International Journal of Multidisciplinary and Current Research ISSN: 2321-3124
Research Article Available at: http://ijmcr.com

Impact of population growth on food security in Rwanda, case study of Huye District

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Received 25 May April 2017, Accepted 30 July 2017, Available online 01 Aug 2017, **Vol.5 (July/Aug 2017 issue)**

Abstract

This Research is about the impact of population growth on food security in rural areas of Rwanda with a case study of Huye District. The study came at time the food insecurity problem in sub-Saharan Africa is associated with a range of issues such as population growth, resource distribution, security, consumption patterns, agricultural production, environmental degradation, socioeconomic status, land ownership rights, HIV/AIDS, and access to credit and health services. The objective of this study was to analyze the impact of population growth on food security in rural areas of Rwanda with specific objectives of assess the extent to which the family size impacts the food security in rural areas, examine the current state of food security within Rwandan population and to find out the government contribution on food security problem.

Keywords: *Population, Growth, Food Security, Rwanda, Huye District*

1. Introduction

As the world population continues to grow geometrically, great pressure is being placed on arable land, water, energy, and biological resources to provide an adequate supply of food while maintaining the integrity of our ecosystem. According to the World Bank and the United Nations, from 1 to 2 billion humans are now malnourished, indicating a combination of insufficient food, low incomes, and inadequate distribution of food. This is the largest number of hungry humans ever recorded in history. In this world many people are malnourished and hungry. Based on current rates of increase, the world population is projected to double from roughly 6 billion to more than 12 billion in less than 50 years (Pimentel *et al*., 1994). Pimentel *et al*. argued that as the world population expands, the food problem will become increasingly severe, conceivably with the numbers of malnourished reaching 3 billion. In 1950 the world population was 2.5 billion. In 1990 it had increased to 5.3 billion, a doubling of numbers in just 40 years. Population projections for the year 2000 is 6 billion, for 2025, 7.8 billion, and for 2050, 8.9 billion. Based on their evaluations of available natural resources, scientists of the Royal Society and the U.S. National Academy of Sciences have issued a joint statement reinforcing the concern about the growing imbalance between the world's population and the resources that support human lives (RS and NAS, 1992).

Reports from the Food and Agricultural Organization of the United Nations, numerous other international organizations, and scientific research also confirm the existence of this serious food problem. For example, the per capita availability of world grains, which make up 80 per cent of the world's food, has been declining for the past 15 years (Kendall and Pimentel, 1994). Certainly with a quarter million people being added to the world population each day, the need for grains and all other food will reach unprecedented levels.

More than 99 per cent of the world's food supply comes from the land, while less than 1 per cent is from oceans and other aquatic habitats (Pimentel *et al*., 1994). The continued production of an adequate food supply is directly dependent on ample fertile land, fresh water, energy, plus the maintenance of biodiversity. As the human population grows, the requirements for these resources also grow. Even if these resources are never depleted, on a per capita basis they will decline significantly because they must be divided among more people.

We have a problem. The very survival of the planet we live on is at stake. Several factors, inter-linked, seem to be

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DOI: https://doi.org/10.14741/ijmcr/v.5.4.14

leading to this profound crisis. There is the problem of population growth, of exploding numbers, especially in the poor developing countries; of increasing degradation of natural resources, of soil erosion, depleting water resources, contamination of acquifers, deforestation, desertification, and in general, a collapse of the ecological base. Linked to the problems of population growth and degradation of natural resources are questions of food security, economic growth, equity between nations and within nations, of disintegrating social systems and institutions, leading to crime, violence and terrorism; of new definitions of sovereignty and of interdependence of nations. All these are not isolated problems. Each, to some extent, is both a cause and a consequence of the others. Rwanda has long been a densely populated country, confronted much earlier with severe land-scarcity than the rest of the African continent. Since the early sixties, the expansion of arable land could not keep pace with Rwanda's impressive population growth. As a result of this gap, per capita arable land availability declined over time. In this research we are going to analyze the impact of population growth on food security in rural areas of Rwanda. The tools used for data collection include documentary source questionnaire and interview. From the findings it was observed that the high population growth is more a challenge rather than an opportunity. However it was found that the households with high family size are more food insecure. It was also found that rapid population growth is not only the problem in terms of food security but also the consumption habits; when some suffer from hunger in other hand there those suffer from man- made diseases and other suffer from malnutrition due to misuse of available food.

