In rural economies encumbered by significant market imperfections, farming decisions may partly be motivated by nutritional considerations, in addition to income and risk factors. These imperfections create the potential for farm assets to have direct dietary impacts on nutrition in addition to any indirect effects via income. We test this hypothesis for the dairy sector in rural Ethiopia, a context in which markets are very thin, own-consumption shares are very high, and milk is an important source of animal-based proteins and micronutrients for young children. We find that cow ownership raises children’s milk consumption, increases linear growth, and reduces stunting in children by seven to nine percentage points. However, we also find that the direct nutritional impacts of household cow ownership are less important where there is good access to local markets, suggesting that market development can substitute for household cow ownership.

**Milk and the dairy cow**

The dairy cow is an important agricultural asset in rural villages, signifying wealth and insurance, as well as providing a significant form of nutrition, particularly for young children. Milk is a source of animal-based proteins, amino-acids, and other micronutrients, and its consumption increases levels of insulin-like growth factors. The strong marginal effect of milk on nutrition in early life when physical growth is potentially high and its positive influence on linear growth and other nutrition outcomes is supported by a number of studies (Bhutta et al. 2013, Mølgaard et al. 2011, Marquis, et al 1997, McLean, et al. 2007).

**Ethiopia’s milk sector**

Despite the positive nutritional impact of milk and milk-products, Ethiopia’s milk sector is highly underdeveloped. Milk yields are a fraction of their potential because of the low use of improved breeds and poor management practices (Gebremariam et al. 2010). Moreover, the perishable nature of milk and milk products and the absence of modern processing technologies has limited the spatial development of dairy markets, even without taking into account the severe infrastructural bottlenecks that exist in Ethiopia. Furthermore, the sluggish development of cities (only 20 percent of Ethiopia’s population is urban) has constrained demand for processed milk, the market for which only began to emerge at scale a decade ago. In rural areas, milk markets remain highly incomplete with around 85 percent of milk consumed in situ by households, only 8 percent processed into products with longer shelf life, such as butter, and just 7 percent is sold (MoARD 2007).

Cow ownership is an important determinant of milk consumption. However, little previous work has explored and measured the nutritional outcomes associated with cow ownership. This study examines the impact a dairy intervention, whether this be cow ownership or access to milk markets, or more importantly, the absence of such an intervention, has on the nutritional well-being and the potential stunting of young children. It also reviews the factors that impact consumption in small-scale dairy production environments, as seen in a large proportion of rural Ethiopia.

**Data collection**

To establish the complex relationship between cows and malnutrition, this study drew on data from a survey conducted in association with Ethiopia’s Agricultural Growth Program (AGP) in four regions in the Ethiopian highlands, as shown in Figure 1. The survey sample was made up of 7,930 households.

**Figure 1 - AGP enumeration areas (red), major markets (yellow) and population density**

Source: 2007: National Census of Ethiopia
Notes: Population density categories (in persons per square kilometer) from lightest (pale yellow) to darkest (dark blue) are 0-31, 31-101, 101-139, 139-195, 195-537, 537 and above.

Data analysis started with a simple economic model assessing the nutritional status of children and their food consumption and statistical associations between cow ownership, milk consumption of under-2s, and child anthropometric outcomes, particularly stunting as measured by Height for Age (HAZ) scores. Further to this, sensitivity tests were conducted, such as the impact on these associations of the amount and quality of grazing land available; cattle and other livestock ownership; the impact of animal feed and water availability, and proximity to markets.

In what is otherwise a highly undiversified diet, the data analysis revealed that around one quarter of children consumed milk in the last 7 days. About 64 percent of households own at least one cow. Moreover, a high level of stunting in under-2s (47 percent) was apparent.
Nutrition and cow ownership

The analysis showed that cow ownership considerably increases the likelihood and frequency of milk consumption by young children (Table 1). This greatly improves their HAZ (height for age) z-scores and reduces stunting. The magnitude of the effects of cow ownership on the growth of young children are large, with a reduction of between 5.5 and 10 percentage points in the prevalence of stunted children in cow-owning households relative to that of the population as a whole.

Table 1 – Household cow ownership and stunting

<table>
<thead>
<tr>
<th>Household owns at least one cow:</th>
<th>Impact on stunting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk consumption</td>
<td>Anthropometry: 6-24 months</td>
</tr>
<tr>
<td>Any milk consumption in last 7 days</td>
<td># days milk consumed in last 7 days</td>
</tr>
<tr>
<td>22.2%***</td>
<td>1.3 ***</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using survey data
Note: Asterisks represent level of statistical significance:
* (10% significance), ** (5% significance), *** (1% significance)

Small-scale dairy production is often managed by women in rural Ethiopia. This adds a gender dimension to dairy consumption within rural households and to its consequent impact on child stunting.

Cow ownership and access to markets

Cow ownership is an important driver of milk consumption and linear growth of young children. Nevertheless, access to milk and milk products within the village or local markets were found in the analysis also to have a significant impact on nutritional outcomes. Table 2 shows that if no food market exists in the village yet the household owns a cow, the HAZ score for young children is likely to be 39 percent higher. In contrast, in villages where milk is readily available in the local food market, there is no significant association between household cow ownership and nutritional status. Even if household cow ownership is marginal, village cow ownership and the presence of food markets positively affect milk consumption and nutrition. Therefore, the evidence suggests that these market factors can partially substitute for own dairy production.

Table 2 - Milk consumption and child height-for-age scores for cow-owning households, by access to food markets

<table>
<thead>
<tr>
<th>Food market in village</th>
<th>No food market in village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any milk consumed</td>
<td>Height-for-Age z-score (HAZ)</td>
</tr>
<tr>
<td># days milk consumed</td>
<td>Any milk consumed</td>
</tr>
<tr>
<td>18.9%***</td>
<td>0.7**</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using survey data
Note: Asterisks represent level of statistical significance:
* (10% significance), ** (5% significance), *** (1% significance)

Policy Implications

Chronically undernourished children are less likely to perform well in school and are likely to be less economically productive as adults. Therefore reducing chronic under-nutrition has high economic and social returns. Given the results of this study, three possible classes of intervention are identified:

The choice between these three interventions is fraught with potential trade-offs as well as synergies. On the one hand, the results suggest that cattle ownership at the household level might have the largest short-term benefits. While cattle are not cheap, the nutritional benefits of ownership appear to be large, and cattle rearing and dairy production are common enough skills in most rural settings in Ethiopia. Each intervention has differing degrees of sustainability in the resource-constrained Ethiopian highlands. Nevertheless, by improving productivity and marketing in the dairy sector and scaling up public investments in the livestock sector, these are likely to yield sustainable benefits both economically for farmers and nutritionally for children. At the same time though, attention should focus on technologies for reducing perishability and the health risks of milk products in order to transform and expand access to this essential source of child nutrition and to better cater for strong and growing urban demand.

There is clearly solid ground for strengthening existing efforts to transform dairy production and marketing in Ethiopia as an essential resource for child nutrition and to facilitate dairy market development for long-term benefits.

References


