Global Perspectives in Early Childhood Development: Promoting Equity Begins at Home

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- Pediatrician
- Population Dynamics
- Bangladesh – family planning
- Visionary: child development and preventive health
- *Preventive Pediatrics, Child Health and Development*
- Maternal and Child Health
Advancing Early Childhood Development: from Science to Scale

History

The Lancet

Where and why are 10 million children dying every year?

2003

Child survival movement. Multiple interventions throughout the world.

The Lancet

2013

Decline from 10.8 million deaths in 2000 to 7.6 million in 2010
Millennium Development Goals (MDGs)

Successful global anti-poverty agenda. 1990-2015:

- Extreme poverty cut in half
- Primary education enrollment 90%
- 17,000 fewer children die/day
- Maternal mortality reduced 45%
- 9.7 million receive tx for HIV; 3.3 million malaria deaths prevented
- 2.3 billion gained clean water
- Debt service declines, trade increases

No mention of Early Child Development

What happens to children who survive?

Over 200 million children under 5 years of age in LMICs are not fulfilling their developmental potential based on proxy measures (stunting & poverty)
Momentum is growing

- Since *The Lancet* published the landmark series, *Child Development in Developing Countries* in 2007 and 2011

- Scientific publications increased up to 7-fold
- Funding increased
- Early Child Development actors increased, e.g. economists
- One-third of countries adopted policies
- Global support for Early Child Development
Early Childhood Development: From Science To Scale

3 papers, plus 8 commentaries & notes (2016)

Margaret Chan, WHO
Anthony Lake, UNICEF
Jim Yong Kim, The World Bank Group
Ban Ki-Moon, United Nations

www.thelancet.com/series/ECD2016
What’s new?
2016 Early Child Development Series

- Science
  - Focus on young children – conception to age 3y
  - Life-course approach
  - Nurturing care

- Policies
  - Updated estimates of the burden: 249 million children (43%)
  - Cost of inaction
  - Widespread endorsement as strategy to achieve Sustainable Development Goals (SDGs)
Brain Architecture

- Dynamic interaction: genetic influences & environmental conditions (plasticity)
- Experience Expectant
  - Environmental information that is species-specific and “expected” for brain development
    - Nutrition
    - Neural tube closure (22 days) Folic acid, B-12
- Experience Dependent
  - Environmental information that is unique to the individual
    - Specific language
### Brain Development and Timing

<table>
<thead>
<tr>
<th>Event</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuron Proliferation</td>
<td>Prenatal through 4-5 months post partum</td>
</tr>
<tr>
<td>Axon &amp; Dendrite growth</td>
<td>~15 weeks gestation – 24 months post partum</td>
</tr>
<tr>
<td>Synapse Formation, Pruning &amp; Function</td>
<td>~23 weeks gestation throughout lifespan</td>
</tr>
<tr>
<td>Myelination</td>
<td>~12-14 weeks gestation through adulthood</td>
</tr>
<tr>
<td>Apoptosis programmed cell death</td>
<td>Gestation through adolescence</td>
</tr>
</tbody>
</table>

Prado & Dewey, 2014
Developmental Perspective

Human Brain Development

1000 days

Fetus  Late Infancy/Toddler  Pubertal

Thompson & Nelson, 2000
Environments Across the Life-course

Parents’ Health/Wellbeing
Pre-pregnancy

Pregnancy Environment

Environment In infancy / childhood

Genetic Blueprint for Development

Quality of early environments shape a child’s future potential

Health

Learning

Behavior
Interactions Across The Life-course

Foundations for healthy & productive life set in early childhood
2014 Science: Effects of Early Child Development on Adult Health & Earnings

Building blocks of adult health, earnings, & well-being based in early child development

North Carolina
35 years
Beneficial effects on blood pressure, metabolic syndrome

Jamaica
25 years
Beneficial effects on wages

Campbell Science 2014
Gertler Science 2014
Gene environment interactions underlie developmental programming

