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SYNOPSIS OF ESSP WORKING PAPER 85

Synopsis: Does market access mitigate the impact of seasonality on child growth? Panel data evidence from northern Ethiopia

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Seasonality in agricultural production continues to shape intra-annual food availability and prices in low-income countries. Using high-frequency panel data from northern Ethiopia, this study quantifies seasonal fluctuations in children's weights. In line with earlier studies, we document considerable seasonality in children's age and height adjusted weights. While children located closer to local food markets are better nourished compared to their counterparts residing in more remote areas, their body weight is also subject to considerable seasonality. Further analysis provides evidence that children located closer to food markets consume more diverse diets than those located farther away. However, the content of these diets varies across seasons: children are less likely to consume animal source foods during the lean season that occurs between May and September in northern Ethiopia.

INTRODUCTION

Seasonal energy stress is considered a major contributor to undernutrition in low income settings (Ferro-Luzzi and Branca 1993; Vaitla, Devereux, and Swan 2009). In sub-Saharan Africa, most farmers rely on rain-fed agriculture, resulting in considerable seasonal variations in local food availability and prices. Moreover, children's and adults' anthropometric outcomes fluctuate across agricultural seasons, confirming the link between seasonal energy stress and under-nutrition. Low energy intake, even temporary, can have serious nutritional implications, especially for young children.

This research paper considers how market access interacts with the impact of seasonality on child growth. Emerging evidence from Ethiopia suggests that households located closer to markets enjoy better diets (Stifel and Minten 2015), and their food consumption is less dependent on their own agricultural production (Hirvonen and Hoddinott 2014; Hoddinott, Headey, and Dereje 2015). Yet, the hypothesis that households that have greater access to markets are better able to meet the nutritional needs of their children through the seasons of the year seems plausible, but so far (to our knowledge) untested.

DATA AND DESCRIPTIVE ANALYSIS

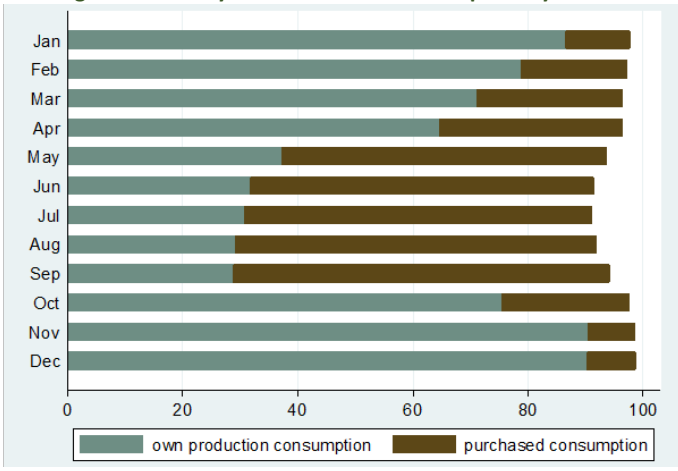
We focus this study on Tigray, the northernmost region of Ethiopia, where undernutrition rates are among the highest in the country. The region is overwhelmingly rural and the mountainous terrain makes travelling difficult and time-consuming.

The data used in the study were collected during a household panel survey between May 2012 and July 2014. The purpose of the survey was to assess the impact of the Social Cash Transfer Pilot Program (SCTPP), operated by the regional government and United Nations Children's Fund (UNICEF). The survey has 7 rounds of data collected over a 24-month period, making it ideal for assessing changes in child nutrition across the seasons.

Households in the district rely on four food markets which are located between 0.5 and 9 km from the local villages (*kushet*). One-fourth of the *kushet*s are located within a distance of 3.5 km from a food market.

Farmers grow their crops mainly in the long rainy season (*meher*) that takes place between June and October. This is followed by the harvest period, typically occurring between October and November. After the harvest, consumption of own production is high (about 90 percent during October and April), but declines to 30 percent during the months of the lean season (May and September) (Figure 1).

Figure 1: Primary sources of food consumption by month



Note: omitted category are gifts and food aid.
Source: UNICEF Tigray Social Cash Transfer Pilot Program data.

Using this information, the calendar year is divided into *lean season* and *non-lean* (i.e., food sufficient) periods. Three of the seven survey rounds were in the lean season, while the four other rounds were conducted in the non-lean period.

