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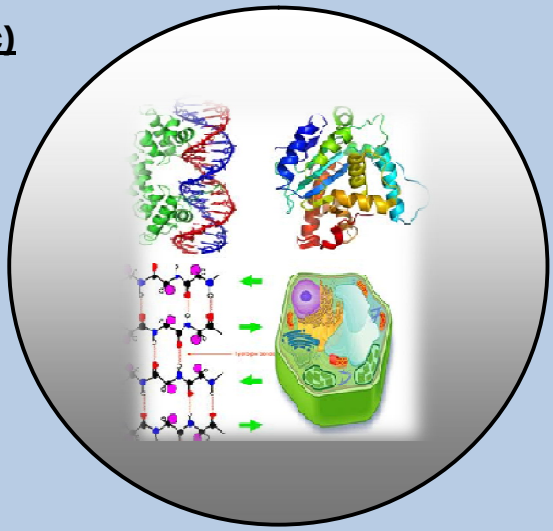

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RESEARCH PAPER

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The Determinants of Rural Households' Vulnerability to Food Insecurity in Jimma Zone, South Western Ethiopia

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ABSTRACT

This study analysis the determinants of rural households' vulnerability to food insecurity in in Jimma Zone, in South Western of Ethiopia. For this study both secondary and primary data were used. The study was based on the survey of a total of 200households randomly selected using a three-stage sampling technique. Analytical tools used include descriptive statistics, Foster-Greer-Thorbecke (FGT) and Logit model. The findings revealed that about 42% rural households were vulnerable to food insecure.Logit model analysis result showed that factors such aseducation level, family size, cultivated land size, total number of livestock, off-farm/nonfarm income,crop yield, and access to credit service were significant variable that influence vulnerability to food insecurity. The findings suggest the following set of policy recommendation. Identifying and understanding factors those are responsible for households' vulnerability to food insecurity and its determinants are important to combat food security problems at the household level. The study findings suggest that in selecting priority intervention areas, the food security strategy should consider statistically significant variables as the most important areas.

Key words: Food security, Food insecurity, Rural households and Vulnerability.

INTRODUCTION

Ethiopia with landmass of 1.1million square kilometres is third giant and second populous nation in the Sub-Saharan Africa with estimated population of about 85.5million. United Nation Development program ranked Ethiopia 157th in the human development index, with per capita average annual income of 120$ and about 40 % of the population below poverty line (UNDP, 2010).

Agriculture is a key driver of Ethiopia's long-term growth and food security. Agriculture directly supports 85 percent of the population, constitutes 43 percent of Gross Domestic Product (GDP), and 80 percent of export value. Nearly 16 percent of Government of Ethiopia (GOE) public expenditures are committed to the sector (Bill & Melinda Gates Foundation, 2010). Agriculture is the predominant and an important economic sector in Ethiopia. However, land degradation coupled with erratic rainfall, drought poses a serious threat on households' food security in Ethiopia. Besides, overgrazing, improper cultivation practices, mismanagement of land resource are the main causes for land degradation. Among the various forms of land degradation, soil erosion is the most serious problem, which results in soil nutrient depletion and loss of fertility of farm land (Wagayehu, 2005). Soil erosion problem still persists and becomes the major cause for food insecurity. Loss of soil nutrient and its productive capacity due to soil erosion leads to low productivity of land, which in turn brings loss in crop yields and results in a vicious cycle of poverty and food insecurity (Alemneh*et al*., 1997). The seriousness of food shortage problem varies from one area to another, depending on the state of the natural resources and the extent of development of food shortage (Webb *et al*., 1992). Earlier studies in Ethiopia's food insecurity roughly estimated that 15 million rural peoples is food insecure in 2006. Out of these about 8.29 million peoples are chronically food insecure while the remaining 6.71 million is acute food insecure people (FSB, 2007). As a result, food insecurity is one of the defining features of rural poverty affecting millions of people particularly in moisture- deficit and pastoral areas (FDRE, 2001). While the problem of food insecurity has big diversity and multiple dimensions, which range from the global, regional, country, local, household to individual level. Household level causes to vulnerability to food insecurity and survival mechanisms may different for different people and areas. Many things are unclear about characteristics, causation and possible remedies of hunger in modern world. A great deal of interested investigation-analytical as well as empirical is needed as back ground to public policy and action for eradicating famines and eliminating endemic under nutrition (Sene, 1981; Dreze and Sene, 1989; Amsalu*et al*, 2012).

