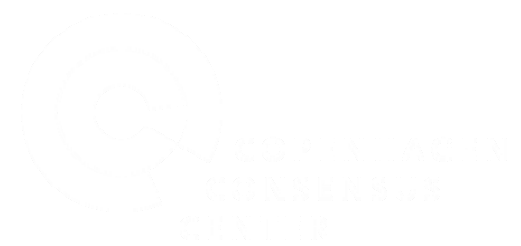


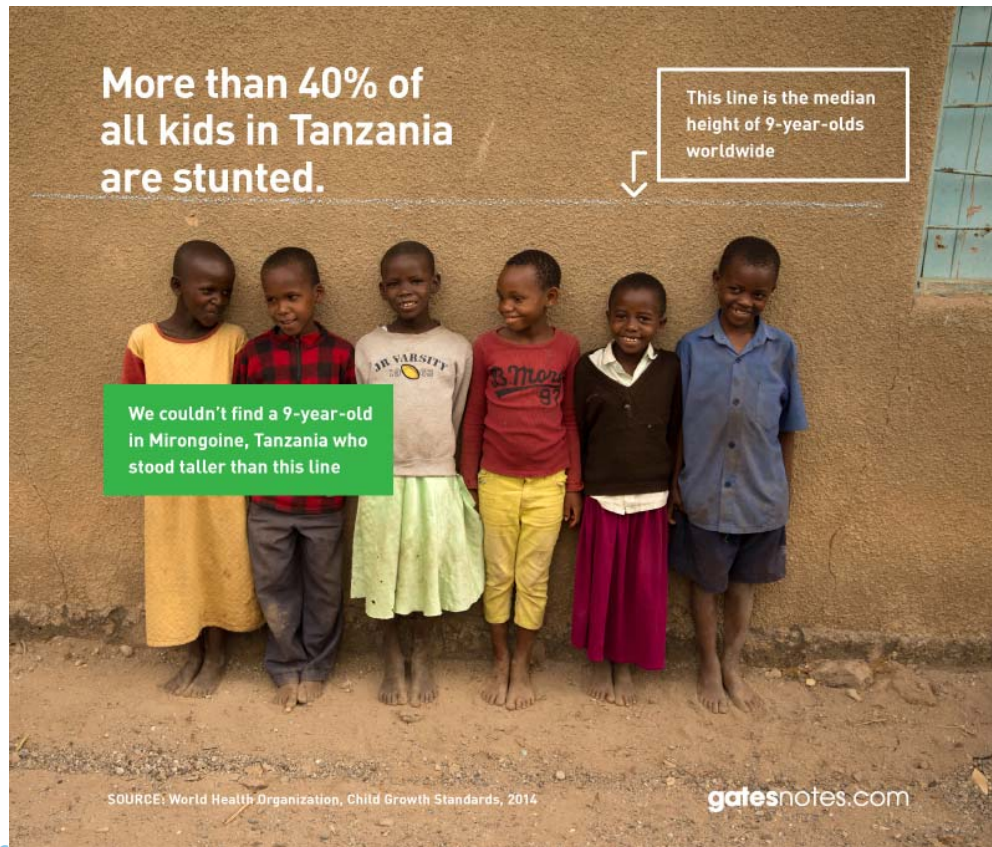
# Reducing stunting in Haiti: a BCA case study

Brad Wong, Chief Economist

Copenhagen Consensus Center



# Stunting: too short for one's age



- Caused by under nutrition and high levels of infection in first 1000 days
- Leads to:
  - Increased risk of childhood illness and mortality
  - Delayed cognitive development
  - Lower productivity in adulthood
  - Higher risk of disease in adulthood
- Stunting in Haiti is 22%, according to 2012 DHS

# Why stunting and why Haiti?

1. Preventing stunting is *ex-ante* likely to be effective use of limited resources
  - **Median BCR of stunting prevention is 18 across selected studies (McGovern et al., 2017)**
  - **Multiple rounds of Copenhagen Consensus exercises consistently put stunting reduction as one of the best buys across all of development**
2. Useful as a case study for BCA Reference Case
  - **Three types of benefits: avoided mortality, avoided morbidity, lifetime productivity -> can test effects of different valuation approaches**
  - **Short term and long term benefits -> can test effects of different discount rates**
3. Part of the *Haiti Priorise* project
  - **Possible to assess the relative effectiveness of intervention against other human capital improvements**

