An Empirical Analysis of Food Insecurity in Ethiopia: The Case of North Wello

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Abstract: In this paper an attempt is made to assess food insecurity situation in the North Wello zone of Ethiopia using household data. To this end, a food balance sheet and an aggregate household food security index have been constructed and food insecurity causation has been studied using a logit model. The survival mechanisms of the people also have been recorded. The evidence suggests that the study area is highly food insecure and survival mechanisms are traditional. Along with food availability and entitlement, attitudinal variables also influence food insecurity.

Résumé: Dans cet article, l'auteur tente d'évaluer la situation d'insécurité alimentaire qui prévaut dans la zone Nord du Wello (Éthiopie) en se servant de données collectées auprès des ménages. À cet effet, un bilan alimentaire et un indexe global de sécurité alimentaire des ménages ont été dressés et une relation de cause à effet avec la sécurité alimentaire a été étudiée en utilisant un modèle logique. Les stratégies de survie des populations ont aussi été enregistrées. Il s'est avéré que la zone étudiée connaît une très forte insécurité alimentaire et les stratégies usitées sont archaïques. Tout comme la disponibilité des ressources alimentaires et l'accès à ces ressources, les changements d'attitude influencent l'insécurité alimentaire.

Introduction

Ethiopia, one of the most famine-prone countries in Africa, has a long history of famines and food shortages that can be traced back to 250 BC.[1] More than half of the Africa's food insecure population live in Ethiopia and six other countries: Chad, Zaire, Uganda, Zambia and Somalia.[2] Earlier studies have estimated Ethiopia's food insecure

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[1] The chronology of Ethiopian famines and food shortages is well documented by Webb, P and J.V Braun (1994). They listed 40 periods of such crises.

[2] Asefa, Sisay 'Perspectives on Agricultural Policy, Rural poverty and Food Insecurity in Ethiopia', in Demeke Mulat, Wolday Amha, Simon Ehui and Tesfay Zegeye (eds) (1995), p. 37.

people to be around 40–50 percent of the total population[3]. Most famines and food crises have been geographically concentrated in two broad zones of this country. The first consists of the central and northern highlands, stretching from northern Shewa through Wello and Tigray, and the second is made up of the crescent of low-lying agro-pastoral lands ranging from Wello in the north, through Haraghe and Bale to Sidamo and Gamo Gofa in the south.[4]

The economic policy of Ethiopia aims at ensuring rapid and sustainable development through an agriculture-centered development strategy. This strategy is known as Agriculture Development Led Industrialisation strategy (ADLI), and concentrates mainly on the linkages between agriculture and other sectors of the economy. Agricultural growth is seen as a guarantee against food insecurity in the country. The food security strategy[5] of Ethiopia is based on three important aspects: a) increasing food and agricultural production, b) improving food entitlement and c) strengthening capacity to manage food crises. In order to improve agricultural production a major emphasis is given to increasing productivity through the diffusion of improved technologies. In the food entitlement strategy, the focus is on reducing vulnerability in drought prone areas. The strategy also focuses on strengthening emergency capabilities. It involves maintaining emergency food reserves, developing an effective early warning system, and holding strategic seed reserves.

The Amhara region (in which the study area falls) has identified drought and erratic rainfall as the main reasons for food insecurity. Agricultural development is considered as the main source of food security but it is also recognised that agriculture alone cannot ensure food security to the masses in the long run. Rural development and off-farm employment are considered important in this regard. Improvements in environmental management, agricultural performance, marketing, employment and services are devoutly wished for, but do not form a concerted strategy.

Food security causation and survival mechanisms may be different for different people and areas. Many things are unclear about the

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[3] (Ibid: 37).
[4] Webb, P and J.V. Braun (1994), op cit, pp. 21–22.
[5] See, MEDAC (1999).

characteristics, causation and possible remedies of hunger in the modern world. A great deal of probing investigation - analytical as well as empirical - is needed as background to public policy and action for eradicating famines and eliminating endemic undernutrition.[6] More evidence on this issue is necessary, particularly at the household level, as the general surveys may not be appropriate for bringing about possible solutions. Additional evidence is needed based on specific explanations. The present paper attempts to fill this gap by providing further evidence on the problem of food insecurity in the most affected zone of Ethiopia, the North Wello.

The study has the following objectives:

1. to quantify the problem of food insecurity in North Wello;
2. to identify the factors influencing food insecurity at the household level;
3. to record the survival mechanisms of these households, and
4. to come up with some policy implications.

