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PROCEEDINGS OF THE FOURTH REGIONAL CONFERENCE OF THE AMHARA REGIONAL STATE ECONOMIC DEVELOPMENT

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FOREWORD

The Ethiopian Economic Association (EEA) and its Bahir Dar Chapter are happy to issue the proceeding of the Forth Annual Conference on the Amhara Regional State Economic Development. The conference organized on September 8, 2012 at the Amhara Regional State Bureau of Finance and Economic Development Conference Hall and Bureau of Agriculture and Rural Development Conference Hall. EEA organized Regional Conferences every year in collaboration with its Chapters as one of its objectives of broadening its activities and coverage at regional level so as to contribute to the economic advancement of regional states through enhancing economic policy formulation capability; the dissemination of economic research findings; promotion of dialogue on critical socio-economic issues; promotion of education in economics in higher learning institutions; enhancing national, continental and global networks of professionals and institutions; and advancement of the professional interests of its members.

The Annual Regional Conference on the Amhara National Regional State Economic Development has grown in depth and width. For the first time, the Forth Regional Conference organized in three plenary sessions and two breakout sessions to accommodate the increased papers.

The conference attracted about 130 participants including the X-President of the Amhara National Regional State and higher officials of the Regional Bureaus and expertise from Regional Bureaus, Universities, NGOs, private sector representative and EEA members in the region. The participants of the conference expressed their satisfaction on the organization of the conference and the content of the papers presented. They reflected that the papers largely focused on local issue that can contribute to the development of the region. They also recommended that the issues raised in the discussion are critical that need due attention by policy makers and implementing organs of the regions.

All papers which were presented at the Forth Annual Conference were reviewed by external reviewers and comments and suggestions including editorial comments were communicated to authors for improvement. Finally, those papers which

passed all the review and editorial process published in the Proceeding of the Forth Annual Conference on the Amhara Regional State Economic Development.

I would like to take this opportunity to express my heartfelt gratitude, on my own behalf and on behalf of the Ethiopian Economic Association, to the many people and organizations that made the conference resounding success. First and foremost, I thank the authors of the papers and the audience whose active participations made the Conference meaningful. The staffs of the Economics Department of the Bahir Dar University which runs the EEA Bahir Dar Chapter and the staff of EEA Secretariat deserve a special recognition for their passion and perseverance in managing the conference from inception to completion.

Our special thanks go to our partners who have shared our vision and provided us with generous financial support to materialize the activities of EEA. These include; The Friedrich Ebert Stiftung of Germany, The African Capacity Building Foundation (ACBF), The Think Tank Initiative of International Development Research Center (IDRC) of Canada; Civil Society Support Program (CSSP), The Norwegian Church Aid, The Royal Netherlands Embassy, The Swedish Embassy through SIDA, The Development Cooperation of Ireland (DCI) the Ireland Embassy, and the British Embassy through DFID.

Finally, I would like to extend my sincere gratitude to H.E. Ato Gedu Andargachew, the V/President of the Amhara National Regional State, for his an insightful opening address; and other senior regional government officials who spared their busy schedule and participated in the conference.

A handwritten signature in black ink, enclosed within a hand-drawn oval. The signature is stylized and appears to read 'Alemayehu Seyoum Taffesse'.

Alemayehu Seyoum Taffesse (DPhil)
President of the Ethiopian Economics Association

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IMPROVING HEALTH SERVICE UTILIZATION THROUGH COMMUNITY BASED HEALTH INSURANCE: LESSONS FROM PILOTING IN THE AMHARA REGION, ETHIOPIA

Abay Akalu¹

Abstract

The financial sources of the Ethiopian health sector are households (37%), the government (21%), employers (2%), and donors (40%). Such significant out of pocket spending can expose households to financial difficulties. Hence a sustainable health financing strategy should be envisaged. It is in light of this that the Federal Ministry of Health (FMOH) released a health insurance strategy in 2008. Among the insurance types in the strategy, community-based health insurance whose implementation is under piloting is the major one.

The purpose of this study is to assess the status of piloting community-based health insurance in the Amhara region and come up with possible scaling up recommendations. Secondary data from Woreda CBHI schemes was used to make simple calculations. The result showed that the Amhara region is on the right track in the piloting exercise. The health care utilization rate has reached 0.64 higher than the earlier 0.36. However, attention should be given by all stakeholders, especially the administrative machinery, in mobilizing the community and improving the health care service quality.

Key words: Health financing, Health insurance, community based health insurance, social health insurance, membership, health care utilization, contribution

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1. Background

The Health Policy of Ethiopia, the first of its kind in the country, was launched in September 1993. It is stated that this policy is the result of a critical examination of the nature, magnitude and root causes of the prevailing health problems of the country. The policy founded on commitment to democracy and the rights and powers of the people that derive from it and to decentralization as the most appropriate system of government for the full exercise of these rights and powers. It accords appropriate emphasis to the needs of the less-privileged rural population, which constitute the overwhelming majority of the people and the major productive force of the nation (FMOH, 1993). Its implementation was divided into four phases of a five year Health Sector Development Program (HSDP). It has now reached its last phase, the fourth Health Sector Development Program (HSDP IV).

Health care in Ethiopia is not financed from a single source. The National Health Account of 2007/2008 (NHA IV) reported that nationally financing sources for the Ethiopian health sector are households (37%), the government (21%), Employers (2%), and donors 40% (FMOH, 2011). As can be learnt from the data a higher proportion comes from donors and households. This financing mechanism has its own problems. The household financing is unplanned and hence demands an individual to pay at point of service. This requires an individual to have some money whenever the need for medical services arises. This is difficult for the poor or even for the rich when the medical care is too expensive. Funds from donors have also its own limitations of sustainability in terms of attached preconditions. Hence, a sustainable health care financing system should be identified.

What is more, medical care expenses have increased a lot. The major driving forces behind this continuing rise in health care costs are medical technology, health care services price inflation, and the growing health care seeking behavior of people (WHO, 2010). Such changes require a large amount of money and hence the need arises for a sustainable health care financing system.

Experience throughout the world shows that financing of health care takes different modalities. Some 100 countries have health financing from general taxes and

another 60 have payroll based mandatory health tax insurance system. Only a few countries have predominantly private health insurance financed systems. In practice most countries have mixed models (World Bank, 2008). Recently many countries have been implementing community based health insurance.

The Ethiopian government has also been investigating for ways of establishing a participatory and equitable health financing mechanism. Setting up health insurance was finally decided to be the chosen course of action. As a result the Federal Ministry of Health (FMOH) developed a health insurance strategy in 2008 stipulating the implementation of three health insurance types: social health insurance (SHI), community based health insurance (CBHI) and private health insurance (PHI). According to FMOH (2008) the social health insurance is meant for pensioners and employees of the formal sector, and contributions to the insurance fund are to be covered by employers and employees; community based health insurance covers members of the informal sector that need to be organized into some kind of community based health organization; and the amount of contributions are to be decided by the community; and private health insurance is to be established by business firms or any voluntary groups or individuals.

Currently, Health Insurance Agency is under formation. SHI proclamation is ratified and regulations are issued. For CBHI, thirteen Woredas in the four regions of the country – Amhara, Oromia, Tigray and SNNPR- are being piloted. Amhara is piloting at South Achefer, Fogera and Tehuledere Woredas whose purpose is to learn by doing so that a tested experience can be drawn and the Woredas would be centers of scaling up.

The role of health insurance is believed to be reducing health care expenditure and increasing health care utilization. Assessing, therefore, whether the health care utilization rate has improved or not, will have a vital role for policy makers. This preliminary study was envisaged to address this general objective with the following specific objectives:

- To assess the status of CBHI,
- To analyze the health care utilization rate, and
- To recommend possible scaling up options.

This study is only preliminary. It is meant to inform the academic arena on the current initiative in health insurance and provoke further research. The study depends for its analysis on the secondary data collected in the pilot Woredas. It has no advanced econometric analysis; it rather tries to explore the overall contributions of CBHI with simple ratios and explanations. The rest of the paper is organized as follows; section two gives literature review, sections three highlights the methodology, and section four presents the findings. Section five and six present lessons learnt, and conclusion and recommendations, respectively.

2. Reviewed Literature

Health financing is the function of health system concerned with the mobilization, accumulation and allocation of money to cover the health needs of the people, individually and collectively, in the health system (WHO, 2000). It is a key determinant of health system performance in terms of equity, efficiency and quality (Islam M, ed., 2007).

The share of the world's population protected against the catastrophic cost of illness rose significantly during the 20th century, with global spending on health increasing from 3 percent to 8 percent of global gross domestic product (US \$ 2.8 trillion), or 4 percent of the GDP of developing countries (US\$ 250 billion) (World Bank, 2004). In order to estimate the health expenditure pattern a national health account (NHA) is done in every country. NHA is a globally accepted framework and approach for measuring total-public, private, and donor-national health expenditure (PHRplus, 2004). The fourth NHA of Ethiopia revealed that there was a tremendous increment of 128% in the health expenditure from 2004/5 to 2007/8. It increased from US\$ 521 million in 2004/05 to over US\$ 1.1 Billion in 2007/08. It is also reported that per capita health expenditure reached 16 USD (FMHO, 2011).

Affordability, efficiency and equity are the main goals in health care that are being attempted through a variety of health care financing mechanisms ranging from simple out of pocket expenditure to health insurance. In low income countries, a tax-funded health system may not be easy to develop due to lack of a robust tax base and a low institutional capacity to effectively collect taxes. Social health

insurance also demands wide formal sector employees. So, none of them can completely hold for Ethiopia. When a taxation capacity is as low as 10 percent of GDP or less, it would take 30 percent of government revenues to meet a target of 3 percent of GDP health expenditure through formal collective health care financing channels (World Bank, 2004).

The performance of a health care service is measured by its degree of addressing equity, efficiency, access and quality. When we take access, it measures the extent at which a population can reach the health services it needs. It relates to the presence (or absence) of economic, physical, cultural and other barriers that people might face in using health services (Islam M, ed., 2007). **Financial (economic) access** refers to the measure of the extent to which people are able to pay for health services. **Physical access (also known as geographical access)** measures the extent to which health services are available and reachable. **Cultural access** also would mean some kind of exclusions due to the culture of the society (Ibid). Physical access is being addressed by construction of health facilities and cultural access by continuous community education through regular health extension programs and other behavioral change campaigns and formal education. The challenge arises regarding financial access. A considerable number of people is believed not to visit health facilities, or if it does will be exposed to catastrophic expenditures.

Health insurance has been considered and promoted as the major financing mechanism to improve access to health services, as well as to provide protection from financial risk. It is a system whereby companies, groups or individuals pay premium to an insurance entity to cover medical costs incurred by subscribers. Depending on how an insurance system is structured, it can pool the premium from the rich and healthy with the poor and sick to improve equity and thus prevent impoverishment by covering medical costs for catastrophic illness or injury.

In expanding coverage to promote health outcomes and financial protection, countries need to:-

- a. Raise sufficient and sustainable revenues efficiently and equitably to provide individuals with a basic package of essential services that both improves health

- outcomes and provides financial protection against unpredictable catastrophic or impoverishing financial losses caused by illness and injury.
- b. Manage these revenues to cover health risks equitably and efficiently so that individuals are provided with 'insurance' against unpredictable catastrophic medical care costs.
 - c. Ensure the purchase of health services in an allocatively and technically efficient manner (World Bank, 2006).

According to Hailu (2007), health insurance has existed for years in Ethiopia as a branch in the life and other insurance companies. The motive for the existence of such insurance companies was profit and as a result setting a premium depended on the health risk a client has. It adopts rules of indemnification. But with a country having a large number of poor people indemnification is unthinkable or would be very much painful. So a variant health insurance mechanism that could fully protect sick people from catastrophic health expenses should be envisaged. It is in view of this situation and with the objective of universal coverage that Ethiopia adopted a health insurance strategy in 2008.

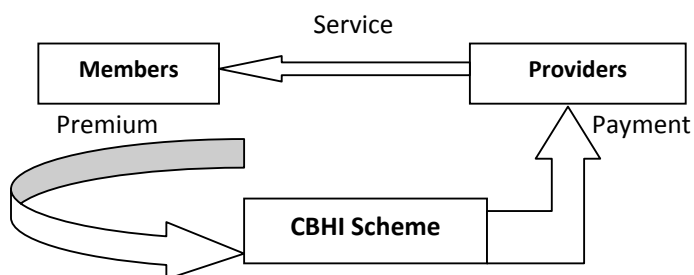
The goals of the health insurance strategy of Ethiopia are to improve access to care by reducing out of pocket spending, increase utilization of health services, improve quality of care by increasing resources for health facilities and enhancing accountability, and mobilize additional resources for the health sector through collection of contributions/premiums (FMOH, 2008).

According to Bennet (2004) it was estimated that there were 157 Mutual Health Organizations (MHOs) (one particular form of CBHI scheme) in 2004. Nearly 50 countries had attained universal coverage by 2008 (CFR, 2012).

Community based health insurance is any non-profit health financing scheme. It covers any not-for-profit insurance scheme that is aimed primarily at the informal sector and formed on the basis of ethic of mutual aid and the collective pooling of health risks, and in which the members participate in its management (Musau, 1999). They differ markedly in terms of their ownership structures, funding flows, benefit package composition, and membership. Scheme objectives and origins are

also diverse (Bennet, 2004). They work by collecting money from different sources, enter an agreement with providers (hospitals, health centers, etc.), and will pay on behalf of the beneficiary to providers. The following simple model /Figure 1/ explains how CBHI schemes operate.

Figure 1: The Basic Model of CBHI /Adapted from Bennet, 2004)



The implementation of CBHI in Ethiopia is through piloting of 13 Woredas in four regions where the Amhara region hosts three- South Achefer, Fogera and Tehuledere. The piloting is backed by a regional pilot implementation directive issued by the regional cabinet in 2010. The piloting is expected to end shortly and lessons for scaling are being compiled. The critical point that the piloting is expected to come up with among others, include the modalities of organizations in order to attain universal coverage and improve health care utilization that will eventually bring about better health status.

3. Methodology

3.1 Study Area

This preliminary study is conducted in the three pilot Woredas of Amhara region namely south Achefer, Fogera and Tehuldere. The population size of the three Woredas is as follows: Fogera 201,835, south Achefer 134,447, and Tehuledere 101,824. South Achefer is found at about 60 km south west of Bahir Dar and Fogera at 55 km to the north. Tehuledere is located to the north of Dessie at about 30 km².

² The distance in km is measured from the capital of the Woreda to the referred regional and zonal towns

3.2 Data Type, Source and Analysis

The type of data used for this study is the secondary data obtained from the pilot Woredas' CBHI executive team. This includes membership data, finance mobilized, and health care utilization data of 2011/12 or 2004 EC. The techniques of analysis are simple ratios of renewal, penetration, population coverage, and utilization rates. Based on ILO (2007) these rates are defined as follows:

- **Penetration rate**- refers to the target population covered by the scheme
- **Renewal rate**- is the number of members renewing membership in the current period as the percentage of the cohort of members covered in the previous period
- **Utilization rate**- refers to the number of times CBHI beneficiaries use a particular service in relation to the total number of beneficiaries.

4. Result and Discussion

4.1 Initiation

Piloting CBHI was started with proper preparations. There were feasibility and other studies like willingness to pay that supported the possibilities of starting. Although preliminary work was carried out earlier, the main activities started at the end of 2008 and beginning of 2009. A feasibility study was conducted that assessed whether commencing CBHI in Ethiopia would be feasible. The feasibility study came up with findings of full possibility and suggested some technical issues about membership, amount of contribution, benefit package, possible concerns of health insurance risks and even projected the basic parameters of the schemes.

Following the feasibility study, the Regional Health Bureau /RHB/ together with the Health Sector Financing Reform/ HSFR/ project developed a regional CBHI piloting directive and had it endorsed by the regional cabinet. This directive outlined the whole procedure of organization and management of schemes. With this directive at hand the RHB, HSFR and the respective Woreda stakeholders mobilized the community and organized three CBHI schemes by 2011.

4.2 Membership and Finance Mobilized

According to the regional directive (ANRS, 2010) a **CBHI member** is head of a household whose registration and contribution fee is paid by herself/himself or third party on behalf of her/him. The **financial sources** permitted in the directive include registration fee, contributions, subsidies, donations, income generating activities (if board allows), penalty and others. **Benefit package** is a list of health care services a member and his family would be eligible to access.

The organization of CBHI schemes involved a lot of work. Continuous sensitization work and Kebele level consultations to decide upon benefits of the scheme and enrolling were undertaken. The Kebele consultations were important to get public confidence and assure community participation in the setting up process.

The establishment of CBHI schemes use Woredas and Kebeles as branches. CBHI has a Woreda level general assembly /GA/ consisting of three representatives from each Kebele, and 10 elected members from Woreda offices. The founding GA inaugurates the establishment of the scheme, elects members of board of directors, and outlines roles of delegates. This assembly endorses the bylaw of each scheme. Boards of directors are established to guide the scheme and day to day execution is handled by government employees. These officials execute all CBHI activities including managing funds and signing contracts with health service providers.

Although CBHI schemes stipulate that every eligible household should be a member, a large proportion of the population is indigent and thus has no capacity to pay. This is, however, covered by government subsidy. Besides, full family membership and waiting period are requirements to benefit from CBHI. If a household head is obliged to pay for all family members, s/he will not have the chance to select only sick members for enrollment. The idea of enrolling all categories of people including the healthy and wealthy also creates solidarity within the community. The number of households and beneficiaries enrolled in the CBHI scheme is indicated in Table1.

Table 1: CBHI membership by Woreda

S/No	Particulars	Woredas			All
		South Achefer	Fogera	Tehuldere	
1	No of Kebeles	20	29	21	70
	Urban	2	2	2	6
	Rural	18	27	19	64
2	Total population	148,975	206,730	107,000	462,705
3	Total households	31,525	48,076	19,455	99,056
4	Total eligible households	29,949	43,268	18,482	91,699
	Eligible for paying	24,363	38,101	15370	77,834
5	Membership				
5.1	Payee members				
	Founding members	4344	5549	8681	18574
	Renewed members	3263	3369	7214	13846
	New enrolees / 2004/	6256	4914	4230	15400
5.2	Indigent members	5586	5167	3112	13865
5.3	Total active members	15105	13450	14556	43111

Source: Fogera, south Achefer and Tehuledere Woreda CBHI scheme office, July 2012

The table indicates that there are 70 Kebeles in the three Woredas that host a total 462,705 people and an estimated 99,056 households. Everybody in the Kebele cannot be a member of CBHI since being an employee of the informal sector is a requirement. Hence the number of formal sector employees and pensioners should be deducted from the number of total households to arrive at eligible number of households. Thus the number of eligible household is 91,699. Again all households cannot be payers as there are the indigent. So, the number of poor people should be deducted to arrive at eligible payee households. Selection of the indigent people was made using a participatory approach. However, the size depends on the Woredas capacity to finance the contribution of these poor people (10% of total). As a result the number of indigent members in Table 1 does not indicate the total number of the poor in the Woreda.

Along with the indicated members (head of households) a significant number of family members have also got registered as beneficiary. Beneficiary means all family members of a household registered as users of the scheme. The following table

shows the total size of registered population disaggregated by payee and non-payee /indigent/. Because the first round payment was on a six month basis, the first round members were enrolled from June/July 2011 to December 2012 and the second round from December 2012 onwards. Table 2 shows that more than 140 thousand people are organized under CBHI and are accessing the service.

Table 2: CBHI beneficiaries by Woreda

S/No	Beneficiaries	Woredas			All
		South Achefer	Fogera	Tehuledere	
1	Payee beneficiaries				
	2004 first half	16,396	20,055	32,479	68,930
	Renewed for 2004 2 nd half	12,370	12,893	24,897	50,160
	Newly enrolled in the 2 nd half	20,870	16,068	11,315	48,253
2	Indigent	16,344	13,510	11823	41,677
3	Active beneficiaries	49,584	42,471	48,035	140,090

Source: Fogera, south Achefer and Tehuledere Woreda CBHI scheme office, July 2012

Calculating a few ratios from this raw data shows the following results.

- a. Penetration Rate** - This rate measures the schemes' effectiveness in reaching the target population. This can be calculated using the following formula.

Current members/eligible households

Using the data in Table 1 the penetration rate or enrollment rate will be 47%. That is, 43111 divided by 91699.

- b. Renewal Rate** - This rate indicates members' value for the service and their commitment to finance their health care needs.

Renewing members/cohort of members in the previous period

Taking again data from Table 1, first round payee members were 18,574 and out of this 13,846 renewed their membership for the second round making the rate to be 74.5%. The number of indigent is not taken here as its renewal is not the function of households paying capacity.

- c. Coverage** - This can easily be calculated by dividing the total beneficiary population by total population of the Woredas. Accordingly using the data from Table 2 the coverage will be 30%.

These three indicators show that the CBHI membership in Amhara region is on the right track. The sources of income for the schemes are dominantly contribution and registration fees collected from payee members followed by subsidies received from national & regional governments. The following table shows the amount of money mobilized.

Table 3: Funds mobilized by CBHI schemes and government subsidy/starting from establishment/

Woreda	Collected money by source /ETB/				Total money mobilized
	Payee	Indigents' subsidy	General subsidy	Others	
South Achefer	1,544,760	386,466	391,505.63	5072.32	2,327,811.95
Fogera	1,075,003	292,928	393,960	4431.52	1,766,322.50
Tehuledere	1,300,758	249,655.40	602,530.38		2,152,943.78
All	3,920,521	929,049.40	1,387,996.01	9503.84	6,247,078.25

Source: Fogera, South Achefer and Tehuledere Woreda CBHI scheme office, July 2012

As can be seen from the table, the total funds mobilized are more than 6.2 million out of which payee members contributed 63%. This is a very good amount of money mobilized from 30 % of population coverage. Table 3 also contains Br 929,049.40 paid as subsidy for the indigent population. The regional government covered 90 % of the subsidy and the Woreda administration the remaining 10%.

4.3 Health Care Utilization

Health care services can be accessed from all providers i.e. private as well as public. However, since the system is at its initial stage, working first with public facilities and assessing the possible challenges have been required. Accordingly about 27 health centers and 4 public hospitals have entered an agreement to provide the service. The facilities are obliged to provide a complete service only with membership cards and any copayment is forbidden. Problems associated with the existing health system such as inefficiency and the fact that CBHI is new challenged smooth delivery. However improvements are observed particularly in health centres.

To access health services individuals should have a CBHI membership card with pictures of family members for whom contributions are paid. A household head or a

family member will also need to show an ID card while seeking service. The health facilities seeing the ID card and his/her eligibility to access the service will send him/her to the outpatient ward where the clinical support is available. Each time an examination or drug is needed, he will take the prescription or examination request paper to the registrar to have registered the expense required and get what he needs. There is no payment at the point of service. Table 4 shows the health care service accessed over the years.

Nevertheless unavailability of drugs and lack of facilities to treat some diseases still prevail. In such cases, beneficiaries will be obliged to buy what they need from outside the facility. Noting this, the board of directors of each scheme with the support of RHB has decided to reimburse the cost of such expenses as far as a beneficiary brings the request and receipt.

Taking the total number of beneficiaries who accessed a health care service and dividing it by the total beneficiaries one can arrive at utilization rates. From Table 4 the total numbers of beneficiaries who access health care utilization are 90469 and the total number of beneficiaries from Table 2 are 140,090. Dividing the users by total beneficiaries will give the rate of utilization which is 0.64, far higher than 0.36 which had been estimated some years back.

Table 4: Health service utilization and total cost

Woreda/Facility	Outpatient		Inpatient		Total	
	No of beneficiaries	Cost in Br	No of beneficiaries	Cost in Br	No of beneficiaries	Cost in Br
South Achefer						
Health Center	19,976	267,582.20	7	738.35	19,983	268,320.55
Hospital	591	80,718.55	103	50,768.20	694	131,486.75
Sub total	20,567	348,300.75	110	51,506.55	20,677	399,807.30
Fogera						
Health Center	34,991	724,413.80	10	547	35,001	724,960.80
Hospital	1013	93,696.09	155	71,756.81	1,168	165,452.90
Sub total	36,004	818,110	165	72,304	36,169	890,413.70
Tehuledere						
Health Center	37,427	1,107,379.60	80	8,357.45	37,507	1,115,737.05
Hospital	3,424	163,410.50	43	4,711.05	3,467	168,121.55
Sub total	40,851	1,270,790.10	123	13,068.50	40,974	1,283,858.60
All Woredas						
Health Center	85,361	1,943,197	97	9,642.80	85,458	1,952,839.80
Hospital	4,768	310,608.85	243	95,472.95	5,011	406,081.80
Grand total	90,129	2,253,805.85	340	105,115.75	90,469	2,358,921.60

Source: Fogera, south Achefer and Tehuledere Woreda CBHI scheme office, July 2012

5. Lessons Learnt

The possible lessons that can be learnt from such an initiative are the challenges to mobilize the community to accept the idea and have them organized. Since the community has bad memories of getting organized, they questioned whether present efforts will lead to a different type of organization. With a series of awareness creation campaigns the communities were finally convinced of the advantages of the present initiative.

Reports by beneficiaries across the three pilot Woredas appreciated the benefits of health insurance. People have started to go for early treatment which contributes to increase productivity and avoid catastrophic expenses. Health personnel in all the facilities reported improvement in the empowerment of a patient in terms of asking for service in case someone rejects their request. Another positive impact from the piloting is that medical personnel treat a patient without worrying about their ability to pay. An additional advantage to the health facilities is the mobilization of a considerable amount of money helping them to improve the quality of health care service. A very surprising impact observed so far is that no health institution reported lack of money to purchase drugs. Rather they reported the unavailability of drugs in the market.

6. Conclusion and Recommendation

The experience from the piloting showed that CBHI can be an excellent alternative to bring people to health facilities. It will also mobilize a huge amount of money to the sector and would force the country health care system financing to be performance-based that will bring efficiency and equity. However, this can only be achieved if the administrative machinery at all levels take the task as its agenda and also support the health facilities to improve their service delivery capacity.

The scaling up is very much important and it would be feasible if all the administrative machinery get involved in the public campaign and also improve the quality of health care. There needs to be a measure to capacitate health facilities in all aspects so that they will not be without a drug or equipment when a member seeks service. The last recommendation is that scaling up should be on gradual basis and the region should not be in a hurry to cover all Woredas at once.

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SELF-REPORTED HEALTH CARE SEEKING BEHAVIOR IN RURAL ETHIOPIA: EVIDENCE FROM CLINICAL VIGNETTES¹

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Abstract

Between 2000 and 2011, Ethiopia has rapidly expanded its health-care infrastructure recording an 18-fold increase in the number of health posts and a 7-fold increase in the number of health centers. However, per capita yearly outpatient health care utilization has increased only marginally - from 0.27 to 0.3. The extent to which individuals forego necessary health care, especially why and who foregoes care are issues that have received little attention in the context of low-income countries. This paper uses five clinical vignettes covering a range of context-specific child and adult-related diseases to explore the health-seeking behavior of rural Ethiopian households. We find almost universal preference for modern care. The effect of socio-economic status on the type of care sought is relatively minor and is discernible mainly for adult-related conditions. Similarly, delays in care-seeking behavior are apparent only for adult-related conditions. These child-adult differences may be attributed to the spread of health posts which focus on raising awareness of maternal and child health. Overall, the analysis suggests that the lack of health-care utilization is not driven by inability to recognize health problems or due to lack of trust in the benefits of modern care but due to supply-side restrictions.

Keywords: Health care seeking behavior; Ethiopia, clinical vignettes, foregone care

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1. Introduction

Over the past decade, Ethiopia has recorded notable progress in a number of population health outcomes. For instance child mortality per 1000 live births has fallen from 166 in 2000 to 88 in 2011 and maternal mortality rates have declined from 871 to 676 per 100,000 live births (see Table 1 for details). These changes have been accompanied by a rapid expansion in the supply of health-care infrastructure at all levels. According to Ethiopia's Federal Ministry of Health (see Table 2 for details), there has been an 18-fold increase in the number of health posts from 833 in 2000 to 15,095 in 2011 and a 7-fold increase (356 to 2,660) in the number of health centers over the same period. Consequently it is estimated that primary health care coverage has increased from 51 percent in 2000 to 92 percent in 2011.⁸

Table 1: Selected health indicators

Health indicator	Year of the survey		
	2000	2005	2011
Under five child mortality rate (per 1,000 live Births)	166	123	88
Under five child diarrhoea:			
Prevalence sometime in the two weeks before the survey (in percent)	24	18	13.4
Percentage of these for whom treatment was sought from a health facility	13	22	31.8
Under five child acute respiratory infections (ARI):			
Prevalence at some time in the two weeks before the survey (in percent)	24.4	13.8	7
Percentage of these for whom treatment was sought from a health facility	15.8	21	27
Maternal mortality ratio per 100,000 live births in the last five years preceding the survey	871	673	676
Mothers who received at least one antenatal care visit for birth in the last five years preceding the survey (in percent)	26.7	28.1	42.4
Deliveries attended by skilled health professionals in the last five years preceding the survey (in percent)	5.6	5.7	10

Source: 2000, 2005, and 2011 Ethiopian Demographic and Health Surveys.

⁸ Primary health care coverage is defined in terms of village-level access to a health post. These health posts which are staffed by health extension workers typically work on disease prevention, environmental hygiene and sanitation and health education and communication in rural parts of the country (for more details see Banteyerga, 2011).

Table 2: Basic health care infrastructure indicators in Ethiopia

Health indicator	Year		
	2000	2005/06	2011
Number of health posts	833	5,955	15,095
Number of health centers	356	635	2,660
Number of hospitals (public only)	78	86	122
Number of hospital beds (public, private and NGO)	11,689	13,922	--
Physicians (GP + Specialist) to population ratio*	1:48,829	1:35,493	1:53,642
Nurses to population ratio*	1:9,187	1:4,207	1:2,772
Rural health extension workers to population ratio	--	1:8,434	1:5,426
Primary health care coverage in percent	50.71	76.9	92.1
Outpatient care utilization per capita per year	0.27	0.33	0.30
Total hospital admissions	95,515	327,075	677,934

*Includes only those health professionals working in public health facilities

Source: 2000, 2005, and 2011 Ethiopian Health and Health Related indicators statistics obtained from the Ethiopian Federal Ministry of Health (FMOH).

Despite these increases in the supply of health care and increases in the utilization of some specific services, overall outpatient health care utilization rates remain low. For example, according to the Ethiopian Demographic and Health Surveys (Table 1) utilization rates for children suffering from diarrhoea have risen from 13 to 32 percent and for acute respiratory infection from 16 to 27 percent between 2000 to 2011, however, outpatient health care utilization per capita per year has increased only marginally from 0.27 in 2000 to 0.3 in 2011. It is unlikely that the limited increase in utilization is due to a decline in morbidity (see Mariam, 2011) and more likely that the gap between availability and utilization is driven by supply-side factors such as the availability and quality of care or demand-side constraints such as price (direct or indirect) or suppressed demand driven by difficulties in understanding disease symptoms and a low perceived need for modern health care.

Indeed the extent and the reasons for foregoing care and who foregoes care are issues that have often been overlooked in health systems research. In particular, it is difficult to measure the extent of foregone care and barring a few exceptions there is little evidence on the patterns of foregone health care in low and middle-income

countries (LMICs)⁹. Available attempts to do so (for example, see e.g. Pradhan et al., 2002 Sparrow et al., 2010), rely on explicitly asking survey respondents whether they did not use care when needed. This raises two concerns - first, poorer households may underestimate the need for health care as they may be less aware of their health problems. Highlighting this concern, data from World Health Surveys tend to show pro-rich distributions of a variety of self-reported ill-health indicators which contrasts with pro-poor inequalities in more objective indicators such as child mortality suggesting that poorer households tend to provide more positive assessments of their health status as compared to richer households. Second, even if poor households value their health in the same way as richer households, they might still report a lower *need for health care* (suppressed demand) due to insufficient knowledge of the benefits of care, distrust of the health care system and financial and/or other supply side restrictions. For example, data from the Ethiopian World Health Survey, in which respondents were asked whether they received care the last time it was needed, reveals that only 13 percent of respondents in the poorest quintile reported an unmet need for medical care (WHO, 2005). In contrast, 74.4 percent of women in the poorest quintile, interviewed in the 2011 Ethiopian Demographic Health Survey, did not receive any antenatal care during their last pregnancy (CSA and ICF International, 2012). This suggests that respondents have difficulties distinguishing between needing and using health care and that figures based on asking about foregone are likely to lead to an underestimate of unmet health needs.

One way to investigate the problem of foregone care is by using the concept of anchoring vignettes in much the same way as it has been used to correct self-reported health measures (Salomon et al., 2003; Bago d’Uva., 2008). The idea is to present survey respondents with well defined medical cases and ask them about treatment needed. By fixing the medical condition the first concern raised above, foregone care due to lack of awareness of health problems, should be mitigated. An example would be to present respondents with the symptoms of acute malaria and ask them “if, where and when” a person experiencing such conditions should seek health care. Investigating the responses to such queries will then yield evidence on

⁹ Based on the World Bank classification of countries using the 2010 GNI per capita: low income countries, \$1,005 or less; middle income countries, \$1,006 - \$12,275

the perceived need for care and support an investigation of variations in the need for health care across socioeconomic status, and other attributes of interest such as gender, ethnicity, household demographic composition and geographical location.

This approach has been adopted by several studies in high-income countries (Adamson et al., 2003; Chaturvedi et al., 1997 Chavez et al., 2010; Frie et al., 2010) and has revealed that in these countries lower socioeconomic (ethnic or education level) groups are *more* likely to consult a doctor for a given set of symptoms. Thus, the studies conclude that inequalities in actual health care utilization may be attributed to barriers in health care provision and differences in case management due to ethnic origins and not due to difficulties in understanding the symptoms of the disease or due to a lower perception of the need for care (Chaturvedi et al., 1997 Adamson et al., 2003). Despite the potential advantages of using health care vignettes as an alternative technique to analyze health care seeking behavior, this approach has not been widely used in the context of low and middle-income countries where presumably variations in the perceived need for health care are much greater than in high income countries.¹⁰

The current study uses a series of context-specific child and adult related clinical vignettes to explore the health care seeking behavior of rural Ethiopian households. The analysis deals with three issues. First, do households seek modern care, second, conditional on seeking modern care where do they seek care and finally the timing of their care-seeking behavior. Based on an assessment of these three issues and variations in responses across vignettes and across socioeconomic status we seek to shed light on why forego care and who foregoes care? Specifically, we seek to assess whether limited health care utilization is driven by on one hand lack of awareness of health problems and/or lack of knowledge of the consequences of disease-related symptoms or on the other hand due to supply-side constraints such as unavailability of care or quality of care. In terms of who foregoes care the focus is on variation

¹⁰ A recent exception is Benziger et al. (2011) - based on a vignette designed to capture acute coronary syndrome (ACS) Benziger et al. (2011) report that women in Peru are less likely to recognize the symptoms of ACS and also less likely to seek health care for chest pain as compared to men.

across socioeconomic status (education of the household head and consumption quintiles) and geographical location.¹¹

The remainder of paper is organized as follows - the next section provides a description of the data and methods. Section III contains estimates of the statistical analysis and the final section summarizes and concludes the paper.

2. Theoretical framework

The concept of health care seeking behavior in the literature is explained as a multifaceted which could be influenced by a number of factors related to socioeconomic status, self-rated health status, demographic characteristics, attitude to modern and traditional care options, and access and quality of the health care services.

One of the basic problems in the health care system of many countries is the existence of health inequality where the poorest segment of the population have less access to care and thereby low health status. According to the behavioral model developed by Andersen and Newman (2005), the need for medical care is not only depends on the illness level of the individuals. In order to have effective demand, the patients should also have the means to use health care services. Richer households spend more for health care service compared to the poor in absolute terms but they spend relatively less proportion of their income. The poor can face difficulties in accessing health care services since they need to spend a greater proportion of their household income when they need care. Thus, the people in lower socioeconomic groups are less likely to seek care compared to those in higher socioeconomic groups (Chuma et al., 2007; Droomers and Westert, 2004). Similarly, the literature emphasis that the health care seeking behavior is affected by educational status (Van der Meer and Mackenbach, 1998; Bago d'Uva et al., 2008). Those people with higher level of education status are more likely to have more understanding about the importance of health care services and thereby to need

¹¹ Geographical location may also be viewed as a proxy for ethnicity as the country is divided into states/regions based on ethnicity. In each of the regions from where the data are draw a specific ethnic group dominates except for Southern Nations, Nationalities and Peoples Region (SNNPR) which consists according to the 2007 Census contains 45 different ethnic groups (CSA, 2009).

immediate care when it is necessary compared to those with lower level of educational level.

Healthcare seeking behavior is also affected by individual characteristics like age, sex, and marital status. Household size is also the other predictor which has effect on desire to care. There is no clear and acceptable relation between such individual and household characteristics and the need for care in the literature. For instance, older people could be more likely to need care since they have more decision making in the households. On the other hand, older people may belong to traditional cohorts and they could be less likely to seek modern health care compared to the younger people (Gabrysch et al., 2009; Teffa and Chepngeno, 2005). Similarly, there is no agreement in the literature about the impact of gender and marital status on the demand (Adamson et al., 2003; Minne, 2010). This indicates that demographic factors are not the only factors that could determine the demand for care and other factors like households income and educational level could systematically influence the attitude of individuals for care at the same time.

Self-rated health status and perception to modern and traditional care are also important influencing factors in this regard. According to Kroger (1983) those people who have low self-rated health status are more likely to seek care. Attitude on the type and severity of illness also systematically determines health care service utilization. If the patient perceive that his/her illness is acute, he/she is more likely to see care immediately. Moreover, attitude towards alternative care options also influences the need for modern health care services (Glei et al., 2000). If the people trust modern care providers less than traditional providers, they are less likely to seek care from modern health facilities. Moreover, several scholars argue that there is disparity in healthcare seeking behavior related to differences in ethnicity, religion, and geographical location (Ben-Shlomo et al., 2008; Brown et al., 2011).

The geographical proximity and quality of health services could affect the decision to seek care. When the health facilities are located outside the acceptable distance to the community, the people may prefer to use either inappropriate care options or they may forgone care (Asenso-Okyere et al., 1998; Tipping and Segall, 1995; Shaikh, 2008). Similarly, people may change their need for care due to their experience in

the health care services utilization. Perceived low quality care that could happen due to low competency of health professionals and unavailability of necessary medical equipment may discourage future need for care. The way health professionals treat the patients during service delivery also matters. Moreover, the demand for care could be also influenced by the direct and indirect health care expenditures for diagnosis, drug, transport, and opportunity costs of visiting health facilities (Minne, 2010).

3. Data and Methods

3.1 Data Description

This study is based on a household survey which covers the four main regions of the country (*Tigray, Amhara, Oromia, and SNNPR*). From each of these regions, which together account for about 86 percent of the country's population (see http://www.csa.gov.et/pdf/Cen2007_firstdraft.pdf) four districts were selected and within each district a household survey was canvassed in 6 randomly chosen kebeles (peasant associations). In each of the 96 kebeles, 17 households were randomly surveyed yielding a total of 1,632 households comprising 9,455 individuals. The survey was canvassed between March and April 2011 and contains extensive information on a variety of individual and household socio-economic attributes including information on health status, health care utilization and health care seeking behavior.

The survey instrument contains five short clinical vignettes which were developed with input from researchers at Addis Ababa University's School of Public Health. The vignettes are based on illnesses that are widely prevalent in the study region and may be related to acute respiratory infection/pneumonia among babies, diarrhoea affecting female infants, adult male experiencing malaria, adult male experiencing tetanus, and an adult female affected by tuberculosis.¹² The vignettes were

¹² According to the WHO's country health profile the most prominent cause of death among Ethiopian children under the age of five is pneumonia accounting for 21 percent of child deaths. Diarrhea also figures prominently accounting for 14 percent of child deaths. In terms of burden of disease (BOD), diarrhea, respiratory infections, malaria and unintentional injuries are the four most prominent contributors to the country's BOD (see <http://www.who.int/gho/countries/eth.pdf> - accessed on August 21, 2012).

primarily designed to enable an exploration of heterogeneity in health care seeking behavior for conditions affecting children and adults. For each case respondents were asked what they would do - whether and where they would seek care and when they would seek care in case they or someone in their household were to experience the symptoms described in the vignettes. Respondents were offered a set of 11 choices for health care provider including an option for foregone care (do nothing). Conditional on their response, respondents were asked when they would seek care and were offered a set of 6 options ranging from immediate to more than a week later. The vignettes were designed with the view that medically the immediate care-seeking option may be considered the appropriate course of action (for details see Appendix A1). The vignettes were read out to respondents by trained enumerators and responses provided by household heads were recorded. Response rates for both where to seek care and when to seek care are high, 99.7 and 97.4 percent respectively.

In addition to the vignettes, information on a range of other variables was collected in order to enable an exploration of the link between health care seeking behavior and other attributes of interest. These include information on household demographic composition, education of the household head, household health status, socio-economic status as captured by per capita household consumption, attitudes towards modern health care, range of variables to control for access to public (health) infrastructure and finally a set of indicators to control for regional differences. Descriptive statistics for the sample as a whole as well as region-specific descriptive statistics are provided in Table 3.

Table 3: Descriptive statistics

Characteristics	Region				Total sample
	Tigray	Amhara	Oromia	SNNPR	
Male headed households (share)	0.72	0.91	0.91	0.90	0.86
Age of the household heads (mean)	48.01	47.64	44.01	45.25	46.23
Head's education (share)					
No education at all	0.59	0.43	0.46	0.38	0.47
Informal education	0.08	0.26	0.14	0.03	0.13
Primary	0.31	0.29	0.36	0.49	0.36
Secondary or postsecondary	0.01	0.02	0.04	0.10	0.04
HH size (mean)	5.17	5.69	5.91	6.40	5.79
Household composition (share)					
Share of children aged under 6	0.15	0.13	0.17	0.14	0.15
Share of male aged 6 to 15	0.15	0.15	0.18	0.16	0.16
Share of female aged 6 to 15	0.14	0.15	0.14	0.16	0.15
Share of male aged 16 to 64	0.22	0.26	0.24	0.26	0.25
Share of female aged 16 to 64	0.26	0.26	0.24	0.25	0.25
Share of elderly aged above 64	0.08	0.05	0.03	0.03	0.05
Self-assessed health status (SAH) – share of household					
Share of household with high SAH	0.70	0.74	0.93	0.79	0.79
Share of household with fair SAH	0.05	0.04	0.01	0.06	0.04
Share of household with low SAH	0.24	0.22	0.05	0.15	0.17
Consumption quintiles (share)					
Poorest quintile	0.23	0.14	0.05	0.38	0.20
2 nd quintile	0.24	0.22	0.12	0.21	0.20
3 rd quintile	0.23	0.22	0.20	0.15	0.20
4 th quintile	0.14	0.24	0.29	0.12	0.20
Richest quintile	0.15	0.18	0.33	0.14	0.20
Modern care can be trusted (share)					
Disagree	0.14	0.05	0.06	0.08	0.08
Neither agree nor disagree	0.07	0.03	0.09	0.06	0.06
Agree	0.80	0.92	0.85	0.86	0.85
Access to public infrastructure					
Water using from public sources (share)	0.77	0.57	0.34	0.67	0.59
Use electricity (share)	0.06	0.15	0.02	0.06	0.07
No TV signal (share)	0.80	0.53	0.81	0.68	0.70
No mobile signal (share)	0.92	0.73	0.74	0.78	0.79
Travel time to the nearest health post (in minutes, mean)	34.54	31.2	24.65	21.36	27.81
Travel time to the nearest health center (in minutes, mean)	74.38	65.65	63.92	54.68	64.66
Travel time to the nearest public hospital (in minutes, mean)	140.87	116.83	96.31	88.68	110.65
<i>N</i>	408	408	408	408	1632

3.2 Statistical Analysis

The analysis begins by examining responses to the two parts of each vignette, that is, where to seek care and when to seek care. This is followed by an examination of a binary outcome - the probability of seeking (modern) care versus the alternative of other care options.¹³ Odds ratios based on logit regressions of the binary outcome as a function of a number of individual, household and village characteristics are provided for each vignette. While the use of binary response models is consistent with other papers in the field (Chaturvedi et al. 2003; Adamson et al., 2003) given the limited variation (as will be seen later) we also estimate a set of odds ratios based on a series of multinomial logit (MNL) models for each vignette. To enhance the tractability of the empirical work the 11 options offered to respondents are classified into five options which include seeking care from health posts, health centers, private/NGO clinics, public/private/NGO hospitals and other options. While we follow this five-part classification for all the vignettes an exception is the tuberculosis-related vignette where due to the unlikelihood of getting treatment from a health post for the described symptoms, we re-estimate a MNL model where seeking care from a health post is classified as part of other care options. Conditional on choosing modern care we examine the timing of care-seeking behavior using a set of ordered logit models. The outcome variable consists of five options – seek care immediately, the next day, after two days, between three days to one week, a week or more.

4. Results

4.1 Where to Seek Care

Table 4 provides vignette-specific information on the reported choices. The table reveals a potentially striking pattern - across all vignettes there is a strong preference for modern care. Only in a handful of cases ranging from 2 percent for diarrhoea and about 5 percent for malaria do households report that they would resort to other options. Given the country's low socio-economic development and low educational stock (see Table 3) this is surprising. A potential explanation may lie in the rapid and recent spread of health posts and health extension workers who

¹³ 'Other care' includes do nothing, traditional healers, religious healers, and visiting a pharmacy/drug store.

since 2004-05 have been charged with the responsibility of raising awareness of health issues. This interpretation is buttressed by the descriptive statistics provided in Table 3 which show that across the board 85 percent of the sample respondents agree with the statement that modern sources of health care can be trusted.

Table 4: Responses to the vignettes

	Case vignette ^a				
	ARI/ Pneumonia	Diarrhoea	Malaria	Tetanus	Tuberculosis
Where to seek care					
Health post	41.43	33.38	21.73	24.35	19.66
Health center	49.80	56.68	61.58	59.29	60.55
Private clinic	4.19	5.82	6.94	6.87	6.23
Mission/NGO clinic	0.20	0.20	0.26	0.20	0.33
Public hospital	1.37	1.51	4.45	4.32	9.96
Private hospital	0.13	0.20	0.20	0.13	0.33
Mission/NGO hospital	0.07	0.07	0.00	0.07	0.00
Pharmacy/drug store	0.20	0.39	0.26	0.39	0.00
Religious healer	0.79	0.33	1.18	0.13	1.18
Traditional healer	0.72	0.92	1.83	1.77	0.66
Do nothing	1.11	0.52	1.57	2.49	1.11
When to seek care^b					
Immediately	54.24	45.76	27.67	34.86	21.05
The next day	37.04	39.11	31.47	25.97	25.35
After two days	6.95	11.61	22.72	17.27	17.64
Between three and a week	1.33	2.64	12.42	11.86	12.77
After a week or more than a week	0.44	0.88	5.73	10.05	23.20
<i>N</i>	1,632				

^a All figures in the table are in percent.

^b Only for respondents who use modern care (that is, health post, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and Mission/NGO hospitals).

Nevertheless, surprised by these high rates of modern care uptake in response to hypothetical symptoms we also examined actual outpatient health care seeking behavior. While these two - actual health care seeking behavior without any controls for the particular disease affecting individuals and hypothetical care seeking behavior in response to a description of disease-related symptoms may not be comparable, given the high rate of modern care uptake we felt it was important to examine actual utilization in order to get a sense of the credibility of the vignette instrument. Figures for actual health seeking behavior provided in Table 5 show that foregone care is close to 30 percent as compared to about 5 percent on the basis of

the vignettes – a clear difference. However, conditional on facing an illness/injury close to 90 percent of respondents report that they use modern care as opposed to other care options. This figure is quite similar to that obtained from the vignettes suggesting that the overwhelming reliance on modern care as revealed by the vignettes is not unusual and may be a consequence of the rapid spread of Ethiopia's health extension program.

Table 5: Outpatient care utilization

	<i>N</i> (%)
Household members reporting illness/injury in the two months preceding the survey (percent of sample)	1,161 (13.53)
Obtained health care conditional on illness/injury (percent of those reporting illness/injury)	818 (70.64)
Source of care (percent who report conditional on illness/injury)	777 (95)
Health post	58 (7.46)
Health center	399 (51.35)
Private clinic	137 (17.63)
Mission/NGO clinic	7 (0.90)
Public hospital	70 (9.01)
Private hospital	13 (1.67)
Mission/NGO hospital	6 (0.77)
Pharmacy/drug store	31 (3.99)
Religious healer	4 (0.51)
Traditional healer	24 (3.09)
At home	19 (2.45)
Neighbor's home	2 (0.26)
Other	7 (0.90)

To explore patterns in health care seeking behavior across various characteristics we provide estimates of the probability of using modern care based on a set of logit models (Table 6). While variation is limited, since about 95 percent of the respondents report that they would opt for modern care, we persist in doing so in order to enhance comparability with other papers in this genre (Adamson et al., 2003; Chaturvedi et al., 1997). Two clear patterns emerge from these estimates. Across all socio-economic categories as captured by the education of the household head and consumption quintiles, health care seeking behavior for the two most common sources of child morbidity and mortality (ARI/pneumonia and diarrhoea) and for tetanus do not differ systematically. Exceptions are malaria where households in the richer quintiles are 2.1 to 2.7 times more likely to seek modern care as compared to those in the poorest quintile and tuberculosis (specification in column 6) where households in the richer quintiles are 1.9 to 3.2 times more likely to seek modern care. The uniformity of health care seeking behavior displayed across consumption quintiles suggests that information on health education and the appropriate course of action for the most common childhood diseases, which is the focus of the health extension program, seems to have percolated to the lowest socio-economic quintiles. The second clear pattern is that across all vignettes, households in Tigray, Amhara, and Oromia are far more likely to use modern care as compared to their counterparts in SNNPR. The reason for this sharp difference across regions is not entirely clear as these are differences which persist after controlling for socio-economic status and availability of public infrastructure including access to health services as measured by time taken to travel to the nearest public health facilities. Indeed, if anything, access to public health facilities in SNNPR seems to be better or at least at par with other regions (see Table 3). It is possible that the quality of health facilities is substantially different in SNNPR as compared to other areas but, at the moment, an exploration of this aspect is precluded due to lack of data.

Table 6: Probability of seeking modern care – Odds ratios based on logit specifications

Variables	ARI/ Pneumonia	Diarrhoea	Malaria	Tetanus	Tuberculosis	Tuberculosis
	(1)	(2)	(3)	(4)	(5)	(6)
Head sex	1.911	1.555	1.149	0.923	2.432*	1.294
Head age	1.000	0.973	1.015	0.981	0.960**	0.985**
Head's education (ref: no education at all)						
Informal education	0.827	0.285**	0.433**	1.150	1.139	1.021
Primary	0.905	0.750	1.967**	1.247	1.110	0.702**
Secondary or post secondary	3.532			1.525	1.321	0.543*
Household size	1.018	1.147	0.907	1.240**	0.954	1.025
HH composition (ref: share of male adult aged 16 to 64)						
Share of children aged under 6	0.0761*	0.0714	0.233	0.0355***	0.0272**	0.661
Share of male aged 6 to 15	0.922	0.327	0.496	0.115*	0.158	1.425
Share of female aged 6 to 15	0.0413**	1.193	1.009	0.379	0.302	1.232
Share of female aged 16 to 64	1.764	0.662	0.139	0.912	0.174	0.502
Share of elderly aged above 64	0.156	0.155	0.0322***	0.391	0.209	0.810
HH health status (ref: Share of household with good SAH)						
Share of household with fair SAH	2.173	1.648	1.606	1.735	0.605	1.170
Share of household with low SAH	7.492	2.059	195.6**	6.005	8.521	0.620
Consumption quintiles (ref: poorest quintile)						
2 nd quintile	1.856	2.214	2.693**	1.414	2.160	2.257***
3 rd quintile	2.441	2.384	1.665	0.975	1.140	1.915***
4 th quintile	0.783	1.847	2.765**	1.359	1.036	3.231***
Richest quintile	0.743	3.706*	2.121*	1.041	0.637	2.289***
Trust in modern health care (ref: disagree)						
Agree	1.323	1.682	3.740***	2.697***	1.905	0.497***
Neither agree nor disagree	0.586	0.562	0.659	0.401**	0.200***	0.215***
Access to public infrastructure						
Water using from public sources	0.908	0.747	1.300	0.963	1.080	0.923
Use electricity	3.723	2.302	0.758	1.104	4.124	2.404**
No TV signal	1.374	2.645**	1.294	0.864	1.198	0.710*
No mobile signal	1.077	1.133	1.430	1.349	2.834***	1.119
Travel time to the nearest health post (in minutes)	1.004	0.995	1.018**	1.010	1.001	1.005
Travel time to the nearest health center (in minutes)	1.004	1.007	0.997	0.997	0.998	0.992***
Travel time to the nearest public hospital (in minutes)	0.994**	0.992***	0.995**	0.996*	0.998	1.002**
Regional dummies (ref: SNNPR)						
Tigray	6.757***	7.204***	4.425***	5.441***	5.327***	1.083
Amhara	4.517***	10.58***	2.463**	3.124***	2.131	4.929***
Oromia	3.199**	6.701***	3.405***	5.415***	2.344*	7.830***
N	1,578	1,509	1,509	1,577	1,576	1,576

*** p<0.01, ** p<0.05, * p<0.1

Note: Except for the result in the last column, modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals and other care option includes do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Tables 7A to 7F provide multinomial logit estimates of health-seeking behavior for each of the vignettes. Across all cases characteristics such as the sex and age of the household head, household size and demographic composition and self-assessed health status do not appear to be systematically related to health-seeking behavior. Accordingly for each vignette we focus mainly on the link between socioeconomic status, geographical local and health care seeking behavior.

The estimates of the ARI/pneumonia vignette show that household heads with any kind of education are 1.3 to 1.9 times more likely to take their children to health centers which potentially offer higher quality of care as opposed to health posts as compared to household heads with no education. Educational status is not systematically related to other sources of health care, and interestingly even household heads with no education are unlikely to rely on other care options. Household consumption seems to have little bearing on the outcome. Turning to diarrhoea, educational status does not exert much of an influence on care-seeking behavior and once again household heads with no education are not systematically drawn to the other care options. However, there is clear evidence that households in higher consumption quintiles are more likely to access hospitals as opposed to other sources of health care. While there are some differences in health-seeking behavior across educational categories and consumption quintiles the remarkable aspect is not the difference but the similarities which suggest that regardless of socio-economic status, as far as children's diseases are concerned, household heads recognize the symptoms and seek appropriate care.

With regard to the three vignettes for adults - malaria, tetanus and tuberculosis – household consumption appears to play an important role in influencing choice of outcome. Households in the bottom quintile appear to be restricted to health posts while all other consumption quintiles appear to be far more likely to access higher level health facilities. At the same time there is no evidence that even households in the lower-most quintile are being pushed to other care options. Indeed in the case of tetanus and tuberculosis it seems that households in some of the better-of quintiles are more likely to choose other care options. The role of education is muted and apart from some cases such as malaria, where households with informal education are 4.6 times more likely to resort to other care options as compared to the uneducated it does not seem that household education levels have a strong bearing on choice of provider.

Table 7A: Probability of seeking care for ARI/pneumonia– Odds ratios based on multinomial logit specifications

Variables	Health center	Private/ NGO clinic	Public/Private NGO hospital	Other care options
Head sex	1.014	2.520	2.467	0.728
Head age	0.992	1.008	1.006	1.010
Head's education (ref: no education at all)				
Informal education	1.705***	1.063	0.287	0.747
Primary	1.340*	0.650	0.686	0.610
Secondary or post secondary	1.917**	0.726	1.170	0
Household size	1.052	0.976	1.056	0.961
HH composition (ref: share of male adult aged 16 to 64)				
Share of children aged under 6	0.232***	0.259	1.285	20.03
Share of male aged 6 to 15	0.688	5.160	4.540	7.716
Share of female aged 6 to 15	1.042	3.169	1.882	41.03*
Share of female aged 16 to 64	0.547	2.108	0.390	4.057
Share of elderly aged above 64	1.069	0.145	0.00131	20.34
HH health status (ref: Share of good SAH)				
Share of fair SAH	0.821	0.709	0.108	0.533
Share of low SAH	0.369**	0.220	0	0.0161
Consumption quintiles (ref: poorest quintile)				
2 nd quintile	1.252	1.415	2.160e+08***	0.579
3 rd quintile	1.228	1.380	5.112e+08***	0.593
4 th quintile	1.188	1.401	9.503e+08***	1.398
Richest quintile	1.164	1.640	7.353e+08***	1.426
Trust in modern health care (ref: disagree)				
Agree	0.725	1.141	0.393	0.463
Neither agree nor disagree	0.383***	0.853	0	1.018
Access to public infrastructure				
Water using from public sources	1.259*	0.735	0.236**	0.843
Use electricity	4.275***	3.215*	18.55***	0
No TV signal	1.000	0.747	1.358	0.405*
No mobile signal	2.245***	0.800	6.658**	0.960
Travel time to the nearest health post (in minutes)	1.013***	0.994	1.012	1.010
Travel time to the nearest health center (in minutes)	0.990***	1.002	1.003	0.994
Travel time to the nearest public hospital (in minutes)	1.002	0.997	0.990*	1.010***
Regional dummies (ref: SNNPR)				
Tigray	0.718*	0.0752***	0.459	0.0985***
Amhara	6.392***	1.232	1.021	0.645
Oromia	2.414***	0.680	0.669	0.105***
<i>N</i>	1,559	1,559	1,559	1,559

*** p<0.01, ** p<0.05, * p<0.1

Notes: The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Table 7B: Probability of seeking care for diarrhoea– Odds ratios based on multinomial logit specifications

Variables	Health center	Private/ NGO clinic	Public/Private/ NGO hospital	Other care options
Head sex	0.954	1.009	6.360	1.517
Head age	0.990	1.001	0.983	1.020
Head's education (ref: no education at all)				
Informal education	1.378	0.572	0.160*	3.531*
Primary	0.961	0.645	0.477	1.177
Secondary or post secondary	1.113	0.757	0.768	0
Household size	1.046	1.136	1.010	0.897
HH composition (ref: share of male adult aged 16 to 64)				
Share of children aged under 6	0.283**	0.131*	0.123	2.644
Share of male aged 6 to 15	0.775	1.518	0.555	3.527
Share of female aged 6 to 15	0.609	0.415	1.385	0.165
Share of female aged 16 to 64	0.746	0.732	0.887	2.700
Share of elderly aged above 64	0.981	0.0661	0.168	20.60
HH health status (ref: Share of good SAH)				
Share of fair SAH	0.892	0.854	0.353	0.653
Share of low SAH	0.410*	0.0266*	0.181	0.199
Consumption quintiles (ref: poorest quintile)				
2 nd quintile	1.431*	1.990*	7.667*	0.533
3 rd quintile	1.457*	1.456	7.713*	0.624
4 th quintile	1.145	1.544	10.47**	0.943
Richest quintile	1.275	1.891	6.936*	0.450
Trust in modern health care (ref: disagree)				
Agree	0.783	1.269	0.336	0.327*
Neither agree nor disagree	0.360***	0.989	0	1.058
Access to public infrastructure				
Water using from public sources	1.032	0.740	0.246***	2.023
Use electricity	3.399***	2.771*	28.60***	0
No TV signal	0.843	0.817	2.328	0.351**
No mobile signal	1.120	0.311***	1.306	0.769
Travel time to the nearest health post (in minutes)	1.014***	0.998	1.001	1.021*
Travel time to the nearest health center (in minutes)	0.992***	1.004	1.005	0.982** *
Travel time to the nearest public hospital (in minutes)	1.001	0.989***	0.996	1.014** *
Regional dummies (ref: SNNPR)				
Tigray	0.702*	0.0519***	0.342	0.0464* **
Amhara	4.241***	2.498**	1.812	0.203**
Oromia	3.011***	2.653***	1.200	0
Observation	1,569	1,569	1,569	1,569

*** p<0.01, ** p<0.05, * p<0.1

Notes: The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Table 7C: Probability of seeking care for malaria – Odds ratios based on multinomial logit specifications

Variables	Health center	Private/ NGO clinic	Public/Private/ NGO hospital	Other care options
Head sex	1.089	1.454	1.864	0.897
Head age	0.990	1.003	0.993	0.965*
Head's education (ref: no education at all)				
Informal education	1.562	1.200	1.440	4.648***
Primary	0.799	0.607*	0.976	0.342**
Secondary or post secondary	0.616	0.419	0.569	0
Household size	1.050	1.126	1.037	1.253**
HH composition (ref: share of male adult aged 16 to 64)				
Share of children aged under 6	0.719	0.475	0.452	0.582
Share of male aged 6 to 15	1.237	3.226	1.515	2.668
Share of female aged 6 to 15	1.230	1.998	1.129	1.628
Share of female aged 16 to 64	0.823	0.586	0.457	5.351
Share of elderly aged above 64	0.768	0.642	2.136	103.2***
HH health status (ref: Share of good SAH)				
Share of fair SAH	1.039	1.375	0.394*	0.254*
Share of low SAH	0.584	0.0810	0.368	0.00143**
Consumption quintiles (ref: poorest quintile)				
2 nd quintile	2.092***	2.635**	2.176	0.736
3 rd quintile	2.113***	2.384**	2.621*	0.686
4 th quintile	2.183***	2.366**	5.388***	0.931
Richest quintile	2.010***	3.603***	3.228**	1.310
Trust in modern health care (ref: disagree)				
Agree	0.439***	1.115	0.603	0.0816***
Neither agree nor disagree	0.225***	0.567	0.340	0.154***
Access to public infrastructure				
Water using from public sources	1.002	0.732	0.510**	0.566
Use electricity	3.581***	1.967	6.716***	4.466**
No TV signal	0.501***	0.436***	1.838	0.337***
No mobile signal	1.443	0.561*	0.394**	1.359
Travel time to the nearest health post (in minutes)	1.012***	0.993	1.000	0.993
Travel time to the nearest health center (in minutes)	0.990***	1.003	1.000	0.998
Travel time to the nearest public hospital (in minutes)	1.003**	0.993**	1.001	1.008**
Regional dummies (ref: SNNPR)				
Tigray	1.038	0.162***	1.022	0.0638***
Amhara	4.052***	2.690***	6.517***	0.949
Oromia	7.808***	7.294***	8.065***	0.202*
Observation	1,554	1,554	1,554	1,554

*** p<0.01, ** p<0.05, * p<0.1

Notes: The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores

Table 7D: Probability of seeking care for tetanus – Odds ratios based on multinomial logit specifications

Variables	Health center	Private/ NGO clinic	Public/Private /NGO hospital	Other care options
Head sex	0.848	1.895	2.075	1.187
Head age	0.992	0.997	1.006	0.993
Head's education (ref: no education at all)				
Informal education	1.148	0.470*	0.563	0.453
Primary	0.895	0.459***	0.715	0.341**
Secondary or post secondary	0.977	0.229**	0.172	0.696
Household size	1.063	1.046	1.028	1.027
HH composition (ref: share of male adult aged 16 to 64)				
Share of children aged under 6	1.105	1.327	2.180	77.24**
Share of male aged 6 to 15	1.845	2.748	1.605	140.9***
Share of female aged 6 to 15	1.062	1.584	0.497	6.263
Share of female aged 16 to 64	1.098	0.323	1.017	8.144
Share of elderly aged above 64	1.426	0.323	1.582	47.37**
HH health status (ref: Share of good SAH)				
Share of fair SAH	0.942	1.375	0.852	0.246
Share of low SAH	0.447*	0.0375*	0.173	0.0250
Consumption quintiles (ref: poorest quintile)				
2 nd quintile	1.777***	2.330**	4.931**	2.203
3 rd quintile	1.484*	1.978*	5.776**	1.124
4 th quintile	2.125***	2.050	15.24***	3.063*
Richest quintile	1.596*	2.306*	4.838**	5.192***
Trust in modern health care (ref: disagree)				
Agree	0.413***	2.747	0.986	0.0821***
Neither agree nor disagree	0.309***	1.253	0.617	0.408
Access to public infrastructure				
Water using from public sources	0.958	0.692	0.389***	1.105
Use electricity	2.133**	2.547*	3.711**	1.017
No TV signal	0.654**	0.515**	1.837	0.638
No mobile signal	1.297	0.438***	0.325***	0.723
Travel time to the nearest health post (in minutes)	1.016***	1.004	1.003	0.999
Travel time to the nearest health center (in minutes)	0.989***	1.003	1.002	1.002
Travel time to the nearest public hospital (in minutes)	1.003**	0.989***	0.997	1.003
Regional dummies (ref: SNNPR)				
Tigray	1.200	0.140**	1.332	0.123***
Amhara	3.812***	2.594***	3.478**	1.155
Oromia	9.857***	10.64***	10.24***	0
Observation	1,537	1,537	1,537	1,537

*** p<0.01, ** p<0.05, * p<0.1

Notes: The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores

Table 7E: Probability of seeking care for tuberculosis – Odds ratios based on multinomial logit specifications

Variables	Health center	Private/ NGO clinic	Public/Private/ NGO hospital	Other care options ^a
Head sex	1.113	2.964*	1.724	0.338*
Head age	0.988	0.997	0.990	1.045**
Head's education (ref: no education at all)				
Informal education	1.027	0.671	1.203	1.079
Primary	0.698**	0.522**	0.536**	0.547
Secondary or post secondary	0.546*	0.227**	0.349*	0.329
Household size	1.043	0.990	1.028	1.213
HH composition (ref: share of male adult aged 16 to 64)				
Share of children aged under 6	1.061	0.313	3.912	13.12
Share of male aged 6 to 15	1.730	2.971	3.637	97.47***
Share of female aged 6 to 15	1.399	1.228	2.451	4.729
Share of female aged 16 to 64	0.544	0.259	1.414	2.894
Share of elderly aged above 64	0.914	0.234	2.732	11.77
HH health status (ref: Share of good SAH)				
Share of fair SAH	1.334	1.862	1.099	1.408
Share of low SAH	0.624	0.0251**	0.168	0.0461
Consumption quintiles (ref: poorest quintile)				
2 nd quintile	2.251***	2.366**	3.311***	2.271
3 rd quintile	2.012***	1.716	3.301***	0.861
4 th quintile	3.432***	2.471**	12.75***	7.473***
Richest quintile	2.659***	2.665**	7.099***	9.827***
Trust in modern health care (ref: disagree)				
Agree	0.357***	1.238	0.394**	0.210**
Neither agree nor disagree	0.261***	0.872	0.180***	0.495
Access to public infrastructure				
Water using from public sources	0.976	0.724	0.635*	0.694
Use electricity	1.919*	2.016	3.427***	0.392
No TV signal	0.696*	0.596	0.544**	0.249***
No mobile signal	1.102	0.426***	0.689	0.170***
Travel time to the nearest health post (in minutes)	1.008**	0.993	1.004	1.011
Travel time to the nearest health center (in minutes)	0.991***	1.000	0.994*	0.996
Travel time to the nearest public hospital (in minutes)	1.004***	0.994**	0.999	1.004
Regional dummies (ref: SNNPR)				
Tigray	1.008	0.167***	1.067	0.268**
Amhara	5.572***	3.514***	11.30***	1.537
Oromia	10.41***	10.44***	14.14***	0.301
Observation	1,559	1,559	1,559	1,559

*** p<0.01, ** p<0.05, * p<0.1

Notes: The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Table 7F: Probability of seeking care for tuberculosis – Odds ratios based on multinomial logit specifications

Variables	Private/ NGO Clinic	Public/Private /Ngo Hospital	Other Care Options
Head sex	2.682*	1.559	0.836
Head age	1.009	1.002	1.016**
Head's education (ref: no education at all)			
Informal education	0.651	1.171	0.957
Primary	0.750	0.774	1.359*
Secondary or post secondary	0.416	0.638	1.629
Household size	0.949	0.984	0.971
HH composition (ref: share of male adult aged 16 to 64)			
Share of children aged under 6	0.287	3.595	1.535
Share of male aged 6 to 15	1.719	2.047	0.769
Share of female aged 6 to 15	0.849	1.700	0.812
Share of female aged 16 to 64	0.462	2.524	2.044
Share of elderly aged above 64	0.253	2.885	1.303
HH health status (ref: Share of good SAH)			
Share of fair SAH	1.359	0.817	0.857
Share of low SAH	0.0423*	0.283	1.359
Consumption quintiles (ref: poorest quintile)			
2 nd quintile	1.073	1.454	0.452***
3 rd quintile	0.877	1.630	0.539***
4 th quintile	0.728	3.644***	0.344***
Richest quintile	1.011	2.611**	0.474***
Trust in modern health care (ref: disagree)			
Agree	3.524**	1.114	2.162***
Neither agree nor disagree	3.276	0.687	4.648***
Access to public infrastructure			
Water using from public sources	0.739	0.657**	1.022
Use electricity	1.048	1.810*	0.445**
No TV signal	0.857	0.789	1.357
No mobile signal	0.379***	0.629**	0.767
Travel time to the nearest health post (in minutes)	0.985**	0.996	0.993*
Travel time to the nearest health center (in minutes)	1.010***	1.004	1.009***
Travel time to the nearest public hospital (in minutes)	0.990***	0.996**	0.997***
Regional dummies (ref: SNNPR)			
Tigray	0.164***	1.061	0.852
Amhara	0.620	2.023**	0.208***
Oromia	0.992	1.384	0.132***
Observation	1,576	1,576	1,576

*** p<0.01, ** p<0.05, * p<0.1

Notes: The reference outcome is health centers. Other care options include do nothing, traditional healers, religious healers, pharmacies/drug stores and health posts..