# The intervention, micronutrients and nutrition for mothers + children, reduces stunting by 20.3%

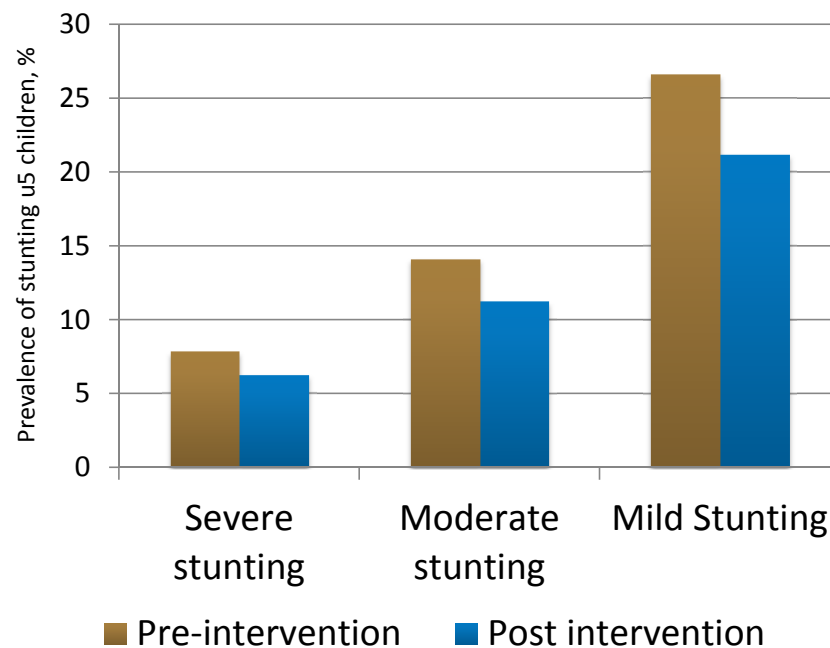
## Components of intervention

| Component                            | Intervention population              |
|--------------------------------------|--------------------------------------|
| Salt iodization                      | Whole population                     |
| Multiple MN supplementation          | Pregnant women                       |
| Calcium supplementation              | Pregnant women                       |
| Energy protein supplementation       | Pregnant women                       |
| Vit A supplementation                | Children 6-59 months                 |
| Zinc supplementation                 | Children 12-59 months                |
| Breastfeeding promotion              | Mothers of children aged 6-23 mth    |
| Complementary feeding education      | Mothers of children aged 6-23 mth    |
| Complementary food supplementation   | Mothers of children aged 6-23 mth    |
| Severe Acute Malnutrition management | Children 6-23 months severely wasted |

Source: Bhutta et al, 2013



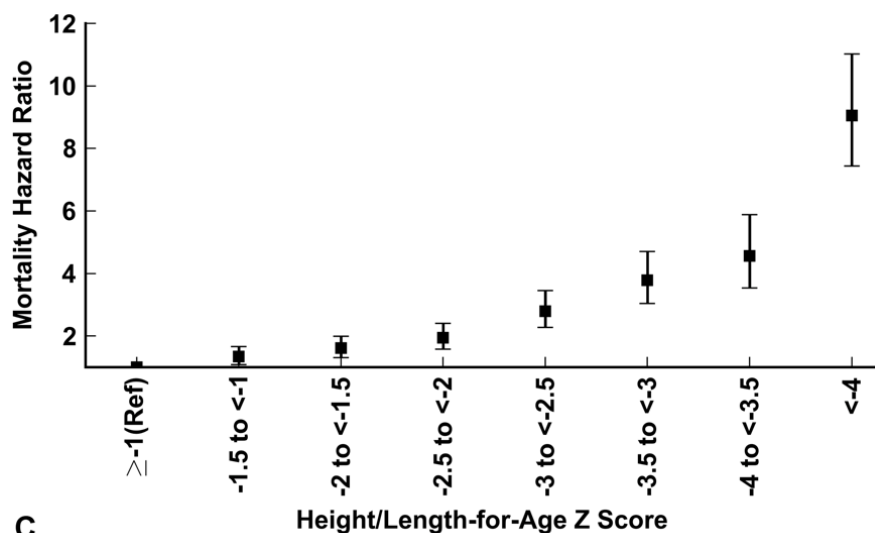
## Effect of intervention on stunting prevalence in Haiti



