Prenatal and Early Life Risk Factors
For Chronic Disease

A Web-based Training

Presented by IHS Division of Diabetes
Treatment and Prevention
Indian Health Service
When Does Diabetes Start?
-or-
“How Adversity Gets Under the Skin”

Ann Bullock, MD
Division of Diabetes Treatment and Prevention
Indian Health Service
Our model of Diabetes has been too small…

• We’ve thought it was only about:
  – Genes we inherit
  – Our lifestyle choices (diet & exercise)

• But it’s now clear that these alone do not explain all of diabetes risk

• It’s also becoming clear that the roots of diabetes overlap with the roots of other chronic problems: heart disease, depression, substance abuse, domestic violence, learning problems, etc.
Childhood Trauma Predicts Adult Health

- Children born in Helsinki, Finland between 1934-44
- 320 were evacuated abroad during WW II—separated from their parents
  - Average age at evacuation: 4.8 years old
  - Average duration of evacuation: 1.7 years
- 60 years later, compared with children not evacuated, evacuees were much more likely to have:
  - Heart disease (OR 2.0) and hypertension
  - Type 2 Diabetes (OR 1.4)
  - Depressive symptoms (OR 1.7)
- “This study is among the first to show that early life trauma predicts higher prevalence of cardiovascular disease and type 2 diabetes in late adulthood...”

For diabetes risk, it matters what happened…

• To us as adults
  – Diet and exercise choices
    • But many people have access only to food of poor nutritional quality, even if plenty of calories—another stimulus to overeat
  – Stress and trauma

• To us as children
  – Stress and trauma
  – Nutrition

• To us in the womb
  – Nutrition and stress

• To our parents
  – Nutrition and stress

• To our grandparents
  – Nutrition and stress at time eggs and sperm are forming
“Adverse pre- and postnatal experiences can have a profound effect on the course of health and development over a lifetime. … biological events that occur during fetal and postnatal life predispose the child to an elevated risk of subsequent problems in physical and mental health.”

“A Science-Based Framework for Early Childhood Policy: Using Evidence to Improve Outcomes in Learning, Behavior, and Health for Vulnerable Children”, Center on the Developing Child at Harvard University, August 2007, p.6
http://www.developingchild.harvard.edu
“...confronting the origins of disparities in physical and mental health early in life may produce greater effects than attempting to modify health-related behaviors or improve access to health care in adulthood.”
Framework for Chronic Disease

• CD is the product of multiple stressors which accumulate over lifetime
  – genetic, biological, behavioral, social/experiential, economic

• Stressors affect both the body’s physiologic systems as well as our health behaviors

• Different health “trajectories” are the product of risk and protective factors

• While stressors have effects throughout life, the body is especially vulnerable to them during critical developmental periods

“What you walk around with are the first two to five years of your life.”

Frank Langella, actor
USA Today, p 2D
12/3/08
Early Life Experience and the Brain

• Developing brain is remarkably shapeable and adaptable

• “The brain’s exquisite sensitivity to experience in early childhood allows traumatic experiences during infancy and childhood to impact all future emotional, behavioral, cognitive, social, and physiologic functioning.”

Early life risk factors combine and take their toll on the brain

- Family Structure
  - Parental employment
  - Father’s absence
  - Teen parenthood
- Human Capital
  - Maternal education
  - Maternal verbal ability
- Mental Health
  - Maternal depression
  - Stressful life events
- “…associated with lower IQ scores as early as age 2-4 years and more behavior problems by age 3.”

Fuligni and Brooks-Gunn from Promoting Health: Intervention Strategies from Social and Behavioral Research, 2000
Brain Development

FIGURE 8-1 Human brain development. SOURCE: Charles A. Nelson, University of Minnesota. Reprinted with permission.