It was recommended that population growth can be controlled through continuing encouraging families for using family planning methods. Infrastructures also remain poor should be emphasized in order to facilitate market access, this because better access to markets can increase farming incomes and encourage shifts to higher of value crops or livestock. Strengthening agricultural production in rural areas especially that of smallholder farmers, would certainly enhance food availability and support food and nutrition security in different areas both urban and rural.

1.1 Research questions

- Is the family size effect the food security in rural areas of Rwanda?
- What is the degree of food security situation in Rwanda?
- Are there any government strategies and measures to sustain the food supply in rural areas?

2. Material and methodology

Methods and tools of data collection

The researcher got this kind of data from the respondents' views to the questions which were asked through questionnaires, and interview.

Data collection instrument

Data collection for this study was conducted through documentary, observation, questionnaire and interview.

A profile of the sampled households in Huye District

Unable to cover the whole country due to some factors such as limited time and lack of enough funds, the researcher took Huye District which is among the thirty Districts that make up Rwanda. This District is found in southern province bordered by Nyanza district in the North, Gisagara in the east and south, Nyaruguru in the South West and Nyamagabe in the North West.

The district has a population of 290,677 inhabitants living in 62236 households with an average of 500 inhabitants per square kilometers. In this regard is one of the most populated in the country and is a good sample of Research findings in Rwanda.

3. Results

3.1 Households composition

In order to depict the household characteristics as it relates to the population growth and food security at household level, it is important to understand their nature of set up. In this part, social demographic features of the sampled respondents were put into consideration including the sex, age, size, educational level and main occupation of the heads of households. The social demographic features proved to be very vital to the researcher in many ways. For instance by analyzing the education level of respondents, the researcher related respondents' level of education and the nutritional status through the number of meals per day and experiencing food insecurity. Other socio demographic characteristics of respondents provide a basis for their background features and act as a plat form for reliability of respondents' Knowledge on population growth and food security situation.

Table 1: Distribution of respondent according to sex

Sex		Number of respondents	Percentage
	male	39	57.4
	female	29	42.6
	Total	68	100.0

Source: Primary data

Table 1 revealed that 57.4% of all respondents were male and 42.6% were female.

According to the above table, the majority of heads of households are male, and the minority 42.6 which are female-head of household is the big number due to the historical background of Rwanda. According to the information given to the researcher, some are widowers because of 1994 genocide and other are orphans children heading households.

Table 2: Distribution of respondent according to age group

		Number of respondents	Percentage
Age	20-30	15	22.1
	31-40	20	29.4
	41-50	17	25.0
	51-60	12	17.6
	over 61	4	5.9
	Total	68	100.0

Source: Primary data

The age of respondents was taken into account because age affects directly the dependents ratio and this affect directly the level of food security.

Table 2 above depicts that the majority of respondents belong to the age between 31-40 years equaling to 29.4%, followed by those between 41-50 years who make up 25.0%, 22%1in the age of 20-30 years, then17.6% in the age of 51-60 and lastly 5.9 in the age of 61 and above. Since there is many people are heads of house hold at fewer than 30s age this revealed that youths are dominating among the respondents and this point out that this population is in rapid increase which is followed by high reproducing rate.