In general, the problem of food insecurity has big diversity and multiple dimensions, which range from the global, regional, country, local, household to individual level. The various, complex and interrelated determinants of household vulnerability to food insecurity not studied in detail in in the study area. Therefore, this study attempts to fill the gap by conducting an empirical research on identifying, analyzing and understanding those elements that are responsible for variation in household vulnerability to food insecurity that is needed to guide policy decisions, device appropriate interventions and integrated efforts to combat food insecurity. The general objective of the study was to assess and understand the determinants of households' vulnerability to food insecurity in Jima zone, south western Ethiopia.

The specific objectives of the study are:

- To assess the socioeconomic characteristics of households that related to rural households' vulnerability to food insecurity
- To assess the extent of households vulnerability to food insecurity
- To analyze the determinants of rural households' vulnerability to food insecurity

MATERIAL AND METHODS

Description of the Study Area

The proposed study was conducted in two sub-districts in Jimma Zone between December 2012 and September 2013 in Omo-Nada and Tiro-Afetaweredas of south western Ethiopia. This study area is selected to represent a dominantly subsistence farming community where high land degradation, erratic rainfall, soil erosion and drought problems pose a serious threat on households' food security from Jimma zone, south western Ethiopia. Jimma Zone is one of the 20 administrative zones in Oromia Regional State, is divided under 18 administrative districts with 2.5 million populations from which 94% are rural inhabitants (FDRE, 2008). The Zone covers a total area of 15,569 km^2 that receive reliably good rains ranging from 1,200–2,800 mm per annum. Subsistence farming is the dominant form of livelihood in the area where only 15% of the population is in non-farm related jobs. The area has suitable agro-ecological potential with the lowest drought risk rating (298) in the country. Cereals (maize, teff-*eragrostistef*, sorghum and barley), pulses (beans and peas), *cash crops (*coffee and khat-*cathaedulis*), and root crops (*ensetventricosum*-false banana and potato) are the major crops produced in the area. Different fruits and vegetables are also commonly grown where home-gardening by small holder families was observed to increase household income and food security (Kebebew*et al*., 2011)

Sampling Procedure

Three-stage sampling techniques were used to generate the required primary data. At the first stage, Sokoru and TiroAfeta*woreda*s were selected purposively from Jimma zoneof south western Ethiopia. In the second stage, four peasant associations were selected randomly from each *woreda*. Finally, a probability proportional to sample size sampling procedure was employed to select 200 sample households.

Analytical Technique

Two types of data analysis, namely descriptive statistics and econometric analysis were used for analyzing the data collected in the study area.

Descriptive statistics

This method of data analysis refers to the use of ratios, percentages, means, and standard deviations in the process of comparing socio-economic and institutional characteristics of the farming households that related to food security.

Foster-Greer-Thorbecke (FGT) model

Foster *et al*. (1984) was used to estimate the incidence and intensity of household food insecurity. The FGT model is expressed as follow:

$$FGT(\alpha) = \left(\frac{1}{n}\right)\sum_{i=1}^{q}\left[\frac{(c - y_i)}{c}\right]^{\alpha} \quad (1)$$

Where:

n = is the number of sample households; *yi*= is the measure of per adult equivalent food calorie intake of the i^{th} household; *c* =represents poverty line (expressed here in terms of caloric requirements); α = is the weight attached to the severity of food insecurity. α = 0, 1 or 2 shows head count ratio[1], food insecurity gap[2] and squared food insecurity gap[3] respectively (Hoddinott, 2001) and *q*= is the number of food-insecure households.

