Diarrheal Diseases in Kenya

addressing post acute mortality

[Jenny] [Hanna] [Truman] [Aria]
Agenda

Objective
Considerations
Background
Solution
Financials
Conclusion
70% of child deaths can be prevented
Diarrheal disease is a leading cause of preventable death.
Objectives

Decrease post-acute mortality rate

Prevent development of diseases

Define and tackle root causes

Analyze previous efforts
Increasing Antibiotics

**Benefits**
- Reduction of diarrhea episodes
- Reduced risk of death
- More evidence and studies to rely upon in solving the greater issue

**Costs**
- Expensive
- Doesn’t treat viral infections
- Bacterial resistance

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**Cost & Benefits**

**Background**

**Solution**

**Finances**

**Conclusion**
Follow-up Treatment

Benefits
- Helps ensure patients follow protocol
- Early diagnosis of treatment failure
- Allows full treatment process to observe for post-acute mortality

Costs
- Recruiting more health care providers
- Costly in time, money, access to rural areas, ability
- Not sustainable

Cost & Benefits  Background  Solution  Finances  Conclusion
### Addressing Malnutrition

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>diarrhea + malnutrition are continuous cycle</td>
<td>not an immediate cure—long term approach</td>
</tr>
<tr>
<td>tackles root cause</td>
<td>requires outreach + edu</td>
</tr>
<tr>
<td>cost of malnutrition in Kenya very high</td>
<td>nutrient reabsorption failure</td>
</tr>
<tr>
<td>preventative (long-term)</td>
<td>distribution</td>
</tr>
</tbody>
</table>

### Cost & Benefits

<table>
<thead>
<tr>
<th>Background</th>
<th>Solution</th>
<th>Finances</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Background

Malnutrition is the root of post acute mortality
Background

2009 micro vaccines/pills
Solution: 3 Part Strategy

- Micronutrients powder packets
- Dispensaries for Safe Water
- Education & Campaign

Cost & Benefits  Background  Solution  Finances  Conclusion
Marsabit
- Poverty rate: 83.5%
- Malnutrition Prevalence: High
- Access to Safe Water: 35.7%

Mandera
- Poverty rate: 89.1%
- Malnutrition Prevalence: 2nd highest in country
- Access to Safe Water: 39.6%
Micronutrient Powder Packets

Cost & Benefits
Background
Solution
Finances
Conclusion
Micronutrient Powder Packets

Kakuma Refugee Camp MixMe Packets

Sprinkles Packet

Cost & Benefits  Background  Solution  Finances  Conclusion
Micronutrient Powder Packets

Redesign

Cost & Benefits  Background  Solution  Finances  Conclusion
Dispensers for Safe Water

Cost & Benefits

Background

Solution

Finances

Conclusion
Chlorination has been estimated to reduce childhood diarrhea by ~40%
Dispensers are...

Effective

Cheap

Powerful
19,413 dispensers installed
Educational Reform

Cost & Benefits

Background

Solution

Finances

Conclusion
HOW:

Cost & Benefits  Background  Solution  Finances  Conclusion
Increase community awareness and understanding
Dispenser Costs

Dispenser Costs (1) | Provides safe water for # of people | For # of years
--- | --- | ---
$180 | 170 people | 1 year

<table>
<thead>
<tr>
<th>County</th>
<th>Population</th>
<th>Dispenser Costs in USD</th>
<th>Dispenser Costs in Ksh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsabit</td>
<td>15,361</td>
<td>$16,263.53</td>
<td>$1,690,268.67</td>
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<tr>
<td>Mandara</td>
<td>36,076</td>
<td>$38,198.12</td>
<td>$3,969,930.61</td>
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</table>

Cost & Benefits  |  Background | Solution | Finances | Conclusion
Micronutrient Powder Costs

<table>
<thead>
<tr>
<th>County</th>
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<td>36,076</td>
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USAID Funding

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<th>Nutrition</th>
<th>Nutrition in Ksh</th>
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<tr>
<td>$4,100,000.00</td>
<td>426,113,000</td>
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</table>

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<thead>
<tr>
<th>Water Supply and Sanitation</th>
<th>Water Supply and Sanitation in Ksh</th>
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<td>$6,500,000</td>
<td>675,545,000</td>
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**Overall Financing**

