complex, involving substantial variation in crops grown across the country's different regions and agro-ecologies (EDRI, 2011). According to EDRI five major cereals (Teff, Wheat, Maize, Sorghum and Barley are the core of Ethiopia's crop agriculture and food economy, accounting for about three quarters of total area cultivated, 29 percent of agricultural GDP, and 64 percent of calories consumed. Ethiopia's crop agriculture in general, and the cereals sub-sector in particular, face serious challenges. Cultivated crop area (13 million hectors in 2007/08) accounts for relatively small share of the total area of the country as most land is not suited for cultivation. According to

CSA (2010) The Average cultivated land for 2010/11 was 12, 030, 638.06 hectares. This shows that the land for cultivation decreases over time.

2.3.4 Livestock Production

Ethiopia's livestock population is the largest in Africa in to 2008/09 Ethiopian sedentary private holdings were estimated at about 49 Million heads of cattle, 25 Million heads of Sheep, 22 Million heads of goats, and 39 Million poultry (CSA, 2009).

Livestock is one of the agricultural components that, complements crop production. The term livestock refers to domestic animals such as cattle, camel, sheep, goat, mule, horse, and donkey and sometimes include poultry and bees (Michael Roderick, 1987; Atnafu, 2007). Farmers keep different types of livestock for their different purposes. The livestock species reared and system of population varies from place to place depending on climate, economic situations, crops grown, population pressure etc. (FDRE, 2006).

Following Sereseinfed, (1996) and Williams et. al., (2000) livestock production systems in SSA countries can be classified in to:-

- Mixed rain-fed:- it is a system that is based on rain-fed cropping combined with livestock
- Landless:- it refers to intensified livestock production
- Range land:-that refers to areas where livestock production dominates crop production or areas with minimal cropping.
- Mixed irrigated:- under which livestock production are integrated with cropping under irrigation.

For this study preferred types of the livestock system is mixed, because the study area is within the highland part of Ethiopia. Highlands cover some 40% of the total area, and constitute approximately 80% of the total cattle, 75% of sheep and 25% of goats (Jobre (2005). That is to say crop production and livestock rising are coexisting in highlands part of

the country. In crop livestock integrated farming system livestock supports crop production by providing manure, draft power, income to purchase inputs, etc. In low lands of the country livestock provide meat, milk, blood and sources of income.

The livestock development master plan study-phase I (MOA, 2006) classified livestock production system in Ethiopia into three broad categories.

- Subsistence crop related livestock production
- Purely pastoralists production
- And the private commercial or pastoral production.

Integrated crop-livestock production system characterizes the production of highlands and agro-pastoralist with regard to the size and scale of production, this system is small holdings mainly growing crops and cash crop with small landholding that range from 0.5 to 1 hectare. Livestock is integrated in to crop production and are used for draught, milk, meat and source of food and income.

Natural pasture constitutes the major sources of livestock feed in Ethiopia with the exception of intensive dairy farm in larger towns. The availability of feed is dependent on rain fall pattern and the size of grazing land. Livestock feed is 35% deficient in average seasonal years and the goes up to 70% in bad years. Besides, feed shortage is more pronounced in drought periods particularly in pastoral areas. In addition to the effect of rain fall in animal feed, is also affecting the feed resources. As a result, grazing land is shrinking from time to time (MOA, 2006).

According to Adugna and Aster (2007) lack of feed water during the dry season and drought is the main constraint affecting livestock production in the area shortage of rain and the frequently recurring drought in the area is major cause forage production and quality. Shortage of feed and

water and the harsh climate condition of the area seriously affect the health and productivity of animals. Bush encroachments are exacerbating the problem of feed shortage. Undesirable plan species such as acacia drepanolobium reduces accessibility of forage leading to reduction of effective grazing area. The prolonged dry season and drought are the cause for high mortality rate. In addition animal's diseases are also challenges for livestock production in low land hot areas.

2.4. Conceptual Framework

An attempt has been made to provide a theoretical debates and empirical evidence concerning population agriculture along with farmers' response to growing population pressure on agriculture has been examined. As noted in the literature review, farmers respond to population growth, and hence the resulting pressure on agricultural productivity, in different ways. There was also an attempt made to categorize the responses to, or consequences of, population pressure in to a/ on structure of agricultural land b/ on crop production c/ on livestock ownership.

In order to understand the concept of framework in Figure 2 it is necessary to explain each component in the context of this study. One of the main component is population growth, which considers the increasing size of population (population pressure).In a condition where population growth exceeds food production which leads to increased food needs. Therefore, a food supply-demand gap reflects a lack of balance between available foods (supply) and the need for food demand.

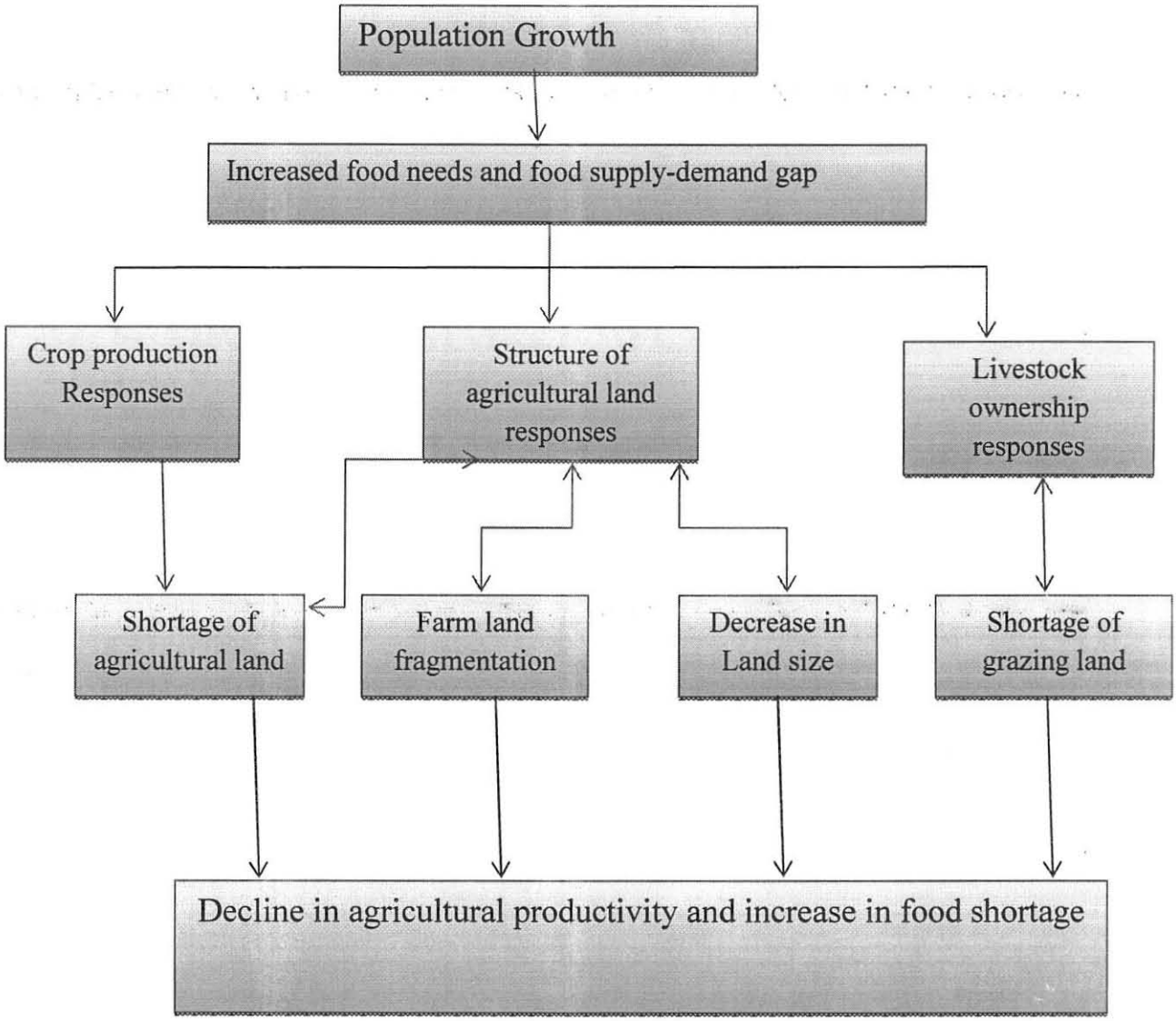

Figure 1 Conceptual frameworks of farmers' response to population growth.

