The Lancet’s Series on Maternal and Child Undernutrition
Dr. Robert Black, Johns Hopkins Bloomberg School of Public Health

About the Series

**Paper 1**: prevalence and short-term consequences (deaths and disease burden)

**Paper 2**: long-term educational and economic effects and associations with adult chronic diseases

**Paper 3**: evidence-based interventions to significantly reduce the effects of undernutrition

**Papers 4 & 5**: scaling up interventions through actions at national and global levels

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Undernutrition Begins with the Mother

Maternal undernutrition: underweight for height (low body mass index)
Less visible micronutrient deficiencies
May lead to health problems for the mother and intrauterine growth restriction (IUGR)

Stunting & Wasting Begin Early in Childhood

Stunting – a chronic restriction of vertical growth indicated by a low height for age
Wasting – acute weight loss indicated by a low weight for height
Usually caused by - diets that do not provide sufficient nutrients and by high rates of infectious diseases
178 Million Children Under 5 Suffer from Stunting

90% of All Stunted Children Live in Just 36 Countries
High Prevalence of IUGR, Stunting and Severe Wasting in Children Under 5

- 13 million babies are born each year with intrauterine growth restriction
- 178 million children are stunted; 32% of all children
- 19 million children are severely wasted

Attributing Deaths and Disease Burden to Undernutrition and Suboptimal Breastfeeding

- Health consequences measured in deaths, contribution to overall rates of disease, and number of life years diminished by disease or disability
- Disability-adjusted life years (DALYs): burden of disease measures the gap between the current health of population and ideal situation (living into old age w/ full health)
- One DALY = one lost year of “healthy” life
The Burden of Maternal and Child Undernutrition

IUGR, stunting and severe wasting together are responsible for 2.2 million deaths and 91 million DALYS, 21% of the total for children under 5.

Represents 7% of the total global disease burden for any age group, the highest for any risk factor for disease burden.

Micronutrient Deficiencies

Vitamin A and zinc deficiencies account for the largest remaining disease burden among the micronutrient deficiencies – a combined 9.95% of global childhood DALYs.

Iron deficiency is a risk factor for maternal mortality, responsible for 115,000 deaths per year, 40% of maternal mortality.
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Suboptimal Breastfeeding

Increases the risk of poor nutrient intake and illness

Estimated to be responsible for 1.1 million child deaths and 44 million global childhood DALYs (10% of all childhood DALYs)

Paper 1 Key Messages

Together these risk factors were responsible for more than one-third—about 35%—of child deaths and 11% of the global total disease burden

More than 3.6 million mothers and children die each year as a result of undernutrition

The very high mortality and disease burden resulting from these nutrition-related factors make a compelling case for the urgent implementation of proven interventions
Damage Suffered in Early Life Leads to Permanent Impairment

Undernourished children are more likely to become short adults and to give birth to smaller babies.

Evidence links stunting to cognitive development, school performance and educational achievement.

Poor fetal growth or stunting in the first 2 years of life leads to reduced economic productivity in adulthood.

Child's height for age is best predictor of human capital.

Rapid Weight Gain After Being Undernourished Increases Chronic Disease Risk as Adults

Children whose early growth is restricted and gain weight rapidly later are more likely to have high blood pressure, diabetes and both cardiovascular and metabolic disease.

No evidence that rapid weight or length gain in first 2 years increases risk of chronic disease.

By supporting early nutrition and growth, incidence of chronic disease could be reduced.
Evidence-Based Interventions

Systematic review of efficacy or effectiveness of 45 possible interventions that affect maternal and child undernutrition and nutrition-related outcomes, including:

- Breastfeeding promotion
- Complementary feeding promotion strategies with or without provision of food supplements
- Micronutrient interventions (fortification & supplementation)
- General supportive strategies for improving family and community nutrition and disease burden reduction
- Interventions for the treatment of severe acute malnutrition

Interventions with Sufficient Evidence to Implement in All Countries

**Maternal and Birth Outcomes**
- Iron folate supplementation
- Maternal supplements of multiple micronutrients
- Maternal iodine through iodization of salt
- Maternal calcium supplementation
- Interventions to reduce tobacco consumption or indoor air pollution

**Newborn Babies**
- Promotion of breastfeeding (individual and group counseling)

**Infants and Children**
- Promotion of breastfeeding (individual and group counseling)
- Behavior change communication for improved complementary feeding
- Zinc supplementation
- Zinc in management of diarrhea
- Vitamin A fortification or supplementation
- Universal salt iodization
- Handwashing or hygiene interventions
- Treatment of SAM

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Interventions with Sufficient Evidence to Implement in Specific Situational Contexts

Maternal and Birth Outcomes
- Maternal supplements of balanced energy and protein
- Maternal iodine supplements
- Maternal deworming in pregnancy
- Intermittent preventative treatment for malaria
- Insecticide-treated bednets

Newborn Babies
- Neonatal vitamin A supplementation
- Delayed cord clamping

Infants and Children
- Conditional cash transfer programs (with nutritional education)
- Deworming
- Iron fortification and supplementation programs
- Insecticide-treated bednets

Modeling the Impact of Interventions

Scope of the modeling

Using results from review, modeled impact on death and disability using Disability Adjusted Life Years (DALYs)*

- 36 high burden countries
- Impact of nutrition interventions
- Impact on nutrition of disease control interventions

* 1 death = 33.3 DALYs  1 stunted survivor = 0.23 DALYs
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Modeling the Impact of Interventions

Modeling approach

Major component was cohort model, following children from birth to 36 months, with stunting and death as outcomes

Severe acute malnutrition (SAM) modeled separately

PAPER 3

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Reductions in Child Mortality at Full Coverage

Child interventions

• Breastfeeding promotion – 9.1%
• Vitamin A supplementation – 7.2%
• Zinc supplementation – 3.6%
• Treatment of severe malnutrition – 2.2%
• Comp. feeding promotion/supplement. – 1.5%

Maternal interventions

• Energy/protein supplementation – 2.9%
• Intermittent preventive malaria treatment – 1.9%
• Multiple micronutrients – 1.6%

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Other Intervention Effects at Full Coverage

• Zinc supplementation – 17% reduction in stunting
• Complementary feeding promotion/supplementation – 15% reduction in stunting
• Iron and folate supplementation – 20% reduction in maternal deaths
• Hygiene promotion – 2.4% reduction in stunting

Evidence-Based Interventions

Effective interventions are available to reduce stunting, micronutrient deficiencies and child deaths and nutrition-related disability.

Interventions showing the most promise for reducing child deaths and future disease burden include:

• Breastfeeding promotion
• Appropriate complementary feeding
• Supplementation with vitamin A and zinc
• Appropriate management of severe acute malnutrition
**Paper 3 Key Messages**

We have evidence-based interventions that work

If implemented at scale, these interventions would:

- Reduce all child deaths by one-quarter in the short term
- Reduce prevalence of stunting at 36 months by one-third, averting 60 million DALYs

Conception through 24 months is the critical window of opportunity to prevent and intervene to reduce stunting

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**Progress is Possible, If Nutrition Becomes a Priority**

Nutrition is a central component for human, social and economic development

Intensified nutrition action in high-burdened countries can lead to the achievement of the Millennium Development Goal of halving hunger by 2015 (MDG 1) and greatly increase the chances of achieving goals for child and maternal mortality (MDGs 4 & 5)