## TABLE 8-1 Conditions and Substances that Affect the Developing Brain

<table>
<thead>
<tr>
<th>Needed for Normal Brain Development</th>
<th>Detrimental or Toxic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Adequate protein and energy</td>
<td>Lead</td>
</tr>
<tr>
<td>Micronutrients, such as iron and zinc</td>
<td>Tobacco</td>
</tr>
<tr>
<td>Adequate gestation</td>
<td>Prenatal infections</td>
</tr>
<tr>
<td>Iodine</td>
<td>Polychlorinated biphenyls (PCBs)</td>
</tr>
<tr>
<td>Thyroid hormone</td>
<td>Ionizing radiation</td>
</tr>
<tr>
<td>Folic acid</td>
<td>Cocaine</td>
</tr>
<tr>
<td>Essential fatty acids</td>
<td>Metabolic abnormalities (excess</td>
</tr>
<tr>
<td></td>
<td>phenylalanine, ammonia)</td>
</tr>
<tr>
<td>Sensory stimulation</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Activity</td>
<td>Methylmercury</td>
</tr>
<tr>
<td>Social interaction</td>
<td>Chronic stress</td>
</tr>
</tbody>
</table>

Note: The listed factors are not intended to be exhaustive.
Early Life Risk Factors for Obesity at Age 7 years

1. Parental obesity
2. Birth weight
3. Weight gain in 1st year of life ("catch-up growth", "adiposity rebound")
4. >8 hrs/week TV watching at age 3 yrs
5. Short sleep duration at age 3 yrs
6. Not: calories eaten, junk food, breastfeeding


Other studies: youth obesity predicted by depression, behavior problems, low cognitive stimulation
International Diabetes Federation
Conference on Type 2 Diabetes Etiologies
2002

1. Genetics
2. Fetal Origins
3. Lifestyle
4. Stress
1. Genetics

- **Genes Inherited**
  - It does matter what genes we inherit
  - *But* only 15% of genes in cells “turned on” at any given time

- **Genes Expressed**
  - “Epigenetics”: the “on/off switches” for genes
    - reaction to the environment
    - not always reversible if at key developmental stage of life
    - we know the body’s “on/off switches”: DNA methylation, histone acetylation, microRNA

Epigenetics

- No longer “nature vs. nurture”—nurture affects nature
- Rat pups raised by nurturing mothers
  - Gene which affects stress hormone receptors “turned on”
  - Grow up to be stress resilient
- Rat pups raised by neglectful mothers
  - Gene which affects stress hormone receptors “turned off”
  - Grow up to be very stress reactive
- “…there is no change in gene sequence; the changes are only in...gene expression. Hence, these kinds of effects are called epigenetic. Epigenetic mechanisms can provide a potential pathway by which early experience can have lasting effects on behavior.”  
  
  *JAMA 294(17):2221-4, 2005, p. 2222*
“It is biologically impossible for a gene to operate independently of its environment: genes are designed to be regulated by signals from their immediate surround... Just as our diet regulates certain genes, our social experiences also determine a distinct batch of such genomic on-off switches.”

Goleman D. 2006. Social Intelligence, p. 151
2. Fetal Origins

- Alcohol/Drugs
- Nutrition
- Smoking
- Maternal Diabetes
- Toxic/Infectious Exposures
- Maternal Low Birth Weight
- Maternal Stress/Mental Health
  - Mother’s own Childhood
  - Current/Prenatal
Definitions

• “Preterm” baby
  – Baby born before 37 weeks of pregnancy (“gestation”)

• Low Birth Weight (“SGA”) baby
  – “Small for Gestational Age”
  – Baby born small for whatever gestational age baby born at

• Babies can be either/both “SGA” and “Preterm”—they both increase that baby’s later risk for chronic disease
Prenatal Depression Effects on the Fetus and Newborn

• Mothers with depressive symptoms
  – ↑stress hormone (cortisol), ↓serotonin/dopamine levels
  – More likely to deliver prematurely and have low birth weight babies

• Newborns of mothers with depressive symptoms:
  – ↑cortisol and ↓serotonin/dopamine levels (like mom)
  – ↓“neurobehavioral profiles”

  *Infant Behavior & Development 27:216-229, 2004*

• Preterm delivery risk increases with depression severity
  – 44% of 791 pregnant patients had depressive symptoms, half of them severe

  *Human Reproduction 2009 24(1):146-153*
Prenatal Effects on Stress Hormones Persist

• Girls born to mothers who had significant anxiety during pregnancy had increased stress hormones—as adolescents
• And this was associated with depressive symptoms in these adolescents

*Neuropsychopharmacology* 33:536-545, 2008
Risk of Type 2 Diabetes

• Review of 30 studies worldwide: Inverse relationship between birth weight and risk of diabetes
  – “U-shaped” association in Native American groups

