



Community-based complementary foods (CFs) safety assurance method improves the nutritional status among children under-five

KEY MESSAGES

- Nutrition during the first 1000 days of life, particularly the transition to complementary foods (CFs) is critical to the nutritional status of children.
- Developing and promoting community-based CFs is important and will contribute to optimize nutritional intake and thus nutritional status among young children.
- Ensuring the safety of CFs from the risks of aflatoxin and microbial contamination is important in preventing the challenges of stunting among under-five children.
- Implementing a method known as HACCP based SOP is important in preventing CFs from the risks of aflatoxin and microbial contamination.

RATIONALE

In Ethiopia, approximately two in every five (38%) children younger than five years old are stunted.¹ According to latest economic estimates, the country loses close to 53.6 billion Ethiopian Birr or 16% of the gross domestic product (GDP) of productivity due to stunting.² To tackle the challenges of stunting in Ethiopia, developing and promoting community-based production of complementary foods (CFs) are an efficient means to address the existing problems in complementary feeding practices. As a result, community-based production of CFs was started in 2012 through the support of UNICEF Ethiopia and partners.

The community-based CFs were well integrated and accepted by the communities. However, CFs and their ingredients are often contaminated by aflatoxins.³ Previous studies have reported that chronic exposure to aflatoxin is linked to hepatocellular carcinoma (HCC)⁴, growth faltering^{5,6} and impaired immunity⁷ in children. To ensure the safety of CFs from the risks of aflatoxin contamination, a method known as HACCP based SOP was developed and training was given in 2016 to key actors at grassroots level; to the health extension workers (HEWs), mothers/caregivers and women development army (WDA). This study aimed to evaluate the impact of the method in terms of the nutritional status among under-five children and to validate the method in another setup for national scaleup.

Table 1. Comparison of anthropometric results among method implemented and method not implemented villages under- five children in Machakel district, Ethiopia, 2021

Nutritional status	Total number of children	Method implemented villages under-five children	Method not implemented villages under-five children
Wasting	198 (99:99)	14 (14.1%) (8.6- 22.3, 95% CI)	22 (22.2%) (15.2- 31.4, 95% CI)
Under weight	198 (99:99)	23 (23.2%) 16.0- 32.5, 95% CI)	28 (28.3%) (20.4- 37.8, 95% CI)
Stunted	198 (99:99)	28 (28.3%) (20.4- 37.8, 95% CI)	30 (30.3%) (22.1- 40.0, 95% CI)

KEY FINDINGS

- The method implemented in rural Ethiopia prevents the safety of CFs from the risks of aflatoxin contamination.
- The nutritional status (stunting, wasting and underweight) among method implemented villages under-five children were improved.
- The prevalence of undernutrition was higher among under-five children in the method not implemented villages compared to children in the method implemented villages.
- The method was easily implemented in a cash crop producing area in the Southern Ethiopia.
- Mothers were interested and promised to implement the method in their locality for improving the nutritional status of their children.

METHODS AND FINDINGS

To prevent community-based CFs in rural Ethiopia from the risks of aflatoxin contamination, a method known as hazard analysis critical control point (HACCP) based standard operating procedure (SOP) was developed and training was given in 2016 to key actors at grassroots level; to the health extension workers (HEWs), mothers/caregivers and women development army (WDA). The objective of this study was to evaluate the impact of the method in terms of the nutritional status among under-five children, the safety of CFs in terms of aflatoxin contamination and validate the method in another setup, a cash crop area in Southern Ethiopia.

A cluster randomized trial study design was conducted for the impact study among 198 under-five children. Anthropometric measurements for children were measured using standardized techniques. Quasi experimental study design was used for validation study using 40 mothers' child dyads. Sociodemographic information, knowledge and practices of complementary feeding were collected using pretested questionnaires. Sixty CF samples were collected from both impact and validation study and the level of aflatoxins (AFB1, AFB2, AFG1, and AFG2) were determined using a validated method. Data were analysed using SPSS and ENA for SMART 2011 statistical software.

