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FOREWORD

The Ethiopian Economic Association (EEA) and its Hawassa Chapter are happy to issue the proceeding of the Second Annual Conference on the Southern Nations and Nationalities Peoples Regional State (SNNPRS) Economic Development which was organized on the 1st March, 2009 at Regional State Bureau of Finance and Economic Development Conference Hall.

In quest of its mission, EEA has been actively engaged in economic research, training, organization of International and National conferences and round table discussions on the Ethiopian economy and the dissemination of the results of these activities through its various publications. It has also been engaged in providing professional opinion and reflections on many issues affecting the development of this country.

EEA organized this important conference as one of its objectives of broadening its activities and coverage at regional level so as to contribute to the economic advancement of regional state through dissemination of economic research findings; promotion of dialogue on 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 Second Annual Conference on the Regional State Economic Development was attended by about 150 participants drawn from Regional Bureaus, Universities, NGOs, private sector representative and EEA members in the region. The conference presentation and discussions thereof covered divers themes. These included: Population, informal sector employment, Agricultural extension and efficiency and water supply.

All papers which were presented at the Second 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 Second Annual Conference on the SNNPRS 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 Second Annual Conference meaningful. The Regional State Bureau of Finance and Economic Development deserves huge thanks for granting us free use of its conference hall and facilitating the organization of the conference. The many professionals who dedicated their time to the conference and served as chairpersons deserve due thanks for their special contributions.

The staffs of the Economics Department of the Hawassa University which runs the EEA Hawassa Chapter and the staff of EEA Secretariat deserve a special recognition for their passion and perseverance in managing the conference from inception to completion.

I would like to seize this moment to express our gratitude to the Consortium of Donors who have funded the conference and all other activities of EEA and maintained continued interest in our Association. These are: Friedrich Ebert Stiftung of Germany (FES), Embassies of UK (DFID), Ireland (DCI), Sweden (SIDA), the Netherlands, Norwegian Church Aid, the African Capacity Building Foundation (ACBF) and International Development Research Centre (IDRC) of Canada.

Finally, I would like to extend my sincere gratitude to Ato Hailebirhan Zena, Head of Bureau of Finance and Economic Development of SNNPRS for his insightful opening remarks; and other senior regional government officials who spared their busy schedule and participated in the conference. I would like also to thank Dr. Yosph Mamo, President Hawassa University, for his welcoming address and continued support to EEA Hawassa Chapter.



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

TABLE OF CONTENTS

**POPULATION-LAND PRESSURE, RURAL YOUTH OUTMIGRATION AND
FERTILITY IN SELECTED WOREDAS OF AMHARA AND SNNP REGIONS OF
ETHIOPIA: A COMPARATIVE ANALYSIS.....1**

Assefa Hailemariam, Charles Teller, Degnet Abebaw and Fitsum Z.
Mulugeta

**THE ROLE OF INFORMAL SECTOR EMPLOYMENT IN POVERTY ALLEVIATION:
THE CASE OF HAWASSA CITY, ETHIOPIA.....23**

Tefera Darge

**TECHNICAL EFFICIENCY OF SMALLHOLDER MAIZE PRODUCERS IN ETHIOPIA:
THE CASE OF WOLAITA AND GAMO GOFA ZONES.....41**

Endrias Geta, Ayalneh Bogale, Belay Kassa, Eyasu Elias

**WILLINGNESS TO PAY AND COST RECOVERY OF URBAN DRINKING WATER
SUPPLY: A CHOICE MODEL APPROACH.....55**

Solomon Tarfasa

**DEVELOPMENT CHALLENGES IN THE AGE OF CLIMATE CHANGE: THE CASE
OF SIDAMA69**

Seyoum Yunkura Hameso

POPULATION-LAND PRESSURE, RURAL YOUTH OUTMIGRATION AND FERTILITY IN SELECTED WOREDAS OF AMHARA AND SNNP REGIONS OF ETHIOPIA: A COMPARATIVE ANALYSIS¹

Assefa Hailemariam², Charles Teller³, Degnet Abebaw⁴ and Fitsum Z. Mulugeta⁴

Abstract

This study attempts to bring the issue of rural youth out-migration to the research and policy agenda. Increasing rural population in Ethiopia posed the challenge of acquiring farm land or a diminishing land size for the youth as compared to previous generations. The study attempts to shed some light on the linkages between youth migration and the fertility situation of the migrant sending households. This study uses rural household data collected from West Gojjam (in Amhara region) and Wolaitta zones (in SNNP region), which were found to be the main source areas of youth in-migrants of Addis Ababa based on a rapid mapping survey. The approach the study used is mainly descriptive. The study found differences in different characteristics of households both across location and between migrant sending households and those households that do not have any member migrated out. The characteristics that these differences are noted include household wealth, household headship, household size, fertility and fertility preference, contraceptive knowledge, awareness and practice.

Key words: Migration, youth migration, fertility, contraceptive, unmet need, rural Ethiopia

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1. Introduction

The Ethiopian population can be described as one that is growing fast. But recently it has begun to slowdown in its average annual growth rate, from 2.9 (1984-1994) to 2.6 percent between 1994 and 2007. Demographically, the country is mainly dominated by children and youth. According to the 2007 population and housing census, Ethiopian had 73.9 million inhabitants. Out of this 66 percent were below the age of 25years. The rural population of Ethiopia is around 83.9 percent of the total (CSA 2008). The main source of livelihood of this large rural population is agriculture. The rapid population growth has resulted in the decline of average land holding and increased population pressure.

Rural youth is most affected due to this population pressure. Acquiring land is a major challenge for this portion of the population and when they do get land, it is most likely to be a smaller one, on average, as compared to the previous generation. This and some additional factors play important role in inducing rural out-migration of the youth. This trend is easily noticeable from the increasing number of unskilled youth in-migrants in the streets of Addis Ababa.

Studies like Adams (2005) suggest that migration and remittances have important role in poverty reduction. Households receiving remittance are more likely to spend more on health and education than non-migrant households. The findings of these studies suggest that out-migration and remittance could reduce fertility rate through its effect on education and health in the source households, though rigorous investigation is needed to support the claim. Most of such studies focus on the effect of migration on the fertility outcomes of the migrants. Unlike these studies, our analysis focuses on the migrant sending households of rural Ethiopia rather than the migrants themselves.

This study attempts shed light on the situation by studying the two major rural places of origin of youth migrants in Addis Ababa: West Gojjam zone of Amhara Regional state and Wolaitta zone of Southern Nations, Nationalities and Peoples Region (SNNPR). In this study primary data on key indicators such as household characteristics, migration status, networking and information transfers,

employment, asset holding, access to infrastructure and fertility and family planning has been collected and analyzed.

The remaining part of this paper is organized as follows. Section II below will present a summary of studies conducted in this area. Section III will present the approach used for the study while Section IV presents the findings. Finally Section V will conclude with some conclusions and recommendations.

2. Review of Previous Works

Several researchers have found compelling evidence that migration and remittances have an important role for poverty reduction. Using data for Guatemala, Adams (2005) finds that the remittance receiving households spend more on health than do other households. There are also other studies, such as Acosta (2006) that reported the direct and beneficial effect of remittances for stimulating schooling participation of children. From these pieces of evidence, one may argue that out-migration and remittances could reduce fertility rate via its effect on education and health in the source households. However, a rigorous testing of the impact of migration and remittances on fertility of source households remains largely unknown.

Recently, Biene et al. (2009) and Naufal and Vargas-Silva (2009) have studied the impact of migration on fertility rate using data on international migration and remittance flows. Having assessed the direct relationship between international migration and home country fertility, Biene et al. (2009) concluded that south-north migration can lead to a reduction in fertility rates and thus contribute to a reduction in home country population pressure by serving as a channel for the transfer of low fertility norms and by raising the incentive to acquire education. While also emphasizing the need for further research on the issue, the authors drew some policy implications that out-migration is not only reducing population pressure in the short run but also reduces fertility of an area over time. Findings of empirical studies using similar data but using a different modelling approach were also consistent with the aforementioned findings (Naufal and Vargas-Silva, 2009).

As the effect of international migration on fertility is different from the impact of internal migration on fertility, inferences cannot be made about the interactions of

fertility with regard to population movement within the national territory where out-migrants are not necessarily exposed to different socio-cultural environment and have access to better employment opportunities and infrastructure facilities. This usually happens due to differences in the determinants and impacts of migration on welfare depending on the type of migration: international versus internal. Using data for Burkina Faso, Wouters (2008) for instance, has pointed out that compared to internal migration, the welfare gains from international migration is limited and concluded that this is because “the beneficiaries of international migration do not include the rural poor.”

Theoretically, migration influences the fertility behavior of migrants and of migrants’ households who are staying behind. A number of studies on migration, nonetheless, tend to focus mainly on investigating the relationship between migration and migrants’ own fertility behavior (Goldstein and Goldstein, 1981; Brickerhoff, 1994; Bilsborrow, 1998). It is thus obvious that existing literature has neglected the other important aspects of migration such as the link between household fertility and out-migration and the impact of such out-migration on their fertility then after. In this study, we focus on the former - the fertility behavior of households from which members are moving out.

3. Approach

This study uses data from a survey conducted by Ethiopian Economics Association. The survey was conducted in two phases. The first phase of the survey was conducted in Addis Ababa to identify the main rural sources of unskilled youth in-migrants of Addis Ababa. There were 1,198 unskilled youth migrants interviewed during this mapping survey. Sampling was subjective since it was difficult to find a comprehensive list for such a target population. Rather the survey was conducted by interviewing shoe-shiners, parking attendants, daily laborers and others between ages 15 and 29 years.

The two major sources of youth in-migrants in Addis Ababa were identified from the first phase of the survey, the urban youth survey, by asking the respondents where they were from originally. The urban youth survey was conducted during January and February 2011. According to the results of the urban mapping survey, the main

migrant sending areas were found to be Wolaitta Zone from SNNPR and West Gojjam Zone from Amhara Region. The woredas⁵ that were most frequently reported were Kindo Didaye from Wolaitta and Mecha from West Gojjam. In addition to these two woredas, main peri-urban areas near the zonal capitals were chosen for comparison. These peri-urban areas were Sodo Zuria of Wolaitta and Bahr Dar Zuria of West Gojjam.

A two-stage random sampling method was used to draw sample households within the chosen woredas. First, random samples of kebeles were selected based on a sampling frame of list of kebeles found in the study woredas. Second, within the chosen kebeles the sample households were drawn following a systematic random sampling technique. The sample households were drawn based on an updated household list in each Kebele. The survey covered 839 households located in 24 kebeles in the SNNPR and Amhara regions (see Table 1). In other words, the study covered about 35 households in each study kebele.

Table 1. Distribution of Household samples in SNNPR and Amhara region

Woreda	Sample households	Percent
SNNPR-Wolaitta		
Sodo Zuria woreda	210	25
Kindo Didaye woreda	210	25
Amhara-West Gojjam		
Bahr Dar Zuria Woreda	210	25
Mecha woreda	209	25
Total sample households	839	100

4. Findings

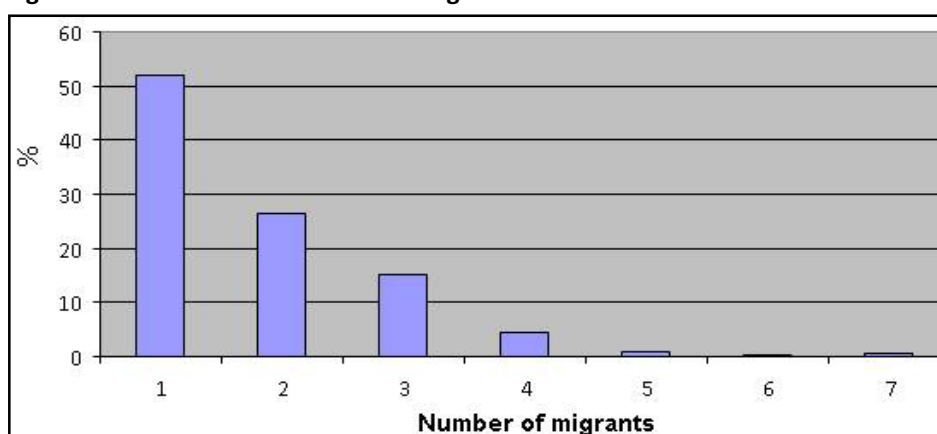
a. Household characteristics

For the purpose of our analysis we grouped household as a migrant and non-migrant. A migrant household is one with at least one member who permanently left the household to live in a woreda which is outside of the household's woreda in the past ten years. If there is no such migration in the household in the past ten

⁵ A Woreda is a district that is composed of smaller administrative units (the smallest administrative units in Ethiopia) called Kebeles

years then the household is grouped as a non-migrant household. Migrant households in our sample constitute 37 percent of the full sample. Among these migrant households, close to 50 percent have two or more former household members currently residing in another location (see Fig. 1). The total number of out-migrants from these households is 444; some 150 from West Gojjam, and 294 from Wolaitta. The percentage of households with out-migrants varied greatly by Zone, with over half (50.3 percent) of the Wolaitta and less than a quarter (23.6 percent) of the West Gojjam households having someone who moved out.

Figure 1: Distribution of number of migrants



Migrant and non-migrant households in our sample have different socio-demographic, economic, and geographic characteristics. In particular, migrant households have significantly older household heads. The average age of the household head in the migrant households was 50.5 while that of non-migrant household was 41.2. As expected, migrant households have a larger percentage of female heads than non-migrant households (14.9 versus 10.1 percent).

Household size is slightly larger in migrant households (5.6) than non-migrant households (5.4), which is statistically significant at 10 percent level of significance. However, surprisingly, a similar picture emerges in terms of landholding and livestock ownership between migrant and non-migrant households. There is also strong association between access to public infrastructure and household migration status. In particular, proximity to woreda capital and migration status of a household

are strongly and positively correlated. Similarly, proximity to primary school and household migration status are positively associated. However, migrant and non-migrant households do not have statistically significant differences in terms of physical distance to nearest secondary school. We also find significant differences in self-reported satisfaction in household standard of living. In particular, 54 percent of migrant households are either satisfied or very satisfied with the current standard of living of their household while the corresponding figure for non-migrant households is about 60 percent (see Table 2).

