Breastfeeding and the health of women and children in the 21st century

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World Health Organization
Breastfeeding: the single most effective intervention to prevent infant deaths (*Lancet* 2003)
What is the relevance of breastfeeding to women and children in low, middle and high income countries in the 21st century?
Global target

INCREASE THE RATE OF EXCLUSIVE BREASTFEEDING IN THE FIRST 6 MONTHS UP TO AT LEAST 50%
First global map of breastfeeding prevalence

Re-analysis of DHS and MICS surveys for 127 out of 139 LMICs
Patterns of breastfeeding vary by region
Breastfeeding: one of the few positive health behaviors more prevalent in LMICs than HICs

Low- and middle-income countries
- Less than 40% of infants under 6 months are exclusively breastfed
- About 1/3 of children between 6 and 24 months are not breastfed

Most high-income countries
- Fewer than 20% of children are breastfed up to 12 months (data is limited)
- More educated, wealthier women breastfeed for longer
Breastfeeding practices over time

For each doubling in national GDP per capita, breastfeeding prevalence at 12 months decreases by 10 percentage points.

Population-weighted averages from 217 surveys
Impact of breastfeeding on maternal and child health

- Systematic literature reviews (data from low-, middle- and high-income settings)
  - Child mortality, short and long term health outcomes
  - Breast and ovarian cancer among women
  - Interventions to improve breastfeeding practices
- Lives Saved Tool (LiST) modeled preventable child deaths

Improving breastfeeding would annually save about 820,000 children under 5 years of age.

87% of them among infants less than 6 months of age.

Reduce infection-related mortality (<3mo) by 88%
Improving breastfeeding practices would have a profound effect on morbidity as well as mortality.

Improving breastfeeding would prevent:
- More than 54% of all diarrhea episodes
- And 32% of all respiratory infections

Protection against hospital admissions even greater:
- 72% of all admissions for diarrhea
- 57% for respiratory infections (in LMICs)
Early initiation and neonatal mortality

- 99,938 infants enrolled
- 56,981 initiated <1hr
- Compared with <1hr, mortality 0-28d
  - 2-23hr: Adj Rel Risk 1.41 (1.24-1.62)
  - 24-96hr: Adj Rel Risk 1.79 (1.39-2.30)
- Similar associations when deaths in first 4 days excluded and when controlled for EBF
Breastfeeding protects health and contributes to development

Breastfeeding protects against:
• Acute otitis media (<2 yrs)
• Malocclusion
• Type 2 diabetes
• Obesity

But not against:
• Asthma
• Eczema
• Food allergies

No evidence for effect on:
• Blood pressure
• Serum lipids
• Growth (wt or length)

Longer breastfeeding associated with higher performance on intelligence tests
• Average of 3 IQ points, controlling for maternal IQ
• Improved academic performance (some studies)
• Increased adult earnings

NOTE: Weights are from random effects analysis
Overall  (I-squared = 88.6%, p = 0.000)

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<tr>
<th>Author</th>
<th>ES (95% CI)</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Johnson (A)</td>
<td>5.00 (0.40, 9.60)</td>
<td>3.06</td>
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<tr>
<td>Der (A)</td>
<td>0.52 (-0.19, 1.23)</td>
<td>8.89</td>
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<tr>
<td>Gibson-Davis (A)</td>
<td>1.72 (0.54, 2.90)</td>
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<td>Zhou (A)</td>
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<td>Morrow-Tlucak (A)</td>
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<td>5.80 (4.10, 7.50)</td>
<td>7.28</td>
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<td>Quinn (F)</td>
<td>8.20 (6.50, 9.90)</td>
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<td>Whitehouse (A)</td>
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<td>Clark (A)</td>
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<td>Evenhoush (A)</td>
<td>1.68 (-0.16, 3.52)</td>
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<td>Jacobson (A)</td>
<td>4.00 (1.08, 6.92)</td>
<td>5.11</td>
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<td>Belfort, 2013 (A)</td>
<td>0.80 (0.39, 1.21)</td>
<td>9.17</td>
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<tr>
<td>Smithler, 2012 (A)</td>
<td>0.97 (0.50, 1.44)</td>
<td>9.12</td>
</tr>
<tr>
<td>Overall (I-squared = 88.6%, p = 0.000)</td>
<td>2.86 (1.88, 3.84)</td>
<td>100.00</td>
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## Breastfeeding benefits women’s health