  *JAMA* 300:2886-2897, 2008

• Study of 6,425 people born in Sweden between 1925-1949
  – Both fetal growth (SGA) and preterm birth strongly associated with diabetes risk

  *Diabetes* 58:523-526, 2009
Risk of Type 2 Diabetes

• Babies of obese mothers develop insulin resistance *in the womb*
  
  “…maternal obesity creates a significant risk for the next generations with metabolic compromise already apparent at birth.”  
  *Diabetes Care* 2009;32:1076-1080

• Rapid weight gain in the first 3 months of life is associated with risk factors for heart disease and type 2 diabetes by early adulthood

  *JAMA* 2009;301(21)2234-2242
“Fetal Programming of Type 2 Diabetes”

“...intrauterine environment may modify gene expression permanently. ...They might also be inherited transgenerationally, affecting the health of future generations. ...During intrauterine life, there are waves of epigenomic modification, intimately associated with growth and development, and opportunities galore for environmental factors to influence these processes. A fetus thus programmed travels a path of limited options.”

*Diabetes Care* 30(10): 2754-5, 2007
FIG. 7. The physiological mechanisms underlying the programming of the separate and combined elements of the metabolic syndrome

- **Substrate Restriction**
  - Decreased $O_2$, glucose, amino acids etc
  - Amino acid balance: homocysteine/glycine

- **Changes in Organ Development and Growth**
  - Decreases in cell number, organ growth, fetal growth
  - Decreased vasculogenesis, angiogenesis
  - Premature differentiation of functional capacity

- **Maternal and/or fetal neuroendocrine adaptations**
  - Decreased anabolic hormones (Insulin, IGFs, thyroid hormones, GH/PRL)
  - Increased stress hormones (Glucocorticoids, catecholamines)

- **Programmed Set points in Physiological Systems**
  - Cardiovascular, renal, metabolic, HPA, etc
  - Altered neuroendocrine regulation of energy balance
  - Homeostasis, growth etc

- **Increased nutrient supply in neonatal, postnatal or adult life**

- **Insulin synthetic/secretory capacity**

- **Hepatic glucose production**

- **Skeletal muscle mass**

- **Cardiac and renal functional capacity**
  - Altered vascular reactivity

- **HPA activity**
  - Altered set points for GH / IGF, appetite regulatory axes

- **Increased insulin sensitivity – muscle, adipocyte**
  - Increased appetite
  - Catch up growth

- **Visceral obesity, increased circulating FFAs**
  - Hepatic glucose intolerance

- **Obesity**
  - Insulin resistance – hepatocyte, muscle
  - Decreased insulin synthetic/secretory capacity

- **Increased GFR**
  - Increased intravascular volume
  - Increased vascular reactivity
  - Hypertension
  - Cardiac Hypertrophy

- **Type 2 Diabetes**

- **Obesity**

- **CVS Disease**

doi:10.1152/physrev.00053.2003
How mother’s undernutrition and/or stress before/during pregnancy increase baby’s future risk of diabetes

• Under-nutrition
  – ↓ cell number
  – ↓ organ growth
  – ↓ overall fetal growth

  ↓ Insulin    ↑ sugar from liver

Birth---------------------------------

• High calorie foods (quality?)
  ↑ Appetite, catch-up growth
  Abdominal fat, insulin resistance
  Obesity

  ---Type 2 Diabetes----

• ↑ Stress hormones (cortisol, adrenaline)
  – ↓ insulin, growth hormones
  – set points for heart, kidneys
  – changes programmed for life

  ↓ heart, kidney  ↑ stress hormones function

------------------------------------------

Hypertension, ↑ fluid
Further ↓ in heart, kidney function

---Heart Disease---
How Parental Adversity Gets Transmitted to the Next Generation


• Epigenetic changes in egg, sperm passed on

• Prenatal undernutrition and/or psychosocial stress:
  – Maternal cortisol reduced by placenta, but can be overwhelmed
  – Reduce cell development, even including overall fetal growth
  – Stress hormones can lead to preterm birth
  – Change stress hormone “set points” in baby
    • adaptive prediction?

• Early life exposure to parental behaviors (e.g. nurturing vs abuse) creates epigenetic changes in stress reactivity. *Nature Neuroscience* 12:342-348, 2009
Stress of Racism

• “The lifelong accumulated experiences of racial discrimination by African American women constitute an independent risk factor for preterm delivery.”
  – Odds ratio of 2.6
  – Independent of maternal sociodemographic, biomedical, and behavioral characteristics.

