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Synopsis: An analysis of trends and determinants of child undernutrition in Ethiopia, 2000-2011

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This study uses two rounds of the Ethiopian Demographic Health Survey (EDHS) to statistically analyze patterns and trends in undernutrition (child growth) in Ethiopia over the period 2000 to 2011. In 2000, over half of Ethiopian preschool children were stunted and almost a third were severely stunted. However, progress against child undernutrition over the study period was solid, with stunting prevalence reduced by 1.4 percentage points per year, although progress has slowed since to 1.0 points per year between 2011 and 2014.

We find the determinants of undernutrition are attributed to levels of household assets, maternal and paternal education, antenatal care, and birth intervals, with other factors, such as piped water and improved toilet facilities, only having importance in either rural or urban areas, but not both. We hypothesize that income growth and improved food security are the main forces driving nutritional change in Ethiopia in recent decades. Moreover, the large rural-urban discrepancy in child nutritional outcomes in Ethiopia is primarily explained by sharp differences in household assets across the rural-urban divide.

The study also examines infant and young child feeding (IYCF) practices, finding that, while breastfeeding is widespread, exclusive breastfeeding is by no means universal. No less worryingly is the striking lack of diversity in children's diets, with most children regularly exposed only to basic staples (grains, roots, tubers), with cow milk constituting the only significant source of animal-based proteins and micronutrients. The most significant predictors of dietary diversity for young children are household assets, parental education, cow ownership, antenatal care exposure, and maternal age, with older women giving their children less diverse diets. Going forward, improving the quality of Ethiopian diets will also be a major task for strategies that aim to improve child growth.

DATA AND METHODS

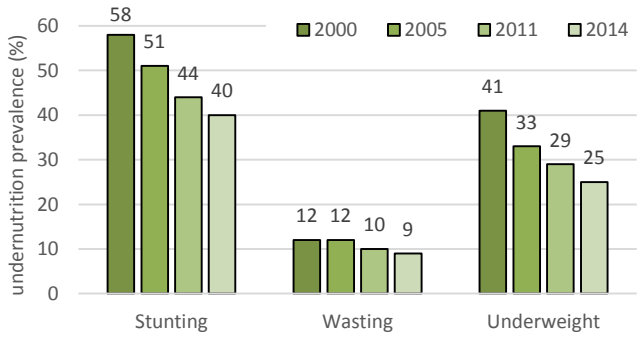
This study uses data from the 2000 and 2011 Ethiopian Demographic Health Surveys (EDHS). These data were collected by the Ethiopian Central Statistical Agency (CSA) along with ICF International and funded by USAID. The EDHSs are nationally-representative surveys and are well suited to understanding trends and determinants of undernutrition in the country.

A range of statistical techniques were employed to analyze relationships between potential determinants of nutritional status and nutritional outcomes, working with nutrition models that closely follow the framework used by UNICEF.

TRENDS IN CHILD NUTRITION OUTCOMES

Ethiopia remains an extremely undernourished country, though it is a country that has made solid progress against undernutrition in the past decade. In 2000, 58 percent of Ethiopian preschool children were stunted. This declined to 44 percent in 2011 and to 40 percent in 2014 (Figure 1).

Figure 1—Trends in preschool children stunting, wasting and underweight prevalence, 2000-2014



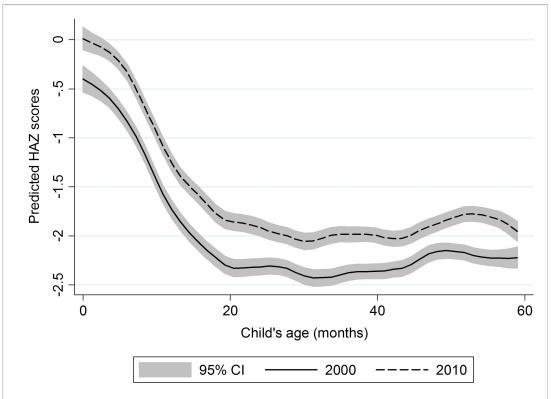
Source: Ethiopia Mini Demographic and Health Survey 201 (CSA 2014).

Child wasting is also relatively high (around 10 percent) and child underweight prevalence is around 25 percent in 2014, down from 41 percent in 2000.

Nutritional progress has been uneven across the country. In rural areas where around 75 percent of Ethiopians reside, progress has been much slower than in urban areas. In proportional terms, stunting rates remain 50 percent higher in rural areas. Overall, drought-prone northerly areas made more modest progress than the higher potential agricultural regions of Oromia and SNNP.

Examining the HAZ scores (Height-for-Age z-score) disaggregated by child age for both 2000 and 2011, suggests that improved child growth outcomes stem largely from larger birth sizes, and hence from improved growth in utero (Figure 2).

Figure 2—Trends in child HAZ scores by children's age



Source: Author's estimates from 2000 and 2011 EDHS.
Note: Local polynomial smoothing estimates with 95 percent confidence intervals.