The rest of the paper is organised as follows. Section II is a brief review of the relevant literature. Section III deals with the general features of the study area. Data sources and methodology are discussed in Section IV. Empirical results are presented in Section V. The last Section consists of a summary and conclusions along with some suggested solutions to the problem.

Review of the Literature

There is a large amount of literature available on food security and famines in developing countries. In what follows a brief review of some relevant studies is presented. Food security is defined in several ways.[7] At the simpler level it may be understood as the access by all people at all times to food sufficient for a healthy life (Reutlinger 1986). Food insecurity, obviously, is the lack of access to enough food. There are broadly three methodological approaches to the analysis of food insecurity and famines: a) General explanations in terms of drought, war, land degradation, etc. b) Scientific explanations

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[6] See Dreze J, Amartya Sen and Athar Hussain (eds.) (1995), p.13.

[7] See Habethold, 'Food Security: A Brief Review of Concepts and Indicators', (originally from Maxwell and Smith, 1992) in Demeke M., et al (eds.) (1995), p.17-18.

which explain food insecurity and the causes of famine with reference
to specific circumstances and people, and c) an eclectic approach
which combines these various explanations (Diriba, 1995, p.6). The
general explanations are imprecise, cannot be used in quantifying the
problem, and also are not helpful in leading to accurate predictions.
Specific policy interventions cannot be made based on these approaches.
Hence, specific models have been developed in the literature, based
on supply, demand and market failure theories. The supply side
explanations are popularly known as Food Availability Decline (FDA)
models and refer to the decline in per capita food availability. The
demand side explanations are known as Food Entitlement Decline
(FED) models. Food availability refers to the supply of food and
entitlement refers to the household's or individual's command over it
(Sen, 1981). The entitlement of a person stands for the set of different
alternative commodity bundles that the person can acquire through
the use of various legal channels of acquirement open to someone in
his position.[8] The argument of FED is that the mere presence of
sufficient food in aggregate terms does not necessarily entitle a person
to access to it. Other types of entitlement such as trade based
entitlement, production based entitlement, personal labour
entitlement, inheritance entitlement and transfer entitlement, etc. have
been discussed in the literature. Sen and Dreze (1989) have included
extended and cooperative conflict entitlements to the list. However,
food availability and entitlement models are not independent
explanations, but in fact complement each other. Moreover, they do
not address the problem at household level. How food security
causation may be explained at the household level involving access to
the individual resources has not been not considered in these models.
In addition to availability and entitlement, the attitudes of the people
are also important. The other issues on famines and food insecurity
such as the stages of coping (Jodha 1975 and Rahmato 1987), exposure,
capacity and capability (Chambers 1989), transitory, chronic and acute
vulnerability (Maxwell 1989), empowerment and enfranchisement (Watts
and Bohle 1992), resource scarcity (Devereux and Hay 1986), etc. have
received attention in the literature. The issue of food aid has been

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[8] Sen, 'Food, Economics and Entitlements' in Dreze J, et al (eds) (1995), p.52.

considered controversial in terms of its political and commercial implications and its disincentive impact on domestic efforts (Maxwell 1986).

Explanations of food insecurity and famine in Ethiopia have mainly concentrated on food availability and entitlement decline. Most of these explanations are aggregate, as they do not give details of specific areas and situations.[9] Diriba (1995) concluded that the decline in physical resources, and also the policy framework of the Ethiopian Government, have played a role in exacerbating food insecurity. Webb and J.V. Braun (1994) related famine causality in Ethiopia to declining production and availability, military conflict, droughts and crop failures, the agricultural policy of the Marxist regime, prices and restrictions on the market. Kebede (1995), evaluating agricultural marketing policies in Ethiopia, concluded that the pre-1990 marketing policy had a negative impact both on the availability and accessibility of food. Bellete (1995) was of the opinion that North Omo was confronted with food insecurity with increasing frequency and that farm households have developed traditional coping mechanisms to alleviate food shortages. Several authors studied the Wello famine of 1972–73. Regarding this occurrence, Sen (1981, p.95-96) concluded that there was a lack of effective demand. Devereux (1988) argued that there was effective demand but food was not available in sufficient quantities, and the markets were fragmented and imperfect.