Table 3: Distribution of respondent according to education

Education level	Frequency	Percent	Cumulative Percent
None	14	20.6	20.6
Primary	40	58.8	79.4
Secondary	11	16.2	95.6
Vocational	2	2.9	98.5
high institutional	1	1.5	100.0
Total	68	100.0	

Source: primary data

The above table 3 shows that 58.8% of respondent are educated at primary level, 20.6 never attend school, 16.2% went to secondary school, then 2.9% attended vocational and 1.5% completed high institution. This revealed that the people in rural areas are those who went to primary school others illiterate, this because they are the ones engaged in agriculture, some in cattle keeping, and other in small jobs. That is why some drop schools. Since the cumulative percentage shows that 79.4% are in the category of attended primary school and illiterate there can be a problem of food insecurity may be due to land use knowledge. For instance educated households know how to prepare and allocate proper food.

Table 4: Distribution of respondent according to their occupation

Occupation	Number respondents	Percentage
Farmer	37	54.4
Trader	9	13.2
Employ	12	17.6
Other	10	14.7
Total	68	100.0

Source: primary data

Table 4 indicates that the majority of respondents equaling to 54.4 % are in agricultural sector, followed by employees who make up 17.6%, then other occupation like pottery construction, unemployed and so on make up 14.7% and lastly 13.2% are traders. With a large number of respondents in the area are in agricultural sector.

Table 5: Distribution of respondents according to monthly income

		Frequency	Percent	Cumulative Percent
Income level	<15000	18	26.5	26.5
	15000-30000	22	32.4	58.8
	30001-45000	11	16.2	75.0
	45000-100000	12	17.6	92.6
	>100000	5	7.4	100.0
	Total	68	100.0	

Source: Primary data

According to Table 5 above, the respondents have not the same level of income:32% of respondents have income in the interval of Rwf 15000-30000 followed by those with income less than 15000 with the proportion of 26.5%. The people in the income level between Rwf 45000-100000 is the third category of the studied population with the 17.6%. The fourth category compiles those with the monthly income of Rwf 30001-45000 with 16.2%, lastly 7.4% is to those with earning over Rwf 100000 as monthly income.

3.2. The population growth within sampled households

The population growth is one of the important issues the researcher was interested in, it is measure by observing some factors based on changing of that population. In the following part the number of spouses, children fathered or mothered and the number of dependents at household level are members of a given household.

Table 1: Distribution of respondents according to how many wives /spouse(s)

Spouse		Frequency	Percent	Cumulative Percent
	0	29	42.6	42.6
	1	36	52.9	95.6
	2	2	2.9	98.5
	4	1	1.5	100.0
	Total	68	100.0	

Source: Primary

As it is shown in table 6 above the majority of respondents are legally married according to the Rwandan constitution which legalize the marriage as act of two person's one husband and one wife. This first category has the percentage of 52.9, it is followed by those with none (0) with the 42.6%; in this category there are those which are children heading households, including Single and orphans. In this category also there are some with marital status of separated, divorced and widowed. Here there is a big number of widowers due to 1994 genocide. The third category is those with more