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<th>Total Cost for Dispensers in USD</th>
<th>Total Cost for Dispensers in Ksh</th>
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<td>$54,461.65</td>
<td>5,660,199.28</td>
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<table>
<thead>
<tr>
<th>Total Cost for Micronutrient Powders in USD</th>
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<tr>
<td>$2,057.48</td>
<td>213,834</td>
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<table>
<thead>
<tr>
<th>Funding from Kenyan Ministry of Public Health in USD</th>
<th>Funding from Kenyan Ministry of Public Health in Ksh</th>
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<td>$37,938,997.40</td>
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<table>
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<th>Funding from USAID (Nutrition) in USD</th>
<th>Funding from USAID (Nutrition) in Ksh</th>
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<td>$4,100,000</td>
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Timeline

Identify Goals

Allocate Funds

Implement Solution

Observe Results

Assess Effectiveness

Cost & Benefits

Background

Solution

Finances

Conclusion
Conclusion
Appendix

- Malnutrition Data
- Government Health Budget
- National Program Costs Covered by Carbon Revenue
- Dispenser Usage
- Reliability of Dispensers
- Breakdown of Dispenser Outages
- Cause of Child Deaths
- Malnutrition - Unsuspected
- Malnutrition in Kenya
- Reducing Malnutrition Infographic
- References
# Malnutrition Data

## Kenya

<table>
<thead>
<tr>
<th>Country/Territory</th>
<th>Dates of survey</th>
<th>Area</th>
<th>Sex</th>
<th>Sample size</th>
<th>WEIGHT/HEIGHT</th>
<th>HEIGHTAGE</th>
<th>WEIGHTAGE</th>
<th>Notes</th>
<th>Ref. No.</th>
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<td>3.5 ± 0.2</td>
<td>15.8 ± 0.2</td>
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<td>01571</td>
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<td></td>
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<td>M</td>
<td></td>
<td>1199</td>
<td>3.6 ± 0.2</td>
<td>15.6 ± 0.2</td>
<td>0.7 ± 25.8</td>
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<tr>
<td></td>
<td></td>
<td>F</td>
<td></td>
<td>953</td>
<td>3.4 ± 0.2</td>
<td>15.7 ± 0.2</td>
<td>0.5 ± 25.8</td>
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**National**

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<thead>
<tr>
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<td>0.6 ± 25.8</td>
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<tr>
<td></td>
<td></td>
<td>M</td>
<td></td>
<td>545</td>
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<td>0.7 ± 25.8</td>
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<td>F</td>
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<td>463</td>
<td>3.4 ± 0.2</td>
<td>15.7 ± 0.2</td>
<td>0.5 ± 25.8</td>
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<th>WEIGHTAGE</th>
<th>Notes</th>
<th>Ref. No.</th>
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<td>F</td>
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</tbody>
</table>

## Notes

- **Central province**: Region with a higher prevalence of malnutrition.
- **Coast province**: Region with a lower prevalence of malnutrition.
- **Nyanza**: Region with a moderate prevalence of malnutrition.
- **Nyeri**: Region with a high prevalence of malnutrition.
- **Turkana**: Region with a very high prevalence of malnutrition.

**Ref. No.**

- 01571: Source reference number for the data.
## Government Health Budget

### Table 1: Government Health Budget as a Percentage of General Government Budget (2012 and 2015)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Burundi</td>
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<td>10</td>
<td>10</td>
<td>13.8</td>
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<tr>
<td>Kenya</td>
<td>6.1</td>
<td>3.4</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Rwanda</td>
<td>10.8</td>
<td>9.2</td>
<td>11.3</td>
<td>10.2</td>
</tr>
<tr>
<td>Tanzania</td>
<td>8.5</td>
<td>8.5</td>
<td>8.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Uganda</td>
<td>7.7</td>
<td>8.6</td>
<td>8.4</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Source: EAC Countries Ministries of Health, EAC Countries Budget Speeches 2012-2015

### Table 2: Per Capita Expenditure on Health in U.S $ for the Years 2010-2013 in East African Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tbody>
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<td>54</td>
<td>51</td>
<td>56</td>
<td>64</td>
</tr>
<tr>
<td>Kenya</td>
<td>56</td>
<td>60</td>
<td>62</td>
<td>67</td>
</tr>
<tr>
<td>Rwanda</td>
<td>77</td>
<td>85</td>
<td>93</td>
<td>95</td>
</tr>
<tr>
<td>Tanzania</td>
<td>41</td>
<td>45</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Uganda</td>
<td>52</td>
<td>50.1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Uganda National Health Accounts FY 2008/09 and 2009/10, March 2013
Kenya National Health Accounts FY 2012/2013
Field and National Program Costs Covered by Carbon Revenue, 2016