The Study Area

North Wello is one of the eleven administrative zones of the Amhara Region of Ethiopia. Its capital, Woldya, is 360 kms away from Bahir Dar, the capital of the Amhara region. North Wello has eight *woredas*,[10] namely, Gubalafto, Habru, Kobo, Delanta-Dawnt, Meket, Wadla, Bugna and Gidan. The total population of North Wello is 1.34 millions, and is increasing at a rapid rate. The rural population in the zone is about 93 percent and the estimated number of rural households 283,000, with an average family size of 4.5. Agriculture is the mainstay of the rural population. The land in North Wello is mostly mountainous and not really suitable for cultivation, thus limiting the cultivable land to only 24 percent of the total area. The

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[9] Diriba, G (1995), pp. 21-35.

[10] A *woreda* is the sub district of a zone (a district).

estimates show that only 0.13 percent of the total land is available for future expansion. The average landholding in North Wello is 0.8 hectares, with a range of 0.5 hectares in Gidan to 1.3 hectares in Meket. These holdings are fragmented and in some cases they are widely scattered. There are six major types of soil: fluvisols, regosols, camisols, phaeozems, vertisols and andosols. Agricultural production takes place during *Belg* (short) and *Meher* (main) rainy seasons and is confined to a few crops such as teff, barley, wheat, beans and sorghum. Agricultural productivity is low due to traditional methods of cultivation, erratic rainfall and soil erosion. Fragmentation of land holdings due to land tenure policies is another reason. Farmers' participation in agricultural extension packages is limited. Fertilizer supply in North Wello is irregular and farmers lack the necessary orientation. In spite of this, fertilizer use is increasing while seed distribution is showing a decline. For instance, the use of urea has increased from 390 quintals in 1995 to 7984 quintals in 1998, but seed distribution had declined from 3623 quintals in 1995 to 3397 quintals in 1998. There are five agro-ecological zones namely, *Kolla* (low land and warm), *Woinga-dega* (moderate), *Dega* (cool), *Kur Wurch* (cold) and *Berha* (desert with high temperatures). Off-farm employment opportunities are very limited. As a consequence, the migration of the people has become a practice. Only 4 percent of the rural population has access to safe drinking water. Health facilities are poor, as there is only one hospital in North Wello. The enrollment in schools is around 17 percent, which by any standard is low.[11]

Data Collection and the Methods of Analysis

A household survey was conducted in 1999 in eight *woredas* of the zone, with a sample of 180 households. These sample units were chosen from the eight *woredas* using a proportionate random sampling method. The samples in each *woreda* were chosen on the basis of the proportion of the population in the *woreda* to the population of the zone.[12] As household food security depends on the factors such as food availability, socioeconomic conditions of the society, and

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[11] The data presented in this section are collected from different secondary sources such as the Departments of Agriculture, Health, and Education in North Wello.

[12] The sample chosen from each *woreda* is as follows: Meket, 28; Gubalafto, 24; Bugna, 24; Gidan, 19; Kobo, 25; Habru, 24; Wadla, 15 and Delanta-Dawnt, 21.

procurement strategies, the present study uses variables such as cereal production, income, live stock, land size, household size, education level and fertilizer use to represent some of these aspects. The households' responses regarding their survival mechanisms during food insecurity periods have also been recorded.

In addition, secondary data on several variables have been collected from various governmental sources in North Wello such as the Department of Agriculture, the Central Statistical Authority (CSA), Disaster Prevention and Preparedness Commission (DPPC), Sirinka Research Center and a non-governmental organisation, Save the Children Fund (SCF).

To assess the magnitude of food insecurity, a food balance sheet and food security index has been computed. The available secondary data have been used to compute food balance sheet. The aggregate house hold food security index (AHFSI) has been constructed using both primary and secondary data.

The Aggregate Household Food Security Index (AHFSI)

The AHFSI incorporates all the three elements of the FAO's concept of food security: availability, stability of food supplies and access to food. It combines the indicators of per capita food availability for human consumption (dietary energy supplies in kilo calories), and information on the distribution of available food. It takes the following form:

$$AHFSI = 100 - [H \{G + (1-G) I^P\} + 0.5 \square \{1 - H [G - (1-G) I^P]\} 100$$

Where

H = is a head-count of the proportion of the sample population undernourished.

G = is a measure of the extent of the food gap of the average undernourished (shortfall in dietary energy supplies from national average requirement).

I^P = is a measure of inequality in the distribution of the individual food gaps of the undernourished, based on the Gini Coefficient.

$\square$ = is the coefficient of variation in dietary energy supplies, which gives the probability of facing temporary food shortage.