Across all vignettes regional patterns are similar and show that households living in the Amhara and Oromia regions are far more likely to seek care from health centers, private clinics and hospitals as opposed to SNNPR and Tigray regions. At the same time households living in SNNPR have a higher probability of resorting to other care options.

4.2 When to Seek Care

While the responses to the vignettes suggest that foregone care is quite limited in the Ethiopian context it is possible that households respond to symptoms with a time lag. In the case of all five vignettes the appropriate reaction in response to the symptoms described is immediate medical attention.

Table 4 displays the distribution of the time lag between the onset of symptoms and the action of respondents. For both the child-related vignettes the reaction of respondents is swift and 91 percent report that they would seek care immediately or the next day in the case of ARI/pneumonia while the corresponding figure for diarrhoea is 86 percent. For the other cases the response is slower and ranges from an immediate/next day response rate of 46 percent for tuberculosis to 59-60 percent for malaria and tetanus. For tuberculosis the reaction time is quite slow with about a quarter of respondents indicating that they would wait for a week or more after the onset of symptoms which in fact requires immediate attention. The sharp differences in reaction times across the two sets of vignettes may be attributed to a greater concern for children as opposed to adults or perhaps more likely and consistent with the emphasis on the scaling-up of the health extension program, due to greater knowledge of the symptoms and markers of child-related diseases.

Odds ratios based on a set of vignette specific ordered logit estimates is provided in Table 8. Age and sex of the household head do not influence the timing of care-seeking. However, across the various cases, educational attainment seems to play a stronger role in influencing timing of care as opposed to choice of health care provider. For instance, in the case of tuberculosis, household heads with informal education are two times more likely to delay seeking immediate care as opposed to those with secondary education. Similarly, across all vignettes the estimates show that household heads with primary or secondary education are systematically more likely to seek care immediately as opposed to their less educated counterparts. Similar to the education effects the effect of household economic status as captured by consumption quintiles indicates that households in richer quintiles are more likely to seek care immediately. For instance in the case of ARI/pneumonia households in the two highest quintiles are 30 (1 – 0.7) to 35 (1 – 0.65) percent more likely to seek care

immediately as compared to households in lower consumption quintiles. Similar patterns prevail for malaria and tetanus although not for diarrhoea and tuberculosis.

Table 8: When to seek care – Odds ratios based on ordered logit specifications

Variables	ARI/ Pneumonia	Diarrhoea	Malaria	Tetanus	Tuberculosis	Tuberculosis- excluding health posts
Head sex	1.297	0.887	1.341*	1.266	1.271	1.002
Head age	1.005	1.008	0.994	0.998	1.000	1.002
Head's education (ref: no education at all)						
Informal education	1.058	0.906	0.933	0.821	1.483**	1.564***
Primary	0.866	0.688***	0.681***	0.780**	0.850	0.982
Secondary or post secondary	0.420***	0.655	0.500***	0.873	0.519**	0.509**
Household size	0.986	0.992	0.913***	0.909***	0.929**	0.954
HH composition (ref: share of male adult aged 16 to 64)						
Share of children aged under 6	0.966	0.821	0.711	1.130	2.303**	3.241**
Share of male aged 6 to 15	1.246	0.859	0.815	1.287	1.183	1.397
Share of female aged 6 to 15	1.071	0.977	1.797	1.601	4.890***	6.934***
Share of female aged 16 to 64	1.429	1.060	0.997	1.265	1.128	1.268
Share of elderly aged above 64	1.121	0.782	0.940	1.033	1.478	1.948
HH health status (ref: Share of good SAH)						
Share of fair SAH	0.870	0.729*	1.594***	1.088	1.018	0.961
Share of low SAH	2.658**	2.562**	2.621***	1.751	1.774	2.238*
Consumption quintiles (ref: poorest quintile)						
2 nd quintile	1.107	0.929	1.118	1.047	1.204	1.095
3 rd quintile	0.892	0.918	0.791	0.644***	1.164	1.039
4 th quintile	0.704*	0.805	0.551***	0.557***	1.165	1.047
Richest quintile	0.650**	1.043	0.642**	0.539***	1.421**	1.214
Trust in modern health care (ref: disagree)						
Agree	1.653**	1.549**	0.829	0.788	1.363*	1.534**
Neither agree nor disagree	1.671*	1.124	0.456***	0.605**	0.760	0.814
Access to public infrastructure						
Water using from public sources	0.719***	1.018	0.773**	0.818*	0.896	0.955
Use electricity	0.591**	0.602**	1.152	0.702	1.167	1.120
No TV signal	0.816	0.495***	0.443***	0.489***	0.295***	0.370***
No mobile signal	1.209	0.939	1.156	1.122	1.751***	1.857***
Travel time to the nearest health post (in minutes)	0.994**	0.992***	0.994**	1.005**	1.001	1.001
Travel time to the nearest health center (in minutes)	0.997**	1.002	1.002*	1.001	1.000	1.000
Travel time to the nearest public hospital (in minutes)	1.004***	1.001	1.003***	1.002**	1.003***	1.003***
Regional dummies (ref: SNNPR)						
Tigray	0.530***	0.777	0.459***	0.422***	0.423***	0.268***
Amhara	0.145***	0.194***	0.170***	0.222***	0.193***	0.107***
Oromia	0.485***	1.018	1.327*	1.132	1.416**	0.818
Observation	1,534	1,547	1,506	1,506	1,530	1,212

*** p<0.01, ** p<0.05, * p<0.1

Note: Modern care options include health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals.

Regional differences continue to remain pronounced. Across all vignettes households living in the Amhara and Tigray region display a greater propensity to seek care immediately as compared to households living in SNNPR. Differences are particularly pronounced in the case of the Amhara region where households are at least 78 percent (1 – 0.22 in the case of tetanus) more likely to seek care immediately as opposed to households residing in other parts of the country.

4.3 Differences in Health Care Seeking Behavior across Vignettes

Although differences in health care seeking behavior across the different vignettes is already apparent, in order to provide a clearer comparative sense of these differences we reshaped the data and estimated models for where and when to seek care conditioning on the clinical vignette by including a set of four indicator variables with ARI/Pneumonia as the reference case. The specifications also contain the set of covariates described in Table 3.

The various estimates provided in Table 9 reveal several differences in the type of care and the timing of care for child-related diseases as compared to adult-related conditions. Households appear to be far more willing to seek modern care for ARI/pneumonia and diarrhoea as compared to malaria and tetanus. For both malaria and tetanus households are 40 percent less likely to seek modern care as compared to ARI/pneumonia. Another notable pattern pertains to the timing of care. Once more there is a clear difference between child and adult related conditions with households about 4 to 9 times more likely to delay seeking immediate care as opposed to ARI/pneumonia. The difference as compared to diarrhoea is somewhat less (about 2 to 8 times) but still substantial. Estimates of the type of health care sought also show that households are more likely to seek care from higher levels of the health care system for adult-related conditions with households substantially more likely to opt for treatment from health centers and hospitals for malaria, tetanus and especially for tuberculosis. The differences in health-care seeking behavior may be due to a greater parental/household concern for children or, as is consistent with our knowledge of the context and recent developments introduced in the Ethiopian health care system, due to the widespread dissemination of

information and knowledge and the appropriate course of action for child-related diseases.

Table 9: Health care seeking behavior across vignettes^a

Variables	Probability of seeking modern care ^b	Where to seek care ^c				When to seek care ^d
		Health center	Private/ NGO clinic	Public/ Private/NGO hospital	Other care options ^e	
	(1)	(2)	(3)	(4)	(5)	(6)
Case vignette (reference ARI/pneumonia)						
Diarrhoea	1.324*	1.511***	1.825***	1.471***	1.216	1.451***
Malaria	0.601***	2.860***	3.851***	7.591***	3.853***	4.114***
Tetanus	0.592***	2.312***	3.197***	6.302***	2.311***	3.755***
Tuberculosis	1.046	3.164***	4.005***	19.90***	2.229***	9.012***
Observation	7,887	7,778	7,778	7,778	7,778	7,623

*** p<0.01, ** p<0.05, * p<0.1

^a All regressions in the table control for individual and household characteristics, access to public infrastructure and regional dummies.

^b Logit, odds ratios

^c Multinomial logit, reference outcome is health post, table contains odds ratios

^d Ordered logit, odds ratios

^e Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores

5. Conclusion

Between 2000 and 2011, Ethiopia has rapidly expanded its health-care infrastructure recording an 18-fold increase in the number of health posts and a 7-fold increase in the number of health centers. Due to this, the country has registered notable progress in reducing child and maternal mortality rate. However, per capita yearly outpatient health care utilization has increased only marginally - from 0.27 to 0.3. The extent to which individuals forego necessary health care, especially why and who foregoes care are issues that have received little attention in the context of low-income countries.

This study aims to explore the heterogeneity in probabilities of preference for modern health care and health care seeking behavior across different dimensions (gender of the household head, socioeconomic status (SES), region, access to infrastructure and so on) using household survey from rural Ethiopia.

Previous studies mainly capture forgone health care service by directly asking the individuals if they used health care services when it was needed. This approach introduces potential bias since the poor have low awareness about health problem and the benefits of cares and they often report low needs for health care. Alternatively, the current study uses purposefully designed clinical vignettes for child cases (ARI/Pneumonia and Diarrhoea) and adult cases (Malaria, Tetanus, and Tuberculosis) to develop an understanding of the perceived need for care across different groups of the community.

The result shows that almost universal preference for modern care for both child and adult cases. Across all socio-economic categories as captured by the education of the household head and consumption quintiles, health care seeking behavior for the two most common sources of child morbidity and mortality (ARI/pneumonia and diarrhoea) and for tetanus do not differ systematically. Exceptions are malaria and tuberculosis where the poorer quintiles groups are more likely to seek care from traditional sources (rather than modern) compared to those from the richer quintiles. On the other hand, the rich are more likely to get medical treatments from health centers and public hospitals.

The preference to use modern health care facilities and the urgency of care demand are also reported to vary across the regions. Households in Tigray, Amhara and Oromia regions prefer to go to modern health care providers when they experiences health problem compared to people from SNNPR. Since we controlled for SES, education and travel time to health facilities, the difference in preference to modern care could be due to variation in the quality of care.

The estimates on the choice of providers show that household heads with any kind of education are more likely to take their children to health centers (rather than health posts) for the ARI/pneumonia vignette. Educational status is not systematically related to other sources of health care. For child vignettes, there is no systematic relation between consumption quintiles and choice of providers. However, for adult vignettes, households in the bottom quintile appear to be restricted to health posts while all other consumption quintiles appear to be far more likely to access higher level health facilities (like health center and hospital).

This implies that improving the economic status of the households is important in order to make them choose the appropriate health care providers and thereby reduce forgone health care.

It is also found that when travel time to the specific facility increases, the probability of using the facility decreases. The policy implication of this finding is that the need to expand health infrastructure in order to reduce transportation cost to go to health facilities and improve health care seeking behavior of the community. Across all vignettes regional patterns are similar and show that households living in the Amhara and Oromia regions are far more likely to seek care from health centers, private clinics and hospitals as opposed to SNNPR and Tigray regions.

This study also shows variation in the urgency of care options across age groups of the household members. It seems that there would be delay in health care seeking behavior if the family members who experienced illness were adult (rather than child). Similarly, households in richer quintiles are more likely to seek care immediately (exceptions are for diarrhoea and tuberculosis). Regional differences continue to remain pronounced. Across all vignettes households living in the Amhara and Tigray regions display a greater propensity to seek care immediately as compared to households living in SNNPR.

In order to provide a clearer comparative sense of the differences between child and adult clinical cases, we reshaped the data and estimated models for where and when to seek care conditioning on the clinical vignette by including a set of four indicator variables with ARI/Pneumonia as the reference case. We find that households are more likely to seek low level care quickly for child conditions and they are more likely to sought delayed but high level care for adult condition. These child-adult differences may be attributed to the spread of health posts which focus on raising awareness of maternal and child health.

Overall, the analysis suggests that the lack of health-care utilization is not driven by low awareness of modern care or due to lack of trust in the benefits of modern care. So the problem is probably due to supply-side restrictions and/or other factors like affordability of medical prices (direct and indirect).

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Appendix Table 1: Clinical Vignettes

1. Vignette 1: A 3 month old baby, who has always been healthy and playful, has been coughing quite a lot in the last few days and is breathing rapidly. The baby has difficulty sleeping because of this cough.

1a. What would you do? (code 1) [If 11 go to 1c]	
1b. When would you take the baby to this facility? (code 2) [if 1 or 2 go to question 2a]	

2. Vignette 2: A 1 year old girl, generally in good health, has diarrhoea for 3 days now. She is still drinking some fluids, but since this morning, she's feeling sleepy and doesn't want to play.

2a. What would you do? (code 1) [If 11 go to 3]	
2b. When would you take the girl to this facility? (code 2)	

3. Vignette 3: A 20 year old male has always been healthy. For the last week, he has episodes of sudden coldness followed by rigor and then fever and sweating. These episodes occur about every two days. In between episodes he can still do some light housework.

3a. What would you do? (code 1) [If 11 go to 4]	
3b. When would you go to this facility? (code 2)	

4. Vignette 4: A 25 year old male has got a small cut in his leg when working on the field three days ago. The wound has become red and from time to time he feels a throbbing pain in his leg, but he can still walk around and do some work.

4a. What would you do? (code 1) [If 11 go to 5]	
4b. When would you go to this facility? (code 2)	

5. Vignette 5: A 35 year old female has been coughing for three weeks now. She feels more tired than usual but can still do some housework. Her relatives think she looks thinner than a few weeks ago.

5a. What would you do? (code 1)	
5b. When would you go to this facility? (code 2)	

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**THE CONTRIBUTION OF URBAN AGRICULTURE TO ADDRESS THE
CHALLENGES OF HOUSEHOLD FOOD SECURITY AND NUTRITION:
REVIEW OF THE EXPERIENCE OF USAID-URBAN GARDENS
PROGRAM FOR HIV AFFECTED WOMEN AND CHILDREN IN THE
AMHARA REGIONAL STATE**

Ayichew Kebede

Acronyms

ACSI	Amhara Credit and Saving Institution
BBS	Basic Business Skill
CBOs	Community Based Organizations
CoP/DCoP	Chief of Party/Deputy Chief of Party
CSA	Central Statistical Authority
EMMP	Environmental Mitigation & Management Plan
Eos	Extension Officers
FHI	Family Health International
GDP	Gross Domestic Product
GSL	Group Saving and Loan
GTP	Growth & Transformation Plan
Ha	Hectare
HAPCO	HIV/AIDS Prevention & Control Coordination Office
HDWs	Hand Dug Wells
HIV/AIDS	Human Immune Virus/Human Immune Deficiency Syndrome
IGAs	Income Generating Activities
IPs	Implementing Partners
Kg	Kilogram
M&E	Monitoring & Evaluation
MoFED	Ministry of Finance & Economic Development
MoH	Ministry of Health
MoU	Minutes of Understanding
NGOs	Non- Governmental Organizations
OACs	Operation Area Coordinators
OVC	Orphans & Vulnerable Children

PEPFAR	Presidential Emergency Plan for Aids Relief
PLWHA	People Living with HIV/AIDS
PSNP	Productive Safety Net Program
SME	Small & Micro Enterprise
SMS	Subject Mater Specialist
SSA	Sub Saharan Africa
TAs	Technical Advisors
TMIDA	Tana Medhanialem Integrated Development Association
ToT	Training of Trainers
TPAs	Teacher Parent Associations
UGP	Urban Gardens Program
UPA	Urban & Peri Urban Agriculture
USAID	United States Aid for International Development
USD	US Dollar
WFP	World Food Program

Abstract

Globally population is growing at an alarming rate. There is equally a rapid urbanization process triggering a growing demand for food. Food and nutrition security has been particularly top on the development agenda in many developing countries including Ethiopia over the last few decades. Urban poverty is pervasive and it has been exacerbated by HIV/AIDs pandemic, leaving hundreds of thousands of children orphans. Moreover, poor women and their families are vulnerable to the pandemic due to their low level of socio-economic status rendering them helpless. Their livelihood in general and food and nutrition security in particular remain precarious. To reverse the status quo, some concerted efforts have been made through the technical and financial support provided by donors. Urban agriculture, among others, is advocated by USAID as an alternative strategy aiming at improving the nutrition and income of the urban poor, mainly women and vulnerable children. The main trust is that it is cost effective, user friendly, and innovative. It is also believed that urban agriculture could contribute towards improving the local environment.

Notwithstanding this, urban agriculture has long been neglected at policy level and in urban land use planning. The USAID Urban Gardens Program has been

operational since 2008 in the Amhara regional state in a number of cities, intermediate towns and their hinterlands where HIV/AIDS prevalence is presumed to be high. The program is expected to contribute its share towards addressing the challenges of food security and nutrition in an urban setting targeting HIV/AIDS affected women, orphans & vulnerable children by promoting urban gardening, economic diversification, and fostering referral linkages to have access to health, education and related services. There have been, however, challenges and pitfalls undermining the benefits of urban agriculture. The purpose of this paper is to review the contribution of urban agriculture in general and USAID Urban Gardens Program in particular, towards improving household food security and nutrition of the urban hard core poor, and assess critical issues and circumstances on the subject and suggest some policy recommendations.

Key Words: Urban Agriculture, Urban gardening, Food security, Nutrition, Micro garden, vulnerable children.

1. Introduction

1.1 Background

Currently, the demand for food is increasing, more than ever before, due to high population growth and changing consumption pattern. It is anticipated that global demand for food will double, through population growth and rising levels of consumption. Half of the world's population is reported to live in cities; and 800 million people engaged in urban agriculture and feed the urban residents (Gittleman, 2009, p.3). This implies that urban agriculture is a beneficial economic activity and has the potential to contribute to urban food security through increased food availability, stability and, to some extent, through enlarging accessibility (Florence et al, 2003, pp 1-2).

On the demand side, the low income segment of the urban poor often spend about 40-60 per cent of their annual income on food. Furthermore, by 2015, about 26 cities will have 10 million people each or more which requires about 6,000 tons of food on a daily basis, and nearly 250 million hungry people live in cities (Stephen, 2012; Florence et al, 2003, P.4). Since recently, the global food crisis facing many countries in the world has been alarming. Globally, close to 1 billion people are

undernourished and the demand for food is expected to grow by 50 per cent by 2030 compared to the present levels (EU, 2012, p. 3).

Ethiopia is no exception in this respect. Population is growing at an alarming rate (2.6 per cent in 2007, though there has been slight decline over the years). According to CSA, the total population of the country was 73.8 million in 2007 while in July 2012 it was estimated at 84.3 million, making the country the second most populous in SSA (CSA, 2012). Although it has been claimed that the country has registered fast economic growth and an overall reduction in poverty over the last few years (i.e. 11.4 per cent annual real GDP growth rate and poverty (measured in terms of head count ratio) reduced from 38.7 per cent to 29.6 per cent in 2010/2011, MoFED, 2012, p.6), a lot remains to be done and poverty reduction remains outstanding and a priority policy concern.

Furthermore, urban absolute poverty and food poverty head count accounts for 25.7 per cent and 27.9 per cent of the total urban population, respectively, in the same period. Similarly, income inequality, measured by Gini coefficient, reported to be 0.37 for urban areas while children's malnutrition, measured by stunting and wasting, is reported to be 44 and 10 per cent, respectively (MoFED, 2012, p.6). This calls for a concerted effort by all actors to address the challenges of urban poverty and household food insecurity and malnutrition.

Ethiopia has long been facing recurrent droughts causing structural food deficit. Hundreds of thousands of vulnerable people are still chronically food insecure relying much on food handouts causing rural urban migration and hence posing challenges to urban areas. The most affected segments of the urban community are those in the low income bracket, vulnerable children and women. To make the condition worse, HIV/AIDS prevalence is high and rampant in many urban areas, especially in towns. In 2010/2011, for instance, adult prevalence rate was reported to be 2.3 per cent, despite some positive changes in recent years (MoFED, 2012, p.65).

The Growth and Transformation Plan (GTP) of Ethiopia has clearly stipulated that women and children are the primary target groups to be supported through

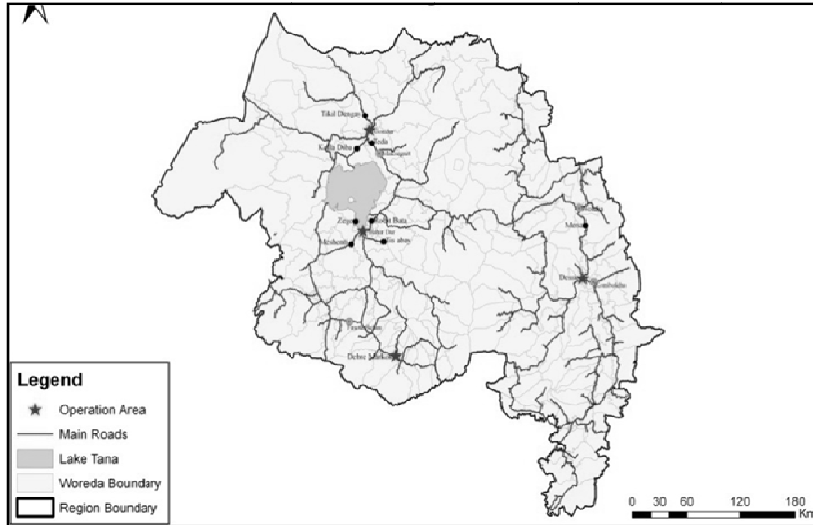
comprehensive care and support strategies. In 2010/11 it was planned to support vulnerable women and nearly half a million children to benefit from diverse social support interventions. Nonetheless, only 12.8 per cent of children had benefited from such interventions (MoFED 2012, p.64). More community based supports, targeting mainly vulnerable women and children, are thus much needed. Urban agriculture is an option, in this respect, to address the food security and nutrition challenges of the marginalized group, including poor women and highly vulnerable children as it could help to improve their nutrition, creating income and employment opportunities through harnessing local assets such as available space and water resource potentials in and around cities. But, it is argued that urban agriculture has been sidelined in the past by policy makers and town planners. For instance, Ethiopia's urban agriculture considered as a less important activity to the urban economy was given minimal attention by policy makers, though it has long been practiced in the backyards, on plots and off plots (USAID UGP, 2010, p.2). Cognizant of this fact, the Urban Agriculture Office of Addis Ababa City Administration took the initiative to draft a policy document on promoting urban agriculture as an economic activity through the technical and financial support rendered by USAID Urban Gardens Program. It is also hoped that it would influence and motivate other regional states to take similar actions and foster the legitimacy of urban agriculture as an important economic activity in urban and peri urban settings.

Against this background, the experience of USAID Urban Gardens Program in the Amhara regional state would be reviewed. The program has a national perspective and has intervened primarily in 23 major towns in Amhara, Oromia, SNNPR, Tigray regional states, including, of course, Addis Ababa City Administration. Between September 2008 and September 2011, it reached 34,200 households and over 118,000 direct and indirect orphan and vulnerable children through micro, household, schools and community gardens. In addition, the program has provided relevant education and training, tools and inputs (Nicholas, 2012, p.1).

In the Amhara regional state, the program has intervened in 14 towns, viz Bahir Dar, Gondar, Dessie, Debre Markos, Finoteselam, Maksegnet, Woldiya and Kombolcha. The programe has been further expanded to intermediate towns such as Tikle

Dingay, Tseda, Mersa, Zeghe, Tis Abay and Koladiba where the prevalence of HIV/AIDS is reported to be high. Please see map below for spatial dimensions of program operation.

Figure 1: USAID Urban Gardens Program Intervention Areas in Amhara Regional State



The program was financed by the President’s Emergency Plan for AIDS Relief (PEPFAR) and implemented by DAI, an international consulting firm selected in a competitive bid, in collaboration with several local NGOs, otherwise called implementing partners (IPs) mainly engaged in HIV/AIDS prevention and control focused activities. In the Amhara region, about 23 IPs have signed grant agreements and implemented the program through a technical backstopping service rendered by TAs.

1.2 Objective

The main objective of this review is to document and draw some lessons from USAID Urban Gardens. Program intervention particularly in the Amhara region and examine its contribution towards addressing the challenges of urban household food security and nutrition, mainly targeting HIV/AIDS affected women and OVCs. In doing so, “to what extent does the program has contributed towards addressing the challenges of

household food security and nutrition?” is the key question that this review is trying to address. Specific objectives include:

- To review the conceptual and emerging issues surrounding urban agriculture,
- To examine in detail the USAID Urban Gardens Program approaches, achievements, and challenges,
- To draw some lessons and suggest policy implications, and
- To provoke some discussions related to urban agriculture and trigger further research in the area.

1.3 Scope

The scope of this review is limited to economic and institutional dimensions of urban agriculture, especially household managed gardening and allied activities by vulnerable groups who are HIV affected women, children and family members. The gardens are established at community, school and backyard levels within the urban and peri urban locations. The social impact of the program is already assessed in a separate study conducted recently by Tufts University in sample towns including Bahir Dar (see Ritu et al., 2011).

A garden is a plot established for vegetable gardening with micro, small and large plot sizes depending on availability of space and related inputs. Plot sizes range from 1 m² using 10-12 woven bags, 30 m² drip kit system with 80 liters water tanker, and 100 sq meter drip kit system with 230 liters tanker to community gardens with up to 2-3 hectares of land where a considerable number of community gardeners are organized (USAID-UGP, 2005, p.3). The scope of this review is thus limited to these plot size options.

The program promoted vegetable crop production both for household consumption and surplus for local markets. A variety of vegetables have been grown, inter alia, head cabbage, Ethiopian cabbage, lettuce, green pepper, onion, garlic, potato, swiss chard, beat root, carrots, and Kale. Some fruit tree varieties, both local and exotic (i.e. mango, guava, avocado, papaya, apple, and banana) were introduced and planted at selected garden sites. Income generating activities, mainly poultry, vegetable marketing, and commercial seedling production have been undertaken.

All in all, program interventions are micro and small in scale, making large scale commercial urban agriculture beyond the scope of this review.

1.4 Method

1.4.1 Source of Data

The source of information for this review is mainly secondary. Available documents were reviewed to the extent possible at desk level. Strategic program documents, quarterly and annual progress and impact assessment reports were revisited. Moreover, sample surveys conducted in all program operation areas to capture the views and perceptions of beneficiaries were examined. Besides, the views of extension officers, selected IP heads and program staff are considered.

1.4.2 Sampling

As the program is designed and implemented with particular focus on designated towns and targeted beneficiaries working in community and school gardens, a random purposive sampling technique is employed. This sampling method is opted for mainly in order to cover all operation areas with contrasting features in terms of agro ecology, demography, land holding size, technology adoption and ensure a good mix of gardeners in terms of sex and age and to have a fair representation of garden sites (for summary, please see the table below). The case of Goh PLWHA association located in Tikle Dingay town, Gondar operation area, is purposely selected for focus group discussion as it has been demonstrating best practices in terms of garden management, income generating, referrals and linkage formation with local partners.

Table 1: Sample size by type of garden, beneficiary and sex

Operation Area	Total no. of gardens	Total no. of direct beneficiaries	Total no. of sample gardens	Group gardens	School gardens	Institution gardens	Sample direct beneficiary			% sample	Sample beneficiaries by sex	
							Care takers	OVCs	Total		Male	Female
Bahir Dar	27	1,335	17	10	7	-	60	33	93	7.0	40	53
Gondar	23	788	19	12	7	-	46	18	64	8.1	28	36
D/Markos	13	1,060	12	4	8	-	37	38	75	7.1	19	56
Dessie	45	1,568	43	15	27	1	45	71	116	7.4	50	66
Total	108	4752	91	41	49	1	188	160	348	7.3	137	211

Source: Annual reports & Field data, June, 2012

1.4.3 Analysis

The type of analysis made in this review is mainly qualitative description. Some quantitative data pertaining to beneficiaries, amount of vegetables produced and consumed, income earned, savings and loan groups etc are depicted using tables. Attempt is made to make some inter-temporal and spatial comparisons. Here percentage points and averages are calculated as deemed necessary.

1.5 Structure

Following this brief introduction, part two is about review of literature on theoretical frameworks, benefits and concerns surrounding urban agriculture. Attempt is made to argue on relevant concepts by drawing some lessons and empirical evidences highlighted from both developed and developing nations. Part three is the core of this review and focuses on exploring the experience of USAID Urban Gardens Program, the case of the Amhara regional state or otherwise called North cluster. In this section, program objectives, approaches, achievements, challenges and lessons learned are thoroughly discussed. In the final part, a brief conclusion and some recommendations and policy implications are given.

1.6 Limitation

This review, to a large extent, depends on secondary source of information. Limited primary data is gathered from the field in a systematic manner owing to shortage of

time and logistics problem. Nevertheless, all possible efforts have been made to minimize information gaps and maintain quality of the review.

2. Review of Literature on Urban Agriculture

2.1 HIV/AIDS and Food Security

HIV/AIDS is a deadly disease and a big challenge to many SSA countries including Ethiopia. It has prevailed for some decades now affecting individuals, households, community and national wellbeing. The productive labor force under the ages of 14-29 is thought to be highly prone to the pandemic. Women in general and the urban poor women in particular are overburdened by the pandemic due to their low level socio-economic status. In the year 2010 in the Amhara region, for instance, of the total HIV prevalence rate (i.e. 2.9 per cent), women prevalence rate was reported to be 3.5 per cent while it was a little bit lower for its male counterpart (i.e. 2.3 per cent). Furthermore, about 42,543 individuals contracted new HIV infections for all ages, and 318,220 children were reported as orphaned due to HIV/AIDS (MoH, 2007, p. 47).

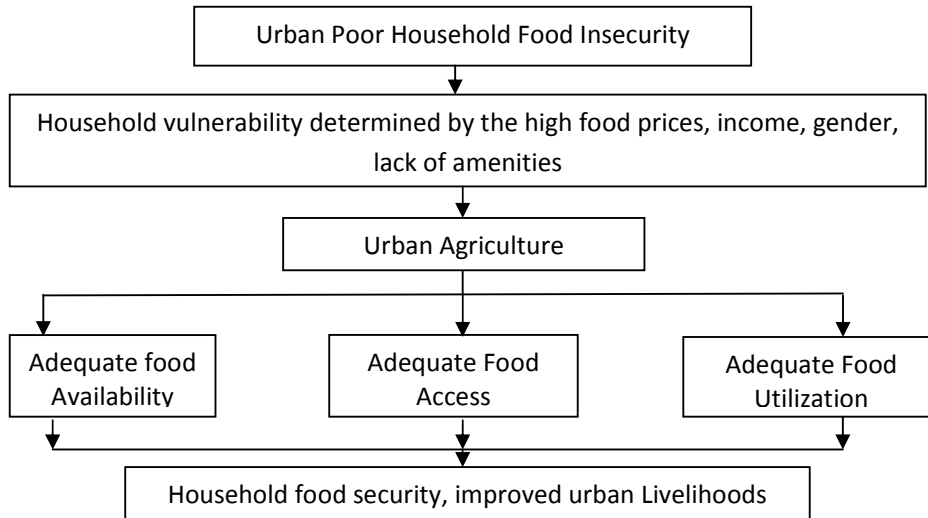
To reduce the spread and mortality rate caused by HIV/AIDS, comprehensive preventive and control measures have been undertaken, inter alia, availing of ART and provision of care and support services are in the forefront. The efficacy of ART, however, is found to be undermined due to inadequate nutrition and food available to the urban poor. For instance, adults living with HIV have 10-30 percent higher energy requirements than healthy adults while for children with HIV the energy requirement goes up to 50-100 per cent (UNAIDS, 2008 cited by Ashta et al., 2009, p.21). This implies that improving the nutrition status of poor households is critical as it strengthens the human immune system. It is further argued that it can delay the progression of the disease and makes it possible for individuals to become productive (USAID UGP, 2010, p.2). Often, both the rural and urban poor are unable to obtain the food they need (and the fuel to cook it) due to lack of money to buy it, the time and the resources to produce it (Sachs & Silk, 1987, p.1). Children are also prone to the negative effects of hunger and lack of nutrition. For instance, pre-school and school aged children who experience chronic hunger have higher levels of anxiety, depression, and behavior problems than children who do not (Katherine

and Anne, 2003, p.5). This implies that children should be supported through appropriate nutrition and food security related interventions as this could help in reducing school dropouts.

Currently, urban household food security is jeopardized by inflation. For instance, in Ethiopia, inflation has remained at double digit since the recent past causing urban food security to become more uncertain. This is clearly discernible from the following statement in one of the weekly private news papers in the country. It goes as "...though inflation has settled a bit, food prices have not by any means come down. Some meat lovers have turned vegetarian, due to the cost of meat, but even vegan food prices have not come down" (Fortune News Paper, Vol. 13 No. 632, June 10, 2012). Hence, addressing the food security and nutrition needs of the urban poor in general and vulnerable women and children in particular remains outstanding.

Anne & Manfred (1997; pp 4-11) further argue that food security is understood as the process in which food is available to all at all times in a required quantity and quality; denoting availability, access and quality as key determining factors. The committee on world food security defines food security as physical and economic access to adequate food for all household members, without undue risk of losing such access. Households are also identified as food secure if their entitlements demand for food is greater than their needs, defined as the aggregation of individual requirements. Food insecurity could be transitory or chronic depending on the level of suffering from food insecurity. The former entails temporary decline to access food while the latter refers to food insecurity by households all the time. Furthermore there are various causes for the vulnerable groups, including informal sector/self employment and unemployment, to become food insecure. The following figure illustrates the conceptual framework of urban agriculture for household food security.

Figure 2: Conceptual framework for urban agriculture as a tool for household food security (after Susan K. et al. 2010, p.87)



2.2 Urban Agriculture

2.2.1 Urban Agriculture as a Holistic System

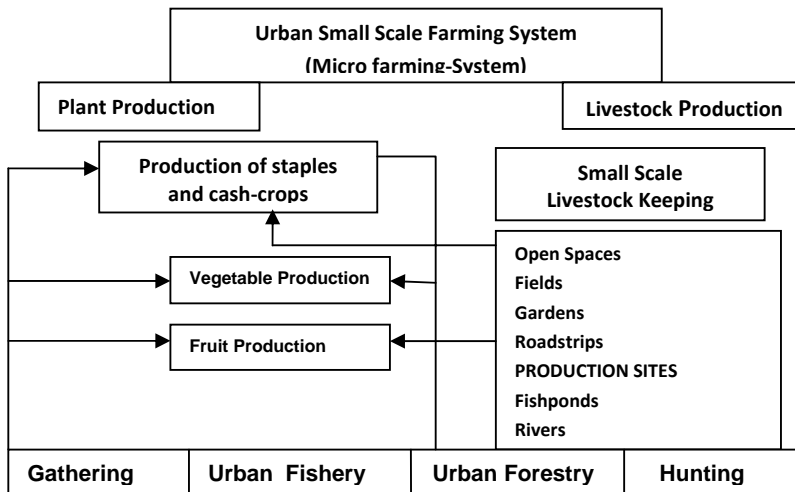
Urban agriculture is defined as the growing of crops and rearing of small ruminants, poultry, fattening, dairy etc. It also includes such economic activities like apiculture, piggery, fishery and forestry within and around cities. Home gardens are not just vegetable gardens; they often contain plants that provide starch, fruits, herbs, flowers, and medicines as well as fuel wood. Often livestock is part of the production system having an added value to use the waste to fertilize gardens and the vegetable leftovers to feed livestock. Urban agriculture is one of the many techniques that can be employed to reduce vulnerability, waste, and other problems of cities (Sachs and Silk, 1987; USAID-UGP, 2009; Deelstra, 1987, p.5).

Urban agriculture is more than growing vegetables in cities. It includes processing and distribution of food and other products through intensive plant cultivation and animal husbandry. It comprises green belts around cities, farming at the city's edge, vegetable plots in community gardens and food production in thousands of vacant inner city plots (Katherine & Anne, 2003, p.1). Its extent varies over time and place

(Streffeler, 1987, p.7). The cultivation techniques employed in the allotment gardens to grow fruits and vegetables are labor-intensive, but save on land and capital (Jerry, 1987, p.15). Hence, urban agriculture is an economic system dependent upon agricultural potentials in urban and peri urban areas. Urban agriculture is more than production, but includes all other primary production processes. The following figure illustrates urban agriculture as a holistic system.

Urban agriculture entails a complex system with diverse interests ranging from a traditional core of activities like production, processing, marketing, distribution and consumption, recreation and leisure, economic vitality and business entrepreneurship, individual health and well-being, community health and well-being, landscape beautification, and environmental restoration and remediation (Katherine & Anne, 2003, p. 3).

Figure 3: The wide range of urban agriculture within an interaction System (after Drescher 1998, modified)



Access to nutritious food is another perspective in the effort to locate food and livestock production in cities. Urban gardening is found to be most effective due to various reasons, inter alia, it entails intensive gardening through maximum utilization of limited space, is easy to practice intercropping, conserves both soil and water, make use of urban waste land, provides meaningful employment to persons

with limited skills and formal education, provides creative ways to recycle old tires and other containers, and is an inexpensive establishment (Sachs & Silk, 1987, p.2). The key feature of urban agriculture is the fact that it is integrated into the urban economy and ecological system reflecting laborers, and urban resource use (organic waste/compost, waste water recycled for irrigation). It has both positive and negative impacts on the urban ecology, competing for land with other urban functions. It involves a range of actors viz, the urban poor, lower and mid level government officials/school teachers, women in processing and selling activities, school communities, etc. Urban agriculture can be the most important resource for women, who rely on it to provide at least part of their family's food. It can also be the principal occupation of men who have no salaried job as well as an essential component of survival in the city (Streiffeler, 1987, p.7). Urban agriculture is not simply an agronomic affair or a geographical paradox but an economic and political problem (Ibid, p. 13). In a nutshell, urban agriculture should be understood in a more systematic and holistic manner rather than as a standalone economic activity.

2.2.2 Benefits of Urban Agriculture

Urban agriculture has the potential to expand the **economic** base of a city which results in increase in entrepreneurial activities, creation of jobs, food costs reduction and availability of products of better quality. Especially, it creates important opportunities to women households to be part of the informal economy. It provides employment, income, and access to food to urban populations, which together contribute to relieve chronic and emergency food insecurity. While the former refers to less affordable food and growing urban poverty, but the latter relates to breakdowns in the chains of food distribution. For instance, in Malawi, the urban poor undertake urban agriculture as food insurance and income generating activity (David et al., 2010, p.194).

Urban agriculture contributes to stability of urban food supply. Although it is influenced by seasons, it has developed means to reducing seasonal gaps in fresh foods due to climatic differences. The income earned is usually spent on non-food items (i.e. transport, housing, school fees, health costs and even female producers spent on food items (Florence et al., 2003). Urban agriculture has the potential for

creating microenterprises that can be owned and operated by community members without requiring much initial capital. It can be an effective arena for the development of small businesses (Katherine & Anne, 2003, p.9). Urban agriculture contributes to food availability in cities and therefore to the diet of urban communities. Fresh plant and animal products added to the staple food which improves the quality of urban diet (Florence et al., 2003, pp.2-5). It generates income to urban households involved in production, marketing and distribution of food, allowing them to buy food and cover other expenses, therefore contributing to household food security and nutrition. It is a relatively cheap source of fruits and vegetables and, equally important, it provides recreation (Jerry, 1987, p.14).

Urban and peri urban agriculture is quite an efficient tool to fight hunger and malnutrition since it facilitates access to food by an impoverished sector of the urban population. Urban and peri urban agricultural (UPA) surpluses can be sold in local markets, generating more income to the urban poor. Though its absolute output is limited without using intensive technology, it has a great opportunity, to use urban resources to enable some inhabitants to provide themselves with substantial portions of their recommended daily allowance of calories and proteins, including most of the vitamins and minerals needed to maintain health (Sachs & Silk, 1987). Urban agriculture is a response to the food insecurity and provided a means to poor communities to achieve for themselves adequate nutrition and livelihood (Gittleman, 2009, p.2).

Urban agriculture also offers diverse **social** benefits. These include, among others, better health and nutrition, increased income, employment, food security within the household, and community social life. Households and small communities take advantage of vacant land and contribute not only to their household food needs but also to the needs of others. Furthermore, gardening has a role in increasing the health of a community. According to some research reports, gardening 3-4 times a week has the same health benefits as moderate walking or moderate bicycling (Katherine and Anne, 2003, p.5). Farming and selling activities can easily be combined with domestic works and child care (Florence et al., 2003, p.5). Confidence or self esteem among the urban poor can also be realized; a feeling of having some base upon which to work gives them increased security, enabling them

to integrate themselves more fully with life of the city. Its contribution to increasing individuals' social networks cannot be overlooked either (Deelstra, 1987, p.7).

Individual self realization increases in the course of direct contact with nature and food production, and at the same time provides an opportunity to enjoy a more beneficial life style, health and recreational needs are met. Urban farms are also a proven effective educational tool to teach kids about healthy eating and meaningful physical activity (Jerry, 1987, p.16). Urban agriculture can optimize human resources by using immigrants from rural areas to use their knowledge to manage green spaces and enable them to adjust to life in large cities during transitions (Deelstra, 1987, p.6).

Environmental Benefits: The transformation of cities from mere consumers of food to generators of agricultural products contributes to sustainability, improved health, and poverty alleviation. It improves the quality of the urban environment through greening and, thus, a reduction in pollution. Green spaces (i.e. well worked garden plots) enable hydro geological systems to maintain their surface water through higher rain infiltration rates, produce favorable effects on air circulation, temperature, and humidity levels in cities. It can even improve the supply of drinking water (Deelstra, 1987, p.5). Local agricultural products or organic food is an added benefit of urban agriculture. It supports more sustainable production of the food that needs less use of harmful pesticides.

More food production in urban and peri urban areas means reducing the need for more transportation and energy which are not environmentally and economically rewarding. The preparation of compost helps to recycle the organic waste of many households at both the micro and macro levels which further generates employment. Its role in community development and revitalization is equally benign (Sachs & Silk, 1897, p.3).

2.2.3 Concerns & Emerging Issues

Despite the aforementioned merits, there are concerns and emerging issues surrounding urban agriculture, among others, access to land and tenure security,

absence of relevant policy, environmental sustainability and vandalism are worth mentioning. Empirical evidence shows that in Nairobi, 70 per cent of urban and peri urban agriculture takes place on public land, along roads, rivers, etc without any tenure security. It is further argued that water security is a particular obstacle to urban agriculture coupled with small plots and unfavorable land tenure matters. For instance, in Botswana, water represents 40 per cent of production costs (Florence et al., 2003, p.4). Growers find it difficult to market their locally grown food to groceries, restaurants and institutions because of wholesale distributors' monopoly. Start up costs for those with limited income is a similar concern as gardeners are obliged to cover such costs as labor, site management, water, equipment, processing, packaging and marketing (Katherine & Anne, 2003). Lack of support from local actors is a critical short coming faced by people doing urban agriculture, especially in many African countries (Steiffeler, 1987). Soil contamination is a potential problem in urban environments, particularly heavy metals such as lead. Against the above background, the following part thoroughly reviews the experience of USAID Urban Gardens Program in the Amhara Regional state.

3. Urban Gardens Program for HIV Affected Women and Children in the Amhara Regional State

3.1 Objective of the Program

The main objective of the program is to improve the **nutrition** status of target beneficiaries through urban gardening and increase their **income** through surplus vegetable marketing, fostering knowledge and **skill** transfer to ensure alternative livelihoods (USAID-UGP, 2009, P.2).

The primary target beneficiaries of the program are women who are affected by HIV/AIDS and orphans and vulnerable children and their custodians. A quarter of the program beneficiaries were day laborers while others depended largely on family meager income and still a good number of target beneficiaries depended on petty businesses and some did not have any means of income before program intervention (for details please see the below table). The following table summarizes the occupation and means of income of program beneficiaries prior to the program intervention.

Table 2: Sample households by occupation & operation area prior to program intervention

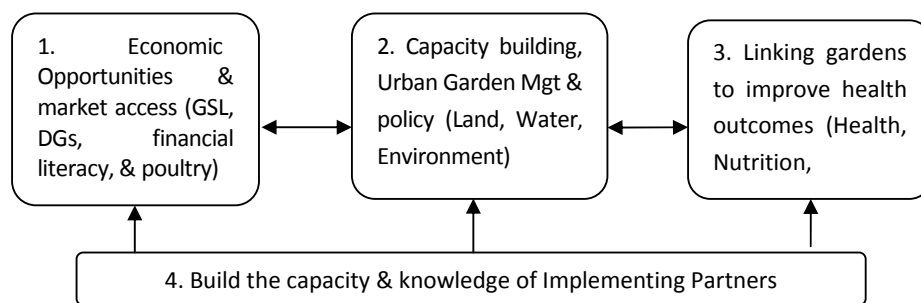
Occupation	Bahir Dar	Gondar	D/Markos	Dessie	Total	%
Family dependent	5	13	17	29	64	18.4
Day laborer	28	25	21	19	93	26.7
Petty business	8	14	22	14	58	16.7
Agriculture & related	13	3	2	1	19	5.5
Shoe shine, lottery, etc.	4	-	-	6	10	2.9
Guard, pension	5	6	4	3	18	5.2
No income source	29	3	8	46	86	24.7
	92	64	74	118	348	100.0

Source: Field survey, June, 2012

3.2 Program Components

The program consists of defined components that are interlinked with each other. These are promoting urban gardening and/or organic vegetable production through harnessing small spaces available in school compounds, road sides, vacant inner city spaces, reclaimed waste lands and institution compounds; promoting economic opportunities and marketing; and fostering referrals & linkages. Cross cutting issues viz child friendly, capacity building and environmental compliance are critical and integral part of the entire program. The following figure illustrates the priority technical components of the program.

Figure 4: USAID Urban Gardens Technical Priority Components and Programmatic Structure (USAID _UGP, 2011)



3.3 Program Approach

3.3.1 Partnership with Local NGOs

Local NGOs, which are mainly engaged in HIV/AIDS prevention and control related activities, were selected in a competitive bidding. To simplify the selection process, objective criteria were set and approved by the top management and the donor. These included: IPs track record, internal implementation capacity (mainly leadership & commitment), background experience on HIV/AIDS related intervention and agriculture, securing legal license renewed by the Charities and Societies Agency, IPs commitment to sustain gardens and integrating program activities with similar interventions, ability to secure land and water options, problem solving capacity, and data recording and reporting.

The selection process is a step by step process. Interested IPs or otherwise called local NGOs submit their proposals following standard templates prepared for the purpose. All proposals are reviewed by a technical team, a pool of TAs in their respective areas, and recommendations are made to facilitate the top management (CoP/DCoP) decision and final approval. Successful IPs are formally awarded contracts and sub-grant agreements are signed between parties.

As per the agreement, each IP is obliged to organize an orientation session, recruit 2-3 extension officers (including assistant and community mobilization officer), secure land and water options, facilitate beneficiary selection and registration, organize sensitization workshops, and facilitate the required agronomic and input supplies for urban gardening. Rapid appraisal for the required in-kind grants is supposed to be done through close support and guidance by area coordinators. Moreover, each IP is obliged to prepare and submit environmental mitigation & management plans for each garden site to ease follow up and monitoring of environmental compliance.

Fostering local partnership with city administration and line departments viz. urban agriculture, HAPCO, SME, Education & Health, and water supply which are expected to provide relevant support like providing land for urban gardening, mobilizing local materials for gardening (e.g. fencing), organizing and facilitating issuance of licenses

for PLWHA associations and SME groups, provision of skill trainings, assigning school focal persons, organizing field fairs and joint program review meetings are imperative.

3.3.2 Beneficiary Selection & Registration

Program beneficiaries were selected based on certain parameters mainly their status with respect to HIV/AIDS and vulnerability. Through the close supervision of IPs and technical support by area coordinators, Kebele administrators, CBOs, and school focal persons and principals identified and selected target beneficiaries. Each IP is supposed to embrace on average 390 HHs and 1,200 OVCs per planning period. This, however, depended on the availability of land and other inputs. IPs had also organized sensitization workshops to create awareness on program objectives, expectations, roles and responsibilities.

Kebele administrators were responsible to communicate with local residents to identify target beneficiaries in a participatory manner. The selection process of OVCs, however, was the sole responsibility of school management committees organized in each school garden site. The committee members are mainly composed of school principals, focal persons, representative of teachers and gardeners. Teacher-Parent Associations (TPAs) are in some cases consulted during the beneficiary selection process.

3.3.3 Access to Land & Water Options

Urban agriculture is undertaken in an urban setting where there is stiff competition for limited land and scarce water resources. The program has been focusing on using micro and small plots found in and around towns for urban gardening. Program area coordinators provided technical backstopping to extension officers and beneficiaries during land and water option assessment. They conducted rapid appraisal to identify potential garden sites suitable for urban gardening. This process was initially easy, but later on became challenging to secure land inside and outskirts of cities, especially in densely populated towns and fast urban expansion.

Most community gardens were located nearby river banks, dumping sites, open plots, backyards, and institution compounds. Available spaces inside school compounds were harnessed to establish school gardens. Kebele administrators, in most cases, were willing to provide the required plot for community gardening so long as it is properly utilized for the intended purpose. Community based organizations such as Idris (mainly concerned with burial services) were helpful in some instances (e.g. Gondar operation area) in securing land and water options.

Once the required plot is secured, a lease agreement or minutes of understanding (MoU) (in the case of school gardens) is signed to ensure access to land and the right to use the land for a definite period of time in the manner stipulated in the MoU. This agreement should be renewed annually by implementing partners and submitted to the program office. The overall condition in general is that beneficiaries have the right to use the land until it is required or re-claimed by local authorities any time they wanted the land for any purpose. Hence, there is no guarantee for the gardeners' to use the land on a long term basis. In this respect, there were disappointing cases here and there, especially in Bahir Dar & Gondar operation areas where few garden sites were reclaimed by local authorities. The Koladiba skill training centre institution group garden, a group garden located near Bata church (Bahir Dar), Woleka group garden (Gondar) are worth mentioning.

In general, the total plot size secured for urban gardening during the program period in all operation areas is 31.4 ha (i.e. Bahir Dar 7.7 ha, Gondar 8.52 ha, Debre Markos 6.37 ha and Dessie 8.8 ha). It should be noted here that per capita landholding is not uniform and varies from area to area. In the Dessie operation area, for instance, where the topography is undulating and with relatively a high density of population, the number of gardens established during the program period is high, almost half of the total number of gardens in the region. However, in terms of plot size, it is more or less similar to that of Bahir Dar and Debre Markos.

Urban gardening is hardly possible in a situation where there is no reliable water. In this respect, the lion's share of urban gardening depended, to a large extent, on municipal water supply and rivers. In 2011/2012 cropping season, for instance, 45 per cent of the gardens depended on municipal piped water taps, 32.7 per cent

depended on rivers, and 16 per cent on improved wells and the remaining on developed springs (USAID-UGP, annual report, 2012).

3.3.4 Sub-grant Management

Sub-grant agreement is signed between parties once contract award is offered to the highest bidder. The average annual financial grant per grantee hardly exceeded USD 12,000 though there were slight variations among sub-grantees depending on the number of gardens and agreed deliverables. Payments for accomplished deliverables were made on a quarterly basis upon receipt of activity reports and its approval by the respective program staff. Prior to submission of payment requests to the grant administrator, area coordinators and the cluster manager are responsible to review and endorse grant requests and make sure that agreed milestones are fulfilled and accomplished as per the schedule. Moreover, implementing partners are expected to properly utilize financial grants according to agreements made. The financial grant is allocated to cover operational and direct expenses, mainly for salaries of extension officers, fuel, stationary items, maintenance of motor bikes, procurement of gardening inputs like seed & seedlings, small hand tools, watering cans, grower bags, industrial materials for fencing, land preparation, etc. Notwithstanding this, there were some complaints by the majority of IPs that the allocated grant was hardly commensurate with the scope of work. Hence, IPs were often obliged to thin out program fund at the expense of garden quality. To partly solve this problem, gardeners are encouraged to voluntarily contribute local materials and free labor.

On top of the financial grant, in kind grant is delivered to each implementing partner and garden site that is especially related to irrigation and water supply options such as drip kits with accessories, diesel and electric pumps, water tankers, etc. The program also provided some motorbikes to each implementing partner to ease the movement of extension officers during field activities and to closely monitor garden management. Refresher training programs were organized to extension officers and through them to gardeners.

3.3.5 Discussion Groups

Discussion groups (DGs) are organized to solve common problems. They also serve as a platform to mobilize local resources and experience exchange. The size of a discussion group depends on the number of beneficiaries in each garden. But the set standard is 20-50 gardeners per DG. Each discussion group has a facilitator to help the group smoothly run the discussion according to agreed schedules. The role of extension officers is mainly to support gardeners to solve technical problems and make sure that group discussions are regularly conducted. Tea and coffee ceremonies are organized as refreshment. Group discussions are conducted close to garden sites to enable gardeners become more practical. They also adopt bylaws to guide group discussions. Such a platform is useful to identify practical problems and give local solutions. If there are some technical agronomic constraints beyond the ability of extension officers, they would be brought to the attention of TAs and/or SMS in local agriculture offices. The arrangement has also enabled beneficiaries to exercise participatory planning and decision making. Besides, it has helped gardeners to socialize and discuss personal affairs. There were however, some setbacks observed during group discussions; inter alia, irregularity, absenteeism, and dependency syndrome. Some gardeners failed to attend group discussions regularly due to mainly sickness, competing engagements and distance from home to garden.

3.3.6 Referral & Linkages

The program promotes internal and external referral and linkages with potential partners having shared vision. A considerable amount of effort has been exerted to create referral and linkages to enable beneficiaries get access to a range of socio-economic services viz. food, clothing & shelter, educational & skill training, psychosocial, health, and economic opportunities.

Through the close follow up by area coordinators, some guidance and technical support have been rendered to implementing partners to explore and prepare service maps in designated operation areas. Service maps are prepared in such a way that they are easily understandable, feasible and posted at central locations so that they can easily be accessible by gardener and EOs as an information source. But there must be some kind of awareness creation activity to make sure that

beneficiaries are aware of the type of service available, eligibility criteria, and the schedule of service provisions. Referral cards are also issued to selected beneficiaries to be submitted to the identified service provider. In this regard, some IPs have established a two way referral system. For instance, WFP and UGP have complemented each other's beneficiaries so long as the required criterion is met by both sides. Nonetheless, service providers are not evenly distributed in program areas. The Dessie operation area has relatively enough service providers while Bahir Dar and Debre Markos do not have any. This might be due to the fact that the distribution of NGO is not even.

3.3.7 Urban Garden Dialogue

To facilitate skill and knowledge transfer to program beneficiaries, be it in group or school gardens, the urban garden dialogue approach is employed. Urban garden dialogue is, in general, an approach that guides extension workers to provide technically backstopping service to program beneficiaries. The dialogue follows five steps viz, walk and talk, listen, plan, take action and return to garden. Extension officers should not lecture and take notes during facilitation of the dialogue. Instead, they are supposed to summarize main observations and/or issues after the dialogue session is over. Some technical manuals are prepared and made available to EOs as reference materials.

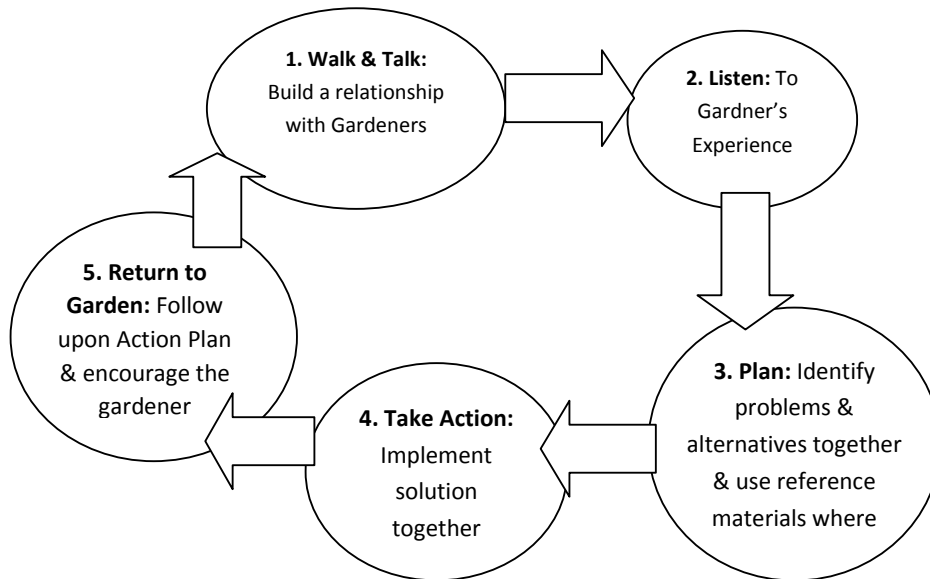
The dialogue tool is designed in such a way that it empowers gardeners and fosters participation. The following schematic presentation illustrates the five steps to be followed during urban garden dialogue.

Urban garden dialogue as an approach consists of 14 (later on 19 tools /topics). These included: land and water management, land preparation, crop selection and nursery management, soil fertility, planting and care, ecological pest management, irrigation, harvesting and post harvest, school gardens and OVC support, environment management, micro gardening techniques, nutrition, HIV-AIDS, chickens, small ruminants, basic marketing & entrepreneurship and group saving and loan. Each tool is structured in such a way that it hints problems, key themes,

training tips, and suggested questions. Key tasks are incorporated as common guiding principles so as to maintain uniformity in application. These include:

- the dialogue should take place in an informal group of 8-10 gardeners or a maximum of 15 gardeners,
- EOs should record problems observed and achievements during the dialogue using log sheets,
- gardeners should be encouraged to share their experience among each other,
- logbooks should be gathered by area coordinators from extension officers at the end of each month to ensure the quality of gardens and to feed into UGP monthly reports,
- Extension officers are responsible to fill out log books (USAID-UGP, 2011, pp.10-11).

Figure 5: 5 Steps Urban Garden Dialogue (USAID UGP, 2012, P. 9)



Extension officers (EOs) are mainly tasked to facilitate the dialogue on a weekly basis while gardeners are on duty at site level. They are also tasked to fill out log sheets every fortnight and submit to area coordinators and feed into the program M&E system. Extension officers are supposed to facilitate urban garden dialogue at least twice a month during the first nine months of program support to newly organized

beneficiaries. It is anticipated that gardeners show independence in garden maintenance, harvesting and marketing three months before graduation. After graduation, technical support is rendered by extension officers and their follow up is critical to ensure continuity of urban gardening. Gardeners are then awarded certificates and the graduation is symbolic of transition from program support to self reliance (USAID-UGP, 2011). However, this remains contentious and far from being realistic.