CHAPTER THREE

Description of the Study Area and Research Methodology

This chapter deals with the human and physical conditions of the study area or Woreda. The chapter gives a brief understanding of the general background of the study Woreda.

3.1 Location of the Study Area

Misha Woreda is one of the ten Woredas and one Administrative town in Hadiya zone, SNNPR. The Woreda's capital is Morsito which is 18 Km and 250 Km away from the zone's capital, Hossana, and Addis Ababa, the capital of Ethiopia, respectively. The Woreda is bordered by Lemo Woreda from East, Ghibe Woreda and part of Gurage zone from West, Silte zone and part of Gurage zone from North and part of Ghibe Woreda and Gombora Woreda from South. Figure 3.1shows the map of the study area.

Map of the Study Area

Source: SNNP Administrative Map 2010

Figure 2. Map of the study area

3.2 Physical Characteristics

Topographically, undulating land feature is the dominant set up of the Woreda with altitude range between 1200 to 2940 Masl and, is divided into Kolla, *Woina Dega and Dega* agro-ecological zones. Annual rain fall is estimated in a range of 800 mm to 1500 mm (MWARDO, 2010). *Belg* (January- April) and the main *Meher* season (June-August) are the two rainy seasons.

Similarly, annual temperature is between 8^0C to 25^0C. The soil class encompasses clay, silt, loam and other mixed textures always exposed to the risk of erosion due to topographic features. With respect to vegetation, manmade plantation is the dominant cover with eucalyptus tree around farm boundaries, homesteads and home gates. Except for patches around some streams and at the bank of *Ghibe* River and low land bushes at *Forkose kebele* Peasant Association, natural vegetation does not currently exist in the area.

The Woreda has a total area of 33,084 hectares allocated for various uses. From the total area about 26, 751 hectares are occupied by annual and permanent crops, about 92 hectares are covered with manmade and natural forests, 4675 hectares are occupied by grazing land, and about 1015 hectares are degraded land due to soil erosion. The area constituted by social institutions is 551hectares.

3.3 Socio-Economic Characteristics

Misha Woreda was previously called Konteb Woreda starting from the period of Emperor Haileselassie and, later during the *Derg* regime. The Woreada centered by the current center of *Misha Morsito* town. But step by step, those large numbers of KPAs were divided in to different part of Zones and Woredas. For instance, from 97KPAs of Konteb worda, 3 KPAs were incorporated with Silte zone during the time of Silte referendum.

The other 14 Kebles were also incorporated with Gurage zone and they formed one Woreda. i.e. Endagagn Woreda, and some others 28 KPAs were separated from Konteb Woreda and they formed Ghibe Woreda in Hadiya Zone, 10 of them also incorporated with Lemo Woreda, in Hadiya Zone, 10 of them also included in Gombora Woreda in Hadiya Zone and the rest 33 KPAs and 2 towns formed the current Misha Woreda by changing the previous name Konteb in 2004. Formal and informal institutions are there established to provide different public services for their citizens in the Woreda.

Formally, there are Woreda Administration (WA) sectors such as Education, Health, Agricultural and Rural Development, Water Development and Sanitation, Capacity Building, Police and Justice, Women Affairs, Youth, Transport and Road, Information and Sport Commission offices along with their own line organizations to lower level are there to accomplish their responsibilities given hierarchically.

The KPAs have their own administrative hierarchies up to the level of "Gott" that is the smallest administrative unit. Some institutions like women's saving and credit Union, small scale cooperation organized and supported by NGO known as Farm-Africa (FA) is among functioning units. Religious institutions such as Protestant, Muslim and Orthodox churches, along with their followers, are available which are organized by the local community up on their interests and preferences.

Concerning educational facilities, there are about 44 schools of three levels, 18 primary first cycle schools, 23 primary 2nd cycle schools, 2 secondary first cycle schools and 1 comprehensive secondary first cycle and secondary 2nd cycle (preparatory) school.

The health facilities available are 35 health posts, 6 health centers; while no higher level institutions exist. Farmers institutions are also there such as 33, FTCs, 25 multiple small-scale cooperatives (engaged in

purchasing and selling of cereals) and gender-based small cooperative established by Farm Africa for few members of Women Association. Concerning road network Misha Woreda is absolutely poor because of the hilly feature of the land and lack of financial resources to construct all weather roads. Most travel in the area on foot and sometime by animals. The car transport is not available in the Woreda except from Hossana to Morsito town and Hossana to Geja town (MWFEDO, 2010).

The major economic activity that the population of the Woreda is engaged in is agriculture. Thus crop production and animal rearing are collectively carried out as economic importance. The major crops grown in the area include Enset, wheat, barely, pea, bean, potato. Among these crops farmers used wheat as the cash crop and they produce it more than other crops in the Woreda. To the part of livestock ownership such as cattle, small ruminants, and equines are used as power sources, asset, and means of transport. Likewise the major food source in the study is Enset and cereals. Among cereals, wheat serves as source of food and cash for the livelihood of the households.

3.4 Population and Settlement

According to the population and housing census report conducted in 2007, the population size of the Woreda is 131,002 (63, 735 males and 67,267 females) from which about 124,778 are rural and 6224 are from urban population. The sex composition of rural population is 60,514 males and 64,263 females while the urban composition of being 3,221 for males and 3, 004 females. As it is true for the zone, the area is densely populated with average density of 431 persons per square Kilometers as compared to the Country's average population density (MWARDO, 2010).

In the proportion of populated zones in SNNPR, Hadiya zone is densely populated next to Gedeo, Kambaata Tambaro and Woleyita zones. From Hadiya Zone Woredas Misha Woreda is the third densely populated Woreda next to Soro Woreda and Misirak Badawacho Woreda (Hadiya Zone Statistical Abstract, 2010).

3.5 Research Design and Methodology

Both qualitative and quantitative research designs are used in conducting this research.

3.5.1 Sources of Data

Data for the study was obtained both from primary and secondary sources. The primary data was generated through questionnaire, field observation and interview with local people and agricultural office officials of Misha Woreda.

3.5.1.1 Primary Sources

Household head questionnaire was designed to generate data on population characteristics, crop and livestock production and the structure of agricultural land in three different KPAs of the Misha Woreda. The researcher and his assistants were collected the data based on the knowledge of local people.

Detail orientation was given to the three interviewers for three days before they were sent to interview the randomly selected respondents. Informal interviews and group discussions were conducted with elderly peasants and community leaders to generate data on population and agricultural activities, especially on crop production, and livestock productions and structure of agricultural land.