The value of this index ranges from 100 (which represents complete, risk-free, food security) to 0, which represents total famine. Countries which have an AHFSI of less than 65 are deemed to have a critical level of food security, between 65 and 75 are categorised as low, between 75 and 85 are medium and over 85 are deemed to have a high food security level.

Specification of the Model

A logit model has been estimated to elicit the factors influencing food insecurity at the household level. The model uses food insecurity among the households as the dichotomous dependent variable. A food insecurity variable is defined on the basis of shortfall of food availability to a household during a year. The model uses various household resources as the factors influencing food insecurity.

Where

$$ P_i = E\left(Y = \frac{1}{X_i} \right) = \frac{1}{1 + e^{-\left(b_1 + \Sigma b_k X_{ik}\right)}} \quad \cdots \text{(1)} $$

P_i = Probability that food insecurity occurs.

b_1 = constant term

b_k = coefficients

X_k = for K = 1 ... 7, are the independent variables and subscript i denotes i^{th} observation.

K_1 = Cereal production.

K_2 = Household income

K_3 = Fertilizer use

K_4 = Household size

K_5 = Livestock owned (in tropical livestock units)[13.]

K_6 = Land size (per capita)

K_7 = Education level of households (literate head = 1).

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[13] The Tropical Livestock Unit conversion used comprises: 1 Cattle = 1TLU, 1 Goat = 0.15 TLU, 1 Horse = 1 TLU, 1 Mule = 1.15 TLU, 1 Donkey = 0.65 TLU, 1 Camel = 1.45 TLU and 1 poultry = 0.005 TLU.

Let

$$Z_i = b_1 + \Sigma b_k X_{ik} \quad \cdots (2)$$

$$\text{Then } P_i = \frac{1}{1 + e^{-Z}} \quad \cdots (3)$$

As Z_i ranges from $-\infty$ to $+\infty$, P_i ranges from 0 to 1 and P_i is non-linearly related to Z_i.

In estimable form, the model is,

$$L_i = Ln\left(\frac{P_i}{1-P_i}\right) = Z_i = b_1 + \Sigma b_k X_{ik} \tag{4}$$

Where L is the logit. It shows how the log odds in favor of food insecurity change as the respective independent variable changes by a unit.

Where L is the logit. It shows how the log odds in favor of food insecurity change as the respective independent variable changes by a unit.

The model is based on the following hypotheses: a) Availability of the food is a supply factor influencing food security. Thus, it is hypothesised that an increase in cereal production would reduce food insecurity. b) Household income, livestock and land size are entitlement factors that have a negative influence on food insecurity. c) Household size is a demand factor, which influences food insecurity positively. e) Education and fertilizer use are the proxy variables for the attitudes of the households and expected to influence food security positively.

Results of the Study

Based on the availability of data, we have computed a Food Balance Sheet for the period 1994-98, using 2100 calories of food per day per person as the minimum nutritional requirement. This is equivalent to 225 kilograms of cereals (teff) per person per annum. Table 1 reveals that food requirement in North Wello grew at 1.78 percent per annum while the food availability declined by 4.41 percent. As a result, the

food deficit grew by 8.51 percent. The self-sufficiency ratio, which is measured as the ratio of the sum of net production of cereals and other food (meat) to the requirement of food, has declined by 5.14 percent. The food availability ratio, which is the ratio of total supply to the requirement, has also declined by 4.38 percent. In the study period, the food availability has not risen above 59 percent of the needs including the normal cropping year 1997. As a consequence, food aid was needed but this was not sufficient to meet the requirements. The result is that the zone has become highly food insecure.

The aggregate household food security index has been computed using both household and secondary data. The estimate of the proportion of the population that is under- nourished (0.4076) has been obtained from Amhara Region's Food Security Office. The food gap of the average under-nourished household (0.4673) has been computed based on the average food availability ratio from the food balance sheet for the years 1995-98. A Gini coefficient (0.3657) has been computed using the sample household incomes[14]. The probability of drought occurrence on the basis of rainfall has been used as the proxy for the probability of facing temporary food shortage (0.30). For this purpose, 550 millimeters rain per annum in maize growing areas, 400 mm rain in teff and lentil growing areas and 950 mm rain for barley and wheat growing areas, have been taken as the threshold. The computation was performed using the monthly rainfall data for the period 1980-96. The index computed is as follows:

AHFSI=100[0.4076{0.4673+(1-0.4673) . 3657}+0.5*0.30{1-0.4076[0.4673-(1- 0.4673) 0.3657]} 100 = 70.59.

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[14] The Gini coefficient is measured as the ratio of the area between the diagonal and the Lorenz curve to the total area of the triangle under the diagonal.