But there are tradeoffs observed related to urban garden dialogue, among others, inconsistency in completing log sheets by EOs is one. Extension officers were unable to supervise all garden sites at a time due to time constraint. In addition, the ratio of EOs to gardeners is not balanced due to partly scattered distribution of garden plots. Also, there has not been proper recording system put in place from the very inception to record observed positive behavior changes on the part of beneficiaries. However, a draft positive behavior checklist was finally prepared and training provided, albeit it has never been fully materialized.

3.3.8 Diversify Economic Opportunities

The program has been supporting the establishment of group saving and loan (GSL), marketing groups, poultry production, and fruit tree management under the economic diversification component. Market information boards were prepared and installed in some strategically located garden sites. The boards serve as information source for local market vegetable prices. Extension officers are responsible to collect bi-monthly price information from at least 2 to 3 local markets. Furthermore, efforts have been made to create market linkages with wholesalers, restaurant owners and institutions, mainly universities.

Field fairs and vegetable days had been organized annually in collaboration with local partners. These events have helped gardeners to have the opportunity to sell their vegetables & eggs. Also they have helped to promote innovative garden management practices such as organic vegetable production, soil fertility enhancement, drip irrigation technology, grey water sorting etc. Field fairs were organized in tandem with public events and holidays having local, regional and

national significance. During such occasions, many visitors, both local and foreign, turn out and exchange experiences about program interventions. Gardeners also express their feelings related to their future plans and required support. Key activities can also be demonstrated, including food preparation demonstration, photo exhibition, video shows, drama, market products, media coverage, etc. The ultimate objective is to secure further support from local partners and the community at large.

The program has promoted household managed poultry husbandry. Beneficiaries are selected based on assessments carried out by extension officers and group leaders. Beneficiaries are required to construct poultry cages using locally available materials as a sign of commitment. For each IP, 90 beneficiaries, both from care takers and OVCs, are selected. Prior to the distribution of chickens, beneficiaries are trained on chicken husbandry (i.e. shelter, feed and health management). Such training is backed by field practices, including chicken feed formulation and demonstration.

The household poultry package consists of 5 pullets (bovan brown that are 3 months old), a cockerel, and 50 kg concentrate chicken feed which could last only for six months. Beneficiaries are trained on how to formulate poultry feed from locally available crops and animal by-products such as maize, wheat, fish bone, ash, charcoal, etc. Traditional treatment of sick chickens is a common practice by many households. Some beneficiaries feed sick chickens antibiotic powder mixed with *Injera* and *Feto/Telba*, *locally available oil seed ingredients*. Lack of access to local vet clinic for poultry vaccination, high mortality rate especially during time of delivery mainly caused by stress from long distance and unusual rainfall, capital constraints to purchase required input for chicken feed, attack by wild animals, and theft are some of the constraints reported.

The program has been promoting fruit tree plantation both at school and community garden sites. Different varieties of fruit tree seedlings were distributed to selected garden sites based on the demand of beneficiaries. Some of the varieties planted included: guava, pawpaw, and avocado. Technical training was provided to extension officers and through them to gardeners on fruit tree management. The

survival rate of fruit tree seedlings in many garden sites is reported to be promising (i.e. 80% on average). However, constraints included budget shortage, theft, animal encroachment, lack of care by individual gardeners and/or school community, water scarcity and flood damage at sites close to river banks. Lack of reliable suppliers for high yield fruit varieties was also found to be critical. A decision on who else would benefit from the fruit trees after program phase out is outstanding.

3.3.9 Child Friendly

More than 50 percent of the gardens supported by the program are school-based. So, due attention should be given to the needs of children and school community. OVC's complex needs require multi sectoral approach that begins with an understanding of the assets and resources available within a community or a school (USAID-UGP, 2012, p.3). Major areas of support in most OVC programs include: food and nutrition, shelter and care, protection, health care, psychosocial, education and vocational training and economic strengthening.

The primary benefits while working with schools are improving the students' nutritional status and creating income. But, there are auxiliary benefits such as creating interaction among students, teachers and the school community which further bolsters interpersonal social skills and can teach students how to cooperate each other and their elders. In addition there is a sense of accountability as a result of doing vegetable gardening, patience as plants do not grow and thrive overnight, pride and self esteem as a result of beautification of the school, and working in teams (Ibid, 2012).

The establishment of a school committee composed of representatives from each school management, teachers, parents, and gardeners is crucial. The school committee is responsible to select beneficiaries, replace dropouts and over all school garden management. It provides technical support in gardening and saving and loan management, follow up garden performance, identify problems and seek solutions, create linkages with other in-school clubs and raise funds for the school garden. Students are motivated to learn leadership skills, prepare crop calendars in line with school calendars and organize inter-school gardening contests.

Safety measures considered to avoid harmful incidents on OVCs include covering open holes, avoiding laborious work (e.g. care takers provided supports in land preparation), cleaning gardens to avoid sharp materials, promoting hygienic gardening practices, and providing school environment education as part of school gardening (USAID-UGP, 2012, PP.12-15).

3.3.10 Promote Micro Garden Contest

The program has been promoting micro garden contest in a number of schools. Events were organized annually in selected schools to foster healthy inter school competition on urban gardening. Children and school principals, IP heads, representatives from local governments etc. attended such events, whose motto was "growing vegetables in small spaces". Most children and local communities had an opportunity to learn on how to use disposed materials for urban gardening purposes. Different activities were conducted with the active participation of children and teachers. These included staging drama, reading poems, food preparation demonstration, presentation of planted seedlings using containers for local officials to take home, visiting gardening activities and awarding prizes for winners. The program inspired school children and stimulated creativity and healthy competition among each other.

3.3.11 Environmental Compliance

Organic and safe vegetable gardening has been promoted as there were some garden sites which used to be dumping sites and contaminated soils and water sources. Implementing partners were obliged to carry out soil and water quality tests for suspected garden sites as a standard requirement by USAID since failure would lead to withholding funding. Water sources, including newly developed wells, and rubbish sites were checked in laboratories using specific and predetermined parameters (eg.: Ph, acidity, fluoride, etc.) recommended by the environment technical advisor. Test results were submitted to program office for documentation and then reported to the donor.

Hence, suspected gardens, including newly developed wells, had all undergone through water quality tests. Fortunately enough, many of the schemes were safe

and conducive for drinking as well as irrigation. Moreover, environmental mitigation and management plans (EMMP) were prepared and mitigation measures have been taken for the majority of garden sites, albeit not to the required level. A standard template was prepared and updated by the environment advisor and refresher training was organized to extension officers.

Efforts have also been made to promote organic fertilizer application. Compost preparation, green manure and manure tea were promoted widely, as long as local inputs were easily available. Technical training has also been provided to the respective gardeners on how to prepare compost and take soil fertility amendment measures. Gardeners were encouraged to use organic pest control mechanism (IPM) such as animal urine, ash, washing with water, etc. (for details, please see UGP, Tips and Tricks, 2011). But, some crop diseases such as aphids and noxious weed infestation were a bit challenging.

The following section examines program achievements and highlights on some key findings from survey results.

3.4 Achievements & Key Findings

1. Number of Gardens Established: The program expanded over time and established its maximum number of target garden sites in year three (i.e. a total of 138 garden sites). In year four, however, the focus was to consolidate and concentrate on 108 selected garden sites. Sub-grant agreements were made between 15 selected or core IPs with the objective of consolidating interventions and ensuring quality and sustainability. Of the total garden sites in year four, school and community gardens accounted for 50 and 45 per cent, respectively, while the balance is for institutional gardens. Please note that in the Dessie operation area, on top of school and community gardens, 1537 and 175 homestead gardens were supported by the program in 2009/10 & 2010/2011, respectively.

Table 3: No. of Gardens established & water supply schemes constructed, 2008/09-2011/12

Indicators	2008/09	2009/10	2010/2011	2011/2012
# of IPs	9	18	23	15
# of Gardens	93	80	138	108
Group	14	35	54	49
School	72	42	75	54
Institution	4	3	9	5
HH*	225	1,537	175	-
Water supply schemes	0	1	11	19

Source: Annual reports,

*homestead gardens, only applicable for Dessie operation area,

The main sources of water supply to the urban gardens already established include mainly municipal water supply taps and perennial rivers. These accounted for 43.5 and 29.6 per cent of the total water source options, respectively. Constructed wells and springs accounted for 20.4 and 5.5 percent, respectively. Municipal water supply taps are often unaffordable and unsustainable.

Table 4: No. of gardens by water supply source, 2011/'12

Source	Bahir Dar	Gondar	D/Markos	Dessie	Total	%
Municipal taps	9	1	4	33	47	43.5
River with gasoline/eclectic pumps	12	11	4	5	32	29.6
HDWs with Afridev pumps	4	7	5	6	22	20.4
Springs	1	4	-	1	6	5.5
Other	1	-	-	-	1	0.9
Total	27	23	13	45	108	100.0

Source: Annual reports,

- 2. Number of Beneficiaries:** The number of direct beneficiaries doubled and reached its peak in 2010/11. However, it declined by half towards the end of program period. This is mainly due to the fact that the consulting firm claimed that the program has fulfilled its agreed obligation with the donor, albeit a few thousand OVC beneficiaries remained. The main objective in year four was to consolidate the most viable garden sites. Therefore, in 2011/12, nearly 4,752

direct (of which 60.4 per cent are female) and 12,651 indirect beneficiaries (of which 50.2 per cent are female) took part. Out of the total direct beneficiaries, OVCs accounted for 63.2 per cent in the same period. This shows that the program has reached its target beneficiaries. For details, please see the following table.

Table 5: No. of Beneficiaries addressed y the program, 2008/09-2011/12

Indicators	2008/09	2009/10	2010/2011	2011/2012
<i>Beneficiaries</i>				
<i>Direct</i>				
Direct	2,185	4,735	8,006	4,752
OVC	1,221	2,839	4,508	3,005
Care Taker	964	1,896	3,492	1,747
<i>Indirect</i>				
OVC non Gardeners	6,749	9,102	23,742	12,651

Source: Annual reports,

3. Food & Nutrition Security Improved

- Beneficiaries were able to produce and consume a variety of vegetables. This has indeed contributed to the availability of food at the household food menu and complemented their daily nutrition requirement.
- Over all, during the program period, about 806, 231 kg of vegetables was produced, of which 49.3 per cent was consumed by gardeners and their families. Vegetable production showed an increasing trend over the years, reaching its climax in 2010/2011. Despite this, there was a slight decline in 2011/12 which is perhaps attributed to the reduction in the number of gardens and beneficiaries with the intention of improving quality. Hence, the average annual vegetable production was 201,558 Kg, of which, nearly 50 per cent of the total production was directly consumed by producers. The per capita household consumption showed slight ups & downs over the program period and the annual average was 19 kg per household. The reason behind this fluctuation will be further assessed.
- Gardeners also benefitted from poultry. A number of beneficiaries reported that they complemented their daily meal from animal products such as eggs. Especially for women and children, poultry is convenient and user friendly.

Table 6: Vegetables & egg production & consumption (in kilogram), 2008/09-2011/'12

Indicators	2008/09	2009/10	2010/2011	2011/2012	Annual average
Vegetables					
Production	123,119	216,225	237,675	229,212	201,558
Consumption	42,074	53,169	220,032	82,212	99,371
Eggs					
No. of Eggs consumed	23,382	N/A	42,456	91,829	52,555
Per capita vege. consumption	19.2	11.2	27.4	17.3	19.0
Productivity (kg/ha)	3,920	6,886	7,569	7,230	6,419

Source: Annual reports,

Overall, production and productivity of vegetables showed an increasing trend, and almost doubled.

Asked about their food security status, the majority of beneficiaries (i.e. 59 per cent) stated that the program has contributed somehow to fulfill their food and nutrition requirements. In addition, almost all respondents (i.e. 99.1 per cent) responded that they have complemented their daily meals with vegetables and animal products such as milk and eggs. Notwithstanding this, significant portion of respondents (i.e. 41 per cent) confirmed that their food security situation is still unpredictable.

Table 7: Household's perception about their food security status

City or Town	Bahir Dar	Gondar	D/Markos	Dessie	Total	%
Yes (partially secured)	38	45	70	51	204	59
No (still precarious)	53	19	5	65	142	41
Total	91	64	75	116	346	100
Complement their daily meals with vegetables	91	64	75	115	345	-
%	100	100	100	99.1	99.7	-

Source: Field data, June, 2012

4. Households Income Improved

From surplus vegetable sales, gardeners were able to earn some income. According to annual reports, the total amount of surplus vegetable production available to local markets increased from 81,047 kg in 2008/09 to 452, 711 kg in 2011/'12. Similarly, the income earned from the sales of surplus vegetable production increased from Birr 115, 769 in 2008/09 to Birr 452, 271 in 2011/12. This increment in the total surplus vegetable sales and income earned quadrupled and tripled, respectively, in the period under consideration.

Table 8: Households income from surplus vegetable & egg sales (in Birr), 2008/09-2011/12

Indicators	2008/09	2009/10	2010/2011	2011/2012
Vegetables				
Sold (Kg)	81,047	144,691	193,127	452,711
Income (Birr)	115,769	249,203	193,796	452,271
Eggs				
Income (Birr)	2,130	9,860	101,190	138,474
Total income (Birr)	117,899	259,063	294,986	590,745
Per capita income	53.9	54.7	36.8	124.3

Source: Annual reports

The annual per capita additional income rose from Birr 53.9 in 2008/2009 to Birr 124.3 in 2011/12. There was in general an increasing trend in the total amount of income earned, except in 2010/11 cropping season. This might be attributed to the highest number of beneficiaries registered during that particular program period with a rush to serve a large number of beneficiaries.

It is not only income earned that is indispensable to ensure household food security, but also how the available income is utilized. Income is largely spent on food, school materials especially by OVCs, covering part of household expenses and saving. Some beneficiaries reported that they reinvested part of their income to expand their petty business activities through mobilizing own resources and accessing loans from GSLs, mainly for productive activities such as animal rearing & fattening.

Attempts have been made to capture the perceptions of gardeners related to their income. In this regard, the majority responded before program intervention that they had no daily income at all or had meager earnings. But after joining the program, the

majority (80% of the respondents) said that their income improved to some extent. 11.2 per cent of respondents confirmed that their daily income exceeded Birr 40. Only 20 per cent of the respondents replied that their daily income showed no significant change at all. It rather remained below 5 Birr despite program support. The following table shows the average daily income earnings by gardeners.

Table.9: Average daily income (in Birr) by gardeners after program intervention, July, 2012.

Income category (Birr)	Bahir Dar	Gondar	D/Markos	Dessie	Total	%
Less than 5.00	14	3	17	31	65	19.7
5-10	13	7	11	8	39	11.8
11-15	16	13	8	21	58	17.6
16-20	16	18	4	9	47	14.2
21-25	-	10	6	11	27	8.2
26-30	4	5	6	7	22	6.6
31-35	4	4	3	8	19	5.7
36-40	1	1	3	10	15	4.5
41-50	4	2	4	6	16	4.8
More than 50	19	-	1	1	21	6.4
No. of respondents	91	63	63	112	329	100

Source: Own computation based on sample field data, June 2012

5. Diversification of Economic Opportunities

- At the end of the program period, 132 saving and loan functional groups comprising of 2,560 members were organized. Their financial status improved to some extent as they were able to mobilize Birr 236,322 during program period. The per capita average saving mobilized was Birr 38 in the same period, though a lot more could have been done.

Beneficiaries had the opportunity to access some loans, irrespective of its size, at a reasonable interest rate (i.e. 3 per cent vs 18 per cent by some MFIs). For instance, a total of Birr 43, 372 in loans were disbursed to group members in the same period with no collateral. The loan was mainly utilized to expand/establish income generating activities. What is more interesting is the fact that children improved their financial literacy at their early age. Most saving and loan groups have been linked to local financial intermediaries (LFIs) in their locality such as ACSI.

Table 10: No of Group saving & Loan, Marketing groups, Chickens & Fruit tree seedlings distributed, 2008/09-2011/'12

Indicators	2008/09	2009/10	2010/2011	2011/2012
<i>GSLs</i>				
No. of GSLs	11	55	149	132
No. of GSL members	254	971	3,666	2560
<i>Marketing shops</i>				
# organized	-	-	7	2
<i>Poultry</i>				
No. of chickens distributed	640	2,880,	12,420	-
<i>Fruit Trees</i>				
No. of fruit tree seedlings distributed	3,510	6,232	5,684	-
Average Survival rate (%)	58	80	80	-

Source: Annual reports,

Asked about their saving culture, the majority (84.2 per cent of the total respondents) confirmed that they have individual savings under their respective group. Savings are mainly utilized to cover household expenses, medical services, school fees, running cost for petty businesses, for asset building, purchasing of small hand tools and sometimes for emergency requirements. From the table below it is vivid that gardeners in Bahir Dar Dessie and Gondar operation areas mobilized relatively better savings than those in Debre Markos.

Towards the end of the program period, nine marketing groups were organized and become functional in Bahir Dar, Dessie, Gondar, Debre Markos, Tikle Dingay and Finoteselam towns. Skill trainings programs were organized to selected group members (25 participants from each group, the majority were female) on basic business skills (BBS) and management. A decent financial support (Birr 20,000 per group) was provided by the program to fix mini shops or kiosks mainly to sale surplus vegetable produced and agro-business related goods and services. The respective municipality, except in Bahir Dar, provided the required working premises. In the latter case, however, the established marketing groups were obliged to search for a rented shop, as the municipality was reluctant to give working premises to fix container shops with the pretext that it would reduce the image of the city. In any case, gardeners learnt the importance of establishing such shops. Some bottlenecks were, however, observed in this respect including shortage of working capital, inadequate support from local government authorities, especially

to obtain required working premises, inefficiency on group management and lack of integrity among group members (e.g. Woramit marketing group, Bahir Dar), and lack of transportation facility to collect and deliver fresh vegetables to customers.

Table 11: Monthly saving mobilized by gardeners and operation area

Saving (Birr)	Bahir Dar	Gondar	D/Markos	Dessie	Total	%
Less than 5	2	-	31	9	42	13.2
5-9	12	7	6	14	39	12.3
10-14	34	38	6	6	84	26.4
15-19	7	2	3	10	22	6.9
20-24	10	4	3	14	31	9.7
25-30	5	2	1	6	14	4.4
31-40	3	4	-	4	11	3.5
41-50	-	1	2	-	3	0.9
More than 50	1	1	11	9	22	6.9
No saving	19	5	6	20	50	15.7
Total	93	64	69	92	318	100.0

Source: Field data, June, 2012

6. Garden Management Capacity Enhanced

The majority of gardeners accessed several skill training sessions and experience exchange forums organized. A range of technical topics were covered, viz urban gardening, drip kit installation, marketing, group saving and loan, poultry and fruit tree management.

It was trusted that problem solving ability of gardeners is enhanced through the establishment of 136 functional discussion groups (DGs) in 20011/12.

Table 12: No. of functional discussion groups (DGs) established, 2008/09-2011/'12

Indicators	2008/09	2009/10	2010/2011	2011/2012
<i>DGs</i>				
No. of functional DGs	23	136	205	136

Source: Annual reports

Micro garden contests were conducted with the motto “producing vegetables in small containers and bags” and replicated by local residents, school teachers, the community and institutions in many places. But, in Tikle Dingay town it was exceptionally rewarding. In 2010/12, nearly 4, 000 seedlings were distributed by Goh PLWHA association to local residents and institutions. Besides, seedling production

has become more like a commercial venture in some model school gardens, e.g. Kebele 03, Gondar.

Table 13: Micro garden contest conducted by operation area, 2011/'12

Indicators	Bahir Dar	Gondar	D/Markos	Dessie	Total
<i>Contest participants</i>					
Towns	2	1	1	2	6
Schools	6	6	7	12	31
<i>Inputs</i>					
No. of grower bags	698	545	915	810	2,968
No. of vege, seedlings	4,188	2,725	7,320	4,860	19,093
<i>Event participants</i>					
Winning school	Ewuket fana	Azezogeneral	Tsehay Gibat	Hope & Kombol #1.	-
No. of students	181	20	115	133	449
No. of teachers	3	5	8	6	22
<i>Guests</i>					
Local gov't & others	18	57	60	15	150

Source: Micro garden event reports by operation area coordinators, May, 2012.

Large quantities of water pumps (both gasoline & electric), drip kits, electric pumps, water tankers (mainly 4,000 lts. capacity) were distributed, installed and became operational. Gardeners were trained to undertake minor maintenance works for water lifting and conveyance system such as gasoline pumps, drip irrigation, water tankers, gate valve, grey water sorting & scheduling, and management of chickens and fruit trees.

7. Institutional Capacity of Partners Enhanced

Capacity of implementing partners improved a lot, especially in managing grants. IP heads attended grant and financial management training for program sustainability. Nearly 69 extension officers (3 EOs from each IP) attended ToT training on specific technical topics, including urban gardening, poultry management, fruit tree management, nutrition, HIV, gender, marketing and enterprise development, environment management and mitigation plan, discussions group and referral linkages, urban garden dialogue facilitation, positive behavior change checklist, data collection and recording. More to that each IP has secured on average two motor bikes to facilitate transport services to EOs.

Partnership with the private sector, mainly local artisans and suppliers was, to some extent, strengthened. The program has awarded some contracts to poultry and seedling vendors, drip kit and water pump and water tanker suppliers and transporters, and deep water well drilling company and local artisans.

8. Referral & Linkages Created

A number of beneficiaries reported that they have benefitted from referral & linkages created with the respective partners. They received a range of services. Hence, it is believed that program synergy has been somehow fostered. The following experience from a community garden located at Tikle Dingay town, Gondar operation area, is depicted.

Box 1: Case study on the role of UGP in fostering referral linkages, Goh PLWHA Association, Tikle Dingay, Gondar

Goh PLWHA association was established in 2006 in North Gondar, Lay Armachiho Woreda, Tikle dingay town, some 27 Km away from Gondar town on the main high way to Humera towards the Sudan Boarder. Tikel dinagy is a woreda capital and a watershed between the highlands & lowlands. The fact that it is located in the main highway heading to the cash crop area, it serves as a terminal to many heavy tracks and military convoys. It is one of the high risk towns in terms of HIV/AIDs prevalence.

Goh is one of the PLWHA associations which became a role model for USAID-UGP that has made a marked difference in breaking stigma and discrimination in the community. It has also registered some concrete achievements in tackling the effect of HIV/AIDS through undertaking various interventions. In this brief article it is endeavored to summarize the program impact on the lives of its members and the local community at large. Below are extracts from the discussions made with Ato Ayalsew Mesele, founder and chairman of the association.

Initially, the association had only about 26 members (of which 20 were Females), but currently the total membership increased to 271 members (of which 190 are females). There were several reasons behind its foundation, but the following are worth mentioning. These are to:

- prevent and endure the pervasive effects of HIV/AIDs,
- support orphans who lost their parents due to the pandemic,
- support those who became bed ridden, and
- aware the local residents and witness about the sweeping effects of the plague,

Before USAID-UGP intervention, the livelihoods of members were miserable, stated Ato Ayalsew. He reiterated that members had no significant disposable income as such, it was a moment when stigma and discrimination were rife, self-employment had never been imagined, and there was no access to saving and loan services. Above all, there was no hope to work, produce and survive, and school dropout was not uncommon. Many of them faced sickness due to opportunistic infections, high dependency and vulnerability to shocks.

Cognizant of these facts, the woreda HAPCO in collaboration with other stakeholders encouraged the association through various supports. USAID-UGP has expanded its intervention to Tikle dinagy since 2010 through availing small financial and in kind grants via Frehiwot implementing partner to build their capacity in urban gardening, improve incomes from surplus vegetable sales, strengthen referral linkages and foster marketing groups and savings & loan groups. The IP has been closely supporting through its extension officers and the local government availed a small plot for vegetable gardening near a school.

The following benefits and impacts were registered. The major achievements in Ato Ayalsew's words are: stigma and discrimination drastically reduced, income opportunities diversified, self employment become possible, common problems solved through group discussions, incomes improved and benefited from loan service, working culture of its members has improved, full-fledged participation is possible to assist children attend their school, health services for opportunistic diseases improved, and more support secured from stakeholders through referrals and linkages. These include: breeding sheep for 44 members, cultivable land & water supply from municipal tap, a varieties of fruit trees which were abandoned by a youth group, honey extractor, poultry house, modern bakery along with accessories, housing furniture and uniforms, food support, door to door support, and free of charge health service.

Moreover, the association has contributed to the local community and nearby schools in terms of availing the following services: skill and knowledge transfer on vegetable gardening, supply a variety of vegetables to households and a local market, and now become well recognized, demonstrated micro gardening to nearby schools using recycled materials, being aware of local development they contributed to environmental sanitation efforts through labor mobilization, and vegetable seedlings distributed to residents to promote urban gardening at homesteads, road sides and institution compounds. The association has set aside some cash in the form of gardening fund to ensure sustainability of the gains of UGP and to become more self reliant.

The above achievements were not without some challenges, said Ayalesew, inter alia, water supply shortage, scarcity of land, and lack of confidence on the part of some members are worth mentioning. The association, however, have tried to address those challenges in the following manner. The water supply problem was alleviated through practicing water harvesting techniques and using gasoline water pump supplied by the program. In addition, land shortage was mitigated through organizing a field day and stakeholder performance review meeting at site level and as such it has managed to grab the attention of the local government and other stakeholders, ultimately it has secured additional plots for expansion. It has tried to build the confidence level of its members through conducting continuous group discussions.

Asked about lessons and/or replicable practices, Ao Ayalsew, listed the following. These are: income generating is possible through networking with stakeholders, water harvesting, soil and water conservation structures improved productivity, each member is entitled to use his/her own plot as long as there is proper soil fertility management practice. Besides, the majority become self reliant and self employed through UGP support & their industriousness.

About the way forward, Ato Ayalsew firmly stated that we acquired some skills and knowledge on urban agriculture and established some IGAs with the support of UGP and stakeholders, we managed to establish a gardening fund, which would serve as a leverage to consolidate IGAs, especially poultry, sheep breeding, dairy production, vegetable production, honey production and vegetable marketing shop. Hence, members would definitely become more self reliant and create employment opportunities for non-members in the locality thanks to USAID-UGP.

Source: Excerpts of a conversation with Goh PLWHA association chairperson, Ato Ayalsew Mesele, Tikle Dinagy town, Gondar, July, 2012

9. Sustainability

Sustainability is a key determining factor for the success of any development program. In light of this, the program exerted efforts to build the capacity of beneficiaries in vegetable gardening, poultry and fruit tree management, group saving and loan, etc. However, it has been recognized by the program that many school and community gardens lack access to reliable water options that has hampered sustained vegetable production. To mitigate such constraint, the program earmarked about Birr 1.3 million before the program came to an end with the intention of developing water supply schemes at selected garden sites. In this respect, about 24 water supply schemes (i.e. 2 shallow wells, 15 HDWs, 7 Rope and washer pumps) were completed and became functional. Besides, technical training was provided to extension officers and beneficiaries on a range of topics including garden management, water supply system maintenance, food and nutrition and facilitation skills. In addition, an agronomic manual and urban garden dialogue tools were prepared.

The survey result shows that out of the total respondents, 95.6 per cent confirmed that they would like to continue engaging in urban gardening while 4.4 per cent declined to do so. The main reason in the latter case is attributed to lack of water supply options and lack of alternative income source to cover municipal water supply expenses.

Asked about how they would like to continue their gardening, the majority responded that they would continue gardening through a combination of strategies such as improving production and productivity, securing additional plots, promoting micro gardens, securing support from families, friends, and forming associations, complementing gardening with other IGAs, hiring casual labor, working in harmony with a group, focusing on more profitable and high value crops, establishing seed capital and/or garden fund and so on. Notwithstanding this, few gardeners expressed their concern about access to land and municipal water supply. They said that they would continue only if their garden plots would not be reclaimed by local authorities. Some respondents underscored that the benefits they have gained so far, which in their words, is a source of inspiration to continue urban gardening. They stated that the program brought some changes in their lives. They noted that

they acquired some skills and knowledge on garden management and developed team spirit.

Table 14: Beneficiary's perception about continuity of urban gardening after program phase out by operation area (2011/'12)

Response	Bahir Dar	Gondar	D/Markos	Dessie	Total	%
Yes	78	61	75	112	326	95.6
No	10	1	-	4	15	4.4
Total	88	62	75	116	341	100

Source: Compiled based on field survey, July, 2012.

3.5 Challenges

These achievements were recorded not without any challenges. Hence, the following deserve mentioning: lack of access and tenure security of land as a result of the rapid urbanization process, soaring municipal water supply tariff, seasonal price fluctuation for some vegetables like onion, and absence of clear policy and institutional backup.

These and related challenges/constraints are further discussed below.

- Absence of policy and strong institutional support: There is no clear zoning for urban garden program almost in all towns. In addition, urban agriculture as an economic activity lacks due attention by concerned sectors. It is not yet properly addressed in urban land use plans. There is no adequate technical and administrative support from urban agriculture line departments.
- Land tenure insecurity: Plot size is not proportional to the number of beneficiaries in some sites. This is due to the fact that there is scarcity of land in urban areas for agriculture purposes. Sometimes, garden sites are reclaimed by local government authorities whenever there is emerging demand, especially for investment and related purposes.
- Long dry spell and severe water supply shortage: This has been frequently observed in all operation areas, especially during peak harvest season in

some garden sites located far from river banks. There are also instances of upstream and downstream water user conflicts here and there (e.g. Angereb group garden, Gondar operation area).

- Soaring fuel price and municipal water supply tariff: The price for fuel and municipal water supply tariff have been rising from time to time. This has eventually impacted on the sustainability of school gardens where there is no alternative source of funding.
- Insufficient working capital: Newly established vegetable marketing groups reported that they faced working capital shortages and consequently became unable to run their shops full-fledged and smoothly.
- Dependency syndrome: It has also been observed that in some places some gardeners do expect free handouts, especially at the initial stage of program intervention perceiving that this is possible since funding is by USAID. This tendency has been observed even on the part of some school principals and implementing partners.
- Absence of local input suppliers & service providers, especially for drip irrigation system: Gardeners have faced challenges in finding accessories for drip kit irrigation system and diesel water pumps. There are not even private maintenance service providers close to beneficiaries.
- Lack of in-depth hydro geological surveys: Although a good number of water wells have been successfully operational, few of them are abandoned, especially in Bahir Dar (e.g. Ghion & Shimbit schools), Gondar (Angereb group garden), and Finoteselam School garden). This was mainly due to lack of in-depth hydro geological study and hard rock formation. In addition, the capacity of local contractors was found to be weak.
- Prevalence of pests & weeds: Pests and noxious weeds were common in many garden sites, especially group gardens. For instance, the low performance of cabbage in Gondar and Bahir Dar operation areas was attributed mainly to the prevalence of aphids. In some group gardens located adjacent to river banks (e.g. Koladiba), the spread of noxious weeds was quite a constraint for women group gardeners as it has been demanding much labor force.
- Unpredictable market price and competition: Though the demand for vegetables is increasing from time to time in urban areas, there were

seasonal price fluctuations, especially for some perishable vegetable crops such as onion and tomatoes. In this case, gardeners were often forced to dump it on the way back home. For instance, the price for onions drastically dropped from 8 Birr/kg to 1 -2 Birr/kg in Bahir Dar operation area in 2010/11 main cropping season. A case in point was the Tis Abay group gardeners who did not benefit from onion production. Consequently, the group was obliged to abandon onion production and swiftly reverted to some other crops like sugar cane. The nearby farmers around Fogera have produced a lot of onions and supplied to Bahir Dar market and it was difficult for small gardeners to compete.

- Lack of alternative financial support: Some IPs have no alternative financial support or access to borrow money to run their petty businesses. This problem was more pronounced in Bahir Dar, Gondar and Debre Markos operation areas than in Dessie where there is alternative NGO program interventions that can be complementary. Hence, it was difficult for some IPs to implement fixed obligation grant modality. They rather required advance payments from the program or compromised gardening activities such as land preparation and planting.
- Thefts: There were occasional thefts which prevailed mainly during harvesting and seedling transplantation seasons, especially in the latter case and community gardens in the former case which are located relatively far away from residential areas. Unattended drip kits and mature vegetables are susceptible to vandalism.

3.6 Lessons Learned

- **Small grants along with local resources could make a difference in food and nutrition security & improving income of poor households:** For sustainable urban gardening as an alternative strategy for household food security, it is not the amount of the grant that matters, but rather the approaches followed to mobilize local resources and active participation of the beneficiary community.
- **Urban garden dialogue is an ideal tool to transfer knowledge and skill to gardeners:** Providing financial and in-kind grant supports is effective when it

is complemented with appropriate Knowledge and skill transfer mechanism. In this respect, urban garden dialogue is found to be the most appropriate approach to promote urban gardening in small plots and find local solutions to local problems. It has also strengthened participation and self confidence of individual beneficiaries and communities.

- **Partnership with local actors improves resource availability:** Partnering with local actors is indispensable to secure the required support. The local community has been able to secure administrative and technical support from city administrations and local government departments to have access to open spaces, water options, establishing referral and linkages, follow up & monitoring, etc. The role of social organizations such as Idirs should not be overlooked in supporting urban agriculture, especially in securing land, beneficiary selection, and networking.
- **Proper selection of IPs & target beneficiaries:** For any program to be successful, proper and transparent as well as objective selection of target beneficiaries and implementing partners is crucial. The number of implementing partners and beneficiaries should be manageable. Otherwise, it might be difficult to closely follow up and monitor planned activities. Garden plot size may not be commensurate with the number of beneficiaries. Too many beneficiaries may be forced to do agronomic activities on tiny plots and consequently resources might spread out. Also, agreement should be signed with IPs that are more reliable and accessible to beneficiaries.
- **Demand driven, affordable and user friendly technology dissemination:** The introduction of drip kit irrigation system is found to be more effective in moisture deficit area than moisture surplus ones. For example, in Dessie, Kombolcha & Woldiya operation areas where moisture is a limiting factor, drip kit technology is found to be more successful and compared to the Western part of the Amhara region. Therefore, prior to dissemination of any type of technology, it is imperative to conduct some assessment on the demand of beneficiaries and IPs and make sure that the technology is affordable and user friendly.
- **Organize peer experience exchange:** Practical exchange of experience among gardeners is found to be more relevant and effective way than the conventional training approach. Gardeners could learn a lot from each

other and be motivated to replicate good practices they observed from other areas to solve practical agronomic constraints.

- **Organizing field fairs:** Field fairs have the potential to improve value chain development awareness and secure necessary support from local partners. It has helped and motivated gardeners to create linkages with local markets and government institutions like universities and hotels to supply surplus vegetable produce.
- **Micro garden contest is a powerful tool to promote school gardening and environmental sanitation:** By using recycled materials like disposed containers, tires, and grower bags OVCs grow vegetables in and around towns, school compounds and degraded and reclaimed waste lands. Micro gardening has indeed contributed a lot to improve local environmental sanitation by helping to reuse disposed containers. Children are encouraged to participate as fun while learning by doing and economically benefited from micro gardening. Its impact on the reduction of school dropout should, however, be further assessed.
- **Integrated approach is key to diversify income and sustain urban gardening:** Through integrating complementary agricultural activities, community gardeners diversify their incomes and sustain urban gardening. Some beneficiaries efficiently utilize locally available resources and complement urban gardening with other activities. The approach also served as a source of inspiration to beneficiaries to build self confidence.
- **Market boards helped gardeners to have access to price information and improve bargaining power:** Due to price information asymmetry, gardeners often benefited less from their surplus vegetable sales while middlemen benefited more. Institutionalizing market information system and installation of marketing boards at strategic garden sites is therefore crucial to help gardeners sell their surplus products at a reasonable price. This has, to some extent, improved their bargaining power. Organizing vegetable marketing groups and establishing mini-shops could also help gardeners to link vegetable production with local market outlets. Furthermore, self operating vegetable shops could be an option to supply vegetable products to the nearby local markets and a step forward to foster value chain approach.

- **Financial literacy is instrumental to foster saving culture of children and even the marginal groups:** Beneficiaries including vulnerable children have mobilized considerable amount of savings from the meager income they secured. This has also helped to create alternative access to loan services to run petty businesses. This practice has influenced the saving attitude of non-program beneficiaries and the local community to some extent.

4. Conclusion, Recommendations & Policy Implications

4.1 Conclusion

Population is increasing at an alarming rate globally and rapid urbanization is taking place at same time. The corollary is that there is a growing demand for food, both in the urban and rural areas. As such, food and nutrition security is top on the development agenda by developing country governments and donors.

Ethiopia has long been challenged by recurrent droughts and hitherto millions of people depend on free handouts, despite the fact that it has currently been enjoying rapid economic growth. Further exacerbated by the HIV/AIDs pandemic leaving hundreds of thousands of children orphans, the food security situation remains precarious. Women and children in cities are vulnerable to various types of shocks further aggravating school dropouts.

Several poverty reduction interventions have been designed and expedited over the last few years. Urban agriculture is exemplary in addressing the basic needs of the urban poor. Despite its contribution towards food security and nutrition outcomes, especially in the urban and peri urban areas, urban agriculture has long been neglected at policy level.

The USAID Urban Gardens program came into being and has been implemented since 2008 in four major regions of the country, including Addis Ababa city administration with the objective of improving the nutrition, income and skill of HIV affected women, orphans and vulnerable children. From the scanty information gathered and analyzed, in general, it can safely be inferred that the USAID Urban gardens program has contributed its part towards addressing the challenges of vulnerable household food security and nutrition through harnessing the potentials

of urban centers and its hinterlands. It has created alternative income opportunities to poor women and vulnerable children who shoulder the brunt of food insecurity and lack of nutrition. Its contribution towards improving the saving culture and financial literacy of community gardeners and school children cannot be overlooked.

There are, however, some challenges and gaps that undermined the benefits and/or outcomes of urban agriculture not only in the Amhara regional state, but also in other regions. Unless otherwise pertinent actions are taken, these might reverse hitherto program gains weakening their sustainability. Thus, pertinent policy actions should be taken and institutional supports further bolstered. In the following section some recommendations are suggested and policy implications highlighted.

4.2 Recommendations

Based on the foregoing discussions, the following recommendations are made:

- Program support to beneficiaries should be extended to a little bit more than a year; at least 2-3 years seems realistic. A one year program support may not be sufficient to ensure transfer of skills and knowledge in the complex and demanding small holder urban agriculture system.
- Strengthening linkages with local input suppliers: Strong linkages should be created with local input suppliers to enable gardeners to have access to quality seed and seedling supply, water lifting and irrigation system accessories and maintenance services. As the program has delivered several in-kind inputs like drip kits, electric and diesel water pumps, water tankers, and Afridev pumps, etc, linkages should be created and reinforced with local suppliers and maintenance service providers. The few organized vegetable marketing groups might potentially serve as local vendors to supply required accessories and spare parts for gardeners at affordable prices and on time. The woreda water sector line department should also support urban gardeners in major water supply scheme maintenance works.
- Decentralized and demand driven input supply: During the program period drip kits and related accessories were delivered in a blanket manner in a more-top-down approach. Unfortunately, this has resulted in unnecessary delays and mismanagement and inefficiency in using drip kits and related technologies. It

was not uncommon to find drip kits & laterals stock piled in many IPs warehouses in this respect. Hence, prior to distribution, there should be an in-depth assessment of beneficiary demand & proper planning. The procurement process should be pre planned and reserve stock prepositioned so that the cropping calendar could go smoothly as scheduled.

- Strengthen and create market linkages: Urban gardening being a sensitive economic undertaking, especially in the absence of transportation and storage facilities for handling perishable vegetables, market linkages shall be created prior to any surplus production. The possibility for low cost and appropriate storage facilities and transportation means should be looked into with the support of technology multiplication centers. Value chain development approach should be strengthened.
- Coordinate chicken vaccinations at grass roots level: One of the challenges encountered by many target households was the fact that there was lack of access to vaccination service for household managed chickens. To mitigate this problem, the respective local urban agriculture department should render pertinent support and organize affordable and user friendly chicken vaccination service and develop cost sharing mechanisms.
- Conduct micro garden contest as a regular and integral part of the education calendar: It has been observed that the few micro garden contests conducted seasonally have encouraged many children and schools to be creative and actively participate in micro gardening using locally available and recycled materials. This has also stimulated competition among schools. A number of primary schools and the local community in all operation areas were encouraged to replicate micro garden activities in their localities and homesteads using locally available materials. This, in turn, has a positive impact on the local environmental sanitation. Therefore, if this contest is organized routinely in all schools found in the region, the benefits and outcomes could be applied to further improve the quality of education.
- Further strengthen saving and loan groups: As the program has established functional saving & loan groups in all operation areas, this activity should be further reinforced in both school and community gardens. Furthermore, LFIs should strengthen their linkages with saving & loan groups and provide necessary

technical and administrative support to expand the practice in all other areas and improve the entire saving culture and loan management skills.

- Strengthen the establishment of urban garden funds: Some gardeners in a group have already established self managed group gardening funds. The sources of the fund or seed money are mainly from IGAs, surplus vegetable sales set aside for garden fund and members' contribution. The main purpose of the fund is just to cover part of garden management expenses such as input purchase (e.g. improved vegetable seeds, hand tools, seedlings, etc), salary of guards, fencing, to purchase fuel for water pumps, water supply scheme maintenance, cost sharing to partly cover municipal water supply expenses, and over all garden management. Therefore, continuous refresher training, holding innovations and experience sharing meetings should be organized uninterruptedly to sustain urban gardening.

4.3 Policy Implications

- *Access to land and tenure security:* Urban agriculture is undertaken in an urban setting, mainly in fringe lands and open spaces. There are, however, competing activities that hindered the use of urban plots for a relatively long time. So far, the allotment of plots is largely dependent on the will and commitment of mayors and school principals. Therefore, access and use right of plots should be guided by a comprehensive policy framework that stipulates the allotment, management, health and environmental implications.
- *Institutional Support:* Although there has been some support here and there on the part of the respective urban agriculture departments, it has, however, been found inadequate and short of expectations. The roles and responsibilities of institutions should be redefined and staff capacity built to enable them discharge their responsibility and provide technical backup to urban gardeners and entrepreneurs.
- *Revisit municipal water tariff structure:* Municipal water supply tariff structure should be revised and be sensitive towards HIV affected women, orphans and children who are vulnerable to several shocks.
- *Institutionalize school gardening:* Nearly half of the garden sites established so far in the region are located in school compounds. Garden plots are

granted mainly based on the willingness and commitment of school principals and/or management body. In addition, school committees have been organized and focal persons assigned. Therefore, there is a need to integrate such structure within the school management and performance evaluation system. Urban agriculture should also be integrated in the school curriculum so that children will learn more about agriculture and their environment.

- *More inclusive PSNP*: Hitherto the productive safety net program that has been implemented in parts of the Amhara region supported those who have access to land irrespective of their residence. On the other hand, UGP beneficiaries who reside in urban and peri-urban areas and who are equally vulnerable to several shocks lack similar opportunities. Hence, PSNP should be more inclusive towards the urban poor as well as to those who strive to complement their income, household food security and nutrition requirement through urban and peri urban agriculture.
- *Existing cooperative laws and regulations shall be revisited and supportive to PLWHA associations*: The existing cooperative laws and regulations are enforced universally applying to PLWHA associations and other forms of cooperatives equally. But, the former has specific needs and aspirations. For instance, PLWHA associations are not encouraged to hire members as an employed staff. A case in point is the Hiwot PLWHA Association, Bahir Dar. Moreover, the existing law and/or regulation discourages the associations to establish own business entity unless separate from the umbrella organization. Hence, the cooperative law should be pro and supportive to PLWHA associations, so that members could have an opportunity to build self confidence/self reliance and sense of ownership.
- *Harmonizing operational modalities adopted by donor financed projects & programs*: As there are a number of NGOs and donor financed programs and projects intervening in the region in a bid to reduce poverty including USAID Urban Gardens Program, BoFED should be proactive in further harmonizing operational modalities for those projects and programs intervening in the similar operation area (s) so that conflict of interest, unnecessary expectations, resource overlap and/or duplication of efforts could be minimized or avoided. It could even contribute towards bringing more program synergy, sustainability, and breaking of the dependency syndrome.

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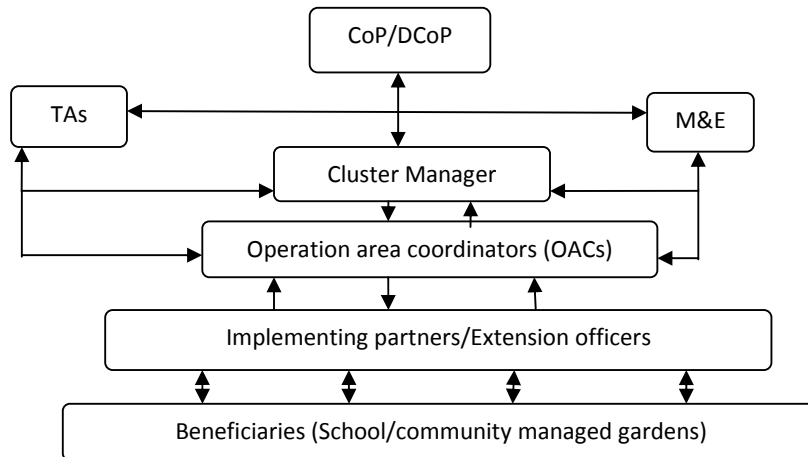
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Annex 1:

Program Management: The program is managed both at the center & cluster levels with the overall guidance by the CoP and DCoP. Cluster managers are responsible to coordinate program activities at region level. The North cluster is thus responsible mainly for the Amhara region and Adwa town in the Tigray regional state. There are four operation areas in the North cluster viz Dessie, Bahir Dar, Debre Markos and Gondar. Under the cluster manager there are operation area coordinators responsible for program activity coordination. OACs are responsible to closely follow up and technically support extension officers who are supposed to closely work with gardeners, both at school and community levels. There are also technical advisors based at head office level in Addis Ababa who are often deployed for field work and take responsibility to give technical backstopping to operation area coordinators and extension officers. Their technical expertise is mainly in the area of water and environment, livestock, school and OVC care, marketing and enterprise development, Health and Nutrition. FHI, an NGO working as a partner, also provided M&E support service to the program. Output and outcome indicators are selected and agreed upon prior to program activity implementation. The program achievement is evaluated based on these indicators.

Organizational set up of USAID-UGP, North Cluster



**RURAL-URBAN LINKAGE: EFFECTS OF RURAL HOUSEHOLD
INCOME ON THE MARKET DEMAND FOR NONFOOD GOODS AND
SERVICES
(Comparative Analysis of Yetmen and Debre Brihan Zuria
Villages)**

Degarege Seyoum Abate

Abstract

This study investigates how increased rural incomes are spent on a mix of goods and services in Gojjam as compared with North Showa, both areas located in the Amhara National Regional State. While rural income was the primary factor for determining economic linkages in Gojjam, its impact depends on yet other fundamental factors such as culture.

The result of this study reveals that the increased rural income in Gojjam does not have a significant role in fostering rural-urban linkages as the demand for the major non-food commodities were low compared to North Sowa. This is due to the influence of culture. This might have implications on economic transformation, and the opportunity of using integrated rural-urban local economic development. The same implications could apply to the Growth and Transformation Plan (GTP).

Key words: Rural-urban linkage, rural household income, non-food goods and services, marginal budget shares, expenditure elasticity of demand.

1. Introduction

Rural-urban linkage refers to the flow of people (migration, commuting), capital (public and private) and goods (trade and in-kind family support) between rural and urban areas. The flow of goods includes the movement of agricultural and other commodities from rural-based producers to urban markets, both for local consumption as well as regional, national and international markets; and in the opposite direction, the supply of manufactured and imported goods (that is non-food goods and services) from urban centers to rural settlements (Tacoli, 2004:2). This flow of non-food goods and services from urban centers to rural areas is the subject of this paper. The paper investigates changes to this flow in relation to the changes of household rural income in Gojjam compared to North Shoa, both in the Amhara National Regional State (ANRS), Ethiopia.

“All major economies of the world, even the richest, started out as primarily agrarian economies” (Diao et al., 2007:1). Unlike many African governments, Ethiopia has invested heavily in its agricultural sector (IFPRI, n.d.) so as to eradicate poverty. To achieve broad-based, accelerated and sustained economic growth, the government of Ethiopia has designed, and is implementing, strategies, policies and plans to guide and manage the overall development of the country. During the implementation period of the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2004/05-2009/10), high and sustained economic growth and significant social and human development results were realized. The economy grew on average by 11 percent per annum. On average, agriculture, industry and service sectors grew by 8.4, 10 and 14.6 percent per annum, respectively, which constitute the percentage real GDP share of 41.6, 12.9 and 45.5 for agriculture, industry and service, respectively, in 2009/10 (MoFED, 2010:2-9). According to MOFED, the three major crops total output increased by 60.4 percent¹⁶ within the PASDEP period. Average productivity of these crops was also increased by about 40.5 percent¹⁷ within the same period. Other food and cash crops, fruits and vegetables, and livestock products also increased significantly. This agricultural growth increased the

¹⁶ Own computation from GTP data of 119.1 million quintals in 2004/05 to 191 million quintals in 2009/10 (for teff, maize and wheat)

¹⁷ Own computation from GTP data of 12.1 quintals/ha in 04/05 to 17 quintals/ha in 2009/10

income of rural households, since agricultural output is the major income source of smallholder households of the Ethiopian highlands.

In Ethiopia, “the main source of household expenditures/income in rural areas was agricultural enterprise which has contributed for 65.3%, while the main source of household expenditure/income in urban areas were wages and salaries as well as household non-agricultural economic enterprise accounted for 37% and 35.7% , respectively” (CSA, 2007:66-67).

The real GDP share of agriculture was still high which made it one of the highest worldwide as compared to 20 percent in 2006 for average low income countries (Dorosh and Schmidt, 2010:1). About 16 percent of Ethiopians live in urban areas, which also made Ethiopia one of the least urbanized and most agrarian economies in the world (CSA, 2007) as compared to the world average of 50 percent, and Sub-Saharan African average of 30 percent (Dorosh and Schmidt, 2010:1). This demonstrates the need for rapid economic transformation by strengthening the rural-urban linkages and fostering economic growth. Promoting vibrant rural and small urban centre non-farm economies will be crucial for further increasing rural incomes and reducing poverty (IFPRI, n.d.).

Most of the agricultural output growth was registered in surplus producing areas at small household levels (which accounted for 87.29 percent of the total grains production) of the country (CSA, 2010:11) which in turn increased the per capita income of the rural dwellers. Among these surplus crop producing areas, Gojjam (the focused research area) was contributing for about 10 percent¹⁸ of the total cereal crop production of the country (CSA, 2010: 14, 35 and 36), which makes it one of the leading areas to supply food grains for Addis Ababa and other surrounding urban centres. Hence this was one of the areas where the farmers’ income increased significantly at smallholder household levels. This increased rural income was expected to stimulate a series of economic linkages resulting from market demand for non-food goods. In prosperous agricultural zones of India, these linkages proved substantial as pump suppliers, input dealers, transporters, consumer goods

¹⁸ Own computation from the CSA data of the production and yield of crops for private peasant holdings for Meher Season 2010/11, i.e. quintals $((8,014,637.56 + 9,433,109.36)/177,613,365.84)*100$.

distributors, and retailers emerged to supply agricultural inputs, consumer goods and services. This in turn absorbed surplus rural labor; raised demand for agricultural produce and again boosted agricultural productivity and rural incomes. Therefore, the growing farm income consumption linkages induced sizable second rounds of rural growth via increased consumer demand for non-agricultural goods and services (Diao et al., 2007: 3). The existence of a domestic market for non-food products and services was an important pre-requisite for successful industrialization (Fujita, 2010:2), which Ethiopian GTP is intending to achieve.

However, it is arguable whether the income of rural households changed the standard of living of the rural communities in Gojjam, and thereby created additional market demand for urban (manufactured) goods and services. Whether the flow of non-food goods and services from urban centres to rural areas changed the standard of living of rural households or not as their income grow has been a contentious issue for Gojjam. Most people argue that this part of rural-urban economic linkage is feeble as compared to other types such as the flow of food items from rural to urban areas. They justify their arguments by the poor quality of life of farmers that is observed. For example, regardless of their income levels almost all farmers in the study area walk barefoot and wear old clothes. The researcher supports these arguments because the variation in expenditure among households should eventually affect lifestyles (Rashed, et al., 2008:2). However, in rural areas of Gojjam regardless of the income levels almost all households follow similar lifestyles, such as wearing tattered clothes as opposed to those in North Showa. This paper attempts to investigate these contentious issues since they have economic implications on the rural-urban transformation.

The exchange of goods between urban and rural areas is an essential element of rural-urban transformation, since it has a direct relationship to the theory of 'virtuous cycle'. The virtuous cycle model of rural-urban local economic development emphasizes the efficient economic linkages and physical infrastructure connecting rural producers with internal and external markets (Tacoli, 2004; Momen, 2006). Thus rural income in Ethiopia should induce non-agricultural growth by creating not only non-farm opportunities but also increasing urban income. Rural non-farm income also creates market demand for agriculture (Diao et al., 2007:29).

The observations in Gojjam indicate that the rural-urban local economic development opportunity through creating market demand for non-food goods seems to be weak as compared to North Showa Zone of Amhara Region. Thus, this study is motivated by the existence of such weak linkage.

While the rural income is the primary factor for determining the economic linkages, its impact depends on yet other fundamental factors such as culture. A case in point is Gojjam which has been known for its relative surplus production of grains as compared to North Showa Zone. In 2009 the per capita income from grains production for Yetmen (Gojjam) households was more by 26 percent compared to Debre Brihan-Zuria (North Showa) households¹⁹. However, this increased income in Gojjam is hypothesized to have insignificant impact on market demand for major non-food goods and services. Observations in Gojjam indicate that demand for non-food commodities is low compared to North Showa areas of similar or even lower level of income. Other socioeconomic issues such as differences in culture are believed to play a pivotal role in influencing the expenditure behavior of the rural households. Using total expenditure as a proxy for income, this paper has the main purpose of analyzing the expenditure behavior of rural households, with different incomes and socioeconomic characteristics such as culture, on the market demand for urban non-food goods and services in Gojjam compared to areas in North Showa. So far there has not been any attempt to systematically investigate the effects of these fundamental determining factors on market demand for non-food goods and services. This paper is thus aimed at filling this research gap.

Two distant villages, that is Yetmen village of Felege Selam Kebele (Enemay Woreda, East Gojjam Zone) and a village in Debre Brihan-Zuria of Koremargefia Kebele (Basona Woreda North Shewa Zone) were used for analytical comparisons by using the 2009 Ethiopian Rural Household Survey (ERHS) data strengthened by focused discussions.

The remaining part of this paper is organized as follows. Section two contains the conceptual and empirical review of literature. The methods of analysis, the choice of

¹⁹ Own computation using the 2009 ERHS data, which were 94,394 kilograms of grains production in Yetmen, and 83,750 kilograms of grains production in Debre Brihan-Zuria households and its prices.

a functional model, the data sources and the choice of variables are presented in section three. Section four discusses empirical results. In section five the main findings of the study are summarized and some important policy implications are discussed.

2. Literature Review

2.1 Conceptual Review

The work of J. H. von Thünen on 'classical analysis of the spatial allocation of economic activity' made in 1826 was considered as the birth of rural-urban linkage. He showed how the market process determined land use using a model of agricultural land use in different geographical locations. In 1933 another breakthrough was made by Walter Christaller in which he developed the central place theory to explain how urban settlements are formed and spaced out relative to each other. Since the early 1990s various economic studies explaining spatial differentiation have emerged (von Braun, 2007:2-3).

The distinction between rural and urban areas has been blurred since the two areas are becoming integrated due to better transport and communication, rural-urban and return migration, urban activities in rural areas (rural industrialization) and rural activities in urban areas (urban agriculture). Among the elements of rural-urban linkage, the exchange of goods between urban and rural areas is the essential element for economic transformation (Tacoli, 2004:4). The literature on rural-urban interdependence has explicitly or implicitly depended on the virtuous circle of growth model of local economic development (Momen, 2006:4). The virtuous cycle model of rural-urban local economic development emphasizes the efficient economic linkages and physical infrastructure connecting rural producers with internal and external markets. This cycle involves the following phases (Tacoli, 2004: 4):

- higher income for rural households increases their demand for consumer goods,
- this leads to the creation of non-farm jobs and employment diversification in nearby small towns,
- which in turn absorbs surplus rural labour, raises demand for agricultural produce and boosts agricultural productivity and rural incomes.

Rural incomes in agrarian societies, like Ethiopia, is gained from rapid agricultural growth with enhanced agricultural productivity (Getnet, 2009:761), and can induce non-agricultural growth that creates not only non-farm opportunities and rural income but also increases urban income. Rural non-farm income also creates market demand for agriculture (Diao et al., 2007:29).

“Analytically and in roughly chronological order, students of rural economy have classified agricultural growth linkages into four categories”. These are: production linkages- include forward linkages from agriculture to nonfarm processors of agricultural raw material as well as backward linkages to input suppliers; consumption linkages- include spending by farm families on locally produced consumer goods and services; factor market linkages between agriculture and nonfarm economy- include rural labor market demands and rise of rural wage rates to benefit the poor as well as cash surplus from agricultural sales to finance nonfarm investments; productivity linkages- include an array of beneficial macro linkages transmitted from agriculture to the nonfarm economy such as low food price to improve the productivity of poor manual laborers, improve food security, political stability, higher productivity of capital and learning by doing; and reverse linkages- linkages created from nonfarm to farm activities (Haggblade, et al., 2007:143).

As agriculture grows, the rural household per capita income increases which stimulates a series of economic linkages with the rest of the economy resulting demand in linkages, which constitute the focus of this study, fall into two broad categories of production and consumption linkages (Diao et al., 2007: 3). The indirect effects arising from agricultural growth can be substantial (Hazell and Röell 1983:12), since it leads to the economic structural transformation from agriculture to non- agriculture sectors (Getnet, 2009). An important aspect of growth linkages to the nonfarm economy is predominantly due to the increase in household expenditures on consumer goods and services, as a result of increased farm incomes (Hazell, and Röell, 1983:10-11).

According to Dorosh and Schmidt (2010:41-42), in Ethiopia, a vibrant rural nonfarm sector induced by agricultural growth linkage can help reduce poverty for the following reasons:

- It helps to absorb the surplus labor in rural areas and enhance their income thereby reducing poverty.
- The rural nonfarm sector is important for the welfare of households without land endowments (which include women and the poor) since it is small in size, needs low capital requirement, and near to living areas.
- Many poor households use the rural nonfarm income as the major means of diversifying income and smoothing consumption as a result of the agricultural seasonality.
- Many nonfarm activities are related to agriculture. Thus, the service of financing, processing and marketing can help boost agricultural growth.

Hence, promoting income diversification activities in rural areas, and fostering small businesses and micro-industries in the small town and urban areas will enhance the economic outcomes in all spatial spheres.

2.2 Empirical Review

A classic early study in the green revolution of India determined that higher-income small farmers spent about half of their incremental farm income on nonfarm goods and services and another third on perishable agricultural commodities such as milk, fruit, and vegetables, thus generating strong demand linkages for locally supplied consumer goods and services (Mellor and Lele 1973:35-55; and Haggblade, et al., 2007:143).

“Evidence from elsewhere in the world and most particularly from elsewhere in Africa overwhelmingly demonstrates that small-scale agriculture has been the principal motor of development in rural areas, and that small-scale agricultural units have achieved higher returns to land and capital over time than large-scale agricultural operations” (Delgado, 1997:35).

In Bangladesh during the 1980s and 1990s green revolution, the rising paddy production created market demand on inputs such as the sinking of 750,000 shallow tube wells, and sale of over a million treadle pumps which launched an explosion in

the rural non-farm economy for 50,000 paddy mills, 80,000 small traders, and 160,000 rural mechanics (Haggblade, et al., 2007:141).

Evidence from India revealed that a 1 percent agricultural growth rate stimulated a 0.5 percent addition to the growth rate of industrial output and a 0.7 percent addition to the growth rate of the GDP (Rangargjan, 1982: 7). A 1 percent rise in agricultural income in a Philippines province generated a 1-2 percent increase in employment in most sectors of the local nonfarm economy (Hazell and Röell, 1983:12).

Agricultural development through a green revolution, therefore, can contribute to overall economic development by raising rural incomes and creating a vast market in rural areas for non-agricultural products and services, thereby stimulating industrialization (Fujita, 2010:2-3).

Regional differences in the structure of household demand links to the local nonfarm economy had been evidenced in the World Bank financed irrigation projects of Malaysia and Nigeria. Linkages to the local nonfarm economy were much stronger in Malaysia. The average household had spent 18 percent of its total budget on locally produced non-food goods and services, and it allocated to these items 37 percent of any increment in its total expenditure. In contrast these figures were 8 percent and 11 percent, respectively, in Nigeria. The factors contributing to these regional differences might be due to their relative isolation (Hazell and Röell, 1983:10-11) or may be due to their cultural differences as expected in Gojjam and North Showa areas of Amhara Region.

Ethiopian country wide study by Diao, et al. (2007:13-14 &29) showed that:

- A 1 Birr increase under traditional agricultural production generated the rise in total GDP of Birr 1.97, 2.18, 3.45, 1.40, and 1.16 from maize, teff, coffee, textiles, and other manufacture outputs, respectively.
- In other ways, a 1 Birr increase under traditional agricultural production generated the rise in total household income of Birr 1.32, 1.48, and 1.88 from maize, teff and coffee outputs, respectively.

- With the exception of coffee farming, consumption linkages account for over half of total additional income created via growth in traditional agriculture.
- Higher overall growth has been induced by agricultural rather than non-agricultural growth. Thus it leads to faster reduction of poverty by generating proportionately more income for the poor households.
- Non-agricultural sectors have to grow in order to match growing supply of agricultural products and increasing demand for non-food products.

Many scholars use the modified Working-Leser Model to estimate the relationships between income and consumption for different commodities and to establish how these changes with income and socioeconomic characteristics of the households, using total per capita expenditure as a proxy for income. Among these Delgado, et al. (1998:33); Nagqangweni (1999:15); and Nagqangweni (2001:12) could be mentioned.

All the aforementioned evidence demonstrates the effectiveness of the smallholder farmers' incremental incomes in creating the market demand for non-food goods and services. They are in line with the general views of the researcher. However, the case in Gojjam seems to contradict this since its impact depends on yet other fundamental socioeconomic factors such as culture. This paper intends to deal with this issue.

3. Methodology

3.1 Methods of Analysis

According to Hazell and Röell (1983:22) the principal purposes of these types of studies are to estimate the relationships between income and consumption for different commodities and to establish how this changes with income and socioeconomic characteristics of the households. These relationships are estimated for individual commodity groups, such as total foods and non-foods. Total per capita expenditure is used as a proxy for income.

All the expenditures should be aggregated to an annual basis, thereby avoiding problems of seasonality and lumpiness in expenditure patterns. Socioeconomic

variables characterizing the households are included in the model in a way that allows them to influence both the intercept and the slope of consumption-income relationships. These variables include the size and composition of the family, and dummy variables to capture the effects of gender and education of household heads, and effects on students in the household. The equations are specified and estimated in a way that ensure the usual adding-up requirements. Similar studies have been also conducted in the past (Hazell and Röell, 1983; Delgado, et al., 1998; Ngqangweni, 1999; and Ngqangweni, 2001).

The reasons why annual consumption expenditure for each household is used as a proxy for income are (Hazell and Röell, 1983:22):

1. The income data proved to be noisy, and the reported income was often less than household expenditure, even after dissavings were allowed for.
2. Consumption expenditure is usually considered as a better indicator of permanent income, which itself is considered to be the more important determinant.

