The Impact of Maternal Health and Nutrition Status on Child’s Health and Socioeconomic Outcomes
-Randomized Controlled Trial in Malawi-

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Aim of the project

- To implement a birth cohort study in the African context
  - Large scale
  - Long-term
  - With exogenous shocks
    - a series of early childhood randomized interventions
  - Collect a wide range of data: socioeconomic and health measures, and biomarkers (including DNA).
  - Open to the possibility of future interventions (such as schooling)
Project Malawi

- Project title: Project Malawi (www.project-malawi.org)
- $2m funding from Korean government
- HIV/AIDS and Mother and Child Health (MCH) projects
- Research area: Lilongwe, Malawi

- Number of group villages: 600
- Number of villages: 1,000
- Number of estimated pregnant women per year: 4,000
Current Interventions

- **Pre-natal support: WHO standard package**
  - 10kg of food (combination of maize, soya, and vegetable oil) per month
  - micro-nutrients (Vitamin A, Iron, Iodine and Folic acid)
  - malaria prevention (Bednet and prophylaxis)
  - anti-parasite medicine (Albendazole)
  - promotion of prenatal care in nearby health centers
  - promotion of facility delivery through transportation voucher.

- **Post-natal support: WHO standard package**
  - 10kg of food (combination of maize, soya, and vegetable oil) per month
  - micro-nutrients (Vitamin A, Iron, Iodine and Folic acid)
  - malaria prevention (Bednet and prophylaxis)
  - anti-parasite medicine (Albendazole)
  - promotion of postnatal care in nearby health centers (such as vaccination)
  - formula with clean water for infant after 6 months
Research Questions 1: Impact

Q1: [Impact] How do prenatal and postnatal health care and nutrition support interventions affect the well-being of children and their mothers?

- No consensus on critical timing
- Fetal Origin Hypothesis
  - Almond et al (2005); Behrman and Rosenzweig (2004); Balck, Devereux and Salvanes (2007), Susser (1994; Almond and Mazumder (2005); Lee(2011)
- Life Course Model
  - Maccini and Yang (2009); Fertig (2005); Glewwe, Jacoby and King (2001); Anderman, Hoddinott and Kinsey (2006); Hoddinott et al. (2008)
Q2: [Complementarity] How big is the interaction of prenatal and postnatal interventions?

- little credible evidence
- Duflo, Dupas, Kremer (2011) - interaction between school uniform distribution and HIV/AIDS teacher training
Research Questions 3: Heterogeneity

Q3: [Heterogeneity] What is the differential effect of these interventions among families of various characteristics?

- by socioeconomic and demographic status
- by genotype
  - gene-environment interaction (Caspi, 2002)
Research Questions 4: Parental Response and Mechanism

Q4A: [Parental Response] What are the parental behavioral responses to these interventions?
   ▶ complements or substitutes?

Q4B: [Mechanism] What are the mechanisms involved from intervention to outcomes
   ▶ health status?
   ▶ cognitive function (IQ)?
   ▶ attitudes such as time and risk preference?
Baseline Survey

- Baseline survey covers:
  - Basic demographics
  - Weight and Height
  - Household roster
  - Education, Employment, Marriage, Birth history
  - Children’s health and nutrition
  - Contraception, Sexual behavior
  - HIV/AIDS related question
  - Consumption
  - Credit history
  - Unexpected events
  - GPS
  - HIV testing, Blood pressure, Hemoglobin level, Urine test, Pregnancy test (if necessary)
  - (future) Saliva 5ml and Blood 8ml for gene research
Randomization of Interventions

- Delivering food is a "logistical nightmare"

- Group village level randomization

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
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<tbody>
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<tr>
<td>Postnatal</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
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</tbody>
</table>

- Expanded through routine pregnancy registry
Follow-up Surveys and Routine Pregnancy Registry

- **Routine Pregnancy Registry**
  - We plan to continue to register new pregnancies (ongoing basis)

- **Annual Follow-up Surveys**
  - **Outcome variables for mother:**
    - mortality, postpartum fever and infection, breastfeeding, length of hospitalization, weight, fertility, child careing behavior, and labor market participation.
  - **Outcome variables for child:**
    - mortality, weight, height, health (fever, diarrhea, etc), cognitive function, educational and economic achievements
Evaluation Strategy: ITT

- The reduced form regression model is

$$\text{Outcome}_{ij} = \alpha + \beta_1 Pre_j + \beta_2 Post_j + \beta_3 Both_j + \gamma X_{ij} + \epsilon_{ij}$$

where

- Outcome is outcomes for individual i
- Pre, Post and Both are dummies for each treatment
- X is a set of control variables
- errors are clustered at the group village level

Kim, Kim and Pop-Eleches (2011)