



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

Seasonality of serum aflatoxin levels in pregnancy and early childhood in a longitudinal cohort study in Banke, Nepal

Johanna Y. Andrews-Trevino

Co-Authors: Patrick Webb, Gerald Shively, Dale Davis, Kedar Baral, Krishna Paudel, Robin Shrestha, Ashish Pokharel, Sudikshya Acharya, Ashish Lamichhane, Shibani Ghosh

ANH Academy Week
June 2019 / Hyderabad, India





FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

U.S. GOVERNMENT PARTNERS





BACKGROUND

- Aflatoxin B₁, a mycotoxin produced by *Aspergillus* fungi, is found primarily in maize and groundnuts. Other foods such as chilies can also be contaminated with aflatoxin.
- *Aspergillus* proliferates under hot, humid conditions.
- Aflatoxin levels in crops are known to vary seasonally. There is little known about seasonality in serum levels of aflatoxin.





FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

OBJECTIVE

To assess aflatoxin exposure in pregnancy and early childhood, evaluating the role of seasonality in patterns of exposure.



USAID
FROM THE AMERICAN PEOPLE



AFLACOHORT STUDY

- Design: Observational Birth Cohort Study
- Primary objective: Understand the relationship between past and current mycotoxin exposure (maternal and infant), birth outcomes and linear growth in Nepali children
- Location: 17 Village Development Committees in the Banke District of Nepal
- Sample size: 1675 mother-infant dyads
- Data were collected on a rolling basis, thereby providing us an opportunity to assess seasonal variation
- Aflatoxin biomarker: serum AFB1 (pg aflatoxin B1-lysine adduct/mg albumin), collected once during pregnancy and in infants at 3, 6, 12 and 18 months of age
 - HPLC-fluorescence detection method

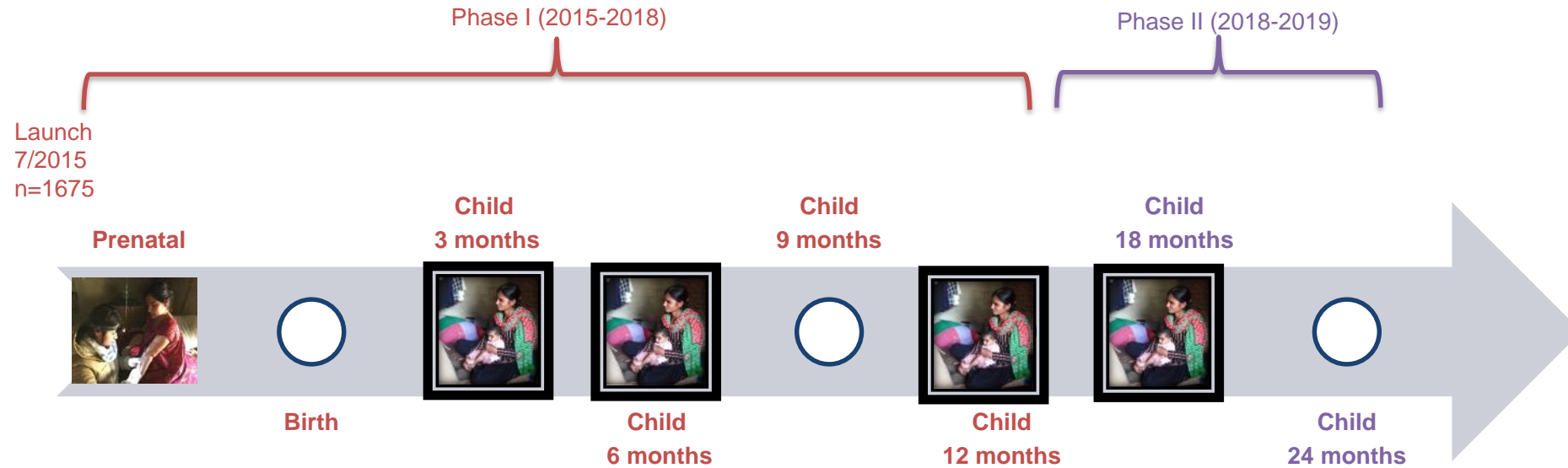




FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

AflaCohort Study, Banke, Nepal (2015-2019)



USAID
FROM THE AMERICAN PEOPLE



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

DATA COLLECTION AND ANALYSIS

Interview



Blood draw



Descriptive statistics and bivariate analyses using logged aflatoxin were conducted in Stata[®] SE version 15.