Each year a mother breastfeeds **decreases the risk of developing invasive breast cancer by 6%**

Breastfeeding also reduces the risk of ovarian cancer

<table>
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<th>New impact modelling:</th>
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<tr>
<td>– Current rates of breastfeeding prevent almost 20,000 deaths from breast cancer per year</td>
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<tr>
<td>– Another 20,000 deaths could be prevented by improving breastfeeding practices further</td>
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New review confirms role of breastfeeding in birth spacing
Are these effects biologically plausible?
Could an intervention as simple and so early, have such a profound impact on health throughout life?
Breastfeeding – exquisitely personalized medicine at a critical moment

Individualized components of breastmilk

- Bacteria from the mother’s gut microbiome
- Immune cells primed in the mother’s intestine
- Carbohydrates that shape the baby’s microbiome
- Small RNA’s that control genes in the baby
- Microvesicles (exosomes) that control genes in the baby
- Stem cells that survive in the baby
Breast milk protein could be used in fight against antibiotic resistance

National Physical Laboratory and UCL study reveals that lactoferrin kills bacteria, fungi and viruses

An antibiotic developed from human breast milk could combat certain drug-resistant bacteria, British scientists have found.

Tackling antibiotic-resistant bacteria, known as superbugs, is a priority for the government. A panel set up by David Cameron forecast that they would cost 10 million lives and £700bn a year worldwide by 2050 if the problem went unchecked.

The breakthrough, by the National Physical Laboratory (NPL) and University College London, found that the minuscule fragment, less than a nanometre in width, is responsible for giving the protein its anti-microbial properties.

This is what makes breast milk so important in protecting infants from disease in their first months of life. The protein, called lactoferrin, effectively kills bacteria, fungi and even viruses on contact.
Human milk oligosaccharides: Every baby needs a sugar mama

Lars Bode Glycobiology vol. 22 no. 9 pp. 1147–1162, 2012
Dynamics and Stabilization of the Human Gut Microbiome during the First Year of Life

Cell Host & Microbe 17, 690–703, May 13, 2015

Mother

Vaginally born/Breast feed  Vaginally born/Bottle feed  C-section

4 days

4 month

12 month
Formula-fed and breastfed rhesus macaques have different gut microbiota and immune systems.
Neuroscientists are probing the connections between intestinal microbes and brain development.
Breastmilk Is a Novel Source of Stem Cells with Multilineage Differentiation Potential

*Stem Cells* 2012;30:2164–2174

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**Diagram:** A flowchart illustrates the differentiation potential of breastmilk-derived stem cells. The pathway shows how stem cells can differentiate into various lineages, including myoepithelial, ductal, alveolar luminal, osteoblasts, chondrocytes, adipocytes, hepatocytes, pancreatic beta cells, neural, and neuronal lineages. The key markers and genes associated with each differentiated lineage are indicated.
Despite this growing body of evidence, women worldwide still do not have the support they need to breastfeed
Building an enabling environment for breastfeeding: A conceptual model
Interventions to improve breastfeeding practices
Systematic review examined the effect of interventions by setting: 20,000+ papers screened and 300 studies examined

Meta-analyses:

- Breastfeeding practices are highly responsive to interventions delivered in health systems, communities and home
- Health system and community interventions can increase exclusive breastfeeding by x2.5
- Maternity leave and work-place interventions also beneficial (studies are few and generally limited to HICs)
- Largest effects of interventions are achieved when interventions are delivered in combination
- Mix of interventions needed may vary by setting and breastfeeding trends
The breast milk substitute (BMS) industry is large and growing.

