Experimental Evidence of Nutrition Interventions in Northern Ghana

Zereyesus, Y. A.¹, Tsiboe, F.², Amanor-Boadu, V. ¹, Ross, K. ¹, and Shanoyan, A.¹

¹ Agricultural Economics Department, Kansas State University
² Department of Agricultural Economics and Agribusiness, University of Arkansas

Contact Author: yacobaz@ksu.edu


Copyright 2016 by Yacob A. Zereyesus, Francis Tsiboe, Vincent Amanor-Boadu, Kara L. Ross, and Aleksan Shanoyan.

All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.
Experimental Evidence of Nutrition Interventions in Northern Ghana

Zereyesus, Y. A. 1, Tsiboe, F. 2, Amanor-Boadu, V. 1, Ross, K. L. 1, and Shanoyan, A. 1

1 Agricultural Economics Department, Kansas State University
2 Department of Agricultural Economics and Agribusiness, University of Arkansas

INTRODUCTION

Background:
- Improving the nutritional status of women and children in northern Ghana is a key objective of the US government’s food security initiative, Feed the Future (FTF).
- FTF seeks to achieve its objective by improving access to diverse and quality foods, improving nutrition-related behaviors, and improving utilization of maternal and child health and nutrition services.
- In 2012, USAID/Ghana funded a population-based baseline survey in northern Ghana to track and evaluate population level changes between the pre- and post-intervention periods.
- Three years later, in 2015, a mid-term population-based survey was conducted from representative households in the same regions in northern Ghana as surveyed in the 2012 population-based survey.
- A number of Implementing Partners are managing development projects in the program area to improve women’s and children’s health and nutrition.
- Analysis of nutrition related outcomes from the two rounds of surveys using standard before-after mean-comparison t-tests indicate positive responses to the FTF program activities and other implementing partners’ projects.
- The nutrition related outcomes of interest are:
  - Children Nutritional Outcomes - dietary diversity, exclusive breastfeeding, minimum acceptable diet, the levels of wasting, stunting, and underweight among children aged 0-5 years
  - Women Nutritional Outcomes - prevalence of underweight and dietary diversity among women of reproductive age; and the overall household level poverty.

Problem statement:
- Donor agencies and governments are increasingly seeking for evidence based policy planning to enhance the effectiveness of development interventions.
- However, standard before-after mean-comparison t-tests do not account other household, women, and children’s characteristics, and may confound the impact of FTF program activities and other Implementing Partners’ projects.
- This study attempts to assess the causal effect of the FTF program activities on women and children nutritional outcomes while taking into account the impact of other household, women, and children’s characteristics.

METHODOLOGY

- To estimate the enhancement in nutrition related indicators attributable to the FTF program activities, ordinary least squares and probit models are specified based on the difference-in-differences model in Meyer (1995) and (Duflo et al. 2008).
- A difference-in-difference experimental design is proposed because, its framework: (1) controls for the time effect common to both control and experimental groups, (2) controls for the experimental group specific effect (average permanent differences between the experimental and control group); and (3) estimates the true effect of the intervention after controlling for the time and experimental group specific effects.


\( Y_{1c} = \alpha_0 + \alpha_1 T_1 + \alpha_2 G + \beta_1 T_1 G + \beta_2 C + \beta_3 M + \beta_4 H + \gamma_1 L + \epsilon_t \) (1)

\( Y_{2c} = \alpha_0 + \alpha_1 T_2 + \alpha_2 G + \beta_1 T_2 G + \beta_2 C + \beta_3 M + \beta_4 H + \gamma_1 L + \epsilon_t \) (2)

\( Y_{1w} = \alpha_0 + \alpha_1 T_1 + \alpha_2 G + \beta_1 T_1 G + \delta_1 W_1 + \delta_2 H_1 + \delta_3 L_1 + \epsilon_t \) (3)

\( Y_{2w} = \alpha_0 + \alpha_1 T_2 + \alpha_2 G + \beta_1 T_2 G + \delta_1 W_2 + \delta_2 H_2 + \delta_3 L_2 + \epsilon_t \) (4)

\( Y_h = \alpha_0 + \alpha_1 T + \alpha_2 G + \beta_1 T G + \delta_1 W + \delta_2 H + \delta_3 L + \epsilon_t \) (5)

- Equations (1) and (2) are estimated by probit and equation (3), (4), and (5) are estimated by (OLS) regressions.