3.5.1.2 Secondary Sources

The secondary data sources included are research papers, publications, unpublished materials and other related literature. These were obtained from governmental and non-governmental organizations, which include official documents and records of Misha Woreda office of Agriculture and Rural Development.

3.5.2 Data Collection Instruments

The data collection instruments used to obtain the desired information on the impacts of population pressure on agriculture and its implication in the study areas were structured questionnaire, interview and field observations. The questionnaire has been administered for the respondents to express their opinions on several items categorized under the broad topics such as: respondent's background information, data on crop production, livestock production and the structure of agricultural land in accordance with population pressure and its implication.

3.5.3 Sampling Procedure and Sample Size

Purposive sampling techniques were used to determine sample KPAs. The author selected this technique, because of accessibility for transportation, communication and to get available information from population concentration.

Out of 35 KPAs in Misha woreda 3 KPAs was considered for socio-economic and demographic household surveys and agricultural surveys. Those three kebeles in Misha Woreda are densely populated and mixed agriculture is practiced while agricultural land structure is also fragmented than other KPAs.

The sample KPAs are Morsito, Shiro and Duna Gemedo. The total households in the KPAs are 2254 and from these 135 households were

selected using simple random sampling technique. This constitute 6% to represent more population in the study

The number of each sampled kebele households' was proportionally distributed below in the table.

Table –1. Distribution of sample size by sample kebeles

Kebeles	**Total No. of HHs**	**The size of sample taken (6%) of HHs**
Morsifo	876	52
Shiro	594	36
DunaGemedo	784	47
Total	2254	135

Source: Misha Woreda Agriculture and Rural Development Office document, 2011.

3.5.4 Method of Data Analysis

In order to attain the specified objectives of the study and to give answers to the questions posed, various methods of data analysis were employed to assess the impact of population pressure on agriculture and structure of agricultural land including socio-economic and demographic variables. Both qualitative and quantitative methods as well as mixed model approach of description, assessment, evaluation and analysis were employed.

CHAPTER FOUR

Results and Discussion

This chapter deals with major findings of the fieldwork, from household survey and other data collection instruments. Issues in focus are mainly on socio-economic characteristics of sample households, the impact of population on agriculture, like on the structure of agricultural land, on crop production and livestock production.

4.1 Demography

4.1.1. Family Size

The size of respondents sample for this study was about 135 from three KPAs. Among them 86.7% were males and 13.3 % were females. The average family size in sample households was 7.2 persons ranging from a maximum of 14 people per household to a minimum of 3 peoples per household.

The respondents were categorized in to three family size groups. The first category of family size is with the family ranging between 10 and 14 who are about 34.1% of the respondents. The next category is the family size ranging between 6 and 9 that contributes 50.4 % of the respondents in the sample. The third category of family size is also between 3 and 5 that account about 15.5% of the sample households.

Table 2. Distribution of Family Size

Attribute	Number of family	Family size	Number of HH	Total Family	HHs in percent
Family Size	1-5	1		84	15.5
		2			
		3	7		
		4	7		
		5	7		
	6-9	6	12	529	50.4
		7	15		
		8	17		
		9	24		
	10-14	10	17	505	34.1
		11	19		
		12	7		
		13	0		
		14	3		
		Total	135	1118	100

Source: Researcher's HH Survey Result, 2012

4.1.2. Age and Sex

The age and sex of the household heads are estimated as determinant factor that affect agricultural activities in household level. The older the household head, the less flexible and unable to involve indifferent agricultural activities. Moreover, such households often experience shortage of labor in farming activities. With regard to sex, FHHs are tend to rent out or share crop out their land due to physical constraints and cultural conditions. Therefore, the sex of the household head is determinant factor for the effectiveness of agricultural activities and to secure food.

According to the data, the age group between 20 and 45 are about 45.9 percent of the sample households. The next age group between 46 and 65 are 43.7 percent and the age groups greater than 65 years are also 10.4 percent of the respondents. Among them, the maximum age in the

sample is 78 years, while the minimum is 24 years. The data also showed that most of the respondents are around the age of 45.

Table 3. Distribution of age and sex

Attribute	Age, sex and family category	No HHs	Percent
Age	20-45	62	45.9
	46-65	59	43.7
	>65	14	10.4
Sex	Male	117	86.7
	Female	18	13.3

Source: researcher's household survey result, 2012

4.1.3. Marital Status

The largest proportions of the respondents are currently married, while only a few are widowed. To put it in to specific figure 86.7 percent of the respondents are married while the remaining 13.3 percent are widowed.

4.1.4. Religion

Approximately three quarters of the respondents in the sampled KPAS of Misha Woreda are protestant Christians. As shown in Table 4.1.3, followers of Ethiopian Orthodox Christian faith account for about 23 percent of the sample population. This shows that, the study area is largely dominated by Protestant Christians and the rest are from Orthodox Christian faith.

4.1.5. Ethnicity

As shown in Table 4. The main ethnic group of the study area is dominated by Hadiya, based on the sample respondents about 92.6

percent that constitutes the study area. The rest 7.4 percent comprises different ethnic groups who live among the Hadiya population.

Table 4. Information on marital status, religion and ethnicity

Attribute	Response (category)	Number of respondents	Percent
Marital status	Married	117	86.7
	Widowed	18	13.3
Religion	Orthodox followers	31	23
	Protestant followers	104	77
Ethnicity	Hadiya	125	92.6
	NonHadiya	10	7.4

Source: researcher's HH survey result, 2012

4.1.6. Educational Status of the Respondents

Level of literacy is used as a means to estimate the potential flexibility of the a society to change. According to survey data, about 34.1 percent of the respondents are not read and write and 65.9 percent are able to read and write. This is very much indication of how much work is left to be done in the study area, especially in Misha Woreda and the sample KPAs.

In addition, the educational status of the children of the respondents was examined during the survey. This shows that about 95.6 percent of the respondents sent their children to different levels of schools. The rest 4.4 percent did not send their children to school because of different socio-economic constraints, such as lack of access to income to fulfill their educational materials. On the other hand, the numbers of schools are not in line with the interests of the beneficiaries. For instance, the distance to travel to school is varied from one place to another; it ranges between 100 meters for Morisito KPA for both elementary and secondary

schools and 7.5 Km for DunaGemedo to go to secondary school. This shows that, in some KPAs facilities of the schools are not sufficient enough for the children in the rural area.

4.1.7 Transport Service

In the study area, traveling for different purposes is mainly on foot. Because there is no accessibility of all-weather road and the people in the study area are vulnerable for the modern transportation. Based on the survey result, about 86.7 percent of the respondents travel on foot and the rest 13.3 percent of the respondents reply that they used animals for their transport services. Modern transport in the study area is not available because of inaccessibility of all-weather roads.

4.2 Structure of Agricultural Land

4.2.1 Land Holding Size

This sub-topic serves to confirm the increasing scarcity of agricultural land and the section of the society who are the most susceptible in the study area. As noted previously, agricultural land scarcity is the major challenge to farming population in the woreda in general and sample kebeles in particular. This problem is felt beyond all problems and more felt among young men and female farmers. The farmers ranked land scarcity as the first main constraint to survive in the village.

The FHHs interviewed replied that:

> *When they widowed, women were usually expelled from their late husbands in their locality as they were considered as outsider. The close relative of the husband inherited land and the women either are sent back to their parents or flee to urban centers.*

This implies that, FHHs were vulnerable before decades and now the condition is improved to have access to agricultural lands.