- In 2014, global sales of all baby milk formula were about US$ 44.8 billion.
- By 2019, the market value is projected to reach US$ 70.6 billion.
The economic case for investing in breastfeeding

Economic gains:
US$302 billion/year
(0.47% of global GNI)
Due to increased productivity associated with higher intelligence

Estimated health benefits:
reduced annual healthcare costs totaling nearly $400 million in the U.S., UK, Brazil and urban China

<table>
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<tr>
<th>Region</th>
<th>Estimated percentage loss in gross national income</th>
<th>Estimated loss in 2012 in US$</th>
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<tbody>
<tr>
<td>Eastern and southern Africa</td>
<td>0.04%</td>
<td>$0.1 billion</td>
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<tr>
<td>West and central Africa</td>
<td>0.06%</td>
<td>$0.3 billion</td>
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<tr>
<td>Middle East and north Africa</td>
<td>0.97%</td>
<td>$11.8 billion</td>
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<tr>
<td>South Asia</td>
<td>0.06%</td>
<td>$1.0 billion</td>
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<tr>
<td>East Asia and Pacific</td>
<td>0.31%</td>
<td>$28.1 billion</td>
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<tr>
<td>Latin America and the Caribbean</td>
<td>0.39%</td>
<td>$12.1 billion</td>
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<tr>
<td>Eastern Europe and central Asia</td>
<td>0.75%</td>
<td>$17.6 billion</td>
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<tr>
<td>Subtotal (low-income and middle-income countries)</td>
<td>0.39%</td>
<td>$70.9 billion</td>
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<tr>
<td>High-income countries</td>
<td>0.55%</td>
<td>$231.4 billion</td>
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<tr>
<td>World</td>
<td>0.49%*</td>
<td>$302.0 billion (total estimated loss)</td>
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*Global average, weighted by gross national income.

Table 2: Estimated economic losses from cognitive deficits associated with regional infant feeding practices compared with every infant breastfeeding until at least 6 months of age.
Building an enabling environment to support breastfeeding: key actions

A package of actions, policies, and programs to support mothers at health facilities, home and work has the greatest impact

• Disseminate accurate information on the value of breastfeeding
• Foster positive social attitudes toward breastfeeding
• Demonstrate political will to support breastfeeding
• Regulate the breastmilk substitute industry by implementing, monitoring and enforcing the Code
• Scale up and monitor breastfeeding interventions
• Enact policy interventions to ensure that maternity protection and workplace interventions are implemented
Viet Nam
Alive and Thrive 2015

Exclusive breastfeeding improved in all three countries. The rate **tripled in Viet Nam** and reached more than **80% in Bangladesh and Ethiopia**.
Case study: UK and US

UK
- Maternity protection (12m paid)
- Baby Friendly hospitals (40%)
- Legislation re. marketing of BMS and BF in public BUT poorly enforced and advertised

Yet
- Low rates of EBF and CBF
- Increasing sales of BMS across the age groups (11th in world)

USA
- Maternity protection (12wks unpaid)
- Legislation re. marketing of BMS
- Baby Friendly hospitals/Insurance coverage
- BF Reporting Card (CDC)

Yet
- Rates of BF generally increasing
- Sales of BMS are decreasing (+France)
Shared responsibility for creating a supportive environment for mothers to exercise their choice.
'Findings suggest that WHO Guidelines on preventing vertical transmission of HIV through exclusive breastfeeding in resource-limited settings are not being translated into action by governments and front-line workers because of a variety of structural and ideological barriers.'
Research priorities

We know what works!

- Policy interventions work
- Facility-based interventions work
- Home-based interventions work
- Community-based interventions work
Research priorities

We know what works!

• Policy interventions work
• Facility-based interventions work
• Home-based interventions work
• Community-based interventions work

But ...

• How to change social values on breastfeeding?
  – Individual mothers
  – Families
  – Communities
  – Health workers
• How to make the economic case for industry and the business sector?
• How to create and sustain momentum?
Every mother and child, no matter their location or circumstance, benefits from optimal breastfeeding.
“If breastfeeding did not already exist, someone who invented it today would deserve a dual Nobel Prize in medicine and economics.”

Keith Hanson, Vice President for Human Development, World Bank Group
# Acknowledgements

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