USAID
FROM THE AMERICAN PEOPLE



DETECTABLE SERUM AFLATOXIN

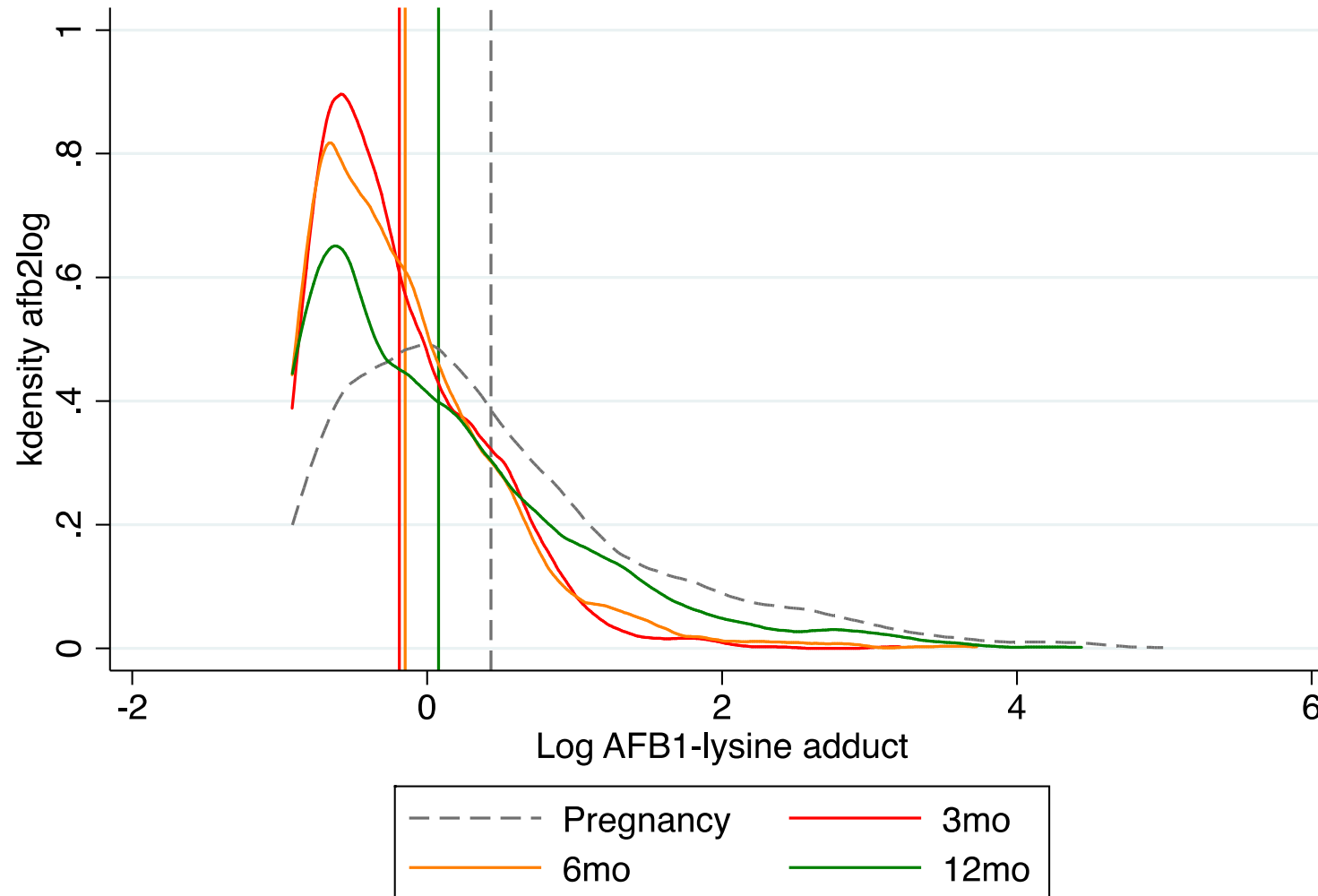
	n	Detectable Aflatoxin B1 (%)	Mean \pm SD AFB1 * (pg/mg alb)	Min	Max
Pregnancy	1652	94.3	3.4 ± 8.5	0.4	147.3
Child 3 mo	1363	80.5	1.0 ± 1.1	0.4	24.7
Child 6 mo	1294	75.3	1.2 ± 2.1	0.4	41.6
Child 12 mo	1329	81.1	2.0 ± 4.6	0.4	84.6
* Detectable only					





FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Source: Mycotoxin Birth Cohort Study / Banke, Nepal / 2015-2019



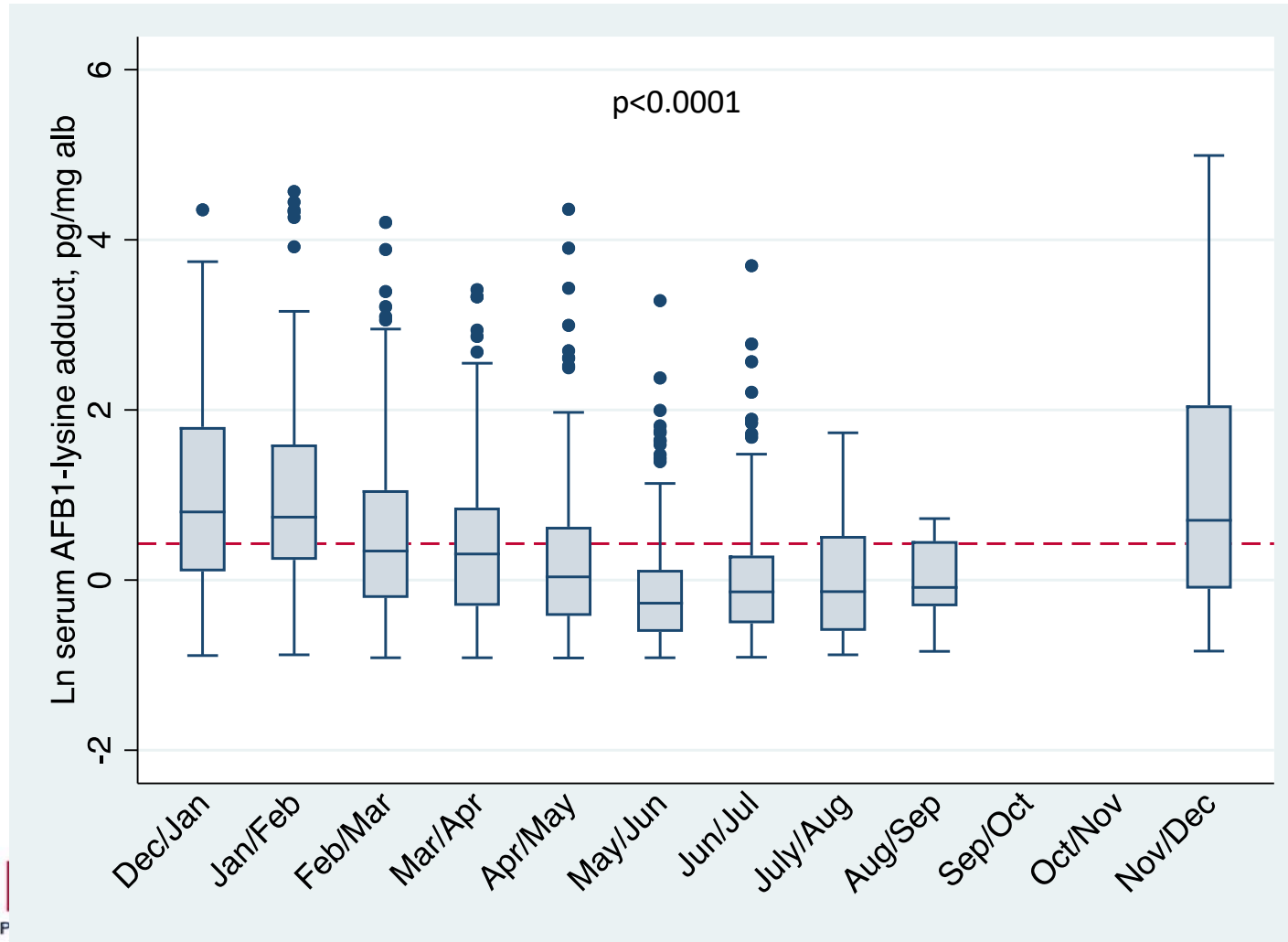
US
FROM THE AMI



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

