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Child Health Outcomes in Ethiopia: Nationally Consistent or Yielding Evidence of Regional, Religious, and Ethnic Inequity?*

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Abstract:

The EPRDF ruling party in Ethiopia has come under much scrutiny for its governance through "ethnic federalism" following its coming to power in 1991. Its leadership has been seen by many as a mask for a highly centralized system that focuses much of the country's resources to Tigray State - the home state of many within the EPRDF. In order to test the argument of unequal resource distribution, child health across demographic groupings was measured to determine if a disparity actually exists. Using the Demographic and Health Surveys' 2005 survey in Ethiopia (EDHS), six health productions functions (two national and four local – for SNNPR, Oromiya, Amhara, and Tigray States) were estimated by using common health variables as well as variables for region, religion, and ethnicity. These models seek to identify the major determinants of health for Ethiopian children under six years of age through their height-for-age z-scores (HAZs), and if this health score is nationally consistent. The results confirmed that for the most part, child health was generally poor throughout the country. Many of the expected determinants of health also held true, particularly mother's size, which was most correlated with a child's health. In terms of region, religion, and ethnicity, the results somewhat contradicted the literature: the children of Tigray State had health almost identical to the Ethiopian average and the children of a number of other states unexpectedly had better health, such as was the case in Oromiya State. However, Amhara State's children had some of the worst health in this analysis. The regression results identified significant impacts on health because of region, especially in Amhara State where HAZs sharply decreased due to residency, but religion and ethnicity usually yielded insignificant impacts. The quantitative analysis measuring the determinants and potential disparities in health offered by this work should be added to the existing literature as a starting point in creating future health policy since it measures how and where inequities in health, and therefore living standards, likely exist rather than assuming what the sources of predicted inequities are.

Key word index: Child health outcomes; height-for-age z-scores; region; religion; ethnicity JEL: 110, 118, 130

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Introduction

Sound health has important implications for an individual's well-being. It offers an additional way of measuring this well-being over more commonly used indicators such as income, which when used alone can sometimes be misinterpreted.¹ Further, the ideal outcome of any government's policy decisions provides for an equitable distribution of health.² Although the ideal of equally distributed health is the responsibility of a government's health sector, other factors outside the government's influence that can determine health such as income, diet, genetics, etc. must also be considered as variables that impact health and health distribution. In the case of Ethiopia, the goal of healthy living unfortunately remains unattainable for most and well-being, as a function of health, thus remains low throughout the country. The major problems of perinatal diseases, malaria, HIV/AIDS, tuberculosis, and others continue to threaten the majority of the population. Additionally, illiteracy – and therefore the inability to learn about good health practices – as well as a shortage of funding and personnel continue to contribute to the poor health of Ethiopians. Finally, poor sanitation, food shortages and droughts add to this poor health.³

Perhaps adding to the overall "common" problems with health is a possibly intentional bias in caring for citizens on the part of the government. Questions and accusations circulate concerning the current Ethiopian People's Revolutionary Democratic Front (EPRDF) government's aims at promoting equity in service delivery as well as a general assumption of active government policy that targets specific groups over others. Prior to 1991, Ethiopia was highly centralized under the *Derg* government while an ambitious health policy had been made for the country whose results did not significantly improve health. The transitional, and later federal, government in 1991 inherited a population of 51 million people with 87% living in rural areas and was faced with critical public health problems.³ This current government that toppled the *Derg* had formed itself as a coalition of ethnically based rebel groups (EPRDF). The strongest leaders of the EPRDF are from the Tigrayan People's Liberation Front (TPLF) – the party of current Prime Minister Meles Zenawi of Tigray State – which many argue still retains most of the political power despite maintaining ethnic representation at many levels of the

government.⁴ For example, despite the ruling party being present in all of the ruling councils of the states in Ethiopia (i.e. EPRDF members make up the bulk of the regional governments), power remains mainly in the hands of the TPLF.⁵

The chosen path of the new government was ethnic federalism and decentralization which divided the country into eleven ethnic states (*kililoch*) in an effort to correct perceived inequities in the distribution of resources by previous highly centralized governments, most famously in the preferential treatment given to Amhara Orthodox Christians over other Ethiopians. Historically, "highlander" Ethiopians – Amhara/Tigrinya – as well as Orthodox Christians were perceived to receive beneficial treatment from the government at the expense of "southerners" and non-Orthodox religious groups. During the *Derg* administration, the Amhara were accused of continuing to be favored. Under the current administration, it is believed that the Tigrinya are the main beneficiaries of policies with the Amhara still receiving favorable attention. Sometimes combined in number, the Tigray and Amhara make up 36% of the country's population. While the Tigray themselves are roughly 6% of the population, they make up the bulk of the political and military elite.⁵⁻⁷ With this history of inequity in place, shortly after coming to power, the EPRDF launched the national "Health Sector Development Plan" that aimed to decentralize healthcare into the purview of regional governments (RHBs – Regional Health Bureaus) as well as neighborhood councils (*kebelewotch*).⁸

Various groups accuse the current government of intentional bias in the health and other sectors despite the EPRDF's platform of federalism and decentralization. They argue that a bias continues in favor of Amharas and Orthodox Christians, now also for Tigrayans, and many add that currently, the powerful Tigrinya political clique can exert political and/or economic pressure on the ethnic states for its own ends.⁷ Today, though federalist in structure (**Figure 1**), most critics maintain that the state remains highly centralized and the independence of the regional governments is questionable. The pro-government view gives the directly opposite position but offers a similarly short showing of quantitative evidence. The question of whether or not there is an equal distribution of resources, specifically in health, thus remains open seventeen years later for the country's now 81 million citizens, 84% of whom live in rural areas.⁴ Finally, complicating this question is the fact that improvements in health are not simply a matter of

government spending or percentage of the GDP spent on health;⁹ they require a more subtle analysis of the government's efforts in the health arena.