Econometrics model

The binary log it model was applied to estimate the effects of explanatory variables on rural household vulnerability to food insecurity. In this model the dependent variable is Household Food security Status (HFS) that is dichotomous taking a value of 1 if the household is food insecure; 0 otherwise. The information, which identifies the food insecure from the food secure households, was obtained by comparing the total food calorie available for consumption in the household per AE to poverty line[4] or the minimum level of subsistence requirement per AE. A household below this threshold is said to be food in secured), otherwise food secure. The cumulative logistic probability model is specified as follows (Gujarati, 1995):

$$L_i = Ln\,[P_i/(1 - P_i)] = \alpha_o + \alpha_1X_1 + \alpha_2X_2 + \alpha_3X_3 + \alpha_4.X_4 + \alpha_5X_5 + \alpha_6X_6 + \alpha_7.X_7 + \alpha_8X_8 + \alpha_9X_9 + \beta_1D_1 + \beta_2D_2 + \beta_3D_3 + \beta_4D_4 + \beta_5D_5 + \beta_6D_6 + \varepsilon_i \quad (2)$$

Where: i presents the individual i i = 1, 2, ., 15; L_i = is log of the odds ratio, which is not only linear in X_i but also linear in the parameters; P_i = the probability that an individual is being food insecure; (1-Pi)= the probability that a household will not be food in secured:

α_o: intercept or constant term;X_1: age (year); X_2: number of family size (AE);X_3: distance to markets (km); X_4:size of cultivated land (ha); X_5:total livestock holding (TLU); X_6 :total farm income per AE (ETB); X_7: off-farm/non-farm income (birr); X_8: Crop production (qt); X_9:Amount of food aid (ETB); D_1: Sex of household head(Male = 1; Female = 0); D_2: education level (Literate = 1; illiterate = 0); D_3: perceived negative effects of rising food price (yes= 1; 0= no);

[1]Head count ratio describes the percentage of sampled households whose per capita income or consumption is below the predetermined subsistence level of energy

[2] The food insecurity gap measure how far the foods insecure, on average, are below subsistence level of energy or below poverty line

[3] Squared food insecurity gapis a measure closely related to severity of food insecurity gap but giving those further away from the subsistence level a higher weight in aggregation than those closer to the subsistence level.

[4] In this study poverty line was estimated based on the cost of 2,200 kcal per day per adult food consumption with an allowance for essential nonfood items. The food poverty, non-food poverty and total poverty lines used were 2692, 2805 and 5622 birr at local average prices, respectively applied to real per adult household consumption expenditure in order to calculate head count, poverty gap and squared poverty gap indices. (MoFED, 2012)

D_4: access to credit previous year 2012/13 (yes = 1, no = 0); D_5: Feed problem(yes= 1; 0= no); D_6: Access to adequate extension service (yes= 1; 0= no); and ε_i is error term.

After specification of the model the parameters of the model is estimated by maximum likelihood function (MLE) using STATA version 12. The model is based on the following hypotheses:

1. Household income, livestock and land size is entitlement factors that have negative effect on rural household vulnerability to food insecurity
2. Household size is demand factor which influence food insecurity positively
3. Education is a proxy variable of attitudes of households and expected to influence food insecurity negatively
4. Female household head is demographic variables and expected to influence food insecurity positively
5. Access to credit is an institutional factors that expected to have negative influence on food insecurity
6. Distance to the market is institutional factors that have positive influence on food insecurity

RESULTS AND DISCUSSION

Demographic and Socio Economic Characteristics of the rural Households

Table 1 showed that 52% and 48% of the households were male headed and female headed households respectively. Categorization of household based on education exhibited that about 49% households are literate, while 51 are illiterate households. Table 2 showed the average age and family size of rural households was 45.25and 7.13, respectively. The mean land size cultivated by the households were 0.77 ha, this shows that the farmers are operating on small scale production. On average, the annual crop productions of households were 87.96 kg while the average livestock owned by the household was 5.84 in TLU. Finally, the finding indicated on average annual income per AE of sample households were birr 3638.90 whereas annual consumption expenditure of household was birr 783.80.

Table 1. Percentage distribution of household food security status by sex and education level.

		Food secure (116)		Food insecure (N=84)			Total (N=200)	
		N	Percent	N	Percent	X^2	N	Percent
Sex	Male	60	0.52	45	0.54	0.79	105	0.52
	Female	56	0.48	39	0.46		95	0.48
Education level	iterate	54	0.47	48	0.57	0.10**	102	0.51
	Literate	62	0.53	36	0.43		98	0.49

Source: Model outputs based on survey data (2013)

Note: **denote 5% level of significance

Table 2. Average distribution of household food security by family size; age; land size; crop yield; livestock and annual income.