The parameters of interest for household expenditure analysis are Average Budget Shares (ABS) and Marginal Budget Shares (MBS). ABS is used to measure the percentage of total household expenditures that goes to a given commodity or expenditure group, whereas MBS is used to measure the percentage of additions to income that are allocated to a given good or expenditure groups (Delgado, et al., 1998:33). According to Delgado, et al. (1998:33):

A high percentage of ABS suggests that the income response for that group is relatively important. Even if marginal income changes have only a small percentage effect on consumption of a good, the absolute change in quantity demanded is significant. MBS, being the practical equivalent of the marginal propensity to consume a given group; it measures the direct impact of income changes on the consumption of the group of goods in question. Unlike ABS, which are derived directly from the expenditure data for each subsample of interest, MBS is based on the coefficients of a demand or income-consumption model that takes into account behavioural factors influencing household expenditures. An MBS that is lower for a given group of goods than the ABS for the same group implies that the relative

importance of that commodity in the consumption basket decreases as income (that is, total expenditure) increases. In such cases demand is income inelastic. A nice property of both ABSs and MBSs is that they are additive. A complete classification of goods yields ABSs and MBSs that sum independently to 100 percent. Commodity groups can be aggregated easily from separate estimates of ABSs and MBSs.

Dividing MBS by ABS gives income elasticity, that is, the responsiveness of expenditure on a given good or group of goods to increments in income. These marginal budget shares depend on the pattern of rural consumption, which may differ by location and by income category (Delagdo, et al., 1998:33; Nagqangweni, 1999:15; Nagqangweni, 2001:12). MBS could be obtained by employing different models.

3.2 Choice of Functional Model

Among the different models employed for such purposes, the two most commonly used for the analysis of consumer allocation of personal consumption expenditure of goods and services are the Working-Leser model (developed by Leser (1963: 694-703)) and an Almost Ideal Demand System (AIDS) (originally developed by Deaton and Muellbauer (1980:312-325)) for each good category, adapted to cross-sectional household data. These models require using total expenditures as proxy for income.

The AIDS was built on the Working-Leser model. AIDS is nothing but the extended part of the Working-Leser model to include the effect of prices (Blanciforti, et al., 1986:7). Since this study uses the Ethiopian Rural Household Survey (ERHS) expenditure data, the prices are not clearly defined, thus the researcher chooses to use the variant Working-Leser model rather than the AIDS model to estimate the MBSs.

3.2.1 The Modified Working-Leser Model

The modified Working-Leser model developed by Leser (1963: 694-703) was originally developed from the linear Engel curve which is derived as follows:

The Engle Curve

$$E_i = \alpha_i + \beta_i E \quad (1)$$

where E_i is expenditure on good i , E is total consumption expenditure, and α is a constant.

However, the function in the Engle equation (1) does not permit the marginal budget share (β_i) to vary at all. Thus a modified Working-Leser model was chosen²⁰ to fulfill the nonlinear function requirement:

$$S_i = \beta_i + \alpha_i/E + \gamma_i \log \beta_i E \quad (2)$$

where $S_i = E_i / E$ is the share of good i in total expenditure, and γ_i is a constant.

Equation (2) is equivalent to the Engel function

$$E_i = \alpha_i + \beta_i E + \gamma_i E \log E \quad (3)$$

In order to compare the expenditure behavior of households with different incomes, allowance must be made for differences in their other socioeconomic characteristics, like differentiating in terms of family sizes, education and age. An Engel function of the form is required: The complete model is then:

$$E_i = \alpha_i + \beta_i E + \gamma_i E \log E + \sum_j (\mu_{ij} Z_j + \lambda_{ij} E \cdot Z_j). \quad (4)$$

²⁰ The modified model differs from the Working-Leser model since it includes an intercept in equation (3). In theory, E_i should always equal to zero whenever total expenditure E is zero, and this restriction should be built into the function. But zero observations on E invariably lie well outside the sample range. Also, observing this restriction with the Working-Leser model can lead to poorer statistical fits, as well as unwarranted changes in the sign of the second derivative of the estimated curve. Inclusion of intercept terms has little effect on MBS for the average person, but it can make a significance difference for income redistribution results. It seems likely that the zero intercept specification is only relevant if higher order nonlinear terms are also included in the model (Hazell and Rell, (1983:22)

Where Z_j denote the j^{th} household characteristic variables and $\alpha_i, \beta_i, \mu_{ij}$ and λ_{ij} are constants.

Instead of restrictive linear Engle curve, this function allows for nonlinear relationships between consumption and income. It also controlled for household characteristics that may affect both the intercept and slope of the Engle function. In order to mitigate the potential heteroskedasticity problems the model was estimated in expenditure share form that is dividing equation (4) by E gives the following equivalent form:

$$S_i = \beta_i + \alpha_i/E + \gamma_i \log E + \sum_j (\mu_{ij} Z_j/E + \lambda_{ij} Z_j). \quad (5)$$

Given the chosen function, the marginal and average shares for the j^{th} good (the MBS_i & ABS_i , respectively) and the expenditure elasticity (ζ_i) can be derived as follows (Chern, et al., 2003:10):

$$MBS_i = dE_i/dE = \beta_i + \gamma_i(1 + \log E) + \sum_j \gamma_{ij} Z_j, \quad (6)$$

$$ABS_i = S_i$$

and

$$\zeta_i = MBS_i / ABS_i$$

Among these options, equation (5) that is the expenditure share version is chosen. It is obtained by dividing the Engle function, equation 4, by E . Since this normalization has the advantage of removing the troublesome heteroskedasticity problem, an inevitable consequence of the fact that variability in E_i increases with total expenditure E in cross-sectional data.

Some disadvantages will exist in estimating share equations. First, the R^2 coefficients are typically smaller²¹. Second, the inclusion of many explanatory variables in the

²¹ This is because the constant term corresponds to a constant budget share, which by itself can be a good fit to the original expenditure data. In fact, if a constant budget share explains all of the sample

equation for every commodity or expenditure group wastes some degree of freedom. Third, the need to use the same functional form in each equation cancels out a common approach of fitting several different functions for each commodity, and then choosing the one that fits best. The model has the added and persuasive advantage of permitting the nonlinear terms in E to be retained in the equation.

Since MBS and ABS in equation (6) and (7) are linear combinations of the estimated parameters, their t-statistics can be readily calculated from the standard errors of the estimated parameters.

3.2.2 Estimation Using Seemingly Unrelated Regression (SUR)

The Seemingly Unrelated Regressions (SUR) model explains the variation of not just one dependent variable, as in the univariate multiple regression model, but the variation of a set of many dependent variables of OLS system of equations. Geweke (2003: 162) has written that “the seemingly unrelated regressions (SUR) model developed in Zellner (1962) is perhaps the most widely used econometric model after linear regressions. The reason is that it provides a simple and useful representation of systems of demand equations”. It is said Seemingly Unrelated Regression Model, since the equations seem to be unrelated although they are related. It is related due to (Dufour and Khalaf, 2002:144):

- The correlation of the error terms in the different regression equations, or
- One of the explained variables is an explanatory variable for another explained variable.

Zellner further showed that SUR estimators are best linear unbiased and maximum likelihood under frequently encountered conditions. In addition, by joint analysis of the set of regression equations rather than equation by equation analysis, more precise estimates and predictions are obtained that lead to better solutions to many applied problems.

variation in expenditure on good l , then the R^2 of equation (4) will be unity, whereas the R^2 for equation (5) will be zero.

Thus, the Seemingly Unrelated Regression (SUR) of the modified Working-Leser model was used to estimate and show the relationships between income and consumption for different non-food commodities. The model should also be strengthened using focused group discussions so as to clearly understand the influences of culture and traditions in the decision-making behaviors of household expenditures that could not be well captured directly by quantitative approaches.

3.3 Data Sources

One of the objectives of this study is to compare the expenditure behavior of households in Gojjam and North Shewa areas of Amhara Region. Similarities and differences between the two areas are therefore of some importance. The recent (2009) Ethiopian Rural Household Survey (ERHS) was used for this analysis. The ERHS is a unique longitudinal household data set covering households in 15 villages of rural Ethiopia. It is conducted by the Economics Department of AAU, in collaboration with the International Food Policy Research Institute and the Centre for the Study of African Economies, University of Oxford. The ERHS includes areas in North Shewa (Debre Berhan-Zuria and Dinki areas), East Gojjam (around Yetmen), and North Wollo (Shumshesha Kebele) Zones of Amhara Region. Among these Yetmen and Debre Berhan-Zuria villages are used for this analysis.

3.4 Choice of Variables

Table 1 below summarizes the dependent and independent variables selected for inclusion in the share equations for Yetmen and Debre Berhan-Zuria Kebeles. These variables are included because they logically explain the relationship between income and consumption of individual commodities. Dummy variables are used to capture the effects of gender on household head, education on household head, students in the household and locations. Many of the household characteristic variables are included to prevent bias in estimator arising from omission of significant sources of inter-household variability in expenditure behaviors.

Table 1: Variables included in Yetmen and Debre Berhan-Zuria Kebeles Dependant

variable: The share of good i in total expenditure ($S_i = E_i / E$)

Description	Name	Unit
Intercept	intercept	birr
Reciprocal of per capita expenditure	recip	birr
Log of per capita expenditure	loge	---
Log of family size	logN	---
Log of family size ÷ by per capita expenditure	logN_e	
Number of babies (<1 year) as a proportion of family size	baby	percent
Baby ÷ by per capita expenditure	baby_e	---
Children ÷ by per capita expenditure	child_e	---
Number of youth (6 to 15 years old) as a proportion of family size	youth	percent
Youths ÷ by per capita expenditure	youth_e	---
Dummy for household head Male=1 Female=0	dhhhead	
Education of household head: Some formal education=1 No formal education=0	deduc	
Dummy for students: Student in the household=1 No student in the household=0	dstud	---
Dummy for Gojjam: Gojjam=1 North Showa=0	dummygojjam	---
Interaction variables for dummy Gojjam and per capita income	dummygojjam×loge	---

4. Empirical Results and Discussions

4.1 Expenditure Behavior of the Average Households using Qualitative Analysis

The researcher, as a discussant, held different focused group discussions in both study sites by raising specific questions for different community groups (male, female and youngsters). The issues for discussion were aimed at knowing the rural community's perception in the areas of:

- Clothing and footwear traditions,
- Elegance and prettiness of women and elegance of men, and
- Criteria of the community for respecting individuals.

Except for some youngsters in Gojjam, the community's perceptions on the issues discussed were uniform. But there are huge differences among the two study sites.

4.1.1 Discussion Results on Clothing and Footwear Traditions

The people of Yetmen rural area (Gojjam) use clothes for many years until they are completely worn out, and walk barefoot. Sewing clothes is highly encouraged than buying new ones. Ability to sew by hand and use sewed clothes is highly encouraged, and those who do not practise this are discouraged by means of sayings²². Applying the sayings to individuals is considered as an insult in the perception of the community. Most people in Yetmen have at most two clothes, one for day to day activities and the other for occasions. Almost all men and women cultivate their plots by wearing very old and dirt shorts and t-shirts. Both men and women walk barefoot. However, the youngsters in Yetmen especially those who have joined the modern schooling system have started to wear better clothes and footwear. Parents are forced to buy uniforms and other clothes for their children.

The case in Debre Brihan-Zuria (North Shewa Zone) is absolutely different from the one in Gojjam. People have a minimum of two clothes and shoes and they buy clothes frequently. Most of them cultivate their plots wearing trousers and shoes or boots. Hand sewing and wearing is not practiced frequently in this area.

Therefore, the clothing and footwear cultures of Gojjam might have a significant negative influence on the clothing and footwear expenditures of households. On the contrary, it may have a positive influence on North Showa's household expenditures.

4.1.2 Culture for Looking Elegant and Pretty

As it has been explained, the reason for buying new clothes and shoes, or for sewing and wearing old ones are mainly due to the communities' value given for elegance and prettiness for people (especially women). In Yetmen rural area women are highly discouraged from making themselves attractive by wearing shoes and new

²² “ይህ ጥፎ አይለብህ ማለት ስድብ ሲሆን አየኸው ለአጣጣፉም ሸንጥ አለው (ሲያምር) ማለት ደግሞ ማድነቅ ነው”።

clothes; and it is a source of disrespect even for men. In contrast wearing new and clean clothes and shoes is a source of respect in Debre Brihan area of Amhara region. In Yetmen the community's perceptions in this regard is expressed in curses and blessings. For example, when parents and grandparents or community members wish lack or bless their sons²³, they say- "let God bless you with a lady who is not attractive and demanding in resources". On the contrary, when they are annoyed by their sons they wish them to have demanding and pretty women²⁴. Although the extent differs compared with women, men are also disregarded if they look elegant by wearing new and clean clothes, especially during the working hours. They are considered as lazy and womanizer²⁵. What makes it more surprising is that the community members may even go to the extent of refusing to mix in marriage with such people, thus out casting them.

Even women do not give value for beautifying themselves. If a woman beautifies herself by wearing better clothes and using cosmetics, she may be disregarded directly or indirectly by other women²⁶.

4.1.3 The Criteria for Respecting Individuals, and for Ceremonial Expenses

The rural Yetmen (Gojjam) community has the following criteria to value their members. Members of the community are appreciated and respected based on:

- their productivity on agricultural activities,
- the amount of resources used in weddings and church related- ceremonies²⁷,
- lending money to other members of the community to cope with at times of difficulties and

²³ አባቶች ልጃቸውን ሲመርቁ “የሴት ደሻሻ፤ የቅርብ እርሻ፤ የጎረቤት ውሻ ይስጥህ ብለው ነው”። ወይም የግራዋ ጣዕም ያላት ሚስት ይስጥህ ይሉታል።

²⁴ አባቶች ልጃቸውን ሲረግሙ “የሴት ወይዘሮ፤ የእርሻ ተራራ ዙሮ፤ የጎረቤት ዶሮ ይስጥህ ብለው ነው”።

²⁵ ወንዶች ነጭ ልብስ ለብሰው የሚታዩ ከሆነ (በተለይ በስራ ጊዜ) “አሸንሻኝ ፤ ወይም ወገብ ነጭ” እየተባሉ ይነቀፋሉ።

²⁶ አንድ ሴት ሌላዋን ሴት በአሽሙር ስትሰድብ “እኔ እኮ በ-ትቴን ለብሼ ፤ አፈር መስየ፤ አፈር ለብሼ ልጅ የማሳድግ ነኝ እንዳንቺ ስኳኳል (ወብቴን ስጠብቅ) የምውል እንዳልመስልሽ” ትላታለች። “ሁልጊዜ የምትወለወል ትባላለች”

²⁷ “ በሰርግና በመከራ ጊዜ ድል ያለ ድግስ ደግሶ የሚያበላ” ከፍተኛ ክብር ይሰጠዋል። መከራ ማለት ሞት ሲሆን (የተሰካር ድግስ ለማለት ነው)።

- the size of a house one constructs, i.e. a high value is given to those farmers who construct houses using more than 100 corrugated iron-sheets

The discussions revealed that ceremonial expenses are one of the problems in Gojjam. Even though wedding and church-related (Teskar) ceremonies do not occur frequently, it should be noted that it is one of the serious problems of the communities. People spend a huge amount of resources for ceremonial purposes. Up to five oxen are slaughtered for each ceremony. In Yetmen priests particularly confessors exact the resources for church related ceremonies. Due to the influence of culture and religious fathers, people spend money for ceremonies irrespective of their income levels. The expenses are covered by borrowing money and renting land if the households do not sufficient income. In the discussions, it was revealed that some people were tired of paying those expenses.

In contrast to Yetmen areas, wedding and church related ceremonies in Debre Brihan are not used as the criteria for respecting community members. People celebrate occasions based on their capacities. Priests and confessors do not have influence on members of the community to exact money. Community members pay a minimal amount of money to churches and get full services.

Thus, this analysis revealed that people in Gojjam are more influenced by culture and traditions than those in North Shewa in spending money. The clothing and footwear expenditures of Gojjam households were highly influenced by culture and traditions. Moreover the ceremonial expenditures were also influenced by culture and traditions rather than economic factors. However, the behavior of young people has started to change regarding clothing and footwear. It should also be noted that some of the community members seem to be tired of the excessive spending for ceremonies although they are not yet able to break the existing strong ties.

4.2 Expenditure Behavior of the Average Households using the Regression Analysis

One of the main objectives of this study was to show that the impact of income on demand for non-food commodities in Gojjam were weak (insignificant) as compared to North Showa. To verify this, a model that relates income and consumption for different non-food commodities has been used. In particular, it was expected that the marginal budget shares (MBS) for non-food items in Gojjam would be lower than that of North Showa households. Since it is difficult to capture the impact of culture directly on quantitative basis, the proportion of expenditure on ceremonies has been taken as an indicator of one aspect of culture. The MBS for each consumption group is estimated using Seemingly Unrelated Regression (SUR) of the modified Working-Leser model. Total per capita expenditure was used as a proxy for income.

4.2.1 Estimation

In order to estimate and compare the effects of rural income on the market demand for the major non-food commodities in Gojjam and Debre Brihan households this study used two types of regression analyses. The first uses separated data to estimate marginal budget shares (MBS) for each site and compares them between each other. Nevertheless, this exercise demonstrates only the magnitude of the MBSs and expenditure elasticity of demand for Yetmen and Debre Brihan households separately. Further inferences about the population at least in the study areas require statistical significance of these differences. Hence, a second regression analysis is employed using the combined data of Yetmen and Debre Brihan households. This method introduced an interaction variable of dummy for Gojjam and the per capita expenditure (\log_e). The dummy for Gojjam (dummygojjam) assumes a value of 1 if the household is from Yetmen and 0 otherwise. A significant and negative coefficient of the interaction variable ($\text{dummygojjam} \times \log_e$) would mean a lower MBS in Gojjam than North Showa households for non-food commodities.

Further analysis has also been made to re-estimate the model by excluding ceremonies from the share of non-food items (nonfood_sh). This analysis implies a

change either in the coefficient of the interaction variable (dummygojjam \times loge) or in the significance of the coefficient is believed to show the impact of cultural aspects represented by the intensity of festivity on the MBS for non-food items in Gojjam vis-à-vis North Showa.

In order to show the responsiveness of demand for non-food commodities to changes in expenditures and to compare the household behaviors between the two study sites, expenditure elasticity for major and interested variables has also been estimated. This shows how the quantity purchased changes (how sensitive it is) in response to a change in the consumer's expenditure, which is a proxy for income. The higher the expenditure elasticity, the more sensitive consumer demand is to expenditure changes (Deaton and Muellbauer, 1980:117). The summary results for all the regression analyses are shown in Table 2 below.

Table 2: Summary of the Seemingly Unrelated Regression (SUR) Results of the Modified Working-Leser Model for Major Non-food Demand System.

Budget shares	Effects of per capita income (loge) using separate regression analysis				Effect of interaction variable (dummygojjam×loge) using combined analysis				Expenditure elasticity of demand for the separate regression analysis			
	MBS for Yetmen (Gojjam)		MBS for Debre Brihan (North Showa)		nonf_sh		nonfood_sh		Yetmen		Debre Brihan	
Total food	10.50***	(9.39)	8.612***	(5.30)	0.569*	(1.78)	0.569*	(1.78)	0.864***	(9.48)	0.756***	(5.73)
Non-food	2.129*	(1.93)	2.967*	(1.81)	-0.554*	(1.78)	-0.641**	(2.63)	0.905*	(1.95)	1.050*	(1.82)
Clothing	0.741	(1.43)	2.725***	(4.49)	-0.126	(0.93)	-0.126	(0.93)	1.013	(1.44)	3.329***	(4.27)
Transport	0.531**	(2.54)	-0.387	(1.118)	0.0369	(0.57)	0.0369	(0.57)	2.909**	(2.44)	2.442	(1.09)
Modern medicine	0.110	(1.31)	-0.0877	(0.87)	0.00367	(0.17)	0.00367	(0.17)	2.346	(1.29)	1.643	(0.83)
Education	0.0323	(0.49)	0.00552	(0.13)	0.00479	(0.33)	0.00479	(0.33)	0.625	(0.49)	0.148	(0.13)
Ceremonies	-0.0092	(0.01)	0.625	(0.83)	0.0877	(0.47)	0.0877	(0.47)	0.013	(0.01)	1.078	(0.83)
Kitchen equipments	0.0203	(0.21)	-0.103	(0.83)	0.00282	(0.10)	0.00282	(0.10)	0.459	(0.21)	2.031	(0.78)
Cosmetics	-0.00751	(0.64)	-0.0627	(1.57)	-0.0237***	(3.60)	-0.0237***	(3.60)	1.317	(0.61)	2.122	(1.47)

Statistics in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Computed regression results from ERHS data

Where nonf_sh is the result of the interaction variables (dummygojjam×loge) for non-food share including ceremonies, and nonfood_sh is the result of the interaction variables (dummygojjam×loge) for non-food excluding ceremonies. Food expenditure has also indicated for comparison purposes.

4.2.2 Discussion of Results for Major Variables of Interest

The main concern of this section is to analyze the impacts of the per capita expenditure (a proxy for per capita income) on the budget shares for non-food commodities. Estimation has been made for the group of food and non-food items. The R^2 ranges from the lowest of 0.26 for cosmetics shares to the highest of 0.98 for food shares.

a) Results for the aggregated nonfood items

The result for the non-food shares depicted in Table 2, column 2 and 3, showed that the effects of income on total non-food commodities were insignificant at 5 percent level of significance for both cases; however, it is positive and somewhat significant at 10 percent level of significance. Although the impacts of income on market demand for non-food items were lower in both cases as compared to its impact on food items, the non-food share of Debre Brihan households higher in amount than Yetmen households. These implies that households in Yetmen have the behavior of spending more for food and less for non-food items, whereas households in Debre Brihan have the opposite behavior. But, since this estimation could only show the magnitude, it has to be re-estimated using interaction variables.

The interaction variables (Table 2, column 4 and 5) of dummy Gojjam and the per capita expenditure (dummygojjam \times loge) including ceremony showed a result of -0.554 at 10 percent level of significance; interpreted as the per capita income increases by 1 percent, the demand for nonfood items in reduced by 0.554 percent in Yetmen compared to Debre Brihan households; and this might be due to the influence of cultural factors. For the result of the interaction variables excluding ceremony, that is taking ceremony as an indicator for culture, was also negative (-0.641) and more significant (at 10 percent level of significance) than the result of the interaction variables including ceremony. These differences are also due to the influences of the cultural factors on non-food budget shares.

The expenditure elasticity of food was below unity in both cases (0.86 in Yetmen and 0.76 in Debre Brihan), implying that food is a necessity in the household budgets. The non-foods expenditure elasticity in Yetmen is less than unity; but its inelasticity

(unresponsiveness) is not because it is a necessity or the most important commodity group like the food items. Rather, it is because they are insensitive for non-food items due to the cultural influences.

b) Results for clothing and footwear items

One of the most important parts of this study is the household expenditure behavior on clothing and footwear. It was assumed that the clothing and footwear lifestyle (cultures) of Gojjam communities have economic implications by spending less as compared to Debre Brihan communities. The regression result of clothing and footwear in Table 2, column 2, proved that the impacts of the per capita income on clothing and footwear shares were insignificant and could not influence the expenditure behavior of the Gojjam households. This implies that while the rural income is the primary factor in determining the economic linkages through creating market demand on clothing and footwear items, its impact could not be seen on the decision-making behavior of buying clothes and shoes; and thus in fostering rural-urban linkages. By implication, and as it has been indicated in the qualitative analysis part of this paper, culture might be the influential factor in determining the expenditure behavior regarding clothing and footwear for these rural households. On the contrary, the per capita income has a positive and highly significant effect (at 1 percent level of significance) on the clothing and footwear expenditure behavior of Debre Brihan households. The result indicated that at most in Debre Brihan, a 1 percent addition in per capita income induced households to spend 3 percent more on clothing and footwear. The effects of the interaction variables for clothing and footwear are also negative as explained above. Expenditure elasticity of demand for clothing and footwear shares in Yetmen is almost unity (1.013) whereas in Debre Brihan it is greater than unity (3.329). This means that the responsiveness of demand for clothing and footwear commodities is much more in Debre Brihan than Yetmen households.

c) Results for transportation service

The transport budget share has been positively and significantly affected by the per capita income of Yetmen households (Table 2, column 2). As the income of the rural households in Yetmen increased by 1 percent (at 5 percent level of significance), households spent 0.5 percent more on transportation. The reason might be due to

the absence of high schools in nearby places, students in Yetmen travel 15 kms to Bichena for their high school education and return home frequently. For the combined analysis the result is positive (0.037) indicating that as income increases by 1 percent demand for transport increases by 0.037 percent more in Yetmen as compared to Debre Brihan households. The expenditure elasticity of demand is more than unity for both cases. But its magnitude is more in Yetmen than in Debre Brihan (2.909 > 2.442) households (Table 2).

d) Results for cosmetics items

For the combined analysis the result of cosmetic is negative and highly significant (-0.0237). A significant and negative coefficient of the interaction variables would mean a lower marginal budget share (MBS) for cosmetics in Yetmen than in Debre Brihan households. The interpretation is that as the per capita income increases by 1 percent, the marginal budget share for cosmetics in Gojjam households is reduced by 0.0237 percent compared to North Showa households. However, this was insignificant to be explained by income in the separated analysis for both cases. The expenditure elasticity of demand is more than unity for both cases. But its magnitude is less in Yetmen than in Debre Brihan (1.317 < 2.122) households (Table 2).

5. Conclusion and Policy Implications

5.1 Conclusion

In this study the influence of rural income in Gojjam on household expenditure behaviour for non-food commodities was empirically examined using qualitative and quantitative methods. For the qualitative analysis, focused group discussion was used while for the quantitative analysis the Seemingly Unrelated Regression (SUR) of the modified Working-Leser model was used to estimate the relationships between income and consumption for different non-food commodities. In the regression analyses, a separate regression analysis was used for each area households; a combined regression analysis for non-food with and without ceremonies, and expenditure elasticities were estimated. The salient points of these analyses are summarized as follows.

The findings from the focused group discussion indicated that rural households in Gojjam:

1. Wear ragged and sewed clothes and walked barefoot. Buying clothes is not frequented and sewing by hand and wearing is highly encouraged than buying new clothes. The case in North Shewa is absolutely different.
2. Do not give value for prettiness and attractiveness of women who wear clothes and shoes. This in turn has negative implications on the decision-making behaviour for buying clothes and footwear.
3. Wearing new and clean clothes and shoes in general, and at working hours in particular, is highly discouraged and it is a source of disregard and insult.
4. Highest values are given for ceremonial preparation; weddings and church-related ceremonies are highly encouraged and they are considered to be the source of superiority. Productivity, offering interest-free credit to community members and constructing sizeable homes using corrugated iron sheets were also other sources of pride and superiority in the community.
5. The role of priests and confessors in exacting resources for ceremonial expenses is too high.
6. Borrowing and renting their cropland are the additional source of fund to cover ceremonial expenses. Community members have started to sense the pains of such practice.
7. There is a tendency to break the strong ties with this type of culture by the youngsters, especially those who have joined the modern schooling system.

Thus decisions in Gojjam to spend money for clothing and footwear, ceremonies and cosmetics are influenced by culture and traditions rather than economics.

Among the effects of the explanatory variables treated in the regression model, the most important variable used to verify the hypotheses of this study were the effects of the per capita income. The result of the regression analyses revealed that:

1. At 5 percent of significance, the result of the interaction variables (dummygojjam \times loge) on the budget share for non-food goods excluding ceremonies is negative and significant (-0.641), whereas it is negative and somewhat significant for non-food items including ceremonies (-0.554 at 10 percent level of significance). A significant and negative coefficient of these

interaction variables would mean a lower marginal budget share for non-food commodities in Yetmen than in Debre Brihan households, which might be due to the cultural influences. Moreover the expenditure elasticity of demand for Yetmen households (which is less than unity) is lower than the expenditure elasticity of demand for Debre Brihan households (which is greater than unity). This indicates the households' insensitivity on decisions of buying non-food commodities in Gojjam compared to North Showa households, which might also be an indicator of cultural influences.

2. The interaction variable ($\text{dummygojjam} \times \text{loge}$) has also a negative and highly significant effect (at 1 percent level of significance) on the budget share for cosmetics (-0.237). This could be interpreted that as the per capita income increases by 1 percent, the marginal budget share for cosmetics in Gojjam households decreases by 0.0237 percent compared to North Showa households.
3. The per capita income (loge) has insignificant effects to explain the clothing and footwear shares (clo_sh) in Gojjam as compared to a positive and highly significant effect (at 1 percent level of significance) in the North Showa households. The elasticity of demand on clothing and footwear for Gojjam household is not significantly greater than one (1.01) as compared to the expenditure elasticity of demand (3.33) for North Showa households. Thus the North Showa households are more responsive to income changes than Gojjam households.
4. The per capita income has positive and significant effects on transport budget shares in Gojjam which might be due to lack of high schools in nearby villages. However, it is insignificant in the case of North Showa households. The expenditure elasticity of demand for transportation was elastic in both cases.
5. Insignificant effects are observed on the demand for ceremonies in both cases. The expenditure elasticity of demand for ceremonies in Yetmen is less than unity, since the households are insensitive to changes in income than in Debre Brihan households.

Thus in Gojjam, it is proved that the increased income did not have significant effects on the market demand for non-food commodities, except transportation. Rather, culture and attitudes might play critical roles in the expenditure decision-making behaviour of Gojjam rural households compared to North Showa households.

The overall result of the study reveal that the increased rural income in Gojjam does not have a significant role in fostering rural-urban linkages as the demand for the major non-food commodities is low compared to North Sowa. The reason for this is that the dominant impact of cultural factors in Gojjam determine the economic linkages instead of the primary factor of rural income. This might have retarding implications on economic transformation, and the opportunity of using integrated rural-urban local economic development. The same implications could apply to the Growth and Transformation Plan (GTP).

5.2 Policy Implications

Based on the results of this study the following policy implications might be worth considering.

1. A continuous awareness creation campaigning through community conferences may have paramount importance to fight the harmful practices connected with ceremonies and attitudes on clothing and footwear.
2. Given the fact that the excessive spending on church ceremonies have less to do with religion per se, changing the attitude of priest to make them realize that money spent on religious ceremonies is extravagant.
3. As it has been revealed by the focused group discussions in Gojjam, there are observed tendencies that the youngsters, especially those who have joined the formal schooling system, to break the clothing and footwear traditions. This could be strengthened further towards general cultural transformation through special programs, such as school clubs.
4. The people in Gojjam can also change their attitude through improving their basic living standards adult education, occasional public conferences, local trade fairs, and by creating competition mechanisms within the communities.

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DETERMINANTS OF FIRM GROWTH: THE CASE OF MICRO AND SMALL SCALE MANUFACTURING ENTERPRISES IN EAST GOJJAM ZONE

Haileleul Admasie Gedefaw

Abstract

This research aims to examine the growth dynamics of MSMEs and identify their major determinants that affect their growth dynamism using longitudinal data collected through a field survey in East Gojjam Zone, Amhara region. In this study, firm growth is mainly measured by business environment, entrepreneur and firm characteristics. Both descriptive statistics and balanced panel data analysis methods are employed on 92 MSMEs over the period 2008 to 2012 to determine the factors of their employment growth.

The findings of the descriptive statistics indicate that MSMEs in East Gojjam Zone are substantially growing; however, there are growth heterogeneities among sub sectors, size, location and gender of owners. The trend of firm entry and exit rate seem to be positively associated but firm entry rate largely out-paced firm exit rate making net entry positive.

Based on econometric analysis, the findings of the study indicate that human capital variables such as the experience and age of leaders, training given by TVET, education level of both the owners and the workers are associated significantly with firm's growth with different signs. Firm growth is also found to be negatively associated with distance from the main business centre. The result also shows that initial size of firms influences enterprises growth positively and significantly in the study area. The employment growth of enterprises owned by cooperative and single form of ownership is estimated to be about 23.4 and 9.6 percentage points lower in 2012 than in the base year (2008) respectively and the employment growth of those enterprises led by females is 14.6 percentage points lower.

The results also indicate that credit, tax, primary education level leaders, and competition do not seem to be able to explain firm growth as far as the study area is concerned. Finally, the findings give rise to some policy implications that are crucial for the improvement of the sector's performance. Prioritizing growth oriented firms, formulating youth enterprises strategy, encouraging partner form of ownership and women's performance in the sector, practicing enterprises agglomeration, motivating new entrants and decrease exit rate of firms by overcoming initial difficulties are the major policy implications of the study.

Key Words: Micro and Small Manufacturing Enterprises, firms' growth dynamism, descriptive statistics, balanced panel data, East Gojjam Zone, Amhara Region

1. Introduction

A common argument in the discussion of Africa's development problems is that the African economies are too dependent on agriculture and natural resource extraction. Unless this trend can be reversed, Africa is likely to remain overly dependent on agriculture and the extraction of natural resources in the foreseeable future. In view of this, growth in the industrial sector is often seen as a vehicle for diversification and sustainable economic development (Page John, 2010). One of the least industrially developed countries in Africa is Ethiopia, where manufacturing accounts for only 5% of total value-added and agriculture employs 85% of the workforce (Eyerusalem Siba and Mans Soderbom, 2011). Hence, Ethiopia needs substantial entry of industrial firms paid with a particular emphasis on growth oriented micro and small scale manufacturing enterprises (here after MSMEs) in order to sustain the overall growth.

Within the developed and developing countries of the world, it is now generally accepted by policy-makers at local, regional and national level, that micro and small enterprises (here after MSEs) are becoming increasingly important in multidimensional aspects. In recognition of the important role of the sector, the Government of Ethiopia has adopted a free market economic policy and formulated micro and small enterprises (here after MSEs) strategy at national level in 1997; which is renewed again in 2011. Since then, MSEs are a special focus of the government, given that they comprise the largest share of total firms and employment in the non-agricultural sectors.

According to the MSEs Development Strategy paper by the Ministry of Trade and Industry (MIT_1997), the whole labour force engaged in the MSEs were more than eight fold to that of the medium and large scale manufacturing industries. Similarly, the CSA 2011 national survey indicated that the number of persons engaged in small scale manufacturing firms in Ethiopia were higher in number than the number of persons who were engaged in medium and large manufacturing enterprises.

According to the records of the Amhara national regional state MSEs agency, currently there are more than 47,211 MSEs. Out of which 2373 legally registered

enterprises are found in East Gojjam Zone. But the number of established medium and large manufacturing enterprises is a gain much smaller than the number of MSEs in our region and it is almost none existent in the study area except the recent Dashen cement factory established in Dejjen.

Within the industrial sector, micro and small scale manufacturing enterprises are especially important as they are the foundation for the establishment and expansion of medium and large scale industries. Moreover, they open opportunities for employment generation, expansion of urban development and provide close support for further agricultural development in stimulating agricultural productivity (through providing agricultural inputs and creating demand for agricultural output) (MOFED 2010/11-2014/15). Therefore, if anyone who needs to transform from reliance on a traditional agriculture to a modern industrial so as to spur the overall development of the country, greater support should be given to those sections of the economy that are able to absorb much of the labour force which increases at an alarming rate in urban areas of the country.

The population size of urban areas in Ethiopia is expanding more rapidly than the ability of the cities' economy to offer new employment opportunities over time. This is mainly due to the natural growth rate difference of birth and death rates as well as migration from rural to urban areas. Such unemployment growth can aggravate the socio-economic problems of the cities unless it is curbed through fostering urban development.

According to CSA (2006), in 2006 the employment to population ratio in urban areas of Ethiopia was 48.8% while in urban Amhara it was 51.6%. In the same year the unemployment rate of Ethiopia was 16.7% while in Amhara region it was 10.3%. But in 2011, the employment to population ratio in urban areas of Ethiopia was 49.4% while in urban Amhara it was 49.2%. In this year the unemployment rate in urban areas of Ethiopia was 22.9% while in urban Amhara it was about 18.7% (CSA, 2011). This shows that the unemployment rate of urban Amhara increases at higher rate (81.5%) than the incremental rate of unemployment rate observed in the rest of the whole regions (37%) within five years.

Besides, to promote the development status of our country, regions should increase the quality and quantity of products they produce and compete in the international market through manufacturing products. Usually Ethiopia exports semi-processed agricultural outputs /products to the international market. It is obvious that countries which export processed and finalized manufacturing out puts to the international market benefit their nations since the exchange values of the manufacturing goods are very high as compare to the other types of goods¹. This indicates that industrialization is really an important tool for a country's development; hence understanding the growth status of manufacturing firms and identifying the factors that can promote and constrain the activities are critical.

For the sake of industrialization and creation of more job opportunities in the urban areas, paying due attention to manufacturing sector is too important. However, it should be noted that giving due attention to industrial sector doesn't mean ignoring the agricultural sector, which is the main stay of Ethiopians in general and Amhara region in particular.

To this effect, the regional state has formulated a strategy for MSEs development by understanding the enormous importance of the sector but to the best of the researcher knowledge growth performance is not realized in-line with the specified strategy. In the study area the growth dynamism of MSEs is quite different in which some MSEs close after they start-up, some enterprises do not show a significant change where as some enterprises experienced high growth and the rest change their size moderately.

Out of the total MSEs that are found in our region, only 5% of the enterprises are established in East Gojjam Zone. Even most of the established enterprises are not growth oriented rather they are under survival stage which indicates that either the exit rate of the firms due to different reasons is extremely higher than the survival and expansion rate of the enterprises or the motivation of the society to engage in the sector is too low in East Gojjam Zone. According to Mulu (2006), 60% of entering firms exit the Ethiopian market within 3 years in business as a result net entry rates

¹ Most agricultural goods have low income elasticities of demand and have low price elasticities of demand, while manufacturing goods have high elasticities of demand.

in the sector have not been high enough to increase the relative size of the manufacturing sector in the last decade.

This shows, unless it is supported by detailed longitudinal firm level survey studies expecting the desired out-come only by formulating good policies and strategies by itself would be improbable. Adjibefun and Daramola (2003) highly emphasized this issue by saying many of the studies that exist in most of the developing countries are macro in nature and generally relay on cross-country rather than firm level survey data. Therefore, policy formulation has been hampered by a lack of studies at firm level in these countries.

To the best of the researcher, a research regarding the dynamic aspects of MSMEs has not been undertaken in the region and at national level at large except a similar paper done by Mulu in 2007 on selected six major towns (Addis Ababa, Hawassa, Bahir Dar, Jimma, Mekelle, and Nazreth). Even most of the previous studies conducted by different researchers are predominantly emphasized on medium and large scale firms using macro level data (Taye, 1996; Mulu, 2006; Admasu, 2007).

In addition, those prior studies considered enterprises size and age as the major factors that affect growth of firms without giving proper attention for the other critical enterprises growth determinant variables such as human capital variables, access to credit, and business environment etc that determine the growth of MSMEs. Hence this paper should be seen as a first step but not the last in these directions.

Therefore, the objectives of the study are to examine the growth dynamics of MSMEs and identify their major socio economic determinants that affect their dynamism in the study area. Specifically, the study seeks to answer the following research questions.

1. Are the MSMEs growing over time in East Gojjam Zone? Which types and legal forms of the enterprises in the sector are growing in the study area?
2. What are the firm and entrepreneur characteristics that affect the growth of MSMEs in the study area?
3. What do the entry and exit rates of firms look like in the study area?

The paper which examines the firm growth experiences in the study area is organized in six parts. The first part presents the introduction session. The second session discusses the theoretical and empirical literatures that examine the major factors influencing the growth process of enterprises while the third part reviews about the methodology of the study under which different sub parts are outlined. The fourth and fifth parts scrutinizes about the descriptive and econometric analysis of the study respectively while the six part which is the final part of the study summarises the essence of the whole study as a conclusions and draws for some policy considerations.

2. Literature Reviews

2.1 Firm Growth Theories

Firm growth is one of the most analyzed fields in economics. However, there is no single theory of firm growth. As cited in Papadaki and Chami (2002), the neoclassical economists were the first to acknowledge the role of the entrepreneur as an individual with special characteristics, within the context of economic theory. The neoclassical theory of the firm looks at single product firms in an industry with a U-shaped average cost curve. Firms grow until they reach the optimum size corresponding to minimum average costs. Once firms have reached their optimal size, they are assumed to grow no more. Hence, the dispersion of firm size will be small and this dispersion will become smaller over time, as firms converge towards the equilibrium size.

The main implication of the neoclassical theory is that firm growth will in the long-run converge towards some optimum size; consequently all firms would grow until achieving the same size. However, the reality is much more complex, and the empirical evidence shows the presence of heterogeneous sizes: a large number of small firms usually coexist with a few large firms in the same industry.

Another governing firm growth theory is the theory postulated by the Behaviourists. The dominant theory of Behaviourist economists is Penrose (1959) which explain that managers can enhance their own satisfaction through an increase in the size of the firm but growth could be limited only by the capabilities of the organization. This

theory argued that firms did not have a long term optimum size but a constraint on current period growth rates. This means that rapid growth can imply a reduction in organizational efficiency. However, this perspective has drawbacks such as the generality of managerial abilities and a lack of empirical studies that investigate the relationship between knowledge structures and firm growth.

Another important firm growth theory which has been widely reviewed empirically is the stochastic Gibrat's Law model (Robert Gibrat 1931). He suggested that there is no relationship between the size of a firm and its growth. This is known as Gibrat's Law or the Law of Proportionate Effect. When we see the reality, firm growth is the result of a multiplicative process that affects the initial size. Hence, the factors that can affect firm growth relate not only to the firm, but also to its environment. However, the stochastic model was superseded in the theoretical literature by the recent learning and selection firm growth theory developed by Jovanovic (1982) and Ericson and Pakes (1995) which we will discuss latter.

Growth of firm theory postulated by Jovanovic (1982) stated that firms do not know their level of efficiency until they enter the market. Once in the market, the most efficient firms² (firms with able managers) grow faster until they reach a minimum efficient size where as inefficient firms disappear with the course of time, therefore, human capital does not affect the evolution of firm growth. The main argument of this theory is that firms whose size is inferior to the minimum efficient size do not accept Gibrat's Law. If these small firms survive, they will increase their size, however, for firms above the minimum efficient scale, Gibrat's Law is accepted. Therefore, Jovanovic (1982) models the heterogeneous behaviour of firm growths depending on firm size and their level of efficiency.

The most recent firm growth theory was also developed by Ericson and Pakes (1995). This theory not only criticized the stochastic growth theory but it also undermines Jovanovic (1982) theory for the immutability of the efficiency parameter. This 'active-learning' model stated that firms that invest on research and development will be more efficient and grow faster than those managed by people

² Jovanovic assumes demand to be deterministic and the only firm specific cost is that associated with managerial inefficiency he assumes there is no technological change in this model

without qualifications and experience. By implication, unlike the passive learning theory, active learning theory which is a more realistic model suggests firms know their own efficiency levels once they enter the market and they will be able to modify their efficiency levels making more effort in their investments. Besides, a firm's experience can also directly affect its growth because time can increase a firm's chances of improving its growth rate and its chances of survival.

In general, though firm growth is one of the most analyzed fields in economics there is no single theory of firm growth and this may be because the definition of the firm is multiple and complex. This shows that firm growth has not been explained in a satisfactory way, as yet and there may still unexplored sources of explanation.

2.2 Human Capital Theory and Firm Growth

The economic prosperity and functioning of a nation depend on its physical and human capital stock. With respect to firms, human capital theory has been frequently utilized as a useful framework to explain the performance of the firm in the general terms including growth, survival, entry and exit issues of the firm. In fact this theory reallocates the attention toward internal capabilities of the firm, more specifically in the direction of entrepreneur and employees itself.

According to Becker (1964), human capital theory posits that individuals with more or higher quality of human capital achieve higher performance at a particular task. In general terms, human capital represents the investment people make in themselves that enhance their economic productivity or organization. Since it is developed through both education and personal experience, it contributes together in the explicit and tacit knowledge of the firm.

He divided human capital theory in to general and specific human capital. General human capital refers to overall education, age, experience and is defined to be not only useful for the current but also for the other potential employers. On the other hand, the specific human capital refers to skills (education and experience) restricted to a certain job (or position) and potentially can lead to the increase in the productivity of the worker only with respect to the tasks that he is performing on his

current job but it could have no any effect on the productivity of employees that work in other firms, i.e. might not be transferred to other occupations.

Previous empirical research findings have emphasized that human capital is one of the key factor in explaining organizational performance. For instance, Bruderl *et al.* (1992) argues that greater entrepreneurial human capital enhances the productivity of the founder which results in higher profits and, therefore, lower probability of early exit. Moreover highly educated entrepreneurs may also leverage their knowledge and the social contacts generated through the education system to acquire resources required to create their venture. In addition to education, specific human capital attributes of entrepreneurs, such as capabilities that they can directly apply to the job in the firm, may be of special relevance in explaining firm performance. The specific human capital can be attained through precise trainings and previous experience.

More focused business training can provide entrepreneur with a specific knowledge, compared to a formal education. This kind of specific human capital also includes knowledge of how to manage a firm, that is, entrepreneur-specific human capital. In particular, entrepreneurs with great industry-specific and entrepreneur-specific human capital are in an ideal position to seize neglected business opportunities and to take effective strategic decisions that are crucial for the success of the new firm (Collombo and Grilli, 2005). In general many of the previous empirical evidences point the positive relation between the growth of the firm and human capital of the leaders and employees.

Overall most economists agree that it is human resources of nation, not its capital nor its material resources that ultimately determine the character and pace of its economic and social development.

2.3 Empirical Reviews

The empirical literature on developed economies shows that the key determinants are size and age (Evans, 1987). Evans showed that the growth rate of manufacturing firms is negatively associated with firm size and age. This confirms Jovanovich's

hypothesis but contradicts Gibrat's law. Unlike Evans, 1987, Coad et al (2008), Goedhuys and Sleuwaegen (2009) and McPherson (1996) argue that there is positive relationship between firm growth and firm size

Another key determinant of firm growth is access to credit. Although many MSEs have limited access to capital, it is often unclear whether credit represents a binding constraint on firm growth. Brown and Earle (2010) evaluate the effectiveness of small business loans in improving employment and sales using panel data in Romania. On the other hand, the findings from one econometric study in Kenya, suggests that credit access is not a significant determinant of firm performance Akoten et.al (2006). Access to finance may be necessary but is not a sufficient condition for MSEs growth as a loan by itself does not create a viable business opportunity.

The other important policy variable that usually negatively affects the growth of firms is tax. Despite this, there is different empirical evidences concerning about the effects of tax on enterprise growth. For instance, Ishengoma and Robert Kappel (2008) in their study indicated that high taxes and tax differentials in Uganda penalized small enterprises growth. According to Harabi (2003), however, tax regulations and the level of taxes do not seem to affect expected firm growth negatively.

Human capital is another key determinant factor for firms' growth. While most empirical evidence indeed suggests that firms with better-educated owners and managers are more efficient, greater complexity emerges when examining the relationship between education and MSEs growth in developing countries. Whilst McPherson (1996) observes that the level of human capital embodied in the proprietor has a positive and significant influence on the growth of MSEs in five Southern African nations, Alvarez and Crespi (2003) cited in Nichter and Goldmark (2005) fail to find a significant effect of skill level in explaining firm's growth in their businesses sample. According to Kantis, Angellini, and Koenig, 2004 cited in Nichter et al. 2005 tertiary level of education in Latin America has positive contribution for firm growth. On the other hand, in Sub-Saharan Africa countries, firms owned by people who have completed secondary school grow better than that of firms owned by people with lower education levels (Liedholm and Mead 1998).

Another important human capital factors which determines firms' growth is experience and access to training. The growth of a firm owned by entrepreneurs who have related experience is better than the growth of firms owned by less experienced leaders (Mulu, 2007). Training is also an important component of human resource development and is emphasized in the economic development process. According to Konings (2008) and Bartel (1994) both cited in Ismail et al (2011), workers who attend training are found to be more productive than those who do not attend any training, hence contribute to firms' productivity. Bartel (1994) found that firms that provide new training program for a certain group of workers significantly increased their productivity by 19%. On the other hand, Mulu (2007) found that vocational training was not a significant factor for a firm's growth in Ethiopia.

The variability of firm growth rates may also differ with sectors and ownership form. Johnson et al (1987) cited in Harabi 2003, find that firms' growth rates vary significantly among the different industries in the manufacturing sector in Morocco. They argue that growth rates of firms in growing sectors should be higher than those of firms in stagnating or declining sectors. With regard to ownership form Coad et al (2008) suggested that enterprises owned by sole proprietor are better than firms managed by partnership.

In addition, the gender of the entrepreneur has been cited to be an important determinant of enterprise growth. Liedholm and Mead (1999) posit that female entrepreneurs in Africa are more risk averse and are less likely to grow in comparison with their male counterparts. They further pointed out that women operators tend to devote their profit to minimize risk and increase security of the welfare of the household, while male operators are likely to invest into the growth of the enterprise. McPherson (1996) observes that firms owned by female persons have lower growth rates for the businesses in five Southern African nations.

Generally, although the first studies on firm growth determinant factors concentrated mainly on the impact of size and age, as we discussed in the theoretical and empirical review there are other important characteristics that can influence post-entry firm behaviour.

3. Methodology

3.1 The Theoretical Frame Work

From the literature section of this research paper, we found that there are different factors that determine the growth of firms. According to Storey (1994), firm growth factors are classified in to three groups. i.e (1) firm characteristics, (2) individual characteristics, and (3) contextual factors. While the firm characteristics include firm age, firm size and the like, individual characteristics include variables like age, gender, work experience, education, etc.

But what is meaning of growth and how we can measure it? Some variables are introduced for growth measuring: sale volume, value added and assets... but from the perspective of African countries, the use of employment as the measure of growth is very appropriate and socially relevant. It also limits the problems related to turnover and value added measures, which are expressed in monetary units, and may be affected by price changes in different countries (Goedhuys and Sleuwaegen 2009).

If we suppose growth, is changing level in firm size between two difference time (t' , t), comparison of firm growth can evaluate with two methods: relative and absolute comparison (Evans David (1987a, b)) specified below.

$$G_{it}^A = EMP_{it} - EMP_{it'} \dots \text{Absolute growth}$$

$$G_{it}^R = \frac{EMP_{it} - EMP_{it'}}{EMP_{it'}} \dots \text{Relative growth}$$

$$G_{it}^{AA} = \frac{EMP_{it} - EMP_{it'}}{t - t'} \dots \text{Annual growth average}$$

$$G_{it}^{Al} = \frac{\ln EMP_{it} - \ln EMP_{it'}}{t - t'} \dots \text{annual growth average on the basis of employment logarithm}$$

In these models :

t : end of period, t' : beginning of period, EMP_{it} : number of employees at end of period,

$EMP_{it'}$: number of employees at beginning of period

If we collect data from same units of observations in a cross-sectional sample surveyed two or more times over time, the resulting observations are described as forming a panel or longitudinal data set (Wooldridge, J. 2002). The general equation of this model is specified as:

$$\ln \text{Firm Growth}_{it} = \beta_o + x'_{it} \beta + \alpha_i + \delta_t + \varepsilon_{it}$$

Therefore, in order to meet the objectives set up on this study the above panel data regression analyses and tests related to it, where the definitions of each term are specified below, are employed as the general methodology by ignoring the relative and absolute measurement methods specified above.

3.2 Model Specification and Data Analysis Method

In order to analyze any longitudinal data set the standard regression model is given by:

$$\begin{aligned} Y_{it} &= \beta_o + x_{1it} \beta_1 + x_{2it} \beta_2 + \dots x_{kit} \beta_k + \alpha_i + \delta_t + \varepsilon_{it} \\ &= \beta_o + \sum_{j=1}^k \beta_j x_{jit} + \alpha_i + \delta_t + \varepsilon_{it} \\ &= \beta_o + x'_{it} \beta + \alpha_i + \delta_t + \varepsilon_{it} \end{aligned}$$

Where:

- $i=1, 2, \dots, N$ (Number of cross-sections); $t=1, 2, \dots, T$ (Number of time periods); $j=1, 2, \dots, K$ (Number of explanatory variables); y_{it} is the growth of the i^{th} firm at time t ; X_{jit} is a matrix of observed explanatory variables likely to influence firm growth; β is estimable coefficient of each explanatory variable; $\alpha_i = (\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_i)$ represents all unobserved time-invariant firm explanatory variable; $\delta_t = (\delta_1, \delta_2, \dots, \delta_t)$ is a time-specific intercept vector; ε_{it} is the error term through spatial and temporal dimensions.

However, in analyzing the above longitudinal data set one can employ any of the three types of panel data models that are predominantly used by the researchers. These are pooled OLS, FE and RE. As to this study is concerned, a linear FE panel data regression model is going to be employed based on the diagnostic tests undertaken below. The equation relating the dependent variable, "Firm Growth" of each MSMEs in East Gojjam Zone over the study years to determine the growth of firms is therefore given as:

$$G_{it} = f(x_{it}, s_i)$$

Where:

X_{it} : are variables of interest varying both across firms and over time (credit, tax distance, age of owners and firms, experience, size, competition and average education level of workers). S_i : are variables that do not change over time (gender, enterprises type, and ownership form and education level of most leaders). This can be written as:

$$\begin{aligned} \ln \text{Firm Growth}_{it} = \ln FG_{it} = & \alpha_0 + \beta_{ab} \ln \text{Ageb}_{it} + \beta_{abs} \ln \text{Agebsqr}_{it} + \beta_{ct} \text{Credit}_{it} + \beta_{tx} \text{Tax}_{it} + \beta_{ex} \text{Exp}_{it} \\ & + \beta_{exs} \text{Expesqr}_{it} + \beta_{ao} \text{Ageo}_{it} + \beta_{ig} \text{Trng}_{it} + \beta_{ewp} \text{Educ_pry}_{it} + \beta_{ews} \text{Educ_sdry}_{it} \\ & + \beta_{dc} \text{Distce}_{it} + \beta_{cp} \text{Compn}_{it} + \beta_{is} \text{Initialsize}_{it} + \beta_{iep} \text{ExpPry}_{it} + \beta_{ies} \text{ExpSry}_{it} \\ & + \beta_{ied} \text{ExpDab}_{it} + \beta_{ml} \text{Male_Yr12}_{it} + \beta_{fl} \text{Feml_Yr12}_{it} + \beta_{wm} \text{WM_Yr12}_{it} \\ & + \beta_{fb} \text{FB_Yr12}_{it} + \beta_{ap} \text{Agop_Yr12}_{it} + \beta_{tl} \text{Txl_Yr12}_{it} + \beta_{sl} \text{Sole_Yr12}_{it} \\ & + \beta_{cp} \text{Coop_Yr12}_{it} + \beta_{pp} \text{Pshp_Yr12}_{it} + \alpha_i + \varepsilon_{it} \end{aligned}$$

Where: $t = 1, 2, 3, 4$ and 5 ; the number of study periods; $i = 1, 2, 3 \dots 92$; the number of panel firms observed over the entire periods; $\ln FG_{it}$ is the growth of the i^{th} firm at time t in log form, $x_{it} = (\ln \text{ageb}_{it}, \ln \text{agebsqr}_{it}, \dots, \text{inysize}_{it})$ is a (92×25) matrix of observed explanatory variables likely to influence firm growth; $\beta_i =$ is estimable coefficient of each explanatory variable; $\alpha_i = (\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_{92})$ represents a (92×1) column vector of parameters, which measures firm specific unobserved heterogeneity; ε_{it} is idiosyncratic disturbance. The definitions and expected signs of the above variables are provided briefly in Table 1 below.

Moreover, the longitudinal data gathered has also been analyzed using descriptive statistics method besides econometric analysis method in line with the study objectives already identified using various statistical tools in EXCEL and STATA version 11.0. The variables included in descriptive analysis method are also tried to incorporate in econometric regression model so as to capture the significance power of those variables in determining firms' growth in both methods. The growth rates of 92 firms in the previous 4 years (2009 to 2012) are statistically assessed in the study area and the data of 2008 is used to check the five year growth rate.

Table 1: Definitions, explanations and expected sign of the study variables

Variables	Definitions of the study variables	Expected Sign
<i>Dependent Variable</i>		
InFG	The number of employees in period t in log form	
<i>Independent Variables</i>		
InAgeb	Logarithm of firm's age in period t	+
InAgebsqr	Age of business square in log form	-/+
Credit	Amount of money a firm borrowed in period t	+
Tax	The annual business profit tax in period t	-
Expc	Business owners service years in period t	+
Expcsqr	Experience square in period t	-/+
Ageo	The age of individual owners in year t	-/+
Trng	Number of training days given for the owners and workers in year t	+
Educ_pry	The average years of primary school level of workers in year t.	+
Educ_sdry	Average years of high school level workers year t.	+
Distce	Distance of the firm from the main road in year t	-
Compn	The number of firms in a town producing the same product in year t	-
Initialsize	The total number of employees in 2008.	-/+
ExpcPry	Primary level owners interacted with experience over time.	-/+
ExpcSry	Secondary level owners interacted with experience over time.	+
ExpcDab	The interaction of ≥diploma holder owners and experience over time.	+
Male_Yr	Male owners growth in 2012 as compared to 2008 (base year)	+
Feml_Yr	Female owners growth in 2012 as compared to 2008 (base year)	-/+
WM_Yr	Wood and metal firms growth in 2012 as compared to 2008 (base year)	+
FB_Yr	Food and beverage firms growth in 2012 as compared to 2008	+
Agop_Yr	Agro processing firms growth in 2012 as compared to 2008 (base year)	+
Txl_Yr	Textile firms employment growth in 2012 as compared to 2008	+
Sole_Yr	Single ownership form firms growth in 2012 as compared to 2008	+
Coop_Yr	Cooperative ownership form firms growth in 2012 as compared to 2008	-
Pshp_Yr	Partner ownership form firms growth in 2012 as compared to 2008	+

The definitions and expected signs of the study variables are provided in Table 1. However, it is difficult in most cases to say a priori what the expected signs of the coefficients are. This is because there is no formal theoretic model that seeks to explain the firm employment growth in relationship with the specified variables.

3.3 The Study Sample and Sampling Approach

The target population of this study are the MSMEs established since and/or prior to 2008 and exist in live until this survey are undertaken in the study area. Based on the available data in the study area currently nearly 938 manufacturing firms has been operated under different form of ownership. Out of the total population I found only 145 manufacturing firms were established since and/or prior to 2008 indicating that majority of the firms is established recently in East Gojjam Zone.

Hence the universe of inquiry for this study includes only these 145 MSMEs operating in East Gojjam Zone by ignoring others which are exited out of the market and whose age since establishment is less than five years. From the total 145 firms only 92 firms give complete information which suggests that the viable response rate of the sample was 63.4%.

3.4 Types of Data and Data Collection Method

Both primary and secondary sources of data are collected and employed for the analysis.

Primary data collection: After I identified my target population longitudinal data was collected using face to face interviews to get data since 2008 to 2012 mid to see the growth dynamics of MSMEs in the study area through a questionnaire.

Secondary source of data: Secondary source of data are also employed for the analysis. These data included information that could obtain mainly from formal sources. The Amhara region MSEs agency, East Gojjam Zone MSEs and trade and industry departments and the four study cities different government institutions were the main secondary sources. Moreover, to complement the survey-based panel analysis information were gathered from various sources such as different reports, bulletins and literatures, which are relevant to the theme of the study.

4. Descriptive Analysis of Firm Growth in the Study Area

4.1 Growth Status of the Firms

To see the growth and its determinants of MSMEs in East Gojjam Zone the researcher used five year data since 2008 to 2012 G.C. All the surveyed 92 firms are categorized in to 4 sub-sectors of the manufacturing activities and the code of each sub-sector is presented here under.

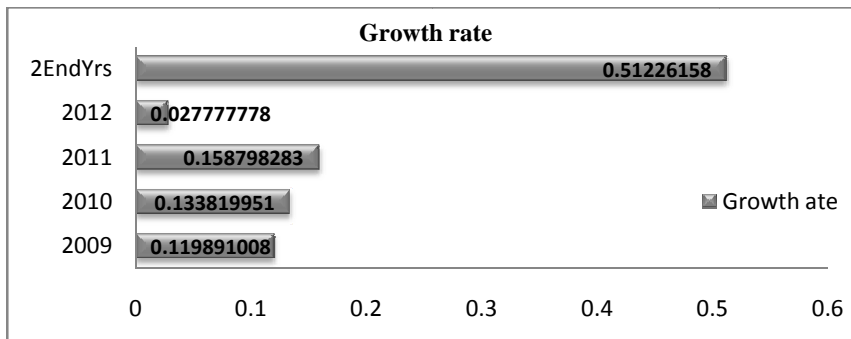
Table 2: Code of the enterprises

S.No.	Enterprises name	Code of enterprises	Remarks
1	Wood and metal work	w+m	In this study agro processing comprises only bakery and manufacturer of edible oil
2	Food and beverage	f+b	
3	Agro processing	Agrop	
4	Textile	Txtl	

4.2 Growth Rates of all MSMEs in the past five years

As compared to 2008, the number of employees in 2009 was higher nearly by about 12% and as compared to 2009; the total number of employees employed in 2010 was increased by about 13.4%. Similarly, compared to 2010 and 2011, the number of employees increased again by about 15.9% in 2011 and 2.8% in 2012 respectively. When we compare the growth rate of employees involved in all enterprises between the two end periods (2008 and 2012), it has a paramount difference showing 51.2% increased in the previous five years.

Figure 1: Employment growth rate (2008-2012)

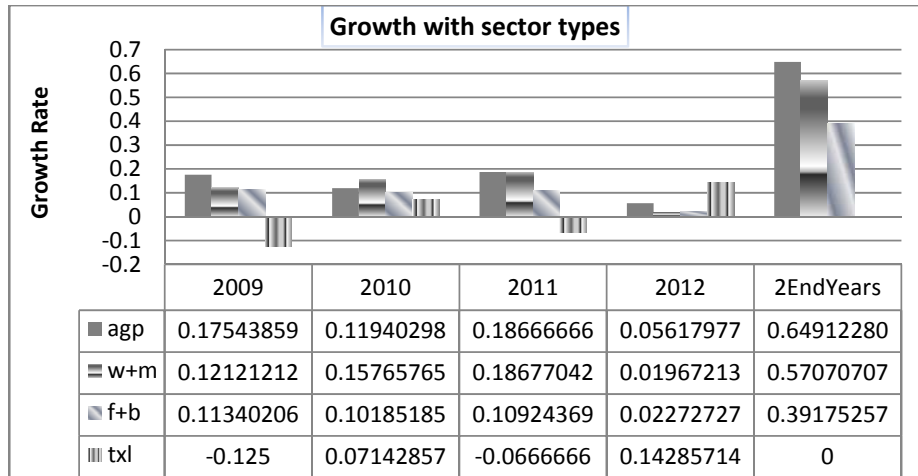


Source: own calculation

4.3 Growth rates of firms in the past five years by enterprises type

The firm growth rates of each enterprises type are shown on Figure 2.

Figure 2: Employment growth of firms over the study periods by sub-sector



Source: own calculation

As it is indicated in Figure 2, almost all of the sub sectors except textile enterprises have recorded positive growth rate. The employment growth rate engaged in textile sub sectors of the manufacturing enterprises showed a negative growth rate in the year 2009 and 2011. But the growth rate of all the other enterprises experiences positive growth rate over a study period under consideration. Albeit the growth rate that we observe in agro processing was positive ranging from 17.5% in 2009 to 5.6% in 2012, it was not consistent over a period of time.

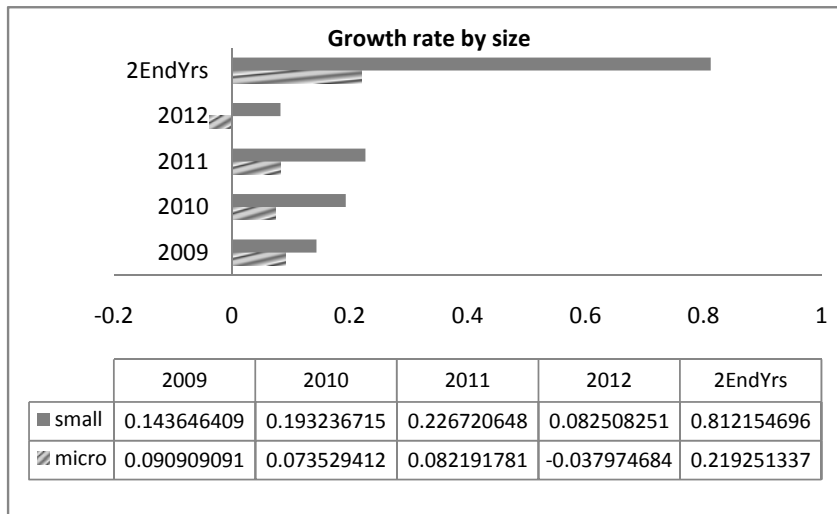
However, the employment growth rate of wood and metal enterprises is not only positive but it increases at an increasing rate having 12.1%, 15.8% and 18.7% growth rate in 2009, 2010 and 2011 respectively. The enterprise growth rate in 2012 highly declined to nearly 2% and this is may be due to the fact that this study was done in the mid of 2012. Similarly the employment growth rate occurred in food and beverage firms are positive. Between the two end periods the highest growth rate is observed in agro processing, followed by wood and metal and the lowest growth

rate observed in textile firms. Hence this finding supports Johnson et al (1987) findings that firms' growth rates vary significantly among the different industries in the manufacturing sector in Morocco.