Measurements of the weight and height of each child in the survey sample households less than five years old were collected in each survey round, with a focus on weight-based anthropometric measures – weight-for-height and weight-for-age Z-scores, which capture the current or recent nutritional status of children. More than half of the children in the sample are stunted, 27 percent are underweight, and 8 percent are wasted.

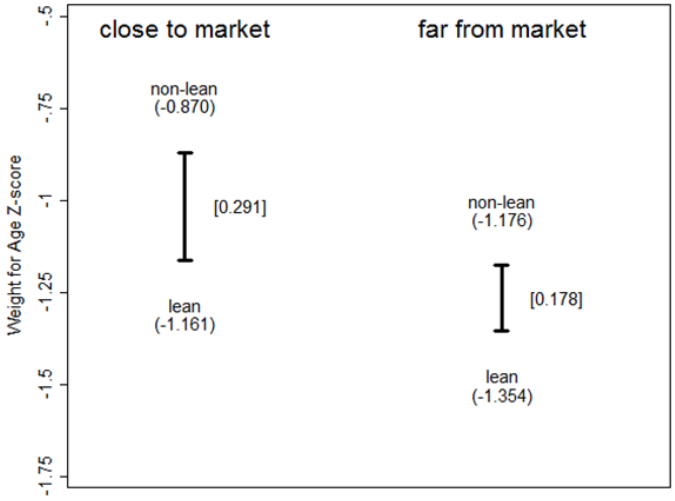
RESULTS

We see that seasonality exerts considerable fluctuations on children's weights: During the lean season the weight-for-height

Z-scores (WHZ) are, on average, 0.29 units of standard deviation lower than during the non-lean season, after controlling for age effects, household wealth, and demographics. The lean season exerts a similar impact on weight-for-age Z-scores (WAZ): a drop in the WAZ scores of 0.20 standard deviation units. Furthermore, children who are located farther away from a food market have lower WHZ and WAZ scores.

Using various modelling techniques, our results suggest that children located closer to the markets are healthier and have higher WHZ and WAZ scores. However, children's weights fluctuate considerably across the two seasons (Figure 2), both in villages with good market access and in villages with poorer market access. The magnitude of these seasonal changes is similar between children located near the food markets and those located farther away.

Figure 2: Predictive margins for weight-for-age Z-score



Note: The number in parentheses gives the estimated WAZ score for each season. The number in brackets gives the distance in WAZ units between the estimated average WAZ score between non-lean and lean seasons.
Source: UNICEF Tigray Social Cash Transfer Pilot Program data.

EXPLORING IMPACTS OF SEASONALITY ON GROWTH

The results of the analysis show two things:

1. Children's weights are subject to considerable seasonality, *irrespective* of their proximity to food markets; and
2. Children located closer to food markets have higher age- and height-adjusted weights than children living in more remote areas.

Based on these findings, we consider the two most important causes of child malnutrition – inadequate diets and illnesses – and explore how seasonality and market access affect these. We find that children located in villages with better market access enjoy more diverse diets during both the non-lean and the lean seasons relative to children residing farther away from food markets. With respect to consumption of animal source foods, which are important for children's physical growth, we find that children located closer to food markets are more likely to consume these foods, but only during the non-lean season. Finally, we find little evidence to suggest that the trends in WHZ and WAZ scores observed are driven by diarrhea outbreaks.

CONCLUSIONS AND POLICY IMPLICATIONS

While proximity to food markets facilitates access to more diverse set of foods, households located closer to these markets are not able to insulate children from seasonal weight fluctuations. One possible explanation is that food prices in these markets are subject to considerable seasonality. This points to three policy options:

1. **Investments in better storage technologies** to help decrease seasonal price volatility;
2. **Expanding irrigation** to allow food to be produced outside the main cropping season, thereby shortening the lean season period and reducing seasonal energy stress among households; and
3. **Improve market integration** to extend access to markets in other regions where food production follows different seasonal patterns. The geography of Ethiopia offers great potential for improving seasonal food availability across many different agro-ecological zones, through cross-regional trade. Moreover, seasonal weather patterns vary across the country, with some areas relying on two agricultural seasons instead of one. Furthermore, better market integration would allow producers to maximize their incomes through specialization, while ensuring that households have access to nutritious foods. Effective behavioral change communication would then play an important role to ensure that the demand for a diverse range of food types remains high so that producers have the incentive to produce such foods.

However, we emphasize that more research is needed to verify the feasibility and cost-effectives of these policy options.

REFERENCES

Refer to **ESSP Working Paper 85** for a full list of references used in this study.

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