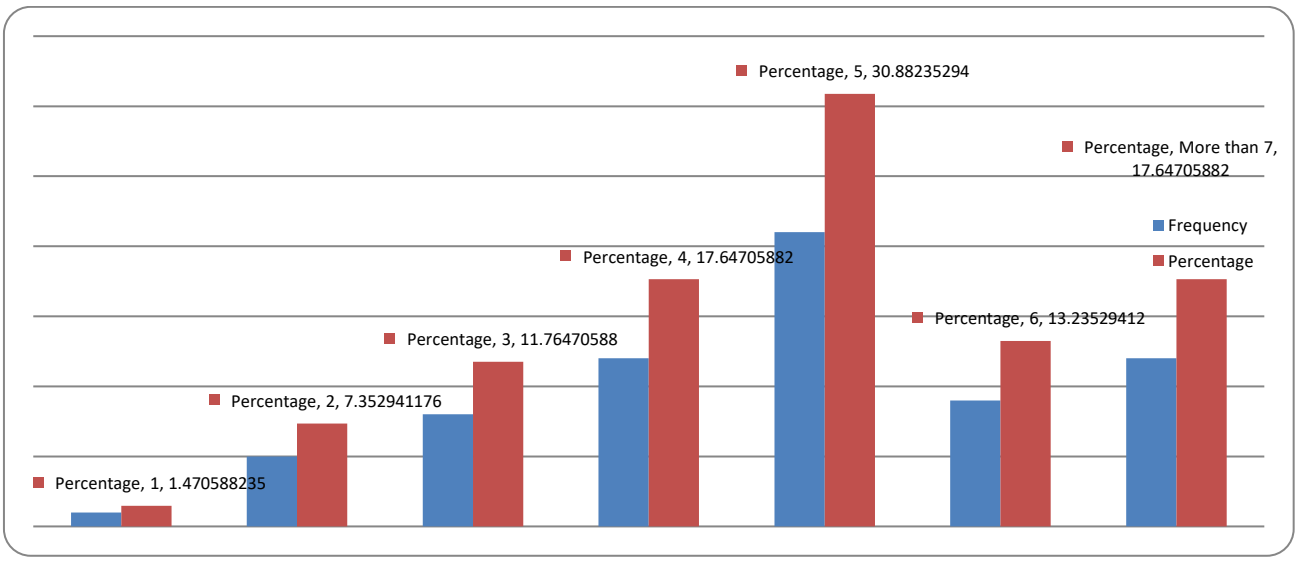
than one spouse (2 with 2.9% and 4 wives with 1.5%). In this last category there are those with the age 50 years and above due to historical background of polygamy in traditional Rwandan society.

As it is shown in the table 7 above, the majority of respondents have from one to three children constituting 60.3% of all respondents. Those with 4,5,6,7 and more than 7 occupy 16.2%, 5.9%, 2.9%, 5.9%, 4.4% respectively which means that this category has 39.5% of all respondents, this mean that the fertility rate is very high. The level of increasing of this population is very high means that there is many people to feed and to take care of.

Table 2: Distribution of respondent according to number of children

Number of children		Frequency	Percent	Cumulative Percent
	1	8	11.8	11.8
	2	17	25.0	36.8
	3	16	23.5	60.3
	4	11	16.2	76.5
	5	4	5.9	82.4
	6	2	2.9	85.3
	7	4	5.9	91.2
	more than 7	3	4.4	95.6
	None	3	4.4	100.0
	Total	68	100.0	

Source: Primary data



Source: Primary data

Figure 1 Distribution members depending one head of household

As it is shown in the figure above with the mean of 4.79 per household only 1% of respondents have one dependent.5% have two dependents. While the majority of our respondents 21.00% have five members depending on one head of household, 9.00%, 12% have 6 and 7 dependents respectively. The above figure4.1 shows that more than 86% of the sampled population has more than 3 members depending on one head of household. This implies that there is a problem of land for inheritance, Not only the problem of food in quantity but also in quality due to the big number to feed and giving them all basic need and these can lead to food insecurity. That was also the reason behind their shown weak level of education shown previously.

3.3 Land size and food security situation

3.3.1. Distribution of respondents according Land ownership and land size

Due to the fact that the majority of people are engaged in agricultural sector for food production, the researcher was therefore interested in knowing the land size in hectare per household.

Table 3: Distribution of respondent according to land size

Land size in hectares	Respondents	Percentage	Cumulative Percent
No land	6	8.8	8.8
less than 0.5 ha	33	48.5	57.4

0.5-1 ha	26	38.2	95.6
1-2 ha	1	1.5	97.1
Above 2 ha	2	2.9	100.0
Total	68	100.0	

Source: Primary data

Table 8 shows that 48.5% of respondents have land less than 0.5 hectare, followed by 38.2 % of respondents with land 0.5-1ha, 2.9% have land above 2 ha, 1.5% between 12ha 8.8% have no land. Since the 95.6% of this population have small land of less than 1ha and included those who not have land this implies that the agriculture output is less than the required means that this people are exposed to food insecurity

Table 4: Respondents' views on the use fertilizers over last growing season

Answer		Frequency	Percent	Cumulative Percent
	Yes	46	67.6	67.6
	No	22	32.4	100.0
	Total	68	100.0	

Source: Primary data

During the field study the researcher was interested in knowing if respondents use fertilizer over the last growing season. As it is shown in the table 4.9 above, 67.6 % were agree. While 32.4% were not in use of fertilizers. This implies that there is small agricultural output due land mismanagement and this also lead to the shortage of the production and reduction of food.