4.4 Initial Firm Size and Firm Growth Rate

Ethiopia distinguishes between micro and small enterprises using initial paid up capital and total number of employees engaged in an enterprise. But in this study, as the researcher is intended to see the employment growth rate as the main policy variable, the classification given by the firms initial paid up capital ignored. Only the number of employees employed in an enterprise can be used as the main criteria to classify whether the firm is micro or small. Therefore, based on the renewed and current definition given by the Federal MSEs agency, firms employing equal to or fewer than five workers classified as micro firms while firms are classified as small if their total number of employees are between 6 and 30. Using this classification method initially 68 firms were assigned as micro firms and the remaining 24 firms were classified as small albeit it vary over the study period under consideration since there appears high workers turn over.

Figure 3: Firm growth rate by firm size



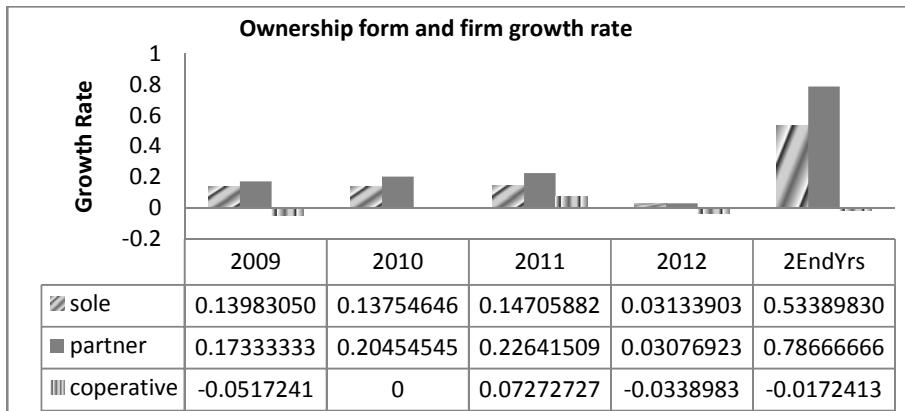
Source: own calculation

Figure 3 indicates that the growth rate of micro firms had no substantial growth differences over time which ranges between 9% and 7.4% until 2011. However, it declines and became negative in 2012 where as the growth rate of small firms were positive and it increases till 2011. Similarly the growth rate of small firms was higher than the growth rate of micro firms at all time. For instance the growth rate of micro firms were 9% in 2009 where as the growth rate of small firms were 14.4% in the same year indicating that the growth rate of small firms was higher by about 5.4%. In 2010 the growth rate of small firms was higher by 11.9% which is higher than the difference in growth rate registered during 2009. The difference in growth rate between micro and small firms was 14.5% and 12.1% in 2011 and 2012 respectively. This shows the trend in growth rate differences between the two types of enterprises was positive over the study period and increases until 2011. Between the two end periods, those enterprises considered as micro show 21.9% growth rate in employment and the growth rate of small firms is 81.2%. Based on this analysis it can be concluded that the growth rate of small firms is higher by more than two times that of the growth rate of micro firms except the growth rate registered in 2009 and the growth rate of small firms was higher by more than three times between the two periods.

4.5 Ownership Form and Firm Growth Rate

Legal form refers to whether the enterprise is private or public or whether the firm is sole proprietorship, partnership, private limited company, or corporation. But in the study area almost all firms have been privately owned under the sole proprietorship, partnership and cooperative form of ownership, hence this study focused only on such firms.

Figure 4: Ownership status of firms and firm growth in the study area



Source: own calculation

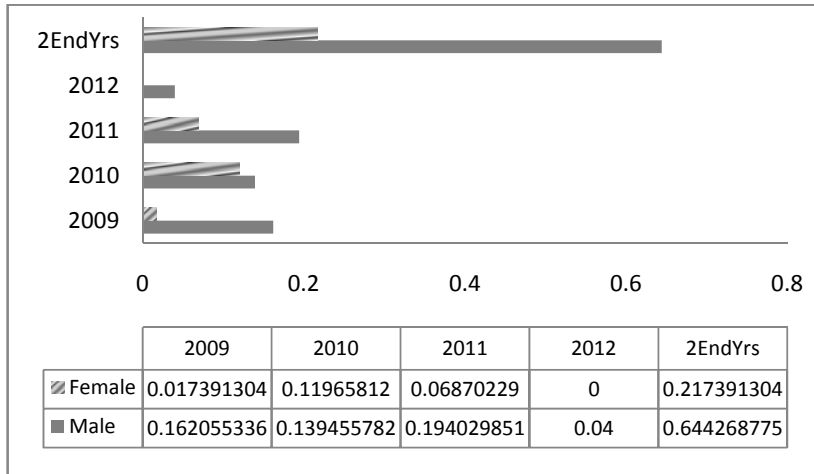
As one can see from Figure 4, the growth rate of sole proprietorship is positive and nearly the same where as firms owned by partnership form revealed not only a positive growth rate but the growth rate also increases until 2011, however, the growth rate of firms in 2012 is nearly the same (3% growth rate) for both form of ownership status. The employment growth status of cooperative form of ownership is by far lower than the growth rate of firms observed in others form of ownerships. For instance, in 2011 the growth rate of individual proprietor firms was about two times the growth rate of cooperative firms and the growth rate of cooperative firms was almost one third of the growth rate of firms owned by partnership. Using the 2008 and 2012 employment data, still the partnership form provides the best growth rate. The skill, experience and information spill over among entrepreneurs as well as financial power may make partners to be efficient and effective which intern helps to receive the fruits of their operation immediately. This finding is different from the findings of Coad et al. (2008) who argue that the growth of firms owned by sole proprietors was better than of others.

4.6 Entrepreneur Gender and Firm Growth Rate

Figure 5 indicated that entrepreneurs' gender highly influences the performance of firms in East Gojjam Zone albeit the performance was not regular for both sexes. The growth rate of firms managed by male entrepreneurs is better than enterprises growth rate led by female entrepreneurs in all study periods. The growth rate of

firms led by male entrepreneurs in 2009 was nearly ten times the growth rate of firms led by females.

Figure 5: Entrepreneur Gender and Firm Growth Rate



Source: own calculation

In 2010 the employment growth rate was 13.4% and nearly 12% for male and female entrepreneurs respectively. Similarly the employment growth rate of firms managed by male entrepreneurs was on average three times that of female entrepreneurs in 2011. In 2012 the growth rate of females is zero where as it is 4% for firms led by males.

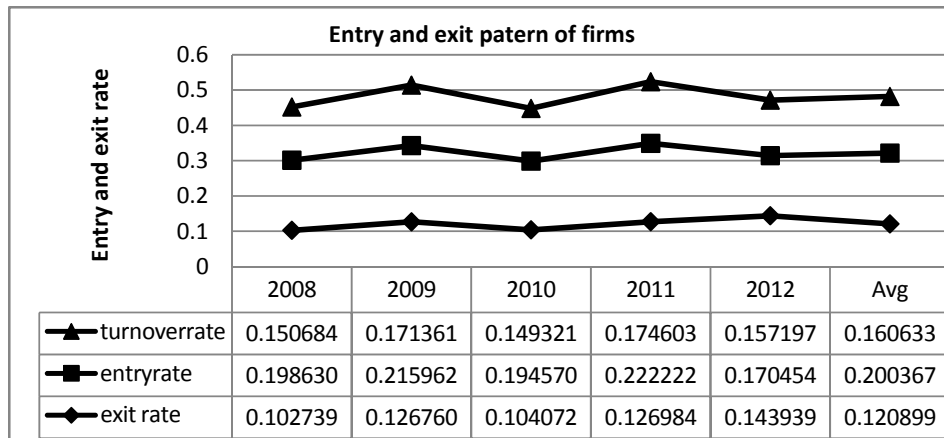
But the growth rate of firms managed by female entrepreneurs initially it was high and it declines in 2010. The growth rate registered between the two end periods had also a significant difference between male and female entrepreneurs. Those enterprises led by male entrepreneurs had 64.4% growth rate and enterprises led by female entrepreneurs registered 21.7% growth rate indicating that the growth rate of male headed enterprises is about three times that of female headed enterprises between the two end periods. This study confirms the findings of McPherson (1996) and Liedholm and Mead (1999) who observe that firms owned by female persons have lower growth rates for the businesses in African nations.

To summarize, the growth rate of small firm was higher than that of micro firms in the study area, i.e. growth rate correlates positively to firm size in the study area. The growth rate of enterprises owned by partnership is better than that of other forms of firms and the growth rate of enterprises owned by cooperative had the lowest growth rate. Finally, the growth rate of enterprises was highly influenced by gender. Considering the two end periods, the growth rate of firms led by male entrepreneurs was about three times to that of led by female entrepreneurs in East Gojjam Zone.

4.7 The Entry and Exit Pattern of Firms in the Study Area

In order to assess the entry and exit rate of firms in the study area the researcher grouped firms in two categories and analyzed the entry and exit rate of firms. These are those firms newly entered in to the market in each study year considered as entry firms and those firms get out of from the market are considered as exit/death firms.

Figure 6: The entry and exit rate of firms



Source: own calculation

Figure 6 depicted above shows the pattern of entry and exit rates of MSMES in East Gojjam Zone in the previous five years. The entry, exit and turnover rate of firms is different in each year. The entry rate of firms are ranging from a maximum of 22% in 2011 to a minimum of 17% in 2012 and the exit rate of firms ranged from a

maximum of 14% in 2012 and to a minimum of 10% in 2008. On average about 20 percent of firms entered which is comparable to the study conducted by Admasu (2006) in Ethiopian manufacturing firms and about 12 percent of firms exited every year from 2008 to 2012. Figure 6 shows us the average turnover rate in the study periods was about 16 percent.

The above figure also shows that the entry and exit rate of firms are positively correlated over the study period under consideration. Which means when the entry rate is high, the exit rate of firms become high and when the entry rate of firms are low, the exit rate of firms become low. Besides, firm entry rate largely out-paced firm exit rate making net entry positive.

5. Econometric Analysis of Determinants of Firm Growth

5.1 Diagnostic tests

Generally, pooled OLS, random and fixed effects are the three types of panel data models that are predominantly used to conduct analyses of longitudinal data set. But, since the data analysis method of each model is quite different depending on the type of data it is very important to test and identify which model is an appropriate for the analysis before making the final regression output.

Accordingly, the result of analysis undertaken using the Breusch-Pagan test indicates the POLS is rejected in favour of a random effect model incorporating firm-specific effects. Furthermore, in order to use a fixed effects model there should be an assumption that the individual unobserved characteristics vary and correlate with the explanatory variables. Besides, the explanatory variables are assumed to be exogenous and independent of the error terms (Verbeek, (2000) and Wooldridge, (2002).

Both tests suggest us to use the Hausman test in order to determine whether to use the RE or FE model. In the Hausman test, the null hypothesis is stated that explanatory variables and the individual unobserved characteristics are not correlated (Hausman test assumes RE is fully efficient but not always the case). This

implies RE model will be better model for the analysis as far as the test is found insignificant and if the test becomes significant FE model will be used.

However, once again Cameron and Trivedin (2009) warn that the default Hausman test is not the perfect test because the individual unobserved characteristics and idiosyncratic error term may not be independently and identically distributed. Hence, the authors recommend us in using the sigma more option (need of using robust Hausman test). In this study, therefore, using both the default Hausman and Robust Hausman test method FE model was found an appropriate model to determine the significant factors affecting the growth of a firm.

5.2 Econometric Results of Firm Growth Determinant Factors

After making all the necessary econometric diagnostic tests the researcher had done the final regression output using the FE model that identified using the tests to get unbiased and efficient estimates. However, since many of explanatory variables that may play an influential role in enterprises growth are time invariant factors, it is impossible to see the impact of such variables using FE model analysis. In order to know the influence of these important fixed explanatory variables on employment growth, those variables are interacted with time dummies putting 2008 as the reference year and other explanatory variable (experience). Entrepreneur gender, sub sectors of the manufacturing sector and the legal ownership form of the enterprises are among the vital predictors which this research paper intended to see their employment growth over time in reference to the base year. Similarly the education level of the leaders interacted with experience to see the immediate impact of entrepreneurs' education level on firm growth. Accordingly, the final regression FE estimates using the stata are presented in the Table 3 given below.

Table 3: Econometric results for firm growth determinant factors

The dependent variable is the employment growth in logarithmic form (lnFG)			
Covariates	Coefficients	T	P > t
lnAgeb	.2748207	3.42***	0.001
lnAgebsqr	-.1420894	-4.40***	0.000
Credit	3.74e-07	1.01	0.317
Tax	-7.76e-07	-0.48	0.634
Expc	.131853	4.84 ***	0.000
Expcsq	.0013664	1.87**	0.064
Ageo	-.0595571	-7.01***	0.000
Trng	.0644576	6.22***	0.000
Educ_sdry	.0456432	2.52*	0.014
Educ_pry	.0983489	3.63***	0.000
Distce	-.5974909	-3.46***	0.001
Compn	.0049751	1.37	0.173
lnl_Insize	.1251576	5.95***	0.000
ExpcPry	-.0035122	-1.12	0.267
ExpcSry	.0021213	2.05*	0.043
ExpcDab	.002113	2.41*	0.018
Male_Yr12	-.0385216	-0.46	0.645
Feml_Yr12	-.1457671	-1.93**	0.057
WM_Yr12	.0178715	0.21	0.830
FB_Yr12	.081718	0.94	0.351
Agop_Yr12	.007192	0.07	0.942
Txl_Yr12	.0945291	0.69	0.491
Sole_Yr12	-.0958593	-1.95**	0.054
Coop_Yr12	-.233789	-3.93***	0.000
Pshp_Yr12	.0533668	0.91	0.363
Cons	1.234283	4.65	0.000
sigma_u	1.0230618		
sigma_e	.17185153		
Rho	.97255783	(fraction of variance due to u_i)	

t statistics, * p<0.05, ** p<0.1, * p<0.01**

1. Age of business and firm growth

The age of business since establishment significantly and positively affects the growth of firms in the study area albeit there is a consensus among many writers on the subject that there is a negative relation between enterprise growth and age of the enterprise. Likewise, the variable age square significantly but at a negative sign influences firms performance. Unlike to the finding investigated by Bigsten and Mulu (2008) who indicated that there had been no a unique relationship between firm age and its growth rate, the results of this study concluded that the relationship between age of firm and growth is concave. Hence, this result may suggest that age has a positive effect on employment growth and the positive effect of age increases and extends to a certain point at which its positive effect disappears (threshold point). Generally, business age seems to have a positive effect on employment growth in the short-term, but the positive effect disappears and age of enterprises influences negatively after a certain period of time. In other words, employment growth increases with firms' age but there is diminishing return to age.

2. Entrepreneur experience and firm growth

The final regression result in Table 3 indicates that the entrepreneur total years of experience had positively and significantly affect firms' growth at about 13.2% for each additional service year of the leaders. Similarly, the variable entrepreneur square positively and significantly influences firms' performance at 10% significance level. This shows the firm growth rate increases at an increasing rate when the internal service years of leaders increase by one year. Moreover, this result is consistent with the notion of learning-by-doing and the idea that an enterprise becomes more productive as they learn both firm specific and industry specific skills. In the other way round, the rationale that experience raises employment may be on the assumption behind experience increases selling volumes and earnings by improving firms' productivity. Empirically, the finding is similar to Mulu (2007) who revealed that the growth of a firm owned by entrepreneurs who have related experience is better than the growth of firms owned by less experienced entrepreneurs in Ethiopia.

3. Age of owner and firm growth

The final econometrics result indicated in Table 3 shows that owners' age is found to be a significant determinant of growth with a negative sign. Holding other being constant as the age of the entrepreneurs increases the growth performance of the firm becomes low.

This finding, therefore, supports the empirical finding of Sinha (1996) who indicated that firms' owned by younger individuals were more successful in India. It seems that young entrepreneurs are more dynamic and growth-oriented in their business performance than older ones since young entrepreneurs are known to be more proactive, innovative and risk taking than adult entrepreneurs as they may be reached closer to their long-run equilibrium scale of operation, being in the market for a longer period. To sum up, when the owner becomes aged he/she may not necessarily result in a decline in unemployment rate since boredom, tediousness and other reasons may occur which intern leads to leaders not being effective and efficient when they stay for long periods.

4. Training given by TVET and firm growth

Contrary to the results by Mulu (2007) who studied the impact of training on firm performance using cross sectional data analysis and concluded that vocational training programs in Ethiopia do not significantly affect firms' growth, training given by TVET for the management (for both firm leaders and workers) in this case has shown to exhibit a significant and positive impact on firms' employment growth in East Gojjam Zone. This is really a powerful empirical finding for those concerned with employment creation in East Gojjam zone since it is the only technical assistance which systematically enhances enterprises employment growth. The importance of TVET for entrepreneurs and workers is perhaps the most imperative finding for the MSMEs from this analysis, as it provides the opportunity for both short-term and long-term impacts on the growth trajectories of MSMEs.

Generally, this finding is consistent with the argument that training enhances scaling up of best practices and diffusion of new technology, since the purpose of training often is to get employees familiarize with the existing best technologies as well as

acquainted them with new techniques of production, new machines, new kinds of raw materials, and all other new features in the production process.

5. Education level of the entrepreneur and firm growth

Since the education level of most respondents which is one of the most important human capitals is constant over time it is difficult to investigate the influential power of owners' education on firm performance using FE estimation method. Hence the researcher interacted this important variable with owners' internal experience to see the immediate effect of it and to assess the joint effect on employment growth in the study area.

Based on this, the final FE regression output indicated in Table 3 shows that on average a firm can grow by about 13.4% ($=0.132+0.002$) per year when it is led by a leader with secondary education level. The performance of firms led by diploma and above diploma holders is nearly the same as the performance of enterprises led by secondary education level holders in the study area. i.e. the econometric result indicated that a firm can grow by about 13.4% ($=0.132+0.002$) per year when it is led by diploma and above diploma education level holders. This indicates that education level and firm growths are positively correlated in East Gojjam zone confirming earlier findings by Liedholm and Mead (1998) in Sub Saharan Africa.

This result is as expected and postulated in the study hypothesis since better educated entrepreneurs are able to supervise their workers and reduce shirking which in turn raises efficiency and effectiveness of labours. This finding is also consistent with McPherson (1996) that the level of human capital embodied in the business owners has a positive and significant influence on the growth of MSEs in five Southern African nations. The ability of a firm to make use of external technologies may also depend on the absorptive capacity of the top managers that may have a high positive effect on the growth of employment.

6. Education level of workers and firm growth

Most previous studies have been tried to assess only the role of leaders' education level on firms' performance. However, it is also important to consider that role of level of education of workers engaged in an enterprise in employment growth.

Supporting the findings of Bager and Scott (2002) that workers education level is an important private firm growth determinant, both primary and secondary education level of workers significantly and positively influences the growth of enterprises in East Gojjam Zone. This result stresses the importance of educated personnel who may play a pivotal role for the high levels of productivity and for employment growth that it implies as well as for the successful performance of an enterprise.

7. Distance that the enterprise found from the main commercial area and firm growth

The growth of firms has also significantly affected by the place where the enterprises are found. Distance in which the firm is located from the main business center (main road) negatively affects the growth of firms in the study area which is similar to the finding of McPherson (1996), Liedholm and Mead (1998) and Mulu (2007) as they confirmed that firms located at commercial markets grow faster than those located at home and other areas.

8. Initial size of employees and firm growth

The regression output showed that the initial size of a firm (proxied by the total number of workers in 2008) was found to be significantly and positively correlated to firm growth. Indeed, the growth rate of small firms was found to be more than three times the growth rate of micro firms as indicated in the descriptive analysis part. Based on this analysis, contradicting the firm growth theory which suggests that there is a negative relationship between growth and size of the firm, it is possible to conclude that firm growth rate correlates positively to the firm size as far as this study is concerned. This means that small enterprises grow faster than micro firms, contrary to the Gibrat's law of proportionate effect which hypothesis there is no any dependency between firm size and firm growth. This evidence may indicate economies of scale which implies that an increase in firm size results in simultaneous increase in employment growth.

Empirically, this result contradicts the findings pointed out by Mulu (2006) and Admasu (2006) that size is inversely related to enterprises growth in Ethiopia but similar to McPherson (1996), Van Biesbek (2005), Coad et al (2008) and Goedhuys

and Sleuwaegen (2009) who argue that there is positive relationship between firm growth rate and firm size.

Contrary to the predicted hypothesis, credit and tax have no any effect on the growth of firms in East Gojjam Zone albeit the signs of the coefficients are as expected. Besides, firms' competition and primary education level of leaders do not have any impact on enterprises growth in the previous five consecutive years in East Gojjam Zone.

9. Other time invariant observed factors

Here, the researcher was keen to assess the effect of time invariant growth determinant observed factors over time in the study area by interacting them with time dummies using 2008 as a base year. But I am interested to see the influence of those variables only between the two end periods (2008 and 2012) rather than testing whether the return to those variables was constant over the entire time periods (2009, 2010, 2011, 2012) so as to make the study clear and untidy. That is, it is vital to assess the employment creation power of those variables in 2012 as compared to the base year (2008).

Based on this, the researcher investigated the coefficients on these interaction terms but a surprising finding is found from the analysis. Except the three fixed explanatory variables the whole time invariant covariates included in the model do not play a significant role in enterprises growth between the two periods. That is only female leaders, individual and cooperative form of ownership interacted with time dummy (in 2012) have a significant influence between the two end years with the expected sign. That is the employment growth of enterprises led by females is estimated to be about 14.6 percentage points lower in 2012 than in the base year 2008. Likewise, the employment growth of enterprises owned by sole and cooperative form of ownership is estimated to be about 9.6 and 23.4 percentage points lower in 2012 than in the base year 2008 respectively.

The rest 6 interaction variables namely male headed enterprises, sub sectors of the manufacturing sector (wood and metal, food and beverage, agro processing and textile) and partner form of ownership estimates are insignificant at any significance

level against a two-sided alternative. However, with respect to the sign of the estimates unexpectedly the coefficient male is negative. Interestingly, the interaction terms of the entire sub sectors of the manufacturing sector (wood and metal, food and beverage, agro processing and textile) and partner form of ownership are all positive showing that the employment growth in each enterprises type and organizations owned by partners are higher in 2012 as compared to the base year (though the estimates are insignificant).

In summary, firm age affects growth positively but the positive effect diminishes with growth and eventually turns negative implying that employment growth increases with enterprises age but at a decreasing rate. That is the employment growth of enterprises increases with firms' age but there is diminishing return to age. Similarly those important human capital variables (entrepreneurs' experience, age of entrepreneurs'/owners, training given by TVET, education level of the management (both the owners and workers) have influential power in employment growth in East Gojjam Zone. Except the explanatory variable entrepreneurs age all the other human capital firm growth determinant factors positively influences employment growth. It is also possible to conclude that distance that the enterprises established from the main business centre and initial size of firms significantly influences enterprises growth.

When we consider the importance of time invariant firm growth determinant factors albeit most of them do not have a significant impact on employment growth female headed, individual and cooperative ownership form of enterprises play a significant role in employment growth with a negative sign between the two end periods. That is, the employment growth of enterprises led by females and owned by individual and cooperative form of ownership is lower in 2012 than in the base year 2008. Other factors which are included as explanatory variables in the study do not have an impact on enterprises growth in East Gojjam Zone.

6. Conclusion and Policy Implications

6.1 Conclusion

The study entitled growth determinants of firms' aims to assess the factors that affect the performance of micro and small manufacturing enterprises (MSMEs) in East Gojjam Zone of the Amhara Region State over the period between 2008 and 2012. In selecting the size of the sample the researcher considered the method of approaching the entire MSMEs and the aim of the study has obviously limited the inclusion of more variables and hypothesis that could have been tested with the given empirical model.

The study utilized panel data collected through survey on 92 MSMEs is believed to add to our understanding of how MSMEs grow. Using employment growth as the dependent variable both descriptive statistics and econometric regression method are employed to analyze the data.

Based on the descriptive statistics analysis, the growth rate of all the 92 MSMEs is positive over the study periods and it increases at an increasing rate until 2011. Between the two end periods the growth rate of employees involved in all enterprises is substantial (51.2%). Considering the growth rate of firms between the two end periods by enterprises type the highest growth rate is registered in agro processing firms (64.9%) and the lowest growth rate (zero) is observed under textile firms in East Gojjam Zone.

The initial size of MSMEs positively correlates with growth rate in East Gojjam Zone. Accordingly, between the two end periods the growth rate of small firms is higher by more than three times to that of the growth rate registered by micro enterprises. Using the 2008 and 2012 year's data enterprises organized and owned by partnership form provides the best growth rate (78.7%) where as the growth rate observed in cooperative form of ownership is the lowest (negative 2%). More of this, the performance of male headed firms was about three times that of female headed enterprises in East Gojjam Zone.

In this empirical work the researcher assessed the entry, exit and turnover rate of firms in the previous five years. On average about 20% of firms entered in to the market and about 12% of the enterprise exited from the market every year from 2008 to 2012 in East Gojjam Zone. Similarly, the firms' average turnover rate in this period was about 16%. In addition to the descriptive statistics the researcher had also analysed the data using econometric analysis method. Based on this, fixed effect panel data model estimation method has been employed to address the study objectives.

The findings that I got in this research using econometric analysis method on a sample of MSMEs are mixed with most of previous studies in terms of supporting the null hypothesis despite differences among analysis in methodology, measures of firm growth, time period, data sources and unit of observations. That means some findings are consistent where as some regression out puts are inconsistent with the previous studies. The age of business and its square influence the growth of enterprises significantly but unlike to the findings of Bigsten and Mulu (2008) enterprises age has a concave shape with respect to employment growth in the study area.

In this study, human capital variables such as workers education level, experience and age of owners, as well as training given by TVET substantially influence enterprises growth as expected in the null hypothesis. The empirical result also shows that growth is significantly and positively influenced with firms led by high school and diploma and above diploma holders. Except the owners' age all these variables influence firms' growth positively. The negative sign coefficient of owners' age indicates that the older the business owner, the lower the enterprise growth performance is.

Turning to the variable distance, it negatively and significantly influences firms' growth in East Gojjam Zone which confirms the findings of Mulu (2007) in Ethiopia. That means if the location where the enterprises found are far from the business commercial area the owners may be less profitable which intern negatively affects firm growth. Unlike the findings pointed out by Admasu (2006) but similar to McPherson (1996), Van Biesbek (2005), Coad et al (2008) and Goedhuys and

Sleuwaegen (2009) firms' initial size has a positive and significant impact on the growth of firms.

Finally, the study also examines whether the time invariant growth determinant observed factors was constant over the study periods by interacting them with time dummies using 2008 as base year. But only female headed, individual and cooperative ownership form of enterprises interacted with time dummy (in 2012) coefficients significantly but negatively influences the employment growth between the two periods with the expected sign.

To sum up, the study aims to assess the growth dynamism and its determinant factors over five years balanced panel data collected through survey on the whole firms and using employment growth as the dependent variable both descriptive statistics and econometric regression method are employed to analyze the data. The analysis has enabled to draw some important policy implications based on the conclusions on the issue of MSMEs growth dynamism and its determinants which are pointed out below.

6.2 Policy Implications

Based on the results, the research paper draws the following policy implications.

- 1 The finding of the study indicated that the growth rate of small firms is by far higher than the growth rate observed in micro firms. Therefore, policy makers and other concerned bodies can prioritise their support to such firms from the point of view of unemployment reduction and poverty alleviation efforts.
- 2 The findings also call for enterprises policies like the youth enterprises strategy, which among others encourages the young enterprises, as they are proved to be growth-oriented in their business performance.
- 3 In contrast to vision of the MSEs development strategy which argues textile manufacturing is one of the growth oriented enterprises that will promote the growth of our nation, the findings of this study shows that not only the number of entrepreneurs engaged in this sub sector is too small but the growth rate of the existing entrepreneurs is also too low. Hence, the administration zone at

different levels and other concerned bodies should give due attention for the growth of the sub sector.

- 4 For better firm growth and by implication, unemployment reduction and poverty alleviation, it may be necessary for MSMEs to be led by leaders with high school level of education and above.
- 5 The other important policy recommendations to emerge from the finding that average education level of workers and training given by TVET has shown to be positively associated with employment growth is that entrepreneurs should attract educated personnel and expanding TVET institutions should be given an increased attention on the part of policy makers as a strategy of supporting firms through a skilled labor supply.
- 6 The fact that the firm growth rate of partnership form of ownership is the highest of all other forms where as the growth rate observed in cooperative form is the lowest may indicate that partnership form of ownership can be a tool for employment growth and poverty alleviation. This implies that by reassessing the cooperative legal form of ownership it might be more effective if the government try to encourage the establishment of firms which are owned by partners.
- 7 The study observes the existence of both active involvement and performance heterogeneities with gender. Hence, measures directed toward encouraging women's participation in the sector and their performance need to be strengthened in order to enable them make economic contribution through employment creation and entrepreneurship.
- 8 Employment growth could be enhanced if the government give due attention for enterprises agglomeration or clustering of enterprises. Micro and small enterprise owners also need to look for means and ways by which they can expand business, for instance, in searching for commercial business centre.
- 9 The entry and exit rate of firms in the study area positively correlated. Hence, the concerned bodies should design programs and policies of support after their establishment in order to motivate new entrants and overcome initial difficulties as well as decrease exit rate of firms.

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DETERMINANTS OF CHEMICAL FERTILIZER TECHNOLOGY ADOPTION IN NORTH EASTERN HIGHLANDS OF ETHIOPIA: THE DOUBLE HURDLE APPROACH

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Abstract

The objective of the study was to assess the determinants of the probability of adoption and intensity of use of inorganic fertilizer in two districts of South Wollo zone, in Ethiopia. The study employed cross-section data to analyze the effect of farmers' demographic, socioeconomic and institutional setting, market access and physical attributes on the probability and intensity of use of inorganic fertilizer. A double hurdle model was employed using data collected from randomly selected 252 farmers between July 2009 and November 2009. Secondary data were also used to complement the primary data. The study depicted low utilization of inorganic fertilizer which was 29.6% and 19% of total cultivated crop land in Ethiopia and South Wollo, respectively.

The results of the study provided empirical evidence of a positive impact of extension and credit services, age, farm land size, education, livestock, off/non-farm income and gender in enhancing the adoption of inorganic fertilizer. Physical characteristics like distance from farmers' home to markets, roads, credit and input supply played a critical role in the adoption of inorganic fertilizers as proximity to information, sources of input and credit supply and markets save time and reduce transportation costs. Therefore, the results of the study suggest that the probability of adoption and intensity of use of inorganic fertilizers should be enhanced to meet the priority needs of smallholder farmers and to alleviate the food shortage problem in the country in general and in the study area in particular.

Key words: Adoption, inorganic fertilizer, technology, double hurdle model, intensity of use.

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1. Introduction

The economic development of Ethiopia is highly dependent on the performance of its agricultural sector. Agriculture contributes 43% of the country's Gross Domestic Product (GDP), 85% of all exports (coffee, livestock and livestock product and oil seeds) and provides employment for 85% of the population (FAO, 2007). Agriculture provides also raw material for 70% of industries in the country (MOFED, 2006). The bulk of agricultural GDP for the period 1960-2009 had come from cultivation of crops (90%) and the remaining (10%) from livestock production (FAO, 2007; MOFED, 2010). The industrial sector is small in size contributing, on average, only about 13% of the GDP.

The growth rate of agriculture and GDP was low for several decades mainly due to severe weather fluctuation, inappropriate economic policies and low adoption of improved agricultural technologies and prolonged civil unrest. The average growth rate of the agricultural sector was 1.7%, 3.8% and 5.5% during the Imperial period (1960-1974), socialist period (1975-1990) and the Ethiopia People's Revolutionary Democratic Front (EPRDF) period (1991-2009), respectively. The growth rate of GDP fluctuates with the growth rate of agriculture. The major crops produced in the country include cereals, pulses and oil seeds with 72%, 12% and 7% of area coverage and 69%, 9% and 3% of production, respectively (CSA, 2009a). Data from the Central Statistical Agency indicate that the major cereals produced in the country include Teff, wheat, barley, maize and sorghum. The same source shows that the yield of cereal crops on the average is 1.55 tons per hectare.

The yield of crops in general and cereals in particular is very low because of low utilization of improved technologies. For instance, the amount of inorganic fertilizer applied in the 2008/09 cropping season was 423,000 tons. During the same period, the total area fertilized with inorganic fertilizer for all crops was about 29.6% of total cultivated area in Ethiopia (CSA, 2009b). The cultivated area covered with improved variety was about 3.4% of total cultivated land. Hence, Ethiopian smallholders' typically produce with their indigenous seed and are characterized by low adoption of improved technologies. Because of the low productivity agricultural sector, Ethiopia has become highly dependent on food import in that domestic food

production and supply have consistently been the national demand (FAO, 2007). For instance, the country received 674,000 metric tons of cereals in the form of food aid in 2006 alone (FAO, 2007).

In the northeast Ethiopia where this study is conducted, crop and livestock production are highly integrated as a means to generate income, cope up with market and environmental risks and meet household consumption requirements. However, the production and productivity of crops and livestock is very low resulting in food insecurity. The average cultivated area with inorganic fertilizer was 19% of the total cultivated area while the average cultivated area with improved seed was also 2.6% of the total wheat cultivated in the study area (CSA, 2009b). Due to low use of improved practices the productivity of all crops is below the national average. For example, the yield of cereals in Ethiopia was 1.55 ton per hectare for traditional practices but more than 3.0 tons per hectare using improved technologies.

There have been quite different types of adoption studies related to improved agricultural technologies in Ethiopia. More precisely, there have been various empirical studies conducted to identify determinants of adoption of agricultural technologies in Ethiopia, (for instance, Asfaw et al., 1997; Tesfaye and Alemu, 2001; Tesfaye et al., 2001; Mergia, 2002; Kiflu and Berhanu, 2004). To the best of the authors' knowledge, there were no similar studies undertaken in the study area. Moreover, since adoption is dynamic, it is imperative to update the information based on the current technologies being adopted by farmers. The general objective of the study is to identify the determinants of the adoption of inorganic fertilizers technology in two districts of south Wollo, north east highland of Ethiopia.

The rest of the paper is presented as follows. Section two presents theoretical and empirical studies. Section three develops the analytical framework and methodologies used in the study. Section four presents and discusses the empirical results of the study. Finally, section five brings the major findings, draw conclusions and make recommendations of the study to improve smallholders' agricultural productivity through adoption of chemical fertilizers technology.

2. Theoretical and Empirical Approaches on Agricultural Technology Adoption

2.1 Concepts and Theoretical Framework of Agricultural Technology Adoption

Adoption refers to the decision to use a new technology, method, and practice by a firm, a farmer or a consumer. The individual level adoption reflects a farmer's decision to incorporate a new technology into the production process. On the other hand, aggregate adoption is the process of spread or diffusion of a new technology within a region or population. Therefore, a distinction exists between adoption at the individual farm level and aggregate adoption within a targeted region or within a given geographical area (Feder *et al.*, 1985). If an innovation is modified periodically, the adoption level may not reach equilibrium. This situation requires the use of economic procedures that can capture both the rate and the process of adoption. The rate of adoption is defined as the proportion of farmers who have adopted improved technology over time. The intensity of adoption is defined as the aggregate level of adoption of a given technology, e.g. the number of hectares planted with improved seed and/or the number of kilogram of improved seed applied. Aggregate adoption is measured by the aggregate level of use of a given technology within a geographical area (Feder *et al.*, 1985).

Studies have indicated that an individual's decision on an innovation is not an instantaneous act. Rather, it is a process that occurs over a period of time and consists of a series of actions (Rogers and Shoemaker, 1971). Adoption is not a sudden event, but a process. Farmers do not accept innovations immediately; they need time to think over before making a decision. There are several well-known schemes for explaining the adoption process. A popular adoption process involves awareness, interest, evaluation, trial and adoption; knowledge, persuasion, decision and confirmation (Adams, 1982; Rogers and Shoemaker, 1971).

Innovativeness generally can be related to other personal characteristics: background, social status, affiliations, and attitudes. Research has shown that adoption of innovations often follows a bell shaped or normal curve when plotted against time. Innovations are new methods, ideas, practices or techniques, which provide the means of achieving sustained increase in farm productivity and income.

It is the extension worker's job to encourage farmers to adopt innovations of proven value. It is an idea or object perceived as new by an individual. The innovation may not be new to people in general but, if an individual has not yet accepted it, to that person, it is an innovation. Some innovations originate from agricultural research stations, others from farmers. Innovations relate to an object's social acts and abstract ideas. Innovations are also classified into process and product innovation (Adams, 1982). A process innovation is an idea to a production process, while product innovation is a material input to the production process. The term innovation and technology are used interchangeably. The concept of diffusion refers to the temporal (of time) and spatial (of area) spread of the new technology among different economic units (firms, farmers, and consumers).

Rogers (1983) defined aggregate adoption (i.e. diffusion) behavior as the process by which a technology is communicated through certain channels over time among the members of a social system. He noted that this definition encompasses four elements: (1) technology, (2) channel of communication, which represents the way information about the technology flows from change agents such as extension workers or technology suppliers to final users or adopters, (3) time, which represents the period over which a social system adopts a technology, and (4) social system, which is comprised of individuals, organizations or agencies and their adoption strategies.

With regard to the measurement of intensity of adoption, a distinction should be made between technologies that are divisible and technologies that are indivisible. The intensity or extent of adoption of divisible technologies can be measured at the individual level in a given period of time by the share of farm area under the new technology or by the per hectare quantity of input used in relation to the research recommendation (Legesse, 1998). Feder *et al.* (1985) suggested that this measure might also be applied at the aggregate level for a region. In the case of non-divisible agricultural technologies such as tractors and combine harvesters, the extent of adoption at the farm level at a given period of time is dichotomous (adoption or non-adoption) and the aggregate measure becomes continuous. Thus, aggregate adoption of lumpy technology can be measured by calculating the percentage of farmers using the new technology within a given area.

All individuals in a social system do not adopt a technology at the same time. Rather they adopt it in ordered time sequence. Based on the time when farmers first begin to use a new technology, five possible adopter categories can be identified in any social systems: innovators, early adopters, early majority, late majority, and laggards (Rogers, 1962; Rogers and Shoemaker, 1971). In describing the characteristics of these groups, Rogers (1962) suggested that the majority of early adopters are expected to be more educated, venturesome, and willing to take risks. Contrary to this group, the late adopters are expected to be less educated, conservative, and not willing to take risks. A practical aspect of the classification of adopters into adopter categories has been in the field of deliberate or planned introduction of innovation. Nevertheless, the usefulness of this categorization is restricted as there is evidence indicating possible movement from one category to another, depending on the technology introduced (Runquist, 1984).

Two approaches appear in agricultural technology adoption studies. The first approach emphasizes on the adoption of the whole package and the second one stresses the sequential or stepwise adoption of components of a package. The technical scientists often advocated the former approach while the latter has been advocated by the field practitioners, especially by farming system and participatory research groups. There is a tendency in agricultural extension programmers to promote technologies in a package form whereby farmers are expected to adopt the whole package. Experiences of integrated agricultural development projects such as Chilalo Agricultural Development Unit (CADU), in Ethiopia, however, show that this approach has not brought the required technical change because of resource limitation (Legesse, 1998).

The adoption of agricultural innovations can provide the basis for increased production and income. That means farmers will adopt only technologies that suit their needs and the circumstances (Nanyeenya *et al.*, 1997). As part of the effort to increase agricultural productivity, researchers and extension staff in Ethiopia have typically promoted a technological package consisting of a number of components. However, because of capital scarcity and risk considerations, farmers rarely adopt complete packages (Million and Belay, 2004).

There is now agreement in the literature that agricultural development implies the shift from traditional methods of production to new, science-based methods of production that include new technological components and/or even new farming systems. For farmers to adopt these new production technologies successfully, they must first learn about them and how to use them correctly in their farming system (Swanson and Claar, 1984). Improved agricultural technologies refers to flow of economic activities with the use of new inputs such as high yield variety of seed, chemical fertilizers, improved breed of animals, improved implements, machineries etc with dynamic resource use. Agricultural technology development has taken place in two forms (1) embodied technological development (2) disembodied technological development. Again, embodied technological development has been taken place in the form of neutral and non-neutral technological development.

Moreover, farmers are assumed to maximize expected utility according to a von Neuman Morgenstern utility function defined over wealth (W). When confronted with a choice between two alternative practices, the i^{th} farmer compares the expected utility with the modern technology, $E_{mi}(W)$ to the expected utility with the traditional technology, $E_{ti}(W)$. While direct measurement of farmers' perceptions and risk attitudes on farming technology are not available, inferences can be made for variables that influence the distribution and expected utility evaluation of the technology. These variables are used as a vector ' X ' of attributes of the choices made by farmer ' i ' and ε_i is a random disturbance that arises from unobserved variation in preferences, attributes of the alternatives, and errors in optimization. Given the usual discrete choice analysis and limiting the amount of non-linearity in the likelihood function, $E_{mi}(W)$ and $E_{ti}(W)$ may be written as:

$$\begin{aligned} E_{mi}(W) &= \alpha_{mi} X_{mi} + \varepsilon_{mi} \\ E_{ti}(W) &= \alpha_{ti} X_{ti} + \varepsilon_{ti} \end{aligned} \tag{1}$$

The difference in expected utility may then be written as:

$$E_i(W) = E_{mi}(W) - E_{ti}(W) = \alpha_i X_i + \varepsilon_i \tag{2}$$

A preference for the modern technology will result if $E_i = E_{mi}(W) - E_{ti}(W) > 0$; whereas, a preference for the traditional technology will be revealed if $E_{mi}(W) - E_{ti}(W) < 0$. The observed adoption choice of an agricultural technology (for example improved forages, improved dairy cows, improved wheat varieties and fertilizers technology) is hypothesized to be the end result of socioeconomic characteristics of farmers and a complex set of inter-technology preference comparisons made by farmers (Adesina and Forson, 1995).

The empirical analysis permits the investigation of the decision on whether or not to adopt agricultural technologies and the conditional level of the technology if the initial adoption decision was made. Several hypotheses can be derived on these two sets of decisions - factors that affect rate of adoption and factors that affect intensity of agricultural technologies adoption.

Different researchers used different models for analyzing the determinants of technology adoption. In principle, the decision on whether to adopt and how much to adopt can be made jointly or separately (Berhanu and Swinton, 2003). The decision on whether to adopt or not was mostly estimated using Logit and Probit models. These models differ in the assumption of distribution. The Probit model assumes standard normal distribution while the Logit model assumes logistic distribution. The specification of Probit model is as follows (Greene, 2003):

$$\text{Pr ob}(Y = 1|X) = \int_{-\infty}^{X'\beta} \phi(t) dt = \Phi(X'\beta) \quad (3)$$

The function $\Phi(\cdot)$ is a commonly used notation for the standard normal distribution. Based on Greene (2003), Logit model is specified as:

$$\text{Pr ob}(Y = 1|X) = \frac{e^{X'\beta}}{1 + e^{X'\beta}} = \Lambda(X'\beta) \quad (4)$$

The notation $\Lambda(\cdot)$ is used to indicate the logistic cumulative distribution function. There are practical reasons for favoring one or the other in some cases for mathematical convenience, but it is difficult to justify the choice of one distribution or another on theoretical grounds (Greene, 2003). Most researchers had also used Tobit model to estimate the rate and the intensity of use of a given technology. In

adoption studies the Tobit model is used with the assumption that the two decisions are affected by the same set of factors (Greene, 2003). Tobit is an extension of the Probit model and it is one approach to deal with the problem of censored data (Johnston and Dinardo, 1997; Greene, 2003). The Tobit model (named after Tobin (1958)) is generally defined as:

$$\begin{aligned}
 Y_i^* &= X_i' \beta + \varepsilon_i \\
 Y_i &= \begin{cases} Y_i^* \dots \text{if } Y_i^* > 0 \\ 0 \dots \text{if } Y_i^* \leq 0 \end{cases}
 \end{aligned}
 \tag{5}$$

Where Y_i is the latent variable which is the rate and intensity of use of a given technology, X_i stands for farmers and institutional characteristics and β is parameters. ε_i is residual. In the double-hurdle model, on the other hand, both hurdles have equations associated with each equation, incorporating the effects of farmers' characteristics and circumstances. Such explanatory variables may appear in both equations or in either of the equation (Teklewold *et al.*, 2006). Empirical studies have also indicated that a variable appearing in both equations may have opposite effects in the two equations. The double hurdle model is the combination of Probit model and truncated regression model. Following Cragg (1971), the decision on adoption can be modeled as a Probit regression:

$$f(y = 0 | X_1, X_2) = C(-X_2' \gamma / \sigma) + C(X_2' \gamma / \sigma) C(-X_1' \beta)
 \tag{6}$$

where $C(\cdot)$ is the normal cumulative distribution function, X_1 and X_2 are vectors of independent variables at each observation and β and γ are vectors of coefficients. The decision on the intensity of use can be modeled as regression truncated at zero:

$$f(y | X_1, X_2) = (2\pi)^{-\frac{1}{2}} \sigma^{-1} e^{\left\{ \frac{-(y - X_2' \gamma)^2}{2\sigma^2} \right\}} \chi \frac{C(X_1' \beta)}{C(X_2' \gamma / \sigma)} \dots \text{for } y > 0
 \tag{7}$$

Where y_i is the observed amount of agricultural technologies, $C(\cdot)$ is the normal cumulative distribution function, and X_1 and X_2 are vectors of independent variables, σ stands for standard deviation and β and γ are vector of parameters. The applications of these models in agricultural technology adoption are reviewed as follows.

2.2 Empirical Studies on Agricultural Technology Adoption

In developing countries research on adoption began four to five decades ago, following the green revolution in certain Asian countries such as India and China. Since then, several studies have been undertaken to assess the rate, intensity and determinants of adoption. Most of these studies focused on Asian countries, where the green revolution took place and was successful. The effectiveness of agricultural extension work highly depends on the availability of extension professionals who are qualified, motivated, committed and responsive to the ever-changing social, economic and political environment. Adoption of technology by farmers can be influenced by educating farmers about improved varieties, cropping techniques, optimal inputs use, price and market conditions, more efficient methods of production management, storage, and nutrition (Anderson and Feder, 2002).

Adoption studies based on the dichotomous regression models have attempted to explain only the probability of adoption versus non-adoption rather than the extent and intensity of adoption. Such knowledge that a farmer is using high yielding technology may not provide much information about the farmer's behavior because he/she may be using a percentage or, indeed, 100% of his/her farm for the new technology. Similarly, with regard to adoption of fertilizer, a farmer may be allocating a small amount or a large amount per hectare. A strictly dichotomous variable is often not sufficient for examining the extent and intensity of adoption for some problems such as fertilizer (Feder *et al.*, 1985). The summary of selected studies of adoption models is presented in Table 1. Different researchers used different models to analyze the determinants of technology adoption. For example, Nykonya *et al.* (1997), Bezabih (2000), Croppenstedt *et al.* (1999) and Adesina and Zinnah (1992) used the Tobit model to estimate the probability and the intensity of fertilizer use. The double-hurdle model, developed by Cragg (1971), has been extensively applied in several empirical studies (see for instance, Burton *et al.*, 1996; Newman *et al.*, 2001, Berhanu and Swinton, 2003; and Teklewold *et al.*, 2006).

Feder *et al.* (1985), by using factors analysis, estimated the relationships between technologies already adopted by maize growing farmers in Swaziland. They found out that farmers adopted the technologies investigated in three independent

packages: (1) improved maize variety, basal fertilizers and tractor ploughing, (2) top dressing fertilizers and chemicals, and (3) planting date, and plant population (density). These findings do not support a sequential or stepwise adoption process. The researchers reported that farmers in Swaziland tend to adopt a package of technologies and the social system, which comprised individuals, organizations, or agencies with their adoption constraints, adopts a technology.

Adesina and Zinnah (1992), by using the Tobit model, conducted a study in Sierra Leone on technology characteristics, farmers' perceptions and adoption decision. The result of Tobit analysis demonstrated that age, farm size, extension service and experience were positively related to adoption decisions.

Table 1: Summary of studies on methodological comparisons for adoption models

Author(s)	Year	Country	Type of technology	Model (s)
Feder <i>et al.</i>	1985	Swaziland	Improved maize variety, basal fertilizers and tractor	Factors analysis
Chilot	1994	Ethiopia	Improved wheat varieties, fertilizer and chemical	Probit and Tobit
Ghosh <i>et al.</i>	1994	USA	Improved dairy technologies	Multinomial logit
Adesina and Zinnah	1992	Sierra Leone	Improved sorghum varieties	Tobit
Asfaw <i>et al.</i>	1997	Ethiopia	Improved maize varieties	Tobit
Nykonya <i>et al.</i>	1997	Tanzania	Improved maize	Tobit
Croppenstedt <i>et al.</i>	1999	Ethiopia	Chemical fertilizer	Tobit
Bezabih	2000	Ethiopia	Improved varieties and chemical fertilizer	Tobit
Mussei <i>et al.</i>	2001	Tanzania	Improved wheat	Tobit
Tesfaye and Alemu	2001	Ethiopia	Improved maize varieties	Tobit
Tesfaye <i>et al.</i>	2001	Ethiopia	Improved maize varieties	Tobit
Shiyania <i>et al.</i>	2002	India	Improved chick pea	Tobit model
Lelissa and Mulat	2002	Ethiopia	Chemical Fertilizer	Probit and Tobit
Berhanu and Swinton	2003	Ethiopia	Soil and water Conservation	Double hurdle
Abay and Assefa	2004	Ethiopia	Chemical fertilizer	Logit model
Million and Belay	2004	Ethiopia	Soil and water conservation	Logit model
Tesfaye	2004	Ethiopia	Chemical Fertilizer	Tobit
Teklewold <i>et al.</i>	2006	Ethiopia	Poultry	Double hurdle
Makokha <i>et al.</i>	2007	Kenya	Improved dairy and forage	Probit

3. Methodology

3.1 Description of the Study Area

This study was carried out in South Wollo. South Wollo is located in the North East part of Ethiopia. South Wollo is one of the eleven administrative zones of the Amhara National Region State. It is situated between the Eastern highland plateaus of the region and the North Eastern highland plateaus of Ethiopia. It is divided into 20 administrative districts and has two major towns (Kombolcha and Dessie) and 18 rural districts. Among the eighteen rural districts, Dessie Zuria and Kutaber are selected for this study.

South Wollo has steep edges of a mountain wall in the Western edge of great East African rift valley. This is acting as a vast retaining wall which drops abruptly into the low, arid and hot Afar depression. There are great differences in elevation of the mountain complexes and these are now left with a bare broken surface due to the undulating topography, reckless large scale felling of trees, unscrupulous cultivation practices from time immemorial. South Wollo is located between latitudes $10^{\circ}10'N$ and $11^{\circ}41'N$ and longitudes $38^{\circ}28'$ and $40^{\circ}5'E$. According to Central Statistical Agency's population census in 2007, the total population of South Wollo was 2,519,450 of which 50.5% were females and 88% were rural dwellers (CSA, 2008). The total land area in South Wollo, Dessie Zuria and Kutaber are 1,773,681 hectares, 180,100 hectares and 72,344 hectares. The proportion of cultivated land area accounts for 39%, 20% and 35.3% for Dessie Zuria, Kutaber and South Wollo, respectively.

3.2 Sampling Procedure

Dessie Zuria and Kutaber were selected purposively based on their accessibility and relevance of the study. Multistage random sampling was used for the selection of the sample respondents. In the first stage of sampling, 6 Farmers' Associations (FAs) were selected randomly from a total of 54 FAs. As the numbers of Farmers Associations in Dessie Zuria (28) were equal to that of Kutaber (26), three Farmers Associations were selected from each district using simple random sampling

procedure. In the second stage, a total of 252 farmers were selected using probability proportional to sample size sampling technique.

Table 2: Distribution of sample farm household heads by farmers' association and district

Name of District	Name of FA	Total household*		Sample farm household heads		
		Male	Female	Female	Male	Total
				Number	Number	Number
	Tita	686	182	7	27	34
Dessie Zuria	Bilen	1,179	161	8	45	53
	Endod Ber	688	102	4	27	31
	Boru	490	123	5	20	25
Kutaber	Beshlo	797	201	8	32	40
	Alasha	1,297	458	18	51	69
Total		5,137	1,227	50	202	252

Source: *Kebele Administration Office (Personal Communication),

3.3 Data Collection and Sources

A structured questionnaire was designed, pre-tested and refined to collect primary data. Experienced enumerators were recruited and trained to facilitate the task of data collection. Farm visit, direct observation and informal interview were undertaken both by the researcher and the enumerators. The secondary data were extracted from studies conducted and information documented at various levels of Ministry of Agriculture and Finance and Economic Development Offices in the study.

3.4 Analytical Models

3.4.1 Econometric Specification of Agricultural Technology Adoption Model

Different researchers used different models for analyzing the determinant of technology adoption. In principle, the decisions on whether to adopt and how much to adopt can be made jointly or separately (Berhanu and Swinton, 2003). The Tobit model was used to analyze under the assumption that the two decisions are affected by the same set of factors (Greene, 2003). Tobit is an extension of the probit model and it is one approach to deal with the problem of censored data

(Johnston and Dinardo, 1997). In the double-hurdle model, on the other hand, both hurdles have equations associated with them, incorporating the effects of farmer's characteristics and circumstances. Such explanatory variables may appear in both equations or in either of them (Teklewold *et al.*, 2006). Empirical studies have also indicated that a variable appearing in both equations may have opposite effects in the two equations. The double-hurdle model, developed by Cragg (1971), has been extensively applied in several empirical studies such as Burton *et al.* (1996), Newman *et al.* (2001), Berhanu and Swinton (2003) and Teklewold *et al.* (2006).

As already noted, in this study a double hurdle model is used to identify factors affecting the probability of adoption and intensity of use of inorganic fertilizers. The double-hurdle model is a parametric generalization of the Tobit model, in which two separate stochastic processes determine the decision to adopt and the level of adoption of technology. The double-hurdle model has an adoption (D) decision with an equation:

$$\begin{aligned} D_i &= 1 \dots \text{if } \dots D_i^* > 0 \dots \text{and} \\ D_i &= 0 \dots \text{if } \dots D_i^* \leq 0 \\ D_i^* &= \alpha' Z_i + U_i \end{aligned} \tag{1}$$

being D_i^* a latent variable that takes the value 1 if a farmer adopts inorganic fertilizer technology and zero otherwise, Z is a vector of household characteristics and α is a vector of parameters.

The level of adoption (Y) decision has an equation:

$$\begin{aligned} Y_i &= Y_i^* \dots \text{if } \dots Y_i^* > 0 \dots \text{and } \dots D_i^* > 0 \\ Y_i &= 0 \dots \text{otherwise} \\ Y_i^* &= \beta' X_i + V_i \end{aligned} \tag{2}$$

Where Y_i^* is the observed proportion of agricultural technologies, X_i is a vector of household socioeconomic characteristics and β is a vector of parameter.

The log-likelihood function for the double hurdle model is

$$\log L = \sum \ln \left[1 - \Phi\left(\alpha Z'_i \left(\frac{\beta X_i}{\sigma}\right)\right) \right] + \sum \ln \left[\Phi\left(\alpha Z'_i\right) \frac{1}{\sigma} \phi\left(\frac{Y_i - \beta X'_i}{\sigma}\right) \right] \quad (3)$$

Under the assumption of independency between the error terms V_i and U_i the double hurdle model is equivalent to a combination of univariate Probit model (1) and the truncated regression model (2). A hypothesis test for the double hurdle model against the Tobit model was used. The double hurdle log-likelihood is the sum of the truncated regression and the Probit models. The test can be done by estimating three regression models (Tobit model, the truncated regression and the Probit models) separately and use a log-likelihood ratio (LR) test. The LR statistic can be computed using the formula (Greene, 2003):

$$\Gamma = -2[\ln L_T - (\ln L_p + \ln L_{TR})] \sim \chi^2_k \quad (4)$$

Where L_T = likelihood for the Tobit model; L_p = likelihood for the Probit model; L_{TR} = likelihood for the truncated regression model and k is the number of independent variables in both equations.

The test hypothesis is written as:

$$H_0: \lambda = \frac{\beta}{\sigma} \text{ and } H_1: \lambda \neq \frac{\beta}{\sigma}$$

H_0 will be rejected on a pre-specified significance level if $\Gamma > \chi^2_k$

3.4.2 Measurement and Definitions of Variables for Adoption

3.4.2.1 The Dependent Variables of Probit and Truncated Regression Models

The dependent variable of Probit model have a dichotomous value depending on the farmers' decision either to adopt or no to adopt the inorganic fertilizers. However, the truncated regression model would have a continuous value which should be the intensity, the use and application of the technology. In this case, it indicates the amount of inorganic fertilizer applied in kilogram. The inorganic fertilizers in question are DAP and Urea which were imported from abroad.

3.4.2.2 The independent variables and their definitions used in double hurdle model

Adoption literatures provide a long list of factors that may influence the adoption of agricultural technologies. Generally, farmers' decision to use improved agricultural technologies and the intensity of the use in a given period of time are hypothesized to be influenced by a combined effect of various factors such as household characteristics, socio-economic and physical environments in which farmers operate.

The explanatory variables included in the empirical models were selected following the literature on farm level investment theory (Feder *et al.*, 1985; Feder *et al.*, 1992; Clay *et al.*, 1998; Berhanu and Swinton, 2003). Following these literature, farm investment can be modeled as a function of market access factors (as a proxy for return on investment factors); capacity to invest; physical incentive to invest; socio-institutional factors; and household demographic characteristics.

The market access factors affect the relative profitability of investment in improved technology. Ideally such factors would include crop prices, cost of labour and materials used for improved agricultural technologies and the yield effect of such practices. However, the survey results revealed that it was not possible to get accurate information on grain selling prices from the majority of the sample respondents. Instead, relative prices were proxied by distance from market place and input supply institutions. Labour input is a major cost component in crop and livestock production investment in the study area. Distance from an all-weather road was used to proxy for differences in the opportunity cost of labour.

Physical factors create opportunities for investing in crop and livestock production. These factors were expected to detract from investment due to increased transaction costs. The factors expected to affect the capacity to invest include livestock holding, off/non-farm income, farm size and family labour. Farm size is measured as the total acreage (in hectares) of cultivated land, and family labour is measured as number of household members in man equivalent. The effect of farm size is that more land indicates greater wealth and capacity and should encourage investment in improved technology. Own labour availability should encourage investment either due to availability of labour to do the work or due to the need to

feed more people. Livestock holding is measured as the number of livestock in Tropical Livestock Unit (TLU). Livestock are important source of income, food and draft power, and represent an asset which indicates the wealth status of the household and as such are expected to facilitate the adoption of improved agricultural technologies. Off/non-farm income is captured as a dummy variable indicating whether or not the farmer had access to additional income from off/non-farm activities.

Several socio-institutional variables were hypothesized to encourage farmers to invest in crop and livestock production. These include access to credit service and contact with agricultural extension agents. Household demographic variables include age, sex, number of dependents in the household expressed in adult equivalent and literacy level of the household head. In the course of identifying factors influencing farmers' decision to use improved agricultural technologies, the main task is to analyze which factor influences the decision, how and by how much. In this study, it was hypothesized that probability of adoption and intensity of adoption of chemical fertilizers are influenced by the combined effect of various factors. The potential explanatory variables which are hypothesized to influence the probability of adoption and intensity of adoption of chemical fertilizers in the study area are given in Table 3.

Table 3: Summary of definitions and measurements of Probit and Truncated model variables

Definition of variables	Measurement of variables	Expected sign
Dependent variables		
Adoption of inorganic fertilizers	Dummy (Yes/no)	
Amount of inorganic fertilizers	Continuous (Kilogram)	
Independent variables		
Distance to nearest market	Walking minutes	-
Distance to nearest all weather road	Walking minutes	-
Age of the household head	Years	+/-
Education of the household head	Formal schooling in years	+
Adult equivalent in the family	Number	-
Labour available in the family	Number	+
Farm size	Cultivated area in ha	+
Fragmentation	Number of plots	-
Livestock owned	TLU	+
Distance to input supply institutions	Walking minutes	-
Distance to extension agent(s) office	Walking minutes	-
Distance to credit office	Walking minutes	-
Sex of the household head	Male/female	+
Access to off/non farm income	Yes/no	+/-
Access to extension service	Yes/no	+
Access to credit	Yes/no	+

5. Results and Discussion

Improved technologies such as improved seed and breed, fertilizers and herbicides have played a significant role in enabling farmers to increase the production and hence improve the standard of living of smallholder farmers. The process of adoption of improved agricultural technologies is the interest of many agricultural economists. The majority of smallholder farmers in Ethiopia are producing both crops and livestock. Yield of these activities are very low due to low adoption and application of improved agricultural technologies mainly improved seed, fertilizer, improved forage and cow.

5.1 Description of Variables of Empirical Adoption Models

The rate of adoption of chemical fertilizer was 17.9% of the sample respondents. The mean level of use of chemical fertilizer was 43 kg and 8 kg for adopters and for full sample, respectively. The description of continuous variables indicated that adopters are slightly old, educated and resource endowed mainly labor, land and livestock (Table 4).

Table 4: Descriptive statistics of explanatory variables on probability of adoption and intensity of adoption of inorganic fertilizer (means)

Variables	Non-adopters (207)	Adopters (45)	Total (252)	t-value
Distance from home to nearest market	81.17	94.22	83.50	-1.46
Distance from home to road	37.66	24.42	35.30	-2.84***
Respondent's age	54.12	49.27	53.25	2.96***
Highest Level of years of schooling	1.88	3.80	2.22	2.69***
Number of man equivalent	3.73	4.56	3.87	3.64***
Number of adult equivalent	4.61	5.71	4.80	2.88***
Total cultivated area in hectare	0.63	0.91	0.68	3.08***
Number of plots	3.61	4.78	3.82	8.76***
Total Tropical Livestock Unit	3.40	4.76	3.64	4.22***
Number of oxen	0.96	1.76	1.10	4.6***
Distance from distribution centre	107.19	47.04	96.45	-9.55***

***, ** and * implies significant at 1%, 5% and 10% probability level, respectively

Source: Own survey, 2009

Moreover, description of dummy variables indicated that there was a significant difference between adopters and non-adopters with regard to sex, access to off/non-farm income, credit and extension service (Table 5).

Table 5: Proportion of farm household involved in access to socio-institutions (%)

Variable	Non-adopters (195)	Adopters (57)	Total (252)	χ^2 -value	
Sex	Female	18.4	1.6	20	4.132**
	Male	64	16	80	
Off-farm Income	%	57	16	73	7.293***
Extension service	%	39	15	54	20.993***
Credit Participation	%	6	13	18	5.4**

***, ** and * implies significant at 1%, 5% and 10% probability level, respectively

Source: Own survey, 2009

5.2 Estimation Procedure of Empirical Adoption Models

There are farmers who have adopted and non-adopted improved agricultural technologies. These farmers can use the new technology in a different level. Therefore, the rate of adoption was estimated using Probit model whereas the intensity and level of use of the improved agricultural technologies was estimated using truncated regression model. Hence double hurdle model was used to estimate the Probability and intensity of adoption of improved agricultural technology. Accordingly explanatory variables were checked for problems of multicollinearity, endogeneity and heteroscedasticity. Following Gujarati (1995), the problem of multicollinearity for continuous explanatory variables was investigated using a technique of variance inflation factor (VIF) and tolerance level (TOL), where each continuous explanatory variable is regressed on all the other continuous explanatory variables. The larger is the value of VIF, the more worrying is the multicollinearity or collinear is the variable (X_j). As a rule of thumb, if the VIF of a variable exceeds 10 and R^2 exceeds 0.90 the variable is said to be highly collinear. The values of VIF were less than ten and hence no signals of multicollinearity problems (Table 6).