Econometric analysis of data when examining the nature and sources of inequality in health thus becomes crucial and preferable because of the solid quantitative evidence it can provide; it is however often bypassed by the political literature. Although further research needs to be done even within this field to more fully examine the possible existence of disparities, especially in health, such analyses offer good indicators concerning health and inequity. This is because the existence of regional disparities, which may remain today, could be seen as intentionally caused by the federal government, the regional governments, or the neighborhood councils (*kebelewotch*) – which have the power to grant access to health care to individual families – or could simply be the result of general health inputs.^{10,11}

Daniel O. Gilligan and John Hoddinott¹² seek to address this by focusing on several possible influencers of health, including having a parent as a *kebele* (local) official – in their work, a dummy variable is used to indicate this. These dummy variables for families who have a parent as a *kebele* official in the Amhara, Tigray, Oromiya or Southern Nations, Nationalities, and People's Region (SNNPR) States offer positive relationships between themselves and food consumption, but are not significant. Specifically, in their Probit model, having a parent as a *kebele* official in Tigray, Amhara, Oromiya and SNNPR States yields insignificant increases of 1.8%, 3.3%, 3.5% and 6.3% respectively in participation in employment generating schemes or free food distribution.¹² Their analysis using *kebele* variables, though yielding insignificant results, points to the need for future research to analyze the role of local government in the distribution of food aid in Ethiopia.

Thomas S. Jayne, et al.¹³ use 1996 data to offer a deeper analysis for investigating possible government inequity by examining the regional distribution of food aid. The authors explain that in food aid, Tigray State had the highest (and significant) probability of receiving food aid, the distribution of which the government controlled both directly and indirectly. The authors though appropriately explain how Tigray State had suffered under the previous *Derg* government which politicized food aid by withholding it to prevent rebel movements which might have had carry-over effects on the 1996 receiving of the food aid. Jayne et al.'s analysis of free distribution of food, using Probit models without controlling for other factors, shows sizably larger probabilities

for Tigray regional residents (49.3% chance) over Amhara (4.7%), Oromiya (-11.8%) and "other region" (19.2%) residents receiving free food. In terms of a food-for-work program, the chances for Tigray, Amhara, Oromiya and "other" States receiving aid is 29.9%, -4.4%, -9% and 7.7% respectively without including other factors. These point to a significantly large bias towards Tigray State over other regions, though again this may be the result of higher need in that region because of previous predatory government tactics that had ended only five years before these data were collected.

The authors further imply a possible bias by disassociating the effects of past receiving of food aid leading to present receiving of food aid, describing them as "inertia effects." However, these inertia effects from the current government correcting past malnutrition do not fully account for the amount of food that is being channeled from the government to Tigray State. Curiously, when the authors control for these inertia effects, the probability of Tigray State receiving aid does decrease greatly, but there is still evidence of a Tigray State bias.¹³ By disaggregating according to regional state and identifying this possible "inertia effect," the authors lay the groundwork to analyze future datasets for possible Tigrinya-bias in the government towards service provision at the state level.

Building upon the small supply of quantitative literature that explores inequity in Ethiopia, this paper seeks to go further. It takes a national and local view which has obvious drawbacks but will help identify the amounts of the health disparity throughout the country. This is accomplished by analyzing the health of Ethiopian children (whether or not this can be traced to government policy cannot be answered by this paper). Using the Demographic and Health Surveys' data, the resulting health production functions containing various common health inputs as independent variables – also including variables for ethnicity, region of residence and religion – will provide unique insight into the factors that influence health in Ethiopia nationally and at the regional level as well as determine if this health, which is likely poor overall, is equitably distributed across the population. Though this analysis cannot explain the sources of the inequities that may exist, it will add to the discourse by analyzing the size of these inequities. In this manner, this paper thus seeks to take the first step that has been bypassed by much of the political literature on both sides concerning overall equity and well-being in Ethiopia (in this

case, measured by health) by analyzing whether or not inequities exist rather than attempting to determine who the authors of these inequities are.

Conceptual Framework and Hypothesis

The conceptual framework here is the health production function using Ordinary Least Squares (OLS). The major drawbacks of OLS are the problem of endgoneity, the possibility of independent variables being related to each other (or the error term), and the exclusion of these variables to sufficiently explain my dependent variable, child Height-for-age Z-scores (HAZs). This is important to note and means that along with the regression results, attention must also be paid to the significance tests as well as the descriptive statistics, as both will yield valuable information.

In the health production functions themselves, health will be used as a measurement of individual well-being, something that should be distributed equally throughout a country. If this ideal state does not exist and an inequity is found, this health production cannot be used to determine what the source of the inequity is. Though government bias might be the reason for the inequity, other factors can also easily be the source of it. Like a normal production function, the health production function measures a health outcome for an individual as a result of various health inputs that should have a significant impact on the health outcome. A typical health production is given in the following equation:

H (health outcome: child health) = H (typical health inputs, child/parent/household characteristics, region, wealth ...) + $error^{14}$

To measure individual health – the health of the child – the Height-for-age Z-score (HAZ) is used. Yamano and co-workers used child height to measure the health of children because stunted growth is an adequate indicator for poor health.¹⁵ Height also accounts for access to food and indirectly accounts for wealth, that is access to resources. In determining this health, these authors also determine that certain factors have an influence, such as urban residency, satisfactory local infrastructure, being male, parents' education, ownership of farm equipment/land ownership (wealth), water source, etc. Often, a positive relationship between

these health indicators and individual health exists, though depending on the sample, there can often be insignificant results or results with unexpected signs. By accounting for as many health inputs as possible, a large number of factors that typically affect the health outcome will be controlled for. In this way, the role of the main variables in question: ethnicity, regional state of residence, and religion, will be more precisely and accurately ascertained.

My hypothesis is more in line with the econometric analyses and expects that service delivery and health overall in Ethiopia is poor and little variation in terms of health throughout the country exists. Traditional indicators such as wealth, gender, education, etc. over region, religion and ethnicity will thus be more effective in determining individual health. With a quantitative analysis, the hypothesis of there being no significant bias or significant difference in health across the expected variables should hold, especially at the aggregate/national level. The health production function used for the regression models, and the variables will be:

Child Health (Child height-for-age) =

F (Mother's height-for-age, Family Size, Region of Residence, Religion, Ethnicity, Parents' Education, Family's Wealth, Child Size at Birth, Child Birth Month, Child Gender, Urban Residency, Sanitation, Access to Clean Water)

Data Analysis Plan and Methods

The data for this analysis comes from The Ethiopian Demographic and Health Survey (EDHS) which taken in 2005. It is a comprehensive and detailed survey that has a wealth of information on maternal and child health. The aim of the survey was to determine current national population statistics concerning maternal and child health to add data to assist in the formulation of health policy. The questions were established by DHS but further adjusted through the input and suggestions of stakeholders in the government and donor community as well as aid workers. Survey-takers were carefully trained and sent out to cover the great majority of their assigned households. Through careful consistency checks, errors were carefully avoided when the data were entered at the DHS headquarters.