Table10. Respondents views on Agricultural production in supplying food up to next season

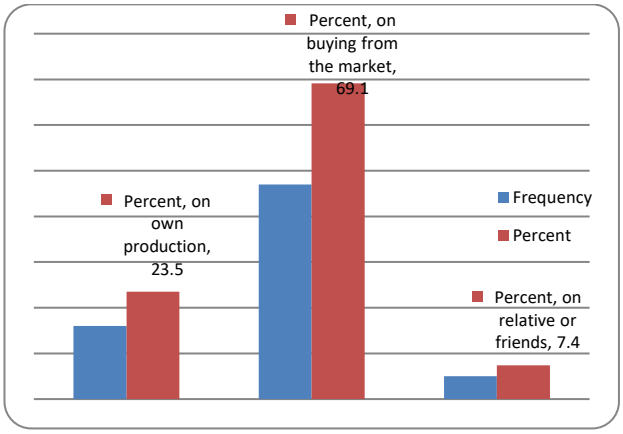
Opinion	Frequency	Percent	Cumulative Percent
Yes	13	19.1	19.1
No	55	80.9	100.0
Total	68	100.0	

Source: Primary data

The knowledge about the situation of supplying food up the next season is the basic reason of being food secured within long period of time. In the table 10 above 80.9% responded that they do not save their agricultural production in the season. This may due to small cultivable land and the ideas of consuming whole quantity either wasting it or there a big number of consumers in household. It is observed that only 19.1% can sully their production up to next season. This means that there is a big gap between the production and the number of consumers. There is a big problem at supply side and therefore it is seen that this people depend on the market.

3.4 Food production and food availability

In order to find out how people get food the researcher was interested in knowing where they gain food for consumption the table below show that some depend on own production, on buying from the market and other depend on relative or friends.



Source: Primary data

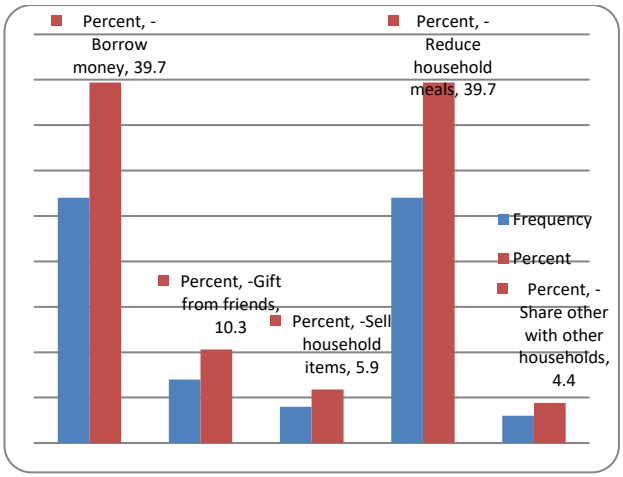
Figure 2: Distribution of respondent according where they find food

According to this figure 2, the majority of the respondents depends on the market with 69.1% ; Looking at specific food items further shows that the market was the main source for rice (81%), groundnuts (67%), fish and meat (90% - except poultry: 50%), and milk (55%). while own production was the 23.5% of the total, In this group we found those with higher plots of land, the variety produced are rice in some cases maize, beans and potatoes .And lastly 7.4% of total respondents depend on relative or friend, in this group, is where we found those with low income and others with incapacity for working.