Table 2: Household characteristics by migration status

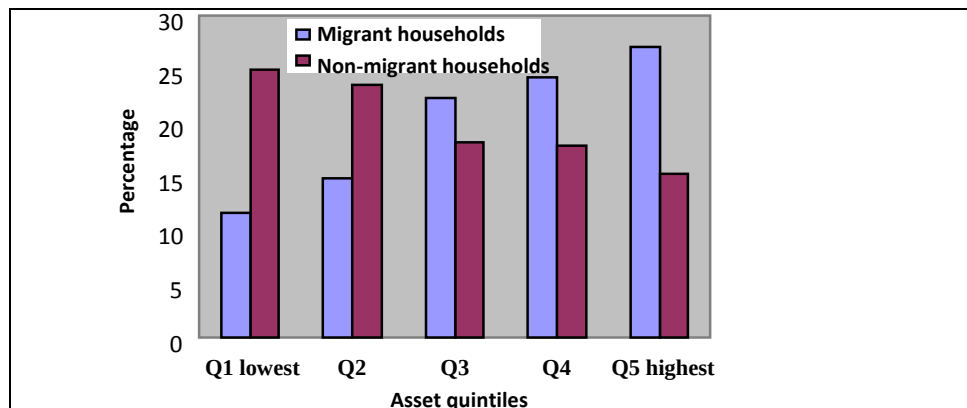
Household characteristics	Whole sample		Migrant Households		Non-migrant Households	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age of household head in years	44.649	13.023	50.487	12.196	41.221	12.261***
Gender of household head, 1 if male	0.882	0.322	0.851	0.356	0.899	0.301**
Number of household members excluding migrants	5.449	1.936	5.583	1.886	5.371	1.962*
Landholding in hectares	0.789	0.663	0.801	0.691	0.781	0.645
Livestock ownership in TLU	3.722	2.934	3.801	2.975	3.676	2.912
Distance to nearest primary school (1-4 grades)	23.349	17.596	21.65	15.95	24.39	18.42**
Distance to nearest primary school (5-8 grades)	31.192	47.723	27.61	28.76	33.29	55.85**
Distance to nearest secondary school (9-10 grades)	112.139	90.603	112.6	93.4	112.08	88.97
Distance to nearest secondary school (11-12 grades)	263.616	2.912	272.12	260.47	258.63	269.41
Distance to woreda capital	166.267	102.897	160.01	127.26	169.94	85.38*
Has improved latrine, 1 if yes	0.719	0.449	0.832	0.374	0.654	0.476***
Satisfied/very satisfied with his/her standard of living, 1 if yes	0.578	0.494	0.535	0.499	0.603	0.489**

***, ** and * denote statistically significant mean differences between migrant and non-migrant households at 1%, 5% and 10%, respectively.

In the literature, different patterns of migration are usually associated with household poverty status. In this study we tried to capture household poverty status using a wealth index which is derived from principal component analysis of ownership of several farm and consumption assets. In the absence of income data, as in our case here, the use of wealth index is increasingly becoming popular as a proxy for household economic status (Filmer and Pritchett, 2001). Fundamentally, a composite score of assets, which is constructed by the principal component analysis is used to divide households into wealth quintiles, from lowest to highest quintiles. The lowest quintile represents the poorest 20 percent of households in the sample and the highest quintile stands for the richest 20 percent of the households in the sample. Figure 2 depicts the distribution of relative wealth among the sample households by household migration status.

Interestingly, the distribution of wealth looks different for migrant and non-migrant households. Stated in other words, it is observed that a larger proportion of migrant households are concentrated in the higher quintiles of asset index suggesting that migrant households are relatively wealthier than non-migrant households. The direction of causation between wealth and migration needs further investigation since migration could induce the creation of wealth (through increased income through remittance) or the possession of wealth could facilitate migration. Migration is more affordable for those households that are wealthier than poorer and wealthier households might consider migration as a means of diversifying their portfolio or just as a means of pursuing opportunities to realize their potentials.

Figure 2: Distribution of household asset ownership by migration status



b. Individual characteristics

Almost two-thirds (63.5 percent) of the permanent out-migrants in the past 10 years have been males, and also two-thirds left when in the youth age range of 12-20. In general, girls out-migrated at younger ages than boys; the youngest group of migrants were females from Wolaitta, with 37.6 percent out migrating before age 15; the oldest group of migrants were boys from West Gojjam, with only 6 percent out migrating before age 15, and 57.9 percent after age 20. Peak age group for girls was around 14-17 years of age, but for boys, spread out between 15-24 years of age. Most (85.6 percent) were single, and 10.6 percent married; however there was a much higher percentage of separated/widowed/divorced out migrants from West Gojjam (10.7 percent) versus only 1.3 percent from Wolaitta. In terms of religion, all individual migrants from West Gojjam were Orthodox Christian, while two-thirds of Wolaitta out-migrants were Protestant, one-third Orthodox Christian and very few were Muslim. Ninety-two percent of out-migrants from west Gojjam were Amhara (8 percent Tigray), and 99 percent were Wolaitta in Wolaitta, where 70 percent also frequently used Amharic as a second language.

When it comes to education, 21.5 percent of the migrants from West Gojjam and 15.8 percent from Wolaitta had some secondary education when they left their place of origin. Information elicited from the sample households also reveals that the individual migrants currently had higher educational attainment as compared to the level he/she had when they left the household. For instance, about 63 percent of the individual migrants from West Gojjam and 22 percent from Wolaitta now have some secondary education.

When households were asked if they had received remittance in the 12 months prior to the survey from members who have migrated, 24.6 percent in Wolaitta and 14.6 percent in West Gojjam said that they had; those remittances sent were mostly used for agricultural purposes in West Gojjam (36.8 percent) while in Wolaitta it was mostly used for food (only 13.4 percent was used agriculture related purposes). Individual migrants from Wolaitta were twice as likely to visit their original households in the past year (42.4 percent) than those from West Gojjam (20.5 percent).

Most (84 percent) of the individual migrants in the study areas were destined to urban areas. However, there are considerable differences between the two zones regarding this outcome. In particular, urban destinations comprised about 79 percent and 90 percent for individual migrants from West Gojjam and Wolaitta, respectively.

Table 3 shows the regional distribution of the destinations of migrants. As the table indicates most of the migrations are intra-regional. However, there are significant differences across the study areas. About 80 percent of the migrants from West Gojjam stayed in Amhara, whereas only 49 percent for migrants from Wolaitta stayed within SNNPR.

Table 3: Regional destinations of migrants

Region of Origin	Region of Destination					Total (N) %	
	Amhara	SNNPR	Addis Ababa	Benishangul Gumuz	Other or do not know		
Amhara	80.1	3.3	4.6	5.3	6.6	151	100
SNNPR	4.1	49.1	29.1	---	17.7	406	100
Total (N)	122	204	125	8	106		

A list of several push and pull factors of migration were proposed for the respondents as main reasons for outmigration. The most frequent responses are summarized and shown in Table 4. Overall, more permanent migrants left for work-related reasons (62.7 percent) than for education (27 percent) or marriage/family-related reasons, but varied greatly by zone and sex. Surprisingly, education was by far the highest reason for girls (68.6 percent) and boys (57.8 percent) in West Gojjam than for girls (16.2 percent) and boys (16.8 percent) in Wolaitta (see qualitative sections for reasons). This is also a very important issue for further investigation.

Table 4: Reasons for outmigration by zone

Reasons	West Gojjam %	Wolaitta %	%	Total (N)
Reasons for migration				
Work related	34.4	73.3	62.7	(346)
Study related	61.6	15.2	27	(154)
Other	5	11.5	10.3	(52)
Boys				
Work	37.4	75.1	64.8	(197)
Study	57.8	15.8	27.3	(83)
Other	4.8	9.1	7.9	(24)
Girls				
Work	27.5	73.1	60.2	(109)
Study	68.6	16.2	30.9	(56)
Other	4	10.8	8.8	(16)

c. Marriage, fertility and fertility regulation

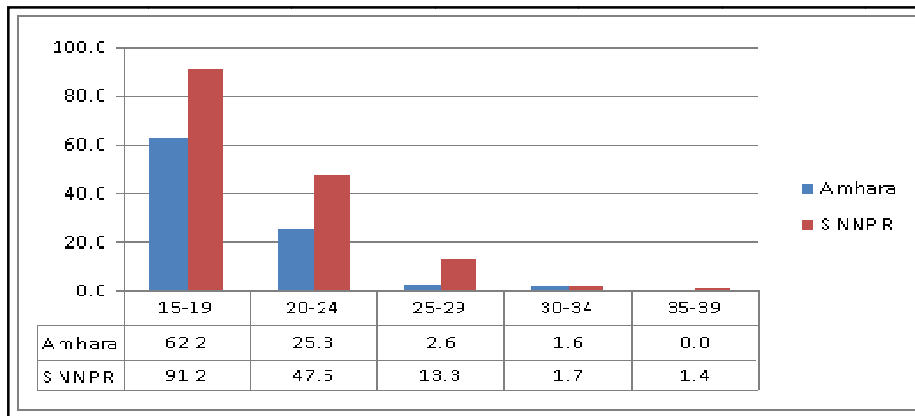
Marriage in Ethiopia is almost universal and celibacy is uncommon. Moreover, it takes place at an early age. In the migration survey, respondents were asked to disclose the current marital status of all household members aged 15 and above in the categories “never married”, “married”, “divorced”, “widowed” and “separated”. Seven in every ten women in West Gojjam and close to two-third (64 percent) in Wolaitta zone were currently married at the time of the survey. The proportion divorced/separated is considerably higher (8.2 percent) in West Gojjam compared to Wolaitta (3 percent), whereas the proportion widowed is higher in Wolaitta compared to that in West Gojjam (3.9 percent versus. 1 percent).

Also of interest is the proportion of females who marry young. Almost nine in every ten women aged 15-19 were single in Wolaitta compared to six in ten in West Gojjam, indicating that marriage takes place early in West Gojjam compared to Wolaitta. This is no surprise as the Amhara Region is well known for its early marriage in the country (Pathfinder, 2006; CSA and ORC Macro, 2006).

Figure 3 shows that three quarter of the women have been ever married by age 20-24 in West Gojjam while in Wolaitta about half (52.5 percent) have been ever married. By age 30, almost all women (97.4 percent) in West Gojjam and 86.7 percent in Wolaitta have been ever married and by age 35, all women in both zones have been ever married indicating that celibacy is uncommon.

In both zones, higher proportions of single younger women (under 35 years of age) are observed in non-migrant households compared to those with migrant households. With regards to proportion of currently married women, higher proportion living in migrant households were married among those under 35 years of age in West Gojjam Zone and under 30 years in Wolaitta zone. However, among older women, this pattern is reversed in both zones.

Figure 3: Proportion single by five year age group: West Gojjam and Wolaitta Zones



Regarding the proportion of divorced/separated women, higher proportion of younger women (<35 years) living in non-migrant households were observed in West Gojjam, while in Wolaitta zone, in all ages, higher proportions of divorced/separated were observed in migrant households.

Due to absence of birth registration and low level of literacy (25 percent and 55 percent, respectively in West Gojjam and Wolaitta) it was not possible to collect birth history data to analyze fertility in the study population. Instead, each woman of reproductive age in all sampled households was asked to provide information on the number of sons and daughters ever born, the number living with her, the number living elsewhere, and the number of sons and daughters who died and the births, if any, that occurred in the 12 months preceding the survey.

As can be observed from Table 5, current fertility data from both study sites appear to be seriously underreported, as it usually is the case. On the other hand, the mean parity values (lifetime fertility⁶) are consistent. Hence there is a need to adjust the fertility measures for errors of age reporting, the tendency to omit early neonatal deaths and reference point errors regarding births in the last 12 months preceding the survey. The Brass (1981) Gompertz relational model is applied to adjust the

⁶ Lifetime fertility refers to the number of children ever born alive during the entire reproductive period of the woman

fertility data because the model is believed to yield robust estimates of fertility even under conditions of declining fertility. The adjusted Total Fertility Rate (TFR) is 5.7 children per women for the two woredas in West Gojjam and 6.0 for those in Wolaitta Zone. Thus, this suggests that both study areas are in a high fertility regime.

Table 5: Reported Age Specific Fertility Rates

Age Group	West Gojjam		Wolaitta	
	ASFR	Mean Parity	ASFR	Mean Parity
15-19	0.051	0.2	0.029	0.1
20-24	0.093	1.1	0.097	0.9
25-29	0.231	3.2	0.167	2.5
30-34	0.172	4.4	0.277	5.2
35-39	0.155	6.5	0.108	6.4
40-44	0.045	6.8	0.061	6.9
45-49	0.027	7.4	0.024	8.1
TFR	3.9		3.8	
Adjusted TFR	5.7		6.0	
No. of women	454		472	

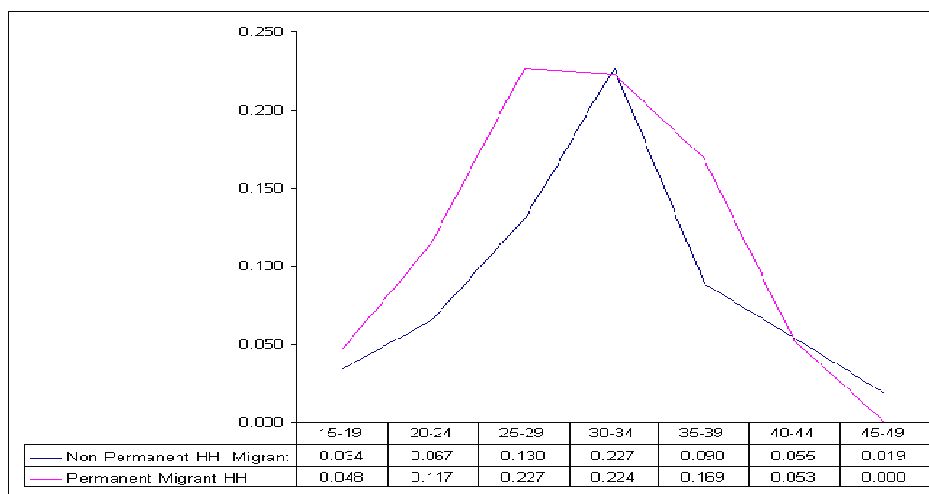
Age Specific Fertility Rate (ASFR) of women living in non-migrant households and those with permanent migrant members is presented in Fig. 4. As can be observed from the figure, ASFR of women in migrant households is higher throughout the reproductive ages except among women aged 45-49. The reported TFR is 3.1 for women in non-migrant households and 4.2 children per woman for those in migrant households.

Women under the age of 35 years living in migrant households had higher mean parities (lifetime fertility) compared to those in non-migrant households. However, after age 35, women living in non-migrant households appear to have higher mean parities compared to those in migrant households. The difference appears to be slightly higher in West Gojjam compared to Wolaitta.

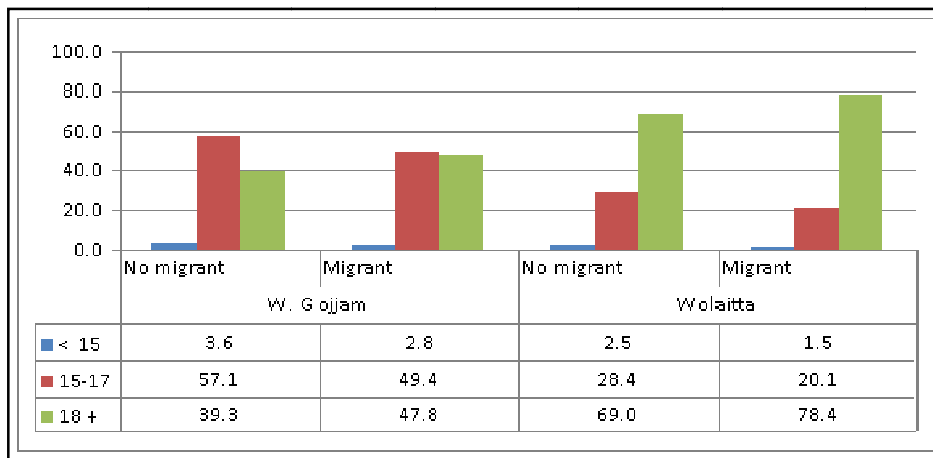
The age at which women start childbearing is another important demographic determinant of fertility. A low median age at first birth is an indicator of high fertility. Thus, postponement of first birth, reflecting an increase in age at marriage,

has made huge improvements to overall fertility decline in many African countries (Tesfayi, 2011). Age at first birth is also a factor that is well known to affect the health of mothers and children. Teenage mothers face high risk of maternal morbidity and mortality and their first born children are susceptible to high infant mortality. The proportion of women who become mothers before age 20 is a measure of the magnitude of adolescent fertility which is a major health and social problems in many African countries (ibid).

