Exploring child health risks of poultry keeping in Ethiopia: Insights from the 2015 Feed the Future Survey

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The agricultural sector in Ethiopia and in other developing countries is increasingly asked to contribute to reducing undernutrition as well as poverty and food insecurity. Within agriculture, the livestock sector is thought to play a particularly important role in this respect, since the consumption of animal-sourced foods (ASFs) is a well-known determinant of child growth and the production of ASFs is an important source of income. However, there is growing evidence of associated health risks of poultry rearing in developing countries, particularly for young children who have been observed to directly ingest poultry feces. This is hypothesized to contribute to chronic gut damage — a condition termed environmental enteric disorder (EED) — that is widely believed to be a leading cause of child stunting in developing countries such as Ethiopia.

Introduction

Ownership of chickens is very common in the developing world, and Ethiopia is no exception. Figure 1 shows estimates of chicken ownership for rural households from 42 recent Demographic Health Surveys. Ownership varies between 30 to 60 percent across regions, but it is notably high in Eastern and Southern Africa. In Ethiopia, just over half of rural households own poultry, but in the main highland regions this rises to 60 percent.

Figure 1 – Ownership of poultry by rural households

Source: Authors’ estimates from 42 recent Demographic and Health Surveys.

Poultry therefore provides an important source of nutritious food and household income in rural areas. Yet, despite the potential of poultry to improve nutrition, new research suggests that there may also be significant health risks to the use of low-input, low-output scavenging poultry production systems. In Zimbabwe, where scavenging poultry systems are also common, young children were observed for prolonged periods in order to better understand hygiene and care practices (Nigure et al 2013). One of the most striking findings from this study was that young children were typically left by themselves for long periods on the ground in homestead gardens where they often ingested chicken feces or soils contaminated with feces.

Unsurprisingly, microbiological tests show that chicken feces contain extremely high concentrations of bacteria (E. coli), which may cause severe long term damage to the gut (now termed environmental enteric disorder (EED) or environmental enteropathy). This particular damage to the gut has long been known to restrict the absorption of nutrients, but the leakage of pathogens into the blood stream is also thought to trigger a low grade immune system response, which diverts the body’s resources into fighting infections at the cost of child growth and development (Korpe & Petri 2012). These processes are hypothesized to cause stunted growth patterns and reduced cognitive development. Hence, while nutrient-rich foods from poultry could improve child growth, exposure to poultry feces could retard that growth.

Scavenging poultry systems in Ethiopia

Ethiopia is very dependent on scavenging poultry systems in which animals roam freely and ingest household food scraps within a boundary of about fifty meters from the main household dwelling (Dessie et al 2013). Young children are highly likely to be exposed to poultry fecal matter in these environments. To make matters worse, it is a common practice to keep poultry within the household dwelling overnight. Moreover, this elevated exposure to poultry and their feces takes place within a context of very poor hygiene standards in general. The 2011 Ethiopian Demographic Health Survey, for example, suggests that less than one percent of Ethiopians have a place within their dwelling to wash hands. Another survey, conducted by IFPRI under the Alive and Thrive program, asked survey enumerators to observe and report on whether there were signs of animal feces in the homestead compound: 40 percent of households with small children had homesteads with visible signs of animal feces.

Unfortunately, directly testing the effects of children’s exposure to fecal matter from poultry and other animals is very difficult. Microbiological tests and indicators of EED are still prohibitively expensive for large samples, and there is, as yet, no experimental research into the impact of poultry interventions on EED. In the Feed the Future survey we therefore added a simple but non-standard question designed to proxy for increased risk of exposure to poultry feces: whether or not households keep poultry (and other animals) in the main homestead dwelling overnight. The survey finds that about half of rural households own poultry, and half of these poultry-owning households keep poultry inside the main dwelling overnight. This common practice almost certainly increases children’s exposure to fecal matter from poultry, although scavenging systems in general are likely to be less hygienic than keeping animals penned up.
**Child stunting and poultry keeping**

Figure 2 presents rates of child stunting by whether or not poultry are kept inside the main household dwelling overnight. Strikingly, stunting rates for children with this elevated risk are 50 percent, as compared to 44 percent for children from households where poultry are kept outside.

**Figure 2 - Child stunting rates in poultry-keeping households**

![Graph showing stunting rates](image)

Source: Authors’ estimates from the 2015 Feed the Future survey. Data are based on a sub-sample of households that own poultry.

**Table 1 - Regressions of child stunting against poultry based on a sub-sample of households that own poultry.**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Child stunting</th>
<th>Child stunting</th>
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<tbody>
<tr>
<td>Owns poultry (0/1)</td>
<td>-0.021 (0.019)</td>
<td>-0.050* (0.026)</td>
</tr>
<tr>
<td>Poultry in house (0/1)</td>
<td>0.058** (0.029)</td>
<td></td>
</tr>
<tr>
<td>Model includes other controls?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Model includes district fixed effects?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of observations</td>
<td>3,494</td>
<td>3,494</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates from the 2015 Feed the Future survey. Notes: These are linear probability estimates. Standard errors are reported in parentheses, and are clustered at the district level. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively. All regressions include controls for child and household demographics, religion and village fixed effects.

Table 1 provides multivariate tests of the statistical significance of this relationship, controlling for household wealth, parental education, access to health and agricultural extension services, nutritional knowledge, and district (woreda) level fixed effects (which control for a range of unobserved time-invariant environmental characteristics). These multivariate tests suggest that while ownership of poultry is generally associated with lower stunting rates (about 5 percentage points lower), keeping poultry inside the house is associated with higher stunting rates (about 7.5 percentage points). This result implies that increased risk of exposure to feces might fully negate any nutritional benefits from owning poultry.

**Conclusions and recommendations**

Although more research is needed on this issue, the results above potentially have very important implications for both water, sanitation and hygiene (WASH) sector programs and livestock programs. Traditionally, WASH programs have not paid as much attention to exposure to animal fecal matter as they have to human fecal matter, e.g., open defecation, because exposure to human feces is a more important cause of observable clinical diseases, such as diarrhea. However, exposure to animal fecal matter could be as important, or even more important, for sub-clinical diseases and disorders, such as EED. So WASH sector interventions have a role to play in reducing children’s exposure to animal feces, be it in the household, in the compound, in water and food supplies, or through other vectors such as hands and clothing.

However, livestock sector development programs can also play a role in reducing exposure to animal feces. Ethiopia’s poultry sector is hugely dominated by scavenging free-range systems, low levels of vaccinations, low feed use, and low use of improved breeds (Dessie et al 2013). Programs focused on livestock commercialization typically try to introduce a package of interventions designed to raise productivity and profitability, including construction of improved chicken houses and pens. Such practices might also reduce children’s exposure to animal feces – especially with some additional focus on hygiene implications – thereby improving nutrition not only through better diets, but better hygiene as well. On the other hand, there may be benefits to packaging WASH-specific behavioral change interventions alongside livestock-specific programs. Therefore, we strongly recommend that both the WASH and livestock sectors should consider redesigning their programs with the livestock dimensions of hygiene and child health in mind.

**Suggested reading**

