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Urbanization and Spatial Connectivity in Ethiopia

Summary of ESSP-II Discussion Paper No. 3: "Urbanization and Spatial Connectivity in Ethiopia: Urban Growth Analysis using GIS" (December, 2009)

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This study uses Geographic Information Systems (GIS) techniques to estimate urbanization rates in Ethiopia, using a definition of urban extents that combines city population size, along with population density and travel times in surrounding areas. Defining the minimum population of an urban area as 50,000, the urbanization rate has risen from only 3.7 percent in 1984 to 14.2 percent in 2007. Over this same period, the percentage of the population more than 10 hours travel time from an urban center has fallen from 40.3 percent in 1984 to only 12.2 percent in 2007.

Ethiopia remains one of the least urbanized countries in the world. Using the Ethiopian Central Statistical Agency's definition of urban, which includes cities as small as 2,000 in population, Ethiopia's urbanization rate is only 16 percent. Using an alternative definition of urbanization based on a minimum city size of 50,000, but including surrounding areas of high population density outside of municipal boundaries, Ethiopia's urbanization rate is lower: 14.2 percent. By comparison, using the same definition, the average for sub-Saharan African countries is approximately 30 percent.

Calculating urbanization by administrative boundaries does not show the true extent of urban areas, particularly areas where agglomeration economies are possible. Cities do not expand evenly and at the same pace in all directions. Individuals tend to concentrate near key transportation infrastructure, which stretches across administrative boundaries, in order to reduce distance to economic density and market opportunities.

In this study, we examine the evolution of urbanization and market connectivity in Ethiopia by utilizing road and population data from corresponding census years (1984, 1994, and 2007) in order to model growth in urbanization and reductions in remoteness over time.

We first calculate travel times using national road datasets in order to measure accessibility by assigning a specific travel speed to each road type (asphalt concrete, gravel, earth, etc.). We also assign walking speeds, assuming that the primary mode of transportation for villages that are not connected by road infrastructure is on foot and/or by animal. A travel time model is then generated that calculates the travel time from any point within Ethiopia to cities of at least 50,000 people, taking into account slope (if one is walking or driving uphill, travel speed will be less), and transportation infrastructure defined by road maintenance and surface type.

We then spatially allocate urban versus non-urban areas in Ethiopia by creating specific thresholds following two criteria whereby locations are categorized as urban if populations have: a population density greater than 150 people per km^2; and are located within 1 hour travel time from a city of at least 50,000 people (following the WDR methodology – Uchida and Nelson, 2009).

Our results indicate that Ethiopia's urban population doubled from 1984 to 1994. In 1984, Addis Ababa was primarily confined to its city administrative boundaries. By 1994, its urban network expanded, creating an urban corridor between Sebeta in the southwest and Bishoftu and Nazreth in the southeast. In 1994, Dire Dawa more than doubled its urban population from 20,3 to 58.2 percent (Table 1).

Since the previous census in 1994, new cities were created in the four major regions (Amhara, Tigray, Oromia, and SNNPR) and economically viable cities experienced large growth. By 2007, SNNPR underwent major urban growth (from 2 to 21 percent), and urban population nationally doubled again from 7 to 14 percent.

Table 1: Agglomeration Index – Percent urban by region

Regions	Percent Urban 1984	Percent Urban 1994	Percent Urban 2007
Addis Ababa	61.2	85.5	99.3
Afar	-	-	-
Amhara	2.0	3.7	7.5
Benishangul – Gumuz	-	-	-
Dire Dawa	20.3	58.2	66.3
Gambella	-	-	-
Harari	55.2	76.2	86.0
Oromia	1.7	4.6	9.2
SNNPR	-	2.2	21.1
Somali	0.2	1.6	1.9
Tigray	2.0	3.8	8.0
Ethiopia	3.7	7.1	14.2

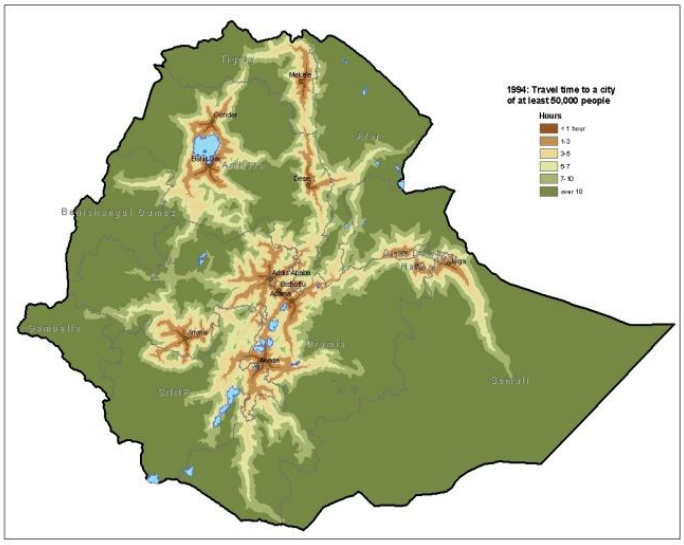
Source: Authors' calculations and Central Statistical Authority

Underlying this growth is improvement of transportation to market centers. The upgrading of major roads not only facilitates access to urban areas for populations living on these corridors, but also continues to draw people to these networks in search of greater mobility and increased economic benefits.