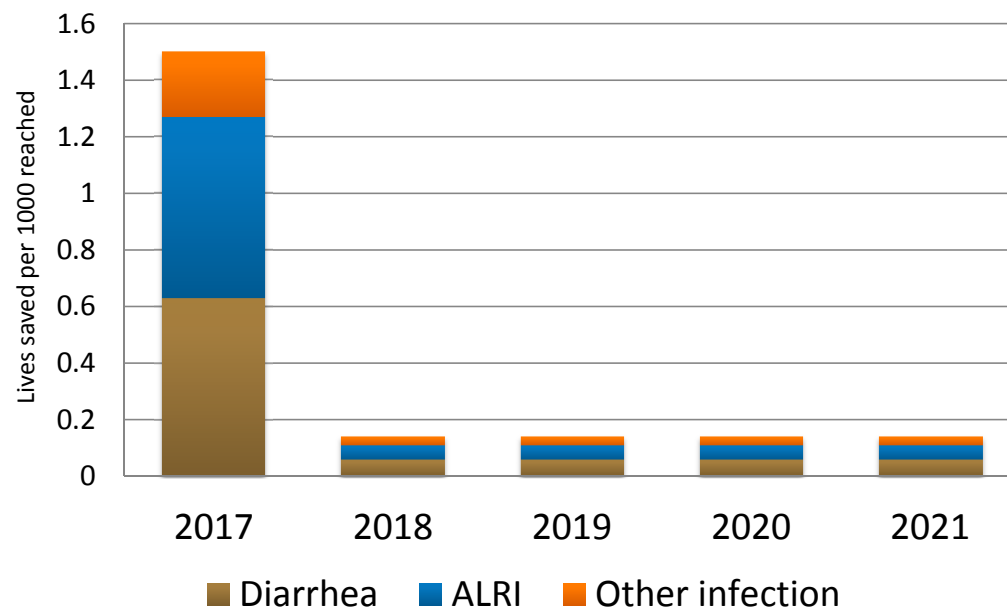
Source: Calculations based on Bhutta et al, 2013, Haiti DHS 2012

# For a given Haitian birth cohort, this intervention would save two lives per 1000 over five years

Effect of stunting on all-cause mortality hazard ratios, children under 5



Avoided cause specific mortality for 2017 Haitian birth cohort, per 1000 children reached



Source: Olofin et al, 2013

Source: Calculations based on Olofin et al, 2013 and Global Burden of Disease 2016

# Several approaches are used to value avoided mortality

- Approach 1: apply 'default value' of 170x GNI per capita PPP for each life saved -> **7.6m HTG**
- Approach 2: apply sensitivity value of 80x GNI per capita PPP for each life saved -> **3.6m HTG**
- Approach 3a: Estimate the VSLY from approach 1 and value each year of life lost (YLL) -> **304k HTG, 424k HTG and 918k HTG for each YLL** at 3%, 5% and 12% discount rates respectively
- Approach 3b: Estimate the VSLY from approach 2 and value each year of life lost (YLL) -> **143k HTG, 199k HTG and 432k HTG for each YLL** at 3%, 5% and 12% discount rates respectively

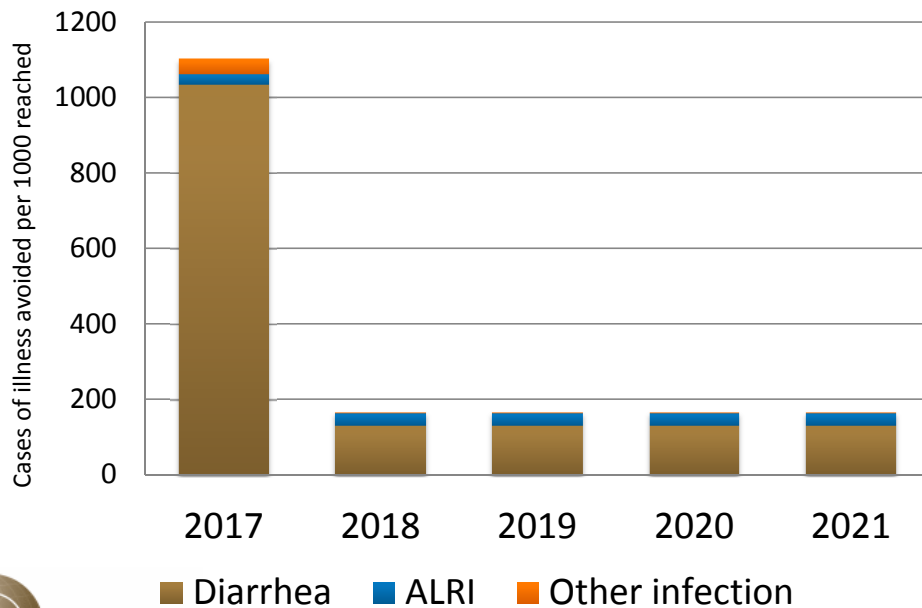
# Avoided mortality benefits: Results from different valuation approaches