Prenatal Stress

• “Thus, prenatal stress—whether nutritional or psychosocial in origin—shapes a wide range of traits that influence future risk of developing CVD, including how the body manages and distributes glucose and lipids, regulates blood pressure, and responds physiologically to stress.”

• “…stressors experienced by one generation, such as imbalanced nutrition or psychosocial stress, can perpetuate changed biological settings to offspring…”
3. Lifestyle

Overeating as an *Adaptive* Response

- Prevalence of overweight in women increases as food insecurity increases
  
  
  – Food Insecurity associated with depression and anxiety in mothers and behavior problems in children
  
  *Pediatrics* 118(3):e859-e868, 2006

- Carbohydrates affect brain serotonin levels
  
  *Obes Res* 1995 Suppl 4:477S-480S

- “Comfort Foods” reduce stress hormone response and anxiety
  
  *Proc Natl Acad Sci* 100(20):11696-11701, 2003
  
  *Endocrinology* 145:3754-3762, 2004
Overeating and Psychological Distress

“Youths who overeat may have or be at risk for serious psychological distress, including deficits to self-esteem, compromised mood, and suicide risk. Overeating may be a tangible behavior that signals the need for intervention.”

Ackard et al, Pediatrics 2003;111:67-74
4. Stress

“Toxic stress in early childhood is associated with disruptive effects on the nervous system and stress hormone regulatory systems that can damage developing brain architecture and chemistry and lead to lifelong problems in learning, behavior, and both physical and mental health.”

Adverse Childhood Experiences and Adult Risk Factors for Age-Related Disease

- Dunedin Study: 32 year longitudinal study of a representative birth cohort—New Zealand

- Adverse childhood experiences in first decade of life:
  - Low SES
  - Maltreatment
  - Social Isolation

- Controlled for established risk factors including birth weight, family history, childhood BMI, adult health behaviors

- Attributable to adverse childhood experiences:
  - 31.6% of depression
  - 13% of elevated inflammation
  - 32.2% of cases with clustering of metabolic risk markers

- As severity of each ACE worsened, greater number of age-related health risks in a dose-response fashion

*Arch Pediatr Adolesc Med* 2009;163(12):1135-1143
“Childhood Trauma…"

• “…is probably our nation’s single most important public health challenge… …chronic maltreatment has pervasive effects on the development of mind and brain. Developmental trauma sets the stage for unfocused responses to subsequent stress, leading to dramatic increases in the use of medical, correctional, social, and mental health services.”

• “Complex trauma”: e.g. abuse; neglect; exposure to DV, community violence; poverty; caregiver psychopathology—compounded when caregiver the source of trauma or even if they are unable to support and help child process trauma experiences

### SIDEBAR 1.
### Domains of Impairment in Children Exposed to Complex Trauma

<table>
<thead>
<tr>
<th>I. Attachment</th>
<th>IV. Dissociation</th>
<th>VI. Cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems with boundaries</td>
<td>Distinct alterations in states of consciousness</td>
<td>Difficulties in attention regulation and executive functioning</td>
</tr>
<tr>
<td>Distrust and suspiciousness</td>
<td>Amnesia</td>
<td>Lack of sustained curiosity</td>
</tr>
<tr>
<td>Social isolation</td>
<td>Depersonalization and derealization</td>
<td>Problems with processing novel information</td>
</tr>
<tr>
<td>Interpersonal difficulties</td>
<td>Two or more distinct states of consciousness</td>
<td>Problems focusing on and completing tasks</td>
</tr>
<tr>
<td>Difficulty attuning to other people’s emotional states</td>
<td>Impaired memory for state-based events</td>
<td>Problems with object constancy</td>
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<tr>
<td>Difficulty with perspective taking</td>
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<td>Difficulty planning and anticipating</td>
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<td></td>
<td></td>
<td>Problems understanding responsibility</td>
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<tr>
<td></td>
<td></td>
<td>Learning difficulties</td>
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<tr>
<td></td>
<td></td>
<td>Problems with language development</td>
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<tr>
<td></td>
<td></td>
<td>Problems with orientation in time and space</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Biology</th>
<th>V. Behavioral control</th>
<th>VII. Self-concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensorimotor developmental problems</td>
<td>Poor modulation of impulses</td>
<td>Lack of a continuous, predictable sense of self</td>
</tr>
<tr>
<td>Analgesia</td>
<td>Self-destructive behavior</td>
<td>Poor sense of separateness</td>
</tr>
<tr>
<td>Problems with coordination, balance, body tone</td>
<td>Aggression toward others</td>
<td>Disturbances of body image</td>
</tr>
<tr>
<td>Somatization</td>
<td>Pathological self-soothing behaviors</td>
<td>Low self-esteem</td>
</tr>
<tr>
<td>Increased medical problems across a wide span (eg, pelvic pain, asthma, skin problems, autoimmune disorders, pseudoseizures)</td>
<td>Sleep disturbances</td>
<td>Shame and guilt</td>
</tr>
<tr>
<td></td>
<td>Eating disorders</td>
<td></td>
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<tr>
<td></td>
<td>Substance abuse</td>
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<tr>
<td></td>
<td>Excessive compliance</td>
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<tr>
<td></td>
<td>Oppositional behavior</td>
<td></td>
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<tr>
<td></td>
<td>Difficulty understanding and complying with rules</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reenactment of trauma in behavior or play (eg, sexual, aggressive)</td>
<td></td>
</tr>
</tbody>
</table>