Figure 4: Age specific fertility schedule for women in households with and without permanent out migrant member



The proportion of women with at least one child who had their first baby before age 18 by the five year age group of their current age is presented in Figure 5. There is a clear indication that age at marriage is increasing in both study areas. Among women age 30 and older, more than 40 percent had their first birth before they were 18 years old but among the younger ones, this has declined considerably.

Figure 5: Age at first Birth: West Gojjam and Wolaitta Zones

The figure also shows that considerably higher percentage of younger women had their first baby before they reached age 18 in West Gojjam. This is mainly due to early marriage. As pointed out earlier, the zone has been known for one of the most severe crises of early child marriage in the country.

Knowledge of family planning appears to be universal in the study areas. More than 95 percent of women of reproductive age in West Gojjam and 99 percent in Wolaitta have heard about a family planning method. There is no statistically significant difference in level of knowledge among women living in migrant and non-migrant households in both study sites (95 percent versus. 95.8 percent in West Gojjam and 99 percent versus. 98.2 percent in Wolaitta). While almost all women reported knowledge of at least one modern method of family planning, only 46.5 percent in West Gojjam and 43.2 percent in Wolaitta reported ever having used a method.

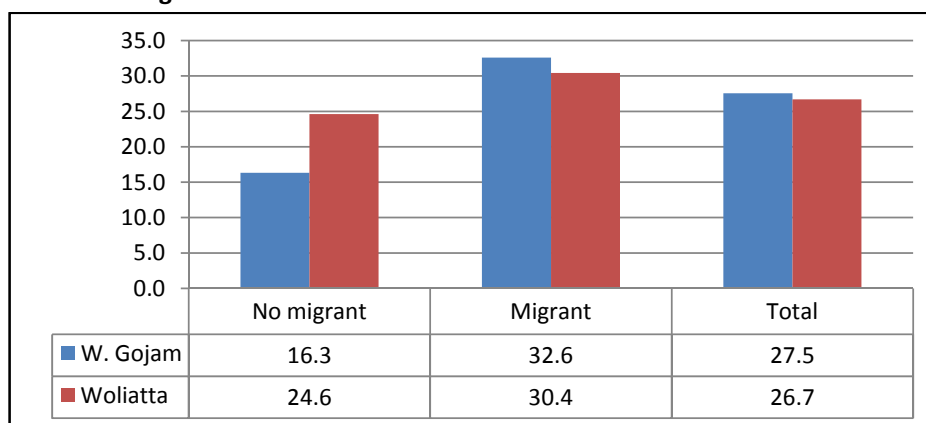
In both study areas, higher percentage of women in migrant households reported ever using a family planning method compared to those in non-migrant households (53.3 percent versus. 31.3 percent in West Gojjam and 48.8 percent versus. 40.7 percent in Wolaitta).

The current use of contraceptive is expressed as the proportion of women who reported that they were using any family planning method at the time of the survey. Overall, 27.5 percent in West Gojjam and 26.7 percent in Wolaitta zone were found

to be using contraception at the time of the survey. The pattern of current use by age shows a peak at age group 25-29. The drop in use among older women may reflect declining fecundity, while lower levels among women under 25 are to be expected since many may not yet have reached their desired family size. In both study areas, more than 8 percent of current users were in the age group 40-44, indicating a high level of acceptance of family planning even at the older age group. Regarding method mix, a little over a quarter of the users were using temporary or short-term methods, particularly injection (23.2 percent). Only 2 percent of the users used long term or permanent methods.

The proportion of women using contraception was two times higher in migrant households (32.6 percent) than non-migrant households (16.3 percent) in West Gojjam. Similarly, in Wolaïtta, current contraceptive use is greater for women living in migrant households (30.4 percent) than women living in non-migrant households (16.3 percent). Overall, 31.8 percent of women in migrant households were using contraception at the time of the survey compared to 21.9 percent in households with non-migrant households.

Figure 6: Percent of women using contraception with and without permanent out-migrant members in household



Studies show that satisfying women's unmet need⁷ for family planning reduces the total fertility rate (TFR) by a considerable amount (Westoff and Bankole, 1995; Westoff, 2001; Casterline, 1995; Sinding, et al, 1994). Unmet need for contraception in the two study areas was very high (43 percent in West Gojjam and 38.2 percent in Wolaitta). The proportion of women with unmet need in non-migrant households is similar in the two study sites (38.3 percent in West Gojjam and 38.2 percent in Wolaitta). However, migrant households in West Gojjam had a higher proportion of women with unmet need compared to those in Wolaitta (42.8 percent versus. 38.6 percent).

Regarding fertility desires, there is a strong desire for more children among most women interviewed in the study. Many respondents who already had large families desired additional children. One out of every five women with five or more children ever born wants to have at least one additional child and fourteen percent want two or more children. A higher proportion of women with five or more children in Amhara want at least two more children compared to those in Wolaitta. Overall about 14 percent of women with at least five children ever born want to have two or more additional children.

Table 6: Percent distribution of women by desire for more children, by number of children ever born: West Gojjam and Wolaitta Zones

Children Ever Born	Desired Additional Children	Study Area		Total
		West Gojjam	Wolaitta	
Four Children	no more	49.1	44.2	46.9
	One Child	13.2	18.6	15.6
	Two Children	24.5	18.6	21.9
	Three Children	5.7	9.3	7.3
	Four Children	7.5	9.3	8.3
5 or more Children	no more	72.4	82.9	78.2
	One Child	10.3	5.7	7.7
	Two or more Children	17.3	11.4	14.0

⁷ Women with unmet need includes all fecund women who are married or living in union—and thus presumed to be sexually active—who are not using any method of contraception and who either do not want to have any more children (unmet need for limiting births) or want to postpone their next birth for at least two years (unmet need for spacing births) (Westoff, 1988)

The desire for more children varies little even when the data are disaggregated by household migration status. There is a high desire for more children irrespective of household migration status. In both zones, close to two-third (65.5 percent in West Gojjam and 66 percent in Wolaitta) of women with 3 children ever born and living in non-migrant households want at least two children; 14.3 percent in West Gojjam and 34.8 percent in Wolaitta who had 4 children ever born, and 11.5 percent in West Gojjam and 9.7 percent in Wolaitta with 5 or more children ever born want at least two children.

In migrant households, larger proportion (83.7 percent) of women with fewer than 4 children ever born in Wolaitta compared to those in West Gojjam (65.4 percent) want at least one more child. On the other hand, there is no significant difference in the proportion who desired more children among those with 4 children ever born. It appears that higher proportion of women in west Gojjam with permanent migrant want more children compared to those in Wolaitta.

Knowledge of the reasons for not intending to use contraception is of significant value to family planning programs. In this study, close to two-third of the non-users intend to use contraception in the future and a little over one-third did not have any intention to use contraception in the future. Women who were not using family planning at the time of the survey and who said that they did not intend to use it in the future were asked why they did not intend to use.

Among the reasons given for not intending to use contraception included: desire for more children (16.6 percent), health concern (24.9 percent), being in fecund (27.9 percent), cultural/religious opposition (10 percent), fear of side effects (5.7 percent), lack of knowledge (2.2 percent) and others (12.7 percent). There is no notable difference in the reason for not intending to use contraception by study site or by migration status of the household.

5. Conclusion and Recommendations

Given the fact that the study is conducted only in four woredas and the findings presented are based on descriptive analysis only, it is important to put these limitations straight forward before proceeding to the conclusions. The results are

indicative but not conclusive, and they are not representative of the whole of rural Ethiopia.

The study suggests that rural youth out-migration is an important livelihood strategy in the face of high population growth and limited access to farm land. Without inferring on the direction of the causation, there is a correlation between the migration status of the household and several household and individual characteristics such as wealth, marital status, household size, fertility, contraceptive use and unmet needs for contraception. These findings are inputs for further analysis of the data as well as for proposing a larger and a more comprehensive study at a relatively more representative scale.

The fact that the study areas are in high fertility regime and there are very high unmet needs call for the attention of the government and other stakeholders to plan interventions in these areas. The fact that patterns of fertility and family size are correlated with the household's migration status suggests that interventions should consider migration as part of the equation. As mentioned above we are not making any conclusive remarks, but the relationship between migration and household/individual characteristics show that some attention should be given to the role of migration. This fact should be kept in mind while developing policy and interventions until further studies solidify the exact line of causation.

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THE ROLE OF INFORMAL SECTOR EMPLOYMENT IN POVERTY ALLEVIATION: THE CASE OF HAWASSA CITY, ETHIOPIA

Tefera Darge¹

Abstract

Informal sector plays an important role in urban poverty alleviation through creating jobs and reducing unemployment. It serves as a breeding ground for new entrepreneurs, and contributes for the reduction of urban crime and violence. This study is aimed at assessing the role of informal sector in solving unemployment and alleviating poverty. Primary data are gathered from a sample of 450 informal sector operators in Hawassa city. Ordinary logistic regression is used to determine the factors that can contribute to the livelihood improvement of the operators. Consequently, lack of working capital, working premises, adequate market, and raw materials are found to be the major impediments for informal sector operators. Nearly, nine out of ten operators have witnessed that their livelihood improved after they joined the sectors. Those operators who are more educated, younger, females, more profitable, stayed longer in the activity, natives to the city, and have a culture of saving, have depicted better livelihood improvement vis-à-vis their counterparts. Given the immense contribution that the sector has, therefore, the government needs to consider the sector as one of the fundamental pillar to combat poverty reduction. Thus, the operators should be encouraged to join the formal sector by lessening the bureaucracy to get license, minimizing entry cost such as lowering registration or licensing cost, and providing tax-holidays for sometimes.

Key words: Informal sector, formal sector, livelihood, poverty.

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1. Introduction

Informal sector refers to a home based or an individual establishment or an activity operated by the owner with a few or no employees. In most cases, informal sectors are unregistered, operating on a very small scale, have low level of organization, have very low level of productivity and income. They have little or no access to organized markets, credit institutions, modern technologies, formal trainings, public services and etc. Besides, they carry out much of their activities without having a fixed working location, such as in small shops, outlets or home-based activities (CSA 2004).

Urban informal sector operators perform different activities, such as selling fruits and vegetables, clothes and shoes, various items in kiosk, food processing and sale, small manufacturing, production, construction and repair of goods, coolies, money changing, domestic works, prostitution, drug peddling, small-scale artisans, barberry and shoeshine (ESCAP 2006; Blaauw 2005; Yuki 2007; Reddy et.al. 2002).

Informal sector plays an important role in urban poverty alleviation through creating jobs and reducing unemployment (Lal and Raj 2006; Reddy et.al. 2002). In urban areas of Africa, for example, the employment in informal sector is estimated to be 60 percent (The World Bank 2008); this figure is about 37 percent in Ethiopia, 44 percent in the Southern Nations, Nationalities and Peoples' (SNNP) region of Ethiopia, and 26 percent for the study area, Hawassa city (CSA 2011). It provides wide range of services, and produces a variety of basic goods that can be used by all classes of consumers, especially by the low income earners (Asmamaw 2004). Besides, this sector is a breeding ground for new entrepreneurs, and absorbs the labour forces that are left out from the formal sector employment (UNCHS 2006). The sector also contributes a lot in reducing urban crime and violence (Reddy et.al. 2002).

Poverty alleviation and its eventual elimination occupy an innermost position in the development agenda of many developing countries, including Africa (Dhemba 1999). Nowadays, it seems that developing countries are giving more emphasis on improving socio-economic status of underprivileged groups of society to open-up better opportunities for employment and income generation (Asmamaw 2004).

Informal sector is a dynamic sector, and not a transitory phenomenon in the development process, but, it is rather, soon to be absorbed by the formal sector (Ruffer and Knight 2007). The 2006 UNCHS document has regarded informal sector as a transitional stage in the move to formal sector (UNCHS 2006). Thus, understanding the informal sector employment is crucial for the success of economic development policies and poverty reduction strategies.

However, studies in the area of informal sector nexus with poverty alleviation are limited in Ethiopia, particularly in the study area. This study is, thus, aimed at assessing the role of informal sector in solving unemployment and eventually reducing poverty in Hawassa city. Specifically, this study aims at identifying the problems facing the informal sector operators, assessing the improvements in livelihood of the operators, and suggesting appropriate policy recommendations.

2. Methodology

2.1 Sampling and Method of Data Collection

The study area, Hawassa city, is the capital city of the SNNP region that is located about 275 kilometer South of Addis Ababa, the capital of Ethiopia. The city is one of the fastest growing urban centers in the country. It is the main administrative, commercial, industrial and tourist center in the southern region.

Multistage sampling method is employed to identify the sample of informal sector activities. Hawassa city is subdivided into eight sub-cities (*kifle ketema*). In the first stage eight clusters are formed using the eight sub-cities. Then using simple random sampling method four of the sub-cities are selected. The selected sub-cities are Tabor, Meneharia, Misrak and Haike-dar sub-cities. The selected sub-cities have twelve *kebeles* (the smallest political and administrative unit in Ethiopia). In the second stage sample of nine *kebeles* are selected from the sub-cities using simple random sampling technique. Then a central position within a kebele is located. A random direction is then chosen by spinning a pen. Following, every fifth informal sector activities are selected in that direction from the central position to the end of the kebele.

The Central Statistics Agency (CSA) of Ethiopia's definition is used to identify whether the enterprise is informal sector enterprise or not. Accordingly, the enterprise/business is informal if it does not have a license, and full written book of account that shows monthly income statement and balance sheet (CSA 2011).

The sample size is determined using the formula (Cochran 1977)

$$n = Deff \left(\frac{z_{\alpha/2}}{e} \right)^2 pq$$

where *Deff* is the design effect = 1.5; *e* is the desired level of precision (= 5%); α is level of significance (= 5%); *p* is estimated proportion of informal sector operators; and *q* is the complement of *p* (i.e., $q = 1 - p$). According to urban employment unemployment survey of Ethiopia, among currently employed population in Hawassa city about 23% are employed in the informal sector (CSA 2009). Hence, $p = 0.23$ is used to calculate the sample size. By substituting the values in the above formula and adding 10% contingency, sample size ($n = 450$) informal sectors are selected. Following, the sample size is distributed among the selected *kebeles* based on the proportion (size) of informal sectors in the *kebeles*. Finally, data is gathered from the owner of the enterprise using structured questionnaire. The data collection was undertaken from April 11, 2011 to April 24, 2011.

2.2 Variables in the study

The dependent variable of the study is the livelihood improvement of the informal sector operators. It is categorized in to four ordered responses: no improvement, satisfactory improvement, good improvement and very good improvement in livelihood.

The life improvement of informal sector operators can be determined by several socioeconomic, demographic and other variables. The following table shows the description of the major explanatory variables used in the study.

Table 1: Description of some of the explanatory variables in the study

Variables	Categories	Variables	Categories
Sex	Male	Migration status	Migrant
	Female		Native
Level of Education	No education	Age	10-19
	Primary		20-24
	Secondary		25-34
	Certificate and above		35-65
Religion	Orthodox	Marital status	Single
	Protestant		Married
	Other		Others
Initial capital	<=150 birr	Monthly profit	<500 birr
	151-499 birr		500-999 birr
	500-999 birr		1000-1999 birr
	1000-4999 birr		2000-8000 birr
	5000-30000 birr	Length of stay in the activity	<=1 year
Saving status	Yes		1-3 years
	No		more than 3 years

2.3 Methods of Data Analysis

The ordinary logistic regression method is used to model the relationship between ordinal response variable and different explanatory variables. Models with terms that reflect ordinal characteristics, such as monotone trend can improve model parsimony and power (Agresti 2002). The ordinary regression analysis takes into account the ordinal nature of the dependent variable (Green 2003). Thus, this study uses ordinary logistic regression to determine factors that affect livelihood improvements of the operators which is an ordinal variable.