Avoided mortality benefit per child reached, HTG

| Discount rate | Approach 1: All deaths avoided valued at 7.6m HTG | Approach 2: All deaths avoided valued at 3.6m HTG | Approach 3a: All YLLs valued at constant VSLY derived from VSL of 7.6m HTG | Approach 3b: All YLLs valued at constant VSLY derived from VSL of 3.6m HTG |
|---------------|---|---|--|--|
| 3%            | 14,314  | 6,736   | 16,222   | 7,634  |
| 5%            | 13,613  | 6,406   | 14,486   | 6,817  |
| 12%           | 11,545  | 5,433   | 11,593   | 5,456  |

# The intervention avoids 1755 cases of illness over five years, 90% of them from diarrhea

Avoided cases of illness for 2017 Haitian birth cohort, per 1000 children reached



## Approaches to valuing avoided mortality

- Approach 1: transfer WTP to avoid case of shigellosis from Guh et al. 2008 (rural China) using income elasticity of 1 -> **715 HTG per case of illness**
- Approach 2a: convert cases to years lost to disability (YLDs) and value each YLD at VSLY (using VSL of 7.6m HTG) + cost borne by third parties
- Approach 2b: same as approach 2a except using the lower VSL of 3.6m HTG





# Avoided morbidity benefits: Results from different valuation approaches

Avoided morbidity benefit per child reached, HTG

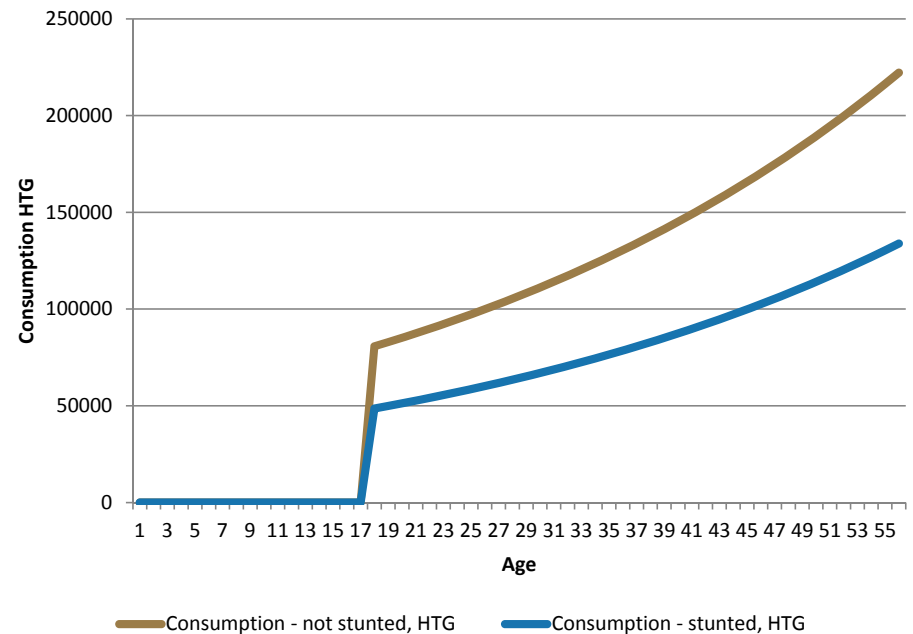
| Discount rate | Approach 1: Benefit transfer from Guh et al. (2008) | Approach 2a: Each YLD valued at constant VSLY (from 7.6m HTG VSL) + costs borne by third parties | Approach 2b: Each YLD valued at constant VSLY (from 3.6m HTG VSL) + costs borne by third parties |
|---------------|---|--|--|
| 3%            | 1,192   | 1,897  | 1,402  |
| 5%            | 1,150   | 2,185  | 1,521  |
| 12%           | 1,025   | 3,261  | 1,975  |

# Stunting reduces lifetime consumption by 66%

## Effects of stunting on lifetime consumption

- Multiple sources of evidence across different contexts for relationship between stunting and reduced cognitive development, schooling, productivity and asset ownership (McGovern et al. 2017)
- Seminal study in this genre suggests **66% reduction in per capita consumption** from stunting (Hoddinott et al. 2011)
- Studies also suggest reduction in **income of 25-35%** (Gertler et al. 2014, Hoddinott et al. 2008)