The survey respondents were randomly chosen 15-49 year old women in Ethiopia. They answered questions which supplied information on a wide range of health issues such as fertility rates and children's general health. Though these women were randomly chosen, sufficient attention was placed on distributing the survey throughout the Ethiopian regions. The survey-

takers interviewed over 10,000 households in all eleven of the regional states and chartered cities and the women in the surveys had a 96% response rate. Although the questions took local language and other factors into account to ensure that proper information was recorded, and though it was carefully translated from English, it was only translated into three languages – Oromiffa, Amharic, and Tigrinya. Also, though a number of the questions called for careful measurements to be taken by survey-takers, many depended on estimations of the mother or "yes/no" responses which are less exact.

The DHS information for these children is advantageous as all of the children were born at least nine years after the start of the federalist government. They are thus less prone to the health shocks from overt regional disparities in terms of government policy under previous regimes faced by previous generations such as the blocking of food aid to the Tigray region in the 1980's, though these effects might still creep in through the parents. This survey was taken in one year (2005), and the data cannot be used to estimate changes in inequity since it is not being compared to similar data from previous years. It is, however, important because it can give a view of the current health situation in Ethiopia.

For this paper's analyzed sample, data of women who have had a child/children in the past 59 months and their children are used. Residents of Harar, Dire Dawa, and the capital Addis Abeba are excluded from my sample because these are the three most urbanized areas and they all have much higher health outcomes than the rest of the country. Thus the entire sample comes from the eight ethnic-regional states and the sample size for these women respondents is n=3,252. Additionally, certain variables have been adjusted to help with the analysis and intended health production functions. The models are six separate health production functions with different combinations of variables. The first two take a similar aggregate (national) view of the influences on health in Ethiopia and offer insight as to the effect of region, religion, and ethnicity. The final four models are only from Oromiya, SNNPR, Amhara and Tigray States respectively, the four largest states by population. These four models can offer insight as to what influences health on a regional level and the two national models will show if there are differences in health influencers across regions. The dependent variable for all the models are height-for-age z-scores (HAZs) for children under six years old, recorded when interviewing their mothers, which are relative to the Standard Deviation-derived Growth Reference Curves

from the National Center for Health Statistics/Center for Disease Control and Prevention (NCHS/CDC) median population. The DHS believes that the z-scores is important to use because it is a standardized measurement that assumes a standard level of health for healthy children. The calculations for this variable come from complex measurements that take into account, age, gender, and other factors according to CDC, NCHS and DHS determinants.

The values are defined as follows: if a child is -2 standard deviations below the median for example, s/he is considered stunted and malnourished and if the z-score is less than -3, the child is severely malnourished, according to the DHS survey manual. So, rather than using absolute values, the median z-score (which is 0) is a measure of an adequately and properly fed child. The z-scores also have the benefit of accounting for genetic factors because children under six years old have not yet fully developed their genetic traits, so ethnic differences have little or no effect. For them, nutrition and health overall are the determinants of early height.¹⁶ The range of the HAZ here is -5.98 to 5.78 HAZs (which can thus also be understood as the standard deviations from the standard median). In parts of the analysis, it is multiplied by 100 to make differences clearer (i.e. in the regression, an intercept value of 156.48 is interpreted as 1.5648 HAZs).

A similar variable used for mother's height is on the same scale which is included as an independent variable as it is a strong determinant of child height. This variable is recorded only for mothers who have had a child/children in the past 59 months. Adding this variable should account for much of the variation in child height as a malnourished mother will be much more likely to give birth to a smaller child as a result of her nutritional intake. Her genetic characteristics could also have an influence on her child's height. As a result, these two variables should be closely related.

Region will be one of the most important variables in the regression for determining whether it has a significant impact on health will add to the present discourse. There is also an additional variable to account for whether or not the family lives in an urban area. This variable is important because it can account for access to health, which it does in the regression analysis as explained in the next section. Along with region, the role ethnicity and religion play in terms of health must be analyzed to see if any inequities exist here. Religion will be represented in the overall model and in the Oromiya model (model 3) by the two largest groups, Orthodox Christianity and Islam. Since SNNPR State has Orthodox Christianity and Protestantism as its

largest religions, these are used in the SNNPR model (model 4). In Tigray and Amhara States (models 5 & 6), as the population is overwhelmingly Orthodox Christian, using other religion variables would not offer valuable insight, so no religion variables are used. Again, in the national models, all of Ethiopia's religions (Orthodox Christian, Muslim, Protestant, Catholic, Traditional, Other) will be analyzed.

Ethnicity will also have important meaning in the regression, but the data offer 98 different ethnic groups. The following six groups that make up the majority of the country's population and have suitable (*n*>130) representation in the sample were selected to be analyzed: Oromo, Amhara, Tigrinya/Tigre, Somali, Afar, and Sidama. However, in the aggregate models, the three groups most prominent in the literature, Oromo, Amhara, and Tigrinya/Tigre will again be used. The diversity offered by the many other groups will serve as a good base. Additionally, in model 2, an interactive term will be used for Oromos living in Oromiya State, Amharas living in Amhara State and Tigrinya/Tigres living in Tigray State rather than separating the variables since there is a great deal of overlap between ethnicity and ethnic state of residence.

Gender is important to note when dealing with health and will be represented by a dummy variable. Wealth is calculated by a score which takes into account a family's possessions, divided into quintiles, and is important because it can indicate a family's access to health opportunities. Further variables included mothers' descriptions of access to health, type of toilet facility, type of water, size of child at birth, education of parents, number of people in the household, and birth month (to determine whether or not the child was born during the rainy season).

Results and Discussion

The analysis determined that the average child HAZ in Ethiopia is -1.75 standard deviations from the established median and the average mother's height-for-age z-score is -1.07 (see **Table 2** for Descriptive Statistics of all the variables); so overall, it is clear that child and maternal health for the entire country is poor (that national average child HAZ is only slightly above the DHS -2 z-score mark of being stunted and malnourished). According to the survey responses themselves, health may be poor due to serious concerns for most Ethiopian mothers

such as money, transport, having no one to travel with, and worrying about there not being a female attendant.

