Combating Child Malnutrition in Post-Conflict Zones:  
Assessing an Intervention in the Democratic Republic of Congo 

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ABSTRACT: The Democratic Republic of the Congo (DRC) has the highest percentage of undernourished people in Sub-Saharan Africa, at 75% in 2006. This abstract presents results from our 2014 study of a nutritional therapy treatment to combat moderate and severe forms of malnutrition in the town of Butembo in the North Kivu region of DRC. The treatment has been offered by Georgio Cerruto Therapeutic Nutrition Center at the Université Catholique du Graben in Butembo since 2002. We attempted to evaluate this treatment using a post-treatment design using a comparison group from a rural area outside of Butembo. Our data offers a rare insight into the prevalence and intensity of child malnutrition and assesses the impact of a treatment. We propose to use this study as a basis for a more formal study using (i) randomization, and (ii) in-field longer-term study design. Our main goal is to construct an effective medical supply chain to address this problem long-term not just in the DRC but elsewhere in Africa.

¹This abstract is based on a capstone project I supervised and conducted with my final year students at the Bush School of Government, Texas A&M University (where I was a professor before coming to UT, Austin). My team comprised of Sky Barlow, Zike Chen, Gavin Finnegan, Dr. Blaise Pascal Furaha (from DRC), Brandon Pichanik, Cait Stadler and Julie Swensen. A working paper from which many parts are abstracted here is available. It has not yet been submitted for publication but that is planned.
1. BACKGROUND

The Democratic Republic of the Congo (DRC) located in Central Africa is the second largest nation on the continent after Algeria. It is a nearly landlocked country with a tropical climate. The DRC is endowed with natural resources, including copper, cobalt, gold, and diamonds. However, the country has suffered from conflict, a weak economy, and among the lowest Human Development Index (HDI) rankings in the world. Conflict and civil war has been a constant in the DRC since it gained independence in 1960, resulting in poor outcomes in health, education, and living standards. Not only did the Congolese suffer from internal conflicts, strife from neighboring countries from the east, specifically Rwanda and Uganda, spilled into the DRC in the 1990s. Renegade elements of these conflicts remain to this day in the DRC’s eastern region of North Kivu. Prior to the Rwandan genocide, rebel forces occupied eastern DRC and following the genocide, Rwandan forces and hundreds of thousands of refugees entered the country. This further increased the likelihood of small-arms conflict in the North Kivu region.

Malnutrition

Malnutrition is arguably the number one risk to health worldwide as it threatens the well-being of more than two billion people in the world today. According the World Food Programme, malnutrition is defined as “A state in which the physical function of an individual is impaired to the point where he or she can no longer maintain natural bodily capacities such as growth, pregnancy, lactation, learning abilities, physical work and resisting and recovering from disease.” Around the globe, malnutrition is an underlying cause in one-third of all child deaths, a total of 2.6 million children a year. For those who do survive, one of every four children suffers “stunting,” a condition where their bodies do not fully develop due to malnutrition and chronic nutritional deficiencies.

Given that a healthy average minimum dietary energy requirement is 1,750 calories, seventy-five percent of the Congolese population was undernourished in 2006. From 1990 to 2009, the GHI score for the DRC increased by fifty-three percent, indicative of a strong correlation with national instability. The average Congolese woman has 4.8 children while the maternal mortality rate is 540 deaths for every 100,000 live births. The DRC ranks twelfth of 224 countries with regards to infant mortality with 73.15 deaths for every 1,000 live births while its under-five mortality ranking is fifth of 194 nations with 146 deaths per 1,000 children.

2. RESEARCH QUESTION and RESULTS

Our research was primarily concerned with assessing the effectiveness of the Giorgio Cerruto Therapeutic Nutrition Center – hereafter referred to as simply “the Clinic” – in battling
malnutrition in the area. Their treatment consists of a 30-day in-house nutritional therapy that administers high protein shakes to children and young mothers.