AFB1 VARIATION BY MONTH: PREGNANCY



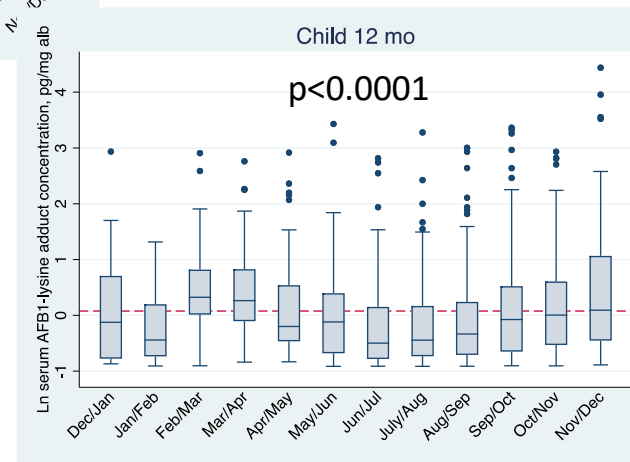
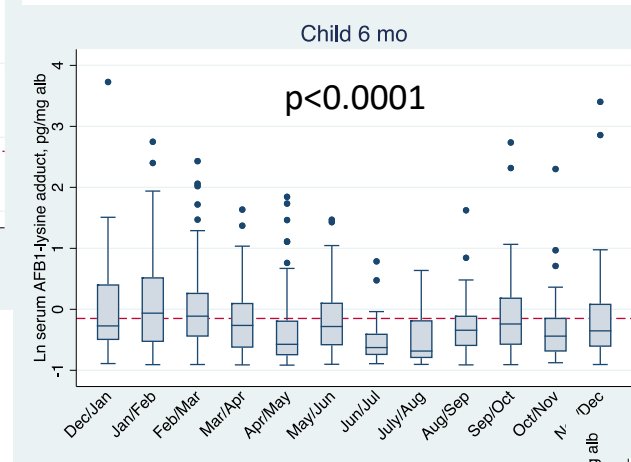
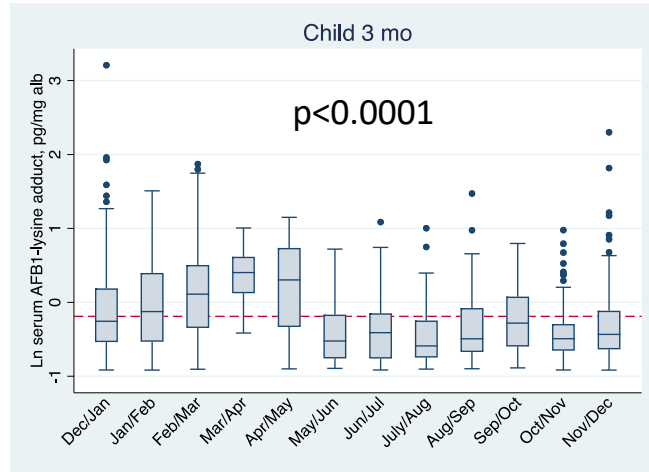
USAID
FROM THE AMERICAN PEOPLE