3.5. Nutritional status in household

The most knowledgeable woman in the household regarding food preparation and

Distribution of food within the household were asked a series of questions regarding the strategy used by household and number of meals in order to deal with none food availability situation.



Source: Primary data

Figure 3: Respondents' views on how household deals with the reduction of food

In response to reduction of food production, the majorities of them reduces household reserved meals and borrow money both at 39.7%, 10.3% got gift from friends, 5.9% sell household items where 4.4% share with other households.

3.6. Number of meals per day

During field research the researcher wants to know how many number of meals intake per day in order to investigate the issue relating to food.

Table 5: Distribution of respondent according Number of meals

Meals		Frequency	Percent
	One meal	4	5.9
	Two meals	51	75.0
	Three meals	13	19.1
	Total	68	100.0

Source: Primary data

Table 11.above shows that out of the total of respondents 75% take two meals per day while 19.1% takes three meals and 5.6% eat only one meal per day. The proportion of those with one meal is high compared to the studied population, this means that there a big number of people with serious food insecurity problem. Basing on above explanation deducted from respondents, by viewing those who take food in one meal per day, several factors the basis of this such as owning small land for cultivation, low fertility of soil, droughts due to climate change and the high demand of food due to the large family size.

3.7 Monthly income and nutrition status

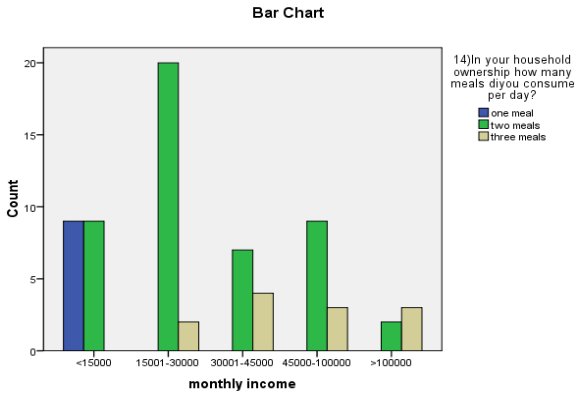


Figure 4: Monthly income and meals

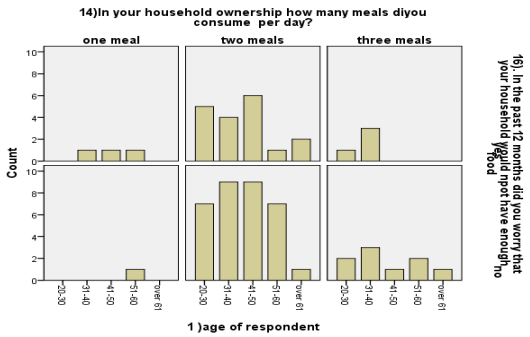
Figure 4 above portrays that the number of meals is less in the case of people with low income. In case of those with one meal it is in the income level less or equal 15000. Eating two meals is observed in all cases and in most cases is observed in income level of Rwf 15000 to 50000 and three times per day is observed in those with high level of income. From the above, result shows that most of sampled households were those with low income where we found the poor and the poorest categories. This revealed that the more income is decreased the number of meal decreased which define their positive relationship. In the following table the people were asked whether they ever had to skip meals due to the lack of food. The mean income level is examined and the number of time everything happened.

Table 6: Respondents' views on whether they ever cut the size of your meals or skip meals because there was no enough money for food

Monthly income	Worry of Lack money for food	Observed		Expected	
		Count	%	Count	%
<15000	Yes	13.5	71.10%	13.5	71.10%
	No	5.5	28.90%	5.5	28.90%
15001-30000	Yes	6.5	28.30%	6.5	28.30%
	No	16.5	71.70%	16.5	71.70%
30001-45000	Yes	2.5	20.80%	2.5	20.80%
	No	9.50012	79.20%	9.5	79.20%
45000-100000	Yes	2.5	19.20%	2.5	19.20%
	No	10.5	80.80%	10.5	80.80%
>100000	Yes	0	0%	0	0%
	No	1	100%	1	100%

