Health Disparities in Children – Prematurity and Cerebral Palsy

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Cerebral Palsy Clinic

• The Inner City Population of Atlanta in the 1990’s was low income, predominantly minority and decidedly underserved

• In 1998 we started an interdisciplinary clinic for children with Cerebral Palsy
In 2002 we surveyed the records of 260 children who had attended the clinic since its inception.

We found a complex set of medical, developmental and social complications.
TB – Birth History

• Born at EGA 28 weeks to a 39 y.o. G5P4 GBS (+) with a history of polysubstance abuse and limited prenatal care
• precipitous delivery by EMS en route to hospital
TB – at 30 months

• Motor – CP
  • Spastic Diplegia

• Cognitive – ID
  • 5 words

• Behavior/Social – Autism
  • Self Injurious Behavior
  • intermittent episodes of squealing
  • stereotyped behaviors
Sickle Cell Disease

• Stokes were common complications of Sickle Cell Disease occurring in as many as 3% children

• This is now largely rare because of early identification and preventive intervention
AG – age: 8 years

• Congenital HIV/AIDS
• CMV retinitis
• PCP pneumonia x3
• G-tube from age 3 yrs to 6 yrs
Percentage of Patients Whose Mothers Used Substances during Pregnancy, per Gestational Age Group

- <28 weeks: 25.58%
- 28-32 weeks: 19.64%
- 33-35 weeks: 18.18%
- 36-40 weeks: 14.29%
- 41+ weeks: 8.89%
The Child lives with...

Lives with...

- <28-35 Weeks
- 36-41+ Weeks

Bar chart showing the distribution of children living with different caregivers.
Demographic and Etiological Findings

- A high rate of mothers using substances during pregnancy particularly in the lower birth weights and gestational age

- More than 50% children live in single parent families with mother but and about 20% live with their grandparents
### TABLE 10-1 Risk of Adverse Child Outcomes and Environmental Conditions Associated with Poverty Status

<table>
<thead>
<tr>
<th>Child Outcomes</th>
<th>Risk for Poor Relative to Nonpoor Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead poisoning</td>
<td>3.5&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Birth to unmarried teenager</td>
<td>3.1&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Short-stay hospital episode</td>
<td>2.0&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Grade repetition and high school dropout</td>
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</tr>
<tr>
<td>Low birthweight</td>
<td>1.7&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mortality</td>
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</tr>
<tr>
<td>Learning disability</td>
<td>1.4&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Parent report of emotional or behavior problem that lasted 3 months or more</td>
<td>1.3&lt;sup&gt;e&lt;/sup&gt;</td>
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**SES Mediators**

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<tr>
<td>Child abuse and neglect</td>
<td>6.8&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>Depression</td>
<td>2.3&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>Experiencing violent crimes</td>
<td>2.2&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>1.9&lt;sup&gt;i&lt;/sup&gt;</td>
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Racial, Ethnic, and Socioeconomic Disparities in the Prevalence of Cerebral Palsy

• METHODS: In a retrospective cohort of 6.2 million births in California between 1991 and 2001, we compared maternal and infant characteristics among 8397 infants with cerebral palsy.

• RESULTS: Overall, black infants were 29% more likely to have cerebral palsy than white infants.

• CONCLUSIONS: The increased risk of cerebral palsy among black infants is primarily related to their higher risk of low birth weight.

• Understanding how educational attainment and use of prenatal care impact the risk of cerebral palsy may inform new prevention strategies.

Yvonne W. Wu, et al Pediatrics 2011;127;e674
## Children: Poverty & Vulnerability

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From Neurons to Neighborhoods: The Science of Early Childhood Development NIM 2000
# Poverty Effects on Cognitive and Educational Function

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Children Who Are Poor</th>
<th>Children Who Are Not Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental delay</td>
<td>5.00%</td>
<td>3.80%</td>
</tr>
<tr>
<td>Learning disability</td>
<td>8.30%</td>
<td>6.10%</td>
</tr>
<tr>
<td>Grade retention</td>
<td>28.80%</td>
<td>14.10%</td>
</tr>
<tr>
<td>Ever expelled or suspended</td>
<td>12.10%</td>
<td>6.10%</td>
</tr>
<tr>
<td>High school dropout rate in 1994</td>
<td>21.00%</td>
<td>9.60%</td>
</tr>
<tr>
<td>Not employed or in school at age 24</td>
<td>15.90%</td>
<td>8.30%</td>
</tr>
</tbody>
</table>
Emotional and Behavioral Problems by Family Income

- <£6500
- Less poor
- Average
- Richer
- >£24,380

Male
Female
Cycle of Disadvantage and Disability

**Potential Outcomes**
- developmental disabilities
- child abuse
- foster care placement

**Risk Factors**
- infant increased needs
  - medical needs
  - developmental needs
  - increased irritability
- mother under stress
  - increased demands
  - lack of supports
  - substance abuse

**Background**
- poverty
- poor community supports
- poor health services
- poor education

**Self Worth**
- despair
- substance abuse
- promiscuity

**Pregnancy**
- poor prenatal care
- tobacco, alcohol, and drugs
- risk of STDs/HIV

**Newborn Infant**
- prematurity/LBW
- FAS
Social Determinants of Health

• The social determinants of health are the circumstances in which people
  • are born, grow up, live, work, and age, &
  • the systems in place to deal with illness.