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

AFB1 BY MONTH: CHILD 3, 6 AND 12 MONTHS



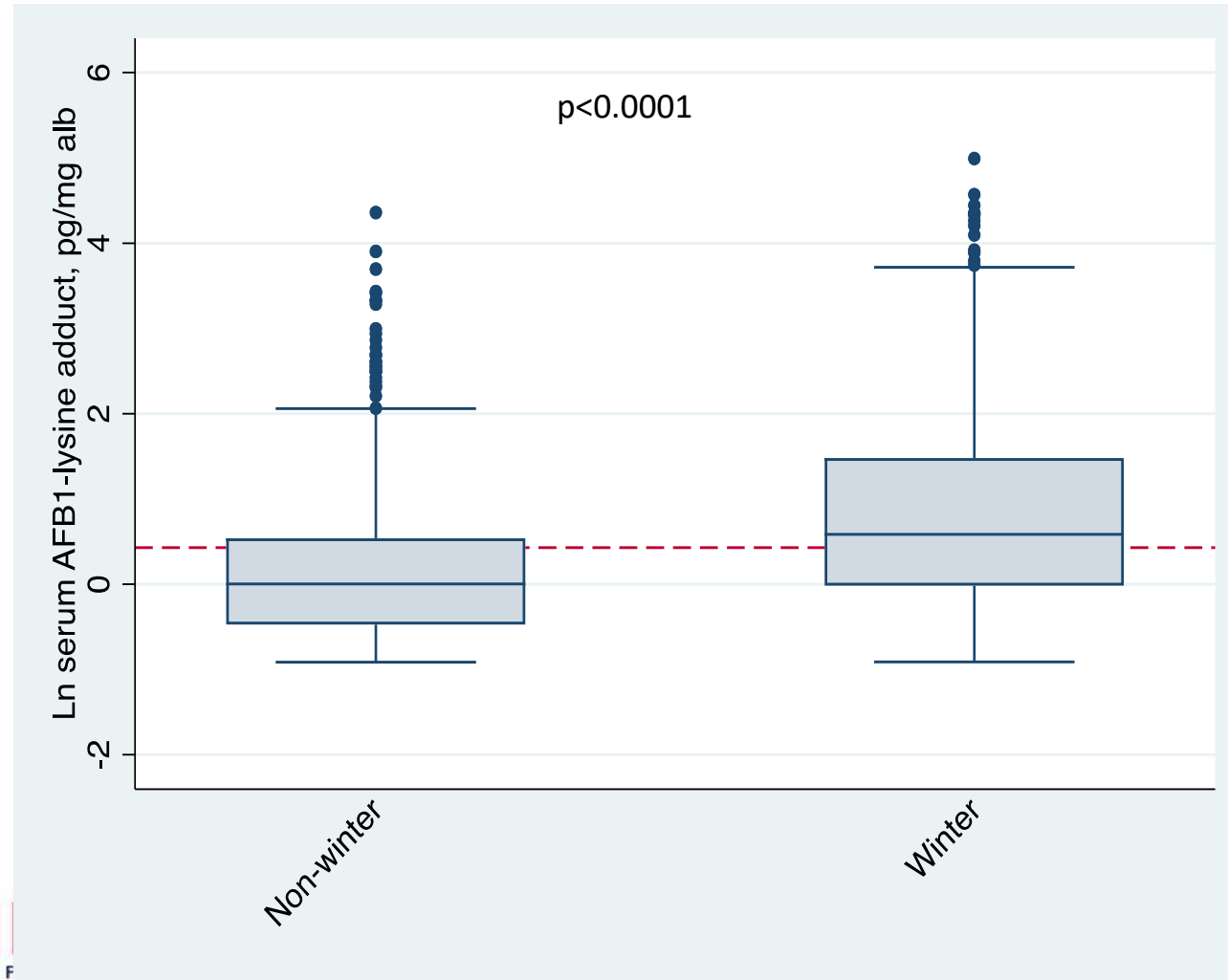
USAID
FROM THE AMERICAN PEOPLE



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

AFB1 WINTER SEASON: PREGNANCY



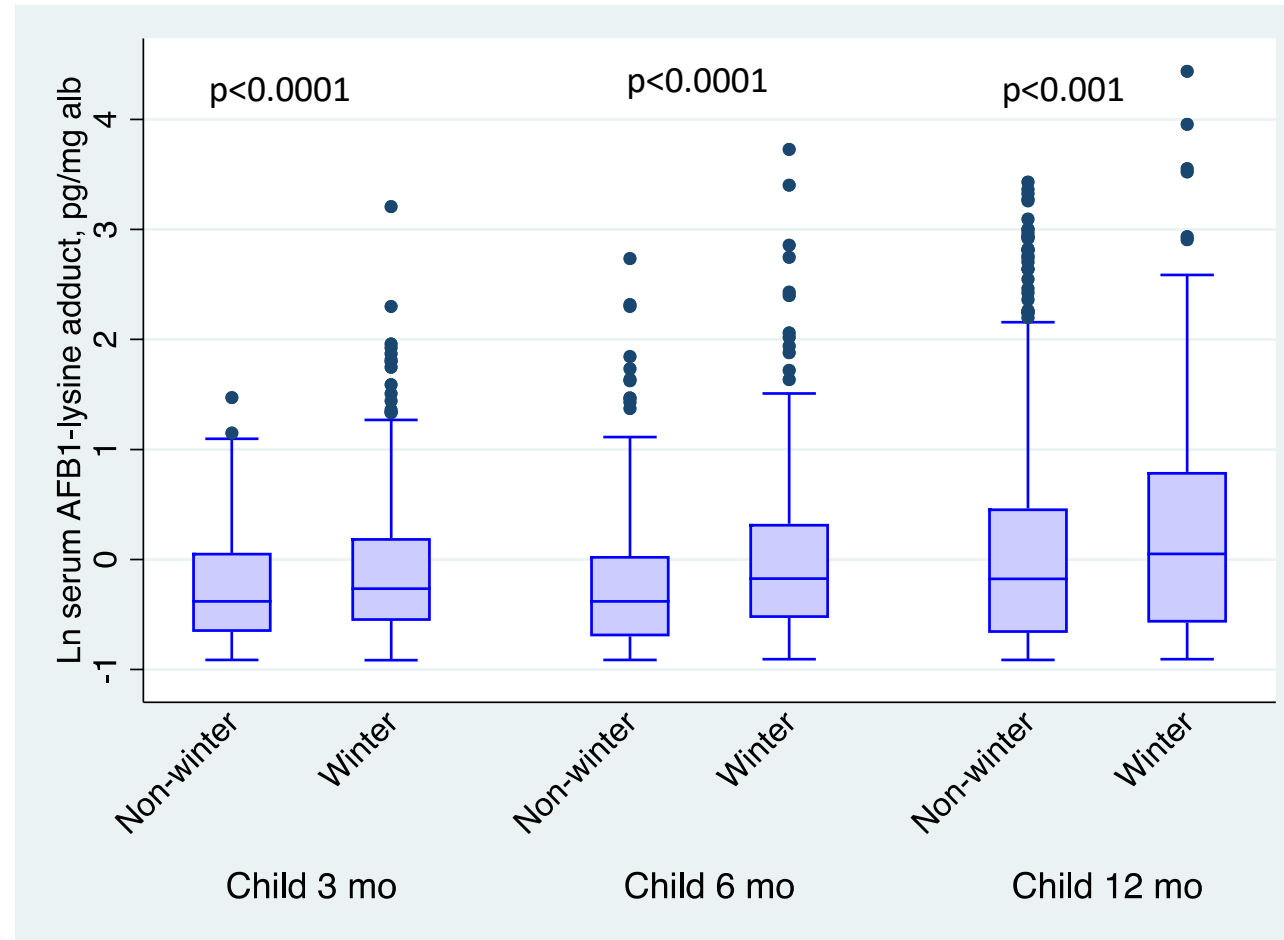
USAID
FROM THE AMERICAN PEOPLE



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

AFB1 WINTER SEASON: 3, 6 AND 12 MONTHS



USAID
FROM THE AMERICAN PEOPLE



CONCLUSIONS

- High occurrence of aflatoxin exposure during pregnancy and in the first year of life in infants from this region of Nepal.
- Seasonality has a significant relationship with higher levels being observed during the dry winter and spring months in both mothers and infants.
- The level of exposure and its relationship with health outcomes may be modulated by seasonality.