Development
- Variations in Genetic Sequence
- Epigenetic Modification

Environment

Adult Health and Wellbeing
- Cardiovascular disease
- Obesity/diabetes
- Mental health
- Cognitive function
- Behaviour/social function
Life Course Perspective to Child Development

Healthy nutrition and learning opportunities throughout life

Conception
Birth
Early Childhood
Childhood
Adolescence
Adulthood

Black et al., Lancet, 2017
Life Course Perspective to Child Development

Conception

Birth

Early Childhood

Childhood

Adolescence

Adulthood

Healthy nutrition and learning opportunities throughout life

Chronic health problems
Limited economic potential
Figure 1. Life-span development of equity/inequality may be modified by early intervention. Modified from Ref. 26.
Nurturing Care Promotes Equity

- Nurturing care promotes early child development
  - Nutrition
  - Health care
  - Responsive caregiving
  - Protection from danger
  - Opportunities to explore, learn and discover
Nurturing care is fostered by a supportive environment

Nurturing care: parents & caregivers
Nurturing care is fostered by a supportive environment – the ecological model

Capacity for nurturing care

Nurturing care: parents & caregivers
Nurturing care is fostered by a supportive environment – the ecological model

- Early Child Development Programs
- Capacity for nurturing care
- Nurturing care: parents & caregivers
Nurturing care is fostered by a supportive environment – the ecological model

- National Policies
- Early Child Development Programs
- Capacity for nurturing care
- Nurturing care: parents & caregivers
The personal cost of inaction in grades and earnings lost

<table>
<thead>
<tr>
<th></th>
<th>Grade Deficit</th>
<th>Income Loss</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunted only</td>
<td>4.67</td>
<td>42.3%</td>
<td>106.5m (18.5%)</td>
</tr>
<tr>
<td>Poor only</td>
<td>0.71</td>
<td>5.8%</td>
<td>75.6m (13.1%)</td>
</tr>
<tr>
<td>Stunted and poor</td>
<td>6.56</td>
<td>32.4%</td>
<td>67.2m (11.7%)</td>
</tr>
</tbody>
</table>

249.3m (43.3%)
Cost of inaction in grades and earnings lost

43% of children in LMICs (249 million) lose 26.6% of average adult income
Improving Early Child Development: Key to achieving Equity and the SDGs

All girls and boys have access to quality *early childhood development education*

Target 4.2
Preparation for Sustainable Development Goals

1. Direct Measurement of Early Child Development
   • Caregiver Report
   • Direct observation/testing

   On and off track

2. Scaling Up
Early Childhood Development Standards for 0-3 years

• WHO growth standards (height & weight) adopted by > 140 countries
• Global standards for early child development (age 0-3)
• Partnership:
  • 0-3 WHO Developmental Indicators group
  • Harvard CREDI group
  • Global Child Development Group
Early Child Development Standards

Healthy children from 8 low-, middle-, & high-income countries, representing multiple regions

1. Two psychometrically-strong instruments:
   - Brief instrument to monitor child development at population level
   - Longer instrument to monitor program effectiveness
   - Standard Operating Procedures (SOP)
   - Quality Assurance Procedures
Early Child Development Standards

Healthy children from 8 low-, middle-, & high-income countries, representing multiple regions

2. Global population-level standards:
   • On track/off-track

3. Implementation, Dissemination & Capacity Building
   • Public access to the instruments and standards
   • Global Monitoring Report on Early Child Development
   • Training courses (SOPs, quality assurance, data processing, interpretation, and application)
Scaling Up Effective Interventions to Support Nurturing Care

• Policies to support families
• Integrate with existing services (e.g., health care)
  • Expand from medical model to include:
    • breast and complementary feeding
    • responsive caregiving
    • child protection
    • opportunities to explore and learn
Authors