- Field Costs: 96%
- National Costs: 70%
Dispenser Usage

Usage

The adoption rate is an important measure of the use of dispensers. It is a percentage of randomly sampled households that tested positive for Total Chlorine Residual in their drinking water during an unannounced visit. 1.5% of all dispensers are evaluated every month. For the first three months of evaluation in a new region, 2% of all dispensers are monitored. A random selection of 8 households are interviewed at each dispenser by our Monitoring and Learning Team.
Reliability of Dispensers

Reliability

We monitor whether dispensers are functional, do not need repairs, and are filled with chlorine to assess how reliable our service is. Reliability is a critical factor in user adoption as empty or broken dispensers are not usable. We define a functional dispenser as one that releases a proper dose of chlorine (3ml), and requires no repairs. Data is gathered by our circuit riders on each trip that chlorine is delivered to the dispenser.
Dispenser Outages

Breakdown of Reported Dispenser Outages

- Dispensers with chlorine outages (%)
- Dispensers with hardware outages (%)

Graph showing the percentage of dispencer outages from July 2015 to November 2016.
Causes of Child Deaths

Causes of deaths in children under 5 years (over 8 million/year)

- Newborns 41%
- Children 59%

- Preterm 12%
- Asphyxia 9%
- Sepsis 6%
- Other neonatal 5%
- Pneumonia, neonatal 4%
- Congenital 3%
- Tetanus 1%
- Diarrhoea, neonatal 1%

- Malaria 8%
- Noncommunicable diseases 4%
- Injury 3%
- AIDS 2%
- Pertussis 2%
- Meningitis 2%
- Measles 1%
- Other infections 9%
- Diarrhoea 14%
- Pneumonia 14%

Diarrhea Basic Information

Infection in the intestinal tract caused by bacterial, viral and parasitic organisms.

Infection spread through contaminated food or drinking-water, or person-to-person as a result of poor hygiene.
Malnutrition - unsuspected

The killer no one suspects

1 out of 6 children under 5 in Kenya is underweight.

A deadly problem

Malnutrition is an underlying cause of more than half of under five deaths worldwide.

Stunting levels 2000-2008 (children under five)

- 2000: 35%
- 2003: 28%
- 2008: 30%

Stunted is the medical term for the condition of a child who is too short for his or her age.

If stunting is not treated before the child is two years it may lead to irreversible brain and body damage.

1 out of 7 children in Kenya is severely stunted.
Malnutrition in Kenya

1 out of every 3 children under five years in North Eastern region is underweight.

53,958 is the number of stunted children under 5 who were treated in public facilities in 2012.

Poor feeding = malnutrition

Children in Nairobi are five times more likely to be fed a balanced diet than children in North Eastern.

Urban vs rural

Children in rural areas are twice as likely to be underweight as children in urban areas.
Reducing malnutrition

Malnourishment can be avoided but it requires both knowledge and resources. More supplementary foods and nutrition campaigns are necessary.

1,000 days
If a woman and her baby eat healthy from the first day of pregnancy to the child’s second birthday malnourishment can be avoided or reversed.

1,290
is the number of nutritionists in Kenya

Supplements
More supplementary foods need to be distributed for the affected children to recover. Adherence to folate and iron supplements among pregnant women is essential. Children under five years need vitamin A supplements.

There is one nutritionist for every 31,000 people in Kenya.

To battle malnutrition, better access to nutritional care is needed. This requires training of more nutritionists.
References:

- https://www.evidenceaction.org/dispensersforsafewater/#why-dispensers-for-safe-water-is-better
- http://worldpopulationreview.com/countries/kenya-population/
- http://www.who.int/pmnch/media/press_materials/fs/fs_mdg4_childmortality/en/
- http://jid.oxfordjournals.org/content/182/Supplement_1/S122.full
- https://www.one.org/us/2013/06/20/6-steps-to-reducing-global-child-malnutrition/
- http://www.medschool.umaryland.edu/GEMS/