The proportional odds model is the widely used logistic regression model for ordinal response. The response variable of this study and has four ordered categories: no, satisfactory, good, and very good improvement in livelihood. The proportional odds model compares the probability of unequal or smaller response, $Y \leq j$, to the probability of a large response, $Y > j$, that is

$$\log it[P(Y \leq j \mid x)] = \log \frac{P(Y \leq j \mid x)}{P(Y > j \mid x)} = \log \frac{\pi_1(x) + \pi_2(x) + \dots + \pi_j(x)}{\pi_{j+1}(x) + \pi_{j+2}(x) + \dots + \pi_J(x)}$$

$$= \beta_{0j} + \beta_1 x_1 + \dots + \beta_{p-1} x_{p-1} \quad j = 1, 2, \dots, J-1$$

This is called the proportional odds model. It is based on the assumption that the effects of the covariates $x_1, x_2, \dots, x_{p-1}$ are the same for all categories in a logarithmic scale, and each cumulative logit has its own intercept. Moreover, the proportional odds model is not affected if the labeling of the categories are reversed (only the sign of the parameter is changed), and if some of the categories are merged (Agresti 2002; Dobson 2002).

Besides, the proportional odds assumption (parallel regression assumption) is checked by using likelihood ratio test. The chi-square statistic is found to be insignificant (i.e., $P > 0.05$), shows that the assumption is satisfied.

3. Results and Discussion

3.1 Sample Characteristics

Majorities of the operators, about 70 percent, belong to the age group of 20-34 years, while almost one fifth belong to under age group of 20 years and the remaining one tenth belong to in the age group of 35-65 years. The mean and median ages of the respondents are, respectively, 24.44 and 23 years with standard deviation of 7.3 years. This shows the dominance of young people in the sector. Of the total respondents, about 55 percent are males and the remaining are females. Among the respondents, about one tenth of them have no education, half of them have primary education, a quarter of them have secondary education, and the remaining one sixth of them have certificate and above level of education. This finding suggests that overwhelming majorities (almost 90 percent) of the respondents have basic literacy. This is due to the fact that youths with more education are entering in to the sector. As to the marital status of the operators, 63 percent of them are single, 32 percent are married, and the remaining 5 percent are divorced or separated or widowed. Regarding the religious affiliation, about 46 percent are Protestant, 43 percent Orthodox, 8 percent Muslim, and 3 percent

belong to other creed followers. The migration status of respondents indicates that nearly three fourth of the sampled operators are migrants to Hawassa city (see Table 2).

Table 2: Background characteristics of sample of informal sector activity owners (operators) in Hawassa city, April 2011.

Characteristics	Respondents (n = 450)	
	Number	Percent
Sex		
Male	249	55.3
Female	201	44.7
Broad age group (n = 438)		
10-19	88	20.1
20-24	184	42.0
25-34	127	28.2
35-65	39	8.9
Religion		
Protestant	206	45.8
Orthodox	195	43.3
Muslim	36	8.0
Others	13	2.9
Marital status		
Single	285	63.3
Married	142	31.6
Others	23	5.1
Educational level		
No education	46	10.2
Primary (1-8)	227	50.4
Secondary (9-10)	109	24.2
Certificate and above	68	15.1
Migration status		
Migrant	328	72.9
Natives	122	27.1

Source: Own Computation 2011.

3.2 Nature of the Informal Sector Activities

The informal sector covers a wide range of activities. However, in this study only seven selected informal sector activities are included, namely: selling cooked foods and/or drinks (26.4 percent), bicycle or motor bicycle repair (14.4 percent), selling clothes and/or shoes (14.2 percent), vegetable and/or fruit vending (13.3 percent), beauty work (12.4 percent), selling various items in kiosk (10.2 percent) and shoeshine work (8.9 percent).

Informal sector workers usually acquire necessary skills for the job through either on job training or traditional apprenticeship system (ESCAP 2006). The survey result shows that majority of the operators (80.7 percent) have acquired the skills to apply in the job by self thought, 10.7 percent have acquired the skill through apprenticeship or on job training, 8 percent have acquired the skill from their family, and the remaining 0.6 percent have received the skill through formal, vocational and technical trainings. This clearly indicates the peculiar scenario of lack of formal skill training among the informal sector business operators in the city.

The informal sector activity requires longer working days and hours. The result demonstrates that, on average, the operators spent 6.37 days per week and 10.62 hours per day. This shows that the sector demands extensive labour time investment, because – the marginal profit contribution of labour productivity is very low and the operators, as a result, need to invest longer hours to maximize their profit. On average, an operator stayed in the sector business for 2.84 years (34 months). In fact, operators have huge variation in terms of experience they have operating ranging from 2 months to 40 years.

Entry barriers into informal sector activity are quite negligible for most of the operators, for it requires low initial capital. This study found that shoe-shining business requires the minimum start-up capital of all sectors considered, that is Birr 188. Whereas, starting a beauty salon, on average requires the maximum start-up capital of Birr 4803 of all informal sector business considered. Sixty five percent of the operators indicated that their source of start-up capital is their own saving “*Equb*”. While 17 percent have borrowed from friends or relatives, 13 percent of them have obtained assistance from friends or relatives, 3 percent have borrowed from micro finance institutions, and the rest 2 percent have utilized inheritance or

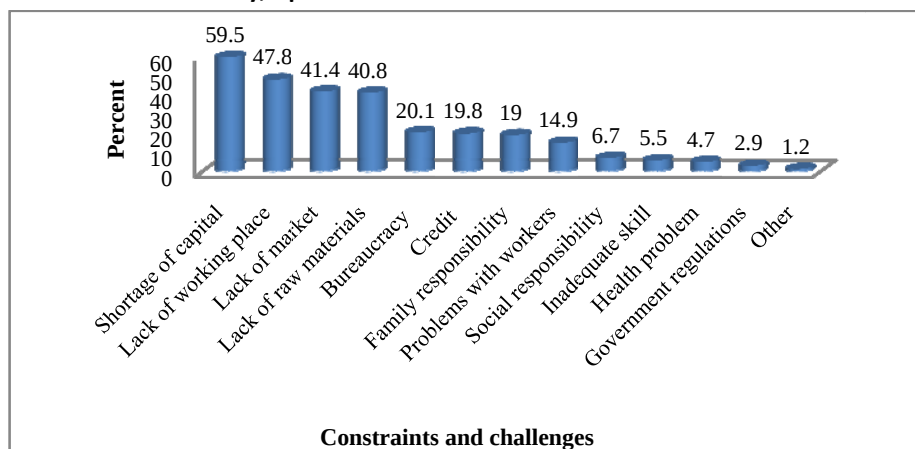
assistance from governmental and non-governmental organizations to start-up their business. This finding indicates that only a negligible portion of the operators are getting support from formal financial institutions.

Profit level in the informal sector is generally low (ESCAP 2006). However, in this study the average monthly profit is found to be about Birr 994, which is almost equal to the monthly salary of a bachelor's degree holder in Ethiopia's civil service salary scale. Yet the average profit ranges from Birr 473 for shoeshine workers to Birr 1362 for vegetable or fruit vendors. Moreover, the standard error of 45.82 shows the presence of large variation in the monthly profit which ranges from Birr 100 birr to Birr 8000.

3.3 Constraints and Challenges of Informal Sector Operators

Informal sector operators are constrained by a myriad of challenges which deter and limit the potential for growth and productivity. The result shows that, about 76 percent of the operators have been struggling with impediments which hinder their activity. Shortage of working capital is the major obstacle affecting 59.5 percent of the operators, followed by lack of working places (47.8 percent), lack of or inadequate market (41.4 percent) and lack of raw materials (40.8 percent). Bureaucratic bottlenecks to obtain license, family responsibilities, problems with workers, social responsibilities, inadequate skill, health problems and government regulations are also among the challenges the operators have been struggling with (see Figure 1).

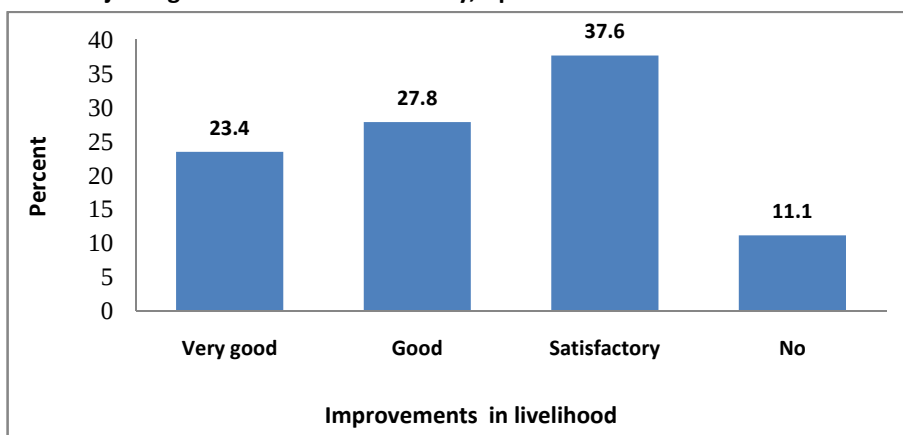
Figure 1: Constraints and challenges facing sample of informal sector operators in Hawassa city, April 2011.



3.4 Improvements in Livelihood of Informal Sector Operators

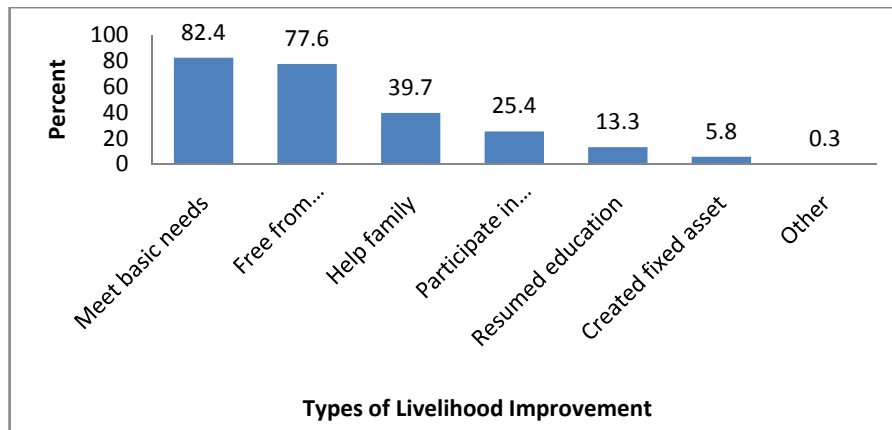
The sampled operators were asked to rate the achievement of their livelihood improvement after they joined the sector. Accordingly to their rating, 37.6 percent of them said livelihood improvement is satisfactory, 27.8 percent said it is good, and 23.4 percent indicated it is very good. While the remaining 11.1 percent have witnessed that their livelihood has not shown improvement. In sum, nearly nine out of ten operators have witnessed that their livelihood improvement in one way or another after they joined the sector (see Figure 2).

Figure 2: Improvements in livelihood among sample of informal sector operators after joining the sector in Hawassa city, April 2011



Those informal sector operators who reported improvement in livelihood were asked to point out the improvements they have achieved. Accordingly, majority of the operators meet their basic needs (82.4 percent), and make themselves free from unemployment (77.6 percent). Helping family (39.7 percent) and participating in social life (25.4 percent) are also among the main improvements. Besides, 13.3 percent of the operators resumed education and 5.8 percent created fixed asset (see Figure 3).

Figure 3: Types of improvements in livelihood among sample of informal sector operators after joining the sector in Hawassa city, April 2011.



3.5 Determinants of Improvements in Livelihood of Informal Sector Operators

Ordinal logistic regression is used to identify the determinant factors of livelihood improvements of the operators. Among the variables included in the model, sex, educational level, age, migration status, monthly profit, saving status and length of stay in the sector are found to be statistically significant predictors of livelihood improvement as indicated in Table 3.

The study revealed that the odds of achieving better livelihood improvement for males is 37 percent less than females, implying that females are enjoying better livelihood improvement compared to males after they joined the informal sector. This, partly be attributed to the fact that majority of females who were either unemployed or housewives prior to joining the informal sector are now self-employed, and generating their own income which can make them to feel better in their livelihood.

The finding indicates that the odds of attaining better improvement in livelihood is 61 percent less for operators with no education, 51 percent less for operators with primary education and 46 percent less for operators with secondary education, than operators with certificate and above level of education. This result suggests that improvement in livelihood goes with the educational status of informal sector

actors. Education is more relevant to the modern world of work in which problem-solving and flexibility is required to go with changing technologies and to tackle the market competition (Simon et.al. 1994). This finding also corroborates with the conclusions of Wamuthenya (2010) and Adams (2008) that in the informal sector earning increases with level of education.

Younger operators in the age group of 25-34 years have 2.05 times more likely to attain better improvement in livelihood than the older operators in the age group of 35-60 years. This means younger operators are enjoying better livelihood improvement. This can be attributed to the change in livelihood status of youths before and after joining the sector. That means most of them were either unemployed or student in the past, but now, they are self employed, generating their own income, and no more depend on others.

Migrant operators have 54 percent less odds of having better improvement in livelihood compared to native operators in the city. This is, may be, because migrants move to the city with high expectation of livelihood improvement. However, they are obviously confronted with a host of challenges and difficulties while struggling to adjust themselves with the city life style. Partly, also migrants might be treated partially when looking for working premises, and access to finance to expand and start their business.

The odds of gaining better improvement in livelihood is 92 percent, 82 percent and 63 percent lower for operators who earn an average monthly profit of less than Birr 500, Birr 500-999 and Birr 1000-1999, than those operators who earn an average monthly profit of Birr 2000-8000 respectively. This means operators who are generating higher profit are enjoying better improvement in their livelihood. It is obvious that improvement in livelihood is associated with more profit generating capacity.

Saving can boosts the odds of livelihood improvement by over 4 folds when the operators have a saving culture than when they do not have the culture. Saving helps people to plan for future expense, cope with stochastic crises and cover unanticipated expenses (Bamlaku 2006).

Table 3: Ordinal logistic regression analysis of determinants of improvements in livelihood of informal sector operators in Hawassa city, April 2011

Improvements	Odds Ratio	Standard error	95% Confidence Interval	
			Lower limit	Upper limit
Sex				
Male	0.63*	0.17	0.36	1.08
Female (ref)				
Level of Education				
No education	0.39**	0.19	0.14	1.00
Primary	0.49**	0.16	0.25	0.94
Secondary	0.54*	0.18	0.27	1.04
Certificate and above (ref)				
Age				
10-19	2.03	0.97	0.79	5.20
20-24	1.80	0.77	0.77	4.18
25-34	2.05*	0.85	0.91	4.63
35-65 (ref)				
Migration status				
Migrant	0.46***	0.11	0.28	0.75
Native (ref)				
Monthly profit (in birr)				
<500	0.08***	0.04	0.03	0.21
500-999	0.18***	0.08	0.08	0.44
1000-1999	0.37**	0.16	0.16	0.89
2000-8000 (ref)				
Saving status				
Savers	4.01***	0.95	2.52	6.40
Non savers (ref)				
Length of stay in the activity				
<=1 year (ref)				
1-3 years	1.98***	0.49	1.22	3.22
More than 3 years	1.81**	0.50	1.05	3.12
LR chi2 (30)v				
	167.28			
Prob > chi2				
	0.0000			

***Significant at 1%; **Significant at 5%; *Significant at 10%; ref- indicates reference category; unmarked- indicates insignificant variables; the significant LR statistics (Prob>chi2=0.000) shows that the overall model is significant. Birr is Ethiopian currency.