Given the limited infrastructure during the eighties and early nineties, a 10-year Road Sector Development Program was formulated in 1997 to improve road infrastructure. The construction and rehabilitation of roads outlined in the RSDP improved travel time within

the country considerably. In 1984, 40 percent of the population was over 10 hours from a city and 82 percent were over 5 hours. By 1994, 31 percent of total population was greater than 10 hours travel time (Figure 1).

Figure 1: Travel Time in 1994



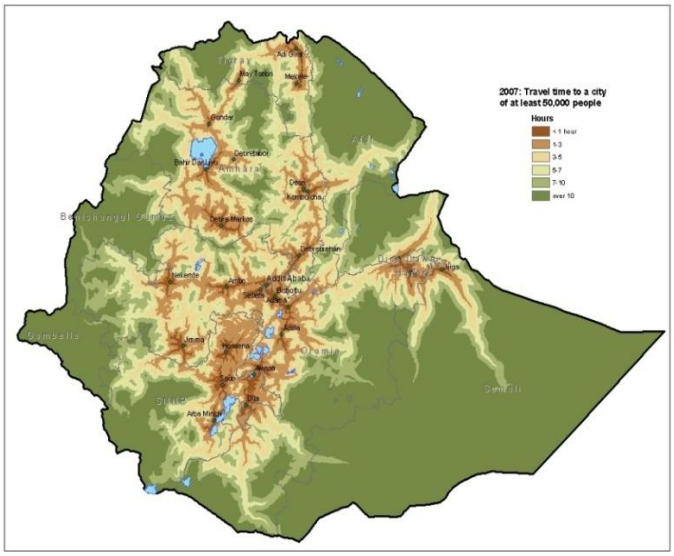
Source: Authors' Calculations and Ethiopia Roads Authority

Currently, only 3.2 percent of the population in Amhara, and 4.5 percent in SNNPR are more than 10 hours from a major city (Table 2 and Figure 2). SNNPR showed the most improvement in travel time, by connecting 45 percent more people to a city within 3 hours travel time. In Tigray and Oromia, 21 percent of the population improved market access from over 10 hours to between 3 and 10 hours travel time to a major city. Yet, even though urban centers linked to other large cities through improved infrastructure, only 5 to13 percent of the population in any region are within one hour travel time to a city of at least 50,000.

Table 2: Percent population connected in 2007

Region	Access < 1 hour	Access 1 - 3 hours	Access 3 - 5 hours	Access 5 - 10 hours	Access > 10 hours
Tigray	10.9	15.4	12.5	53.7	7.6
Afar	-	-	1.8	9.7	88.5
Amhara	5.1	22.7	37.1	31.9	3.2
Oromia	9.0	18.1	36.4	27.8	8.7
Somali	7.9	-	-	13.6	78.5
Benishangul -Gumuz	-	-	-	29.2	70.9
SNNPR	12.5	52.7	12.3	18.1	4.5
Gambella	-	-	-	-	100
Harar	100	-	-	-	-
Addis Ababa	100	-	-	-	-
Dire Dawa	100	-	-	-	-
Ethiopia	12.5	23.6	25.8	26.0	12.2

Figure 2: Travel Time in 2007



Source: Authors' Calculations and Ethiopia Roads Authority

Implications for Development Strategy

Poverty reduction strategies in Ethiopia have relied primarily on agricultural and rural development investments. This is due to the overwhelming numbers of inhabitants that derive their livelihoods from rural activities. Although the majority of the population lives in rural areas, the government of Ethiopia has identified urban planning and infrastructure improvement as an ongoing and greater upcoming priority.

According to MoFED, 70% of the urban population is considered slum dwellers on the basis of quality of housing, overcrowded living spaces, access to and quality of infrastructure, and security of tenure. Overall, while rural poverty rates dropped from 47.5 to 39 percent from 1995 to 2005, urban poverty rates increased from 33 to 35 percent over the same period (HICES 04/05). These figures suggest that **although investment in agriculture remains a priority, investments in urban areas should be re-evaluated to address underperformance in poverty indicators in the cities.**

Looking forward, it is important that Ethiopia set in place the policies needed to incentivize city growth while also supporting the agricultural backbone of the overall economy.

This brief is intended to promote discussion; it has not been formally peer reviewed but has been reviewed by at least one internal and/or external reviewer. ***The Ethiopia Strategy Support Program*** *of the International Food Policy Research Institute (IFPRI) works closely with the government of Ethiopia, and other development partners to provide information relevant for the design and implementation of Ethiopia's agricultural and rural development strategies. For more information, see http://www.ifpri.org/book-757/ourwork/program/ethiopia-strategy-support-program or http://www.edri.org.et/.*

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