Source: Primary data

The result in the above table 12 shows the direct relationship between income and food security situation. Those with income less than Rwf15000 were more experienced fear for having enough money for food at 71%. This percentage reduced at 28.3% for those with income 15001-30000, reduced at 28.3 for those with income 30001-45000 at 19.2 % with their income 45000-100000 at 0 % for those with income more than Rwf100, 000. Those figures above showed that the chance of being food insecure went in opposite direction with monthly income; the more income was increased the more the fear of having fear for food reduced up to 0%.
The level of food security is also viewed in relation with other factors, that why we can examine the number of meals per day in relation to the factors age number of meals and age group. The following figure shows how there is interrelation between those factors.



Source: Primary data

Figure 5: Relationships between numbers of meals per day, guarantee for food security in relation to the age group

The figure 5 above shows that even the majority of respondents take two meals per day they are the group where many people in which there is a problem of no guarantee for food in all age categories. In the category of those who takes three meal all categories of age is stable, the reason behind this is because as it was show in the above income situation level table, it is where people have more income as the first factor for guarantee in food security situation.

In the category of those who takes one meals per day there are some people who are in the age 30 to 60 have the problem of food because they do not have enough food for their families, this is characterized by the category of the low income agriculturalist.

Conclusion

High population growth is more a challenge rather than an opportunity in a sense that it leads to increase of government burden, unemployment and land degradation. Family conflicts due to sharing small plot of land are also the consequence of high population growth. It leads also to poverty, high mortality rate and leads to low to life expectance. High population growth is the source of food insecurity, to this point it was found that the households with high family size are more food insecure. This leads us to accept the null hypothesis that the population growth impacts the level of food security.

Based on the first source of income for household, It is though that many of the poorest rural households will never be able to obtain adequate consumption levels based on traditional agriculture sector alone this leads to conclude that rural household still are not food secured .Since in our data analysis we found that many people eat one meal other two meals from this recommendation can be given.

Recommendations

Since we found that the population growth is not favorable the following recommendation are necessary for high growing population.

Firstly family planning is a best tool for controlling population growth. To this point the number of children per family should be fixed as in order to slow down the observed rapid population increase.

Secondly Increase agricultural output (Target livelihood groups: Agriculturalists)

Of all factors with the potential to increase agricultural productivity, the availability of adapted and improved seeds and other inputs, including fertilizers should be prioritized. Seed fairs and private (for profit) seed distribution networks must be promoted. In addition, agriculture extension officers must promote the use of sustainable practices to control erosion and loss of fertility within a sustainable agriculture model. Model gardens and demonstration plots may be useful. Such programs must be developed locally to address specific local conditions.

Thirdly develop vocational skills and rural capacities building: Laborers typically have little access to land and depend on manual labor to sustain their livelihoods.

Unskilled agricultural labors wages are low which results in limited income for laborers. By developing skills and capacities, laborers will become more specialized workers which in turns can commend higher income.

Agriculturalists who have limited access to land similarly need to develop alternative livelihood strategies to supplement their own agricultural production. Such additional strategies could include skilled and unskilled labor. Interventions to consider include: vocational training, investment in adult training programs and school implementation.

The stakeholders and other support institutions need to encourage and promote the agricultural cooperatives in the area that leads to supporting agricultural productivity hence sustaining the household food security and reduced poverty levels.

There is need to establish income enhancing activities such as credit facilities from

Various nongovernmental organizations and other interested parties. The local

Leaders could greatly enhance improvement of agricultural production.

The Government should be able to design policies that lead to empowerment of rural economy development through entrepreneurship trainings to support other policies which are still implemented. Briefly the knowledge and resources to reduce hunger and malnutrition are available implemented to such as the reorganization of the available space and technological innovations are necessary in order to ensure food security for a steadily and rapidly increasing population.

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