The prevalence of wasting, underweight, and stunting for the 99 under-five children from the method implemented villages respectively were: 14 (14.1%) (95% CI: 8.6-22.3); 23 (23.2%) (95% CI: 16.0-32.5) and 28 (28.3%) (95% CI: 20.4-37.8). While the prevalence of wasting, underweight, and stunting for the 99 under-five children from the method not implemented villages respectively were: 22.2% (95% CI: 15.2- 31.4), 28.3% (95% CI: 20.4- 37.8) and 30.3% (95% CI: 22.1- 40.0). Aflatoxins were not detected (< LOD) in all of the CF samples collected from the impact study.

CONTACT

Abebe Ayelign
abebeayelign@gmail.com
abebe.ayelign@aau.edu.et

Taddese Alemu Zerfu
tadalzerfu@gmail.com

Sarah DeSaeger
sarah.desaeger@ugent.be

ACKNOWLEDGEMENTS

This work is funded through the Innovative Methods and Metrics for Agriculture and Nutrition Actions (IMMANA) Fellowship programme. IMMANA is co funded with UK Aid from the UK government and the Bill & Melinda Gates Foundation, facilitated by the London School of Hygiene and Tropical Medicine (LSHTM).

The validation study result showed that; the majority (77.5%) of the mothers know the importance of complementary feeding and giving CFs to infants after 6 months of age. Nearly two-thirds (62.5%) of the respondents had the knowledge about the health impacts of aflatoxins. But only 37.5% of mothers lack awareness about the health risks of aflatoxins. Overall, 23.3% of the CFs were contaminated by aflatoxins. AFB1 was detected in 6.7%, while AFG1 was detected in 16.7% of the CF samples respectively.

The community-based production and distribution of CFs was started through the support of UNICEF Ethiopia and partners. The district health office in each region coordinated all activities through the active participation of the HEWs and WDA in each village. However, currently CFs production and distribution are not actively functional in some villages. Therefore, attention is needed from the government side.

NEXT STEPS FOR THIS RESEARCH

- Scale up the community-based production of CFs to national level and implement the method to assure CFs are free from other contaminants, in addition to aflatoxins.
- Plan to implement the method in dairy farms in rural Ethiopia to prevent milk and milk products from the risks of contamination.

REFERENCES

1. Central Statistical Agency (CSA), 2016. Ethiopia Demographic and Health Survey 2016. Addis Ababa, Ethiopia, and Rockville. CSA and ICF, Maryland, USA.
2. Federal ministry of health (FMOH, 2013). The cost of hunger in Ethiopia: Implications for the growth and transformation of Ethiopia.
3. Ayelign, A., Woldegiorgis, A. Z., Adish, A., & De Saeger, S. (2018). Total aflatoxins in complementary foods produced at community levels using locally available ingredients in Ethiopia. *Food Additives & Contaminants: Part B*, 11(2), 111-118.
4. Gong, Y. Y., Watson, S., & Routledge, M. N. (2016). Aflatoxin exposure and associated human health effects, a Review of Epidemiological Studies. *Food Safety*, 4(1), 14-27.
5. Makori, N., Matemu, A., Kimanya, M., & Kassim, N. (2019). Inadequate management of complementary foods contributes to the risk of aflatoxin exposure and low nutrition status among children. *World Mycotoxin Journal*, 12(1), 67-76.
6. Turner, P. C. (2013). The molecular epidemiology of chronic aflatoxin driven impaired child growth. *Scientifica*, 2013, 1-21.
7. Ismail, A., Naeem, I., Gong, Y. Y., Routledge, M. N., Akhtar, S., Riaz, M., ... & Ismail, Z. (2021). Early life exposure to dietary aflatoxins, health impact and control perspectives: A review. *Trends in Food Science & Technology*.