	Food secure (N=116)	Food insecure (N=84)		Total (N=200)
	Mean	Mean	Sig	Mean
Age (year)	46.83	43.04	0.03**	45.24
Family size (number),	6.50	8.00	0.00***	7.13
Annual crop yield (kg)	122.75	39.90	0.01**	87.96
Annual Farm income per AE (birr);	4634.15	1901.42	0.00***	3638.90
Annual Off-farm income (birr);	500.43	329.52	0.00***	428.65
Land size (ha)	0.86	0.65	0.06*	0.77
Livestock holding (TLU);	6.36	5.11	0.01**	5.84
Annual consumption expenditure (birr);	1064.22	469.18	0.00***	783.80

Source: Our results based on survey data (2012/2013)

Note: *, **, and * denote a 1%, 5% and 10% level of significance, respectively**

Extent of Rural Households Food Insecurity

Based on the cut-off of 2,200 kcal, 42 % of the households were classified as food insecure and 58 % as food secure. The results of the summary of the household incidence, depth and severity of food insecurity, are presented in Table 3. The results revealed that the incidence of household food insecurity was 0.42. This implies that about 42 % of the sampled households were not able to meet the daily recommended caloric requirement which is 2100 kcal per day per AE or food insecure. The calculated value of food insecurity gap was 14.67 %. These implyabout 14.67 % of food insecure households were below the recommended daily caloric requirement level or below poverty line. Finally, the severity of food insecurity households was 0.0726. This implies about 7.26 % of households are the most food insecure groups of households in the study area (Table 3).

Table 3: Summary of rural household incidence and severity to food insecurity

Type	**Percent (%)**
Incidence food insecurity **(**Head count ratio)	42.00
Depth food insecurity (Food insecurity gap)	14.67
Severity food insecurity(Squared food insecurity gap)	7.26

Source: Own survey (2012/2013)

Determinants of Rural Households' Vulnerability to Food Insecurity

Log it model was employed to assess determinants of household vulnerability to food insecurity.

Before fitting the models, it was important to check whether there exists serious problem of multi collinearity among the hypothesized explanatory variables. The value of VIF for each of the continuous variables shows less than 10. Hence, there was no a multi collinearity problem among all the hypothesized continuous variables included in the model. The result of the computation of Contingency Coefficients revealed that there was no a serious problem of association among discrete explanatory variables as the contingency coefficients did not exceed 0.75. Therefore, all the hypothesized dummy variables were included in the logistic regression model.

As repeatedly stated, rural household vulnerability to food insecurity variable was used in the model as a dependent dummy variable with a value of 1 describing the probability of the household being vulnerable to food insecurity, 0 otherwise.

For analyzing the determinants of rural households' vulnerability to food insecurity, a total of 15 explanatory variables were included in the model. In order to identify the most important determinants from the potential hypothesized independent variables assumed to cause household vulnerability to food insecurity, binary Log it model was estimated using STATA version 12. The results of the log it regression model are presented in (Table 4).

The maximum likelihood estimates of the log it model showed that family size, education level, livestock holding, land size, crop yield, off-farm/non-farm income and access to credit were found to be the important determinants identified to influence household vulnerability to food insecurity. The discussion and interpretation of the significant explanatory variables in the model in the study area are presented as below:

Other things being constant, the odds ratio in favor of being food insecure increase by a factor of 1.348 as family size increase by one unit.

The result indicated that larger household size tends to be food insecure compared to smaller family size. The possible explanation is as family size increases, the amount of food for consumption in one's household increases thereby that additional household member shares the limited food resources. This result is in conformity with the findings of Del Ninno *et al.* (2001); Amsalu *et al* (2012); Amsalu *et al* (2013).

Likewise, other things being constant, the odds ratio in favor of being household vulnerability to food insecure decrease by a factor of 0.394 as education of the family increase by one unit. This is due to the fact that education equips individuals with the necessary knowledge of how to make a living. The effect of education on food security works indirectly by influencing the actions of the person in how to make a living. Literate individuals are very ambitious to get information and very curious to accept agricultural or livestock extension services, and soil and water conservation practices including any other income generating activities. Similarly, livestock size is negatively and significantly associated with the probability of being household vulnerability to food insecure. The result indicates that, other things held constant, the odds ratio in favor of being food insecure decrease by a factor of 0.91 as the total livestock holding increase by one TLU. This result is in agreement with the prior expectation and the findings of Amsalu *et al.,* (2012).