Disaggregating child HAZs across the various indicators (see Table 3) yields some surprising results that already go against the prevalent literature. In terms of region, Amhara and Tigray States are expected to have the best health indicators, but the data shows that Amhara State actually has the worst health with an average HAZ of -2.13, and its children are "stunted" and malnourished, according to DHS definitions, while Tigray State's average HAZ is about average for the sample (HAZ= -1.73). Gambella State has the best health of all the states (HAZ = -1.21) which is surprising as Gambella is a state usually seen to be at the periphery of the government's attention. The ethnic groups' HAZs were similarly surprising and of these, the Sidama children had the poorest health with an average z-score of -2.33 which is considered stunted. Religion too had puzzling results as it showed Muslims (HAZ= -1.66) and Protestants (HAZ = -1.74) having better HAZs when compared to Orthodox Christians (HAZ = -1.82) who would be expected to have the best health indicators due to the perceived preferential treatment of that group. This may also have to do with differing practices among Orthodox Christians and Muslims, though there is a high degree of interaction as well as cultural similarities between the two groups such as rules involving not eating pork. With the interactive variables to capture the effects of living in one's home ethnic-states, we see some interesting results that combine the individual regional and ethnicity findings which also go against the literature: Oromo children living in Oromiya have the best HAZs (-1.53), followed by Tigrinya/Tigre children living in Tigray State (HAZ= -1.73). Amhara children in Amhara State (HAZ= -2.15) still have the worst health indicators here.

Parents' education, location of residence, sanitation, water access, child birth month, family's wealth index quintile (except for a curious switch from the expected results between the "poor" and "poorest" quintiles) and child size at birth all corresponded to their predicted values as HAZs increased as these indicators improved. Finally, though child gender shows a somewhat surprising roughly 0.1 z-score difference in HAZ between males and females in favor of females, it is interesting to also note that there is a 12% chance that the average child HAZ of these two groups could be the same. Similarly, the probability of average child HAZ being the same

regardless of toilet facility (35% chance) indicates that this, along with the access to health variables, has no significant effect on child health.

The second part of the analysis came with the actual six OLS regression models (Table 1), but from the outset, it must be understood that none of the *R*-squared values exceed 0.1. Though this means that the chosen independent variables in the regression analysis may not correspond well with the dependent variable of child HAZ, the significance of the variables on a case-by-case basis gives valuable information and directions for future research. The first two national models use all 3,252 children of the created sample. Model 1 includes all the predicted determinants of health including variables for ethnicity, religion, and region of residence. Since there is a great deal of overlap between ethnicity and ethnic regional state of residence, though it is not 100%, model 2 is the same as model 1 except interactive variables were created for the three ethnic groups and regions that are the focus of much of the current literature. These interactive variables represent Oromos who live in Oromiya State, Amharas who live in Amhara State and Tigrinya/Tigres who live in Tigray State. Though the interactive variables help lend a new view to the ethnicity/region question, they may also simply be picking up the states' fixed effects. The final four models are used to analyze the factors contributing to health in each of the four most discussed regions. Models 3-6 thus represent Oromiya State (n=756), SNNPR State (n=667), Amhara State (n=500), and Tigray State (n=413) respectively.

There are a number of commonalities throughout the models that support the mainstream literature on determinants of child health. Mother's HAZ always plays a very important role in determining the HAZ of the child, though at the local levels, its' magnitude can vary. Additionally, family size has a significant negative effect on child health, except for in the Amhara and Oromiya State models where there is no significant relationship between family size and child's HAZ. Wealth, though not significant, almost always shows the predicted positive relationship between it and child HAZ (the richer a family is, the healthier their children), though from the disaggregated data in **Table 3**, the better child height for age for "poorest" families versus "poorer" families may indicate that wealth might not always have the expected positive effect. Interestingly, the Tigray State model (model 6) has the largest and only significant positive relationship between wealth and child health whereas a number of its other variables are different than the other five models. This could indicate that in Tigray State, wealth as opposed

to other variables that hold true in other states, is one of the stronger drivers of child health and that Tigray State overall offers a unique case for what determines child health.

Having access to good sanitation according to toilet facility surprisingly usually yields small and insignificant effects on child health. This could indicate that sanitation is not a strong determinant of health, or more likely that toilet facilities are not as strong an indicator of sanitation as predicted. Good water though often yields significant, but modest, effects on child health in the models for Ethiopia on the national level and in Oromiya State, but it does not account much for child health in the last three models/states. Additionally, children born during the rainy seasons have better HAZs than children not born during the rainy season which can indicate the importance of more food during the very early months of a child's birth or other similar factors that are unique to rainy seasons. This holds on the national level as well as in the Oromiya model, a logical deduction because Oromiya State is one of the most fertile states in Ethiopia and this variable could be accounting for the importance of farming in rural areas. Amhara and Tigray States however, in the north of the country, are more drought-prone which explains their still positive, but insignificant, relationship between rainy season birth and child health. This does not account for SNNPR State which is similar to Oromiya State in geography because SNNPR State shows no significant relationship between rainy season birth and child health which could mean that birth month affects child health through different means.

Nationally, girls have significantly better health outcomes than boys, between 0.11 and 0.10 HAZs higher, an important finding. This more strongly shows the surprisingly better health of girls over boys in the analysis that goes against intuition concerning child health by gender in the developing world. For example, the study by Yamano and colleagues showed an insignificant, but roughly 0.2 cm, advantage in height of boys over girls.¹⁵ However, with the regional models, there is no state that shows a significant effect on child health from gender which is puzzling since a significant effect exists on the national level.

Urban residency serves as a proxy for type of location but can also represent some of the variation that would have been represented by the access to health variables. Since the DHS data did not have appropriate variables for distance to health facilities and other access to health variables, urban residency can almost be used as a proxy. "Peri-urban" residency according to Yamano, et al.'s study offered conflicting, and insignificant results when accounting for child

height, yielding both positive and negative effects.¹⁵ The data here yield a strong positive relationship between urban residency and health, especially in SNNPR State where urban residency increases child HAZ by 1.03. For the Oromiya, Amhara, and Tigray State models, urban residency does not significantly account for health. The disconnect between urban residency and child health could also be because urban dwellers in the regions make up between 5% and 7% of their respective populations, so there may be other influences here. Child size at birth (as estimated by the parent) also usually yields a positive relationship to current child HAZ and is significant at the national level, but not always significant in the regional models. Though there were a few interesting, though slight, exceptions, the general trend of larger birth size leading to better child health holds. This makes intuitive sense, but Yamano, et al.'s (2003) research showed significantly negative effects of "initial height" on current child height, reducing child height by 0.2 - 0.25 cm.¹⁵

In terms of parents' education, with an aggregate view (in the first two models) an increase in education usually leads to an increase in child HAZ, but there are many instances of either the wrong relationship (i.e. a negative one) between parents' education and child HAZ, or an insignificant effect when the models are analyzed by region. This can be due to the great majority of Ethiopian parents having not completed primary school which may skew the results. Since the groups that have had primary education or beyond are in the minority, sometimes in the extreme – especially in the case of women who generally receive less education than men – some of the puzzling effects of parents' education on child HAZ are explainable. For example, in the Tigray State model (model 6), there is a very significant effect on children whose mothers have completed beyond primary school, -1.17 HAZ from the norm. But this occurs largely because a very small portion of Tigray State mothers have completed education beyond primary school; 19 of the 413 respondents. Thus, a number of other factors can be affecting this particular state's child HAZs aside from education.