We designed our research to answer two main questions:

- What is the prevalence of child malnutrition in eastern (conflict-prone) DRC, and
- Did the clinical treatment positively affect the nutritional status of children?

The Clinic is located in the town of Butembo with a growing population of 700,000 in North Kivu. Amidst decades of fighting in North Kivu, Butembo has experienced less conflict than neighboring cities. The local economy is based on trade rather than direct mineral extraction that is easily exploited by force. Though Butembo lacks a single paved road, the standard of living benefits from a public water utility, a privately funded university and a hospital. A small United Nations post and a detachment of the Congolese military (FARDC) provide Butembo with a level of security that is uncommon in a majority of North Kivu. However theft, kidnapping, assault, and murder remain pressing concerns that discourage NGOs from establishing a presence. The Clinic was primarily interested in our answer to the second question.

**Prevalence:** The first question was of special interest to the Bunyuka Parish, which we used as our control group. Bunyuka is a rural community located twelve kilometers outside of Butembo. Bunyuka has no central water or electricity, but does have two small clinics. Unlike Butembo, residents of Bunyuka do not speak French and solely rely on tribal language, Nandi, and a local dialect of Swahili. We chose the largest church in this area to assess prevalence of malnutrition. After the church service we were able to measure 1456 children in this control group.

**Figure 1:** Survey at Bunyuka Parish

Figures 2 and 3 compare Bunyuka weight data against World Health Organization (WHO) global standards as a baseline. Figure 2 shows that the WHO baseline outcomes are far superior to the Bunyuka sample. As age increases, children in Bunyuka consistently fall below the baseline weight
of an average healthy child. In addition, Further, as age increases, the gap in WFA between those in the Bunyuka and WHO studies continues to diverge. Thus, if malnourished as an infant children in Parish have little chance of catching up with the global standard of health, and in fact, their condition worsens as they reach adolescence.

**Figure 2:** WHO and Bunyuka Comparison of Weight for Age Median Outcomes

![Graph of Weight for Age Median Outcomes](image1)

**Figure 3:** Comparison of Below-Average WHO with Above-Average Bunyuka Height

![Comparison of Weight for Age Median Outcomes](image2)
Figure 3 compares WHO’s lowest 25th percentile height with Bunyuka’s top quartile (75th percentile) height. Substantively, these figures show that even children who would be considered relatively healthy in Bunyuka have worse outcomes than even the lower end of the WHO standard. Again the divergence worsens as age increases.

Among the 632 Bunyuka mothers we surveyed, poverty is clearly related to the malnutrition problem because the food that is consumed most is Casava, a protein deficient and carbohydrate rich food that is plentiful and cheap. Meat and even lentils are too costly for the families to afford.

Table 1: What Families Eat the Most

<table>
<thead>
<tr>
<th>Food</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>74.37</td>
</tr>
<tr>
<td>Rice</td>
<td>2.37</td>
</tr>
<tr>
<td>Beans</td>
<td>6.96</td>
</tr>
<tr>
<td>Corn</td>
<td>0.47</td>
</tr>
<tr>
<td>Bananas</td>
<td>0.79</td>
</tr>
<tr>
<td>Meat</td>
<td>0.47</td>
</tr>
<tr>
<td>Potatoes</td>
<td>12.82</td>
</tr>
<tr>
<td>Other</td>
<td>1.74</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: Sample = 632.

**Impact of Treatment:** To answer our main question about the effect of the Cerruto clinic intervention on malnourished children, we surveyed a sample of former patients from the clinic and measured indicators for their current health status. The clinic offers a twenty-one day nutritional therapy treatment and sees an average of fifty cases each month. Among its stakeholders are the Giorgio Cerruto Foundation in Italy and the Université Catholique du Graben (UCG).