RESULTS

Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before</th>
<th>After</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (yes=1)</td>
<td>0.18 (0.39)</td>
<td>0.13 (0.34)</td>
<td>-0.05 [0.01]***</td>
</tr>
<tr>
<td>Stunting (yes=1)</td>
<td>0.38 (0.48)</td>
<td>0.22 (0.41)</td>
<td>-0.16 [0.01]***</td>
</tr>
<tr>
<td>Wasting (yes=1)</td>
<td>0.13 (0.33)</td>
<td>0.11 (0.31)</td>
<td>-0.02 [0.01]**</td>
</tr>
<tr>
<td>Exclusive Breastfeeding (yes=1)</td>
<td>0.59 (0.49)</td>
<td>0.58 (0.49)</td>
<td>0.00 [0.00]</td>
</tr>
<tr>
<td>Minimum Acceptable Diet (yes=1)</td>
<td>0.43 (0.49)</td>
<td>0.42 (0.49)</td>
<td>-0.00 [0.00]</td>
</tr>
<tr>
<td>Women’s BMI</td>
<td>22.06 (3.04)</td>
<td>22.31 (3.36)</td>
<td>0.25 [0.08]***</td>
</tr>
<tr>
<td>Women’s diet diversity score</td>
<td>4.56 (1.59)</td>
<td>3.39 (1.81)</td>
<td>-1.17 [0.04]***</td>
</tr>
<tr>
<td>Monetary food shortfall (%)</td>
<td>0.38 (0.30)</td>
<td>0.14 (0.23)</td>
<td>-0.23 [0.01]***</td>
</tr>
</tbody>
</table>

Significance levels: *p<0.1 ** p<0.05, ***p<0.01

Fig 1: Effect of interventions on child anthropometric indicators

Fig 2: Effect of interventions on child nutrition

Fig 3: Effect of interventions on women’s nutrition

Fig 4: Effect of interventions on household nutrition

DISCUSSION

Preliminary results from the analysis indicate that:
- No significant change in children’s stunting and underweight rates, but wasting rate appears to have increased (Fig. 1).
- No significant reduction in exclusive breastfeeding and minimum acceptable diet (Fig. 2).
- Women’s BMI scores seem to have improved while their dietary diversity score seems to have declined (Fig. 3).
- Household level food poverty shortfall seems to have improved (Fig. 4)

RECOMMENDATIONS

- The time period between the baseline and the first interim indicator assessment may not be enough to establish causal effect on the nutrition indicators.
- Analysis should be repeated when enough time has passed and/or when the interventions come to an end.
- The current analysis could be corroborated with further detailed data from Implementing Partners on the exact coverage of activities in the field.
- With the availability of disaggregated data, other methods of analysis, e.g., Propensity Score Matching, could be used in addition to the current analysis for more robust conclusions.
- In the future, with more data available, further re-analysis on the causal effects of the nutrition interventions on the current outcome indicators as well as other indicators, e.g. poverty rates, could be done.

Variable Interpretation

- Y_{1c}: Anthropometric indicators for children (Stunting, Underweight, and Stunting)
- Y_{2c}: Children nutrition indicators (exclusive breastfeeding, and minimum acceptable diet)
- Y_{1w}: Women’s BMI
- Y_{2w}: Women’s diet diversity
- Y_h: Household Nutrition indicators (food poverty)
- T: Period indicator (pre-intervention period=0)
- G: Experimental and control group indicator (control group=0)
- C: Causal effect indicator (where T=1 and G =1)
- W: Child’s demographics (age, gender, etc.)
- M: Caretaker of child demographics (age, gender, etc.)
- H: Household demographics (age, gender, etc.)
- L: Location fixed effect for community and locale
- W: Women’s demographics (age, gender, etc.)

REFERENCES


AAEA Annual Meeting, July 31 - August 2, 2016 in Boston, MA