In terms of non-typical health indicators, half of the focus of this paper, an interesting result is that in the first three models (Ethiopia overall and Oromiya State) where Orthodox Christian and Muslim variables are used (the two largest religious groups in these models), Muslim children have significantly, but moderately, better HAZs than do Orthodox Christian children, contradicting the mainstream literature. In SNNPR, however, Orthodox Christians have

better health than Protestants, the second largest religious group in the state, which is in line with the literature, though this is not statistically significant. According to Jayne, et al.,¹³ with government aid programs, depending on the program, Muslims and Protestants compared to Orthodox Christians sometimes have improved chances of receiving aid but at other times have worse chances, though these results are not significant. In my national model and SNNPR's (models 1&4 respectively), these results hold and there is no significant effect of religion on child health (Amhara and Tigray States again are Orthodox Christian by a sizeable majority), but in Oromiya State which is a diverse state, Muslim children have HAZs 0.38 greater than the norm. Ethnicity similarly shows no significant differences in health, except for Oromo children in model 1 who have HAZs 0.50 greater than the norm.

In model 1, children living in Oromiya, SNNPR, Amhara and Tigray will have HAZs of 0.35 (95% significant), -0.25 (95% significant), -0.49 (99% significant) and -0.067 (not significant) away from norm, respectively. Since the results of region and ethnicity (though ethnicity is usually not significant in model 1) are somewhat contradictory since they often overlap, model 2 becomes important to analyze their interaction more carefully. Though often insignificant, ethnicity somewhat dilutes some of the impacts of the stark differences among the regions in model 1 because a large number of members of ethnic groups live in the corresponding ethnic states so the true parameter could be some combination of the two which is the reason for creating model 2.

In the case of model 2, Tigrinya/Tigre children in Tigray's health are insignificantly impacted upon by their location, but Oromo children in Oromiya have a significant HAZ of 0.17 greater than the norm while Amhara children in Amhara have HAZs of 0.26 less than the norm. The findings of model 1 and 2 show a clear indication of Amhara children or Amhara State residents having very poor health versus their Oromo counterparts, but not necessarily their Tigrinya/Tigre counterparts, in their respective home states. This is in line with the disaggregated data and offers some interesting additions to the literature. Where Tigrinya/Tigre and Amhara are expected to have good health as opposed to Oromos, of the three, the data show that Tigrinya/Tigre do have the best health, but it is roughly equal to the Oromos while Amharas have the worst health by far. With the regression results however, the evidence is a bit murkier,

especially regarding the status of Tigrinya/Tigre (or Tigray residents) child health, but Amhara/Amhara residents still have some of the poorest health.

The regional models were expected to provide evidence for region-specific influencers of health, but among them for the most part, health outcomes are roughly similarly influenced with slight exceptions. On the national level, however, the aggregate view of health outcomes yields several important findings. One major one is that religion and ethnicity do not play the large role expected by the mainstream political literature in determining health. Region however (both alone and when used in the interactive variables), does have strong effects on child health but the results are surprising because Amhara/Amhara dwellers have the worst health and Oromos/Oromiya dwellers have very good health while the health of Tigrinya/Tigre's in Tigray State is not sufficiently determined by the aggregate models. The data also show that a number of ethnic and religious groups believed to be marginalized have in fact better health indicators than expected, whereas groups believed to be privileged do not. Thus, when compared to the more political literature, the hard data do point to some instances of inequity in health distribution, but it is often smaller than the political literature indicates and/or not in the expected places.

There is however one aspect of the data that may more strongly hint at a government bias. **Table 4** shows health facilities by chartered city and regional state and there are obvious disparities; but even where uneven resource distribution exists, it does not always translate into differing health outcomes – in my analysis, the establishment of health facilities throughout Ethiopia's regions do not always correspond to the results. Amhara State, for example, has by far the least hospitals per person and predictably low health outcomes, while on the other hand, Tigray and Oromiya States with their similar health, have differing amounts of hospitals per person – though it is important to note that Tigray State has the second highest number of hospitals per person of the rural states. This table's information is thus important in showing a possible avenue of government bias towards urban areas and certain states, but is only a start as it can support neither side of this argument on its own.

Conclusion

This research article offers a starting point in analyzing possible inequities in Ethiopia by a specific metric: children's health. Though the possible government biases in terms of region, religion, and ethnicity must be more extensively analyzed and the disparities in health for certain groups may indicate an unequal distribution of resources on the part of the government, this could not be fully determined in this study. Additionally, there may be other factors that account more effectively for the disparities in health outcomes that were not addressed in the data, such as diet. The study, however, confirms what most of the literature agrees on, that health overall is poor in Ethiopia. It also goes further by pinpointing in what respect generally accepted inputs, especially maternal health and family size, impact child health in both predicted and unpredicted ways. Thus, in giving due to the more significant findings, the targets of recommended policy options can now be narrowed.

One puzzling aspect of this analysis was the differing magnitudes of even the most significant characteristics across the different models. These discrepancies, when dealing with the aggregate level models as opposed to the local level models, prove the importance of local analysis, especially when creating policy that accounts for factors that may be lost at the national level. This is seen clearly by the influence, however strong, of access to clean water, urban residency, size at birth, month of birth, and region on child health differing depending on the model's level of analysis. Because of this disconnect between national and local analyses and the low capacity in the health sector, health projects must be conducted on the local level using local data because the impacts will be better targeted and resources more effectively used. Using national data can lead to generalized findings, but the econometric analyses focusing on local data will yield the most accurate findings. Also, even when making national generalizations, a sample like the one used here of 3,252 women is a good start, but more work needs to be done to make assumptions for the over 81 million Ethiopians.