We measured families and children using the same instruments and indicators for health and noted similar aspects of trust and compliance as with the control respondents in Bunyuka. As in Bunyuka, a meal was given to respondents after the survey. Overall, 215 families were surveyed and 351 children were measured. The results are in the form of average treatment effects for the treated population (ATT) in terms of their height. For four age groups – below the age of 3, between the ages of 3 and 6, between the ages of 6 and 9, and between the ages of 9 and 12 – Figure 4 presents the outcomes for the lowest and highest quartile, by outcome. The quartile ATT for a specific age group is simply the difference between the Treatment outcome and the corresponding Control outcome.
For infants below age three there is a positive (and statistically significant) treatment effect. That is, children receiving treatment turn out to be are healthier compared to children in the Bunyuka control group. We believe this is due to the treatment provided at the clinic, which allows children suffering from early malnutrition to recover. However, at older ages the treatment effect not only disappears but turns negative -- the average treatment outcome is inferior to the average control outcome in all other age groups (for both quartiles). That is, as the age of the child increases, the effect of the treatment decreases.

The treatment group is defined as a child who has received treatment at least once in the Clinic. One interpretation is that treatment at an early age arrests the negative effects of malnutrition, while treatment at a later age does not. However, most children who were treated, received treatment at an early age. The treatment was still beneficial as a lifesaving measure, but as these children grew older, the treatment was unable to prevent stunting or in repairing the damage to growth already incurred. Thus, there appears to be a selection bias: the selection into treatment is of the sickest, and the treatment is unable to reverse this selection.

The reasons for this need to be investigated further. According to the clinic, one reason is that it is imperative for mothers to continue the protein treatment even after they have completed their therapy at the clinic. Even the families understand the need. However, there is near unanimous (98%) believe that the most significant deterrent is the cost of treatment. The average cost of treatment according to those who have undergone treatment was 5 USD. In a population with an average income under the World Bank global poverty threshold of 1 USD per day, this is a significant financial commitment. The treatment at the clinic is usually subsidized by the Clinic.
However, once that initial treatment is completed (which may require patients staying for one month at the clinic) the parents must fund a continuing program of protein intake. This is not affordable for the poor population. Sometimes the products, which are imported and distributed through UNICEF or NGOs, become unavailable as the supply chain is subject to theft and impropriety. Thus, once the patient has left the clinic, their condition declines, as Figure 4 indicates. The only time when the patient goes back to the clinic is when their condition becomes dire and the patient is struggling to survive. This selection effect is also evident in the results.

Limitations of this study

i. The scope of the project is limited to an area within a radius of Butembo, in North Kivu, DRC. Are these findings local, or can they be applied more universally to other conflict-prone regions.

ii. The study was not immune to framing biases. The presence of foreigners during the survey implementation could have prompted respondents to provide answers considered more socially desirable to appease the enumerators, Bunyuka parishioners or religious officials, UCG clinic staff, or members of the research team.

iii. The use of the WHO Child Growth Standards, while internationally recognized as a reputable baseline, is less accurate than a baseline formulated for the health of Congolese children more specifically.

iv. Pre-treatment data will greatly improve the ATT estimation. The data available for the children treated at the clinic is from the measurements taken during our treatment survey, therefore we are unable to chart their growth progress before and after treatment.

v. Randomization will greatly improve the ATT estimation.

3. PROPOSAL

I propose to use this study as a valuable baseline to conduct a 3-4 year study with randomization and a pre- and post-treatment design. Such a randomized controlled trial will seek not only to answer questions about the effectiveness of the present treatment but, with the valuable benefit of hindsight from this survey, also look into ways to make the treatment to continue to be effective even after the patient has left the clinic. The crucial takeaway from the study is precisely its ability to uncover the social dimensions of the problem that exacerbate the medical problem of malnutrition. Combating malnutrition is not just a matter of a medical treatment but one of finding the wherewithal and producing an effective supply chain to enable a continuation of that medical treatment. I (with the help of a University of Texas team) propose to design a study to solve these bigger problems. We can start in the same DRC region since we have valuable experience there (and a costly learning curve has been climbed) and continue to plan similar studies in other regions like South Sudan.