• These circumstances are, in turn, shaped by a wider set of forces:
  • economics, social policies, and politics
Home Living Conditions of Children who are Poor

- Financial insecurity
- Food insecurity
- Unstable home life
- Fear of bullying
- Fear of abuse
- Exposure to drugs and violence
- Too much watching TV
- Limited role models
- Limited encouragement
Asthma and Equity

- CDC Morbidity and Mortality report:
  - Smoking in the home is highest among black people & persons with low incomes
  - Asthma prevalence 2x as high, and mortality 3x as high, in blacks as in whites
  - Asthma hospitalization among Medicaid children: 93% in blacks, 34% in Hispanics, higher compared to whites
The Built Environment

• The term built environment refers to the human-made surroundings that provide the setting for human activity, e.g. buildings, neighborhoods and cities

• In recent years, public health research has included healthy food access, green spaces, community gardens, “walkability”, and “bikability”
Built Environment Factors in Poor Communities

• Unsafe Neighborhoods
  • Due to: Crime, Traffic Density, Litter & Trash, Poor Lighting
  • 61% more likely to be Obese; 43% more likely to be overweight
  • 26% of black children and 23% of Hispanic children are reported to live in unsafe neighborhoods, compared with 8% of white children.

• No Access to Sidewalks or Walking Paths
  • 32% higher adjusted odds of obesity

• No Access to Parks or Playgrounds
  • 26% higher adjusted odds of obesity

• No Access to Recreation or Community Centers
  • 20% higher adjusted odds of obesity
Physical Conditions of U.S. Schools

the condition of building features in schools with the highest concentration of poverty are less than adequate compared to schools with the lowest concentration of poverty.
Cumulative risk

Poverty

Lead & other toxins

Noise

Poor nutrition

Stressed mother

Anxiety

Unsafe neighborhood

Poor Education

From Lecture by Dr. Howard Frumkin
Can we make a Difference?

• Absolutely!!!!!!
• Positively!!!!!!
Children in Romania

- All families were ordered to have 5 children
- Poor people could not take care of their children so they were sent to orphanages
- Some were adopted and some remained
- A team of researchers from Tulane University in New Orleans evaluated the children and found...

Zenah et al Scientific American May 2013
Rat Mothers at Work

• When rat mothers give birth to their pups they will lick and groom them (LG)

• Not all mothers groom their young the same way, *high LG mothers* groom and lick their young at a much greater rate than the *low LG mothers*.

• As a result the pups of *high LG mothers* were healthier, grew at a good rate, and were all around much better off than the pups raised by *low LG mothers*. 

Next Generation

• The high LG mother rats had daughters that went on to lick and groom their own litters more frequently than the daughters of low LG mothers.

• But interestingly, when the offspring of a low LG mother is raised by the high LG mother, the rat adopts the high-licking behavior when it has babies of its own!
Value-Added Teachers and Student Outcomes

• Tracked one million children from a large urban school district from 4th grade to adulthood.

• Found that when a high VA teacher joins a school, test scores rise immediately in the grade taught by that teacher

• Found that students assigned to higher VA teachers are more likely to attend college, earn higher salaries, live in better neighborhoods, and save more for retirement.

The graph illustrates the average test scores by school year, relative to the entry of a high-value-added teacher. The x-axis represents the school year relative to the entry of the high-value-added teacher, with years -3 to 2 displayed. The y-axis shows the average test scores.

Key observations:
- The solid blue line represents the average score in the grade the teacher enters.
- The dashed black line represents the average score in the previous grade.

A notable increase in scores is observed at year 0, indicating the teacher's impact. The vertical red line at year 0 marks the entry of the high-value-added teacher.
• Economists argue for early and sustained investments in early care and education programs, particularly for children whose parents have limited education and low income, on the basis of persuasive evidence from cost-benefit analyses that reveal the costs of incarceration and diminished economic productivity associated with educational failure.
Cycle of Environmental Health Disparities

**Health Risk Factors**
- Physical
  - Asthma & Allergies
  - Neurotoxicity
  - Obesity & Hypertension
- Emotional & Social
  - Depression
  - Substance Abuse
  - Violence

**Compounding Factors**
- Limited Educational Services
- Limited Health Care Services
- Limited Social Capital

**Personal Characteristics**
- Limited Education
- Limited Employment Options
- Limited Empowerment
- Limited Income

**Residential Options**
- Limited Choice
- Limited Infrastructure
- Limited Services

**Residential Characteristics**
- Older Houses
- Adverse Environmental Factors
- Increase Social Factors

**Impact**
- Increase Toxins
- Increase Stress
Break the Cycle

• Raise Awareness of Children's Environmental Health
• Raise Awareness of Environmental Health Disparities
• Promote introduction of these topics into curricula of diverse University Departments
• Cultivate Future Leaders
• Influence Public Policy
Cycle of Environmental Health Disparities

Social and Economic Disadvantage and Health
- Limited Education
  - Limited Employment Options

Improving Education Through KIPP Schools
- Limited Educational Services
- Limited Health Care Services
- Limited Social Capital

Health Risk Factors
- Reducing Second Hand Smoke
  - Neurotoxicity
  - Obesity & Hypertension
  - Emotional & Social
- Environmental Factors and Obesity
  - Violence

Impact of the Built Environment on Birth Weight

Toxic Waste Sites and Mercury Exposure
- Limited Choice
  - Limited Infrastructure

Laws and the Built Environment
- Older Houses
- Adverse Environmental Factors
- Increase Social Factors

Healthy Homes: Reducing Lead Exposure

Impact
- Increase Quality
• We may not be required to complete a task but we are not allowed to desist from undertaking the challenge
Thank You.....

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