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EXPOSURE TO AFLATOXINS GREATER AMONG POOR IN EASTERN KENYA

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Aflatoxins are naturally occurring fungal toxins that can contaminate important food crops, such as maize, groundnuts, tree nuts, and a range of other produce. Unfortunately, they are not always easily detectable, and the impact of aflatoxin exposure can be deadly. Chronic exposure can lead to liver disease, including a common form of liver cancer, hepatocellular carcinoma; exposure to high doses can result in acute death from aflatoxicosis. Recently, some studies have suggested that exposure to aflatoxin also may impede child growth, potentially contributing to a significant problem of unexplained stunting in many poor countries.

Regulated testing ensures that only safe levels of aflatoxin occur in the food supply in rich countries, but in poor countries that lack sufficient regulation and monitoring, aflatoxin exposure can be significant. In recent years, international donors have invested heavily in aflatoxin control in poor countries, partly based on a small number of studies linking aflatoxin consumption to child stunting[1]. Although the findings of these studies are consistent, none adequately control for factors that could potentially confound the association between aflatoxin and child growth—such as poverty. Children in poorer households are more likely to be fed diets deficient in essential nutrients. They also are likely to suffer from more frequent infections, another common cause of child stunting. Are increased rates of child stunting among poor households a result of higher levels of aflatoxin exposure or more likely due to poor diet quality and increased exposure to infection? Unfortunately, very little is known about the role of poverty in aflatoxin exposure.

A new study[2] funded by the UK Government's Department for International Development (DFID) and the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH), conducted by researchers at IFPRI and the University of Georgia addresses this question, by generating much-needed evidence on the socio-economic determinants of aflatoxin exposure. The objective of the study was to quantify the extent socio-economic characteristics explained differences in aflatoxin exposure levels measured in adult women from a rural area in Kenya's Eastern Province. Leroy, Wang, and Jones studied aflatoxin exposure in nearly 900 women of childbearing age living in rural Kenya. Socioeconomic status was measured using a comprehensive household questionnaire. Aflatoxin exposure was assessed by determining women's serum aflatoxin levels.

The contributions of this study are twofold: this is the first study to examine the determinants of aflatoxin exposure using a comprehensive set of carefully measured demographic and socio-economic variables; and secondly, by using a large sample of women from a small geographical area, potential bias due to agro-ecological differences in different sample environments is reduced.

ESTABLISHED CONSEQUENCES OF CHRONIC AFLATOXIN EXPOSURE

- **Liver disease**
- **Acute death from aflatoxicosis**
- **Hepatocellular carcinoma (a form of liver cancer), particularly with exposure in combination with hepatitis B infection**

PROJECT APPROACH

The researchers first studied the relationship between aflatoxin exposure level (measured via serum samples) and several household, farm, and individual characteristics from cross-sectional data on 884 mothers (pregnant or with a child under 24 months).

[1] Leroy 2013. http://www.ifpri.org/publication/child-stunting-and-aflatoxins
[2] Leroy et al, 2015

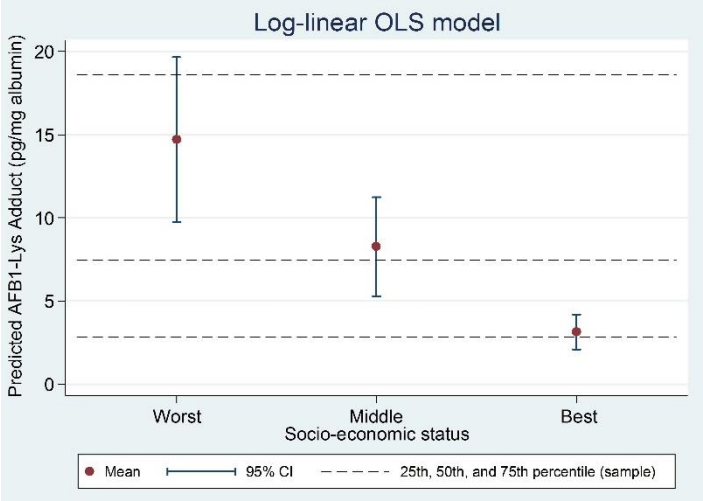
The study used baseline data of an intervention trial conducted in Kenya's Eastern Province, specifically looking at maize-growing sub-locations in two counties: Meru and Tharaka-Nithi. A random sub-sample of 64 maize-producing villages within these two counties was drawn such that no two selected villages were closer than 4km from each other. Using a household survey, data were collected on various socio-demographic and agricultural characteristics, including women's age and education levels, household food consumption and food security, and the use of agricultural inputs. In addition, women provided a blood sample in order to determine serum aflatoxin levels, a best available measure of aflatoxin exposure.

The researchers then used regression analyses to estimate the extent to which combined characteristics could predict exposure. Finally the researchers used the estimated model to predict changes in exposure when changing women's characteristics from the most disadvantaged group to the most advantaged group.

RESULTS

Aflatoxin was detected in the serum of all surveyed women. Most surprisingly, even among this fairly homogenous group of women from poor rural households in Kenya's Eastern Province, there were significant differences in serum levels based on poverty levels. The study found that serum aflatoxin levels were 5 to 7 times higher among the poorest women, as compared to the least poor (see Figure 1). The poverty effect was large: a recent post-harvest intervention designed to reduce aflatoxin in Guinea documented an effect half of the size of that which was found in this study (Turner et al, 2005).

Figure 1: Women's aflatoxin exposure levels



Woman in Kenya (Credit: S.Malyon/ CIAT)

CONCLUSIONS

This study is the first to show the significant association between poverty and aflatoxin exposure. Yet, whether or not aflatoxin truly causes child stunting is a question that can only be answered through a rigorous approach, such as a randomized-controlled trial. In the meantime, knowing that the poorest families are at the greatest health risk from this food-borne toxin suggests that addressing aflatoxin contamination should be a priority for policy-makers concerned about the welfare of the poor. Furthermore, a better understanding of how better-off families manage to mitigate aflatoxin exposure can be used to develop strategies that protect the poor.

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