The longer that the operators stayed in the business, the better that the operators have improvement in their livelihood compared to the operators who stayed short in the business. Accordingly, those operators who stayed in the sector for 1 – 3 years

and more than three years have shown a chance of improvement in livelihood by 1.98 and 1.81 times, respectively, than those operators who stayed in the sector for a year or less. This shows that longer stay in the business is associated with better improvement. With longer stay in the business, the operators familiarize themselves with the business environment and generate more profit which helps them to improve their livelihood.

4. Conclusion and Recommendations

Informal sector plays a crucial role in urban poverty alleviation through creating jobs and reducing unemployment. Consequently, many developing countries are recognizing the sector importance in their economy and trying to put appropriate policies in place to encourage the sector (Reddy et.al 2002). In view of its contribution to socio-economic development, an enabling environment has to be created for operators in order to facilitate the transition of the sector to formality (Asmamaw 2004).

Informal sector plays a crucial role in urban poverty alleviation through creating jobs and reducing unemployment. Consequently, many developing countries are recognizing the sector's importance in their economy and trying to put appropriate policies in place to encourage the sector (Reddy et.al., 2002). In view of its contribution to socio-economic development, an enabling environment has to be created for operators in order to facilitate the transition of the sector to formality (Asmamaw, 2004).

Shortage of working capital is the major impediment that the actors have indicated in the sector. In this respect, the policy makers need to design imperative measures to solve this hindrance factor, such as through providing access to microcredit and/or special credit services. Lack of working premises is the other challenge that the operators are confronted with, which deserves an immediate attention by the government. Similarly, it is also vital to tackle the problems of an inadequate market and a shortage of raw materials.

Better educated operators enjoyed improvement in livelihood, which has a direct implication that improving and/or upgrading the educational level of the operators

is recommended. Moreover, supporting the operators by providing business trainings will help them to generate better profit. It is essential to cultivate and beef up the culture of saving in order to improve the livelihood of the operators. On the other hand, migrants are not enjoying better livelihood improvement compared their counterparts, because migrants are partially treated in terms of getting working premises, and financial assistance. The policy implication is that there is a need to give equal opportunities to the migrants, and to resolve the attitude of partiality towards them. To sum, the operators should be encouraged to join the formal sector by lessening the bureaucracy to get license, minimizing entry cost such as lowering registration or licensing cost, providing tax-holidays for sometimes etc.

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TECHNICAL EFFICIENCY OF SMALLHOLDER MAIZE PRODUCERS IN ETHIOPIA: THE CASE OF WOLAITA AND GAMO GOFA ZONES

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Abstract

Increasing population pressure and low levels of agricultural productivity have been critical problems of Ethiopia. These have aggravated the food insecurity situation by widening the gap between demand for and supply of food. Increasing efficiency in maize production could be taken an important step towards attaining food security. The present study was undertaken in Wolaita and Gamo Gofa zone of southern Ethiopia to assess technical efficiency of smallholder farmers and identify factors that determine its magnitude. Data envelopment analysis was used to determine the levels of technical efficiency. Factors influencing technical efficiency of smallholder farmers in maize production were identified using tobit regression model. The mean technical efficiency was found to be 40 percent indicating that there was substantial level of technical inefficiency of smallholder farmers in maize production. Important factors that significantly affected the technical efficiency were agro-ecology, oxen holding, farm size and use of high yielding maize varieties. Thus, concerned authorities have to concentrate in lowlands, improve oxen holding farm households, consolidate the fragmented land holdings and promote high yielding maize varieties to enhance the technical efficiency of maize producers.

Keywords: Data envelopment, Decision making unit, technical efficiency, tobit

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1. Introduction

Ethiopia, one of the world's centers of genetic diversity in crop germplasm (McCann, 2001), produces more of maize than any other crop (CSA, 2010). The area under maize cultivation in 2009/2010 was 1.69 million hectares from which 37.8 million quintals of maize were produced which was higher than that of any other cereal crop. From the country's total grain production, maize shares more than 27 percent (ibid). Maize is major food crop in Wolaita and Gofa areas of southern region of Ethiopia. Past extension programs had given the highest priority to maize over long periods of time because of its known ability to respond positively to improved inputs and the possibility of achieving dramatic growth in productivity (Samuel, 2006). However, the levels of productivity of the crop have remained to be low (Arega, 2003). Production inefficiency of smallholder farmers representing major supply of agricultural production in Ethiopia has been one of the key factors limiting agricultural productivity.

In order to improve maize production and productivity, an efficient use of production inputs has to be adopted by smallholder farmers. An understanding of the relationships between efficiency, policy indicators and farm-specific practices would provide policy makers with information to design programs that can contribute to increasing food production potential among smallholder farmers (Msuya et al., 2008). In Wolaita and Gofa areas of southern Ethiopia, information on the levels of productivity of maize and farm household technical efficiency in its production is lacking. Therefore, the present study was designed to determine the productivity of smallholder maize production and assess the technical efficiency of maize producer farmers and identify its determinant factors.

2. Empirical Methodology

This study was carried out in Wolaita and Gamo Gofa zones of Southern Ethiopia. In order to select sample households, multistage sampling technique was followed. In the first stage, study districts were purposively selected based on the extent of maize production. The numbers of districts selected were two each from Wolaita and Gofa areas. In the second stage 2-3 villages where different soil fertility

management practices have been promoted for maize production by extension agencies were selected from each district based on the discussion with district agricultural extension service officers. Finally 385 sample farmers were randomly selected from each village to administer the survey. The dataset contained detailed information on household's socioeconomic and demographic characteristics, farm characteristics, input utilization and institutional as well as policy related variables. Input-oriented analysis was applied to minimize inputs use of decision making units (DMUs) and still achieve the given current level of maize yields. If a DMU's actual productivity is equal to frontier productivity or lies on the frontier, it is perfectly technically efficient. On the contrary, if a DMU's actual productivity is less than frontier productivity or lies below the frontier, it is technical inefficient.

Estimation of technical efficiency follows non-parametric and parametric techniques. The non-parametric technique constructs frontiers and measures efficiency relative to the constructed frontier using linear programming techniques such as Data Envelopment Analysis (DEA). The parametric technique estimates frontiers and provides efficiency using econometric methods such as Stochastic Frontier Approach and distance functions. The conventional approach to the estimation of production functions consists of first specifying a parametric form for the function and then fitting it to observed data by minimizing some measure of their distance from the estimated function (Banker and Maindiratta, 1988). Statistical tests are performed by postulating again a parametric form for the distribution of the deviations of observed data from the fitted production function. The fundamental weakness of this approach lies in its inability to theoretically substantiate or statistically test the maintained hypotheses about the parametric form for the production function and the postulated distribution for the disturbance term. Furthermore, it is not immediately apparent what restrictions these hypotheses impose on the production correspondence (Javed et al., 2008).

DEA is a non-parametric approach based on utilizing the linear programming techniques to measure the efficiency and/or inefficiency. It constructs a linear piecewise frontier from the observed data, thus, it does not require any assumptions about the functional form and the distribution of error terms. Thus, DEA has main advantages in terms of not requiring the assumption of a functional form to specify

the relationship between inputs and outputs, and the assumption about the distribution of the underlying data (Coelli, 1995 and Krasachet, 2003).

DEA efficiency measures are relative, as they refer to the sample they are calculated from. These relative rankings can be fragile if the number of firms in the sample is small relative to the number of outputs and inputs being considered (Andreu, 2008). In this study the number of farms was larger than the rule-of-thumb benchmark, $M \times N$, where M is the number of outputs and N is the number of inputs. Overall, DEA's flexibility in accommodating multiple outputs and inputs in different units with no need to express a specific technical relationship among them has been seen as an advantage.

According to Coelli, et al. (1998), it is necessary to select orientation from input oriented DEA model or output oriented DEA model according to which quantities the decision maker has more control over. Smallholder farmers in the study areas have more control over inputs than outputs. Accordingly, input oriented DEA model will be used in the study. Besides, it is pointed out that constant return to scale DEA model is only appropriated when all firms are operating at optimal scale. However, it is not possible to hold this assumption in agriculture in the study areas since smallholder farmers face constraints. As a result the variable returns to scale DEA model was applied for this study.

The outcomes of DEA of this study were efficiency scores which represent performance indicators as 1 = best performance and 0 = worst performance. The best of efficient DMUs lie on the frontier while the inefficient ones lie below the frontier. The efficient DMUs can be considered as benchmark of the inefficient DMUs. The inefficient DMUs can improve their performances to reach the efficient frontier by decreasing their current input levels (Cooper et al., 2006). The efficiency scores can be calculated by using a linear programming model as presented in Charnier et al. (1978). Following the same authors, the linear programming model for this study is, therefore, constructed as follows:

$$\underset{\Delta, \lambda}{Min} \Delta_j$$

$$\begin{aligned}
 \text{Subject to: } & \sum_{j=1}^n y_j \lambda_j - y_j \geq 0, \lambda_j \geq 0 \text{ for } \forall_j \\
 & x_{ij} \Delta - \sum_{i=1}^m x_{ij} \lambda \geq 0, \\
 & \sum_{j=1}^n \lambda_j = 1, \\
 & 0 \leq \Delta \leq 1
 \end{aligned} \tag{2}$$

where Δ_j is a scalar which indicates technical efficiency scores of the j^{th} household; y_j is a $1 \times n$ vector of output produced by n households; x_{ij} is a $m \times n$ input matrix and λ_j is a $n \times 1$ vector of weight value.

The underlying assumptions of this model are that farm household j (1, 2, ..., n) produces output y_j using a combinations of inputs x_{ij} (i = labor, seed, fertilizer, oxen power); and an input oriented production frontier of variable returns to scale (VRS). The objective function Δ_j is a scalar that represents the minimum level to which the use of inputs can be reduced without altering the output level. It is the global technical efficiency score (GTE) for the DMU “ j ”. If this index is equal to one, the production unit is considered technically efficient. If it is less than one there is some degree of technical inefficiency. A Δ_j index equal to one ensures that the use of all inputs cannot be reduced at the same time, although a variation in the use of one of them may improve efficiency (Iraizoz et al., 2003).

The individual DEA efficiency score varies between 0.00 and 1.00. This means the efficiency scores are double-truncated at 0 and 1. Though other types of regression model such as multiple linear and one sided tobit regression models can be applied only if the efficiency scores do not assume both or either of the upper and lower limits. Therefore, in this study, the two-limit tobit regression model was applied to identify the sources of efficiency since the dependent variable in this case assumed 0 as lower limit and 1 as upper limit (Maddala, 1999).

The two-limit tobit model is defined as:

$$y_i^* = \beta_0 + \sum \beta_m X_{jm} + \mu_j \quad (3)$$

where y_i^* is latent variable representing the efficiency scores of farm j , β is a vector of unknown parameters, X_{jm} is a vector of explanatory variables m ($m = 1, 2, \dots, k$) for farm j and μ_j is an error term that is independently and normally distributed with mean zero and variance σ^2 .

Denoting y_i as the observed variables,

$$y_i = \begin{cases} 1 & \text{if } y_i^* \geq 1 \\ y_j^* & \text{if } 0 < y_i^* < 1 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (4)$$

The distribution of dependent variable in equation (4) is not normal distribution because its value varies between 0 and 1. The ordinary least square (OLS) estimation will give biased estimates (Maddala, 1999). Therefore, the alternative approach is using the maximum likelihood estimation which can yield the consistent estimates for unknown parameters vector.

Following Maddala (1999), the likelihood function of this model is given by:

$$L(\beta, \sigma | y_j, X_j, L_{1j}, L_{2j}) = \prod_{y_j=L_{1j}} \phi\left(\frac{L_{1j} - \beta'X_j}{\sigma}\right) \prod_{y_j=y_j^*} \frac{1}{\sigma} \phi\left(\frac{y_j - \beta'X_j}{\sigma}\right) \prod_{y_j=L_{2j}} 1 - \phi\left(\frac{L_{2j} - \beta'X_j}{\sigma}\right) \quad (5)$$

where $L_{1j} = 0$ (lower limit) and $L_{2j} = 1$ (upper limit) where $\phi(\cdot)$ and $\Phi(\cdot)$ are normal and standard density functions. In practice, since the log function is monotonically increasing function, it is simpler to work with log of likelihood function rather than likelihood function and the maximum values of these two functions are the same (Greene, 2003).

The regression coefficients of the two-limit tobit regression model cannot be interpreted like traditional regression coefficients that give the magnitude of the marginal effects of change in the explanatory variables on the expected value of the dependent variable. In a tobit model, each marginal effect includes both the

influence of explanatory variables on the probability of dependent variable to fall in the uncensored part of the distribution and on the expected value of the dependent variable conditional on it being larger than the lower bound. Thus, the total marginal effect takes into account that a change in explanatory variable will have a simultaneous effect on probability of being technically efficient and value of technical efficiency score. McDonald and Moffitt (1980) proposed a useful decomposition of marginal effects that was extended by Gould et al. (1989). From the likelihood function of this model stated in equation (5), Gould et al. (1989) showed the equations of three marginal effects as follows:

The unconditional expected value of the dependent variable

$$\frac{\partial E(y)}{\partial x_j} = [\varphi(Z_U) - \varphi(Z_L)] \frac{\partial E(y^*)}{\partial x_j} + \frac{\partial [\varphi(Z_U) - \varphi(Z_L)]}{\partial x_j} + \frac{\partial (1 - \varphi(Z_U))}{\partial x_j} \quad (6)$$

The expected value of the dependent variable conditional upon being between the limits

$$\frac{\partial E(y^*)}{\partial x_j} = \beta_m \cdot \left[1 + \frac{\{Z_L \phi(Z_L) - Z_U \phi(Z_U)\}}{\{\varphi(Z_U) - \varphi(Z_L)\}} \right] - \left[\frac{\{\phi(Z_L) - \phi(Z_U)\}^2}{\{\varphi(Z_U) - \varphi(Z_L)\}^2} \right] \quad (7)$$

The probability of being between the limits

$$\frac{\partial [\varphi(Z_U) - \varphi(Z_L)]}{\partial x_j} = \frac{\beta_m}{\sigma} \cdot [\phi(Z_L) - \phi(Z_U)] \quad (8)$$

where $\varphi(.)$ = the cumulative normal distribution, $\phi(.)$ = the normal density function, $Z_L = -\beta'X / \sigma$ and $Z_U = (1 - \beta'X) / \sigma$ are standardized variables that came from the likelihood function given the limits of y^* , and σ = standard deviation of the model.

The marginal effects represented by the equations above were calculated by the STATA command `mfx` which was complemented by specific options that allowed the estimation of marginal effects of change in explanatory variables.

The theoretical model discussed above assumes that the dependent variable which is defined as the technical efficiency of smallholder maize producers depends on the following explanatory variables: agro-ecological location of household, rainfall distribution, sex of household head, age of household head, education of the

household head in years of schooling, family size of household, oxen holding of household, farm size, use of hybrid seed, frequency of extension visit, distance to development centre, access to credit and consumption expenditure of household.