Though the national models here give an admittedly broad view, the exceptionally poor health for ethnicities such as the Amhara, Sidama, and members of the less populous groups in Ethiopia calls for further research as they have severely low child health indicators in most of the regressions and descriptive statistics. These groups should especially be analyzed more carefully (to see whether the poor health estimated here is true and if it is the result of active government bias or other factors) and their health problems should be appropriately addressed. Future policy should thus focus on bringing up their health, and the health of the entire country, by addressing the main factors of health determined by this analysis as well as concentrating on equally and efficiently distributing what little health services are present.

Whether or not the government is the author of the inequality, they must take the lead in equitably improving health. Again, as well as being a matter of money spent, improvements in health involve effort and cost-effective strategies, so new and innovative means need to be found to improve health in Ethiopia with current remedies. These include full utilization of oral rehydration therapy (ORT) to stop diarrhea, conducting education concerning maternal health, and promoting a viable and acceptable family size policy. Proven as well as new techniques should be the direction of future research.

More broadly, a comprehensive and simple health policy that realistically takes into account the government's abilities and resources must be mapped out. An improved relationship with NGOs and other international agencies as well as local communities which address the population's most basic needs – especially in maternal health which is especially poor – is also necessary. At the same time, government and local capacity in the health sector must be improved while working with other groups. Additionally, food security has to be addressed as well as infrastructure, especially for access to health. While some of these are admittedly long-term goals, there are changes that can be undertaken now such as using health funds where they will have the most impact, avoiding large and costly projects for more simple, effective and proven ones, and so on. Finally, it seems that decentralization of health in the long run is ideal but at this point, there is resistance in many quarters to recognize the disconnect between what individuals need, what the government thinks they need, and what is available. Thus, political will to appropriately and efficiently tackle the fundamental health issues in Ethiopia is essential.

Appendix

Table 1. Regression Results

	1	2	3	4	5	6
	(Overall)	(Interactive)	(Oromiya)	(SNNPR)	(Amhara)	(Tigray)
Variable			· · · /	. ,	. ,	
Intercept	-156.48	-165.84	-125.36	-140.36	-214.07	57.24
	(26.02)***	(25.37)***	(60.12)**	(52.86)***	(63.11)***	(76.04)
Mother's Height for Age	0.232	0.238	0.292	0.130	0.327	0.193
	(0.029)***	(0.029)***	(0.065)***	(0.066)**	(0.068)***	(0.083)**
Family Size	-14 20	-13 75	-21.86	-30.09	8 55	-61 47
2	(0.021)**	(6 19)**	(15.93)	(11 74)**	(17.31)	(23.09)*
Family Size Sayared	1.09	1 04	1 38	1 75	-0.668	4 14
1 anay Size Squarea	(0.012)**	(0.428)**	(1.12)	(0.74)**	(1.31)	(1.86)**
Pagion	(0.012)	(0.+20)	(1.12)	(0.74)	(1.51)	(1.00)
region resides in Oromiva	35 57					
resides in Oronnya	(12.02)					-
regides in SNINDD	(13.92)**					
Tesides III SININPR	-24.8/					
.1 1	(11.16)**					
resides in Amnara	-48.65					
· 1 · · · ·	(15.57)***					-
resides in Tigray	-6.67					
	(32.25)					
Religion						
Orthodox	-3.34	5.82	4.61	28.04		
	(10.59)	(9.85)	(19.22)	(22.21)		
Muslim	5.46	17.09	38.39			
	(9.71)	(8.93)*	(17.38)**			
Protestant				7.42		
				(18.03)		
Ethnicity						
Oromo	50.44					
	(14.08)***					
Amhara	21.55					
	(15.15)					
Tigrinya/Tigre	17.50					
	(32.56)					
Interactive Ethnicity/Region						
Oromo residing in Oromiya		17.06				
5		(8.59)**				
Amhara residing in Amhara		-26.43				
Timilara restantg in Timilara		(10.90)**				
Tiorinya/Tiore residing in Tioray		10.95				
nginiya, ngio tostanig in ngiay		(11.94)				
Mother's Highest Education Completed		(11.)+)				
completed primary school	10.01	11.03	25 74	30.70	-15.10	-17 10
completed primary selloor	(0,00)	(0 10)	(18 20)	50.70 (17.71)*	(21.01)	-17.19
completed beyond primary asha-1	(9.09)	(9.10)	(10.20)	$(1/./1)^{r}$	(21.91)	(22.70)
completed beyond primary school	14.91	14.82	30.43	41.33	5.54	-11/.34
	(19.95)	(19.96)	(49.03)	(41.43)	(33.91)	(46.21)***

Father's Highest Education Completed

40

completed primary school	12.55	11.13	28.11	-16.61	-2.50	0.878
	(7.70)	(7.69)	(14.83)*	(16.21)	(18.11)	(18.30)
completed beyond primary school	29.56	28.82	-16.75	17.72	63.51	74.43
	(12.91)**	(12.92)**	(26.52)	(25.62)	(33.56)*	(41.07)*
Family's Wealth	0.370	0.587	2.24	0.038	0.584	5.92
-	(1.18)	(1.17)	(2.88)	(2.75)	(2.82)	(3.56)*
Child's Size at Birth						
Normal	15.27	16.24	21.75	32.48	7.80	23.32
	(7.61)**	(7.62)**	(17.27)	(17.99)*	(15.45)	(16.75)
Large	18.77	20.38	27.77	59.00	34.67	4.64
	(11.24)*	(11.24)*	(23.66)	(30.64)*	(25.33)	(27.83)
very large	27.38	25.77	10.95	26.77	47.68	48.95
	(9.37)***	(9.36)***	(18.40)	(19.47)	(24.30)*	(31.11)
Child's Birth Month						
rainy season	22.75	22.77	44.63	16.88	4.82	22.55
	(6.24)***	(6.24)***	(13.17)***	(14.13)	(13.82)	(15.15)
Child's Gender						
child is female	11.39	10.42	-6.89	-3.03	20.23	7.89
	(6.25)*	(6.26)*	(13.23)	(14.22)	(13.77)	(15.25)
Location						
urban	28.60	33.23	-43.68	102.56	47.45	-115.64
	(15.68)*	(15.55)**	(42.24)	(35.50)***	(39.58)	(74.43)
Sanitation/Water Access						
access to a good toilet	0.46	-5.76	7.53	19.40	3.87	26.20
	(8.61)	(8.22)	(19.20)	(16.88)	(16.34)	(27.97)
access to good water	16.35	17.91	28.84	14.93	-14.80	0.352
	(6.59)**	(6.55)***	(13.65)**	(14.50)	(14.19)	(15.93)
Ν	3252	3252	756	667	500	413
F	8.80***	9.48***	3.22***	3.42***	3.28***	3.42***
R-Squared	0.0638	0.0580	0.0730	0.0867	0.0980	0.0867
Adjusted R-Squared	0.0566	0.0519	0.0504	0.0613	0.0681	0.0613