The interview with elders depicted that

> *The size of agricultural land, including settlements and grazing lands, provided for a couple was more than one hectare and now merely under hectare. The farming population is increasing; new farming members are born and indeed, land could not be expanded. As a result, the same land has to be redistributed among our family members now and then. In other words, it is fragmented from year to year, because the young farmers have to share agricultural land from their family. It was also found that none of the respondents in the interview practice fallowing, the customs that traditional land fertility restoration farming system depends. The agricultural land has to be used intensively without fallowing and applying insufficient fertilizer.*

This revealed that population increase has influenced the land holding size over time and resulted in shortage of agricultural land.

The average land holding size for the three KPAs were about 0.77 hectares. In Table 5,when we see each *kebeles*, in *DunaGemedo KPA*, the land holding size is a maximum of 1.43 and a minimum of 0.25 hectares. In the same KPA indicated above the land holding size less than 0.5 hectares were possessed by 20 respondents and the mean of the land size for them was 0.34 hectares. This covers about 42.6 percent of the respondents in DunaGemedo.

Table 5. Distribution of land holding size in the three KPAs

Name of KPAs	Land size										
	0 to 0.5	Mean	%	0.51to 1 ha	Mean	%	>1 ha	Mean	%	Total mean	%
DunaGemedo	20	0.34	42.6	23	0.7	48.9	4	1.3	8.5	0.78	100
Shiro	15	0.26	41.7	18	0.55	50	3	0.98	8.3	0.6	100
Morsito	22	0.37	42.3	25	0.76	48.1	5	1.63	9.6	0.92	100
Total Mean of KPAs		0.32			0.67			1.3		0.77	100

Source: Researcher's house hold survey, 2012

In the next category respondents with the land size between 0.51 to 1.0 hectares are 23 while the mean is 0.7 and it accounts about 48.7 percent. Thirdly, the rest four respondents were with the land size between 1.03 and 1.43, the mean is 1.3 and it is about 8.5 percent of the total respondents. This implies that, in Duna Gemedo KPA the majority of the respondents hold <1 hectare; i.e. about 91.5 percent of the KPA respondents are with scarce of agricultural land for their survival. The mean of Duna Gemedo respondents landholding size is about 0.78 hectares.

Shiro is other sample *kebele* under this survey and from the total respondents that were selected about 41.7 percent are with the mean of 0.26 hectares. Secondly, about 50 percent of the respondents HHs are with the land holding size between 0.51 and 1 hectare while its mean is about 0.55 hectares. This shows that about 91.7 percent of the respondents of *Shiro Keble* are with less than 1 hectare landholding size. The mean land holding size of *Shiro kebele* respondents are 0.6 hectare while the rest 8.3 percent are with mean land size of 0.98 hectares.

The other sample kebele is Morsito KPA, its case is not much more different from the above two KPAs. As shown in Table 5.which reveals that about 42.3 percent of the respondents in the survey are owned between 0 to 0.5 hectares and the mean of the land holding size is 0.37 hectare. The next category respondents with the land holding size between 0.51 and 1 hectare are 48.1 percent while the mean is about 0.76 hectares. This revealed that, 50 percent of the respondents of Morsito KPA are with land holding size between 0.51 and 1 hectare. The rest 9.6 percent of the respondents are possessed with the mean of 1.63 hectares. The total mean land size of Morsito KPA is 0.92 hectare and it is slightly better than other kebeles under the study.

However, the field evidences showed that neither staying in the village nor cultivating personally is sufficient to obtain enough land currently, which is mainly aggravated by the shortage of farm land. Moreover, over population resulted in land fragmentations, overgrazing, expansion of new settlements and it leads to land degradation and as a result create land scarcity.

Likewise, this study found that population pressure contributed a lot for scarcity of agricultural land; for instance from the total respondents 77 percent were replied that the impact for land scarcity is population pressure.

4.2.2 Farm Fragmentation

Fragmentation occurs when the land holding is divided into a number of small parcels. The major cause for land fragmentation is the need to balance the distribution of poor and fertile land stocks amongst the population. The data collected from 135 HHs indicate that they altogether cultivate 324 plots with each HH having an average of 2.4 plots per HHs and about 16.3 percent of them possess one plot while the

remaining 83.7 percent of the respondents are with 2 or more plots. The distribution of land fragmentation of sample KPAs are showed in Table 6.

Fragmentation is relatively higher in Morsito KPA and middle in DunaGemedo and slightly smaller in Shiro KPA. Accordingly, the majority of the sample households in DunaGemedo, Shiro and Morsito KPAs possess two or more than two plots of land. The intra-KPA variation in land fragmentation is not as strong as inter-KPA variation. The inter-KPA variation is due to variation in population density. The above figure in sampled KPAs implies that, Morsito KPA is more fragmented than the other two sample KPAs. The reason behind is the exertion of more population on scarce land.

Table 6. Farm fragmentation in three Kebeles.

Name of KPAs	No of farm plots owned by a household					Number of HHs
	1	2	3	4	>4	
DunaGemedo	7	18	17	5	-	47
Shiro	7	13	13	3	-	36
Morsito	8	20	18	6	-	52
Total	22	51	48	14	-	135
%	16.3	37.8	35.6	10.3	-	100

Source: Researcher's household survey, 2012

Fragmentation is higher in those land holdings that are relatively considered as large one and more than one hectares. Farmers were asked to tell the average travel time required to cover the distance between their dwellings and their furthest plots. This indicates that travel time is a problem in the sampled KPAs, which strongly influence

the farmers to manage his/her plots and it consumes much work time in travel from one plot to another plot. Among participants in the research about 94.1 percent replied that the time consumed to travel from one plot to another is excess and can hinder production activities in the area. The rest 5.9 percent of the respondents agreed that they have single plot and they didn't affected by fragmentation of land.

However, the process of further farm fragmentation has become in practice, the current level of farm together with existing farm has declined the productivity of agricultural activities. This may hinder sustainable intensification of small holder agriculture in many ways. The incentive to apply sustainable land management practices like rotation, agro-forestry, and inter-cropping and soil erosion control is generally affected negatively by farm fragmentation and decreasing of farm land. Small farm holders face higher overhead costs of application of technology and sustainable land management practice. Moreover, small holders are less risk tolerant and the opportunity cost of participation in sustainable land management practices is not high, when compared to HHs with relatively higher farms.

According to the sampled respondents, the land size is decreased over time. From all respondents about 77 percent answered as, population pressure is the main contributor for the scarcity and further fragmentation of farm lands. During the time of interview from elders, the researcher tried to gain information before land distribution of 1975 and after land distribution. The response is as follows:

> *Prior to 1975 land reform, land in the study area was owned by the land lords and the farmers were tenants, but they had no right to own land for their livelihood. After 1975, the land owned by the land lords was distributed among farmers in the study area. The nationalization of*

land in the area thus necessitated redistribution of land among farmers, which involved a readjustment in the size and allocation for individual households. In most cases the KPAs agricultural land in the survey was redistributed every two years. The frequent redistribution of land since 1975 has among other things, resulted in land fragmentation.

This implies that, after 1975 the redistribution of land has not continued up to the present day, the newly young farmers have only access to inherit or divide from their parents. This points that sever fragmentation was occurred and led to scarcity of agricultural land for their livelihood.