3. Results and Discussion

The results of DEA model indicate that the average technical efficiency was found to be about 0.40. This indicates that if the average farmer in the sample was to achieve the technical efficiency level of its most efficient counterpart, then the average farmer could realize 60 percent cost savings. This indicates that there was a substantial amount of technical inefficiency in maize production. However, about 7.26 percent of the DMUs operated at greater than 90 percent technical efficiency level in maize production (Table 1).

Table 1: Frequency distribution of technical efficiency of maize producers

Technical efficiency range	Frequency	Percent
0.00-0.10	27	7.26
0.11-0.20	86	23.12
0.21-0.30	76	20.43
0.31-0.40	51	13.71
0.41-0.50	30	8.06
0.51-0.60	35	9.41
0.61-0.70	20	5.38
0.71-0.80	13	3.49
0.81-0.90	7	1.88
0.91-1.00	27	7.26
Total	372	100.00

Source: Own Computation

According to the results of tobit regression model, important variables affecting the technical efficiency were found to be agro-ecology, oxen holding, farm size, use of hybrid maize variety and consumption expenditure of farm households (Table 2 farm size and use of hybrid maize variety were statistically significant at positively affecting the technical efficiency of smallholder maize producers at less than one percent level of significance. The use of hybrid maize variety also enhances maize productivity and technical efficiency in its production. Technical efficiency was also significantly influenced by agro-ecology, oxen holdings and consumption

expenditure of households at 5 percent level of significance. The fact that technical efficiency was positively and significantly related to agro-ecology variable suggests that there is a room to increase maize productivity and efficiency in mid-altitude and even more in lowland areas.

The relationship between oxen holding and technical efficiency in maize production was positive and statistically significant. Thus, oxen availability is crucial to increase technical efficiency in maize production in the study areas. It can be observed that consumption expenditure was significantly and positively related to technical efficiency. This could be related to the efficiency-wage hypothesis in labor economics that improved consumption expenditure (or income) leads to better nutrition of laborers and hence the enhanced technical efficiency in production.

Table 2: Tobit regression results of determinants of technical efficiency

Variable	Coefficient	t-ratio
AGROECO	0.048**	2.070
RAINDIST	0.024	0.780
SEX	0.041	0.590
AGE	-0.001	-0.850
EDU	0.000	-0.090
FAMISIZE	-0.007	-1.220
OXEN	0.021**	2.170
FARMSIZE	0.074***	5.500
HYV	0.107***	4.060
FRQEXT	0.003	1.590
DISTDC	-0.033	-0.690
CREDIT	-0.020	-0.710
EXPEND	0.001**	1.960
Constant	0.057	0.550

***, ** and * indicate the level of significance at 1, 5 and 10 percent, respectively.

The marginal effects of changes in explanatory variables from tobit regression analysis were computed following the procedure proposed by McDonald and Moffitt (1980) and Maddala (1999). The derived values for the statistically significant explanatory variables indicate the effects of a unit change in those variables on the unconditional expected value of technical efficiency, expected value of technical

efficiency conditional upon being between 0 and 1, and probability of being between 0 and 1 (Table 3).

Table 3: The marginal effects of change in explanatory variables

Variable	$\frac{\partial E(y)}{\partial X_j}$	$\frac{\partial E(y^*)}{\partial X_j}$	$\frac{\partial [\varphi(Z_U) - \varphi(Z_L)]}{\partial X_j}$
AGROECO	0.04504	0.03686	0.02692
RAINDIST	0.02230	0.01836	0.01254
SEX	0.03763	0.03032	0.02621
AGE	-0.00084	-0.00069	-0.00050
EDU	-0.00029	-0.00024	-0.00018
FAMISIZE	-0.00660	-0.00540	-0.00394
OXEN	0.01952	0.01597	0.01166
FARMSIZE	0.06955	0.05692	0.04156
HYV	0.09837	0.07919	0.06989
FRQEXT	0.00277	0.00227	0.00166
DISTDC	-0.03065	-0.02508	-0.01832
CREDIT	-0.01845	-0.01504	-0.01145
EXPEND	0.00001	0.00001	0.00001

Source: Own Calculation

The result shows that a unit change in agro-ecological variable ordered from highland to lowland in an increasing order (i.e., with values 1 for highland, 2 for midland and 3 for lowland) increases the probability of a farmer being technically efficient by about 2.7 percent and the mean level of efficiency by about 3.7 percent with an overall increase in the probability and level of technical efficiency by 4.5 percent. That is a unit change in the agro-ecology brings about 4.5 percent increase in the expected value of unconditional technical efficiency.

A unit change in the number of oxen owned by households would increase the probability of a farmer to be technically efficient by 1.2 percent and the expected value technical efficiency by 1.6 percent. A unit change in farm size would result in 4.2 percent change in the probability of a farmer under technically efficient category and about 6 percent change in the technical efficiency. A change in the dummy variable representing the use of hybrid maize variety from 0 to 1 would increase the

probability of farmers to fall under efficient category by about 7 percent and the expected value of technical efficiency by about 8 percent.

4. Conclusion and Recommendations

This study was carried out in Wolaita and Gamo Gofa zones of southern Ethiopia to assess the technical efficiency of smallholder maize producers and factors determining its magnitude. The study was based on the cross-sectional data collected 385 randomly selected households. The DEA model was employed to determine the levels of technical efficiency of individual farm households in the sample. Moreover, a two-limit tobit regression model was used to identify factors determining technical efficiency.

The mean technical efficiency was found to be 40 percent. This reveals that if the average farmer in the sample was to achieve the technical efficiency level of its most counterparts, then the average farmer could realize 60 percent cost saving without any reduction in the level of the output produced. The two-limit tobit regression model results indicate that agro-ecology, oxen holding, farm size and use of high yielding varieties were significant determinants of technical efficiency.

The agro-ecological variable had a positive and significant influence on the technical efficiency in maize production. This implies that farmers in the higher altitude areas were less efficient in maize production than the farmers in the lower altitude areas. The result suggests that there has to be agro-ecology specific extension of maize technologies and concentrated efforts in the mid- and low-altitude areas to increase the level of technical efficiency in maize production. An oxen holding has significantly affected the technical efficiency of maize farmers. From this result, it can be recommended that there has to be increased availability of oxen for farm operation through targeted credit, improved health service and management practices.

The technical efficiency of the sample farmers was highly influenced by the use of hybrid maize variety. In other words, farmers who were users of hybrid maize variety were technically more efficient than non-users. As a result, increased endeavor should be applied to further improve the availability and affordability of

hybrid maize seed through area specific multiplication and dissemination programs. Farm size was a highly significant variable in positively affecting the technical efficiency of the sample farmers in maize production. This requires policies that consolidate the fragmented farms and increase farm size per household for the case of this particular study by either strengthening the resettlement programs or absorbing the underutilized labor in these areas to off-farm opportunities.

Consumption expenditure was a significant determinant of the technical efficiency of farm households in maize production. Since higher consumption expenditure implies a better nutrition of farm households, it has a positive contribution to the technical efficiency. Therefore, rural income and expenditure enhancement programs such as employment generation schemes and paid social works would be of crucial importance in increasing the technical efficiency of smallholder maize producers in the study areas.

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WILLINGNESS TO PAY AND COST RECOVERY OF URBAN DRINKING WATER SUPPLY: A CHOICE MODEL APPROACH

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Abstract

Financial resources are crucial to improve existing urban drinking water supply in developing countries. Cost recovery rates of these services are typically low while demand for more reliable services is high and rapidly growing. Most stated preference based demand studies in the developing world apply the contingent valuation method and focus on rural areas. This study examines the willingness of households to pay for improved water supply services employing a choice model (CM) in an urban context in Ethiopia, Hawassa, where a household survey of 170 households in the city, about 300km south of the capital city of Ethiopia, Addis Ababa, with a total population of about 160,000(CSA,2007) was conducted. The design of the choice model allows the estimation of the values of two attributes of drinking water supply service (frequency of water supply per week and its quality). The study found that households are willing to pay up to 60 percent extra for improved levels of water supply over and above their current water bill. Especially those households living in the poorest part of the city with the lowest service levels demonstrate that they are willing to pay more despite significant income constraints they are facing. Women value the improvement of water quality most, while a significant effect is found for averting behavior and expenditures. The estimated economic values can be used in policy appraisals of investment decisions.

Key Words: Water supply, Choice modeling, Domestic water demand, Ethiopia, Willingness to pay

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1. Introduction

Urban drinking water can be supplied publicly or privately. In the world, of every 10 people, 2 lack accesses to safe water supply, 5 have inadequate sanitation, and 9 do not have their wastewater treated to any degree. Due to low public investment and insufficient tariffs in urban water systems in Ethiopia, there exists a low level of service, rationing and unscheduled disruptions, a long wait of months or even years for customers who want new connections due to lack of pipes and meters among other facilities (World Bank, 2004).

Financing domestic water supply is important to ensure water access for the urban poor and to broaden livelihood options. For instance, it has been the case that 44 percent of the financial requirement of the entire water supply program has been provided by government and the consumers, and the rest by external support agencies. This reflected the huge gap between the finance needed to maintain and operate the existing water supply system in Ethiopia. It represents a financial burden for the local and central governments which are already under considerable pressure from other investment activities and the fast growing urban population (Rahamato, D., 1999). The main objective of this study is to investigate urban households demand for improved water supply and to identify their willingness to pay in developing country's context, including Ethiopia.

Among stated preference (SP) methods, the contingent valuation of public programs is the most frequently employed valuation tool in environmental economics (Bateman et al, 2003). A limited number of studies have been conducted to investigate the demand for a domestic water supply service in rural and urban Ethiopia using contingent valuation (see Fissiha, 1997; Dhunfa, 1998; Alebel, 2004; Kinfe, G. and Berhanu, A., 2007). However, the contingent valuation method is inadequate to value a single attribute of a multi-attribute good, such as a domestic water supply service. An appropriate alternative tool is choice modeling (Louviere et al., 2000), as it allows the investigation of an attribute of a good with many attributes and also attempts to model the decision process of an individual or a household in a particular context and is able to predict with great accuracy how individuals would react in a particular hypothetical situation. The limited number of

choice modelling conducted in this area in the developed world focused on WTP to avoid water restrictions, for instance due to droughts (Hensher et al., 2006).

The study contributes its own share in the empirical work on the case under consideration. To the knowledge of the author, it is the first study applied to the topic of improving urban drinking water services in Ethiopia and to inform policy makers with regards to the provision of the service. In this study, a more advanced stated preference Choice Modeling (e.g. Blamey et al., 1999; Scarpa et al., 2007) is applied where households are asked to choose between different policy scenarios of improved water supply services at different water price levels. In the design of the choice modeling, a distinction is made between improved supply reliability and water quality.

2. Methodology

2.1 Choice modeling

Choice models rely on the theory of consumer demand, and are based specifically on Lancaster's characteristics theory of value, which assumes that consumers derive satisfaction not consuming the good per se but from the characteristics composing the good (Hanley et al., 2001). Employed in this analysis is the random parameter logit (RPL) model which does not require the assumption of independence from irrelevant alternatives (IIA) and which can also account for unobserved, unconditional heterogeneity in preferences across respondents, unlike the Multinomial Logit model (MNL) that suffers from the IIA assumption and which treats preferences across respondents as being constant (Hausman and McFadden, 1984).

The random utility function in the random parameter logit (RPL) model is given by:

$$U_{ijt} = V_{ijt} + \varepsilon_{ijt} = Z_{ijt}(\beta + \eta_i) + \varepsilon_{ijt} \quad (1)$$

where respondent i receives utility U by choosing alternative j from a choice situation t . The utility is decomposed into a deterministic component V_{ijt} and a stochastic term ε_{ijt} . Indirect utility is assumed to be a linear function of the choice

attributes z_{ijt} (as well as the social, economic and demographic characteristic, if included in the model) and parameter, β , which due to preference heterogeneity may vary between respondents by a random component, η_i . Assuming the error term follow an IID extreme value distribution of type I, the probability of choosing j in each of the choice sets can be derived (Revelt and Train, 1998).

Recent applications of the RPL model have shown that this model is superior to the MNL model in terms of overall fit and welfare estimates (Brefle and Morey, 2000). Even if unobserved heterogeneity can be accounted in the RPL model, the model fails to explain the sources of heterogeneity (Boxall et al, 1996). One solution to detecting the sources of heterogeneity while accounting for unobserved heterogeneity could be to include interactions of household characteristics with choice specific attributes in the utility function. When the interaction terms are included, the indirect linear utility function (V_{ijt}) that is estimated becomes:

$$V_{ijt} = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \dots + \beta_n Z_n + \delta_1 S_1 + \delta_2 S_2 + \dots + \delta_m S_m \quad (2)$$

where n is the number of urban drinking water attributes considered and the vector of utility parameters β_1 to β_n are attached to the vector of attributes, Z_n . In this specification, m is the number of respondent specific household characteristics that explain the choice of the improved drinking water, and the vector of coefficients δ_1 to δ_m correspond to the vector of interaction terms S that influence utility.

2.2 Economic welfare measurement

In this section, the compensating surplus (CS) is calculated following Bateman et al. (2003). This is a measure of the change in utility arising from a change in a good or service, and in this particular case a change in a domestic water supply service. It measures the change in income that would make an individual indifferent between the initial (status quo) and a subsequent situation (improved water supply) assuming the individual has the right to the status quo. This change in income reflects the individual's willingness to pay (WTP) to obtain an improved water supply.

Assessment of economic welfare involves an investigation of the difference between the well-being (or utility) achieved by the individual under the status quo (or constant base) alternative and some other alternatives. It is therefore, a matter of considering the marginal value of a change away from the status quo. First, the values of the attributes that are associated with the status quo are substituted into the equation that estimates the indirect utility associated with that option. If socio-economic variables are included in that equation, the values to be substituted are the sample mean (or the individual specific welfare measures can be computed). Note that the monetary attribute is assigned a value of zero for this stage. Next, the values of the attributes that are associated with an alternative allocation of resources are substituted into the equation that relates to the relevant change attribute. The value of the relevant alternative specific constant (ASC) should be included in this calculation. Socio-economic variables are treated the same as for the status quo option and again the monetary attribute is set at zero. The utility associated with the change alternative (V_1) is then subtracted from the utility associated with the status quo option (V_0). If the model is linear (in the monetary attribute) this 'indirect utility difference' is then divided by the negative of the coefficient associated with the monetary attribute (β):

$$\text{Compensating Surplus} = \frac{-(V_0 - V_1)}{\beta_{\text{Monetary attribute}}} \quad (3)$$

A negative value for this surplus estimate would indicate that the respondents are willing to pay the amount of the surplus in order to experience an improvement in their well-being caused by the reallocation of resources from the status quo to the change alternative. By setting up multiple scenarios of alternative resource allocation (by varying the values the levels of attributes can take) and repeating this arithmetic exercise, an array of values associated with the scenarios can be estimated. Note that these results apply only when all attributes enter in a linear fashion (Bennett, J. and Blamey, R., 2001).

2.3 The experimental design

The set of attributes and levels used in this study are: (1) water supply (1, 2, 3 extra day per week), (2) water quality (dummy: no boiling at all), and (3) an increase in the households monthly water bill in Birr² (3, 5, 10, 15 and 20) (see Table 1).