Table 4. The maximum likelihood estimates of the log it model.

Variables	B	S.E.	Sig.	Odd ratio
Sex of household head (male = 1, female = 0)	-0.686	0.564	0.224	0.504
Age of household head (year)	-0.024	0.017	0.156	0.977
Family size in AE	0.299	0.084	0.000***	1.348
Education of household head (literate = 1, illiterate = 0)	-0.931	0.49	0.057*	0.394
Crop production (qt)	-0.003	0.001	0.017**	0.997
Annual farm income (ETB)[5]	0.000	0	0.254	1
Annual off-farm/non-farm income (ETB)	-1.253	0.518	0.016**	0.286
Cultivated land size (ha)	-0.58	0.34	0.089**	0.56
Livestock holding (TLU)	-0.094	0.044	0.031**	0.91
Rising food price problem (yes=1; no=0)	0.108	0.57	0.849	1.114
Access to credit previous year (2012/13) (yes = 1, no = 0)	-0.918	0.482	0.057*	0.399
Distance from settlement center to nearest market place (km)	0.008	0.019	0.673	1.008
Feed shortage (yes = 1, no = 0)	1.603	1.023	0.117	4.97
Adequate access to extension service (yes = 1, no = 0)	-0.065	0.658	0.921	0.937
Amount of food aid (ETB)	0.000	0.001	0.788	1
Constant	0.228	1.581	0.885	1.256

Source: Our results based on survey data (2012/2013)

Note: ***, **, and * denote a 1%, 5% and 10% level of significance, respectively

[5] **1$ dollar=17 ETB at time of survey**

This indicates that households with more livestock produce more milk, milk products and meat for direct consumption and owners could be more food secured. Besides, this enables the farm households to have better chance to earn more income from livestock production which enables them by increasing purchasing power of food during food shortage and could invest in purchasing of farm inputs that increase food production, and able in ensuring household food security. As off/non-farm income increases by one Birr odds ratio in favor of being vulnerability to food insecurity decrease by a factor of 0.286, other variables assumed to be constant. This result is in conformity with the findings of Pearce *et at*., (1996), Amsalu*et al.,* (2012). In the areas, where the farmers face crop failure and sales of livestock and livestock product is inadequate, income earned from off/non-farm activities are an important means of acquiring food. Accordingly, the success of farm households and their family members in coping with food insecurity is highly determined by their ability to get access to off/non-farm job opportunities. The result suggests that households engaged in off/non-farm are endowed with additional income and less likely to be vulnerable to food insecurity. As the crop yield increase by one kg odds ratio in favor of being vulnerability to food insecurity decrease by a factor of 0.997, other variables remain constant. As access to credit increases by one Birr odds ratio in favor of being vulnerability to food insecurity decrease by a factor of 0.399, when other variables are constant. The result imply those households who received farm credit have possibility to invest in farming activities, which is important component in small farm development programs. Provided other associated production factors remain normal, as the cultivated land size increases by one hectare odds ratio in favor of being vulnerability to food insecurity decrease by a factor of 0.56, when other variables are constant.

CONCLUSION AND POLICY IMPLICATIONS

The study revealed that 42 % of the households were food insecure or not able to meet the daily recommended caloric requirement (below povertyline) in the study area. The study identified the major determinants of rural households' vulnerability to food security are education, family size, off-farm income/nonfarm, cultivated land size, crop yield, livestock holding, access to credit. The determinants of household vulnerability to food insecurity from logit model reveled that education, off-farm income/nonfarm, cultivated land size, crop yield, livestock holding, access to credit have negatively related with household vulnerability to food insecurity while family size is positively related. Based on the findings the following policy recommendations are forwarded.

1. Proper attention should be given to limit the increasing population. This could be achieved by proper awareness creation about practicing family planning activities through integrated health and education services.
2. Improving households' off-farm / non-farm income have a significant negative influence on household vulnerability to food insecurity, therefore, concerned stakeholders should identify the different possible types of off-farm/non-farm activities and support with the necessary knowledge and skills of the various types of off-farm and non-farm activities that could improve their food security status.