4.3 Crop Production

Agriculture is the main stay of the population in the study area. Farmers grow crops with the objective to meet the food needs of the household. Like most other parts of the highland Ethiopia, the list of crops produced in the study area includes, different types of cereals, root crops, vegetables and the main staple food Enset. Overall, the information obtained from the woreda agriculture and rural development office, cereals and Enset are the major types of crops produced in Misha Woreda and the sample KPA; account for about 85 percent of the land under crops. Based on the data from the respondents cereals are the leading crops in terms of production and about 43 percent of the total production in the area. Enset is the second major crop and staple food for the population, accounts about 38.3 percent of the total production in the area. Potato and other root crops contributed about 13.4 percent and cabbage and other vegetables contributed 5.3 percent in the study area.

Nearly all of the crop production in the study area is rain fed. In fact, the proportion of respondents that reported that they were not practiced

irrigation because of hilly feature of the land. Like in nearly all parts of highland Ethiopia, the main season for growing crops in the study area is the period known as 'Meher' which extends from late spring to early autumn. Virtually all of the months in this planting season are rainy in normal years with the maximum precipitation occurring in summer.

The farmers also grow some crops in the 'Belg' season. The main productions which are cultivated in the 'Belg' season are potato and vegetables.

Table 7. The share of crop production in 2011

No	Type of crop	Share in percent	Rank
1	Enset	*38.3*	Second
2	Cabbage	5.3	Fourth
3	Potato	13.4	Third
4	Cereals	43	First

Source: - researcher's household survey result

According to the data generated by the household survey, the average production of wheat in the study KPAs, for 2010/11 was about 4.7 quintals per household, while the average production before 10 years for the same crop was also 10.7 quintals per household. Wheat is the crop which is used as a food and mainly as cash earning to purchase essential commodities and agricultural imputes like, fertilizer, pesticides, etc., but its production has decreased from time to time. Even this above figure itself shows the magnitude of its decline from 10 years.

The second major perennial crop used as staple food for Hadiya zone in general and the study area in particular is Enset. It is extensively cultivated in sampled KPAs. As noted in the table above, the average number of total Enset during 2010/11 period was about 324 while the average number of Enset before 10 years was about 619. The harvested

Enset during 2010/11 was about 6 quintals and it was about 10 quintals before 10 years. This implies that Enset production has decreased in current time than 10 years before; the reason behind this decrease is lack of animal manure which created due to decline in livestock and shortage of grazing land. This is because the land in the area is occupied by dense population and no fallow land is available for grazing.

Based on respondents data, from cereal groups barely is the third major crop produced in the study area. The average production for barley in 2010/11 was about 1.7 quintals and 10.7 quintals before 10 years. The other cereals are also bean and peas. Their average production account for about 1 quintal for 2010/11 and 2.7 quintals before 10 years and about 1.5 quintals for 2010/11 and 3.0 quintals before 10 years respectively.

Table 8.Distribution of Crop production in 2010/11 and before 10 years

No	Crop Type	Total Product	Mean of total production in quintal 2010/11	Mean of total production in quintal before 10 years
1	No of Enset	In number	324	619
2	Harvested Enset	Quintal	6	10
3	Maize	>>	-	-
4	Wheat	>>	4.7	10.7
5	Bareley	>>	1.7	3.6
6	Lentils	>>	-	-
7	Bean	>>	1.0	2.7
8	Peas	>>	1.5	3.0
9	Potatoes	>>	1.0	1.5
10	Cabbage	Bundle	6	10

Source: the researcher's house hold survey result, 2012.

Among the production of vegetables and roots, potato and cabbage are the main vegetables cultivated in the study area. Potato is mainly produced during the 'Belg' season and cabbage is in both 'Belg' and

'Meher' seasons. In the study area, the average production was about 1 quintal in 2010/11 and 1.5 quintal before 10 years for Potato and about 6 bundles in 2010/11 and 10 bundles before 10 years for cabbage production.

Contrary to the overall situation, observation showed that, crop output decreased over time despite this, however, about 98% of the respondents reported that crop output decreased in last 10 years and 2% only reported as crop output increased from 10 years before. This indicates that crop production is decreasing gradually because of inaccessibility of agricultural land and infertility due to land degradation.

Majority of the respondents agreed that the food production for their households is not enough, the problem is the fast increase in family size hinders food availability of households. Almost all of the respondents in the study replied that to overcome their food shortage they have used their cattle and other resources for sale and sometimes they exposed to famine in the dry season.

4.4 Extension Service

Like many other places of the country the study area has made efforts to enhance crop production of small farmers within the framework of the national extension program. The intension of this research is not to look into the success or failure of the extension, but an assessment on the household grain production is made with a view to find how farmers are advancing forward to attain food security and thereby improve their living conditions.

As a result the field research indicated that about 68 percent of the respondents get advice and support from extension program while about 32 percent respondents suggest that they did not get any advice and support from extension program.

Whether the extension program was practiced in the study area, starting from several years, improvement in production is not significant to fulfill the food supply of the households. According to the house hold survey in the area about 86.7 percent of the respondents agreed that, the time given by the extension workers for the farmers in our KPAs is not enough to support and to give advice about modern production system, modern input use and as a result to secure their own food supply. The rest 13.3 percent of the respondents have got enough support from extension workers.

4.5 Livestock Production and Grazing Patterns in the Study Area

Ethiopia has one of the largest livestock population in Africa. The bulk of the livestock population of the country is found in the highlands. The study area is one of the Ethiopian highlands, where mixed farming is practiced. The small landholder using and managing almost 100% of the land is conducting intensive agriculture system. Farmers in the study area are using oxen in less access; they used human labour and traditional farm tools like hoe. On the other hand, livestock products such as milk, meat, manure and skin are used for cash and consumption.

In the study area, the role of livestock production is as equally important as cultivation of crops. According to the information generated through household survey, the ever increasing shortage of cultivable land is forcing the local people to pay attention to the production of livestock mainly sheep, oxen and cows for their livelihood. Indeed, cattle production is the interesting one but the inaccessibility of grazing land is discouraging for the peasant society in the study area.

Table 9. Livestock ownership within three KPAs sample households in 2010/11 and before 10 years.

No.	Live Stock Type	Average Number owned by three KPAs	
		2010/11	**Before 10 years**
1	Oxen	0.7	1.7
2	Bulls	0.3	1.4
3	Calves	1.4	2.4
5	Sheep	1.9	4.1
6	Goats	-	-
7	Donkeys	0.5	1.0
8	Horses	0.8	1.6
9	Mules	0.3	0.5
10	Chicken	3.0	8.7
11	Beehives	0.4	1.0

Source: Household survey of the researcher, 2012

means nearly two oxen, which shows that the farmers were secured in oxen possession and they were produced more production than present day.

Regarding the raring of cows about 80.7% of the respondents were owned one or more cows. In addition, about 31.1% of respondents were owned one cow, and 49.6% of the respondents were owned two and more cows. On the other hand, 19.3% of the respondents did not have cows. In the study area the current number of cows per household ranges between one and four. The average number of cows per household in the area was found to be 1.4 and the ratio of the cows in the study KPAs is nearly the same.

The cows raised before 10 years were not the same as present day, based on the respondents under the study about 5.2 percent of them were owned only one cow while about 92.6 percent of the respondents had two and more cows. The others, only 2.2 percent had no cows.

This implies that the number of cows decreased from 10 years before than this time, because of many reasons. Some respondents argued that the population pressure in the area exerted on the grazing land and as a result shortage of the grazing land leads to low number of cows.

The survey result revealed that in 2010/11 about 25.2 percent of the respondents were owned one sheep only, and 49.6 percent of the respondents were possessed two and more sheep. The other 25.2 percent of the respondents had no sheep. The average number of sheep per household in the study area was found to be 1.9 means nearly two sheep per household.