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Disciplines: Biology, Epidemiology, Economics, Education, Developmental Psychology, Genetics, Pediatrics, Psychiatry, Public Health, Political Science, Nursing, Neuroscience, Statistics, Sociology, Nutrition, Global Health

Donors: Bill & Melinda Gates Foundation, Hilton Foundation
Children’s HealthWatch

• Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (welfare reform). What happens to young kids??
• How policies and economic conditions relate to health of low-income children and families (Medicaid).
• Ongoing cross-sectional survey administered to caregivers of children < age 4 in emergency departments and primary care clinics at 5 urban medical centers (Baltimore, Boston, Little Rock, Minneapolis, Philadelphia).
• All centers have Grow Clinics to care for underweight children

www.childrenshealthwatch.org
Material Hardships & Child Health
> 60,000 children (age 0-3)

- Food insecurity (USDA 18-item Household Food Security Scale)
  - Increased risk of poor/fair health, developmental risk, prior hospitalization
  - No relation to underweight or overweight
  - Increased risk of maternal depressive symptoms, poor/fair health
- Housing insecurity
  - Increased risk of poor/fair health, developmental risk, low weight-for-age

**Food & housing insecurity are health risks**

**Food insecurity is invisible!**

**Hidden Hunger**

Must ask to identify

www.childrenshealthwatch.org
Food Insecurity Mechanisms

- Episodic - anxiety
- Cut quality
- Cut quantity

Stress

Nutrition
Children’s HealthWatch (2009-2015)

23,820 children; 6601 (28%) from Food Insecure households.

Rates of obesity and underweight by age

- Obesity
- Underweight

<13 mo  13-24 mo  25-36 mo  37-48 mo
0      10      20      30

Percent
Children’s HealthWatch (2009-2015)

23,820 children; 6601 (28%) from Food Insecure households.

Adjusted odds of obesity by age
Children’s HealthWatch – Baltimore, Maryland
Prevalence of food insecurity among households with children under age 4

Food Insecurity Prevalence 2006-2015
Food Insecurity in Baltimore

Food Insecurity in Baltimore Policy Brief

Develop Food Insecurity Screen
2-item Screening Questions (Hunger Vital Sign)

1. We worried whether our food would run out before we got money to buy more

2. The food we bought just didn’t last and we didn’t have money to get more

   _____Often True
   _____Sometimes True
   _____Never True

Families “at risk for food insecurity” if they answer “sometimes true” or “often true” to either or both statements

Children age 0-3: sensitivity 97% and specificity 83%

## Convergent Validity of Screen

<table>
<thead>
<tr>
<th></th>
<th>Screen</th>
<th>HFSS</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Child health (fair/poor)</td>
<td>1.56</td>
<td>1.73</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Child hospitalizations</td>
<td>1.17</td>
<td>1.19</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Developmental risk</td>
<td>1.60</td>
<td>1.72</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Caregiver health (fair/poor)</td>
<td>1.99</td>
<td>2.29</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Caregiver depressive symptoms</td>
<td>2.76</td>
<td>3.13</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Adjusted for site, race/ethnicity, US born mother vs. immigrant, marital status, education, child gender, caregiver employment, breastfeeding, LBW
POLICY STATEMENT  Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN

Promoting Food Security for All Children
COUNCIL ON COMMUNITY PEDIATRICS, COMMITTEE ON NUTRITION

Sixteen million US children (21%) live in households without consistent access to adequate food. After multiple risk factors are considered, children who live in households that are food insecure, even at the lowest levels, are likely to be sick more often, recover from illness more slowly, and be hospitalized more frequently. Lack of adequate healthy food can impair a child’s ability to concentrate and perform well in school and is linked to higher levels of behavioral and emotional problems from preschool through adolescence. Food insecurity can affect children in any community, not only traditionally underserved ones. Pediatricians can play a central role in screening and identifying children at risk for food insecurity and in connecting families with needed community resources. Pediatricians should also advocate for federal and local policies that support access to adequate healthy food for an active and healthy life for all children and their families.