Reducing Prenatal and Early Life Risk Factors for Chronic Disease
Cultural/Group Support

• Pima Pride/Action
  - DPP pilot study
    People randomized to “Action” group
      - Structured diet/exercise meetings
    People randomized to “Pride” control group
      - Unstructured activities emphasizing Pima culture and history
  • “Pima Pride” group showed more positive outcomes on every biological parameter measured

Breastfeeding

Exclusive breastfeeding for the first 2 months of life was associated with an odds ratio for Type 2 diabetes of 0.41 (adjusted for age, sex, parental diabetes, and birthweight) in a study in Pima Indians.

Disconnect between hunger and satiety happens early in life

- Study in 2 daycare centers found:

  1. Children’s “disregulated energy intake” is related to mothers’ weight and perceived control over eating.

  2. Instituting an age-appropriate intervention which helped children focus on their own internal cues resulted in improved ability to self-regulate eating.

Harlem Children’s Zone

• Led by Geoffrey Canada, focus on education
• Goal: to break the cycle of poverty in Harlem— “…to transform every aspect of the environment that poor children were growing up in; to change the way their families raised them and the way their schools taught them as well as the character of the neighborhood that surrounded them.”
• “Conveyor belt” of intensive services: Baby College— day care— pre-school— kindergarten— elementary school— middle school— high school

Whatever It Takes, 2008, Paul Tough
Break the Depression Cycle

• 2-3x increased risk for anxiety and disruptive behavior disorders and major depression in children of depressed parents
• “These offspring problems often begin before puberty, continue into adolescence and adulthood and can be transmitted to the next generation.”
• Treating children is difficult and controversial
• But treating the mothers’ depression reduces symptoms in both mothers and children

*JAMA.* 2006;295:1389-1398
Stimulation in Early Childhood: Has Effects Years Later

- Weekly play sessions with mother and child over 2 years
  - Given to growth retarded children age 9-24 months
  - Intervention aimed to improve the mother-child relationship:
    - listening and talking to children, allowing them to experience success/praise, reducing punishment
  - Resulted in less anxiety, depression, attention problems and higher self-esteem **16 years after the intervention.**

Parenting Groups Improve Antisocial Behavior in Children

• “Harsh, inconsistent parenting is strongly associated with antisocial behavior in children…”

• Intervention was a series of group classes which focused on parenting skills and support

• Resulted in “a large reduction in antisocial behavior” in the children

BMJ 2001;323:194
The economics of early life intervention

• “...for many skills and human capabilities, later intervention for disadvantage may be possible, but it is much more costly than early remediation to achieve a given level of adult performance.”

• “Simple economic models show the importance of accounting for early and late investments and for examining...economic costs of late remediation for early environmental influence.”

