

# Impact and Validation of Innovative Community Based Complementary Foods Safety Assurance Method in Rural Ethiopia



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## Introduction

In Ethiopia, two in every five (38%) children younger than five years are stunted, making the country to have the highest burden of under nutrition in Sub-Saharan Africa (SSA). According to latest economic estimates, the country losses close to 53.6 billion Ethiopian Birr or 16% of the gross domestic product (GDP) of productivity due to stunting. Nutrition during the first 1000 days of life, particularly the transition to complementary foods (CFs) is critical to nutritional status of children. To tackle the challenges of stunting in Ethiopia, developing and promoting community-based production of 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. However, CFs and their ingredients are often contaminated by aflatoxins. Previous studies have reported that chronic exposure to aflatoxin is linked to hepatocellular carcinoma (HCC), growth faltering and impaired immunity in children. Therefore, ensuring the safety of community-based CFs in terms of aflatoxins are a goal worth achieving. To ensure the safety of the community-based CFs, a method known as a hazard analysis critical control point (HACCP) based standard operating procedure (SOP) was developed (part of my PhD work) 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) while it has been implemented since then. Hence, the purpose of this study is to evaluate the impact of the method in terms of the nutritional and health status of under five children and the safety of the CFs in terms of aflatoxin contamination and to validate the method in another setup, more specifically in the cash crop producing area in the southern parts of Ethiopia.

## Methods/ Approach

### 1. The impact study

The impact evaluation study was conducted in the Machakel district, Amhara region, Ethiopia. The study was conducted using retrospective cohort study design. Four villages (smallest admirative unit) from method implemented and four villages from non implemented villages were randomly selected. A total of 198 mothers' child dyads (having children 3.5- 5 years age); 99 mothers' child dyads (from method implemented (exposed) villages and 99 mothers from non-implemented (non-exposed) villages were participated in the study.

#### 1.1 Sociodemographic information

*The sociodemographic information of the 198 mothers' child dyads were collected using pretested questionnaires.*

### 1. 2. Anthropometric measurement

The height, weight, and mid upper arm circumference (MUAC) of the 198 young children were measured using standardized techniques.

From the collected anthropometric data three indices of nutritional status—namely the weight-for-age Z-score (WAZ), the height-for-age Z-score (HAZ) and weight-for-height Z-score (WHZ) were calculated based on the growth standards published by the World Health Organization (WHO) in 2006.

### 1.3 CF Samples collection

Manually cleaned, dehulled, dried and then roasted (light roasting) CF ingredients (cereals- maize, wheat & teff and legumes- broad bean & pea) about 200 gm each were collected from 78 households from the method implemented villages. The samples were kept in polyethylene bags and kept together in a plastic box with lids. This way the samples were transported from field to Center for Food Science Nutrition, Addis Ababa University.

The samples collected were taken out from the polyethylene bags in Center for Food Science and Nutrition Research Laboratory and milled starting from the next day of arrival. Between batches of milling, the milling machine was cleaned properly using blower and rinsed by 70 % alcohol (ethanol) and then sanitized by grinding some portion of the next sample to avoid cross contamination. After that, CF flour was prepared with a ratio of 75: 25 cereals and legumes with three cereals and two legumes. Then after a composite sample of 30 CF samples (500 gm each) were prepared out of the 78 CF samples.

#### 1.3.1 Moisture analysis

Moisture contents of the samples were determined according to AOAC (2000), using the official method 925.10.

#### 1.3.2 Aflatoxin analysis

The levels of aflatoxin (AFB1, AFB2, AFG1 & AFG2) were determined using validated HPLC techniques. The analysis was done at Bless Agri Food Laboratory Services, a private lab in Ethiopia.

### 2. The validation study

The validation study was done at Dilla Zuria district, Gedee zone, South region, a cash crop (coffee) producing area. Two villages were selected and in each village 20 mothers', a total of 40 mothers' child dyads (having children 6 to 23 months) were included in the study. The study used quasi-experimental study design.

## Methods/ Approach Cont'd

### 2.1 Sociodemographic information

*The sociodemographic information for the 40 mothers' child dyads were collected using pretested questionnaires.*

### 2.2 Training the mothers'

Training was given to the mothers' individually about 2 hours so as to validate the method (HACCP based SOP) and let them to prepare CFs using the available ingredients.

### 2.3 CF samples collection

Manually cleaned, dehulled, dried and then roasted (light roasting) CF ingredients (cereals- maize, barley and legumes- haricot bean, broad bean, chick pea & pea) about 300 gm each were collected from 30 mothers' (households). The samples were kept in polyethylene bags and kept together in a plastic box with lids. This way the samples were transported from field to Center for Food Science Nutrition, Addis Ababa University.

The samples collected were taken out from the polyethylene bags in Center for Food Science and Nutrition Research Laboratory and milled starting from the next day of arrival. Between batches of milling, the milling machine was cleaned properly using blower and rinsed by 70 % alcohol (ethanol) and then sanitized by grinding some portion of the next sample to avoid cross contamination. After that, CF flour (300 gm each) was prepared with a ratio of 75: 25 cereals and legumes with one cereal and one legume.

#### 2.3.1 Moisture analysis

Moisture contents of the samples were determined according to AOAC (2000), using the official method 925.10.

#### 2.3.2 Aflatoxin analysis

The levels of aflatoxins (AFB1, AFB2, AFG1 and AG2) in the CF samples were determined using a validated LC-MS/MS method (Monbaliu et al., 2010). The aflatoxin analyses was done at the Centre of Excellence in Mycotoxicology and Public Health, Department of Bioanalysis, Ghent University, Belgium.

## Findings/ and Interpretations

The findings /and interpretations are not yet finalized.

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