Gitterman, Pediatrics, 2015
Additional validations of 2-item Screen for Food Insecurity

- **Adolescents** (sensitivity 88% and specificity 84%).

- **Adults** (sensitivity 97% and specificity 74%).
2015 Civil Unrest in Baltimore

- April 12: Freddie Gray was arrested by Baltimore police officers
  - While in a police vehicle, he sustained neck and spinal injuries
- April 19: Freddie Gray died
  - Protests citing racism and social injustice
  - Violence erupted: fires and property destruction
Proximal and Distal Neighborhoods

- Univ of MD Medical System
- Civil Unrest Site
- Proximal Neighborhoods

Map from the Maryland Department of Planning
Jan 2014-Dec 2015
N=1,095

Civil unrest

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prior (Jan 2014-Mar 2015)

Acute (Apr-Aug)

Following (Sep-Dec)

Add survey (Jun-Oct)
N=137
Data Analysis

- Cochran-Armitage trend analysis
  - Compare monthly prevalence of maternal-child health problems by residential proximity over 24 months

- Piecewise logistic regression
  - Investigate changes in maternal-child health problems prior, during, and following the unrest

- Sobel test
  - To examine whether maternal concerns mediated the relation between proximity and maternal-child health problems

- SAS and Mplus
Sample Characteristics by Residential Proximity (N=1,095)

<table>
<thead>
<tr>
<th>Category</th>
<th>Distal</th>
<th>Proximal</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12 months</td>
<td>49</td>
<td>44</td>
</tr>
<tr>
<td>Fair/poor health</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Child</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Mean age</td>
<td>91</td>
<td>94</td>
</tr>
<tr>
<td>Black/AA*</td>
<td>83</td>
<td>76</td>
</tr>
<tr>
<td>HS graduates**</td>
<td>44</td>
<td>41</td>
</tr>
<tr>
<td>Employed</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Depressed</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Fair/poor health</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<0.05, **p<0.01
Monthly Prevalence of Maternal Depressive Symptoms by Residential Proximity

![Graph showing monthly prevalence of maternal depressive symptoms by residential proximity. The x-axis represents months from January 2014 to December 2015, divided into Prior, Acute Period, and Following periods. The y-axis represents prevalence. The graph includes two lines: one for Distal and one for Proximal.](image)
Path Model of Residential Proximity on Maternal Depressive Symptoms via Maternal Concerns

Note. Indirect effect via maternal concerns is $a \times b = 0.18$, SE=0.11, $p<0.10$; based on Sobel test and adjusted for child sex. *$p<0.05$, **$p<0.01$
Summary

• Prior to civil unrest, rates of depressive symptoms ~ 20%.
• Residential proximity to civil unrest: increased likelihood of depressive symptoms during acute period, reaching up to 50%.
• 5 months after civil unrest, maternal depressive symptoms returned to prior rates.
• Maternal concerns regarding daily/community routines partial (not full) explanation for relation between residential proximity and maternal depressive symptoms.
Implications

• Civil unrest often reflects social injustice/lack of equity.
  • Reduce social injustice by providing basic resources for low-income communities and families (housing, food, etc.)

• Maternal depressive symptoms can undermine maternal well-being and negatively impact parenting among young children.
  • Policies and programs to protect mothers and children from community violence.
  • Surveillance of maternal mental health, services as needed.

In press *American Journal of Public Health*
Ecological Perspective to Equity

Bronfenbrenner, 1979
Ecological Perspective to Equity

Bronfenbrenner, 1979
Ecological Perspective to Equity

REACH

SUSTAINABILITY

Policy

Community

Family

Child

Bronfenbrenner, 1979

Domains of nurturing care

Health

Nutrition

Early learning

Responsive caregiving

Security and safety

Bronfenbrenner, 1979
Thank You!