3. Livestock variable appears to have negative impact on household vulnerability to food insecurity. This implies livestock sector plays a great role in reducing vulnerability to food insecurity. Hence farmers should be encouraged to engage in livestock husbandry through providing with improved livestock production technologies (health service, improved breeds and feeds, *etc.*) to improve production and productivity of the sector, this will ultimately decrease vulnerability to food insecurity.

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REFERENCES

Alemneh, D, Shishira, EK, Yanda, PZ and Johnsen, FH. 1997. Land degradation in Tanzania: Perception from the village. World Bank Technical Paper, No.370. Washington, D.C: 1-17

Amsalu, M. Bekabil. F. and Beyene.T. 2012. "Empirical analysis of the determinants of rural households' food security in Southern Ethiopia.The case of Shashemene District".*Basic Research Journal of Agricultural Science and Review*. 1(5): 80-82.

Amsalu, M., Bekabil, F. and Beyene.T. 2013. Analysis of Factors Determining Households Food Security in Pastoral Area Oromia Region, Moyale District, in Ethiopia.*International Journal of Agricultural Science, Research and Technology*. 2(3):105-110.

Ayalneh, B. 2002. Land degradation, impoverishment and livelihood strategies of rural households in Ethiopia: Farmers' perceptions and policy implication.Shaker Verlage, Germany.8. 179-182.

Bill & Melinda Gates Foundation, 2010.Accelerating Ethiopian Agriculture Development for Growth, Food Security, and Equity. Addis Ababa, Ethiopia.

Dawit, D. 2012. Assessment of Biomass Fuel Resource Potential and Utilization in Ethiopia: Sourcing Strategies for Renewable Energies. International Journal of Renewable Energy Research. 2(1):131-134.

Del Ninno, C., P.A. Dorosh, L.C. Smith and D.K. Roy.2001. The 1998 Floods in Bangladesh Disaster Impacts, Household Coping Strategies, and Response.Research Report 122.IFPRI.

Dreze, J and Sene, A. 1989.*Hanger and Public Action*, Oxford, clarendon press.1.12-13.

Federal Democratic Republic of Ethiopia (FDRE), 2001.Regional Conservation Strategy.The Resource Base, Its Utilization and Planning for Sustainability, Dire Dawa, Ethiopia. 1: 40-45.

Federal Democratic Republic of Ethiopia (FDRE, 2008).Population Census Commission.Summary and statistical report of the 2007 population and housing census. Addis Ababa, Ethiopia.

Federal Food Security Coordination Bureau (FSB), 2007. Annual Report Amharic Version, Addis Ababa. 4:30-35.

Foster, G.E., Greer, J. and Thorbacke, E. 1984. A Class of Decomposable Poverty Measure. Econometrics 52(3): 761-766.

Gujarati, D.N. 1995. Basic econometrics (3rd ed), McGraw Hill, Inc., New York.

Hoddinott, J. 2001. Method for Rural Development projects: Food Security in practice, IFPRI, Washington D.C. 1: 80-100.

Hoddinott, J. 2001. Method for Rural Development projects: Food Security in practice, IFPRI, Washington D.C. 1: 80-100.

Kebebew Z, Garedew W, Debela A. 2011. Understanding home-garden in household food security: case study around Jimma, Southwestern Ethiopia. Research Journal of Applied Sciences 6(1):38-43.

Maddala, G.S. 1981. Introduction to Econometrics: Business Economics, Second Edition. Florida University, Macmillan, New York.

MoFED. (2012). Ethiopia's Progress Towards Eradicating Poverty: An Interim Report on Poverty Analysis Study (2010/11). Development Planning and Research Directorate, Ministry of Finance and Economic Development, Addis Ababa, Ethiopia.

Sene, A. 1981. *Poverty and Famine. An Essay on Entitlement and Deprivation.* Oxford, Oxford University Press.

Wagayehu, B. 2005. Stochastic dominance analysis of soil and water conservation in subsistence crop production in the Eastern Ethiopian highlands: The case of the Hunde-Lafto area. *Environmental and Resource Economics* 32: 533-550

Webb, P., Von and Braun, J. 1994. Famine and Food Security in Ethiopia: Lessons for Africa, John Wiley and son's ltd, New York, USA

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