Heckman, *PNAS* 2007;104(33):13250-13255
Nurse-Family Partnership

Program Overview
FAMILIES SERVED

- Low income pregnant women
  - Usually teens
  - Usually unmarried
- First-time parents
THREE GOALS

1. Improve pregnancy outcomes
2. Improve child health and development
3. Improve parents’ economic self-sufficiency
Elements of the Nurse-Family Partnership

• Mothers enroll voluntarily early in pregnancy
• Home visits by nurses over 2½ years
• Powerful relationships with families build on native strengths
• Construct program around each family’s goals and values
• Nursing guidelines are rich with resources to nurture multiple, inter-related aspects of health
Nurses and Families Attend To:

- Personal health
- Environmental health
- Life course development
- Maternal (Parental) role
- Building support systems through family, friends, community
- Connections to other health and human services as needed
TRIALS OF PROGRAM

Elmira, NY – ‘77

- Low-income whites
- Semi-rural

N = 400

Memphis, TN -‘87

- Low-income blacks
- Urban

N = 1,138

Denver, CO – ‘96

- Large portion of Hispanics
- Nurse versus paraprofessional visitors

N = 735
Consistent Program Effects*

- Improved prenatal health
- Fewer childhood injuries
- Fewer subsequent pregnancies
- Increased intervals between births
- Increased maternal employment
- Improved school readiness

*Effects observed in at least two of the three trials (Elmira, Memphis, Denver)
ELMIRA LONG-TERM RESULTS: Benefits to Mothers

<table>
<thead>
<tr>
<th>Fewer convictions</th>
<th>72%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer days in jail*</td>
<td>98%</td>
</tr>
<tr>
<td>Fewer arrests</td>
<td>61%</td>
</tr>
</tbody>
</table>

* Impact on days in jail is highly significant, but the number of cases that involved jail-time is small, so the magnitude of program effect is difficult to estimate with precision.
# ELMIRA LONG-TERM RESULTS: Benefits to Children

<table>
<thead>
<tr>
<th>Category</th>
<th>% Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abuse &amp; Neglect</td>
<td>48%</td>
</tr>
<tr>
<td>Arrests</td>
<td>59%</td>
</tr>
<tr>
<td>Adjudications as PINS* (person in need of supervision) for incorrigible behavior</td>
<td>90%</td>
</tr>
</tbody>
</table>

*Based upon family-court records of 116 children who remained in study-community for 13-year period following end of program.

15-YEAR FOLLOW-UP
Effects on Child Development Memphis 6-Year

- Higher IQ’s
- Better language development
- Fewer mental health problems
Nurse-Family Partnership

• “The most rigorously evaluated example of a program that promotes safe, stable, and nurturing relationships and environments…” *JAMA* 2009;301(21):2262-4

• “in a series of rigorous experimental evaluations, the Nurse Family Partnership has produced multiple, positive impacts on families and children, including fewer subsequent pregnancies, increased maternal employment, higher cognitive performance, and better social behavior by children in the preschool years, as well as (in the study with the longest-term follow-up) fewer arrests in adolescence” (p. 13).

“A Science-Based Framework for Early Childhood Policy: Using Evidence to Improve Outcomes in Learning, Behavior, and Health for Vulnerable Children”, Center on the Developing Child at Harvard University, August 2007, p.6 http://www.developingchild.harvard.edu
“…we are placing bets on the value of early intervention, beginning prenatally with a mother’s first pregnancy, and extending throughout the first years of life and beyond, as one of the surest ways to begin to address past centuries of neglect and improve the prospects of American Indian and Alaska Native children in this century.”

**Nutrition**
- Fruit/Veg Supplementation
- WIC+
- WIC+
- School Food Programs
- Breastfeed
- “Backpack Foods”

**Depression & Substance Abuse**
- Screen: high schools, family planning/prenatal/well child/WIC clinics
- Treatment: CBT, EMDR, DBT, groups, dual diagnosis
- Coping Skills classes: emotions (e.g., LifeSkills), racism, finances, relaxation
- Find ways to help pregnant women abstain from drugs/alcohol/smoking

**“Parenting”**
- Nurse-Family Partnership
- Case manage all pregnancies
- Family Planning
- Parenting classes—pay parents to attend
- Play groups/psychosocial stimulation
- Parent-Child Interaction Therapy
- Mentoring
- DSS/Court referrals
- Pregnant teens group
- Harlem Children’s Zone: Strong Day Care—Head Start—Schools
- Coping skills for kids, bullying interventions
- Renew tribal traditional pregnancy/child-rearing practices