- This relationship needs to be considered in any analysis to ascertain the role of aflatoxin in modulating health outcomes such as birth size and linear growth and/or in strategies aiming to mitigate aflatoxin in the food system.





FEED THE FUTURE

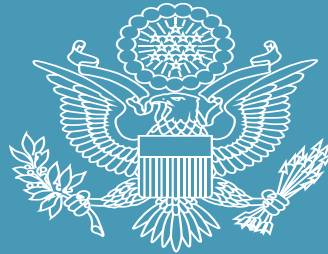
The U.S. Government's Global Hunger & Food Security Initiative

COLLABORATORS AND TEAM

- Child Health Division, Department of Health Services, MOHP
- Nepal Health Research Council (NHRC) and Tufts IRB
- Patan Academy of Health Sciences (PAHS)
- Helen Keller International (HKI), Nepal
- Purdue University
- University of Georgia, FTF Innovation Lab on Peanuts and Mycotoxins
- USAID Bureau of Food Security and USAID Nepal
- Tufts University
- Banke District Public Health Office
- Banke VDC and Ward Health Posts, FCHVs
- Nepalgunj Medical College
- AflaCohort Field team and participants



USAID
FROM THE AMERICAN PEOPLE



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

www.feedthefuture.gov



USAID
FROM THE AMERICAN PEOPLE