In the subjective assessments of child birth sizes reported by mothers, the proportion of rural children 0 to 12 months of age reported to be below average size declined from 42.2 percent in

2000 to 33.8 percent in 2011. In contrast, in urban areas the proportion of children reported to be below average in size was unchanged at approximately 28 percent. These birth size results suggest that improved maternal nutrition in rural areas has been an important factor behind Ethiopia's broader nutritional progress.

Identifying causes of child growth outcomes

Two of the most important factors driving nutritional change are **economic status** (wealth and assets) and **parental education**, since these affect other factors, such as fertility decisions, health service utilization, and sanitation. To measure economic status with the EDHS data, we constructed an asset index from 24 questions on ownership of household durables (e.g. TVs, radios, tables) and housing characteristics. We found large differences in the asset index scores across the urban-rural divide, and strong positive associations between the asset index and child growth outcomes.

Given the vulnerability of infants and young children to disease, **health services** can have a range of impacts on child growth outcomes. Our analysis uses indicators of health service utilization and access covering different stages of a young child's life cycle, including antenatal care provision, the environment for the delivery of babies, and vaccinations of children in the household. Related to deliveries of babies, we found a relatively strong relationship between birth intervals and HAZ scores – with longer birth intervals being beneficial for child growth. **Sanitation** shows a positive correlation with HAZ scores for urban areas. **Piped water** also is associated with better child growth outcomes.

Explaining the results

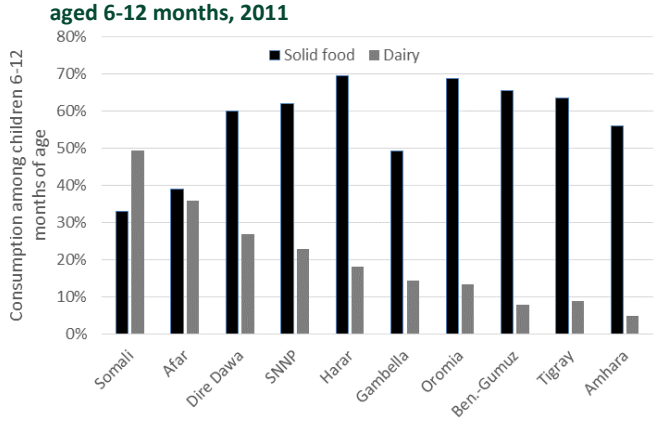
Using a range of modeling techniques to assess the strength of the relationships between variables, the large rural-urban differences in economic status, education, and health access were found to successfully explain the large rural-urban differences in child stunting rates. However, differences in household assets provide by far the largest explanation. Differences in assets between rural and urban households account for two-thirds of the predicted difference.

In general, the models performed well in accounting for rural-urban differences in nutrition, but perform poorly in accounting for changes in stunting rates over time. We conjecture that improvements in economic status probably explain much of the improvements in stunting over time, but that the asset index does not fully reflect these improvements, especially in rural areas. Improvements in food security, for example, might be driving much of the reduction in stunting.

FEEDING PATTERNS AND DETERMINANTS

Ethiopia has very poor infant and young child feeding (IYCF) practices. Under 60 percent of newborns are taken to the breast within the first hour after birth. Exclusive breastfeeding is relatively low (73 percent), and the timely introduction of solid foods at between 6 and 8 months of age is even worse (44 percent). Continued breastfeeding after age one year is relatively good (93 percent), but the proportion of children that achieve minimum dietary diversity (4 out of 7 food groups) is very low (3 percent). There are sizeable variations in these indicators across the regions, however, as well as to the timely introduction of solid foods, possibly due to pastoralist households providing children more dairy products and less solid foods (Figure 3).

Figure 3—Introduction of solid foods and dairy products among children aged 6-12 months, 2011



Source: Author's estimates.
Notes Sample means are weighted means, reflecting the survey design.

Children's food consumption patterns were examined using the seven food groups that comprise the dietary diversity score. Staple foods consisting of grains, roots, and tubers are the most common consumption item. Dairy products follow next. Milk plays a particularly important role in child growth in Ethiopia and is a proven predictor of child growth. Dairy consumption is about twice as prevalent in pastoralist areas relative to the highland regions. There are pockets of high consumption of Vitamin-A rich fruits and vegetables, meat and pulses, but there is, nevertheless, very little diversity in children's diets.

Influences on dietary diversity include cow, goat/sheep and chicken ownership, as well as the underdevelopment of internal livestock trade in Ethiopia, limiting access to animal sourced products. Strikingly too, the association between antenatal care visits and dietary diversity proved to be strong.

CONCLUSIONS

Ethiopia has made impressive progress in reducing child undernutrition, though this progress is somewhat enigmatic. Conventional statistical models are only able to explain a small proportion of this improvement, although we conjecture that broader economic progress explains much of the nutritional improvement seen.

The Ethiopian population remains overwhelmingly poor, with rural areas lagging behind urban areas. Extremely low levels of both maternal and paternal education have reasonably large effects on nutrition, suggesting that educational improvements could play a larger role in the future. More conjecturally, antenatal care seems to have positive associations with child growth outcomes, but access is still very low, especially in rural areas. Improved sanitation and water quality will likely also contribute to better nutrition outcomes. Together, all these factors can potentially impact child growth and nutritional outcomes significantly in the rapidly changing demography of Ethiopia.

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