Table 1: Food Balance Sheet for North Wello (1994–1998)

Sl. No	Variable	1994	1995	1996	1997	1998	Growth rate
1	Production of cereals (in Qts.)	1502004	1319649	1828012	1732539	1042911	-3.73
2	Less 15% post harvest loss	225300.6	197947.4	274201.8	259880.9	156436.6	_
3	Less 6% seed	90120.24	79178.94	109680.7	103952.3	62574.66	_
4	Net production (1-2-3)	1186583	1042523	1444129	1368706	823899.7	-3.73
5	Food Aid	131915	219228	16391	131738	137182	1.36
6	Total Grain available (4+5)	1318498	1261751	1460520	1500444	961081.7	-4.35
7	Other food sources (meat)[a]	28338.28	28338.28	28338.28	28338.28	28338.28	0.0
8	Total supply (6+7)	1346836	1290089	1488858	1528782	989420	-4.41
9	Population	1260317	1281887	1312582	1344042	1376292	-
10	Requirement of food at 2.25 Qt per person	2835713	2884246	2953310	3001594	3096657	1.78
11	Food Balance (8-10)	-488877	-594157	-464452	-1472812	-2107237	-8.51
12	Self sufficiency ratio (4 + 7)/10	0.4284	0.3713	0.4986	0.4654	0.2752	-5.14
13	Food availability ratio (8/10)	0.4750	0.4473	0.5041	0.5903	0.3195	-4.38

Source: computed by authors, using data from NWAD, CSA, DPPC and Population Census of Ethiopia.

a) 100-gram meat is equal to 187 calories.

b) Projected using the growth rate of population of the Zone.

c) Is the average of annual growth rates.

The result indicates a high level of food insecurity among the households of North Wello. The empirical exercise in terms of both food balance sheet and AHFSI indicates that North Wello is highly food insecure.

The estimation of the logit model includes all the variables except income (due to multi-collinearity). The results of the model are as follows:

Table 2: The results of the logit model

Variable	Coefficient	*t*-values
Cereal Production	-0.0045905	(-2.9726743)*
Education	-1.3678679	(-1.695914)***
Fertilizer Consumption	-0.0348195	(-2.5044034)**
Household Size	1.5735330	(4.3085769)*
Land Size	-2.5024824	(-1.6265848)***
Livestock	-1.0582047	(-3.2566326)*
Intercept	2.6935556	(1.1596914)
Log likelihood	27.670730	
Chi – squared	11.72	

Note: *Indicates significance at 1% level, ** at 5% level and *** at 10% level

Since R^2 as a measure of goodness of fit is not well suited for the dichotomous dependent variable models, we have used $\square^{\square}\square$ (Chi-square) Statistic as shown below:

$$\chi_2 = \frac{\sum_{i=1}^{G} Ni \ (P - P\,*)_2}{P\,*\,(1 - P\,*)}$$

Where: N_i = Number of observations, P = the actual probability of food insecurity P*= estimated probability of food insecurity and G = number of categories.

The estimated value of c^2 (11.72) is higher than the critical value (6.635) at one percent significance level. Hence, the model is considered a good fit.

The regression coefficients of the model have the expected signs and are associated with significant t-ratios. Thus, all the independent

variables included in the model have influenced the dependent variable significantly. The percentage change in the probability of food insecurity with respect to a given independent variable is measured as $b_j P_i(1-P_i)$.

A 100-kilogram increase in cereal production by the household reduces the probability of food insecurity in the household by 10.5 percent.

Likewise, an increase in education in terms of one person in the family will result in a decline of probability of food insecurity by 31.5 percent in the household.

An increase in fertilizer consumption by 100 kg will result in a probability of 80.22 percent decline in food insecurity in the household.

Similarly, an increase in the family size results in an increase in the probability of food insecurity by 36.25 percent.

A land size increase by one hectare will result in a probability of 57.66 percent decrease in food insecurity.

As livestock (measured by Tropical Livestock Unit, TLU) increases by one unit, the probability of food insecurity declines by 24.38 percent.

Household Survival Mechanisms

Household[15] responses during food insecurity and famine might be different for different areas and different people. Survival is defined as the ability of households to keep all or some of its members alive under severe food deficit within the existing social, economic and moral institutions of society (Diriba 1995). Households were asked how they had responded to the recent crises. The responses recorded are as below.