Table 1: An example of choice task

	Policy Option 1	Policy Option 2	Status Quo
Water Supply (Extra days per week)	2	1	0
Water Quality (dummy: no boiling at all)	NO	For infants	For infants
Increase in monthly water bill	Birr 10	Birr 3	0
I prefer	☐	☐	☐

Paired choice sets were created using the fractional factorial orthogonal design procedure in SPSS, enabling the capture of main effects plus two-way interactions which produced 12 paired choice sets. A status quo alternative was added in all sets whose inclusion is instrumental to achieving welfare measures that are consistent with demand theory (Louviere et al., 2000; Bateman et al., 2003). Each choice task asked the respondent to hypothetically choose one of the two available options, in addition to the status quo option. If neither of the two options was found satisfactory, the respondent could choose the 'opt-out option'. After collecting socio-economic data, each respondent was introduced to the type of choice task required. The results of 16 respondents were discarded because of inconsistencies. Thus, a total of 1740 (12×145) observations were obtained.

In June of 2010, a household survey was carried out with about 170 households in Hawassa city, about 300km south of the capital city of Ethiopia, Addis Ababa, with a total population of about 160,000 (CSA, 2007). Because no recent statistical information about household characteristics was available, the survey was conducted in three zones identified by Hawassa Water Supply and Sewerage Service (HWSSS) namely, Misrak Wukro, Manaharia and Mahal Piasa. Misrak Wukro is

²Birr is Ethiopia's national currency. At the time of the study, 1 Birr was equal to approximately 0.06 USD.

generally considered the poorest part of the city, whereas households in Manaharia and Mahal Piasa are better off. In selecting respondents from each zone, first households with private compounds were identified, and secondly from these a household was chosen at random. The third criterion was that respondents were split as evenly as possible between male and female in order to allow for testing of gender related differences. Trained enumerators were used in the interview.

3. Results

3.1 Sample characteristics

The average monthly household income is USD 145. Given the average household size, this gives a monthly per capita net income of USD 26. A larger proportion of the respondents (63%) were female and respondents are, on average, 34 years old. Consumption varies between 10 and 800 liters per day per household. On average, a household has access of 4 days per week to drinking water supply and pays USD 2.2 per month for their water bill. A larger proportion of households (58%) also spend a considerable amount of money every month on substitutes such as bottled water. The result also shows that a household, on average, consumes about 3000 liters ($3m^3$) per month per household, which is about 100 liters per day per household, according to this study. Given the average family size, per capita water consumption per day is 25 liters, which is far below the world standard WHO (2004) of 45 liters per capita per day.

Table 2: Sample characteristics

Variable	Mean	Std	Min	Max
Monthly household income (in Birr)	2388.42	1665	50	8000
Proportion of female respondents	0.633	0.48	0	1
Age	33.917	6	16	80
Family size	5.617	3.25	1	21
Monthly water bill	36.199	31.22	2.0	210.0
Amount of water consumed per household/month	99.158	87.3	10	800
Aversion cost	32.092	57.2	0	252
Water supply per week per household	4.095	1.68	1	7

3.2 The random parameter logit model (RPL)

The result of the RPL model is presented in Table 3. All the attribute parameters are highly significant and have the expected signs. The positive sign of the values for all non-monetary parameters suggests that improvements in all the non-monetary attributes are more likely to bring about a positive utility among individuals. The result also shows that the coefficient for the monetary attribute is negative, as expected, implying that the utility of the households decrease as the monthly water bill increases. The estimated standard deviations are also significant and sizeable, indicating that we have captured unobserved heterogeneity with the random parameter specification (see Eq.1). The alternative specific constant (combined into one as the experiment was generic) is also positive and statistically significant at 95 per cent, indicating that respondents receive more utility from the improvement than from the current water supply, *ceteris paribus*. Also, since the experiment was generic, this indicates that factors other than attribute levels affect behavior.

Table 3: Random parameter logit model

Variable	Coefficient	Standard error
ASC	1.162***	0.168
Water Bill	0.196***	0.012
Water Quality	2.933***	0.302
Water Supply	0.765***	0.091
Derived standard deviations		
Water quality	2.933***	0.303
Water Supply	0.765***	0.091
Log likelihood function	-1198.995	
McFadden Pseudo R ²	0.390	
Number of respondents	145	

Note: ***, denotes significance at 1%

Results of the random parameter logit model with interaction given in Table 4 also show that out of the five socio-demographic variables, four of them were significant. These are: sex of the household head, income, the zone in which the respondents live and households' aversion behavior. The sex of household head being positive and significant implies that women prefer improvement in the domestic water

supply compared to male household heads. The positive sign of income indicates that the higher the income of a household the more the household head is willing to pay for the proposed change. Households in the study area, especially those living in the poorest part of the city with the lowest service levels, are willing to pay up to 60 percent extra for improved levels of water supply over and above their current water bill. A significant effect is found for averting behavior and expenditures. The explanatory power of the model is increased by about 28% as a result of including the socio-demographic characteristics. The models are estimated with a simulated maximum likelihood using Halton draws of 500 replications. From the results of the model, it can be concluded that households in Hawassa city support an improvement in domestic water service in terms of supply and water safety.

Table 4: Results of random parameter logit model with interactions

Mean Parameters	Coefficient	Standard Error
ASC	1.136***	0.185
Water Bill	-0.136***	0.013
Water Quality	1.826***	0.937
Water Supply	0.763***	0.495
Water Quality X Female respondents	0.889**	0.281
ASC X Income	0.0001*	0.0001
Water supply X living in Misrak Wukro	0.296**	0.145
Water quality X aversion costs(Birr/month)	0.011***	0.005
Derived Standard deviation		
Water Quality	2.867***	0.310
Water Supply	0.715***	0.079
Log likelihood function	-1176.864	
McFadden Pseudo R ²	0.381	
Number of respondents	145	

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively

3.3 Welfare analysis

As indicated(see Eq.3), the compensating surplus for the change from the status quo to the new scenario is estimated by calculating the difference between the values of the two scenarios and multiplying by the negative inverse of the coefficient for the

monetary attribute (that is the water bill). Assuming that the status quo is water supply per week is 4 days, on average, and boiling for infants only is needed, the mean WTP for three scenarios are presented in Table 5. These three scenarios are: (1) availability of water per week is 5 days and boiling for infants only is needed; (2) Availability of water per week is 4 days and boiling is not needed; (3) availability of water per week is 5 days and boiling is not needed.

It can be seen from the results that as the supply of water increases, the WTP also increases while the quality of the water is kept constant. When boiling for infants only is needed, WTP increases from 0 to USD 0.66 per month as the availability of water increases per week by one day. If the quality of water improves to the point where no boiling at all is needed, households are willing to pay USD 1.36. If it is supposed that, at least all of the households with private connection in the city, roughly 12500, would be willing to pay this amount, then a total of USD 17000 per month could be generated. The present value of these total benefits could then be compared with the present value of capital costs of this “ideal” option in order to calculate the net benefits. This implies that households prefer an improvement in the urban water service in terms of both the attributes of quality and supply of water. Thus, there is room for policy intervention to improve urban drinking water supply in areas similar to the case under consideration.

Table 5: Mean WTP per month per household in USD

	With Boiling		Without Boiling	
Water supply per week(in days)	4	5	4	5
WTP	0	0.66	1.12	1.36

5. Conclusions

Choice Modeling can be used to investigate urban households demand for improved drinking water supply in terms of their willingness to pay in developing countries such as Ethiopia. It can be concluded that households in Hawassa city support improvement plan in the drinking water service in terms of quality and supply. Therefore, to minimize the operating and maintenance cost burden of expanding domestic water service to households in Hawassa city and similar cities in the country, these attributes can be targeted to design appropriate strategies to

improve the current domestic water service and generate additional revenue as the households show a positive willingness to pay for the improvement plan. Moreover, the present value of the total benefits could then be compared with the present value of capital costs of this “ideal” option in order to calculate its net benefits. This economic value can be used in policy and project appraisals of improved drinking water investment decisions.

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DEVELOPMENT CHALLENGES IN THE AGE OF CLIMATE CHANGE: THE CASE OF SIDAMA¹

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Abstract

Today, developing countries face distinctive challenges of development such as to poverty reduction, growth and economic development. The growing concern with climate change presents additional challenges and opportunities to these countries. The paper explores development possibilities/challenges in the age of climate change on the basis of selected review of the literature on mainstreaming climate change to development. The themes under discussion relate to on-going empirical research on vulnerability and adaptations to climate change in Ethiopia, the case of smallholder farmers in Sidama.

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1. Introduction

This brief paper addresses some challenges of development in the age of climate change. It starts with an exploration of the background to the problem of development and climate change, followed by a brief history of environmental concerns and sustainable development. Then it outlines key post-WWII development agendas and development challenges facing developing economies in the age of climate change, taking the case of Sidama Zone. The paper concludes with tentative recommendations.

2. Background

Climate change is one of the most complex challenges of our young century. No country is immune. No country alone can take on the interconnected challenges posed by climate change, including controversial political decisions, daunting technological change, and far-reaching global consequences.

As the planet warms, rainfall patterns shift and extreme events such as droughts, floods, and forest fires become more frequent. Millions in densely populated coastal areas and in island nations will lose their homes as the sea level rises. Poor people in Africa, Asia, and elsewhere face prospects of tragic crop failures; reduced agricultural productivity; and increased hunger, malnutrition, and disease. World Bank, 2010, p. xiii

The quote above is important because it captures the sense of urgency in dealing with climate change. A growing body literature recognises climate change as the most urgent challenge, presenting a unique challenge for economies and economics (Stern, 2007; Giddens, 2009; see also the concept map in Appendix).

Some scholars described this era as ‘the age of global warming’ (Nordhaus, 2007). Others claimed that climate change is ‘the greatest and widest-ranging market failure ever seen’ (Stern, 2007). Conceptually, climate change is a variation in the mean state of the climate persisting for an extended period (typically decades or longer) and resulting from anthropogenic greenhouse gas emissions (IPCC, 2007).

More climate change is expected to take place in the form of increased global average air and ocean temperatures. The signals of climate change are ever manifested in enhanced frequency and heightened intensity of extreme weather conditions such as droughts, floods, storms, hurricanes, and heat waves. Warmer temperatures, changing precipitation patterns, sea level rise, and melting glaciers are broad signifiers of global warming.

From economist's perspective, climate is global public good and as such climate change is an externality. According to William Nordhaus of Yale University, climate change presents fundamental problem as it takes millions of firms, billions of people and trillions of decisions to face realistic carbon prices if their decisions about consumption, investment, and innovation are to be correct (Nordhaus, 2007). Hence the need for different interventions involving both market and non-market forces.

Another problem is that while "global-warming" explicitly indicates the global nature of climate change, vulnerability to climate change varies in time and space. Examples abound. A country that is prone to Monsoon climate such as Bangladesh is more susceptible to flooding than Ethiopia. A low-lying small island in the midst of oceans is more prone to rising sea levels than Zimbabwe. A community in a Canadian Arctic, whose livelihood depends on hunting and fishing, faces different challenges to pastoralists in East Africa who are vulnerable to drought.

In other words, while all societies on earth are affected by climate change, its intensity and its severity vary from one location to another and across societies. Impacts are amplified for societies struggling to achieve poverty eradication and development (Adger, *et al.*, 2003; Hope, 2009; Hassan, 2010).

3. Development agendas of developing economies

Developing countries including Ethiopia are already facing significant challenges of development such as poverty reduction, growth, and economic development. Climate change increases the intensity and focus of development challenges. Following on Rashid Hassen (2010:661) one would consider the issue of "double challenge of adapting to climate change while accelerating development in sub-Saharan Africa". In other words, the question arises as to how can Sub-Saharan

African countries can accelerate economic growth and social development “necessary to reduce vulnerability and enhance their adaptive capacity to cope with the consequences of predicted unfavourable future climate”? Hassen opines that such an endeavour requires major investments and policy reforms to induce a needed radical transformation of the way development is currently pursued to a more climate-sensitive path of low carbon growth” (*ibid*).

It also means pursuing pro-poor policies aimed at poverty reduction for further progress and human development to happen. A World Bank study stated that “peace and stability are not possible until poverty is alleviated” (Moreno-Dodson, 2005, p.vii). One way of reducing poverty is through economic growth measured in the growth of a country’s GDP, over a period of time, often a year. Indeed, economic growth had been the focus of post-WWII development economics.

In the decades that followed independence of many countries, the persistence of poverty despite economic growth altered the focus to poverty alleviation and fulfilment of basic needs. Since the 1970s, additional concerns appeared broadening wellbeing beyond minimalist measurements and well into the realm of the social and political indicators.

Questions were also raised not only about the measurement of wellbeing (Seers, 1979) but also about the meaning of development (Sen, 1981, 1991). Amartya Sen’s *Development as Freedom* and *Capability Approach* have expanded the dimensions of development discourse. Thus the concepts of capability, equity and sustainability came to be seen as both a good in themselves and an end (Chambers and Conway, 1991).

As a long term process, economic development subsumes economic growth (quantitative expansion of economy) and qualitative transformation of society and polity (Hameso, 2001). This process is affected by internal dynamism and global processes. Both global warming and global economic crises will have direct impact on economies.

Table 1: Important timelines in post-WWII development agendas

Time	Event/Responsible agencies	Aim/Goals
1950s-60s	Independence of countries (Governments)	Economic growth and development models
1970s	Basic needs approach (Various scholarly and policy circles)	Provision of basic services (food, shelter, clothing, etc...)
1980s	Structural adjustment programmes (IMF, WB)	Macroeconomic and financial stability
1990s	Structural adjustment programmes and poverty reduction programmes (IMF and WB)	Macroeconomic and financial stability and poverty alleviation
2000s	Millennium Development Goals (UN)	Plan to achieve key development targets by 2015
2010s	Sustainable livelihoods approach (Various scholarly and policy circles, GOs, INGOs)	Develop capacities, assets, institutions for sustainable livelihoods PLUS mainstreaming climate change adaption to development

4. A brief history of environmental concerns on development

Hardin's (1968) famous article, "*The Tragedy of the Commons*," described the degradation of shared resources under conditions of uncontrolled access. The argument is based on a communal land, where an individual villager reaps the benefit of each additional animal's grazing, while the whole village shares the cost of the reduction in available grass. As each villager pursues his or her own personal gain, the number of cattle rises until it eventually exceeds the carrying capacity of the commons. Hardin linked this metaphor to population growth as representing a tragedy of the commons (O'Neill 2001).

Concerns about population and the use of natural resources for development continued well into the 1970s and thereafter. So did scholarly debate about the links between environment and development. The Brundt land Commission Report *Our Common Future* (United Nations, 1987) defined the concept of *sustainable development* as "development that meets the needs of the present without compromising the ability of future." Other scholars define sustainable development

as the use of environmental resources in manners that produce positive outcomes for future generations. The issue relates to intergenerational justice, and it is the focus of much of the writings on the environment (Lundahl and Ndulu, 1996).

Table 2: Important timelines in global climate change discourse and policy

Time	Event	Aim/goal
1987	The Brundt land Commission Report <i>Our Common Future</i> (United Nations)	Stated the overall objective of sustainable development—reconciling traditional development objectives with environmental ones: promoting harmony among human beings and between humanity and nature
1992	UN Conference on Environment and Development, over 180 countries signed, United Nations Framework Convention on Climate Change (UNFCCC)	Agreement reached on the need for serious action to reduce man-made greenhouse-gas emissions
1997	Kyoto Protocol (ratified in 2004)	Established a legally binding greenhouse-gas-emission targets for industrialized countries to be achieved in the target period 2008-2012
1998	Intergovernmental Panel on Climate Change (IPCC) was formed	Provide governments with a clear scientific view of what is happening to the world's climate
2004	UNDP's Climate Change Adaptation Policy Framework	Help developing country governments to prepare their National Adaptation Plans of Action (NAPAs)
2007	Developing countries, including Ethiopia produced their NAPA	Specific adaptation options or measures identified.
2012	Durban Summit	The formation of Durban Platform (an Ad hoc group) to negotiate legally binding emissions reduction by 2015. But, any reductions won't take effect before 2020.