*90% significance

**95% significance

***99% significance

<i>Variable</i> child's ht/a standard deviation x 100	<i>Mean</i> -175.22	Median -180	<i>St. Dev.</i> 181.90
mother's ht/a standard deviation x 100 family's size family's size squared	-106.93 6.20 42.93	-109 6 36	109.60 2.11 30.56
family's wealth index	-4.24	-5.08	4.41
Variable	N	%-age	
Region resides in Oromiya resides in SNNPR resides in Amhara aresides in Tigray resides in Benishangul-Gumuz	756 667 500 413 288	23.25% 20.51% 15.38% 12.70% 8.86%	
resides in Somali resides in Afar resides in Gambella	236 219 173	7.26% 6.73% 5.32%	
Reliaion			
Orthodox Muslim Protestant Traditional Catholic Other	1337 1131 659 48 41 36	41.11% 34.78% 20.26% 1.48% 1.26% 1.11%	
Ethnicity			
Oromo Amhara Tigrinya/Tigre Somali Afar Sidama	807 643 403 214 181 124	24.82% 19.77% 12.39% 6.58% 5.57% 3.81%	
Interactive Ethnicity/Region			
Oromo residing in Oromiya Amhara residing in Amhara Tigrinya/Tigre residing in Tigray	676 470 392	29.79% 14.45% 12.05%	
<i>Mother's Highest Education Completed</i> no education completed primary school completed beyond primary school	2582 537 133	79.40% 16.51% 4.09%	
<i>Father's Highest Education Completed</i> no education completed primary school completed beyond primary school	1995 922 335	61.35% 28.35% 10.30%	
Family's Wealth Index Quintile Poorest Poorer Middle Richer Richest	910 658 629 604 451	27.98% 20.23% 19.43% 18.57% 13.87%	

Table 2. Descriptive Statistics of Sample Population (N=3252)

Child's Size at Birth			
very small	619	19.03%	
Small	307	9.44%	
Normal	1343	41.30%	
Large	348	10.70%	
very large	635	19.53%	
Child's Birth Month			
rainy season	1676	51.54%	
non-rainy season	1576	48.46%	
Child's Gender			
child is female	1595	49.05%	
child is male	1657	50.95%	
Location			
Urban	261	8.03%	
Rural	2991	91.97%	
Sanitation/Water Access			
access to a good toilet	1043	32.07%	
no access to a good toilet	2209	67.93%	
access to good water	1773	54.52%	
no access to good water	1479	45.48%	
Access to Health			
distance to health facility, "a big problem"	2331	71.68%	
not "a big problem"	921	28.32%	
getting permission, "a big problem"	938	28.84%	
not "a big problem"	2314	71.16%	
getting money, "a big problem"	2534	77.92%	
not "a big problem"	718	22.08%	
getting transportation, "a big problem"	2484	76.38%	
not "a big problem"	768	23.62%	
going alone, "a big problem"	1952	60.02%	
not "a big problem"	1300	39.98%	
no temale health attendant, "a big problem"	2279	/0.08%	
not "a big problem"	973	29.92%	

Variable	N	Mean	Median	St. Dev.	Means Test
Kegion	750	156 14	1505	102 (0	000/
resides in Oromiya	/30	-100.14	-138.5	182.08	99%
resides in Ambara	500	-194.04	-202	165.74	9970
resides in Tigray	300 413	-215.45	-221.5	150.54	9970
resides in Benishangul-Gumuz	288	-171.42	-1/5	171 08	99/0
resides in Somali	236	-171.42	-177	202.69	99%
resides in Afar	219	-141.85	-149	216.81	99%
resides in Gambella	173	-120 57	-143	201 79	99%
	175	120.07	115	201.79	55770
Religion			10.6		a a a (
Orthodox	1337	-182.42	-186	158.81	95%
Muslim	1131	-165.71	-168	194.63	95%
Protestant	659	-173.90	-181	194.27	95%
Traditional	48	-190.56	-207	250.60	95%
Catholic	41	-14/.95	-13/	205.59	95%
Other	36	-240.53	-229.5	186.61	95%
Ethnicity					
Oromo	807	-147.88	-147	185.99	99%
Amhara	643	-197.87	-204	156.63	99%
Tigrinya/Tigre	403	-171.32	-172	154.39	99%
Somali	214	-175.90	-177	204.86	99%
Afar	181	-151.34	-159	217.64	99%
Sidama	124	-233.40	-246	188.65	99%
Interactive Ethnicity/Region					
Oromo residing in Oromiva	676	-153.25	-157.5	185.25	99%
Amhara residing in Amhara	470	-215.05	-223	156.24	99%
Tigrinya/Tigre residing in Tigray	392	-172.92	-174	153.76	99%
Mother's Highest Education Completed					
no education	2582	-182.30	-100.5	185 55	00%
completed primary school	537	-158.42	-161	164.62	99%
completed beyond primary school	133	-105.48	-117	156.85	99%
completed beyond primary school	155	-105.40	-117	150.05	<i>JJ</i> 70
Father's Highest Education Completed					
no education	1995	-186.26	-193	185.94	99%
completed primary school	922	-169.36	-175.5	172.90	99%
completed beyond primary school	335	-125.52	-131	172.94	99%
Family's Wealth Index Quintile					
poorest	910	-175.56	-193	194.45	99%
poorer	658	-191.44	-197	176.55	99%
middle	629	-184.40	-185	179.51	99%
richer	604	-169.98	-177	175.90	99%
richest	451	-145.03	-147	171.06	99%
Child's Size at Birth					
very small	619	-197.87	-202	171.51	99%
small	307	-180.31	-196	197.82	99%
normal	1343	-173.96	-179	179.59	99%
large	348	-166.32	-165	179.13	99%
very large	635	-158.18	-165	188.18	99%

<u>Table 3. Dependent Variable (child HAZ) Disaggregated across Independent Variables</u> (N=3252)