Table 6: Variance inflation factors (VIF) of the continuous explanatory variables

Variables	Collinearity Statistics	
	Tolerance	VIF
Distance from home to nearest market	0.756	1.323
Distance from home to nearest all weather road	0.790	1.266
Highest Level of education of the head	0.842	1.188
Number of man equivalent in the family	0.153	6.536
Number of adult equivalent in the family	0.149	6.728
Total cultivated area in hectare	0.744	1.344
Number of plots	0.796	1.256
Total Tropical Livestock Unit	0.764	1.310
Distance from distribution centre for improved wheat seed	0.384	2.603

To observe the degree of association between dummy explanatory variables contingency coefficients were computed. Contingency coefficient is a chi-square based measure of association where a value 0.75 or above indicates a stronger relationship between explanatory variables (Healy, 1984). This was also checked and

less than 0.7 (Table 7). For endogeneity an attempt was made to exclude dependent variable as explanatory variable. To avoid heteroscedasticity problem, robust standard error was estimated.

Table 7: Contingency coefficients for dummy explanatory variables

Variables	Sex	Extension access	Credit access	Off/non-farm access
Sex	1	0.173	0.039	0.074
Extension access		1	0.106	0.141
Credit access			1	0.026
Off/non-farm access				1

At this stage farmers were classified into adopters and non-adopters. Adopters are farmers who use inorganic fertilizer (DAP and Urea). Non-adopters are farmers who use none of this technology during the survey year (2008/2009 production year). The study depicted low consumption of improved wheat seed which is 29.6% of total cultivated land in Ethiopia and was 19% in south Wollo (CSA, 2009b). The test statistics of double hurdle versus Tobit model indicate the rejection of Tobit model (Table 8). Overall, the likelihood (rate or probability) of adoption of chemical fertilizer was modest; an average farmer had 17.9% predicted probability of adopting the technology. An average farmer had used chemical fertilizer of 43kg with an average cultivated area of 0.29 hectare for adopters.

Table 8: Test statistics of double-hurdle model

Type of statistics	Probit, D	Truncated, Y(Y>0)
$\chi^2(16)$	94	126
p-value	0.00***	0.00***
LOG-L	-46	-177
AIC((-LOG-L+k)/N)	0.25	4.29
χ^2 -Test Double Hurdle versus Tobit	$\Gamma = 64 > \chi^2(16) = 32$	

5.3 Econometric Results of Inorganic Fertilizer Technology Adoption Model

The parameter estimates of the Probit and truncated regression models employed to identify factors influencing farmers' adoption of inorganic fertilizer are presented in Table 9. In all the analyses the likelihood ratio test statistics suggested the statistical significance of the fitted regression. Results of the analyses also revealed that rate of adoption and intensity of adoption of inorganic fertilizer were influenced by different factors and at different levels of significance for different factors. The discussion of results about the significant factors is presented as follows.

Age had a significant positive effect on the level of use of inorganic fertilizer at less than 1% level of significance. This might be related to the reason that older farmers might have gained knowledge. The result is consistent with the findings of Teklewold *et al.* (2006) and Hailu (2008). The model result indicates that as the age increases by one year, the intensity of inorganic fertilizer use of the farm households increases by 114%. However, this may diminish, as the household head gets older. As expected, being male was positively related to the intensity of use of inorganic fertilizer at less than 1% level of significance. This means that male farmers use more inorganic fertilizer, compared to their female counterparts, even though sex is excluded from the first hurdle since it had no significant effect on probability of adoption. The result is consistent with the findings of Abay and Assefa (2004) and Teklewold *et al.* (2006). The justification for this is that male farmers might have access to information through male extension agents. Education was hypothesized to affect technology adoption positively since it increases the capacity of farm households to acquire information and knowledge of improved technologies and promote the decision to use it on his/her farm. In this study, in conformity with the hypothesis, education positively and significantly affected the intensity of use of inorganic fertilizer at less than 5% level of significance. The result is consistent with the findings of Doss and Morris (2001) and Abay and Assefa (2004). The model result indicated that farm households who increase their formal education by one year will increase intensity of inorganic fertilizer by 189%.

As expected, labour force available had influenced the level of use of inorganic fertilizer positively at less than 1% level of significance. The probable reason for this

finding was that improved practices are labour intensive and hence the household with relatively high labour force uses the technologies on their farm plots better than others. This finding is consistent with the results of Hailu (2008). Adult equivalent was found to be significantly and negatively influencing the intensity of use of inorganic fertilizer at less than 1% level of significance. This implies that increase in adult equivalent negatively influences, through increases in household food requirement, the decision to intensify inorganic fertilizers.

Table 9: Factors affecting probability of adoption and intensity of use of chemical fertilizer

Variables	Probit			Truncated		
	Coefficient	Robust Std. Err.	Marginal effect	Coefficient	Robust Std. Err.	Marginal effect
Distance to market	-0.006**	0.003	-0.0002	-0.123**	0.05	-0.12
Distance to road	-0.008	0.007	-0.0003	-0.41***	0.11	-0.40
Sex	-0.719	0.413	-0.0440	23.64*	14.1	23.04
Age	-0.009	0.012	-0.0003	1.17***	0.29	1.14
Education	0.051	0.046	0.0019	1.94**	0.80	1.89
Adult equivalent	-0.207	0.178	-0.0076	13.1***	3.22	12.78
Active labour force	0.285	0.180	0.0105	-17.1***	3.73	-16.7
Total cultivated land	0.265	0.292	0.0097	21.3***	5.38	20.72
Number of plots	0.080	0.062	0.0029	-6.02***	1.55	-5.87
Livestock owned	0.042	0.082	0.0016	6.48***	2.21	6.32
Off/non-farm income	0.622	0.439	0.0178	14.63**	5.73	14.26
Distance to input supply	-0.03***	0.008	-0.0011	-0.33**	0.16	-0.32
Extension service access	1.95***	0.668	0.1005	35.9***	11.4	35.04
DA distance	0.02***	0.008	0.0009	-0.36**	0.16	-0.35
Credit service	1.2***	0.371	0.0239	-20.52	13.6	-20.0
Credit distance	-0.01***	0.005	-0.0005	-0.28***	0.10	-0.27
Constant	-0.114	1.492		72.38***	22.7	
Test statistics	No of observation=252			No of observation=45		

***, ** and * implies significant at 1%, 5% and 10% probability level, respectively

In this study, in conformity with the hypothesis, farm size had influenced the intensity of use of inorganic fertilizer positively at less than 1% level of significance. The result is consistent with the finding of Doss and Morris (2001). Farm size is an

indicator of wealth and perhaps a proxy for social status and influence within a community. Number of plots had influenced the intensity of use of inorganic fertilizer negatively at less than 1% level of significance. The reason might be related to the poor transportation access in the study areas and the land fragmentation problems, as the number of plot increases the time required to reach the plots and labour required increases. The cost of intensifying inorganic fertilizer on fragmented plots is likely to be high. The result is consistent with the findings of Chilot (2007). Ownership of livestock had the expected positive and significant effect on intensity of inorganic fertilizer at less than 1% level of significance. Livestock ownership is considered as an asset that could be used either in the production process or it could be exchanged for cash (particularly small ruminants) for the purchase of inputs whenever the need arose. Moreover, livestock is considered as a sign of wealth and increases availability of cash for adopting technologies. The result is consistent with the findings of Abay and Assefa (2004).

Access to extension service had the expected positive and significant effect at less than 1% significant level on probability of adoption and intensity of its use due to access to information for these technologies. Agricultural extension services are the major sources of information for improved agricultural technologies. One means of which, farmers' access information about improved technologies is by contacting the extension agent. The result is consistent with the finding of Teklewold *et al.* (2006). Having access to credit had the expected positive and significant effect at less than 5% significant level on probability of adopting inorganic fertilizer due to access to finance for these technologies. Agricultural credit services are the major sources for improved agricultural technologies to solve financial constraints. If farmers can get access to credit, they can purchase improved technologies. The result is consistent with the finding of Abay and Assefa (2004) and Teklewold *et al.* (2006). According to the results of the double-hurdle model, relative to farmers who face credit constraint, farmers who get credit were about 2.4% more likely to adopt inorganic fertilizer technology. In many cases, farmers will need to use some of their own equity to finance at least part of their investments. In other case, assets such as land or the crop itself may be used as collateral for financing an improved technology. The result therefore suggests that the availability of credit is one of the most important determinants of smallholder farmers' probability of inorganic fertilizer

technology adoption. Access to off/non-farm income had influenced the decision behavior of farm household to use inorganic fertilizer positively at less than 5% level of significance. The possible justification for this result is that off/non-farm income earned might solve the financial constraints to hire labour and purchase farm inputs like fertilizer. The result is consistent with the finding of Teklewold *et al.* (2006).

The coefficient of distance to market had the expected negative sign and significant effect on the probability and intensity of adoption of inorganic fertilizer. The negative sign indicated the importance of proximity to a regular markets leading to better access, lower transport cost, and timely delivery of inputs and disposal of output and better output price for farmers. The market is used to buy required input and sell surplus output. Thus the closer distances of a farmer's home to the market enables and facilitates marketing of inputs and outputs. The result is consistent with the finding of Berhanu and Swinton (2003). The coefficient of distance to all weather roads had the expected negative sign and significant effect on the intensity of adoption of inorganic fertilizer. It is not only the proximity to local and external markets that influences adoption of improved technologies but the distance to all weather roads is also significant. Proximity of farmers to all weather roads is essential for timely input delivery and output disposal. It also decreases the transport cost of inputs; hence, investment in improved road infrastructure is crucial for promoting adoption and welfare gains. The result is consistent with the finding of Berhanu and Swinton (2003).

The coefficient of distance to input supply institutions had the expected negative sign and significant effect on the probability and intensity of adoption of inorganic fertilizer. This variable had influenced adoption of improved agricultural technologies through proximity for farmers. Proximity of farmers to such places is essential for timely input delivery and less transport cost of inputs. This variable had influenced adoption of improved agricultural technologies through proximity for farmers. The coefficient of distance to Development Agent office had not the expected negative sign but significant effect on the probability of adoption of inorganic fertilizer. However it had the expected significant and negative influence on the intensity of adoption of inorganic fertilizer. Distance between credit office and home of the household had influenced adoption of improved agricultural

technologies through proximity for farmers. The coefficient of distance to credit office had the expected negative sign and significant effect on the probability and intensity of adoption of inorganic fertilizer.

6. Summary and Conclusion

The general objective of the study was to assess adoption and intensity of adoption of inorganic fertilizer in two districts of north eastern Ethiopia. As part of the agricultural development-led industrialization program, the Ethiopian government launched the new extension program. The program was expected to result in abrupt changes in the production and productivity of Ethiopian agriculture. In spite of intensive efforts to expand the use of improved agricultural technologies, such as improved varieties and fertilizers, the yield of major crops and livestock, remained low. There has been a growing concern by researchers, extension personnel and policy makers about the effectiveness of adoption of improved agricultural technologies particularly on the area allocated and amount of use of these technologies and farmers learning process from the program to alleviate the food shortage problem in the country. This study was initiated to identify factors that affect the probability and intensity of farmers' decision to use improved fertilizer technologies. There are several studies on farmers' adoption of improved agricultural technologies using static and dynamic models in developing countries including Ethiopia. However, there is no study on this research problem conducted in the study area.

Cross-section data were used to analyse the effect of farmers socioeconomic and institutional setting and physical attributes on the probability and intensity of improved agricultural technologies adoption and determinants of production efficiencies. The study used data obtained from a survey of farmers in north east Ethiopia of South Wollo zones of Dessie Zuria and Kutaber districts collected for the period July 2009 to November 2009. Dessie Zuria and Kutaber districts were selected to represent medium and highland agro-ecological environment in South Wollo. Then 252 farmers were selected using simple random sampling of farm households in six farmers associations where the sample size in each farmers associations was determined based on proportions and size and sample sizes were distributed

proportionately over the six farmers associations. Double hurdle model was employed to study farmers' decision to adopt and intensity of use of improved technologies. The adopters of inorganic fertilizer were characterized by educated and slightly high resource endowment (labour, land and livestock) than non-adopters.

The results of the study provided empirical evidence of the positive impact of education in enhancing the intensity of adoption of inorganic fertilizer technologies to increase production. The study found access and availability of extension service to be more powerful than other factors in explaining adoption and intensity of inorganic fertilizer technology adoption. Family labour availability was also powerful in explaining intensity of inorganic fertilizer technologies suggesting that this input require additional labour for different crop operation.

The age of the farmer significantly and positively affected the intensity of use of inorganic fertilizer technologies. Older farmers adopted more improved agricultural technologies than younger farmers suggesting that accumulated knowledge gained through experience enables older farmers to adopt improved agricultural technologies. Sex of the farmer was significant on probability of inorganic fertilizers technologies adoption suggesting that attention should be provided for empowering female household. Farm land size was critical in the adoption of improved technologies. Farmers with large farm size could increase their production by using inorganic fertilizer. Although small farmers account for most of the cultivated land and production in the country, the fact that farm size had a positive impact on intensity of inorganic fertilizer adoption implies that policy makers should give attention to large farmers in designing technological intervention for increased production and food production.

Physical characteristics like distance from farmers' home to markets, road, and input supply and credit institutions played a critical role in the adoption of improved agricultural technologies as proximity to information, sources of input supply and credit and markets save time and reduce transportation costs. Given the critical role of proximity to such centers and better roads for promoting adoption and productivity gains, the effort of investment in improved roads infrastructure should

be enhanced to achieve increased production, ensure food security and eradicate poverty.

The empirical results show that agricultural extension service was significantly influenced agricultural technology adoption for improving the production and productivity of smallholder farms. The development and dissemination of improved agricultural technologies should be given more emphasis to bring about a significant improvement in the productivity of smallholder mixed crop-livestock farming and eradicate the widespread poverty and food insecurity problem in the country in general and the study area in particular. The agricultural research and extension service should be given priority and emphasis ought to be placed upon fastening the production and dissemination of existing and newly developed improved technology.

Given the critical role of proximity of farmers to market centers and better roads for promoting adoption and productivity gains, the effort of investment in improved roads infrastructure should be expanded to achieve increased production. Moreover, improving technology delivery mechanism, mainly fertilizer production and distribution system, should be expanded. In this regard, encouraging the private sector in the input market could improve the efficiency of input availability and distribution. Therefore, the results of the study suggest that technology adoption of farmers should be improved by raising their education, farm household asset formation and providing extension and credit service. Such actions may, in turn, reduce food shortage problems and facilitate economic growth by enhancing productivity.

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ADOPTION IMPACTS OF IMPROVED IRRIGATION TECHNOLOGIES IN SMALL SCALE IRRIGATION SCHEMES: THE CASE OF SWHISA PROJECT WOREDAS OF AMHARA REGION

Tesfaye Kassie¹

Abstract

The purpose of this paper is to provide an empirical evidence on adoption impacts of improved irrigation technologies in small scale irrigation schemes. The research attempted to answer the question “what was the benefit that the project brought to the farm household given all attempts in the adoptions of different irrigation technologies?” Multi-stage random sampling procedure was adopted for the selection of sample respondents in 15 small scale irrigation schemes. Of the current total number of irrigation users (1481), 558 sample households (of which SWHISA irrigation users account 68 %) were randomly selected. Simple mean, standard deviation, frequency, percentage, and frequency distribution, t-and chi square tests were used for describing collected data. The propensity score matching (PSM) method was employed for the econometric approach.

The result confirmed that the project impacted farm households in annual crop income; land and livestock holdings; and feeding capacity of own produces. Project households were better-off with an average increment of Birr 5,018.56 ($p < 0.01$). The significant income difference was the capital gain which could be invested for further investment in farming (like rented in additional lands; purchase of live stocks) and were confirmed in the empirical analysis. Accordingly, the respective mean differences of stock and cultivated land holdings attributed to the project were 0.72 TLU and 0.22 hectare ($p < 0.01$). Therefore, it is advisable to further extend and scale out the approach of the project to wider range: in area coverage and beneficiary farmers.

Key words: Sustainable Water Harvesting and Institutional Strengthening in Amhara (SWHISA) Project and PSM

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2. Introduction

Farmers in rural Ethiopia live in climate related risk-prone environment. The major source of climate risk is the persistent fluctuation in the amount and distribution of rainfall. The dependence on highly variable rainfall increases farmers' vulnerability to shocks while also constraining farmers' to use yield-enhancing modern inputs.

This exacerbates household's vulnerability to poverty and food insecurity. Poverty in Ethiopia has, in fact, mainly rural dimension. Small-scale farmers are the largest group of poor people in Ethiopia (MoFED, 2006). As a response, the government of Ethiopia has embarked on massive investment in low cost Agricultural water management technologies (AWMTs). Likewise expansion of irrigated agriculture is cited a priority in the agricultural transformation and food security strategy of the Ethiopian Government. In line with this objective, the Federal Government, Regional states and NGOs have been promoting irrigation development so as to increase food production in the country.

Despite these huge investments, their impact remains hardly understood, save the anecdotal evidences gathered here and there. The Comprehensive Assessment of Water Management in Agriculture states that "improving access to water and productivity in its use can contribute to greater food security, nutrition, health status, income and resilience in income and consumption patterns. In turn, this can contribute to other improvements in financial, human, physical and social capital simultaneously alleviating multiple dimensions of poverty" FAO (2000) also argued that well targeted, local interventions in water can contribute to rapid improvements in livelihoods of the rural poor in SSA and help attain the Millennium Development Goals of eradicating extreme poverty and hunger.

Sustainable Water Harvesting and Institutional Strengthening in Amhara (SWHISA) is a food security project aimed at contributing to rural development through improving capacities of institutions and farm families involved in irrigation agriculture. To this end irrigation diagnostic surveys were conducted to understand opportunities and constraints of irrigated agriculture the local context. The diagnostic surveys covered twelve irrigation schemes representing a cross-section of six food insecure woredas of Amhara region soon after the project began in 2005

(PRA Reports, 2006 and 2007). Participatory rural appraisal (PRA) tools were used by multi-disciplinary teams consisting of experts from research, extension, water resource development, cooperative promotion agency, and project staffs. A large team (of 25 to 33 staff) subdivided into three or four smaller six-to-eight person field teams each of which covered communities. Even over this period of time, the level of investigation into the irrigation schemes and food-security situation was more exploratory than exhaustive.

Nevertheless, the approach provides sufficient detail to formulate a range of adaptive research interventions and on farm demonstration which, aimed at increasing agricultural productivity while increasing farm income. In parallel the project made significant effort to build the capacity of regional institutions and farm families and water user association so as to plan and implement irrigation development projects in sustainable manner. Attempts were also made to implement the proposed irrigation scheme rehabilitation plan, though started at the later stage of the project implementation. Following the participatory pilot on farm demonstrations, the project supported woredas to develop strategy and further expand the best practices and irrigation technologies to none project schemes.

While generation of new technology is part of the process of technological change, adoption is the step that allows benefits to be realized that contribute to both economic growth and ideally improved environmental outcomes. This research work is therefore attempted to evaluate the impact of the project and livelihood changes attributed to the program interventions. Estimating social impacts of a project requires measurement of defined social outcome indicators conditional on the same indicators in the absence of a project. Identifying and measuring causal linkages of project impacts on poverty is challenged by disentangling project impacts from non-project influences such as employment trends, crop price shifts, climatic variability, or new programs. In theory, the impact for a household in a project scheme is the difference between an outcome indicator measured with the project and without it.

Data from project schemes can be collected in a reasonably straightforward manner once outcome indicators have been agreed, targets set and monitoring systems put in place. Non-treatment data are more problematic as the data are effectively

“unobserved” since an individual or household cannot be both a participant and a non-participant. While control scheme populations are commonly monitored, a significant methodological constraint is matching a treated household with a non treated household due to economic, social or agro-climatic differences. One approach that attempts to overcome such problems is propensity score matching (Heckman, et.al).

This study illustrates a matching method based on the application of household data from irrigation schemes in project woredas, and its wider reliability. However, constructing impact indicators that correspond to project goals, and which can be directly linked to interventions, is often not straightforward. The need to establish measurable indicators directly linked to plan interventions is a key step in social impact evaluation (Baker, 2000). Five outcome indicators are derived from the available data: (a) gross returns to annual crop production, (wet season crop); (b) gross returns of irrigated crops (post-monsoon crop) and, (c) total cultivated farm sizes of the household (d) total livestock holding (TLU) and (f) household food viability period from own crop produces. The analysis estimates who benefits from SWHISA project and by how much, by purposively comparing private (economic) returns from a land-based intervention alongside changes in livestock holding as proxy to assess asset building impact of the project.

The two main objectives of this paper are (1) To identify the determinates of the adoption of improved irrigation technologies, and (2) To assess impact of the project on the adoption of irrigation technologies and improved agricultural water management practices. From the discussion, it will also draw some policy implications.

2. Research Methodology

2.1 Data Description

The study was conducted in six pilot woredas of the Amhara region namely: West and East Belessa, Goncha Siso Enessie, Menz Mama, Woreillu and Delanta. The survey was carried out in eight project pilot and seven non-pilot kebeles a total of 15 small-scale irrigation schemes in the aforementioned project woredas.

The data used is from a survey of multi-stage random sample of 558 rural households in 15 small scale irrigation schemes interviewed in May 2012. Of the total sample household heads, 499 were males and the rest 59 were females. SWHISA/pilot irrigation users accounted for 63 percent while the remaining balance (37 %) is for the non-pilot. The average family size of the total sample households was 5.66 persons with a range of 1 to 11. It was 5.69 persons for pilot irrigation user groups and for the non-project was 5.61 persons. The average age of sample household head was 42.23 years with a standard deviation of 13.272. The average size of active family labour force of the two irrigation user groups (project and non-project) was 3.17 and 2.94 persons per household with standard deviation of 1.5 and 1.29, respectively. Of the total population (3161) of the sample households, 29 percent were illiterate; 19 percent could write and read; 34 percent engaged in formal education; and the remaining 18 percent were infants.

The average cultivated land holding of sample households for rain fed agriculture was 1.61 hectare with standard deviation of 1.001. The mean cultivated land size for project and non-project irrigation user groups was 1.73 and 1.49 hectares with standard deviation of 1.15 and 0.811, respectively. The mean difference was tested and it was found significant at 5 percent significant level. The average total irrigated land size for project and non-project irrigation user groups in 2011 cropping season was 0.25 and 0.22 ha, respectively and the mean difference is not statistically significant.

The mean livestock holding of project irrigation users was 4.58 with a standard deviation of 2.83 while that of the non- pilot irrigation users was 3.85 with a standard deviation of 2.35. The mean difference in livestock holding between the two irrigation groups was found highly significant ($P < 0.01$).

Crop production was the most important farm activity in the project woredas. Teff, wheat and sorghum were the dominant crops in the rain fed agriculture. Of the total area cultivated (857.28 ha) by sample households under rain fed agriculture: teff accounted 36 % followed by wheat, sorghum and check pea accounted 16,12 and 10 percents, respectively and the remaining (26%) is covered by other different field crops. Similarly, of 184 ha of irrigated land by sample households check pea, lentil

and fenugreek were the major crops with an estimated coverage of 28, 23 and 16 percent, respectively. No conspicuous differences in cropping pattern were observed between project and non-project schemes.

Survey results revealed that out of 558 sample households 22% had regular contact with extension agents once in a week, while the 21 % and 38 % of the respondents had regular contact ones every two and four weeks intervals, respectively . The remaining balance (19%) either had regular contact but at excessively long duration intervals (16 weeks) or un planned random contact or had no contact whatsoever with extension agents throughout the irrigation season (makeup 6 %, 4 % and 9% of the total sample households, respectively).The difference in mean contact time intervals between the treatment and control group was statistically significant ($P < 0.05$). About 60% of the project and 53% of the non-project irrigation user groups attended in short term training, while 32% of the project and 25% of the non-project irrigation user groups participated in experience sharing visits.

2.2 Econometric Approaches

Farmers' adoption behavior especially in low-income countries is influenced by a complex set of socio-economic, demographic, technical, institutional and biophysical factors (Feder et.al, 1985). Hence, modeling farmers' response to agricultural innovations has become important both theoretically and empirically. The methods for examining technology adoption behavior have been explained in the literature. In principle, technology selection can be modeled using a multinomial Logit or Probit specification, where the dependent variable is a categorical variable taking a different value according to the portfolio selected, but count data model can also be used to model technology selection, where the dependent variable is the sum of the number of technology selected.

Ordinary Least Squares (OLS) regression estimates can be computed for binary model, the error terms are likely to be heteroscedastic, though leading to inefficient parameter estimates. Consequently, hypothesis testing and construction of confidence interval becomes inaccurate and misleading. Likewise, a linear probability model may generate predicted values outside the admissible 0-1 bound,

which violate the basic tenets of probability. To alleviate these problems and produce relevant empirical outcomes, the most widely used qualitative response models are logit and probit models (Amemiya, 1981). However, Maddala (1983) and Gujarati (1995) have noted that the logistic and cumulative normal functions are very close in the mid-range, but the logistic function has slightly heavier tails than the cumulative normal function. That is, the normal curve approaches the axis more quickly than the logistic curve.

The logit model based on cumulative logistic probability function is used in this study. Ignoring the minor differences between logit and probit models, Liao (1994) and Gujarati (1995) indicated that the probit and logit models are quite similar, so they usually generate predicted probabilities that are almost identical. The choice between logit and probit models is largely a matter of convenience (Green, 1991; Gujarati, 1995). But the logit model is computationally easier to use and leads itself to a meaningful interpretation than the other types (Pindyck and Rubinfeld, 1981; Green, 1991; Gujarati, 1995).

The count data models do offer some useful advantages for technology adoption studies. Count data models focus on adoption intensity. The use of count data models also allows one to avoid making strong assumptions about relationships between technologies being investigated, as no arbitrary aggregation of techniques is assumed. Reliance on count data is often viewed as limiting, as the complementarities and substitutions among the technologies are not modelled.

The existing count data literature on intensity of technology adoption typically employs parametric specifications such as the Poisson model or the Negative Binomial in which the number of technologies adopted is the dependent variable and a set of farm level characteristics are explanatory variables. In this particular study however, the Poisson regression model, is employed for the estimation of the farmers' decision on how many agricultural water management technologies and water management practices to adopt since conditional mean is equal to the conditional variance and the negative binomial model reduces to the Poisson model. The probability of adopting k practices given n independent agricultural water

management technologies land and water management practices are represented by the binomial distribution:

$$p(y = k) = \binom{n}{k} p^k (1 - p)^{n-k} \quad (1)$$

where $\binom{n}{k} = \frac{n!}{k!(n-k)!}$ and p is the probability of adopting practices.

Statistical theory states that a repetition of a series of binomial choices, from the random utility formulation, asymptotically converges to a Poisson distribution as n becomes large and p becomes small:

$$\lim_{n \rightarrow \infty} \binom{n}{k} p^k (1 - p)^{n-k} = \frac{e^{-\lambda} \mu^k}{k!} \quad (2)$$

where $p = \mu/n$ and μ is the mean of distribution, such as the mean number of technology adopted by the farmer. This formulation allows modelling of the probability that a household adopts the number of agricultural water management technologies and practices k given a parameter, μ the sample mean.

The irrigators make series of discrete household decisions that sums across an aggregation of choices to a Poisson distribution. The Poisson regression model is the development of the Poisson distribution presented in (1) to a non-linear regression model of the effect of independent variables on a scalar dependent variable. The density function for the Poisson regression is

$$\lim_{n \rightarrow \infty} \binom{n}{k} p^k (1 - p)^{n-k} = \frac{e^{-\lambda} \mu^k}{k!}$$

where the mean parameter as the function of the regressor x_i and a parameter vector β is given by

$$f(y/x_i) = \frac{e^{-\mu_i} \mu_i^y}{y!} \quad (3)$$

where

$$f(y/x_i) = \frac{e^{-\mu_i \mu^y}}{y^i} \quad (4)$$

$$E(y/x_i) = \mu = \exp(x^i \beta) \text{ and } y = 0, 1, 2, \dots \quad (5)$$

(6)

Assessment of a counter-factual/ Propensity score matching (PSM) method

The problem in measuring changes in agricultural returns (or land accessed and livestock holdings by household) requires a method to estimate unbiased project impacts. This promotes assessment of a counter-factual, that is, what would have occurred if the project had not taken place. Two methods drawn from the impact evaluation literature are reviewed by Jalan and Ravallion (1999). First, reflexive comparisons collect baseline data on probable participants before a project is implemented. These data are compared to the same individuals after project implementation. This method could be extended to include observations on non-participants, before and after the intervention, allowing 'double-difference' estimates of project impacts. Second, in cases where it is unfeasible or unethical to set up a pre-intervention sample, such as in food aid or educational programs, a control group can be set up by matching project participants to non-participants from a wider survey, such as a national census. Propensity score matching methods are applied on the basis of similarities between observed characteristics in both samples (Heckman, Ichimura, & Todd, 1998)

Problems arise in both methods; reflexive and double-difference comparisons are challenged by attrition, where a non-random subset of the baseline sample drops out for various reasons. Pre-project randomization may not be feasible and there is also the problem of selective non participation among those randomly chosen for the project. Matching methods can avoid these problems but create a different set of challenges. However, our choice evaluation method in the present study has been limited by data availability. SWHISA project, for instance, did not collect

baseline data on the outcome variable of interest and other pre-intervention characteristics of SWHISA and non-SWHISA households in the study area. Thus, we have to rely on a propensity score matching (PSM) which can identify comparable treatment and comparison observations using cross-sectional data (Rosenbaum and Rubin, 1983).

Heckman et. al. (1998) present several essential pre-conditions in order to get reliable and low-bias impact estimates using PSM. Included among these pre-conditions are that (1) data are collected using identical questionnaires for both groups during the same period, (2) treatment and comparison observations share a comparable socioeconomic, demographic and agro-ecological setting, and (3) relevant variables related to treatment and outcome are included in the propensity score function. These were also important which we tried to fulfill in our present study. The dataset used in our study clearly meets precondition (1) because an identical survey instrument is used to elicit data from both groups. Precondition (2) is also met because as noted earlier the survey data for our study comes from households (both SWHISA and non-SWHISA households) residing in the same district. To meet precondition (3), the propensity score is estimated by using sample households' observable characteristics which are relevant for both participation into the program and for the outcome variable of interest.

Jalan and Ravallion (1999) note that in the absence of these features simple difference measures between participants and matched nonparticipants will result in a biased estimate of the project impact. An empirical example that compared bias from observed and unobserved characteristics indicated that biases in naïve estimates were huge but careful matching of the comparison group based on observables greatly reduced the bias (Heckman et.al., 1998).

According to Caliendo and Kopeinig (2008), the following steps should be implemented in PSM:

- Estimation of the propensity scores
- Checking on common support condition
- Choosing a matching algorithm
- Testing the matching quality

- Treatment effect on treated
- Sensitivity analysis

2.3 Empirical Results

Prior to the analysis the data were checked for multicollinearity and linear association among the hypothesized variables using variance inflation factors (VIF) and contingency coefficient for continuous and dummy variables respectively. The test result revealed that no multicollinearity and association between a set of continuous and discrete variables, as the respective coefficients were very low (less than 10 for continuous variables and less than 0.75 for dummy variables). Likewise heteroscedasticity was tested by using Breusch-Pagen/Cook-Weisberg test. The test result rejected the existence of heteroscedasticity hypothesis as ($p=0.899$) and the need to make the standard error robust. Nevertheless, robust standard errors were used to correct heteroscedasticity problems in this study to revalidate Cook-Weisberg test.

Data were analyzed using STATA version 10 with propensity scores matching algorithm developed by Leuven and Sianesi (2003). A result presented in Table 1 shows the estimated model appears to perform well for the intended matching exercise since, the pseudo- R^2 value was quite low (0.0656). A low R^2 value in this case means that households with in and out of the project do not have much distinct characteristics and finding non-participant households to be good match for participants becomes easier.

2.4 Determinates of the Adoption of Improved Irrigation Technologies

The logistic regression model was used to estimate propensity score. Participation in irrigation programs (SWHISA & non- SWHISA) was taken as dependent variable with 1 for SWHISA irrigation user group, 0 otherwise. The pre-intervention variables such as demographic, socioeconomic and institutional variables included in the model were taken as exogenous explanatory variables and assumed to affect participation in irrigation technologies.

Four explanatory variables in the logit model have significant effect on decision to use irrigation technologies. The interest of the matching procedure is to get a household from non-SWHISA schemes with similar probability of participation given the explanatory variables. If the number of explanatory variables affecting decision are limited, it created a good opportunity for matching and it makes the matching procedure less difficult since matching algorithm is implemented to eliminate significant differences of explanatory variables between SWHISA and non-SWHISA irrigation user groups.

Age of the household head significantly and negatively affected the probability of adopting improved irrigation technologies. It coincides with the hypothesis that as the age of the household head increases, the household decides better not to adopt in new attempts and the technology adoption probability of the household becomes low. In other words, the younger the household head is, the more likely will be the probability of adopting improved irrigation technologies.

Community leadership role of the household head was found positively and significantly affect the adoption decision of the family. The probability of adopting technologies increased for households, if the household head had a role in the community leadership: in local administration; scheme organization (irrigation cooperative and water user association); model farmer (*Ginbar Kedem*) in extension service; service cooperatives; informal social institutions like *iddir*, *mahber*, and religious institutions as compared to those who had no special role in the community. This can be explained in the way that projects usually communicate to the rural community through people with a role of leadership in the rural institutions and these people have better information about the project and irrigation technologies being promoted the schemes.

The Pre-intervention literacy of the household head was found significantly and negatively affected the probability of adopting improved irrigation technologies. It coincides with the hypothesis that literacy of the household head is expected to enhance farmer's ability to perceive, interpret and respond to new events. Furthermore, education level increases farmer's ability to get, process and use information and increase farmers' willingness to adopt a new technology. Previous

research results (Ramji et al., 2002; Tassew, 2004) have also revealed that education would influence adoption positively.

As to Yibeltal (2008) and as it was hypothesized distance from the nearest market was found negative and statistically significant (Table 1). It is true that as the farm household is close to the market, the possibility to produce irrigation crops particularly high value crops increases.

Table 4: Logit results of households' adoption on irrigation technologies

Variables	Coefficients	Robust Std.err	Z-values
H_SEX	-0.495	0.378	-1.31
H_AGE	-0.021	0.009	-2.18**
Role_HH	0.554	0.233	2.37**
F_SIZE	-0.085	0.076	-1.12
AFLF	0.184	0.103	1.80
EDU_HH	0.469	0.225	2.09**
OLAND	0.159	0.167	0.95
IRRIG_EXP	0.007	0.136	0.48
DS_LAND	0.472	0.271	1.74
DS_NMKT	-0.443	0.177	-2.5**
Constant	0.746	0.586	1.27
Sample size(n)	558		
Pseudo R ²	0.0656		
Wald chi ² (10)	33.32		
Pro>chi ²	0.0002		
Log likelihood	-250		
Max.vif value	1.80		
Max.cc value	0.043		
hettest(Pro>chi ²)	0.8999		

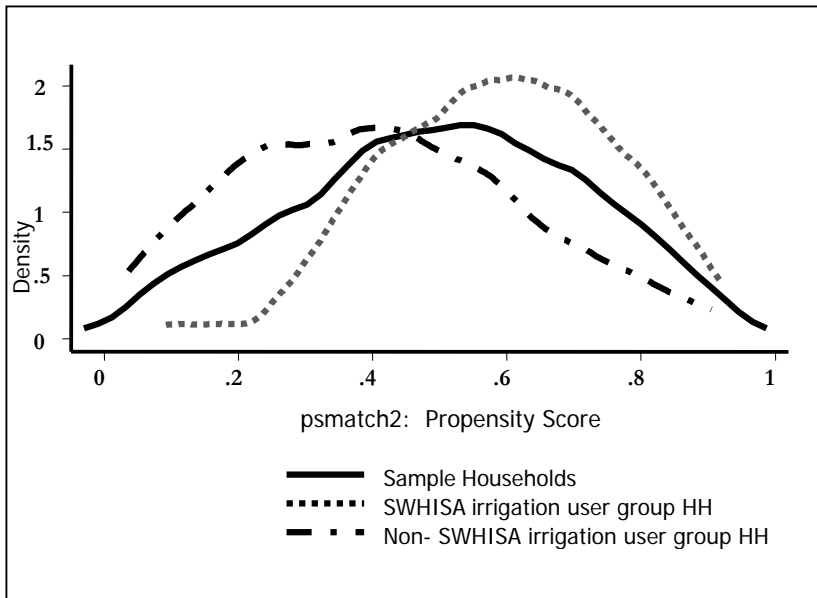
** statistically significant at 5 %

4.5 Common Support Condition

The quality of matching can be assessed by visual inspection using graphs. To do so, we plotted the graphs of estimated propensity scores for non-SWHISA households and SWHISA households both before and after matching (Figures 1 to 3).

Figure 1 reveals the distribution of the households with respect to the estimated propensity scores. In case of treatment households, most of them are found in partly the middle and partly in the right side of the distribution. On the other hand, most of the control households are partly found in the center and partly in the left side of the distribution.

Figure 7: Density of propensity score distribution before matching



After estimating propensity scores values for SWHISA and non- SWHISA irrigation user group, the second step is matching the groups by imposing a common support condition.

Table 5: Distribution of estimated propensity scores

Group	Obs	Mean	ST	Min	Max
Total HHs	549	0.5	0.15	0.088	0.906
Treatment HHs	346	0.54	0.141	0.192	0.906
Control HHs	203	0.46	0.143	0.088	0.780

As shown in Table 2, the estimated propensity scores vary between 0.192 and 0.906 (mean=0.54) for treatment households and between 0.088 and 0.780 (mean=0.46) for control households. The common support region would then lie between 0.192 and 0.78. In other words, households whose estimated propensity scores are less than 0.192 and larger than 0.906 are not considered for the matching exercise. As a result of this restriction, 9 households (5 treatment and 4 control households) were discarded from the analysis.

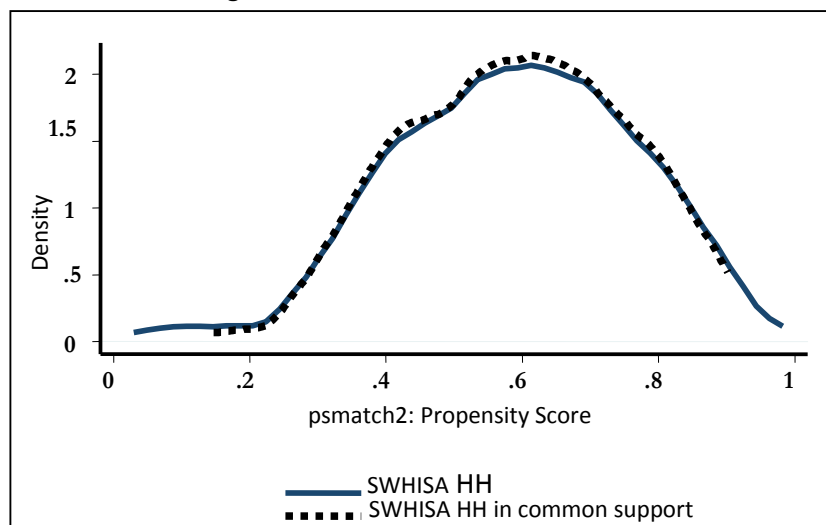
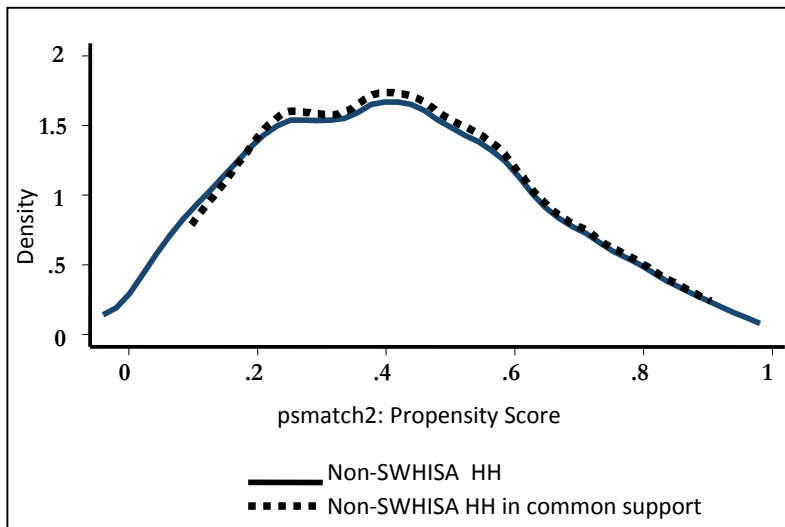
Figure 8: Density of propensity scores of user HHs in common support after matching

Figure 9: Density of propensity scores of non- SWHISA irrigation user HHs in common support after matching



Choice of matching algorithm

Several authors (e.g. Dehejia and Wahba, 2002 and Caliendo and Kopeinig, 2008) suggest trying a number of PSM estimators. As such we implemented kernel, radius, nearest neighbor matching estimators using the PSM algorithm developed by Leuven and Sianesi (2003) with STATA 10.0. A preferred estimator is one that yields statistically identical covariate means for both groups (Caliendo and Kopeinig, 2005), that provides low pseudo-R2 value (Sianesi, 2004) and statistically insignificant likelihood ratio test of all regressors after matching (Smith and Todd, 2005). Guided by the above indicators, we chose kernel matching with a bandwidth of 0.5 as our best estimator (Table 3). Though the three band widths are comparable, bandwidth of 0.5 was selected because of its association with relatively high ATT value.

Table 6: Performance of different matching algorithm

Matching Algorithm	Performance criteria		
	Balancing test	pseudo-R2 After matching	On common Support
Nearest Neighbor			
NN(1)	7	0.0656	549
NN(2)	7	0.0656	549
NN(3)	7	0.0656	549
NN(4)	7	0.0656	549
NN(5)	7	0.0656	549
Caliper			
0.01	8	0.0656	418
0.1	8	0.0656	485
0.25	8	0.0656	488
0.5	8	0.0656	539
Kernel			
Band width 0.1	10	0.0656	549
Band width 0.25	10	0.0656	549
Band width 0.5	10	0.0656	549

Impacts of SWHISA project

Use of improved varieties; use of fertilizer; irrigation scheduling; irrigation methods like application of furrow irrigation; row planting practice; crop pest and disease control; timely maintenance of the irrigation canals; scheme management; selection of high value/market crops; etc. were some of the intervention areas of the project in question. The outcomes of the adoption of these technologies/techniques are assumed to be reflected in the households' income; food security status; and agricultural investments like livestock purchase, farm land rented in, etc. Status of SWHISA and non-SWHISA irrigation user households was compared after matching on the aforementioned outcomes in order of assessing the impacts of SWHISA project through the adoptions of irrigation technologies.

Households who participated in the project are better-off with respect to incomes generated from annual crop produces (ACROPI). Average total annual crop income

of the project and non-project households were 18,027.32 and 13,008.00 Birr, respectively. Mean value difference (5,018.56 Birr) between the two group was highly significant ($P<0.01$) (Table 4). Similarly, the project households are better-off with respect to incomes generated from irrigation agriculture produces (ICROPI). Average total annual crop income of the project and non project households were 6,983.84 and 4,802.61 Birr, respectively. Mean value difference (2,181.23 Birr) between the two groups was highly significant ($P<0.01$) (Table 4).

The amount of income difference was attributed to the adoption of improved irrigation technologies. This income might be the capital gain which could be invested for further investment in farming (like rented in additional lands; purchase of live stocks). Therefore the income disparity between the two groups is largely attributed to size of the plot put under cultivation than change in productivity.

Project households and the control groups were also compared with the numbers of live stocks they hold measured in TLU. The average livestock holding of SWHISA irrigation users was 4.59 TLU while that of the non-SWHISA irrigation users was 3.87. The mean difference was attributed to the impact of SWHISA and it was significantly different at a 5% significance level (Table 4).

The mean cultivated land size for SWHISA and non- SWHISA irrigation user groups was 1.72 and 1.51 hectares. Land was redistributed in project areas before the intervention of SWHISA project. The t-test revealed that mean difference in total area of land cultivated between the two groups was found statistically significant and the difference was attributed to impacts of the project through land rent in than actual difference in landholding entitled to own by farm families.

The food security impact of the project was also assessed. The average numbers of months addressed by own agricultural produces for project households was 10.9 while that of the non-SWHISA irrigation users was 9.4. The difference was found statistically highly significant (Table 4).

With a secure water supply in project schemes, farmers can choose to invest in higher-yielding seeds, grow higher-value crops, and harvest an additional crop or

two each year. Moreover yield enhancing inputs such as fertilizers are highly complementary with water and hence the demand for these inputs is influenced by availability of water. The project schemes were associated with increased intensity of input use, especially labour, oxen, improved seeds and fertilizer compared to control groups. By promoting increase in use of such inputs, irrigation contributes to increased crop production. In SWHISA schemes the predicted average impact of irrigation, based on use of inputs, was an 18% increase in SWHISA schemes crop production relative to control groups. Nevertheless, the main impact of the project on crop production is through promoting increased intensity of farming, rather than through increased productivity of farming practices.

Table 7: Impacts of SWHISA project on some comparative indicators

Variable	ATT		Mean diff.	SE (bootstrapped)	t-value
	SWHISA (Treated)	Non-SWHISA (Untreated)			
Annual crop income (Birr)	18,027.37	13,008.00	5,018.56	1,794.53	3.32***
Irrigated crop income (Birr)	6,983.84	4,802.61	2,181.23	728.06	3.47***
Total cultivated farm sizes of the household (ha)	1.72	1.50	0.21	0.139	2.07**
Total livestock holding (TLU)	4.59	3.87	0.72	0.287	2.66**
Feeding capacity of own crop produces (months)	10.90	10.40	0.51	0.476	2.97***

** and ***statistically significant at 5 and 1 percent levels, respectively

Sensitivity Analysis

In order to control for unobservable biases, Tables from 5-9 below show the result of sensitivity of project effects on outcome variables i.e. crop income, stock and land holdings, food security statuses. It should be clear that matching estimators are not robust against 'hidden biases'. Different researchers become increasingly aware that it is important to test the robustness of results to departures from the identifying assumption. Since it is not possible to estimate the magnitude of selection bias with non-experimental data, the problem can be addressed by sensitivity analysis. Rosenbaum (2002) proposes using Rosenbaum bounding approach in order to check the sensitivity of the estimated ATT with respect to deviation from the CIA. The basic

question to be answered here is whether inference about treatment effects may be altered by unobserved factors. Given that the estimated adoption of irrigation technologies effect is positive for the significant outcome, the lower bounds under the assumption that the true treatment effect has been underestimated were less interesting (Becker and Caliendo, 2007).

Table 8: Result of sensitivity analysis using Rosenbaum bounds for annual crop income (ACROPI)

Rosenbaum bounds for ACROPI (N = 558 matched pairs)						
Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	0	0	13868.5	13868.5	13122.3	14639
1.25	0	0	13008.7	14764.9	12275	15579
1.5	0	0	12321	15524.8	11628.8	16387.5
1.75	0	0	11782	16192.4	11090	17090
2	0	0	11327.2	16775	10637.5	17713.4

* gamma - log odds of differential assignment due to unobserved factors
 sig+ - upper bound significance level
 sig- - lower bound significance level
 t-hat+ - upper bound Hodges-Lehmann point estimate
 t-hat- - lower bound Hodges-Lehmann point estimate
 CI+ - upper bound confidence interval (a= .95)
 CI- - lower bound confidence interval (a= .95)

Table 9: Result of sensitivity analysis using Rosenbaum bounds for irrigated crop income (ICROPI)

Rosenbaum bounds for ICROPI (N = 558 matched pairs)						
Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	0	0	3186.5	3186.5	2964.23	3430
1.25	0	0	2925	3460.5	2700	3750
1.5	0	0	2725	3730.75	2515	4050
1.75	0	0	2560	3975	2362.5	4350
2	0	0	2425	4200	2250	4624.5

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Table 10: Result of sensitivity analysis using Rosenbaum bounds for total cultivated land holding (LAND)

Rosenbaum bounds for WET_CULTIVATED (N = 558 matched pairs)						
Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	0	0	1.5	1.5	1.375	1.5
1.25	0	0	1.375	1.5	1.3125	1.625
1.5	0	0	1.3125	1.625	1.25	1.64
1.75	0	0	1.25	1.625	1.25	1.75
2	0	0	1.25	1.75	1.125	1.75

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Table 11: Result of sensitivity analysis using Rosenbaum bounds for livestock holdings (TTLU)

Rosenbaum bounds for TTLU (N = 558 matched pairs)						
Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	0	0	4.155	4.155	3.93	4.385
1.25	0	0	3.895	4.425	3.67	4.66
1.5	0	0	3.69	4.645	3.465	4.885
1.75	0	0	3.51	4.835	3.285	5.09
2	0	0	3.365	5	3.145	5.26

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

Table 12: Result of sensitivity analysis using Rosenbaum bounds for feeding capacity of own crop produces (FC_OPCROP)

Rosenbaum bounds for FC_OPCROP (N = 558 matched pairs)						
Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	0	0	11	11	10.5	11
1.25	0	0	10.5	11	10.5	11
1.5	0	0	10.5	11	10.5	11
1.75	0	0	10.5	11	10	11.5
2	0	0	10.5	11.5	10	12

* gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+ - upper bound confidence interval (a= .95)
CI- - lower bound confidence interval (a= .95)

The results show that the inference for the effect of irrigation technology interventions is not changing though irrigation users in both programs (SWHISA and non-SWHISA) has been allowed to differ in their odds of being treated up to 200%(Gamma=3) in terms of unobserved covariates. That means for all outcome variables estimated, at various level of critical value of gamma, the p-critical values

are significant which further indicate that we have considered important covariates that affected both participation and outcome variables. We couldn't get the critical value gamma where the estimated ATT is questioned even if we have set gamma largely up to 3, which is larger value compared to the value set in different literatures which is usually 2 (100%). Thus, we can conclude that our impact estimates (ATT) are insensitive to unobserved selection bias and are a pure effect of SWHISA project through the adoptions of irrigation technologies.

5. Conclusions and Policy Implications

This study has evaluated the impact of SWHISA project on household income, food security and livestock owned, consumption using cross-sectional survey data from six woredas in Amhara Regional State. The program was implemented between 2006–2012 periods by Sustainable water harvesting and institutional strengthening in Amhara (SWHISA). The main research question of the study has been “what would the household income, food security and livestock assets have been, had the program not been implemented?”.

Using the PSM method to control for initial differences between SWHISA and non-SWHISA groups we have identified 346 SWHISA scheme households and 203 non-SWHISA scheme households from our original sample of 351 and 207 households, respectively. Imposing a common support condition has resulted in an exclusion of a small number of households (5 household from the SWHISA sample and 4 from the non-SWHISA sample). Stated in other words, these households from the two groups have statistically identical pre-intervention characteristics except the program. The estimated results show that after controlling for other characteristics, the project has significantly raised income among its beneficiary households. More specifically, the annual crop income among SWHISA households was 45-percentage point larger when compared to their counterparts in non-SWHISA group. Interestingly, our finding remains robust for the estimation of propensity scores. However, we also find that the program's average impact hides potentially significant variations across beneficiary households. More particularly, irrigation crop income is larger for households with a smaller dependency ratio, larger landholding and for households headed by females.

In sum, from the findings in this paper it can be deduced that strategies to enhance adoption of improved irrigation technologies include the demonstration of short-term benefits and risk reduction characteristics of technology, and support for dissemination of knowledge on gains from adoption. Our empirical findings also provide important messages for policy makers. First, the findings in this paper provide evidence that SWHISA project played a key role in improving household income, food security and livestock number as proxy to asset building in project woredas. Second, the paper finds evidence that the average impact masks important differences in program impact across targeted beneficiaries. As indicated earlier, the program impact is strongly related among others, to policy variables including landholding, extension service, education level and family size (dependency ratio). This suggests that policy makers can maximize the impact of the irrigation projects by encouraging and supporting family planning, rural education and land consolidation in rural areas. The role of human capital and information in the adoption process is quite significant. Besides improving human capital in the form of education, policy makers could also strengthen farmers' contacts to extension agents, since they help farmers to understand the significance of new technologies in increasing productivity.

In addition, policy and institutional interventions to enhance the impact of irrigation also need to be based on the objective of enhancing the wealth-creating potential of small-holder irrigated farming by strengthening market access, promoting high-value crops, and improving systems for providing extension and technical support to small-holder irrigation. The best place to start perhaps is to ensure access to farm inputs and produce markets. A wider menu of irrigation technologies need to be available for farmers to choose from, so that farmers would respond more flexibly to irrigation development opportunities.

More attention should be given to balancing improvement of irrigation efficiency, specifically ensuring the availability of water in both wet and dry seasons, the equitable water allocation as well as establishment of appropriate water levels in cultivated plots, and expansion of the coverage of irrigation systems. Likewise investment in monitoring, impact assessment, pilot testing of innovations, and

sharing the lessons learned widely among government agencies, investors, donors, private firms and farmers is equally important.

Gender issues are also important in irrigation water development, since often women get underrepresented in the decision-making fora. Gender issues in irrigation development need to be considered at three levels:

- field level, to ensure the allocation of water and land rights, and associated responsibilities do not involve systematic gender-based differences;
- water users association level, to ensure that there are no gender-based exclusions from participation; and
- leadership level, to ensure that equal opportunities exist for leadership positions.

Farmers with little education are often insufficiently prepared for either irrigation tasks or land management. They often lack knowledge about sustainable land management and integrated plant protection. Targeted training for farmers in both issues is thus an urgent need. In particular in cases involving the introduction of irrigation farming to previously rain fed agriculture, the target groups as a rule lack traditional preliminary irrigation know-how. It is therefore essential for them to learn fundamental farming skills in addition to acquiring knowledge about questions bound up with irrigation management. Coordination between institutions is essential as a means of harmonizing training measures and combining them in reasonable ways.

Credit must be seen as reasonable and necessary in cases where the savings of farming households are insufficient to purchase the inputs they need. However, most credit institutions set up high access barriers to credit or demand overly high interest rates. Thus there is a need for credit lines adapted specifically to the needs of farmers active in irrigated agriculture. This would call e. g. for repayment modalities adapted to cropping cycles. These in turn would permit farmers to purchase seed and other inputs and to repay their credits at the end of the harvest season. Special development partner supported credits would be one good way to cover this need more adequately. It can be deduced that strategies to enhance adoption of improved irrigation based technologies management include the

demonstration of short-term benefits and risk reduction characteristics of technology, and support for dissemination of knowledge on gains from adoption.

The research has also clearly demonstrated that irrigation agriculture is a very important and desirable economic activity with many advantages for producers. It contributes to food security, creates employment especially during the main off-farming season, and provides income for poor households. Given adequate support, extension agents can assist farmers to adopt new technologies that can improve soil fertility, improve yields and income and reduce poverty. However, dry season high value crop production such as vegetable is a risky business because of unreliable irrigation water availability. Farmers' access to irrigation water should therefore be given urgent attention with support to research into sustainable management of micro-water catchments for improved high value crop production.

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THE SOURCES OF ETHIOPIA'S REGIONAL URBAN UNEMPLOYMENT DISPARITIES: A CROSS REGION PANEL ANALYSIS

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Abstract

Urban labour market of Ethiopia is characterized by high level of unemployment (18% in 2011) which in turn has generated a series of social problems. From urban employment /unemployment survey of regional data, it is found that there are disparities of the urban unemployment rate among 11 regions which is also persistent overtime. Fixed effect AR(1) panel data analysis methodology is employed to test for the existence of deterministic factors of regional urban unemployment disparities. The regional urban unemployment trend has been analyzed by equilibrium and disequilibrium factors using panel data of 11 regions over the 2003 to 2011 period with a gap of 2008. The finding supports disequilibrium factors are more important sources affecting the disparity in Ethiopia's regional unemployment rate. Empirical investigations showed that self employment, employment by government and private sectors are the major labour demand factors behind regional unemployment disparity in Ethiopia. An increase in the share of manufacturing employment pushes down regional urban unemployment disparity. The education and training system in Ethiopia has inadequately prepared the youth for the world of work. Rapid urbanization rate through rural urban migration which affected the supply side through a high and rapid increase in labour force relative to the absorptive capacity of the economy appear to be the source of high unemployment among regions of Ethiopia. Youth and women experienced higher levels of unemployment than their counterparts of elder and male respectively. From the policy point of view, understanding the sources of regional urban unemployment disparity will help policy makers to determine the appropriate policies to mitigate urban unemployment rate across regions. The empirical results suggested the need for the regional and federal governments to embark on measures capable of creating jobs through industrialization besides the promotion of micro and small enterprises.

Keywords: Region, Urban, Unemployment rate, Disparity, Ethiopia

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1. Introduction

Over the past decade Ethiopia has made significant progress on a number of fronts. The economy has shifted to a higher growth trajectory since 2005/06, with an average growth of 11% per annum. Besides high and sustained economic growth, significant social and human developments were also realized. Poverty head count ratio decreased from 45.5% in 1995/96 to 29.2% in 2009/10 (MOFED, 2010:32). Urban unemployment decreased from 26 % in 2003 to 18% in 2011 (CSA, 2011:206). Though significant progresses have been registered, the development challenges that Ethiopia is facing are immense. Poverty, unemployment particularly urban unemployment and inflation just to mention a few are the major development challenges. Significant proportions of the population (29.2%) still live under poverty. Inflation is increasing at alarming rate (36.3% in April 2012) in Ethiopia. The challenge that attracts the focus of this study is unemployment. A high level of urban unemployment is one of the critical socio-economic problems facing Ethiopia. While the urban labour force grows, with an increasing proportion of youth, employment growth is inadequate to absorb urban labour market entrants.

Unemployment has been regarded as one of the worst economic evils that most countries face, developed and developing alike, since it leads society to poverty, causes income dispersion, and leads to political² and socioeconomic crisis. Unemployment means huge waste of economic and human resources in a society. The economy is not functioning effectively when it works only at a fraction of its full capacity. Unemployment occurs when people are able to work and willing to accept the prevailing wage paid to someone with their skills, but either cannot find or have not yet secured suitable employment (the available jobs do not match expectations of the labour force). The International Labour Organization (ILO), set guidelines to declare an unemployed individual as someone who is 'not working, currently available for work and seeking for a job³. The concept of open unemployment, which

² . Politically, the recent Arab revolts that the world witnesses in Egypt, Tunisia, Syria, Libya, and Bahrain, to mention a few, a revolt that is caused by unemployment (Mouhammed, 2011:100).

³ ILO introduced modifications with regard to active job search requirement which has limited relevance where the labor market is largely unorganized or of limited scope, where labor absorption is at the same time inadequate, or where the labor force is largely self-employed. Since Ethiopian labor

probably is the most common indicator of unemployment, is fairly simple to define: a person is unemployed if he/she has not worked during a certain period of time, but has actively sought employment.

Although unemployment seems a universal problem; it is nowhere as threatening as it is in the developing world. Ethiopia is a typical case of the developing world that has failed to make effective use of its labour force. Ethiopia is the lowest urbanized country in the world compared to world average (50%), Asia and Africa (40%). Only 16.1% of the Ethiopian population live in urban area (CSA, 2007:19), but it is a country where there is rapid urbanization growing at 4.2% per annum which is higher compared to average urban growth rate for Africa (3.2%), Asia (2.4%), Latin America (1.7%) and 2.8% for Arab States (UN, 2011:12). It is also higher compared to national population growth rate of 2.6%. One shouldn't be confused, however, that low percentage of urban population in Ethiopia here meant fewer problems. With the second largest population in Africa and low percentage of the urban population share, the number of urban population in Ethiopia is still high, i.e., more than 13 million people, which represents a number far beyond the countries capacity to serve, employ, provide house, entertain, etc.

Based on Ethiopian Urban Employment/Unemployment Survey (EUEUS) conducted by CSA, though there is a declining trend, urban labour market of Ethiopia is still characterised by high unemployment rate (26.2 % in 2003 and 18% in 2011). Millions of able-bodied people who are able to accept jobs at the prevailing wage rate are unable to find job. Unemployment difference between rural (2.6%) and urban (20.6%) areas in Ethiopia is also striking (CSA, 2005:272). Rural area labour markets are characterised by disguised unemployment (most people in rural areas consider themselves as employed as long as they do some work in the fields for some time) while urban labour markets are characterised by open unemployment (a person is unemployed if he/she has not worked during a certain period of time, but has actively sought employment). Moreover, increasing urbanization implies that unemployment problem will be more serious in urban areas in the future and that the focus should be on urban labour markets.

market fits this description, CSA didn't use the active job search requirement in the construction of unemployment rates (CSA, 2003:43). Thus the CSA definition is used in this study.

Even though urban unemployment is the major problem in all regions of Ethiopia, there is an observed disparity in level of unemployment among regions. It ranges from 7.7% in Gambella region to 25.1% in Addis Ababa (CSA, 2011:206). The disparity is also observed among major regions; Amhara (19.5%), Oromia (14.3%), Tigray (18.4%) and SNNP (11.9%) which have almost similar demographic characteristics. Even the problem is currently increasing in some regions like Amhara while decreasing in others (CSA, 2011:206). The issue of observed regional unemployment disparities within a country is the main motive to pursue the research on this area. If the observed wide disparities continue for long, it may have adverse social effect which may distort social cohesion and lead to a regional division within the country. Besides, the observed unemployment differentials imply inefficiency in the economy as a whole and might affect both aggregate unemployment and national output which requires thorough examination. Though some problems of urban economies (poverty and youth unemployment) have been explored in the literature, no effort to date has been brought into effect which addresses regional urban unemployment discrepancy in Ethiopia. This study is intended to fill this gap.

The aim of the paper is to analyze the sources of regional urban unemployment disparities in Ethiopia. This paper uses 2003-2011 with a gap of 2008 panel data of Ethiopia's 11 regions to examine and test the source that may cause the disparities in the regional unemployment rates in Ethiopia. The study focuses mainly on the time period 2003-2011, due to unavailability of regional labour market data before that period. This study is unique on at least two important grounds. First, there are very few previous studies investigating issues of regional urban unemployment disparity in the context of a developing country, and none in the case of Ethiopia. Second, this study uses a unique panel data, the Ethiopian Urban Employment/Unemployment Survey, which has rarely been used previously.

The paper is organized as follows: Section 2 lays out the theoretical literatures on unemployment disparities followed by a review of previous studies particularly empirical literatures related to the regional unemployment disparities. In Section 3 the methodology i.e. empirical model specification, data and the estimation method are discussed. Section 4 contains both descriptions of existing states of regional

labour market and econometric results and discussions. Conclusions and recommendations are shown in Section 5.

2. Literature Review

2.1 Theoretical Literature Review

2.1.1 Why Unemployment Rates Differ Spatially?

Various theoretical models have explained the existence of regional disparities in the unemployment rate (Marston, 1985:79, Blanchard et al., 1992:61, Decressin and Fatás, 1995:1655, Elhorst, 2003:709). As stated by Marston (1985:79). There are two conceptually different views explaining why the unemployment rate varies from one area to another: the equilibrium view and the disequilibrium view. According to the first view, each region tends to its own equilibrium unemployment rate, which is determined by the influence of three elements. First, higher unemployment rate in some regions may be explained by existence of demand-side determinants (sectoral composition of the regional production). Second, it may be explained by supply-side factors (in labor and firm mobility, in housing supply, in family and social ties, in the regional amenities, etc). Lastly, institutional factors, such as unemployment benefit schemes, the degree of wage bargain centralization and coordination, legislation on minimum wages, union power, etc. Given that all of these sources of regional disparities in the unemployment rates vary slowly through time, the disparities themselves would tend to remain roughly constant. This is the reason why they are considered as equilibrium phenomena (Bande *et.al.* 2005: 2-3).