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[15] The characteristics of the sample households are as follows:

Variable	Magnitude
Family size	4.53
Female Heads	2%
Dependents ratio	52%
Literate heads	39.45%
Production of cereals (average)	6.2 quintals
Livestock	2.2 TLU
Land size (per capita)	0.043 hectares
Fertilizer use	28.6 Kgs.

About 15 percent of the sample farmers have diversified their crops to adjust to the variation in rainfalls and have gone in for the dispersal of their land holdings. They have also grown drought resistant crops such as *acuri ather* and *gigrti,* the local varieties of beans and sorghum respectively.

A majority of the sample households (68 percent) reported that they were dependent on famine relief assistance. About 50 percent of the households revealed that they had to reduce consumption of food drastically in order to feed the young ones and had to shift to the inferior foods such as *kulkal,* a wild fruit. Selling and eating livestock is another survival mechanism reported by 35 percent of the households. Savings either in kind or cash were found to be low among the respondents. Only 8 percent of the sample households reported that they could save something. Banking habits are lacking and very few had bank accounts (6 percent). In times of crises, asset selling was reported by 35 percent of the households. Only 15 percent have participated in food for work programmes, which is not prominent in North Wello. Migration is another escape route reported by 4 percent of the sample households. Of the 180 households 29 were female-headed households. The coping mechanisms were found to be different for this group. Such mechanisms included the renting of lands, working as daily labourers, preparing drinks, selling firewood and dung, and child labour (girls).

Summary and Conclusion

The primary objective of this study was to assess the magnitude of food insecurity in North Wello and find the causes of the phenomenon. To this end, a food balance sheet and aggregate household food security index have been constructed and the food insecurity causation studied using a logit model at the household level. An attempt has also been made to look into the survival mechanisms of the households.

The conclusions based on our empirical study may be summarised as follows:

1. The data analysis based on food balance sheet and aggregate food security index reveals that the North Wello zone of Ethiopia is highly food insecure.

2. The food insecurity causation studied through the logit model reveals that:

> a. The per capita land holding is one of the important factors ensuring food security to the households. But the per capita land holding in the region has been declining due to an increase in population and due to land tenure policies. This situation, coupled with low and declining productivity of land, will aggravate the food insecurity problem in North Wello.
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> b. Cereal production influences food security among the households positively. But in the North Wello, food production is lagging behind the requirements.
>
> c. The livestock sub-sector is very important in assuring food security in the zone. An increase in the livestock population enables the people to be food secure either through the income earned or by direct consumption.
>
> d. The evidence indicates that education improves food security. Education changes the attitudes and also improves the productivity of farmers. But the school enrollment ratios in North Wello have been low.
>
> e. Similarly, an increase in fertilizer application has a positive effect on food security. However, the distribution of fertilizer in North Wello is irregular and the farmers also lack the necessary orientation.
>
> f. The family size of the households has influenced food insecurity positively. The population of North Wello is growing faster than food production, making it food insecure.

3. Coping mechanisms are traditional, and the majority of the sample households depend on famine relief assistance.

Policy Implications

The following are possible areas of intervention which might mitigate the problem of food insecurity in the area.

As North Wello and other zones of Ethiopia are constantly facing food insecurity and famines, there is a need for integrating famine relief and prevention strategies at the local level with the overall development

strategy. The strategy should aim at self-sufficiency at the national level and food security at the local level.

Increasing the productivity of major cereal crops through the increased use of modern farm inputs such as fertilizers, improved seeds, pesticides, etc. is an urgent need. Yield increases are feasible only through the increase in both labour and land productivity, as it is difficult to increase the area of the cultivable land. Extension services, input supply, remunerative prices, etc. have to be tailored to support this possibility. The construction of minor irrigation projects in the long run is very important since agriculture is rain fed. The livestock sector's output has to be increased through the provision of better health care facilities.

Along with availability and entitlement of food, the attitude of the people towards food crises needs to be changed. To address this issue there needs to be increased enrollment ratios at the primary school level and the promotion of adult education, as well as educating and encouraging people towards family planning and the adoption of the habit of saving.

Poverty and food insecurity move together. Thus, poverty alleviation should be given priority through the promotion of food for work programmes, self-employment, and employment generating schemes (EGS). Developing social overhead capital in terms of roads, buildings, etc. paves the way for the development of productive activities and the reduction of poverty in North Wello.

Finally, monitoring the food situation, designing an effective early warning system to inform the people about the likelihood of crop failures, and knowledge of disaster induced food shortages, are crucial for proper steps to be taken when food shortages reach crisis proportions.

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