According to survey result, sheep production before 10 years were not as today, in that, about 92.6 percent of the respondents replied that, they had two and more sheep before 10 years. Respondents with one sheep

were about 3.7 percent of the total sample households. The rest 3.7 percent was with no sheep before 10 years. The average number of sheep was four sheep per household.

On the other hand, the survey results on equines production in 2010/11 showed that, about 43.7 percent of the respondents have one horse, donkey or mule and 6.7 percent of the respondents have two and more equines. The rest about 48.9 percent of the respondents have no equines. The average number of equines per household in the survey area was about 0.5 and the lower number of the equines is due to shortage in grazing land in the study area. But before 10 years this condition was not the same, in that, according to the result of household survey, about 33.3 percent of the respondents argued that they had one horse, donkey or mule and about 34.8 percent of the respondents had two and more equines. The rest 31.9 percent of the sample household had no equines. This implies that the number and average production of equines changed through time due to grazing land scarcity.

As showed on the Table 4.5.2 the survey result clearly display that in 2010/11 about 17.8 percent of the respondents are with one chicken and about 65.9 percent of the respondents have two and more chicken while the respondents without chicken are 16.3 percent of the sample households. The average chicken rising for this year was about 3.0.The result of the study indicates that, chickens have mainly risen to get egg, meat for consumption and to get income from the sale of this production in the study area.

Before 10 years the situation was more than the above production. In the survey result about 97.0 percent of the respondents were owned two and more chicken and about 3 percent of the respondents were with no chicken. This implies that, most of the respondents before 10 years owned more than two chickens. The average production of chicken before

Based on the data showed in the table 10. as far as bee keeping is concerned, in 2010/11 about 11.1 percent of the respondents were owned only one beehive, about 8.1 percent of the respondents were possessed two or more beehives and the rest 80.7 percent were with no beehives. Likewise, 10 years before, the production of beehives were showed as about 2.9 percent of the respondents were with one beehive while 37.8 percent were with two or more beehives and about 59.3 percent of the respondents had no beehives. This implies that the production of beehives in the study area is not significant to support agricultural activities.

Table 11. Distribution of Livestock grazing areas

Grazing Area	Grazing area occupied by respondents 2010/11				Grazing area occupied by respondents before 10 years			
	Bega	%	Kerent	%	Bega	%	Kerent	%
Private grazing	5	3.7	22	66.3	35	25.9	22	16.3
Private fallow land	42	31.1	113	83.7	84		29	21.5
Feeding on crop residue	88	65.2	-	-	29	21.5	-	-
Common grazing area					71	52.6	84	62.2

Source: Household survey result of the researcher, 2012

One of the major reasons given by the respondents about the problems attached to livestock production was shortage of pasture. Of the sample households in this study, 3.7 percent of respondents were used private grazing land in the 'Bega' season whereas about 16.3 percent respondents were used private grazing land in the 'Keremt' season. The

respondents used private fallow lands during 'Bega' season are 31.1 percent and of the sample population 83.7 percent were used private fallow land in the 'Keremt' season. The rest 65.2 percent of the respondents were used crop residue for their livestock in both seasons.

On the other hand situation before 10 years were changed from present condition of the study area. The Table 4.5.3 shows that before 10 years most of the livestock production system was held by using the communal grazing lands. But by know communal grazing land is unexpected and inaccessible. According to survey data about25.9 percent of the respondents were used the private grazing land in the 'Bega' season and about 21.5 percent were used private fallow lands in the 'Keremt' season. The rest of them about 52.6 percent were used common grazing land in the 'Bega' season and about 62.2 percent used common grazing land for 'Keremt' season.

This above impression revealed that the grazing access for livestock production is much better before 10 years than this day; this picture comes because of population pressure which created the fragmentation of the existed land and inaccessibility of grazing land for livestock production in the area. The kind of livestock in the area is intensive, mixed with crop production in that the number of livestock is decreasing from time to time.

However, almost all of the respondents in all sample KPAs were not interested to reduce the number of their stock. When asked about the ownership of grazing land, it was found that almost all of the respondents are dependent up on their private fallow land and crop residue.

Farmers were also asked to indicate if they have received extension service on pasture management. As noted in the previous discussion in

crop production here is also the respondents confirmed the support and advice from extension service on pasture management.

The other common view in this study is the view that crop production and livestock rearing are supplementary; and livestock provide crucial support to cropping in terms of traction, manure provision and transportation. In other words, crop production has also support the livestock production with a provision of crop residue for their food. On the other hand, both are complimentary in that, livestock as a good support for crop production also has damage on agricultural land. The crop production itself decreases the pasture land for the livestock. This shows their complimentary aspect in their ecosystem.

However, it is a common observation in the study area that cultivation and grazing are in fierce competition and no land is available for grazing except in those areas that are not suitable for cultivation either because of the slope problem or exhaustion of farm lands due to continuous cultivation for long period of time, thus, as population increases, so does livestock density resulting in an intense demand for grazing land. This situation, therefore, appears to be the major cause of land degradation in the study area through its effects on vegetation cover.

In the study area, where human and livestock population at higher, shortage of grazing land becomes a cute during the rainy season when all lands are covered by crops, though the problem is reported to exist in both seasons.

Livestock also equally affect crop lands. In the study area, almost all of the households graze their livestock on cropland during the long dry season, which lasts for about 6 to 7 months. Immediately after harvest, no matter where the area is located, croplands are left for uncontrolled grazing. Livestock roam everywhere feeding on crop residue and create enormous stress on the agricultural lands. Thus, the effects of grazing

pattern on the land are not only problems in a time when there is shortage of grazing land in rainy season but also at the end of harvest time where the farm land is left for uncontrolled grazing.

In the study area, ownership of both farm and grazing land is transient and the management of the land varies with season. Private plots that are used for cropping during the rainy season are thrown open access for public grazing after harvest. Each member of KPAs would have unrestricted access to other members' plots during the dry season. After harvest, the owner seldom bothers about his/her holding. In this perspective, therefore, improper resource management appears to be the problem.

4.6 Farm Input use and Extension Service

4.6.1 Contribution of Oxen as Farm Input

Farmers keep ox to plough land. The ownership of ox reduces labour drudgery and helps them undertake different agricultural practices. On the contrary, lack of pair oxen limits the size of land to be cultivated. This makes ox as one of the most important asset of households that base their livelihoods.

Based on the survey data on Table 4.5.2, about 49.6 percent of the sampled households have no ox. Likewise, 42.2percent of the sample households own only one ox. In sum, the numbers of households who have no ox and who own one contribute that 91 percent. This indicates that large proportion of households lack ox to cultivate their land properly and sufficiently. It is only 8.2 percent of households who own a pair of oxen or more. This implies that majority of farmers in the study area are vulnerable for pair of oxen and it shows that agricultural activity is ineffective due to lack of oxen.

Households who do not use oxen are asked to explain the reason, however, most of the respondents nearly half of the total sample households replied that, they have no money to buy ox and to use ox for their farm. In other ways, the respondents with only one ox were used hiring oxen and some farmers with no oxen have used rent oxen and hoe for the cultivation of their agricultural land.

4.5.2 Application of Modern Inputs

The survey finding indicates that all of the respondents under study applied chemical fertilizer on their farm land continuously.