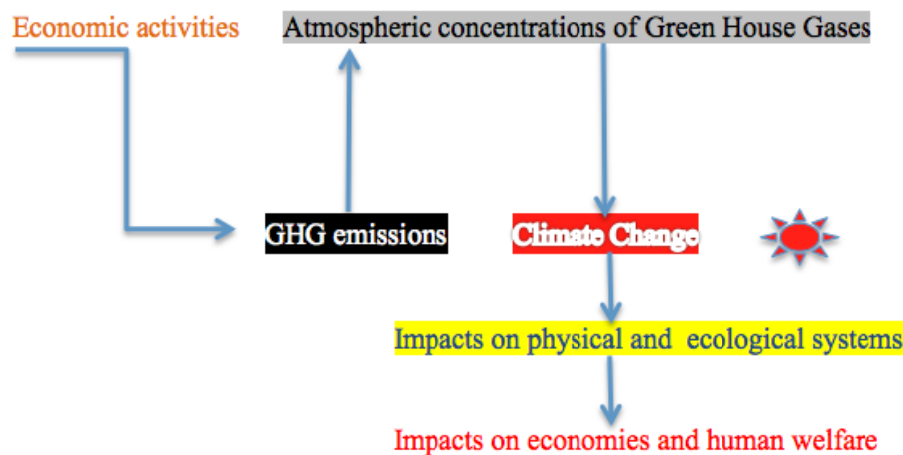
The goals of sustainable development including economic growth, environmental protection and equity are not without tension. A comprehensive strategy to address

development and environmental tension through global partnership was agreed in June 1992 when the UN convened the Earth Summit in Rio de Janeiro in the form of Framework Convention on Climate Change (UNFCCC). A few years later, the Kyoto conference of 1997 resulted in Kyoto Protocol (which was ratified in 2004). In 1998, the Intergovernmental Panel on Climate Change (IPCC) was formed to provide governments with a clear scientific view of what is happening to the world's climate.

For historical reasons, much of the literature in the area of climate-related risks (including policy and practice) dwelt on disaster risk management, often with short-term focus on relief efforts and poverty reduction programmes (Blaikie, *et al.*, 1994; Siegel and Alwang, 1999; Brooks, 2003). More recent research moved towards resilience and sustainable livelihoods (IISD, 2003) and mainstreaming adaption to development (Huq, *et al.*, 2004; Pouliotte, 2009). In the case of SSA, it is argued that development and adaptation challenges are inseparable (Hassan, 2010).

5. Development challenges in the age of climate change

The causal chain linking current economic behaviour to future economic consequences via climate change can be summarized as follows:



(adopted from Shalizi and Lecocq, 2009).

It is expected that more climate change is on the way resulting from past, current, and future greenhouse gas emissions with its potential adverse impacts on socio-economic development of nations.

These adverse impacts of climate change pose unprecedented threat to the millions of people in developing countries (UNDP, 2007). These countries are particularly vulnerable due to their low adaptive capacity and high sensitivity of their socio-economic systems to climate variability and change (Adger, 2003; MoWRNMA, 2007; Morton, 2007).

More specifically, it deepens 'the risks faced by poor and vulnerable people in rural areas, particularly those involved in agriculture and other ecosystem-dependent livelihoods' (Davies, *et al.*, 2009). Decreasing soil fertility, increasing deforestation, rising health problems compounded by inequitable access to resources render the achievement of livelihood security difficult.

It is also argued that "those regions where response [to climate change] is most urgently needed may also be where it is most constrained" (Smithers and Smit, 1997, p.130).

The impacts of climate change are exacerbated in countries where the dominant mode of livelihood is rain-fed smallholder agriculture such as Ethiopia.

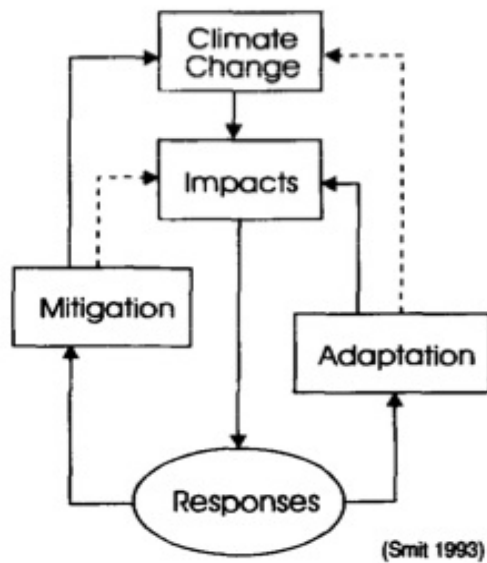
The question then will be what can be done to address the problem of climate change. There are two responses: mitigation and adaptation.

Mitigation refers to actions and processes such as technological change or substitution that reduces greenhouse gas emissions and enhances sinks (IPCC, 2007; Sumi *et al.*, 2010; Shalizi & Lecocq, 2009). Adaptation, on the other hand, refers to adjustments in ecological-socio-economic systems in response to actual or expected climatic stimuli, their effects or impacts (Smit *et al.* 2000, p. 225).

In terms of policy and research priority, further questions can be asked who needs to work on mitigation and who should focus on adaptation. One would argue that, with smaller contribution to climate change, developing countries face the effects

nonetheless and they have to adapt to climate change in order to reduce their current and future vulnerability to climate change (Shalizi and Lecocq, 2009).

Figure 1: Responses to climate change, Smit, 1993.



Some scholars note that while opportunities for mitigation could be limited to some countries, the need for adaptation is felt by all countries (Shalizi & Lecocq, 2009). As climate change is expected to increase in the coming decades, and there is growing realisation that vulnerable countries and communities will be disproportionately adversely affected, much more attention is now paid to adaptation than was previously the case (Huq & Reid, 2004, p.15).

It is acknowledged that even with a significant cut in emissions, damage will be large unless investment is made on adaptation with a view to develop adaptive capacities and reduce future vulnerability to climate change (Parry et al., 2008, p.69; IPCC, 2007).

Indeed both sides of the argument for adaptation and mitigation are valid but singlehanded reliance on one of them is misplaced. Recent literature (e.g. van Vuurena, 2011) noted progress made to treat both mitigation and adaptation as supplemental to each other rather than mere trade-offs. For instance, the newly evolving mechanism of Nationally Appropriate Mitigation Actions (NAMAs) is expected to enable large-scale emission reductions in developing countries. Yet, as a policy instrument, this area is in a early stage of development (Wang-Helmreich, et al., 2011).

Eventually, either or both responses need to take into account local specificity and vulnerability to climate change.

5.1 The case of Ethiopia

One of the specific developing countries affected by climate change is Ethiopia. Climate data for fifty years (1951-2006) shows that temperature has increased by 0.37⁰c every ten years (MoWRNMA, 2007). The increase had direct impacts on different sectors and areas in the country.

The country already faces several environmental problems ranging from land degradation, soil erosion, deforestation, loss of biodiversity, to desertification (Deressa, 2010). The most pronounced problems are recurrent drought, floods, famine and lack of food security.

High vulnerability to climatic risks is linked to dependence on climate-sensitive livelihoods, low economic development, low service coverage, underdeveloped water resources, inadequate road infrastructure, low adaptive capacity, and weak institutions.

The economy is based on largely rain-fed agriculture which contributes 45% of GDP, 60% of foreign exchange earnings, 80% of employment (CSA, 2007; MoFED, 2010). Dependence on undiversified livelihoods based on rain-fed agriculture means that production is sensitive to fluctuations in rainfall. Such dependence remains the source of vulnerability to poverty, food insecurity and their consequences including malnutrition and recurrent famines (Conway *et al.* 2011; Devereux, 2000; Devereux and Guenther, 2007, p.2).

In recognition of the problems of climate change, an adaptation plan and a green economy strategies are proposed. For example, the draft policy document on adaptation to climate change states:

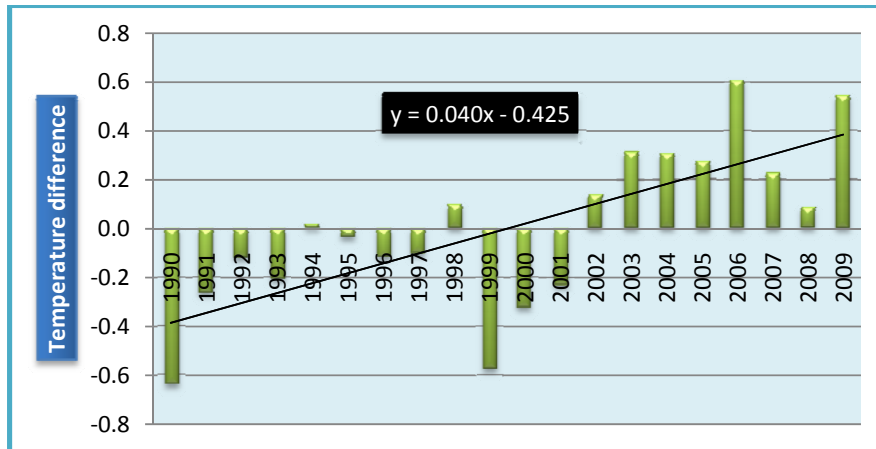
“Ethiopia’s direct and disproportionately high dependence on natural resources and climate sensitive livelihoods coupled with the prevalence of rampant poverty places the country in a most vulnerable position. According to the National Meteorological

Agency, agriculture, water and range resources, biodiversity and human health are vulnerable to climate variability and change, with huge social and economic impacts.” (EPA, 2011)

5.2 The case of Sidama

Within the same framework, Sidama Zone and SNNPR region have been experiencing climate change. In the last decade, average temperature of the SNNPR region had risen by 0.4°C (NREPA, 2012) above the national 0.37°C (MoWRNMA, 2007). This shows the seriousness of the problem in the region.

Figure 2: SNNP Regional average annual minimum temperature difference compared to 1990 – 2009 normal



Source: NREPA, 2012

The above characteristics apply to the Sidama Zone. According to official statistics (CSA, 2007), the Sidama zone has a total population of 2,954,136. It has an area of 6,538 square kilometres with a population density of 452 per square kilometres (one of the highest in the country). Rural residents account for over 94% of the population. A recent research involving 1094 households from highland and midland ecological zones, showed that about 75% respondents reported to be moderately and severely food insecure (Regassa and Stoecker, 2011:1).

In terms of climate change related research, current knowledge and understanding of vulnerability and adaptation by communities in Sidama is weak or non-existent. The economy of these communities is largely based on smallholder farming dependent on indigenous *enset/wesse* and coffee. In a coffee producing Uganda, it is argued that a predicted increase in temperature by an average of 2°C, would drastically reduce production of Robusta coffee, Uganda's major export crop therefore limiting it to highlands (Ben, 2005). Similar scenario could as well apply to Sidama case where coffee production could cease in the midlands and move to the highlands with serious consequences on the livelihoods of millions here and beyond.

The most severely affected areas in the Zone are semi-arid and dry areas such as Boricha, Loka Abaya, Hawassa Zuria districts, to name a few. These areas experienced higher temperature and receive less rainfall. The same areas have been subject to several interventions including the PSNP or Safety Net programmes whose results have yet to be proven from sustainable development point of view.

The following are most recent pictures showing the extent of environmental and developmental challenges facing the Sidama Zone.

Figure 3: Transport and water scarcity in Dorebafano, February 2012 © S. Hameso



Figure 4: Roadside soil erosion, Boricha district, February 22012 © S. Hameso



Figure 5: Landslides and soil erosion, Hawassa Zuria, February 2012 © S. Hameso



Figure 6: Land degradation, Boricha, February 2012 © S. Hameso



Figure 7: Land degradation and flooding, Boricha, February 2012© S. Hameso



Figure 8: Developmental challenges, Hulla, February 2012 © S. Hameso



5.3 Development constraints and opportunities in the age of climate change

- The key problems developing countries face are as follows:
- Underdeveloped infrastructure, markets and institutions
- Poverty
- Overpopulation and natural resource degradation
- Globalization
- Climate change

The first four challenges are broadly covered in the literature and they are self-explanatory. The focus here is challenges associated with climate change. It is rightly argued that as we understand more about the impacts of climate change, adapting to these impacts has grown from a minor environmental concern to a major challenge for human development, and a crucial element in eradicating poverty and achieving the Millennium Development Goals” (Davies, et al., 2008).

An important challenge with climate change is how to enhance adaptive capacity through economic growth. In the case of SSA, one would concur with Hassen (2010:661) when he wrote:

To achieve faster growth and development ... SSA requires more aggressive efforts and major investments in many sectors that would require much higher levels of energy use and emissions and increase the pressures on the already stressed land, water and other natural resources of the region. Development and adaptation challenges for SSA are accordingly inseparable.

Apart from addressing these challenges, it is also vital to explore possible opportunities for development within the constraints of contemporary era.

Possible development opportunities

Many developing nations are “late-comers” starting from low economic base. They would require less of a cost to adjust to carbon neutral growth path than those countries whose economic structures are intricately and intimately tied to fossil fuel combustion. Thus they can pursue a no-regrets approach to adaptation to climate change. Potentials also exist for innovative technologies for environment friendly inventions. These countries can promote alternative and renewable sources of energy including hydropower/dams.

Developing economies also have large pool of human power/resources to undertake green economy/activities, such as planting trees, basin and watershed projects.

Today, there are wide arrays of means to increase environmental awareness, including the media, education, social networks and institutions, etc. The area of opportunities for progress needs increased research by academic and research institutions.

More importantly, developing countries can undertake both mitigation and adaptation measures with the funding support from developed countries. For example, the idea of ‘carbon offsets’ is potentially large supported through the medium of the Global Environment Facility (GEF) (Lundahl and Ndulu, 1996).

6. Conclusions and recommendations

The field of research into the study of the vulnerability of human and natural systems to climate change and variability is a relatively new bringing together experts from a wide range of fields, including climate science, development studies, disaster management, health, social science, economics and policy development, to name but a few (Brooks, 2003, p.1). Such a multi-disciplinary approach combined with multi-agency co-operation is vital to address complex problems related to climate change and development.

More importantly, there is a broad recognition that climate change poses unprecedented threat to the livelihood of millions of people who depend on small-scale agriculture. Africa is highly vulnerable to future climate change and Ethiopia is often cited as one of the most extreme examples. In these circumstances, climate change adaptation should be mainstreamed in development policy, taking into consideration local vulnerability and adaptation to climate change.

Being a global problem, climate change should be tackled by all. Any blame-game and business-as-usual approaches do not help face the challenges of climate change. Instead of attributing the problem to any part of the world all need to cooperate on mitigation and adaptation. This is the understanding reached at Durban Summit, where countries, advanced and developing agreed on some actions towards mitigation and adaptation. While none of the international negotiations pass without challenge, the cost of inaction is huge both for the current and the future generations.

Finally, the need for more research and awareness raising efforts is obvious. Here the role of higher education institutions (by incorporating climate change education into their curricula), research establishments and the public media is paramount. Public institutions such as the National Metrological Agency need to establish robust climate forecasting with investment in local stations. For informed policy is half-way to solve a challenge.

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Appendix

A concept map relating to climate change: Development in the era of Climate Change