A second approach to explain the existence of regional disparities in the unemployment rates is based on the idea of a disequilibrium phenomenon. According to this view, given enough time, all of the regions would tend to “pure” competitive equilibrium outcome, but the adjustment mechanisms in the regional labor markets are so slow or weak, such that adverse shocks are not fully absorbed. This would imply that regional unemployment rates are permanently away from their equilibrium position. The slow adjustment mechanism generates an increasing dispersion, characterized by diverging regional unemployment rates, (Overman and Puga, 2002:115). In the disequilibrium explanation, economic and social barriers may separate regional labour markets. If these barriers do not allow labor to move,

then weak labour demand in one region will raise the unemployment rate above the level in regions with strong labour demand.

In summary, the disequilibrium view states that regional differences in unemployment reflect the slow operation of equilibrating mechanisms due to economic and social barriers, whereas the equilibrium view states that regional differences in unemployment endure due to amenities and/or disamenities. The equilibrium-disequilibrium factors are used in this study to analyze the differentials of urban unemployment rates among regions of Ethiopia. Since Ethiopia is a federal country and regional demarcation is based on language, interregional migration (labour mobility) in Ethiopia is challenged by language difference. Religious and cultural reasons also played their own role in interregional labour mobility in Ethiopia (Berhanu *et al.* 2005:33). Hence, the wide unemployment differentials may imply deficiency in creating labour demand, and then weak labour demand in one region will raise the unemployment rate above the level in areas with strong labour demand among regions. Thus, the disequilibrium unemployment theory could explain regional unemployment disparity in Ethiopia. On the other hand, there is difference in industry structure among regions of Ethiopia, which may give credence to equilibrium view not to be discarded in explaining regional unemployment disparity in Ethiopia.

2.2 Empirical Literature Review

Unemployment disparities are mostly interpreted as a result of limited interregional labour mobility or of differences in regional amenities. Many studies have analyzed disparities in regional unemployment rates for different countries (e.g., Molho 1995:658, Lopez-Bazo *et al.* 2002:327, Overman and Puga 2002:147, Niebuhr 2003:9, Patacchini and Zenou 2007:169, Cracolici *et al.* 2007:670). In these studies, regional unemployment is related to local area characteristics, personal attributes of local population, local demand variables, and attributes of neighbouring regions to take into account the spatial interaction among regions. These empirical studies have brought to light some interesting facts; (i) there are important spatial inequalities in unemployment rates within countries (e.g. UK, Spain, Italy, France, Germany, and Turkey) and between countries, (ii) within country unemployment

differences are more pronounced than between countries inequalities, (iii) these differences are highly persistent over time, and (iv) adjacent regions tend to have similar unemployment rates than to regions located far away, that is unemployment observed at one point in space is dependent on values observed at other locations.

Concerning disparity of regional relative unemployment, a recent analysis of Lopez *et al.* (2005:305-315) showed a clear evidence of disparities of unemployment in Spain; the authors assess spatial differences of unemployment considering equilibrium and disequilibrium explanation factors. They showed that spatial unemployment disparities across Spanish provinces are mainly caused by equilibrium component (share of agriculture, manufacturing, service, construction, energy and labour cost) while disequilibrium variables only have a limited effect on the behaviour of clusters of provinces characterized by low or high unemployment rates. On the other hand, Cracolizzi *et al.* (2007:14) in their cross-sectional analysis of provincial (regional) unemployment differential in Italy using spatial econometrics model (spatial lag model) for 103 Italian provinces and for the years 1998 and 2003 found that the regional differences in unemployment are strictly related to disequilibrium factors (employment growth) rather than to equilibrium variables and their finding leads them to the conclusion that the differentials of unemployment which have characterized the Italian labour market are mainly due to the labour demand.

Chuang and Lai (2008:62) using Taiwan's 23 regions panel data pertaining to the 1995-2004 period, analyzed the deviations in regional unemployment rates by panel AR(1) methodology. According to the study, both equilibrium and disequilibrium factors are important sources affecting the discrepancy in Taiwan's regional unemployment rate. Disequilibrium factors include demographic structure, family background, house ownership and labour migration. Similarly Galiani *et al.* (2005:391-392) in their investigation of persistence and regional disparities in unemployment using 22 Argentinean regions for the time periods 1980-1997 with GMM methodology, found that the differences in the regional domestic gross product per capita are quite important in explaining the changes in regional unemployment. Though the economy suffered huge aggregate shocks that moved local unemployment rates together substantially, the fact that the regional unemployment structure has changed dramatically proves that regional

determinants of unemployment have played a significant role. They also found that the industry mix, the labor force participation rate are important factors in explaining the changes in regional unemployment.

There are few studies in developing countries (e.g., Escobar (2011:1-2) for Colombia, Galiani *et al.* (2005:375) for Argentina, Trendle (2002:327) for Queensland). In these studies differences across regions in labor demand, immigration, sector specialization, educational attainment, labor force participation, urbanization, Family characteristics, labor composition and population density are factors behind observed regional unemployment disparities.

Even though there are no empirical studies which addressed regional urban unemployment disparity in Ethiopia, there are just a few studies on the nature of urban unemployment(youth) in Ethiopia (e.g. Getnet (2003:16), Serneels (2004:35), Berhanu *et al.* (2005:32-34), World Bank (2007:57-58). The findings of these studies show that youth and women are less well off compared to their counterparts of elder and men respectively. The education and training system in Ethiopia is supply driven.

3. Methodology

3.1 Specification of the Empirical Model

The point of departure for the empirical analysis of regional unemployment is a reduced form model i.e. $u_{it} = f(LS, LD, W)$ where, u_{it} is unemployment rate in region i at time t , LS is factors of labour supply, LD is labour demand, and W is wage-setting. In the model, the unemployment rate eventually depends on factors of labour supply (a collection of factors which affect natural changes in the labour force), labour demand, and wage-setting. Wage setting factors to be factors of regional unemployment, requires the assumption of significant interregional variation in the structure of wage determination Elhorst (2003:14). Besides unavailability of data on wages at regional level in Ethiopia, it is not expected that there is significant interregional variation in the structure of wage determination in regions of Ethiopia. Thus, wage setting is not used as a factor in this study. According to Escobar (2011:7), in general terms unemployment rate is a function of factors

that affect labour demand and supply. Empirical researches have proposed a number of variables for the explanation of regional unemployment differentials. According to Trendle (2004:8), the variables that have been found significant in explaining regional variation in unemployment rates can be classified into four categories, namely; non-demographic labour market variables (LABOUR), industry or product market variables (IND), demographic variables (DEMOG) and regional factor endowments (REGION). Thus, the rate of unemployment for the i^{th} region at time t can be written as;

$$u_{it} = \beta_0 + \beta_1 \text{LABOUR}_{it} + \beta_2 \text{INDU}_{it} + \beta_3 \text{DEMOG}_{it} + \beta_4 \text{REGION}_{it} + \varepsilon_{it}. \quad (1)$$

Where, u_{it} is unemployment rate in region i at time t , β_0 is the constant term, the subscript i refers to the region and t refers to time and ε_{it} is an error term. The dependent variable in this study is regional urban unemployment rate. The variables that are used in this study to proxy the above broad categories are; self employment as a percentage of total labour force (SELF_{it}), employment by government as a percentage of labour force (GOVT_{it}), employment by private investment as a percentage of total labour force (PRIV_{it}) and Economic participation rate (PARTI) are non-demographic labour market variables. Employment share of agriculture (AGRI) and manufacturing sector (MANU_{it}), defined as a share of each sector from the total employment are industry variables. From demographic variables four categories of education level of the population, namely; percentage of working age population who are illiterate (ILLITERATE), primary education completed (PRIM), secondary education completed (SECON) including certificate and technical and vocational education and diploma and above education (HIGHER) are used as educational variables. Urbanization rate (URBAN) is also demographic variable which is an indicator of labour supply. Other demographic variables are age structure of the labour force; the proportion of the 15-29 ages (YOUTH) and age of 55 and above (OLD) and labour force comprised of females (FEM). Population density (DENS) is used as regional endowment variable.

Outcome Variable: - In this study the CSA definition that an unemployed individual is someone who is not working and currently available for work during the reference week used by the survey (current status approach) is used. The dependent variable

in this study, U_{it} is the percentage of regional unemployed individuals over regional labour force (economically active population) with the age of 15 years and over. The selection of explanatory variables is based on availability of data and the existing evidence of the factors affecting regional unemployment.

I. Non-demographic labour market variables (LABOUR). A primary factor determining urban unemployment variation between regions is labour demand of a region. According to Elhorst (2003:33), from the three main determinants of the regional unemployment rate (labour supply, labour demand and wage setting), the labour demand factors have received the least attention in applied research. It is quite common to relate the regional unemployment rate to employment growth variable, without explaining by which mechanism employment growth itself is generated and which type of employment growth is more determining. Thus, instead of using a general employment growth variable, decomposing employment into different types gives more sound. In our country case majority of labour force are self employed which are used as a proxy for jobs created by micro and small enterprises (MSE) since the main policy both at national and regional level for employment growth (reducing urban unemployment) is promoting micro and small enterprises (MSE). Employment by private sector (investment) and government still had significant contribution in employment growth. Hence in this study labour demand is decomposed in to self employment, government employment and private sector (investment) employment as a percentage of regional labour force which are disequilibrium variables. Participation rate (PARTI) incorporates the labour supply side effect on regional unemployment disparity. From the accounting identity, higher participation rate means higher labour supply which intern leads to higher unemployment.

II. Industry mix (INDU). It is often argued that one of the main causes of regional unemployment disparities is the location of declining or growing industries in particular regions (Elhorst, 2003:25). It is believed that regions specializing in declining industries (agriculture) are expected to exhibit higher unemployment rates than those based around growing activities (manufacturing) because, employment multiplier of one job in manufacturing is larger than multiplier of one job in

agriculture. Thus, share of employment in agriculture (AGRI), and manufacturing (MANU) are used as equilibrium factors (Korobilis and Gilmartin, n.d:5-6).

III. Demographic variables (DEMOG). In this study educational variables are used as disequilibrium variables by the assumption that educated workers are more likely to migrate in response to economic opportunities. Workers with higher education levels may also be better informed about job possibilities elsewhere. In this study four categories of educational variables are used to capture educational attainment of regional urban working age population, namely; percentage of working age population who are illiterate (ILLITERATE), primary education completed (PRIMARY), secondary education completed (SECON) including certificate and technical and vocational education and diploma and above (HIGHER). Many studies evaluated the effect of education on unemployment rates and they found inverse relation to the unemployment rate through a composition effect, through its positive influence on labour demand, and because skilled individuals are geographically more mobile (Mincer, 1991:8-13). But education opportunities can only make a true contribution in reducing unemployment when economic circumstances improve simultaneously. If the economy is unable to absorb the growing labour force, education may have positive effect on unemployment. Urbanization rate (URBAN) is also labour supply variable, which determines the growth rate of urban population including natural change and migration (Aragon *et al.*, 2003:162). Rapid urbanization rate (accelerated growth of urban population) through natural population growth and rural urban migration which may affect the supply side through a high and rapid increase in labour force and may lead to high unemployment among regions of Ethiopia.

Age structure of the regional labour force (disequilibrium factors) may have important influence on regional unemployment rate (Elhorst, 2003:16 and Chuang and Lai 2008:63). In this study, two categories of age structure of the regional labour force are used i.e.; percentage of the young working age population, aged between 15 and 29 years (YOUTH) and the share of senior labour force with age of 55 and above (OLD). The unemployment rate of young has been relatively very high in many countries and different time periods. In this respect, Ethiopia is not an exception. On the other hand, the unemployment rate of old has been relatively low in many

different countries and time periods as opposed to young population and in Ethiopia this is again not an exception.

The gender variable is also used as disequilibrium factor. In this study gender variable is captured by the percentage of females (FEM) in the labor force of a region. Women in general have less favourable prospects in the labour market since they often combine work with family duties and childcare and spend much more time on household work. Thus, regions with a larger share of women tend to have a higher unemployment rate. On the other hand, unemployed men tend to spend much more time on social activities, and also on looking for work. Male workers usually bear the major responsibility for their families and also tend to choose and consider jobs from a career development perspective. Hence, they are more motivated and active in finding a job or more reluctant to quit a job. Thus, the higher the percentage of males in the regional labor force, the lower the regional unemployment rate will be (Chuang and Lai 2008:57).

IV. Regional factor endowments (REGION). In this study, population density defined as number of people per square kilometre, is equilibrium variable as an indicator for regional amenities. Regions with high population density are expected to have better amenity and people may not leave that region or people come to that region to compensate better amenity which results in higher unemployment (Neibur, 2003:7). Unemployment differentials across regions might persist if there are differences in amenities. Thus one would expect higher unemployment in an area with a more pleasant climate, or more cultural activity, or a better infrastructure (Aragon *et al.* 2003:161).

In view of the above presented discussions, a regional unemployment rate equation is estimated using unbalanced panel data for nine regions and two cities administrative of Ethiopia⁴ (Addis Ababa and Dire Dawa) over period 2003-2011 with year break. Specifically, the following model was considered:

⁴ Regions of Ethiopia are Tigray, Afar, Amhara, Oromia, Somali, Benishangul-Gumuz, South nations nationalities and peoples region, Gambela, Harari, Addis Ababa City administration and Dire dawa city administration.

$$U_{it} = \beta_1 SELF_{it} + \beta_2 GOVT_{it} + \beta_3 PRIV_{it} + \beta_4 AGR_{it} + \beta_5 MANU_{it} + \beta_6 ILLITRATE_{it} + \beta_7 PRIM_{it} + \beta_8 SECON_{it} + \beta_9 HIGHER_{it} + \beta_{10} PARTI_{it} + \beta_{11} URBAN_{it} + \beta_{12} YOUTH_{it} + \beta_{13} OLD_{it} + \beta_{14} FEM_{it} + \beta_{15} DENS_{it} + \alpha_i + \epsilon_{it} \quad (2)$$

The subscript *i* refer to regions and *t* time α_i is region specific effect and ϵ_{it} is the error term. The reason for inclusion of region specific effect (α_i) is that geographic conditions (location of regions) which are unobserved and constant overtime may have effect on regional unemployment rate.

In recent years, there is a growing interest in the spatial association of regional unemployment and spatial factors are explicitly accounted for in regional unemployment studies (Nierbuhr, 2003:16). Specification of equation (2) ignores spatial effects that unemployment rate of a specific region may have effects on neighbouring regions. In the presence of spatial correlation and ignoring the spatial effect from the model may make the results from non spatial model (equation 2) biased and inconsistent. Thus, testing for cross-sectional dependence (spatial correlations) is important in estimating panel data models. If there is significant spatial dependence the results from the linear estimation of equation (2) are invalid and no comments are provided for the parameter estimates and there may be a need to re-specify the regression equation to be able to capture spatial effects as follows;

$$U_{it} = \beta_1 SELF_{it} + \beta_2 GOVT_{it} + \beta_3 PRIV_{it} + \beta_4 AGR_{it} + \beta_5 MANU_{it} + \beta_6 ILLITRATE_{it} + \beta_7 PRIM_{it} + \beta_8 SECON_{it} + \beta_9 HIGHER_{it} + \beta_{10} PARTI_{it} + \beta_{11} URBAN_{it} + \beta_{12} YOUTH_{it} + \beta_{13} OLD_{it} + \beta_{14} FEM_{it} + \beta_{15} DENS_{it} + \beta_{16} (SU_{it}) \alpha_i + \epsilon_{it} \quad (3)$$

The regressor (SU_{it}) captures spatial effects, usually captured by the spatially lagged dependent variable. This specification implies that, regional unemployment not only affects the respective labour market, but instead they spill over to neighbouring regions. It can be simplified by using a spatial weighted matrix *W*. The weighted matrix is used based on the contiguity matrix, with the elements (*i, j*) set to 1 if *i* and *j* are neighbours and 0 otherwise. Although other matrices such as distance matrix could be used, the contiguity matrix is the most appropriate to describe the spatial interactions of labour markets in Ethiopian region since the statistical units are regional states and urban areas of regional states are located in different areas

which are not single points. It will be obtained by specifying for each region i (as the row) the neighbours as the columns corresponding to non-zero elements in a fixed (non-stochastic) and positive N by N spatial weights matrix W . Formally, a spatial lag for u_i at j is then expressed as:

$$u_{it} = \sum_{j=1}^n w_{ij} u_{jt}$$

Where U_{it} is an N by 1 vector of observations (regions). The neighbouring set (S_r) is defined as the set of regions that share a common boundary. Since for each i the matrix elements W_{ij} are only non-zero for those $j \in S_r$ and only the matching U_j are included in the lag. By convention the matrix always has zero on the main diagonal because i is not treated as neighbour of itself ($j \neq i$) and the transformation often used in applied work is to convert the matrix W to have row sum of unity, $\sum_{j=1}^N w_{ij} = 1$,

Thus the model which pertains to spatial correlation by incorporating the dependent variable observed at other neighbouring regions will be used and therefore the model takes the form

$$u_{it} = x_{it} \beta + \delta \sum_{j=1}^N W_{ij} u_{jt} + \alpha_i + \varepsilon_{it} \dots \quad (4)$$

In the above equation unemployment rate is modelled as a function of the spatial lag of the dependent variable, $\delta \sum_{j=1}^N w_{ij} u_{jt}$ which captures spatial effects working through the dependent variable, w_{ji} is contiguity weight matrix, δ is the spatial coefficient indicating the degree to which the dependent variable at location i , is influenced by the values of u_{ji} in neighbouring regions (degree of spatial dependence inherent in the data). It is also used as the measure of the average influence of unemployment rates in neighbouring regions on the unemployment rate in regions of interest. $X\beta$ is matrix of explanatory variables in equation (2).

3.2 Data: Types, Sources and Measurements

The type of data used in this study are secondary data and the main data source for the analysis was urban employment/unemployment survey (UEUS) for the year 2003, 2004, 2006, 2009, 2010 and 2011, labour force survey (2005) and population

and housing census 1994 and 2007 by Central Statistics Agency (CSA) of Ethiopia. Data for the year 2008 for all regions and 2004 for Gambella region is not available that is why the data set becomes unbalanced panel data.

CSA defines unemployment rate as percentage of unemployed individual with the age of 10 and above over the working age population. But ILO minimum age convention, No. 138, (1973:709-710) declared that the minimum age that an individual to be considered as unemployed shall not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years. Thus the ILO definition is used in this study and own calculations are applied to change the data based on available secondary data. All data of variables are transformed to percentages (log levels) except population density and urbanization rate which are in value level and growth rate respectively. The reason for the transformation of data into log levels is just for interpretation simplicity. Except three zones of Afar and six zones of Somali regions, where the residents are pastoralists, all urban centers of the country were considered in urban employment/unemployment survey. Urban centres selected and incorporated into the survey ranges from 99 in 2003 to 102 in 2011, enumeration areas ranges from 527 in 2003 to 660 in 2011 and the total number of interviewed household's ranges from 15580 in 2003 to 19786 in 2011.

3.3 Method of Data Analysis

In this study both descriptive and econometric panel data analysis techniques are employed. The unit of analysis are regional states. The main trends, patterns and existing state of unemployment at national and regional levels have been described following a comparison approach. The starting point for econometric analysis was running a Hausman test to choose the appropriate model, fixed or random effect. The crucial distinction between fixed and random effects is whether the unobserved regional effect (for example geographic conditions of regional states) embodies elements that are correlated with the regressors in the model. If geographic conditions of regions which are unobserved and constant overtime, correlate with one or more of the covariates, fixed effect model is used. In equation (2), if the unobserved heterogeneity (α_i) correlate with included explanatory variables then, the estimated parameters of the random effect model will be biased as a result of

omitted variables problem. On the contrary, if α_i is uncorrelated with one or more explanatory variables, using the random effect model will be more efficient than using the fixed effect model. To verify the appropriate model, Hausman test for random effect model or fixed effect model is used. Statistically significant difference between fixed effect and random effect is interpreted as evidence against the random effects.

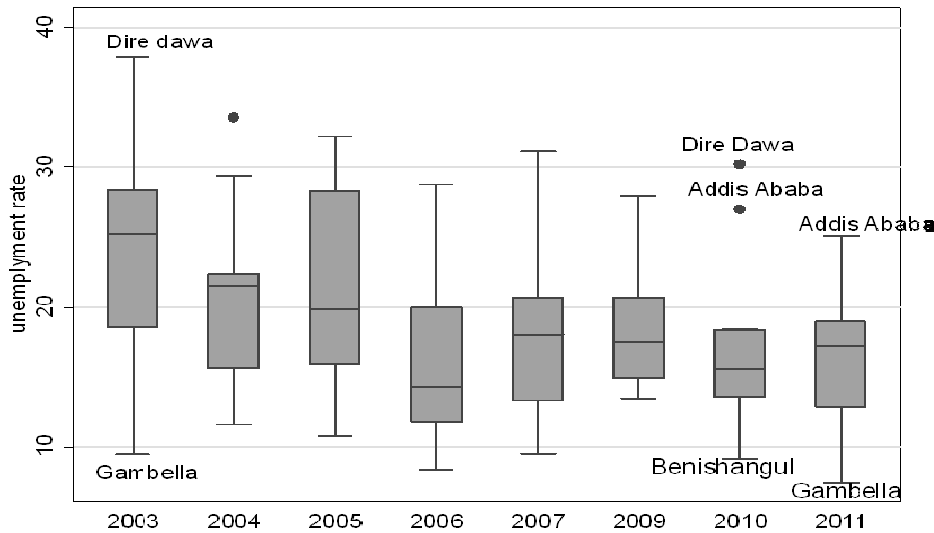
Testing for spatial correlations is important in estimating panel data models. Unemployment of a specific region may have effects on neighbouring regions (spatial correlations). There are three popular tests designed to test for cross-sectional dependence (spatial dependence) large cross sectional units and small time panels and can also be used with balanced and unbalanced panels, namely, Pesaran's test of cross sectional independence, Friedman's test of cross sectional independence and Frees' test of cross sectional independence. These tests can indicate the existence of sizable spatial dependence. If these tests do not show spatial dependence equation (2) can be estimated without considering spatial effects. If there is significant spatial dependence the results from the linear estimation of equation (2) are invalid and no comments are provided for the parameter estimates and there may be a need to estimate equation (3) which explicitly accounts spatial effects. The other problem that expected is serial correlation. Depending on the adjustment process, in general, some fraction of the last period's unemployment may persist into the present. In any case, as the unemployment rates at different periods may be correlated, this renders a series correlation among the disturbance terms. Serial correlation causes the standard errors of the coefficients to be smaller than they actually are which make regression coefficients inefficient. Moreover, Wooldridge test for autocorrelation in panel data can indicate the existence of sizable serial correlations, with the null hypothesis, H_0 : no first order autocorrelation. If the null hypothesis of no first order autocorrelation from Wooldridge test in panel data is rejected, then first order autoregressive (AR1) corrected panel data analysis can be used in the estimation. In the case of serial correlation, the most common method of autocorrelated error structure is AR1 (Chuang and Lai, 2008:53). AR (1) fits a linear regression that is corrected for first-order serially correlated residuals. Thus, the fixed/random effects model can be estimated with an autocorrelated error structure, AR1 adjusted to autocorrelation. Since the data set is panel and the year break is for the whole regions the year break wouldn't have an impact on the result.

4. Result and Discussions

4.1 Description of Existing State of Regional Labour Markets: Some Stylized Facts

Urban unemployment in Ethiopia has a volatile trend for the last nine years (2003-2011). Though it declined from 26.2% in 2003 to 18% in 2011, urban labor market of Ethiopia is still characterized by high unemployment rate. One out of five able-bodied people who is able to accept jobs at the prevailing wage rate is unable to find a job. Aside from high aggregate unemployment rate, the regional urban unemployment rate in Ethiopia shows various discrepancies. The information about regional urban unemployment rates supplied in the Figure 1 shows a significantly different picture of regional labour market performance. The highest unemployment rate in 2003 was in Dire Dawa City (37.89%) and in 2011 it is still the highest (23.44%) next to Addis Ababa. In 2011, Addis Ababa had the highest (25.07%) unemployment rate which was also the highest in 2003 next to Dire Dawa. The lowest urban unemployment rate is in Gambella (9.46%) in 2003 and (7.46%) in 2011, a difference of more than three-fold, confirms that a great discrepancy does exist among Ethiopia's regions.

Figure 10: Box plot of Ethiopian regions urban unemployment variations by year (2003-2011)



Though there is variation in urban unemployment rate among the regions of Ethiopia, the variation itself has a declining trend between 2003 and 2011. The information about the trends of regional urban unemployment rates supplied in Table 1 also indicates a significantly different picture of regional labour market performance. City administrations (Addis Ababa and Dire Dawa) have high unemployment rate followed by northern regions (Tigray, Amhara and Afar) while western regions (Gambella and Benishangul Gumuz) have low unemployment rate.

Table 1: Trends in urban unemployment by regions (%)

Regions	Year								Change (2011- 2003)
	2003	2004	2005	2006	2007	2009	2010	2011	
Tigray	29.17	22.29	18.46	13.71	22.26	20.97	18.31	18.43	-10.74
Afar	27.53	15.69	19.12	17.21	18.38	14.17	13.30	17.20	-10.33
Amhara	21.54	19.13	16.58	10.73	14.05	15.70	16.08	19.54	-2.00
Oromia	24.24	21.48	15.15	13.45	13.64	19.07	16.38	14.39	-9.85
Somali	17.62	17.96	29.56	24.32	18.79	19.83	13.87	17.30	-0.31
Benishangul	15.32	11.63	10.76	8.38	9.50	13.47	9.16	9.28	-6.05
SNNPR	19.50	14.29	15.34	12.23	12.72	15.42	14.54	11.98	-7.52
Gambella	9.48	N.A	25.56	11.45	12.98	15.92	12.90	7.46	-2.02
Harari	27.25	22.34	27.00	14.87	19.05	14.34	15.16	13.80	-13.44
Addis Ababa	32.26	29.41	31.64	28.75	22.29	27.98	27.02	25.08	-7.18
Dire Dawa	37.90	33.56	32.21	22.81	31.11	27.87	30.21	23.44	-14.45
Country	26.20	22.20	20.60	16.70	17.60	20.40	18.70	17.90	-8.30

Source: Own calculations from CSA data.

The negative sign of the last column of Table 1 indicates the amount of decline in urban unemployment by regions between 2003 and 2011. As shown in Figure 2, there is a significant reduction of urban unemployment in most regions. Between the year 2003 and 2011 Dire Dawa, Harari, Tigray, Afar and Oromia are regions where significant reduction in urban unemployment have been registered while the reductions in Somali, Amhara and Gambella regions are low (insignificant). The trend in Amhara region is increasing from 2006 onwards unlike other regions.

Figure 11: Trends in urban unemployment by regions, 2003-2011(%)

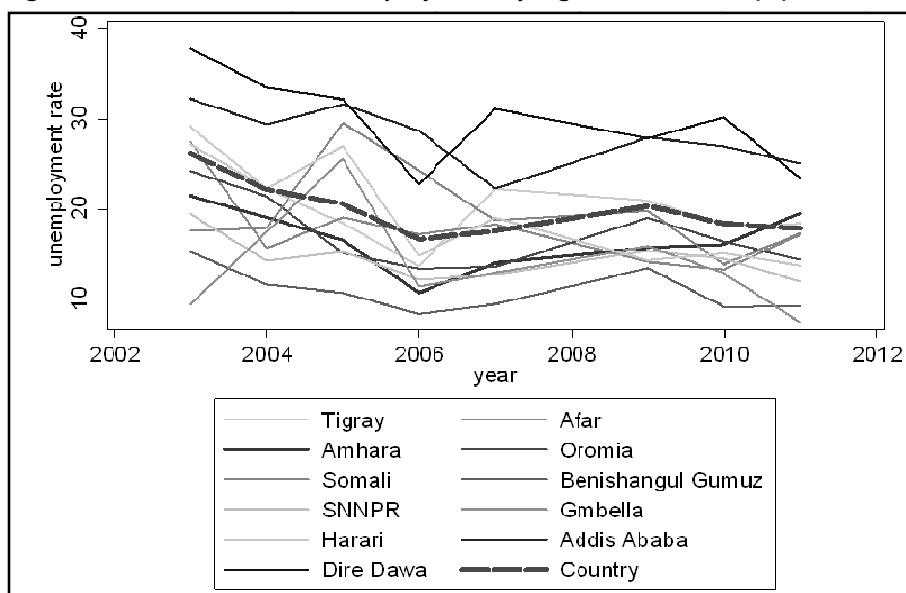


Table 2 depicts Spearman's rank correlation coefficients of the unemployment rates over time among Ethiopia's 11 regions. The Spearman's rank correlation coefficients indicate a high rank correlation between years; for example, the rank correlation coefficient in this research period between 2003 and 2011 is 0.69 which is significant. The results of Spearman's rank correlation may imply that a persistent trend exists among Ethiopia's regional urban unemployment rates, whereby regions with a high unemployment rate stay high and regions with a low unemployment rate stay low.

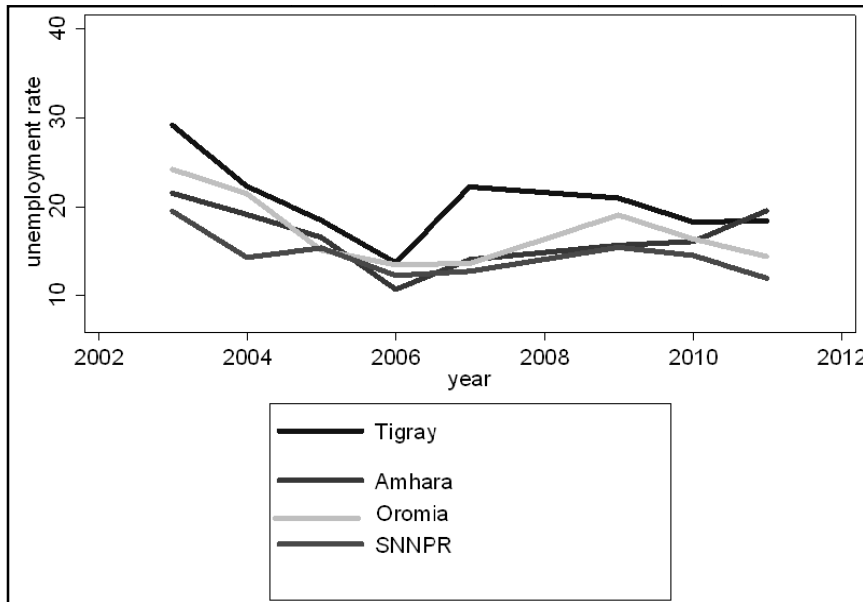
Table 2: Correlations of Ethiopia's regional urban unemployment rates over time

	2003	2004	2005	2006	2007	2009	2010	2011
2003	1.0000							
2004	0.8303*	1.0000						
2005	0.6606*	0.7091*	1.0000					
2006	0.5879	0.5879	0.9030*	1.0000				
2007	0.8424*	0.8788*	0.9030*	0.7939*	1.0000			
2009	0.6121	0.7455*	0.6242	0.6242	0.7455*	1.0000		
2010	0.7818*	0.8909*	0.4909	0.3818	0.7212*	0.8545*	1.0000	
2011	0.6970*	0.7091*	0.7091*	0.6121	0.7818*	0.8303*	0.7455*	1.0000

Note. * indicates significance at 5%

Urban unemployment discrepancy is observed not only among city administrations and developing regions but there is observed discrepancy between major regions which have more or less similar demographic characteristics. Figure 3 shows the annual unemployment rate trend of Ethiopia’s major regions. Among the four major regions (Tigray, Amhara, Oromia and SNNPR) in 2003 Tigray region had the highest unemployment rate (29.16%) and SNNPR had the lowest but in 2011 Amhara region (19.5%) is a leader and SNNPR is still the lowest (11.98%). Between the year 2003 and 2011, urban unemployment in Oromia region decreases from 24.24% to 14.39% (a decline by 9.85%), in Tigray from 29.17% to 18.43% (a decline by 10.74%), in SNNPR from 19.5% to 11.98% (a decline by 7.752%) while a decline of only 2% (from 21.5% to 19.5%) is observed in Amhara region, which is the lowest and even the current trend is increasing in Amhara region unlike other major regions.

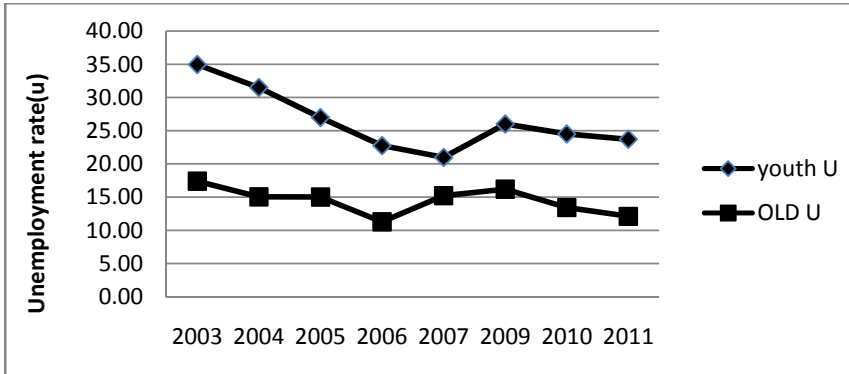
Figure 12: Trends of urban unemployment rate by major regions (%)



Youth comprises those persons aged 15 - 29 years. As part of the society, youths are more vulnerable to the problem of unemployment. As indicated in the Figure 4 below, the youth unemployment rate in urban Ethiopia is systematically higher than the elder. The lack of employment is more serious for them than any group of the population in urban areas of the country. In 2003, youth unemployment rate was

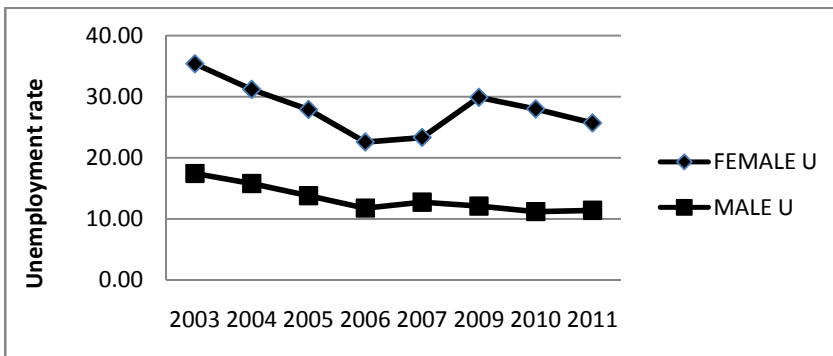
found 34.96 percent, compared to 17.39 percent among old (55 and above). However, the youth unemployment rate declined after four years to 20.97 percent in 2007 and increased to 26 percent in 2009 and again it dropped to 23.7 percent 2011. Unemployment rate among the old also declined after three years to 11.27 percent in 2006 and increased to 16.19 percent in 2009 and again it dropped to 12.10 percent 2011.

Figure 13: Trends in urban unemployment rate by age group



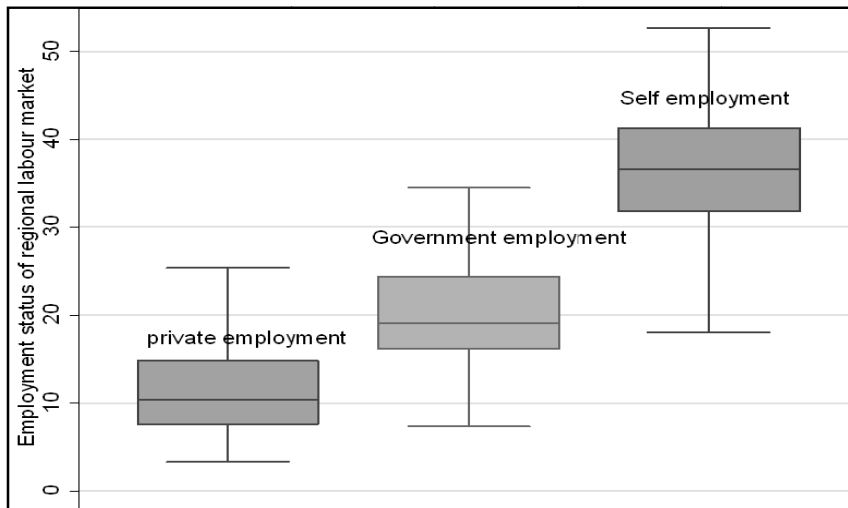
With regard to sex, women face higher level of unemployment compared to their male counterparts. In 2003, unemployment rate among women was 35.39 per cent, compared to 17.43 per cent among men. The unemployment rate of female declined from 35.39 percent in 2003 to 25.7 percent in 2011. The corresponding male unemployment rate also shows a downward trend from 17.43 percent in 2003 to 11.4 percent in 2011.

Figure 14: Trends of urban unemployment rate by sex



Regarding employment status of urban labour force of Ethiopia, self employment, government employment and private employment together constitute more than 75% of the labour force. Majority of Ethiopian urban labour force are self employed followed by government employment and private employment respectively.

Figure 15: Box plot of employment status of regional labour force



In poor countries like Ethiopia where there is low pace of private investment which can absorb the growing labour force, promotion of self employment is more essential in easing the high level of unemployment because, self employment is particularly essential to capital-constrained developing economies such as Ethiopia. In reducing urban unemployment Ethiopian government main policy issue is promoting micro and small enterprises. Regional self employment data has taken as a proxy for jobs created by micro and small enterprises since there is no well documented data for the number of jobs created by micro and small enterprises at regional level. On average more than 36% of the labour force are self employed for the period 2003-2011, which may indicate that micro and small enterprises are playing a key in creating jobs for urban residents. The high proportion of self employment may be due to lack of opportunities elsewhere (formal sector jobs are inadequate), or it may also indicate a lack of jobs in a primary sector. In other words, it could be an indicator of the fact that many of the labour forces in regions of Ethiopia are engaged in informal sector. For example in 2011, 36.5% of the employed individuals are engaged in informal sector.

Table 3: Self employment Trends as a percentage of labour force (%) by regions

Regions	Year								Average
	2003	2004	2005	2006	2007	2009	2010	2011	
Tigray	32.70	38.56	33.15	43.86	46.43	30.45	32.52	31.84	36.19
Afar	26.89	30.27	31.10	32.43	37.73	35.82	33.31	33.32	32.61
Amhara	36.48	36.39	38.44	43.96	50.36	36.66	36.00	36.93	39.40
Oromia	34.73	37.71	42.20	38.08	49.41	34.38	34.23	37.14	38.49
Somali	49.13	44.09	40.27	43.11	51.97	40.95	42.59	40.12	44.03
Benishangul	36.49	39.38	40.30	42.36	43.65	40.18	41.86	42.70	40.86
SNNPR	37.53	42.63	38.75	41.22	46.80	38.38	36.24	37.67	39.90
Gambella	48.29		24.09	37.82	44.76	38.64	41.96	37.72	39.04
Harari	34.62	33.37	28.26	39.07	34.55	35.23	33.13	32.13	33.79
Addis Ababa	22.72	20.30	18.08	20.37	22.88	19.70	20.37	20.04	20.56
Dire Dawa	25.13	28.05	28.11	30.20	52.68	27.30	26.87	30.09	31.05

Source: Own calculations from CSA data.

Next to self employment, public sector (government employment) continues to account for the bulk of regional urban formal employment in Ethiopia. On average (20%) of urban labour force are employed by government for the period 2003-2011. As shown below in Table 4, developing regions such as Afar, Benishangul and Gambella have high share of government employment while Addis Ababa and Dire Dawa have low share. The variation may be due to the significant expansion of the civil service offices driven by decentralization (establishment of government offices at regional, district and lower tiers), meaning that there is employment growth at regional and local levels particularly in developing regions.

Table 4: Trends in government Employment as a percentage of labour force, (%) by regions.

Regions	Year								Average
	2003	2004	2005	2006	2007	2009	2010	2011	
Tigray	12.68	16.26	18.70	15.79	20.31	18.57	17.30	19.31	17.37
Afar	29.55	33.45	20.63	34.54	29.97	25.51	26.12	25.11	28.11
Amhara	16.94	18.13	16.58	15.31	19.38	19.13	19.67	16.75	17.74
Oromia	16.41	18.93	14.88	17.81	18.35	17.50	19.12	17.59	17.57
Somali	18.79	19.65	13.48	15.89	7.31	19.92	20.16	21.83	17.13
Benishangul	28.95	28.02	24.41	25.57	23.80	25.43	27.90	27.83	26.49
SNNPR	17.67	17.81	16.16	18.19	21.69	22.73	24.06	22.90	20.15
Gambella	22.03		30.14	11.44	28.67	25.35	27.41	25.39	24.35
Harari	20.12	23.12	24.29	23.40	27.95	25.29	28.07	23.46	24.46
Addis Ababa	12.47	13.42	13.86	12.92	17.68	13.87	12.82	15.05	14.01
Dire Dawa	14.75	18.21	11.33	15.36	20.76	12.81	14.27	12.02	14.94

Source: Own calculations from CSA data.

The other employment growth variable which is important in reducing urban unemployment may be the performance of regions in attracting investment to their respective regions. Table 5 shows annual employment by private investment as a percentage of regional labour force (%). There are discrepancies among regions of Ethiopia in the share of employment by private investment. On average during the research period (2003-2011), Addis Ababa (22.59%), Dire Dawa (15.53%), Tigray (13.42%) and Oromia (12.63%) are regions which have high private investment employment share while Somali (5.07%), Benishangul (6.38%), Gambella (7.63%) and Amhara (9.33%) have the low private investment employment share.

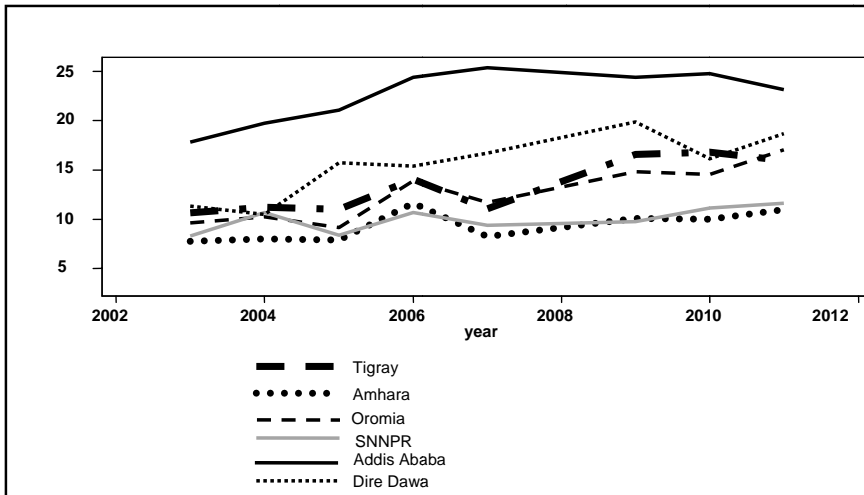
Table 5: Trends in private employment as a percentage of labour force (%) by regions

Regions	Year								
	2003	2004	2005	2006	2007	2009	2010	2011	Average
Tigray	10.63	11.23	11.01	14.07	11.05	16.59	16.81	15.98	13.42
Afar	5.83	6.72	14.26	6.30	10.43	14.22	18.25	19.54	11.94
Amhara	7.77	8.03	7.91	11.64	8.27	10.09	9.99	10.96	9.33
Oromia	9.64	10.26	9.13	13.89	11.69	14.81	14.53	17.07	12.63
Somali	3.31	4.79	5.89	5.79	4.08	5.92	6.36	4.45	5.07
Benishangul	4.91	9.21	4.49	7.32	6.45	4.60	6.48	7.59	6.38
SNNPR	8.31	10.68	8.40	10.71	9.39	9.77	11.13	11.62	10.00
Gambella	4.77		7.96	11.52	9.58	5.81	6.10	7.68	7.63
Harari	8.26	7.51	9.11	9.80	10.31	14.76	10.91	15.06	10.71
Addis Ababa	17.83	19.75	21.08	24.41	25.35	24.40	24.76	23.13	22.59
Dire Dawa	11.32	10.50	15.73	15.39	16.67	19.86	16.11	18.66	15.53

Source: Own calculations from CSA data.

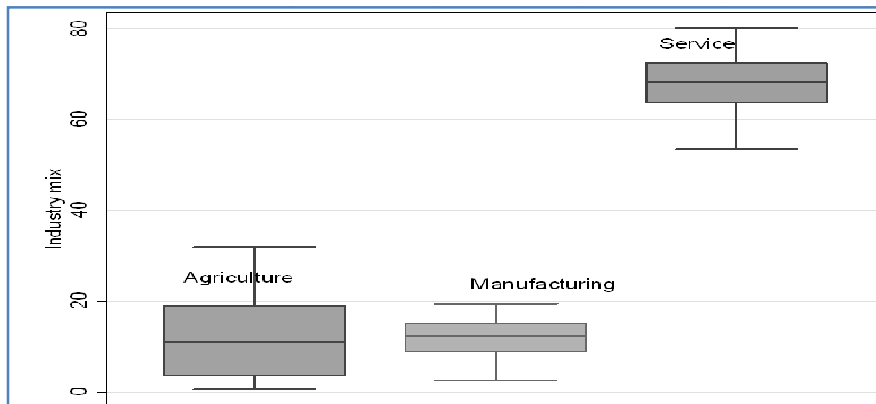
As shown in Figure 5, the share of private employment had an increasing trend during the study period. When comparing major regional states of Ethiopia by share of private investment employment, Addis Ababa, Dire Dawa Tigray and Oromia have higher share respectively while SNNP and Amhara region have lower share. Amhara region is the lowest of all major regions in the share of private investment employment.

Figure 16: Share of private employment as a percentage of labour force (%) by regions



Variation in industry mix among regions of Ethiopia is the other characteristics of regional urban labour market in Ethiopia. Cities are considered to be engines of growth because most non-agricultural production occurs in urban areas and because of their advantage of economic activity agglomeration. In Ethiopia industry structure (industry mix) of regional urban labour market has different performance. Service sector is the leading sector in share of urban employment followed by manufacturing and agriculture respectively.

Figure 17: Box plot of industry mix of regional urban labour market.



Though there is difference among regions, agriculture has a significant share of employment in urban areas (12%). In most regions the share of agriculture to the total employment is decreasing but in regions such as Benishangul Gumuz, Afar and Amhara it is increasing.

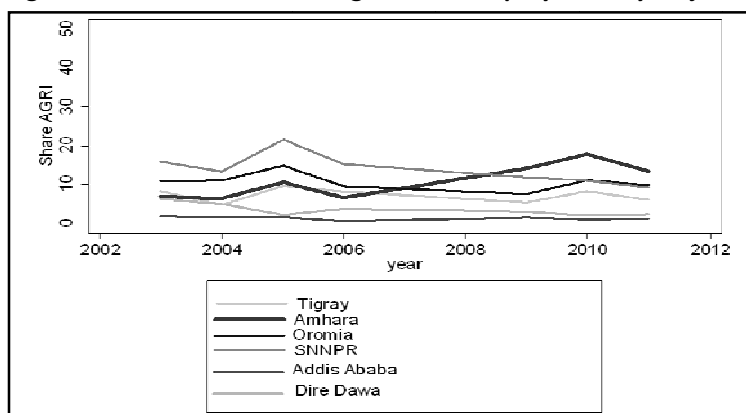
Table 6: Trends in agriculture employment as a share of total urban employment, (%) by regions

Regions	Year							Change (2011-2003)
	2003	2004	2005	2006	2009	2010	2011	
Tigray	8.28	4.78	9.64	8.24	5.48	8.32	6.09	-2.19
Afar	18.14	19.73	23.81	16.75	44.82	28.51	28.72	10.58
Amhara	6.91	6.49	10.58	6.64	14.14	17.87	13.41	6.5
Oromia	10.94	11.03	14.91	9.62	7.6	11.17	9.88	-1.06
Somali	27.54	27.03	17.05	18.92	23.31	25.38	19.2	-8.34
Benishangul	13.07	11.6	24.85	15.84	24.76	27.25	24.97	11.9
SNNPR	15.18	13.38	21.67	15.26	11.85	11.07	9.23	-5.95
Gambella	31.93	N.A	33.54	26.24	27.07	25.88	25.1	-6.83
Harari	2.41	2.7	2.54	1.73	2.59	2.26	2.13	-0.28
Addis Ababa	1.82	1.73	1.53	0.56	1.49	1.01	1.19	-0.63
Dire Dawa	6.36	4.96	2.24	3.75	3.05	2.06	2.43	-3.93

Source: Own calculations from CSA data.

The share of agriculture in Amhara region had increased from 6.91% in 2003 to 13.41% in 2011 which is different from other competing regions. Addis Ababa, Dire Dawa, Harari, SNNPR, Oromia and Tigray regions have low agriculture employment shares which may be an indicator of their high share of manufacturing and service sectors.

Figure 18: Trends in share of agriculture employment by major regions (%)



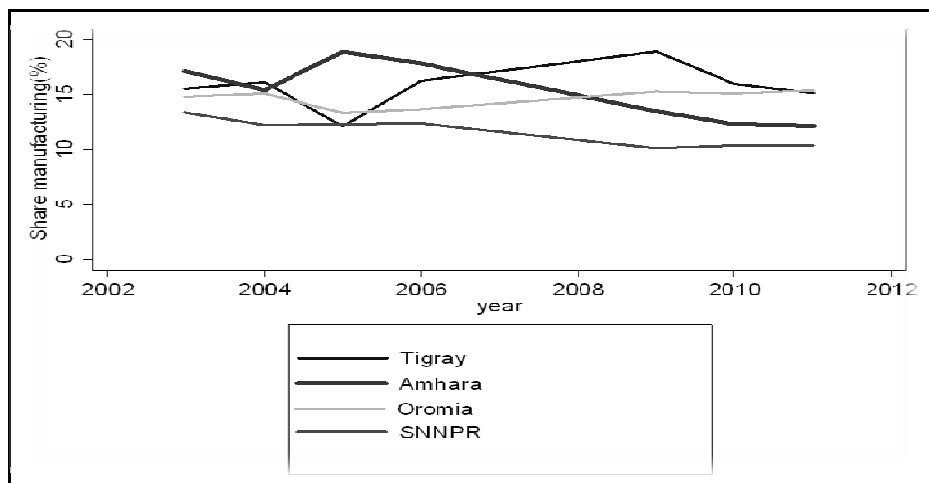
Regions (urban areas) which have high share of manufacturing sector can export their products to other regions or to other countries and they can increase their income which in turn decreases unemployment significantly. On the other hand, in regions with low share of manufacturing sector, unemployment problem will be worsened. As indicated in Table 7, though the share of manufacturing sector is low in all regions of Ethiopia, there is great variation among regions.

Table 7: Trends in the share manufacturing employment (%) by regions

Regions	Year							Change (2011- 2003)
	2003	2004	2005	2006	2009	2010	2011	
Tigray	15.56	16.15	12.14	16.3	18.93	15.99	15.16	-0.4
Afar	10.25	8.89	6.83	9.8	11.81	12.7	12.01	1.76
Amhara	17.17	15.47	18.91	17.88	13.51	12.32	12.18	-4.99
Oromia	14.82	15.12	13.34	13.68	15.29	15.12	15.4	0.58
Somali	3.6	3.89	4.7	6.53	3.49	2.7	5.38	1.78
Benishangul	9.01	8.84	7.91	9.47	6.78	6.56	5.91	-3.1
SNNPR	13.4	12.25	12.33	12.39	10.17	10.43	10.42	-2.98
Gambella	3.39	-	7.44	9.44	3.44	4.85	6.64	3.25
Harari	18.3	12.22	11.14	13.72	12.5	13.47	13.67	-4.63
Addis Ababa	17.87	17.68	16.24	19.39	15.31	16.28	14.46	-3.41
Dire Dawa	14.58	13.96	10.87	11.61	10.39	10.08	11.51	-3.07

Source: Own calculations from CSA data.

As indicated in the figure below among major regions of Ethiopia, in 2003 Amhara region had the highest share of manufacturing relative to other regions but the trend is declining and in 2011 the share become low next to SNNP region. It is in Amhara region that high reduction in the share of manufacturing was registered. It decreased from 17.17% in 2003 to 12.18% in 2011 which may imply the other sectors (agriculture and service) are increasing. Manufacturing employment in Oromia and Tigray is increasing but after 2009 in Tigray it declined.

Figure 19: Trends in share of manufacturing employment by major regions (%)

In all regions of Ethiopia, service sector is the leading in the share of urban employment. More than two third of urban employment in regions of Ethiopia is in the service sector. City administrations (Addis Ababa Dire Dawa) and Harari region have high share of service sector while Afar, Gambella and Benishangul Gumuz regions have low share.

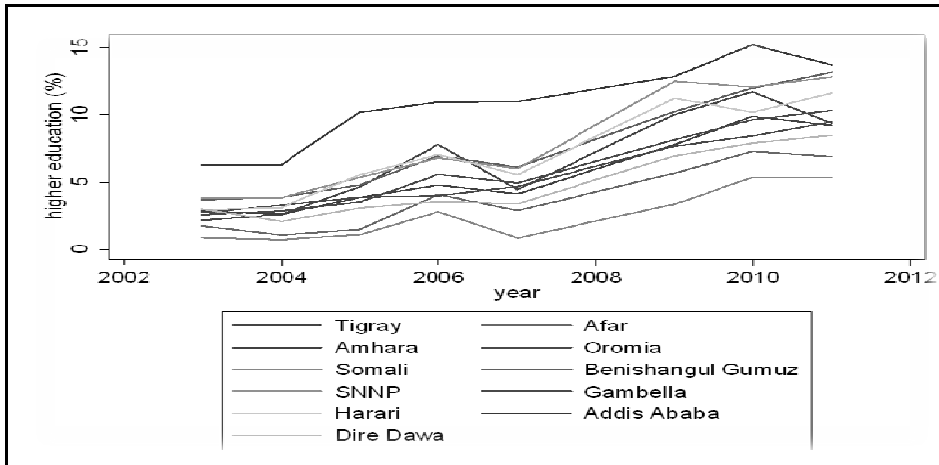
Table 8: Trends in service sector employment as a share of total employment (%) by regions

Regions	Year							Change (2011 -2003)
	2003	2004	2005	2006	2009	2010	2011	
Tigray	65.75	69.7	67.6	67.07	64.08	64.95	68.08	2.33
Afar	61.83	60.67	63.68	63.65	32.61	53.52	47.09	-14.74
Amhara	68.9	71.97	64.01	69.06	62.78	60.75	66.5	-2.4
Oromia	68.61	67.21	67.48	71.29	68.87	66.56	66.26	-2.35
Somali	61.09	66.86	72.65	68.09	68.62	67.69	67.99	6.9
Benishangul	71.79	78.92	59.75	66.27	61.99	60.47	61.56	-10.23
SNNPR	79.39	68.89	61.96	65.92	71.92	71.89	72.16	-7.23
Gambella	59.23	N.A	80.23	67.06	63.04	62.78	62.11	2.88
Harari	73.77	79.24	80.1	79.3	75.52	76.42	75.25	1.48
Addis Ababa	70.67	72.22	71.44	70.27	73.35	73.38	73.22	2.55
Dire Dawa	70.67	71.89	76.84	77.31	74.63	75.38	74.29	3.62

Source: Own calculations from CSA data.

The population's educational attainment is also another factor in explaining the regional urban unemployment in Ethiopia. In Ethiopia for the past decade there is rapid expansion in education and training opportunities. Since 2000, when Ethiopia had only two universities and nine colleges, the number of colleges and higher education institutions in the country has expanded greatly. At present there are 31 universities and more than 500 public and private colleges. The expansion in education and training opportunities, barring quality problems, is an achievement in its own merit as it increases general human capital and meets the basic rights population of children and the young. In 2003 from the total urban working age (15 and above) population, 24.4% were illiterate. But in 2011, literacy rate of working age population decreased to 22.6%. As indicated in Figure 14 below, percentage of working age (15 and over) urban population who completed diploma and above (higher education) had increased significantly in almost all regions.

Figure 20: Trends in share of higher education completed working age population by regions (%)



In Ethiopia, for the last decade, higher education is expanding in almost all regions. But there is discrepancy among the regions, Addis Ababa has high share of higher education completed working age population while Somali had the lowest share. However, in Ethiopia most unemployed individuals are educated. For example in 2011, from total unemployed population only 18.99% are illiterate, the majority (81.1%) are literate.

4.2 Econometric Estimation Results and Discussions

To verify the appropriate model, the Hausman test for random effect model or fixed effect model is carried out with the null hypothesis, H_0 : random effect model is efficient (α_i does not correlate with one or more explanatory variables). The Hausman test p-value is significant (Prob>chi2 = 0.0000) and the null hypothesis is rejected implying fixed effect model is more efficient than random effect model. Thus, Specification of equation (2) is estimated using fixed effect panel data analysis technique. Wooldridge test for autocorrelation in panel data is also carried out, with the null hypothesis, H_0 : no first order autocorrelation and the null hypothesis of no first order autocorrelation is rejected (Prob > F = 0.0007) implying that there is serial correlation among the disturbances. In such cases, the most common method of correction for autocorrelated error structure is the use of first-order autoregressive AR (1) method (Chuang and Lai, 2008:53). AR (1) fits a linear regression that is corrected for first-order serially correlated residuals. Thus, the fixed effects model is estimated with an autocorrelated error structure, AR (1) adjusted to autocorrelation.

To test whether there are spatial effects in unemployment rate among regions of Ethiopia, three tests of cross-sectional independence, namely; Pesaran's test of cross-sectional independence, Friedman's test of cross-sectional independence and Frees' test of cross-sectional are carried out with the null hypothesis, H_0 : there is no regional dependence (no spatial effects). The tests have failed to reject the null hypothesis implying that unemployment of a specific region does not have effects on neighbouring regions. None of them indicated any sizable spatial dependence; hence, no need for resorting to spatial econometric tools.

Table 9 presents the regression results for Ethiopia's regional unemployment rates. A regression result of the first column is without accounting spatial effects and the results in the second column explicitly account spatial effects. The coefficients of the explanatory variables of two models are almost the same. In other words, the results are unaffected by the inclusion of the spatial lag which implies accounting the spatial effect is no more important since regional labour markets are not spatially correlated.

Since all variables in the regression are in log levels including the dependent variable except population density, interpretation of regression coefficients are simply

interpreted as when independent variables change by one percent, unemployment rate changes by the amount of percentages reported in the estimation results. A coefficient of population density (DENS) has different interpretations. Since it is in levels (number of people per square kilometer), it could be interpreted by multiplying the reported coefficient by 100.

Table 9: Fixed Effect with AR (1) Estimation Results of Ethiopia's 11 Regions

Dependent variable: regional unemployment rate

<i>Independent variables</i>	<i>Non-spatial model</i>	<i>Spatial model</i>
SELF	-0.686*** (-3.90)	-0.689*** (-3.44)
GOVT	-0.799*** (-3.23)	-0.808*** (-3.18)
PRIV	-0.517* (-1.89)	-0.513* (-1.75)
AGRI	-0.059 (-0.63)	-0.0630 (-0.63)
MANU	-0.590** (-2.28)	-0.593** (-2.26)
ILLITRATE	-0.003 (-0.25)	-0.004 (-0.29)
PRIM	0.494* (1.88)	0.498* (1.86)
SECON	0.557** (2.35)	0.546** (2.28)
HIGHER	0.849*** (2.61)	0.840*** (2.54)
PARTI	-0.257 (-1.08)	-0.267 (-1.05)
URBA	4.293* (1.95)	4.273* (1.87)
YOUTH	0.426** (2.03)	0.414** (1.93)
OLD	0.515 (1.05)	0.501 (0.98)
FEM	1.065*** (3.15)	1.060*** (3.00)
DENS	-0.0009 (-0.69)	-0.0008 (-0.66)
SU		0.003 (0.02)
CONS	-35.55** (-2.50)	-33.53** (-2.44)
<i>N</i>	54	54

t statistics in parentheses

* Significance at 10%, ** significance at 5 % and *** significance at 1%

As the regression results of Ethiopia's regional urban unemployment rates reported in Table 9, regional labour demand variables, have significant effect in explaining regional urban unemployment rate disparity. Self employment which is a proxy for micro and small enterprise employment is one of the labour demand variables which have negative and significant effect on regional urban unemployment. This implies that in urban Ethiopia, promotion of self employment (MSE) is more essential in easing the high level of regional urban unemployment. The negative and significant coefficient of self employment shows if a given region is creating more employment than others, unemployment in that region should decrease relatively and MSEs have significant effect in reducing regional urban unemployment. The result may also indicate that a high rate of self-employment may reflect an environment encouraging risk-taking, job creation, and market development which in turn reduces urban unemployment. The result is consistent with Berhanu *et al.* (2005:40) finding of the policy of recent initiative to MSE by Ethiopian government have achieved positive results in reducing urban unemployment particularly youth unemployment in recent years.

The negative and significant coefficient of the share of employment by government shows regional urban unemployment rate decreases as a result of the extra job created by government. When the share of government employment from the total regional labour force increases by one percent, regional unemployment decreases by 0.79 percent. Government employment (civil service) or other government investments are playing a significant role in absorbing urban labour which has expanded significantly following the federal political system that required the establishment of government offices at regional, district and lower tiers.

An employment by private sector (investment) has a negative and significant effect (though at 10% significance level) on unemployment implying; regions which can attract more investors to their respective regions and create more jobs tend to have low urban unemployment rate. The negative sign of employment by private investment shows that there is an inverse relationship between private investment and unemployment. This implies that when private investment employment increases urban unemployment declines.

The results of *industry mix* variables are consistent with the common argument in explaining spatial unemployment differentials that regions specialized in declining industries are suspected to exhibit larger unemployment rates. In other words, employment multiplier of one job in manufacturing is greater than one job in agriculture. The traditional export theory of urban growth provides a framework that urban areas which can export their products to other areas can have lower unemployment rate. It has been traditionally argued that basic industry, like manufacturing, is the impetus to growth. With the more favourable industrial structure, indicated by the proportion of employment that is concentrated in manufacturing, the more favourable the employment status of the local labor force and the lower would be the unemployment rate. Coefficient of employment share of manufacturing is negative and significant at 5% significance level which indicates that an increase in the share of manufacturing pushes down regional urban unemployment rate. A one percent increase in the share of manufacturing results in 0.59% reduction in unemployment rate. The result is consistent with Trendle (2002:341) that regions with larger shares of the labour force employed in manufacturing industry tended to experience lower rates of unemployment.

On the other hand, share of agriculture is insignificant in explaining regional urban unemployment disparities among regions of Ethiopia. Insignificance of the share of agriculture may be due to the fact that in urban areas major production activities are non-agricultural and employment multiplier of one job in agriculture is much lower than that of one job in manufacturing. In other words, agriculture is considered to be declining industry while manufacturing is considered to be growing industry. Thus, the regional industry mix in terms of employment (employment shares) could give an account of the variation in urban unemployment rates between regions of Ethiopia⁵.

The results of educational variables are surprising. The result of illiterate is insignificant. The three levels of education (primary, secondary and higher education) have positive relationship with regional urban unemployment in Ethiopia which is against what is hypothesized. The results are different from many studies in

⁵Share of service sector is not included in the model due to multicollinearity problem, since the share is from the total employment, when one sector's share increases the other sector's share decreases.

developed countries that evaluated the effect of education on unemployment rates and they found inverse relation to the unemployment rate through a composition effect, through its positive influence on labour demand, and because skilled individuals are geographically more mobile (Mincer, 1991:8-13). The findings of inverse relationship between education and unemployment rate are confined in developed countries where there is high pace of investment which can absorb the labour force (better education opportunities and improved economic circumstances simultaneously).