According to respondents in this survey, they have been used chemical fertilizers many decades ago and currently in 2010/11 the average utility of chemical fertilizer was 0.9 quintal or nearly one quintal per households. Before 10 years the fertilizer application was more than this time, in that as the sample respondents idea, before 10 years the price of the fertilizer was very cheap and easily accessible, then we were applied much chemical fertilizer for the agricultural activities without frustration. But now, the price of chemical fertilizer is much more exaggerated, with this we could not have access to buy chemical fertilizer based on our needs for our farms. The amount we applied now is not enough for the productivity of agricultural activities.

Table 12. Average use of chemical fertilizer in 2010/11

Average use of chemical fertilizer	Amount in quintal	Average use of selected seed
2010/2011	0.9	0.4
Before 10 years	2.2	-

Source: Researcher's HH Survey Result, 2012

Regarding the implication of improved seeds, the result of the survey has also showed that about 46.7 percent of the respondents have no access to use improved seeds. The rest, 53.3 percent of the sample households have access to selected seeds. This implies that in relation to poverty and shortage of income, almost half of the sample households have no access to use improved seeds to maximize their productivity.

CHAPTER FIVE

Conclusions and Recommendations

The study was conducted in one of the highlands of Ethiopia. Misha Woreda in Hadiya Zone is also one of the highland woredas. This study has attempted to examine the currently burning issue of population pressure on agriculture (food). The study had been conducted by selecting three KPAs covering 135 households. For achieving this objective, both qualitative and quantitative research methodologies were employed.

5.1 Conclusion

Generally, the findings of this study confirm the fact that the current human population is out weighing on the agriculture (food). The problem is escalated by the ever-worsening of scarce of farm lands and land fragmentation contributed for the production of crops and livestock to support the agrarian population of the study area.

Ethiopia is one of the agrarian countries in the world. However, the agricultural system is still rain fed and subsistence mainly used the family labor for low level of production. The population of the country is increasing from time to time in high level.

The size of household members in each family varies from three to fourteen in newly established families to long established families. The sex ratio of the study area, according to 2007 census, was almost one to one. Taking the age group, most of the sample populations in the study area are between 20 and 65 years. The populations are nearly homogenous in ethnic and religious compositions with the entire population of Hadiya and the followers of Protestant Christianity.

The study has also examined farm size fragmentation; currently the maximum land size a household possess is 1.98 hectare. The average land holding size for the three KPAs is about 0.77 hectare.

Land fragmentation also stands as an important feature in the study area. The major cause for land fragmentation is because of human population pressure the need to balance the distribution of poor and fertile land stocks amongst the population. The survey has indicated that an average plot of land for the study area is 2.4 plot per households.

The result on agricultural system indicated that like in many parts of rural Ethiopia, agricultural practices in the study area is also subsistence and traditional. Most of the farmers in the study area are depend on the main rainy season for their annual crop production. The average productivity is decreased. This clearly indicated that, the average annual crop production in the survey area was found to be insufficient for the prevailing large family.

About 85% of the farmers in the study area are practicing crop production in erosion prone areas and still there is an expansion of crop production to more marginal areas due to population increase from time to time. This expansion of crop production resulted in shortage of grazing land for livestock production.

Cereals are the leading crops and devoted about 43 percent of the total production in the study area. The population in the study area, have used cereals to get income and as food. Secondly, the main staple food and perennial crop which contribute large share of consumption for the study area is Enset.

Enset is the second major production next to cereals about 38.3 percent of the total production in the area. It is drought resistant perennial crop which support the population of the area through year to year without

fear and shortage of food. But, this annual crop needs animal manure as a fertilizer to grow. Its access is not easily available due to small number of livestock in the area in case of shortage of grazing lands.

According to information generated through household survey, the role of livestock is equally important as cultivation of crops. Even though, the interest of respondents have to raise more livestock, but the scarcity of grazing land hinder the farmers in the KPAs.

The integration of livestock into crop production has also discussed and it has sound effects on the income of households. The problem attached to livestock production is shortage of pasture and most of the respondents in the study area are suffer with the shortage of grazing land. Crop residues, private grazing land and private fallows are common grazing areas for the households in the study area.

The role of extension services also attempted to assess in this study. The information flow and transfer of incentives in the extension service are basically unidirectional in which a certain package flows from government agency (agriculture office) to the local level without any attempt to consult the peasantry. The survey data have revealed that the actual relationship between extension agents and the local population in the study area is not in conducive manner.

While to look at input use, family labour and oxen are the most important inputs used in the study area. The major farming activity, namely tilling the land, has been employed with human labor and oxen. The number of oxen per household in the study area is in scarce. For instance, based on the household survey, 49.6 percent of the households have no ox to till their farm lands. The main reason is the shortage of grazing land due to farm fragmentation and lack of common grazing area.

According to modern input application, farmers in the study area have continuously used chemical fertilizer and pesticides. In other case, the use of improved seed was ineffective. Respondents in the survey replied that about 46.7 percent has no access to use improved seeds mainly because of shortage of money to buy and its expensive cost.

These above all issues were discussed about the impact of population pressure on agriculture. In that the existed agricultural land and subsistence agricultural systems are in doubt to support the existed and coming population of the country at large and the study area in particular.

5.2 Recommendations

In the light of the findings and the arguments that population growth with agriculture is needed to be recommended for Misha Woreda and study site in particular. The present condition of the study area is mainly characterized by high population increase, low per capita of agricultural land, and decreased in agricultural productivity.

To overcome the problems raised above the possible recommendations can be made as follows.

- Population pressure is one of the major cause for shortage of agricultural productivity, expansion of non-farm activities such as cottage industries, organizing in small enterprises, should be given due attention by all concerned bodies in order to minimize pressure on land. Moreover, application of existed population program needs to be strengthened to control further population pressure.
- For land scarce households in low agricultural potential areas (highland), off-farm activities are more important as it minimizes risks and low adverse effect on the local natural resource base, such

as, access to credit, provision of infrastructure, provision of relevant vocational training. Thus, policy makers and NGOS should give due attention to promote and support non-agricultural activities.

- Moreover, land saving agricultural activities such as livestock fattening, chicken raising, beekeeping, and vegetable production are essentially needed to overcome the problem of small land size and fragmentation.
- The importance of crop residue in improving and maintaining fertility of soil is well recognized by the farmers. In contrary because of shortage of grazing land people used crop residue for their livestock.
- As a staple food for the Hadiya people at large and for the study area in particular Enset crop needs much care to support the high population of the area. The government, NGOs and other community organizations should give great concern for the production of Enset in the study area.
- Finally, limiting birth rates through legal regulations educating people about family planning, increasing access to birth control and contraception and extraterrestrial settlement have been suggested as ways to mitigate over population in the future in the study area.

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Appendixes

Semi structured House Hold Survey Questionnaire

Objective:-

This survey is designed for the purpose of gathering information regarding agricultural activities, population pressure and agricultural land in MishaWoreda, HadiyZone . The result of this survey will be used to make inferences about agricultural practice in accordance with population pressure in the study woreda. You are, therefore, kindly requested to cooperate in providing accurate and reliable information as much as you can. The paper that will be written based on this survey is intended to serve an academic purpose and as partial fulfillment of the requirement for a master's degree in Regional and Local Development Studies.