Child's Birth Month					
rainy season	1676	-164.43	-172	184.58	99%
non-rainy season	1576	-186.68	-192	178.35	99%
Child's Gender					
child is female	1595	-170.23	-177	182.50	88%
child is male	1657	-180.01	-184	181.24	88%
Location					
urban	261	-114.56	-131	171.57	99%
rural	2991	-180.51	-187	181.84	99%
Sanitation/Water Access					
access to a good toilet	1043	-170.87	-179	176.40	65%
no access to a good toilet	2209	-177.27	-181	184.44	65%
access to good water	1773	-164.68	-172	179.88	99%
no access to good water	1479	-187.85	-190	183.55	99%
Access to Health					
distance, "a big problem"	2331	-178.64	-184	184.58	91%
not "a big problem"	921	-166.53	-175	174.72	91%
getting permission, "a big problem"	938	-169.55	-181	189.10	74%
not "a big problem"	2314	-177.51	-180	178.89	74%
getting money, "a big problem"	2534	-175.31	-180.5	186.83	4%
not "a big problem"	718	-174.88	-178.5	163.42	4%
getting transportation, "a big problem"	2484	-178.41	-186	185.76	92%
not "a big problem"	768	-164.88	-169	168.49	92%
going alone, "a big problem"	1952	-177.00	-185	187.44	50%
not "a big problem"	1300	-172.52	-175.5	173.28	50%
no female health attendant, "a big problem"	2279	-176.66	-184	184.53	51%
not "a big problem"	973	-171.83	-175	175.63	51%

<u>Table 4. Hospitals, Health Centers, Health Stations and</u> <u>Health Posts by Region and Population</u>

Kilil	Hospital	Health Center	Health Station	Health Post	Population
Addis Abeba	27	29	130	43	2,973,004
Afar	2	9	45	45	1,263,000
Amhara	18	126	40	1421	19,120,005
Benishangul-Gumuz	2	11	56	65	625,000
Dire Dawa	3	5	7	34	398,000
Gambella	1	8	35	22	247,000
Harar	5	2	19	7	196,000
Oromiya	30	185	817	912	26,553,000
Somali	6	16	75	121	4,329,001
SNNPR	17	161	256	1316	14,901,990
Tigray	15	48	182	211	4,334,996
TOTAL	126	600	1662	4,197	74,940,996
	People per	People per	People per	People per	
Kilil	Hospital	Health Center	Health Station	Health Post	
Addis Abeba	110,111	102,517	22,869	69,140	
Afar	631,500	140,333	28,067	28,067	
Amhara	1,062,223	151,746	478,000	13,455	
Benishangul-Gumuz	312,500	56,818	11,161	9,615	
Dire Dawa	132,667	79,600	56,857	11,706	
Gambella	247,000	30,875	7,057	11,227	
Harar	39,200	98,000	10,316	28,000	
Oromiya	885,100	143,530	32,501	29,115	
Somali	721,500	270,563	57,720	35,777	
SNNPR	876,588	92,559	58,211	11,324	
Tigray	289,000	90,312	23,819	20,545	
TOTAL	594,770	124,902	45,091	17,856	

Source: Federal Democratic Republic of Ethiopia: Ethiopian Ministry of Health⁷



References

- 1. Sen, A. Development as Freedom. New York: Anchor Books, 1999.
- 2. Anand, S., Peter, F., and Sen, A., eds. *Public Health, Ethics, and Equity*. Oxford: Oxford University Press, 2004.
- "Chapter 2: The Society and Environment." <u>Ethiopia: A Country Study</u>. 1991. Library of Congress Federal Research Division. 16 October 2008. <<u>http://lcweb2.loc.gov/frd/cs/ettoc.html></u>.
- 4. "Country Profile 2008: Ethiopia." <u>The Economist Intelligence Unit (EIU)</u>. London, England: 2008.
- 5. Woldemariam, K. *Myths and Realities in the Distribution of Socioeconomic Resources and Political Power in Ethiopia*. Lanham, MD: University of America Press, Inc., 2006.
- 6. Habtu, A. "Ethnic Federalism in Ethiopia: Background, Present Conditions and Future Prospects." *Paper Submitted to the Second EAF International Symposium on Contemporary Development Issues in Ethiopia*. 11-12 July 2003.
- Mengisteab, K. "Ethiopia's Ethnic-Based Federalism: 10 Years After." <u>African Issues</u> 29.1/2 (2001): 20-25.
- "Federal Democratic Republic of Ethiopia: Ethiopian Ministry of Health." <u>Ethiopian</u> <u>Ministry of Health</u>. 2007. Federal Ministry of Health – Ethiopia. 16 October 2008 <<u>http://www.moh.gov.et/></u>.
- 9. Filmer, D. and Pritchett, L. "The Impact of Public Spending on Health: Does Money Matter?" <u>Social Science & Medicine</u> 49 (1999): 1309-1323.
- 10. Chaya, N. "Poor Access to Health Services: Ways Ethiopia is Overcoming It." <u>Population Action International Research Commentary</u> 2.2 (2007).
- 11. Pausewang, S., Tronvoll, K., and Aalen, L., eds. *Ethiopia since the Derg: A Decade of Democratic Pretension and Performance*. London: Zed Books, 2002.
- 12. Gilligan, DO. and Hoddinott, J. "Is There Persistence in the Impact of Emergency Food Aid? Evidence on Consumption, Food Security, and Assets in Rural Ethiopia." <u>American Journal of Agricultural Economics</u> 89.2 (2007): 225-242.
- Jayne, TS., Strauss, J., Yamano, T., and Molla, D. "Targeting Food Aid in Rural Ethiopia: Chronic Need or Inertia." <u>Journal of Development Economics</u> 68 (2002): 247-88.
- 14. Schultz, TP, and Strauss, J., eds. *Handbook of Development Economics, Volume 4*. Amsterdam, The Netherlands: North-Holland, 2008.
- 15. Yamano, T., Alderman, H., and Christiaensen, L. "Child Growth, Shocks, and Food Aid in Rural Ethiopia." Policy Research Working Papers no. 3128 (2003).
- Duflo, E. "Child Health and Household Resources in South Africa: Evidence from the Old Age Pension Program in South Africa," <u>American Economic Association Papers and</u> <u>Proceedings</u> (2000)
- 17. "Regional States of Ethiopia". <u>BBC News</u>. 2009. British Broadcasting Corporation. 20 February 2009 < http://newsimg.bbc.co.uk/media/images/41151000/gif/_41151285_ethiopia_regions_416. gif>.