However in developing countries where there is slow pace of investment and other activities, the growing number of educated people may not be absorbed. Better education opportunities can only make a true contribution in reducing unemployment when economic circumstances improve simultaneously. What is currently prevailing in Ethiopia is that the number of college/university graduates exceeds the economy's capacity to absorb and an expansion of higher education may not necessarily reduce the regional unemployment problem. The results of educational variables are consistent with the finding of Getnet (2003:20) that in Ethiopia case the policy of rapid expansion in education and training opportunities are mostly supply driven and not in line with the skill needs of the economy which leads to structural unemployment. The result are also consistent with the study by Bakare (2011:190) in Nigeria that education status has a positive sign and is statistically significant implying that the education and training system has inadequately prepared the youth for the world of work. On the other hand, the expansion of education and training in Ethiopia faces quality problems and the educated individuals are not well equipped with the necessary skill which leads to the mismatch between education and training skills with requirements of labour market (structural unemployment). Educated individuals in Ethiopia are waiting for either government or private sector employment and they are more likely to be unemployed since the employment opportunities in the formal sector is not sufficient. The excessively academic orientation contributed to creating the wrong kinds of attitudes and job expectations on the part of youth, including the preference for white-collar jobs as opposed to entrepreneurial and manual work.

Economic participation rate variable is found to be insignificant in explaining regional urban unemployment variation in Ethiopia. Urbanization rate is other labour supply variable which is positive and significant in explaining regional urban unemployment disparity. Urbanization rate is a result of natural growth rate (birth minus death) and rural urban migration. The positive and significant coefficient of urbanization rate implies that when urbanization increases regional urban unemployment problem will be more serious (increases). Migration has been the main engine driving urban population dynamics in Ethiopia contributing far greater percentages to the annual urban population growth rates than the annual balance between births and deaths. It supplies the towns and cities of the country with new waves of able-bodied men and women primarily from rural origins. The result is consistent with Harris-Todaro (1970:127) model that, the rural-urban income differential leads to the influx of labour to rapidly growing urban areas. Initially, migrants join the large pool of underemployed labour in urban centres. Thus, urbanization rate increases labour supply in urban areas which reduces the probability of immigrants (rural urban migrants) and/or the host residents to be employed which leads to high urban unemployment.

The results of the age structure of the labour force of regions are not surprising. The positive and significant coefficient of percentage of the youth labour force implies that regions with more of less-experienced workers or young workers tend to have a higher unemployment rate. In other words, a positive relationship between young labour force and rate of unemployment gives sound; since there is no competition in the labour market and it is difficult for youngsters to join the labour market once occupied by elders. The result is consistent with the finding of Berhanu *et al.* (2005:32), that youth are less well off compared to their older counterparts due to the jobs created by medium and large-scale private investments over the last decade are not enough (lack of labour demand) to absorb the number of young people who enter the labour market every year. Moreover, certain negative attitudes towards entrepreneurship exist among youth, among other things, due to previous education and employment policies. The share of elders (55 and above) labour force is insignificant in explaining regional urban unemployment.

The gender variable, the percentage of females in the labor force of region, is significant and has positive sign which is as expected; implying regions with a larger share of women also tend to have a higher unemployment rate. Women in general have less favourable prospects in the labour market as they often combine work with family duties and childcare. Women spend much more time on household work and they are less motivated and less active in finding a job. Equilibrium variable of urban population density is insignificant.

Finally, consistent with the spatial effect tests, the coefficient of spatial lag variable (SU) is insignificant and the coefficients of the other explanatory variables are unaffected by the inclusion of the spatial lag which gives credence that regional labour market in Ethiopia is spatially uncorrelated. The Finding of no spatial effects among regional labour markets of Ethiopia may imply that labour mobility across regions is low. Since Ethiopia is federal country and regional demarcation is based on language, regional labor market is sensitive to cultural or language differentials which restrict labour mobility. The other possible explanation could be weak system of labour market information. Weak labour market information in Ethiopia is not only across regions but also within the region itself.

5. Conclusions and Recommendations

5.1 Conclusions

Using unbalanced panel data collected from Ethiopia's 11 regions pertaining to the period 2003-2011 with year break, this study uses disequilibrium and equilibrium factors to analyze the discrepancy in regional urban unemployment rates. The main findings of the study are: (i) regional urban unemployment rate variation among regions of Ethiopia persists overtime which implies that regions with a higher (lower) unemployment rate tend to have a higher (lower) unemployment rate in the future. (ii) Both equilibrium and disequilibrium factors are sources of affecting the discrepancy in Ethiopia's regional urban unemployment rate. But, the results provide more support to the disequilibrium view; because, from the three equilibrium factors (share of agriculture, share of manufacturing and population density) only share of manufacturing is significant. Disequilibrium factors include employment growth variables (self employment, government employment and

private employment), demographic variables (education, age structure, gender and urbanization rate) and participation rate. In the disequilibrium theory; regional urban unemployment differential is due to adjustment problem; disparities are mostly interpreted as a result of limited interregional labour mobility. (iii) Consistent with the disequilibrium theory, regional urban unemployment in Ethiopia is not found to be spatially correlated (no neighbouring effect), which may have an implication that regional labour markets are sensitive to cultural or language differentials which restrict labour mobility across regions. (iv) Employment growth variables, industrial structure and demographic characteristics (educational attainment of the working age population, urbanization rate, and age structure and gender composition of regional labour force) have a significant effect on the regional unemployment rate.

5.2 Recommendations/Policy Implications

From policy point of view, knowing important sources of regional urban unemployment will help the government formulate appropriate policies to reduce urban unemployment disparities across regions. Though both disequilibrium and equilibrium views seem important, the results provide more support to the disequilibrium theory: regional urban unemployment disparity is due to adjustment problem. Under disequilibrium theory, disparities are mostly interpreted as a result of limited interregional labour mobility and these unemployment differentials can be reduced by encouraging flexible labor markets. To reduce regional urban unemployment disparity, it might be important to establish a system of either encouraging firms to move towards high unemployment regions by establishing different incentive systems or allowing labour to move towards low unemployment areas. One factor which might be important in relation to the labour market of Ethiopia is a system of labour market information that is vital to the regional and federal governments, the private sector and the society at large. Given this, the establishment of a scheme that provides such crucial information would be important.

The finding of this study suggests that self employment (MSE) is an important route to be out of unemployment. But besides a route out of unemployment, it might also

be important to recognize that self employment as an entrepreneurial venture. The promotion of self employment may even have a far reaching positive outcome. The accepted wisdom is that the development of new firms almost always starts with self-employment, and this may turn out to be particularly essential for Ethiopia since the economy is capital-constrained.

To address the problem of urban unemployment, the government still has a range of potential instruments such as direct creation of jobs in the civil service and state owned enterprises employment. It might be important to strengthen government investment in areas where the private sectors are not willing to invest to reduce urban unemployment discrepancy.

The other finding of this study suggests that private investment is a necessary condition for reducing the rate of regional urban unemployment disparity. A vibrant private sector can play a significant role in creating jobs and reducing urban unemployment. Policy measures which enhance private investment such as tax incentives, infrastructure development and other measures which can create an enabling environment for the private sector need to be introduced. Promoting labour-intensive productive activities might be one of the ways through which new opportunities can be created to fight urban unemployment. It might be important to transform production from agriculture to manufacturing (industrialization) to reduce urban unemployment disparity significantly. Manufacturing sector has high multiplier effect than agriculture sector. Thus, giving special attention to manufacturing sector might be important to reduce urban unemployment. In doing so creating access to finance, tax incentives and infrastructure development might be important.

The education system in Ethiopia is supply driven; in this respect the finding of this study suggests that though expansion in education and training opportunities, barring quality problems is an achievement in its own merit as it increases general human capital and meets the basic rights of children and the young, it must cease to be seen as an end. It is therefore very important that the education system in Ethiopia be restructured making cognizance of the current emphasis on self-employment and self-reliance. This will entail an educational system that de-

emphasizes paper qualification and lays much premium on technical know-know and intellectual capability. Restructuring the education and training policy to cognize the short- and long-term skills requirements of the labour market might be an important solution for the identified structural unemployment; i.e., mismatch between the required and the available labour in qualification, location, etc. Hence, education/training should be demand driven.

Urbanization is considered as one indicator of development. Rural-urban migration is continuing to occur at high levels as people seek new opportunities in the city. Urban authorities, faced with the prospect of a growing urban population, need to consider how to create an enabling environment which can turn the challenges posed by increased mobility into opportunities. This might involve developing new alternatives for service delivery, providing urban infrastructure and considering access to land and credit to the newcomers. Policy of strengthening the management, capacity and planning of rural towns, which play a key role in providing services and access to markets for the rural population; and scaling up the provision of rural infrastructure such as roads and electricity are critically important in reducing the challenges in towns and incubating job generating economic activities.

The youth population faces a higher level of unemployment than their prime age counterparts. Strengthening the youth policy designed in 2004 which is in its infancy in terms of implementation might be important in creating conducive environment for youth to play an entrepreneurial role rather than waiting for employment in public sectors. This could be possible by improving the quality of education and training and encouragement of entrepreneurship (avoiding negative attitudes towards entrepreneurship) and self-employment (MSE) by providing the required finance (credit). Like that of youths, women experience higher level of unemployment than their male counterparts in Ethiopia. Empowering women by improving both enrolment and quality of education not to spend much of their time on household activities and to be more motivated and active in finding a job might be important in reducing urban unemployment.

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COMMUNITY-BASED HEALTH INSURANCE SCHEMES: A SYSTEMATIC REVIEW¹

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Abstract

Due to the limited ability of publicly financed health systems in developing countries to provide adequate access to health care, various forms of community-based health financing have been proposed. Most prominently, the attention to community-based health financing has led to the implementation of a number of Community-Based Health Insurance (CBHI) schemes, in several developing countries. This study characterizes such schemes and systematically reviews the existing empirical evidence on three outcomes – access to schemes, their effect on health care utilization and on financial protection. In addition to collating and summarizing the evidence we analyse the link between key scheme design characteristics and their effect on outcomes and comment on the role that may be played by study characteristics in influencing outcomes. The review shows that the ultra-poor are often excluded and at the same time there is evidence of adverse selection. The bulk of the studies find that access to CBHI is associated with increased health care utilization, especially with regard to the use of relatively cheaper outpatient care services as opposed to inpatient care. The schemes also appear to mitigate catastrophic healthcare expenditure. There are clear links between scheme design and effectiveness suggesting the importance of involving the target population in designing and implementing CBHI schemes.

Key words: Catastrophic health expenditure, community health insurance, low-income groups

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1. Introduction

Increased expenditure caused by the need to cope with injury and illness has been identified as one of the main factors responsible for driving vulnerable households further into poverty (WHO, 2000). According to Meghan (2010), more than half of health expenditure in poor countries is covered by out-of-pocket (OOP) payments incurred by households. An increase in such expenditure can have catastrophic effects due to its negative impact on the consumption of other items such as food, housing and clothing.⁶ As shown in Figure 1 in the appendix (based on surveys conducted in 59 countries), there is a direct and strong relationship between the share of OOP payment for health services and the probability of facing catastrophic health care expenditure. The figure also shows that households in developing countries are more exposed to the risk of catastrophic health care expenditure as compared to developed countries.

Coping with health care expenditure may deplete a household's ability to generate current and future income and have inter-generational consequences as households may be compelled to incur debt, sell productive assets, draw down buffer food stocks, or sacrifice children's education. Foregoing medical care may lead to long lasting illness, disability or even death (see O'Donnell et al., 2005; De Weerd and Dercon, 2006; Flores et al., 2008).

Due to the limited ability of publicly financed health systems in developing countries to provide adequate access to health care and the shortcomings of informal coping strategies to provide financial protection against health shocks, various forms of community-based health financing have been proposed as an alternative approach.⁷

⁶ The World Health Organization defines health expenditure as catastrophic if the share of a household's total expenditure on health care services is more than 40 percent of household's capacity to pay. A household's capacity to pay is measured by its total non-food expenditure (for details, see Karami et al., 2009).

⁷ The definition of community is often not clear and Dror and Preker (2002) treat it as "a generic expression used to cover a large variety of health-financing arrangements". Based on our reading of the literature we define the community in terms of the target population which a particular scheme is trying to reach and community-based in terms of involving the community in some or all aspects of the scheme. The range of arrangements which are placed under the rubric of Community-Based Health Insurance schemes is discussed later on in the review.

The increasing attention paid to community health financing system as a policy option has led to the implementation of a large number of community-based approaches, generically termed Community-Based Health Insurance (CBHI) schemes, in several developing countries (Wiesmann and Jutting, 2001; Defourny and Failon, 2008). Typically, such CBHI schemes are non-profit initiatives built upon the principles of social solidarity and designed to provide financial protection against the impoverishing effects of health expenditure for low-income households in the informal urban sector and in rural areas (Ahuja and Jütting, 2004; Carrin et al. 2005; Tabor, 2005; Jacobs et al., 2008).

Matching the roll-out of these schemes, theoretical and especially empirical studies which examine their impact on outcomes - such as utilization of healthcare, financial protection, resource mobilization and social exclusion have proliferated. Existing reviews of this body of work are provided by Jakab and Krishnan (2001), Preker et al. (2002) and Ekman (2004). Based on 45 published and unpublished works, Jakab and Krishnan (2001) conclude that there is convincing evidence that community health financing schemes are able to mobilize resources to finance healthcare needs, albeit there is substantial variation across schemes. They also argue that the schemes are effective in terms of reaching low-income groups although the ultra-poor are often excluded.⁸ Preker et al. (2002), reach a similar conclusion and point out that there is strong evidence that CBHIs are successful at mobilizing resources, enabling access to care for the poor and providing financial protection.

Although both these papers paint a positive picture of the potential of CBHIs in meeting their policy goals they also point out the need for stronger evidence on the performance of CBHIs as long-term viable health care financing instruments. As opposed to these two narrative reviews, Ekman (2004) provides a systematic review of the literature based on 36 studies conducted between 1980 and 2002.⁹ Ekman

⁸ While there are no universally accepted definitions of ultra-poor there are several context specific definitions. For instance, Lipton (1983) uses the term to indicate households who are not able to obtain more than 80 percent of their caloric requirements. Similarly, Ahmed et al. (2007) defines the concept in terms of daily income below USD 0.50 (at constant 1993 PPP USD).

⁹ Among others, a systematic review is characterized by a study protocol which lays out specific research questions to be addressed, pre-defined inclusion criteria for studies, a systematic search strategy to find and include studies that fulfil the criteria and an assessment of the quality/validity of the findings through an assessment of the methodological features of the literature.

(2004) finds that while CBHI do provide financial protection for low income groups and increase cost recovery for health service providers the magnitude of the effect is low and the lowest income groups are excluded from enrollment. Moreover, there is no evidence that the schemes are associated with an increase in the quality of the care. On a methodological note, Ekman (2004) concludes that the evidence base to develop stylized facts is questionable and only five studies included in his review may be considered of high-quality.¹⁰ These studies are labelled high-quality studies primarily as they attempt to use econometric methods, albeit on cross-section data, to identify the effect of CBHI on various outcomes.

The aim of this review is to provide an updated and systematic assessment of studies that have examined the impact of CBHI on various outcomes of interest. The paper relies on 36 micro level studies that have been published or become publicly available between 1995 and 2011 and cover a range of low and middle income countries. Unlike the previous reviews, the current study focuses mainly on papers that have used quantitative methods to identify impact.¹¹ The specific objectives of the study are to: (i) examine the impact of community-based financing on healthcare service utilization, OOP expenditure, inclusion of lower income groups, and adverse selection in enrolment (ii) examine the extent to which variations in outcomes may be related to key scheme design characteristics – an issue which has policy implications but which has not been systematically investigated (iii) scrutinize the research methodology and comment on the potential effects of the study design on the empirical findings.

The paper unfolds by providing, in section 2, a description of the key characteristics of some common types of community financing schemes. This is followed by an account of the protocol used to produce the review (section 3), findings are in section 4, and a discussion of methodological concerns appears in section 5. The final section concludes the paper.

¹⁰ Of the 36 papers reviewed by Ekman (2004), five studies (Carrin et al., 1999; Criel and Kegels, 1997; Jowett et al., 2003; Jutting, 2001; Ranson, 2002) are considered high-quality. The first two are based on descriptive statistics and the remainder use econometric methods. However, all three studies that use regression analysis are based on cross sectional data and only one study (Carrin et al., 1999) uses longitudinal data.

¹¹ The definition of 'impact' is limited to examining the effect of CBHI schemes on the beneficiaries and does not include the impact on providers in terms of cost recovery and resource mobilization for the health financing system.

2. Community-based Health Insurance – Emergence and Characteristics

2.1 Why CBHI Schemes?

CBHI schemes are a relatively recent health care financing approach.¹² In the 1990s, the adoption of structural adjustment programs in a number of developing countries - which was accompanied by a reduction in public health financing – led to the emergence of several types of CBHI schemes (Onwujekwe et al., 2009). These schemes emerged as a way of enhancing health care access to those who were self-employed in the informal sector in urban and rural areas (Wiesmann and Jutting, 2001). According to Ekman (2004) and Uzochukwu et al., (2009), the two main reasons driving the current interest in setting up community health financing arrangements are the limited financial capacity of governments to provide adequate and affordable health care services and/or extend formal health insurance for lower income groups and the catastrophic nature of OOP healthcare expenditures.

With regard to health insurance, there is clear lack of access to such an instrument for populations engaged in subsistence agriculture or in the urban informal sector.¹³ Providing formal health insurance schemes for the poor is difficult for a number of reasons. In a commercial insurance system, premiums are, in part, based on an assessment of an individual's risk profile. However, it is costly to collect information on the health risks of rural self-employed populations who often live scattered over a wide geographical area (Jutting 2004; Tabor, 2005; Dong et al., 2009). Similarly, it is costly to collect premiums and to enforce payments. In such circumstances it is argued that community health insurance schemes can perform better by reducing transaction costs and limiting information asymmetry problems (Jutting, 2004). Individuals within a community have more information on health risks and provide scope for peer monitoring. Furthermore, while market based health insurance schemes aim at profit maximization, CBHIs are non-profit organizations where the premium may

¹² The antecedents of the current interest in CBHI schemes probably lie in the 19th century experience of European and Japanese approaches to financing health care through resource pooling (see Criel et al., 2004; Mladovsky and Mossialos, 2008; Jacobs et al., 2008).

¹³ For example, less than 10 percent of the Indian population has formal health insurance coverage (Lahkar and Sundaram-Stukel, 2010). The World Health Organization Survey also shows that the share of households who had medical insurance in 2002/03 in Ghana, Burkina Faso and Ethiopia were 8.3%, 2.7% and 0.2% respectively (WHO, 2005).

be based on the average risk profile of the community (Ahuja and Jütting, 2004) and therefore, enhance access to health care for low income households.

In many developing countries, there are traditional risk management mechanisms. However, the ability of such traditional approaches to provide adequate protection against ill-health and injury may be limited. Financial contributions to meet health care expenses are made *ex post*, but such events can occur at times (for example, during the lean agricultural period) when it is difficult to mobilize resources. In contrast, CBHI schemes are expected to collect contributions from members on a regular basis and often cover a larger number of households as compared to those included in traditional risk-sharing arrangements. An advantage of CBHI schemes as compared to formal health insurance is that their introduction and uptake may be viewed as an extension of existing informal and social risk management systems (Tabor, 2005). Given the unique ethnic, lingual and cultural diversity of communities within a country, the CBHI arrangement maybe readily adapted to specific local contexts (Wiesmann and Jutting, 2001). Hence, CBHI schemes could be thought of as a hybrid between traditional risk sharing and market based insurance arrangements (Ahuja and Jütting, 2004).

A related factor driving the current CBHI impetus is the experience with other forms of microfinance arrangements (Preker et al., 2002; Ahuja and Jütting, 2004). Several forms of community-development oriented microfinance organizations (microcredit, microsaving, and other micro financial intermediates) have apparently been effective in reaching low-income groups where traditional poverty reduction strategies have failed. Microfinance institutions have played a key role in the development of community health insurances schemes in two ways — introducing the concept of health insurance and through direct provision of micro health insurance service (Jutting, 2004; Acharya and Ranson, 2005). A number of microfinance institutions directly provide micro insurance services for their members since the health condition of their clients is a key concern (see Meghan, 2010). Indeed, Ahuja and Jütting (2004) argue that it is beneficial and less costly to provide insurance services in combination with credit facilities rather than establishing stand-alone micro level health insurance schemes.

2.2 Models of Community-based Health Financing

As mentioned earlier, community-based health financing is a generic term for a variety of resource mobilization models designed to finance access to health care through a greater involvement of the target population in the design and implementation of the scheme as compared to private or national-level health insurance schemes (for details see Jakab and Krishnan, 2001; Perker et al., 2002).

According to the literature, the most common forms of community health financing schemes are (i) Community prepayment health organizations (ii) Provider based health insurance and (iii) Government-run but community-involved health insurance. These schemes differ in terms of design and the involvement of the community in setting up the scheme, mobilizing resources, management and supervision. The remainder of the section characterizes these different schemes and highlights the role of the community in each scheme type while Table 1 provides a snapshot of various scheme characteristics.

2.2.1 Community prepayment health organizations

These types of health organizations are characterized by voluntary membership and payments made in advance in order to cover potential medical costs. Members of the schemes pay premiums on a regular basis, usually when their incomes are high. Such schemes are often initiated with the technical and financial support of NGOs and thereafter the community takes full responsibility for administering and managing the scheme. Local governments may also play a role in encouraging and supporting the efforts of such schemes. The community participates in designing the scheme and decides on the level of benefit and the corresponding premium. In addition, members participate actively in administration and supervision (Arhin-Tenkorang, 2001).

Eighteen studies in the current review examine the impact of community prepayment health organizations (see Table 2). While such schemes often rank high in terms of community involvement they tend to cover a limited geographical area and often cover only cheaper outpatient care services due to difficulties associated

with mobilizing a large enough population. While community involvement is a purported strength of this approach it is also a weakness as the establishment and continuity of such schemes depends on social solidarity and trust amongst community members.¹⁴ Poor management and accounting skills may also undermine the sustainability of such schemes.

2.2.2 Provider based health insurance schemes

These types of health insurance schemes are initiated by healthcare providers (such as a town or regional hospitals) to encourage utilization of healthcare services. This review contains eight studies which may be placed under this rubric (see Table 2). The schemes mainly cover expensive inpatient care and hospitals may have recourse to external funds to subsidize service costs. In this framework, the health care providers are responsible for mobilizing resources and providing health care services. The role of the community in designing and administering the scheme is limited. However, members of the schemes are given a chance to participate in scheme supervision and provide feedback on service quality through meetings organized by the health care providers. Such schemes are often restricted to those households living in the catchment area of the health facility (see Arhin-Tenkorang, 2001).

2.2.3 Government run community-involved health insurance

Government run and community-involved health insurance schemes are often linked to formal social insurance programmes with the objective of creating access to a universal health care system (Jakab and Krishnan, 2001). Unlike other models, government initiated schemes often cover both basic curative and inpatient care. The government (national or regional) plays a substantial role in initiating, designing and implementation of such schemes (Arhin-Tenkorang, 2001). The participation of the community in such schemes varies substantially across countries. Some governments create conditions which enable community involvement in defining

¹⁴ For instance, in such a scheme in Kenya's Kilifi district, households reported that they were not interested in renewing their membership since they feel that corruption affects management (Molyneux et al., 2007).

the benefit package, setting of premiums and scheme management while others introduce the schemes in a top-down manner and limit the role of the community. Membership in such government-initiated health insurance may not always be voluntary. Fifteen studies in this review fall in the category of government-run models of community health insurance schemes.¹⁵

Unlike other forms of CBHI, government supported health insurance schemes have the potential to reach a relatively large number of households. Governments in co-operation with donor agencies may provide reductions in premium and fee waivers for the poorest segments of society while retaining a universal benefit package. The disadvantage of these schemes may lie in their design and implementation features. Since such programmes are the result of a top-down approach, they may not be sensitive to local needs. Limiting the role of community participation in awareness-raising, decision-making and supervision probably robs such schemes of a sense of ownership which in turn may hamper sustainability.

3. Conducting the Review

This study applies the basic principles of a systematic review in order to assess the literature on the impact of CBHI schemes.¹⁶ Unlike a narrative approach, systematic reviews attempt to assess the overall message or develop stylized facts on the basis of knowledge emerging from existing studies while at the same time controlling for or commenting on factors that may lead to misleading conclusions. This protocol followed in this review is as follows:

1. The specific research aim was defined as a review which will provide a synthesis of the existing knowledge on community health financing approaches in dealing with three issues - access to schemes or social inclusion, and their effect on health care utilization and financial protection.

¹⁵ The total number of studies reported here is 41 (i.e, 18 community prepayment health organizations, 8 health care provider initiated insurance schemes, and 15 government run and community involved health insurance schemes). However, Table 2 covers 36 studies and 42 schemes. The difference is because the scheme type in one study (Onwujekwe et al. 2009) is not known.

¹⁶ The detailed protocols are described by Green et al. (2008). Ekman (2004) also uses a systematic review approach and adapts the methods proposed by Clark and Oxman (2002), AHRQ (2002), and McKee and Britton (1997).

2. Source of the data: published and unpublished papers over a 15 year period (1995 to 2011) located through a search of 6 databases — Econlit, PubMed, Science Direct, SSRN, JSTOR, and Google scholar. In addition, a search was conducted on the web pages of the World Health Organization.
3. To identify papers for review a search was conducted using the key words ‘community health financing’, ‘micro-insurance’, ‘OOP payment and community insurance’, ‘community-based health insurance’. This generated a large number of papers (several hundred) whose titles and abstracts were examined and introductions and conclusions were perused for suitability of inclusion. Using this approach 98 potential papers were selected and passed to the second round for intensive reading.
4. Papers included for detailed review needed to satisfy the following criteria:
 - 4.1 They should be concerned with an examination of the impact of community health financing schemes on access to health care and financial protection. The definition of ‘community health financing schemes’ was restricted to non-profit oriented schemes that serve populations in the informal sector (urban or rural) of low and middle income countries.¹⁷ This restriction led to the exclusion of 16 of the 98 papers.
 - 4.2 Studies that use micro data at the household or individual level (led to the exclusion of 9 studies).
 - 4.3 Studies that evaluate the effect of community health insurance mainly using quantitative and statistical analysis. Studies relying mainly on qualitative studies were included provided they used at least some statistical information (12 studies excluded).
 - 4.4 Studies that arrived at their findings based on value judgement and self-perception without using any data were excluded. Similarly, studies that did not provide clear information on the research methods applied and the schemes studied in their analysis were excluded (6 studies excluded).

¹⁷ According to the World Bank classification of economies based on 2010 GNI per capita, the countries covered in our review are in one of the following categories: low income countries, \$1,005 or less (like Afghanistan, Burkina Faso, and Mali); lower middle income countries, \$1,006 - \$3,975 (like India, Nigeria, and Lao); upper middle income countries, \$3,976 - \$12,275 (China and Mexico).

4.5 The outcome measures should include utilization of health care (outpatient and inpatient) services, OOP healthcare payments, and social exclusion in enrolment and service utilization (19 studies excluded).

The imposition of these criteria led to a list of 36 papers (24 published and 12 unpublished) that were retained for the review.¹⁸ Compared to Ekman (2004), 26 of the papers included in the review are different.

5. After paper selection, the papers were read and carefully scrutinized. A data extraction template was developed to collect information from each paper about scheme impact, the characteristics of the scheme (type of scheme, whether the scheme receives external support, whether there are contracts with providers, extent of community participation), the statistical/research methods applied, data characteristics (source, level of analysis, data type, the use of baseline information). A summary of the key features of each of these studies is provided in Table 2.
6. Analysis: The limited number of studies impedes a formal meta analysis which links outcomes to scheme characteristics and study characteristics. However, to assess the overall message emerging from the studies, univariate and bivariate distributions were constructed. These are used to construct stylized facts.

4. Review Results

The key data emerging from the review are laid out in Tables 3 to 6. A brief discussion on each of the issues under scrutiny is provided below.

4.1 Social Exclusion

A majority of the papers (64 percent) find statistically significant evidence to support the claim that the ultra-poor are excluded from CBHI schemes. Even when such households become members, they tend to use healthcare services less intensively as compared to higher income groups potentially due to their inability to afford co-payments and other related costs (transportation and forgone income). These

¹⁸ All studies that meet the selection criteria are included in the review. In some cases the same scheme has been studied in more than one paper although over different time periods, study outcomes, and the use of different methods.

patterns suggest the need to subsidize premium payments or introduce exemption criteria to encourage enrolment of low-income households. In such circumstances, external funding could play a role in ensuring greater equity in access to health insurance/healthcare services.

4.2 Adverse Selection

About 86 percent (see Table 3) of the studies find evidence that individuals suffering from chronic health conditions are more likely to join CBHI schemes as compared to those in good health. While this may be expected and considered a positive aspect from the perspective of the beneficiaries, it also signals the need to account for such risks in the management of CBHI schemes. To control for adverse selection a number of schemes allow enrolment only at the household rather than the individual level and/or promote group registration at the village level. Other schemes introduce a waiting period before new members can receive assistance in order to discourage opportunistic scheme uptake (Wiesmann and Jutting, 2001).

4.3 Utilization of Healthcare Services

Consistent with the results of previous reviews our analysis shows that 77 percent of the studies (27 out of 35) find positive and statistically significant CBHI membership effects on health care utilization.¹⁹ The effect differs across the type of health care services and supports the idea that such schemes are substantially more effective in extending access to outpatient as compared to inpatient care – 86 percent of the studies find an effect on outpatient care while the corresponding figure for inpatient care is 58 percent. While the utilization of preventive and curative outpatient care may reduce the need for inpatient care (Yip et al., 2008) it is likely that the difference in the CBHI effect across types of care is due to differences in coverage for the two types of services. Several CBHI schemes do not cover both types of care

¹⁹ Utilization includes three types of outcome measures (outpatient care, inpatient care and generally utilization). Some studies under the review examine the impact of the schemes for outpatient and inpatient cares separately and the total number of utilization evidences is reported as 35 in Table 3 even if the actual number of studies that examine utilization is 28.

and if they do, inpatient care coverage has a high co-payment arrangement which is like to dissuade health care use.

4.4 Financial Protection

Eighteen studies have examined the impact of the schemes on out of pocket payment and 6 of the 18 papers have also looked at the effect of the schemes on catastrophic health expenditure. 44 percent of such studies conclude that the schemes have not achieved success in reducing OOP healthcare payments. On the other hand, the schemes have registered strong evidence (83% of the cases) in preventing catastrophic health expenditure. This implies that, even if the schemes help to reduce health care service expenditure, they may not provide adequate financial protection. In addition to the regular premium contribution, co-payment arrangement and other related costs of healthcare service utilization could continue to expose households to high out-of-pocket expenditure.

4.5 Scheme Characteristics and Scheme Effects

Variations in the relative performance of different CBHI schemes could be a result of the manner in which such schemes are designed and operated. Table 4 provides a tabulation of various scheme characteristics and their associated effects on the outcomes of interest.

Scheme type: There appears to be a clear link between scheme type and outcomes. Government-run community-involved schemes appear to be far less effective in terms of reaching out to marginalized groups as compared to community pre-payment schemes. The difference is also quite large with 86 percent of studies (6 out of 7) showing that government-schemes tend to exclude the ultra-poor as compared to 43 percent (3 out of 7) in the case of community-run NGO-supported schemes. Consistent with this pattern the studies show that government-run schemes are more successful (8 out of 9) at ensuring health care use (conditional on enrolment) as compared to both community-run (13 out of 17) and provider-run (4 out of 7) schemes. We also find that government-run insurance interventions are

more effective in providing financial protection for beneficiaries, although this does not account for the exclusion of the ultra-poor.

External financing: CBHIs differ in their financing source. Some schemes are entirely dependent on member contributions while others receive external funds in order to ensure financial sustainability and to subsidise premiums for potential beneficiaries. Access to such funds appears to be positively associated with increase in utilization (10 out of 12) and reduction in OOP expenses (7 out of 11). The differences are striking in terms of reducing OOP (only 1 out of 4 schemes is effective in reducing OOP if it does not have an access to external funds) but less effective in terms of reducing social exclusion (only 1 out of 7 studies with external funds finds a reduction in the inclusion of the poor). This pattern suggests that subsidies are benefiting the relatively wealthier members of the community and highlights the need for more effective targeting of such funds. While access to external support may have a short-run beneficial effect, continued reliance on such subsidies may undermine the sustainability of such schemes.

Contract with providers: While some community health financing schemes do not place restrictions on obtaining medical treatment from health providers in a given geographical area others sign contracts with local providers and restrict access. Such arrangements may lead to price discounts although their effect on quality of care is not so clear. The review suggests that such contractual agreements increase utilization of health care and reduce the burden of OOP payments. 79 percent of the studies (15 out of 19) show that schemes with contracts are effective in increasing utilization while the corresponding number for schemes without contracts is 67 percent (2 out of 3). Similarly, there appears to be a strong link between contractual arrangements and reduction in OOP (6 of 10 schemes with a contract find a reduction in OOP while the figure is 0 out of 2 for schemes without a contract).

Community participation: In principle it would seem redundant to examine the link between community participation in community-based health financing as the target population is expected to be engaged in various aspects of such schemes. However, as discussed in section 2, the extent to which potential beneficiaries participate in the design, implementation, management, and supervision activities

varies across schemes. Providing space for community participation may have an impact on the willingness of individuals to buy insurance and the overall performance of the scheme. The review reveals that participation of the community in design and implementation has a positive impact on healthcare utilization and financial protection. For instance, all 11 schemes in which communities have a role in programme design and implementation are associated with an increase in access to healthcare and in reducing OOP expenditure (6 out of 7) while the corresponding figures for schemes without such participation are 70 percent (7 out of 10) and 43 percent (3 out of 7) respectively. Participation of members in management and supervision activities is also linked with increases in access to healthcare service (6 out of 6) and providing financial protection (4 out of 5).

Link with microfinance institutions: As discussed above, several microfinance institutions provide micro insurance service for their members. Five studies in this review evaluate the impact of CBHI schemes which are embedded in microfinance institutions.²⁰ Such schemes appear to be effective in terms of expanding utilization but not in reducing OOP payment. However, the key advantage of microfinance embedding appears to lie in ensuring scheme access - insurance seems to be accessible for households from different socio economic strata.

5. Study Characteristics and Scheme Effects

So far the information and in particular the estimates obtained from the CBHI literature have been taken at face value. However, a reading of the papers raises several concerns, especially if the aim is to identify the causal impact of the schemes on various outcomes.

First, previous studies reveal that CBHI enrolment is often a voluntary choice and there is clear evidence of exclusion of the ultra-poor and the higher enrolment of individuals with existing medical conditions. However, except for Zhang & Wang (2008), the literature does not account for this pattern of self-selection and hence ignores the consequences of estimating the impact of CBHI on health care use and financial protection based on self-selected samples. Without accounting for this

²⁰ Gumber (2001), Ranson (2002), Ranson et al. (2006), Dror et al. (2005) and Hamid et al. (2011).

pattern of self-selection it is difficult to argue that the estimates of CBHI on health utilization should be interpreted as causal effects.

To provide a systematic assessment of the literature along this dimension, Table 5 groups the methods used in the reviewed studies into four categories. These consist of studies that have (i) Tried to control for observed and unobserved factors that may influence scheme uptake (selection effects) using techniques such as difference-in-difference (DID), Instrumental Variables (IV), and Heckman selection models (ii) Studies that have used econometric analysis (Propensity Score Matching (PSM), OLS, logit, probit) to control for a number of potentially confounding variables that may influence outcomes and scheme uptake (iii) Studies that have analysed differences in means and tested whether these are statistically significant (iv) Studies that have analyzed differences in means without conducting any statistical test. Only 2 papers out of 35 studies on utilization fall in the first category. The most common approach is to ignore (unobserved) selection effects but control for a range of observed characteristics which may have a bearing on outcomes and on scheme uptake (about 22 of 35 in the case of health utilization). The upshot is that, potentially, most of the studies in the review are likely to overestimate the effect of CBHI on utilization (since the analysis is based on samples predisposed to using more health care) and underestimate the financial protection effect (sample excludes the ultra-poor).

Second, the bulk of the studies rely on cross-section data for their analysis. Only 2 of the 24 studies that apply regression methods have used panel data (baseline and follow up) (Table 6). Access to longitudinal data permits dynamic analyses and makes it easier to control for unobserved heterogeneity which may have a bearing on outcomes and enrolment. Table 7 shows that cross sectional studies are more likely to report a statistically significant impact of CBHI schemes on health care utilization as compared to studies based on panel data. This evidence is consistent with the argument that cross sectional studies may overestimate the impact of the programme due to the inability to control for unobservable time invariant factors which may influence scheme uptake and outcomes.

Third, a key determinant that may influence participation in CBHIs and scheme effectiveness is the availability and quality of healthcare facilities. While a number of studies (17 out of 24) control for the availability of health care (e.g., distance to nearest health facility), there are very few examples (3 out of 24) of studies that control for the quality of care (e.g., educational background of health professionals, availability of drugs and medical equipment, perception of the community about the quality of service) (Table 6). The current review reveals that empirical studies on utilization outcome tend to find significant impact of CBHI when variables related to health care supply are omitted from the analysis (Table 7).

Based on his review, Ekman (2004) concluded that, “overall, the evidence base is limited in scope and questionable in quality” and only 5 of the 36 papers reviewed were considered high quality. Since then there has been a clear improvement in the quality of the literature. For instance, about 20 of the 36 papers now use statistical regression analysis, an important marker of quality in Ekman’s quality assessment protocol. However, the burden of proof needed to obtain convincing effects has also risen since 2004 and based on current standards a convincing causal analysis of interventions such as the CBHI calls for the use of baseline and follow up data, information on treatment and valid controls and the use of appropriate statistical methods to control for the endogenous nature of CBHI participation. The current review shows that only two studies based on data from China (Yip et al., 2008; Zhang & Wang, 2008) use baseline and follow-up data and control for self-selection effects²¹. At the moment these two may be considered the best examples of impact assessment in the CBHI literature.

6. Summary and Conclusion

A number of community-based health insurance schemes are operating in several low and middle-income countries. Such schemes may be thought of as a hybrid between traditional risk sharing and market based insurance arrangements.

²¹ Furthermore, out of the 20 studies that apply regression techniques, 6 papers (Chankova et al. (2008), Msuya et al. (2007), Gnawali et al. (2009), Robyn et al. (2011), Saksena et al. (2011) and Schneider & Diop (2001)) report one regression result per outcome variable without a sensitivity analysis.

Matching the increased attention paid to such health financing arrangements as a policy option, empirical studies assessing the effects of such schemes have also proliferated.

The aim of this paper was to provide a systematic review of the existing empirical evidence on the operation and effectiveness of such schemes with a focus on three outcomes – access to schemes, and their effect on health care utilization and financial protection. In addition to summarizing the evidence, the paper analysed the link between key scheme design characteristics and their effect on outcomes and finally commented on the quality of the empirical work.

Despite their avowed aim, the review shows that the ultra-poor are often excluded from accessing CBHI schemes. Even if they do enrol, the lowest income groups are less likely to use health care services due to their inability to bear other costs (transportation and opportunity) associated with accessing health care. This implies that there should be target subsidy or fee waiver arrangement for the poorest segment of the community in order to create access to insurance and thereby access to care for those who cannot afford for health insurance. There is also considerable evidence that individuals with pre-existing health conditions are more likely to enrol. The bulk of the studies report that access to CBHI is associated with increased health care utilization, especially with regard to the use of relatively cheaper outpatient care services as opposed to inpatient care. However, it should be noted that the increase in outpatient care utilization indirectly reduce the need for inpatient care. This is due to the fact that early visit to health facilities can reduce the need for prolonged and expensive hospitalization. Therefore, focusing on the preventive and curative care services in relation to the introduction of CBHI scheme in low and middle-income countries is more effective and less costly method. This indicates that CBHI scheme should mainly focus on creating access to outpatient care which could indirectly reduce the need for more expensive inpatient care. The schemes also appear to mitigate catastrophic healthcare expenditure.

The review also assessed the link between scheme characteristics and effectiveness. Government-run schemes appear to be better in terms of ensuring health care access and reducing OOP expenditure as compared to community-run schemes.

However, community-run schemes seem to be stronger in terms of reaching out to marginalized groups. Schemes that have access to external sources of financing, in addition to premiums, are more effective in providing financial protection and expanding access to healthcare services but not at reaching out to the ultra-poor. This pattern suggests that subsidies are more likely to flow to the relatively better-off. Scheme access and effectiveness also appears to be stronger in schemes where the community plays a substantial role in scheme design and implementation. The review reveals that participation of the community in design and implementation has a positive impact on healthcare utilization and financial protection. The policy implication of this finding is that CBHI scheme should be designed and implemented considering the local context and with the participation of the target community.

Notwithstanding the stylized facts that seem to be emerging from the review, the quality of the underlying research base needs to be carefully considered. While there seems to be a greater recognition of the need to control for self-selection and the endogeneity between CBHI uptake and outcomes, the bulk of papers (29 out of 35) continue to ignore self-selection and only two papers use baseline and follow-up data to identify causal effects.

On content, the review suggests that future work on scheme uptake needs to include an assessment of the role of the quality and availability of health care facilities in determining such choices. Furthermore, it is important not only to analyse uptake but to assess changes in uptake over time and to analyse factors that lead to continued enrolment and/or scheme dropout. While understandably the literature tends to focus on the effects of CBHI on utilization and financial protection, analyses should also probe the effects of the availability of insurance on the quality and quantity of health care services. From a methodological and policy perspective, future work on such schemes needs to push the envelope by attempting to gather and analyse longitudinal data (baseline and follow up) and to control for unobserved heterogeneity which may be driving scheme uptake and outcomes. Increases in the quality of the evidence base are essential in order to judge whether community-based schemes are a viable long-term health financing strategy.

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Appendix

Table 1: Common modalities of community health financing

Type of modality	Design features	Management features	Organizational and institutional features	Role of government and NGOs	Role of the community	Strong side of the scheme	Weakness of the scheme
Community prepayment health organizations	Financed by contribution from members	Strong community involvement in decision making and supervision	The provider is not involved in the administration of the scheme	NGOs often provide technical assistance and provide start-up funds	Pay premiums All round community involvement in design, implementation and supervision	Trust and feeling of ownership	Small size in nature and low ability to pool enough resources
	Small financial contribution mainly to cover primary health care services		The schemes may sign contractual agreement with local providers to obtain preferential prices and insure quality of services	Governments provide legal recognition and encourage their establishment			Lack of technical and managerial skills about health insurance administration
	Membership is on a voluntary basis						
Provider based health insurance schemes	Designed by local health care providers (hospitals) to encourage service utilization	Providers involved in scheme management	Providers administer the schemes and collect premiums from	NGOs and governments may improve the facility of the providers	Pay premiums Provide feedback on quality	Does not require management and technical skills from the community	Limited scale
	Often cover expensive inpatient care Membership is on a voluntary basis		Providers may obtain technical assistance from the government and NGOs.			Scheme management and service provision are integrated	Relatively low power of the community to influence benefit package and quality of care
Government-run community-involved health insurance	Designed by governments as part of the health financing system	Schemes are organized and managed through a top-down approach by central and local governments but the community may also be involved in decision making processes	Government are strongly involved in the design, implementation, and evaluation of the scheme.	Government and NGOs may subsidise the scheme and provide exemption from premium payment for lower income groups	Pay premiums Communities may be involved in design and administration of the schemes	The possibility of subsidized premiums	Limited feeling of community-ownership
	Often includes both primary care and hospitalization					Large size of scheme and enhanced sustainability	Potentially high administrative costs
	Membership may voluntary or mandatory						

Source: Adapted from Jakab & Krishnan (2001), Arhin-Tenkorang (2001) and Ekman (2004)

Table 2: List of papers included in the review⁵⁸

Author(s)	Country	Scheme	SchemeType ⁵⁹	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Aggarwal (2010)	India	Yeshasvini Health Care programme	Gov't	2008	No	Outpatient care	Logit model	Sig. pos. effect	The study attempts to reduce selection bias but baseline differences between treatment and control groups are not controlled.
						Social exclusion	Logit model	Sig. pos. effect	
Atim (2000)	Ghana	Nkoranza hospital insurance Scheme	Provider	1998	No	Adverse selection	Simple descriptive	Sig. pos. effect	The study compares the socio-economic status of insured households.
Carrin et al. (1999)	China	RCMS	Gov't	1993 & 1995	Yes	OOP payment	Simple descriptive	Reduction in health care costs ⁶⁰	The study collects baseline information but does not use it appropriately. The analysis on financial protection effect is based on descriptive analysis.
Chankova et al. (2008)	Ghana	Nkoranza hospital scheme	Provider	2004	Yes	Outpatient care	Logit model	Sig. pos. effect	The conclusions are based on a single regression result per country and per outcome.
						Inpatient care	Logit model	No effect	
	Mali	Bla and Sikasso scheme	Com'ty	2004	Yes	OOP payment	Log-linear	No effect	
						Outpatient care	Logit model	Sig. Pos. effect	
	Senegal	Thie's region 27 schemes	Com'ty	2004	Yes	Outpatient care	Logit model	No effect	
						Inpatient care	Logit model	Sig. Pos. effect	
						OOP payment	Log-linear	No effect	

⁵⁸ The total number of schemes is 42 while the number of papers is 36. Chankova et al. (2008), Diop et al., (2006) and Smith & Sulzbach (2008) provide comparative analyses of schemes operating in three different countries.

⁵⁹ 'Scheme type' indicates whether the scheme is a community prepayment health organization (Com'ty); Health care provider initiated insurance scheme (Provider) or a Government-run community-involved health insurance scheme (Gov't).

⁶⁰ Effective reimbursement rate for outpatient visits reduce up to 50% and that of inpatient admission up to 56.1% in the best performing counties.

Author(s)	Country	Scheme	SchemeType	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Chee et al. (2002)	Tanzania	Hanang district health fund	Gov't	2001	No	Adverse selection	Descriptive statistics	Sig. pos.effect	The results are based on healthcare service utilization data obtained from selected providers and the sample may not be representative.
						Outpatient care	Descriptive statistics	Sig. Pos. effect	
Criel and Kegels (1997)	Congo	Bwamanda hospital health insurance	Provider	1986 - 1995	Yes	Inpatient care	Descriptive statistics	Sig. Pos. effect	Does not control for differences between the socio-economic and demographic characteristics of insured and uninsured groups.
Desmet (1999)	Bangladesh	Gonosasthya	Com'ty	1995	Yes	Inpatient care	Simple descriptive	Sig. Pos. effect	Data is from healthcare providers. Does not control for differences between the characteristics of insured and uninsured households..
						Outpatient care	Simple descriptive	Sig. Pos. effect	
						OOP payment	Simple descriptive	No effect	
Devadasan et al. (2007)	India	ACCORD	Provider	2004	Yes	OOP payment	Descriptive statistics	Sig. Neg. effect	The data were obtained from insurance claimants who were hospitalized during the study period. There is no control group.
						Catastrophic OOP	Descriptive statistics	Sig. Neg. effect	
Diop et al. (2006)	Ghana	Nkoranza hospital insurance Scheme	Provider	2004	No	Inpatient care	Logit model	No effect	The study does not control for the endogeneity of scheme participation.
	Mali	Bla and Sikasso scheme	Com'ty	2004	No	Adverse selection	Logit model	Sig. pos.effect	
						Outpatient care	logit model	sig pos. effect	
	Senegal	26 Mutual Health Organizations	Com'ty	2004	No	Adverse selection	Logit model	Sig. pos.effect	
Social exclusion						Logit model	No effect		
						Outpatient care	Logit model	No effect	

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Author(s)	Country	Scheme	Scheme Type	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Dror et al. (2009)	India	Uplift Health	Com'ty	2005	Yes	OOP payment	Descriptive statistics	No effect	In addition to the household survey, the study collects and uses information by interviewing managers of the scheme. However, the study does not control for differences in socio- economic and other household characteristics between insured and uninsured households.
						Social exclusion	Descriptive statistics	No effect	
Dror et al., 2005)	Philippines	Six micro health insurance units	n/a ⁶¹	2002	Yes	Inpatient care	Descriptive statistics	Sig pos. effect	The data has been collected through field surveys. Robustness of results has been examined. Evidence of selection bias which is not controlled for.
						Outpatient care	Descriptive statistics	Sig pos. effect	
						Adverse selection	Descriptive statistics	No effect	
Franco et al. (2008)	Mali	Four mutual health organizations in Bla and Sikasso	Com'ty	2004	Yes	Outpatient care	Probit model	Sig pos. effect	Does not control for selection bias.
						OOP payment	OLS	Sig. neg.effect	
						Social exclusion	Logit model	No effect	
Galárraga et al. (2010)	Mexico	Seguro Popular (SP)	Gov't	2006	Yes	Catastrophic OOP	Instrumental variables	Sig. neg. effect	The study applies instrumental variables techniques on cross sectional data to deal with endogeneity and self-selection problems in insurance enrollment decisions.
						OOP payment	Instrumental variables	Sig. neg. effect	
Gnawali et al. (2009)	Burkina Faso	Nouna CBI	Com'ty	2006	Yes	Inpatient care	PSM	No effect	The study applies PSM on cross-section data. Does not control for unobserved differences between treatment and control.
						Social exclusion	Logit model	Sig. pos.effect	
						Outpatient care	PSM	Sig. pos. effect	

⁶¹ There is no clear information on establishment and management of the schemes

Author(s)	Country	Scheme	Scheme Type	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Hamid et al. (2011)	Bangladesh	Grameen Bank	Provider	2006	No	Utilization	Probit model	Sig. pos. effect	The paper considers endogeneity and spill-over effects of the programme. However, lack of longitudinal data limits the ability of the paper to deal with such issues.
Jowerr et al (2003)	Vietnam	Vietnam's voluntary insurance	Gov't	1999	Yes	OOP payment	Heckman, OLS	Sig. neg. effect	The paper addresses scheme self-selection bias using cross-section data.
Jutting (2003)	Senegal	Les mutuelles de santé	Com'ty	2000	No	Social exclusion	Probit Regression	Sig. pos. effect	The study pays limited attention to potential bias due to unobservable factors that may drive scheme uptake
Jutting (2004)	Senegal	Les mutuelles de santé	Com'ty	2000	Yes	OOP payment Inpatient care	Log-linear Logit model	Sig. neg. effect Sig. pos. effect	The study emphasises endogeneity and self-selection issues.
Lammers and Warmerdam (2010)	Nigeria	Health Insurance Fund (HIF)	Com'ty	2008	No	Adverse selection Social exclusion	Logit model Logit model	Sig. pos. effect Sig. pos. effect	Based on cross-section data. Conducts a sensitivity analysis.
McCord (2001)	Cambodia	GRET	Com'ty	2000	No	OOP payment Inpatient care Outpatient care	Simple descriptive Simple descriptive Probit model	No effect Sig. pos. effect Sig. pos. effect	The study does not deal with self-selection issues.
Msuya et al. (2007)	Tanzania	Igunga district health insurance fund	Gov't	2000	Yes	OOP payment Social exclusion	Descriptive statistics Probit model	Sig. neg. effect Sig. pos. effect	The conclusions are based on one regression per outcome variable. No sensitivity analysis. Does not deal with self-selection issues.
Noterman et al (1995)	De Congo	Masisi referral hospital	Provider	1987-1990	Yes	Inpatient care	Simple descriptive	Sig. pos. effect	The study uses an experimental approach. However, the program was not implemented randomly across eligible households and there is evidence of adverse selection.

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Author(s)	Country	Scheme	Scheme Type	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Onwujekwe et al. (2009)	Nigeria	Anambra state CBHIs	Gov't	n/a	Yes	Social exclusion	Descriptive statistics	No effect	The SES of the respondents is not properly defined.
Ranson (2002)	India	Women's Association's Medical Insurance Fund	Com'ty	1994-2000	No	Catastrophic OOP	Descriptive statistics	Sig. neg. effect	Paper is based on data from reimbursement claims submitted between 1994 and 2000.
						OOP payment	Descriptive statistics	Sig. neg. effect	
Ranson et al. (2006)	India	Self-Employed Women's Association's (SEWA)	Com'ty	2004	Yes	Social exclusion	Descriptive statistics	No effect	The study uses well-argued measures of socio economic status in order to see the impact of the schemes across different income groups. However, does not deal with self-selection issues.
Rao et al. (2009)	Afghanistan	Parwan and Saripul Community Health Funds	Gov't	2004 & 2006	Yes	Utilization	Descriptive statistics	Sig. pos. effect	This study uses longitudinal data with baseline information. However, the paper applies descriptive analysis and does not use the the panel data to control for differences between control and treatment groups.
						OOP payment	Descriptive statistics	No effect	
Robyn et al (2011)	Burkina Faso	Nouna District CBHI scheme	Com'ty	2007	Yes	Utilization	Logit model	Sig. pos. effect	Despite the lack of panel data, the paper tries to deal with selection on observables by minimizing differences between treatment and control groups.
Saksena et al. (2011)	Rwanda	Mutuelles	Gov't	2005-06	Yes	OOP payment	Logit model	Sig neg. effect	The results are based on cross sectional data and there is no sensitivity analysis. Paper checks for endogeneity of enrolment using a Durbin-Wu-Hausman test, which is unable to reject exogeneity of enrolment.
						Catastrophic OOP	Logit model	Sig. neg. effect	
						Utilization	Logit model	Sig. pos. effect	
Schneider and Diop (2001)	Rwanda	Byumba, Kabgayi, and Kabutare prepayment plan pilot	Gov't	2000	No	Utilization	Logit model	Sig pos. effect	The paper does not pay attention to endogeneity of enrolment. A single regression is estimated for each outcome variable.
						OOP payment	Log-linear	Sig neg. effect	

Author(s)	Country	Scheme	Scheme Type	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Senchanthixay (2005)	Lao	Sisattanak district CBHIs	Gov't	2004	No	Outpatient care	Simple descriptive	Sig pos. effect	Simple mean comparisons (without any statistical test) are used. Does not control for difference in income and individual characteristics of insured and uninsured patients.
						Inpatient care	Simple descriptive	No effect	
Shimeles (2010)	Rwanda	Mutuelles	Gov't	2005-06	No	Utilization	PSM, probit model	Sig. pos. effect	Despite the lack of longitudinal data, a range of methods are applied and the robustness of the findings are tested using alternative parametric regressions and propensity score matching techniques.
						OOP payment	PSM, probit model	Sig. neg. effect	
						Social exclusion	Probit model	Sig. pos.effect	
						Catastrophic OOP	PSM, probit model	Sig. neg. effect	
Smith and Sulzbach (2008)	Ghana	Nkoranza hospital scheme	Provider	2004	Yes	Utilization	Logit model	No effect	The study does not control for several important factors like access to health care and education for all comparable countries.
	Mali	Bla and Sikasso scheme	Com'ty	2004	Yes	Utilization	Logit model	Sig pos. effect	
	Senegal	Thie`s region 27 schemes	Com'ty	2004	Yes	Utilization	Logit model	Sig pos. effect	
Sun et al. (2009)	China	Shandong province medical scheme	Gov't	2004	Yes	Catastrophic OOP	Descriptive statistics	No effect	The study is based on comparing health expenditure before and after reimbursement of insurance claims without any control group.
						OOP payment	Descriptive statistics	No effect	
Wang et al. (2005)	China	Fengshan Township CBI	Gov't	2002	Yes	Adverse selection	Logit model and OLS	Sig. pos.effect	Unlike many studies, the study examines adverse selection in insurance enrolment across different health conditions and income groups at the same time.
						Social exclusion	Logit model and OLS	Sig. pos.effect	

Author(s)	Country	Scheme	Scheme Type	Year of study	Pub. status	Outcome variable	Method of analysis	Findings	Remarks
Yip et al. (2008)	China	Rural Mutual Health Care (RMCH)	Com'ty	2002 & 2005	No	Inpatient care	DID, PSM	No effect	The paper uses appropriate methods and data from longitudinal household surveys canvassed before and after the intervention from both treatment and control groups.
						Outpatient care	DID, PSM	Sig. pos. effect	
Zhang and Wang (2008)	China	Fengsan Township CBHI scheme	Gov't	2002 - 2006	No	Social exclusion	DID	Sig. pos.effect	The results are based on a 4-year longitudinal survey. Random effect logit models have been used to control for potential sources of bias.
						Adverse selection	DID	Sig. pos.effect	

Table 3: Effect of CBHI on outcomes

Outcome	Schemes displaying an effect ⁶²		Schemes with no effect		Total
	%	N	%	N	
Utilization	77.14	27	22.86	8	35
Outpatient care	85.71	12	14.29	2	14
Inpatient care	58.33	7	41.67	5	12
OOP healthcare payment	55.56	10	44.44	8	18
Catastrophic OOP	83.33	5	16.67	1	6
Social exclusion	64.29	9	35.71	5	14
Adverse selection	85.71	6	14.29	1	7

⁶² Effect indicates whether the studies find (i) statistically significant and positive effects of CBHI schemes on utilization of health care (ii) statistically significant effects in terms of reducing OOP payment (iii) whether the poor are statistically less likely to access CBHI and (iv) whether those with existing health conditions are statistically more likely to access CBHI.

Table 4: The effect of scheme characteristics on outcomes

CBHI Characteristics	Utilization				OOP Payment				Social Exclusion			
	Effect		No effect		Effect		No effect		Effect		No effect	
	%	N	%	N	%	N	%	N	%	N	%	N
Scheme Type:												
Gov't	88.89	8	11.11	1	66.67	6	33.33	3	85.71	6	14.29	1
Community Provider	76.47	13	23.52	4	37.50	3	62.50	5	42.86	3	57.14	4
External fund ⁶³												
Support	83.33	10	16.67	2	63.64	7	36.36	4	85.71	6	14.29	1
No support	75.00	9	25.00	3	25.00	1	75.00	3	66.67	2	33.33	1
Contract with providers												
Signed agreement	78.95	15	21.05	4	60.00	6	40.00	4	57.14	4	42.86	3
No agreement	66.67	2	33.33	1	0.0	0	100.0	2	66.67	2	33.33	1
Community participation												
Part. in design ⁶⁴	100.0	11	0.0	0	85.71	6	14.29	1	75.00	3	25.00	1
Not part. in design	70.00	7	30.00	3	42.86	3	57.14	4	80.00	4	20.00	1
Part in implementation ⁶⁵	100.0	6	0.0	0	80.00	4	20.00	1	60.00	3	40.00	2
Not part. in implementation	81.25	13	18.75	3	40.00	4	60.00	6	66.67	4	33.33	2
Microfinance linked schemes ⁶⁶	100.0	2	00.0	0	33.33	1	66.67	2	00.0	0	100.0	2

⁶³ External fund indicates any financial support to the scheme from governments or any development organization in order to (partially) cover administrative costs or to provide subsidized premiums.

⁶⁴ Participation in design stage indicates that the target population was given a chance to participate in the establishment of CBHI schemes.

⁶⁵ Participation in implementation indicates that members of the community are involved in managing and supervising schemes.

⁶⁶ Schemes that are linked to existing microfinance services.

Table 5: Research methods

Method	Utilization		OOP health expenditure		Social Exclusion		Adverse selection	
	%	N	%	N	%	N	%	N
DID/ IV/Heckman	5.71	2	16.67	2	7.14	1	14.29	1
Logit/ PSM/Probit/OLS	62.86	22	33.33	7	64.28	10	57.14	4
Descriptive with statistical test	11.43	4	33.33	6	21.43	3	14.29	1
Descriptive without statistical test	20.00	7	16.67	3	7.14	1	14.29	1

Table 6: Study characteristics and outcomes

(only studies that apply regression analysis)

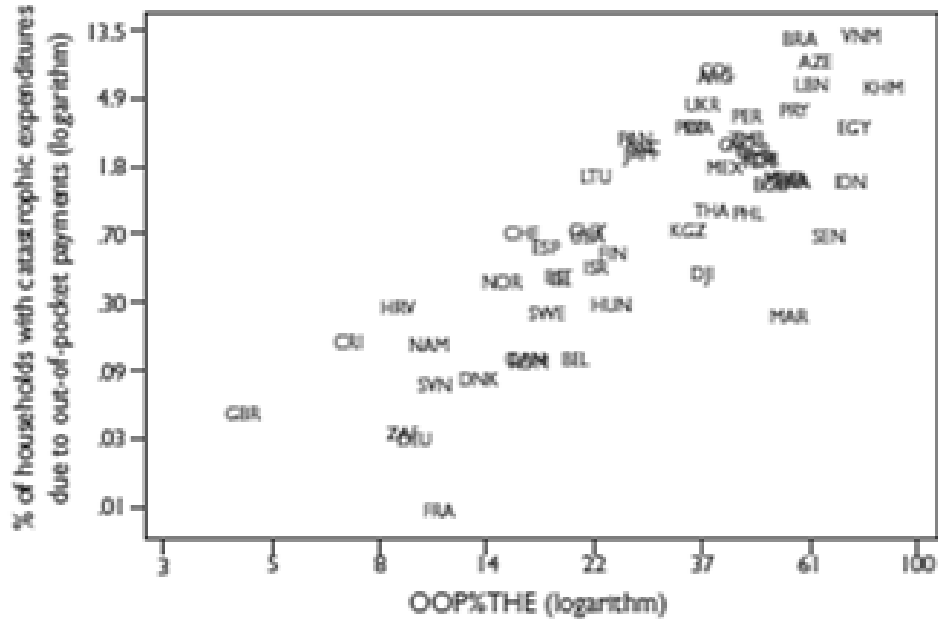
Study characteristics	Utilization		OOP health expenditure		Social Exclusion		Adverse selection	
	%	N	%	N	%	N	%	N
Source of data								
Primary	41.67	10	22.22	2	60.00	6	80.00	4
Secondary	58.33	14	77.78	7	40.00	4	20.00	1
Level of Analysis								
Household	41.67	10	44.44	4	30.00	3	0.00	0
Individual	58.33	14	55.56	5	70.00	7	100.0	5
Data type								
Cross-section	91.7	22	100.0	9	90.00	9	80.00	4
Panel	8.3	2	0.0	0	10.00	1	20.00	1
Baseline information	8.33	2	0.0	0	10.00	1	20.00	1
Set-up and field survey info ⁶⁷	29.17	7	22.22	2	50.50	5	20.00	1
Control for health facility supply	70.80	17	55.56	5	70.00	7	60.00	3
Control for perceived healthcare quality	12.50	3	0.0	0	20.00	2	0.0	0

⁶⁷ Indicates whether the paper uses qualitative information (set up of CBHI schemes, organizational structure, and the perception of the community about the relevance of the schemes) to inform the quantitative analysis.

Table 7: The effect of study characteristics on outcomes

Study characteristics	Utilization				OOP Payment				Social Exclusion			
	Effect		No effect		Effect		No effect		Effect		No effect	
	%	N	%	N	%	N	%	N	%	N	%	N
Source of data												
Primary	70	7	30	3	100.0	2	00.0	0	66.67	4	33.33	2
Secondary	71.43	10	28.57	4	71.43	5	28.57	2	85.71	6	14.29	1
Level of Analysis												
Household	80	2	20	2	100.0	4	00.0	0	66.67	2	33.33	1
Individual	64.29	9	35.71	5	60.00	3	40.00	2	77.78	7	22.22	2
Data type												
Cross-section	72.73	16	27.27	6	77.78	7	22.22	2	77.78	7	22.22	2
Panel	50.00	1	50.00	1	00.0	0	00.0	0	100.0	1	00.0	0
Baseline info												
Controlled	50.00	1	50.00	1	00.0	0	00.0	0	100.0	1	00.0	0
Not controlled	72.73	16	27.27	6	77.78	7	22.22	2	77.78	7	22.22	2
Set-up and field survey info												
Controlled	85.71	6	14.29	1	100.0	2	00.0	0	80.00	4	20.00	1
Not controlled	64.71	11	35.29	6	71.43	5	28.57	2	80.00	4	20.00	1
Health facility supply												
Controlled	64.71	11	35.29	6	60.00	3	40.00	2	71.43	5	28.57	2
Not controlled	85.71	6	14.29	1	100.0	4	00.0	0	100.0	3	00.0	0
Perceived healthcare quality												
Controlled	66.67	2	33.33	1	00.0	0	00.0	0	100.0	2	00.0	0
Not controlled	71.43	15	28.57	6	77.78	7	22.22	2	75.00	6	25.00	2

Figure1: The relation between the share of households with catastrophic expenditures and percentage of out-of-pocket payment in total health expenditures (OOP% THE), based on surveys in 59 countries



Source: Xu et al (2003) Understanding Household Catastrophic Health Expenditures: a Multi-country Analysis