Comparison of stunted vs non-stunted individuals, consumption over life time HTG

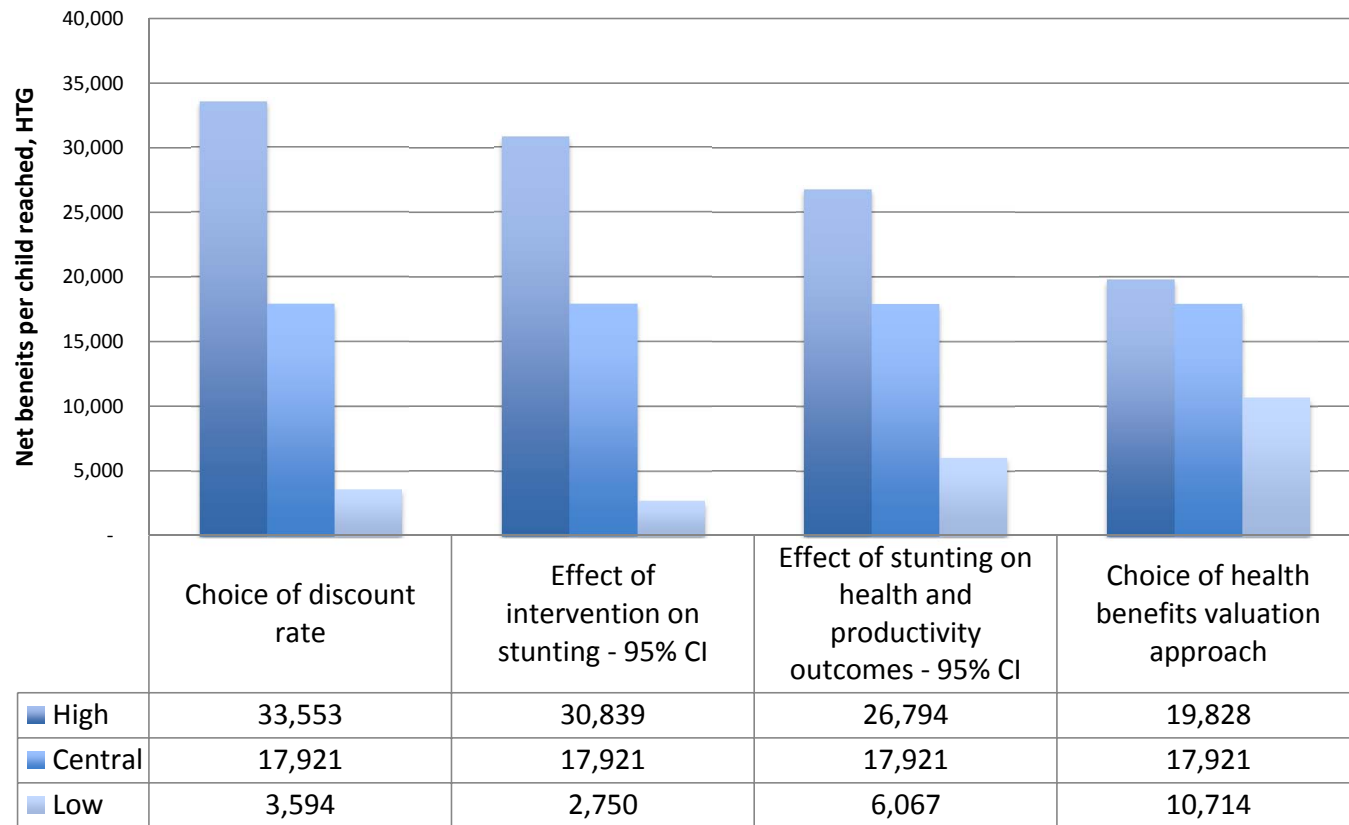


Source: Calculations based on Hoddinott et al. 2011

# Base case scenario results

| Discount rate | Mortality avoided benefit, HTG | Morbidity avoided benefit, HTG | Productivity benefit, HTG | Total Benefit per child, HTG | Total Cost per child, HTG | Benefit to Cost Ratio | Net benefit per child, HTG |
|---------------|--------------------------------|--------------------------------|---------------------------|------------------------------|---------------------------|-----------------------|----------------------------|
| 3%            | 14,314                         | 1,192                          | 31,084                    | 46,590                       | 13,037                    | <b>3.6</b>            | <b>33,553</b>              |
| 5%            | 13,613                         | 1,150                          | 15,728                    | 30,492                       | 12,571                    | <b>2.4</b>            | <b>17,921</b>              |
| 12%           | 11,545                         | 1,025                          | 2,168                     | 14,738                       | 11,144                    | <b>1.3</b>            | <b>3,594</b>               |

# Effect of uncertainty



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