A. House hold location

1. KPA'S Name _____
2. Type of AEZ_____

   2.1 Wurch _____ 2.2 Upper Dega _____2.3 lower Dega _____

   2.4 Dega_____ 2.5 Woinadega_____
3. Distance from all-weatherroad _____km

B. Back Ground of the House Hold

4. Sex of the respondent 4.1-male _____ 4.2. Female _____
5. Age of the respondent _____
6. Marital status 6.1 Married 6.2 Single 6. 3 divorce
   6.4 widowed
7. Religion type

   7.1 Orthodox _____ 7.3 Catholic _____

   7.2 Moslem _____ 7.4 Protestant _____
8. Ethnic origin of the household

   8.1 Hadiya _____ 8.2 non Hadiya _____
9. Do you have children? How many?_____
10. The number of family live in your house?_____

11. Do you read and write?

Husband 1.yes_____ 2. No_____

Wife 1.yes_____ 2. No _____

12 How many of your children are going to school?_____

12.1 How long is the school to travel?_____

13. What do you use as means of transport to travel?

13.1 Animal_____ 13.2 foot___ 13.3 Car___

14. How long it takes to reach the main road?_____

15. Do you feel that population in your KPA is increasing?

15.1 Yes ___ 15.2 No____ 15.3 I don't know_

16. If "yes" how'd you evaluate the level of increase?

16.1 Very high 16.2 High__ 16.3 Medium __ 16.4 low_

C. Structure of agricultural land

17. How much is your land holdings size? _____

18. How is the location of your farm land?

18.1 in one place _ 18.2 In different place_____

19. How many of plots do you have?_____

20. How long is your nearest parcel and distant?

20.1 Distance parcel_____ minutes

20.2 Nearest parcel _____minutes

21. If your farm lands are located in different places what can be the reason?

21.1 Population pressure _____

21.2 Land scarcity _____

22. What the reason for your land fragmentation?

22.1 Population pressure _____

22.2 Redistribution _____

22.3 Poverty _____

23. Is there any problem you have face because of land fragmentation?

23.1 Yes _____ 23.2 No _____

24. What main problem are you facing from fragmentation?

24.1 Farms becomes small_____

24.2 It consumes much time for journey_____

25. Is your farm plot enough to produce food for your house hold?

25.1 Yes _____ 25.2 No_____

26. What do you think is the problem?

26.1 population pressure _____ 26.2 shortage of agricultural land _____

27. How do you overcome food shortage you have?

27.1 By buying food from markets _____

27.2 By selling cattle or other resources_____

28. What is the main source of food for your family?

28.1 Producing annual crops only_____

28.2 Producing perennial crops only_____

28.3 Rearing livestock and producing both annual and perennial crops_____

28.4 Rearing livestock only_____

D. Crop and livestock production

29. Crop production in 2010/2011 and before 10 years

Code	Production item		Production 2010/2011	Production before years
29.1	Cultivated number of enset	Number		
29.2	Harvested enset	Quintal		
29.3	Maize	Quintal		
29.4	Wheat	Quintal		
29.5	Barley	Quintal		
29.6	Lentils	Quintal		
29.7	Beans	Quintal		
29.8	Peas	Quintal		
29.9	Potatoes	Quintal		
29.10	Cabbage	Buddle		

30. Is your agricultural performance when it compared to 10 years before?

30.1 Increased _____

30.2 Deceased_____

30.3 No change _____

31. Productivity of annual crops, when it compared to the early periods of the Ethiopian revolution _____

31.1 Increased _____ 31.2 Decreased _____

32. Why is annual crop production decreasing? _____

32.1 Continuous cultivation _____

32.2 Misuse of Fertilizer _____

32.3 Lack of oxen for their farming activities _____

33. Which crop is used as a source of cash crop in your area?

33.1 Barely_____ 33.2 Wheat_____33.3 Potatoes _____
33.4 Beans_____33.5 Lentils _____
33.6 Peas _____33.7 Maize _____

34. Information on livestock production and the number of beehives

Code	**Livestock**	**2010/2011**	**Before 10 years**
		Number owned	**Number owned**
34.1	Oxen		
34.2	Bulls		
34.3	Calves		
34.4	Cows		
34.5	Sheep		
34.6	Coats		
34.7	Donkeys		
34.8	Horses		
34.9	Mules		
34.10	Chicken		
34.11	Beehives		

35. Where do your live stockgraze ?

Grazing Area	2010/2011	Before 10 years		
	Baga	Keremt	Bega	Keremt
private grazing area				
Private fallow land				
Feeding on crop residues				
Common grazing area				

36. Where do your cattle drink water?

Begakeremet

36.1 River _____ _____

36.2 Ponds _____ _____

36.4 Spring _____ _____

37. What is the reason for your cattle raising?

_____37.1 To support farm 32.2 For manure_____

_____37.3 For food

_____37.4 As a prestige

38. What is the reason for your cattle decrease this time?

_____38.1 Shortage of your grazing area due to population pressure.

_____38.2 Shortage of cattle feed as a result of land holding size decrease.

39. why is your grazing area decreased?

_____39.1 Expansion of land under cultivation

_____39.2 Due to increasing population.

E Farm input use and extension service

40. What do you use to plough your farm?

_____40.1 oxen _____40.2 Human labor_____ 40.3 hoe

41. How many oxen do you have for your farm?

41.1 One only _____ 41.2 Two _____ 41.3 No oxen_____

42. When was you start cultivation by oxen?_____

43. If you have only one ox or have no any, what do you use for your farm?

_____43.1 Hoe _____43. 2 One ox

_____ 43.3 Rent oxen _____43.4 Hiring oxen

44. Why do you not use oxen?

_____44.1 I produce only perennial crops

_____44. 2 I have no ox and no money to buy oxen

45. The share of each crop in a year?

_____45.1 Enset _____45.2 Cabbage and other vegetables

_____45.3 Cereals _____ 45.4 Potatoes and other fruits crops

46. How much is the share of each crop in a year?

_____46.1 Enset _____% 46.2 cabbage and other vegetables _____%

_____46.3 Potatoes and other root crops_____ % 46.4 Cereals _____%

47. Do you use chemical fertilizer?

_____47.1 Yes, but not all the time _____47.3 Yes, continuously

_____47.2 No, I don't use

48. How much you applied?

Quintal

48.1 2010/11_____

48.2 Before 10 years _____

49. Why you continuously cultivate your farm?_____

_____49.1 Due to land scarcity

_____49.2 Encouraged by high crop irises

_____49.3 Due to population pressure

50. Have you ever used selected seeds _____50.1 Yes _____ 50.2 No

51. How much was you used?_____

52. If you didn't used selected seeds, why?

_____52. 1 because of expensive cost _____52.2 Due to in accessibility

_____ 52.3 lack of awareness about it

53. Do you used pesticides? _____since when?_____

54. Do you have access to credit for purchasing farming inputs?

_____54.1 Yes _____54.2 No

55. Do you get advice, assistance and support in connection with agricultural extension agents?

_____55.1 Yes _____55.2 No

56. If you say "yes", starting from which year?_____

57. Is the time given by extension workers enough to support your agricultural activities?

57.1 Yes _____ 57.2 No_____

58. If your answer is "no" what is the reason?

58.1 Due to density of population _____

58.2 Due to shortage of time _____

58.3 Due to work burden_____

Check List for Interviewees

1. What do you feel that how is your kebele population? Is it increase or decrease?
2. Is your land holding size decrease or increase?
3. How was the land tenure system before 1975 and after revolution?
4. Is does females privileged in land tenure system ten years before?
5. Why do you raise livestock?
6. Is there enough farm land for your agricultural purposes?
7. Why is the crop production decreased over time?
8. Is your live stock ownership increase or decrease before decades?
9. What are the reasons for land fragmentation?
10. What the problems faced by farm fragmentation?
11. Is the support given by extension workers enough for your productivity?