



# **The First 1,000 Days – The Connection between You and the Health Legacy of the Next Generation**

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April 19, 2017**

# Acknowledgements

- Nelida Duran, PhD, RD, Assistant Professor, California State University, Northridge
- Marion Taylor Baer, PhD, RD, UCLA Fielding School of Public Health

# Interest in Good Nutrition is Growing Among the Public and ...



# Among Physicians.... finally



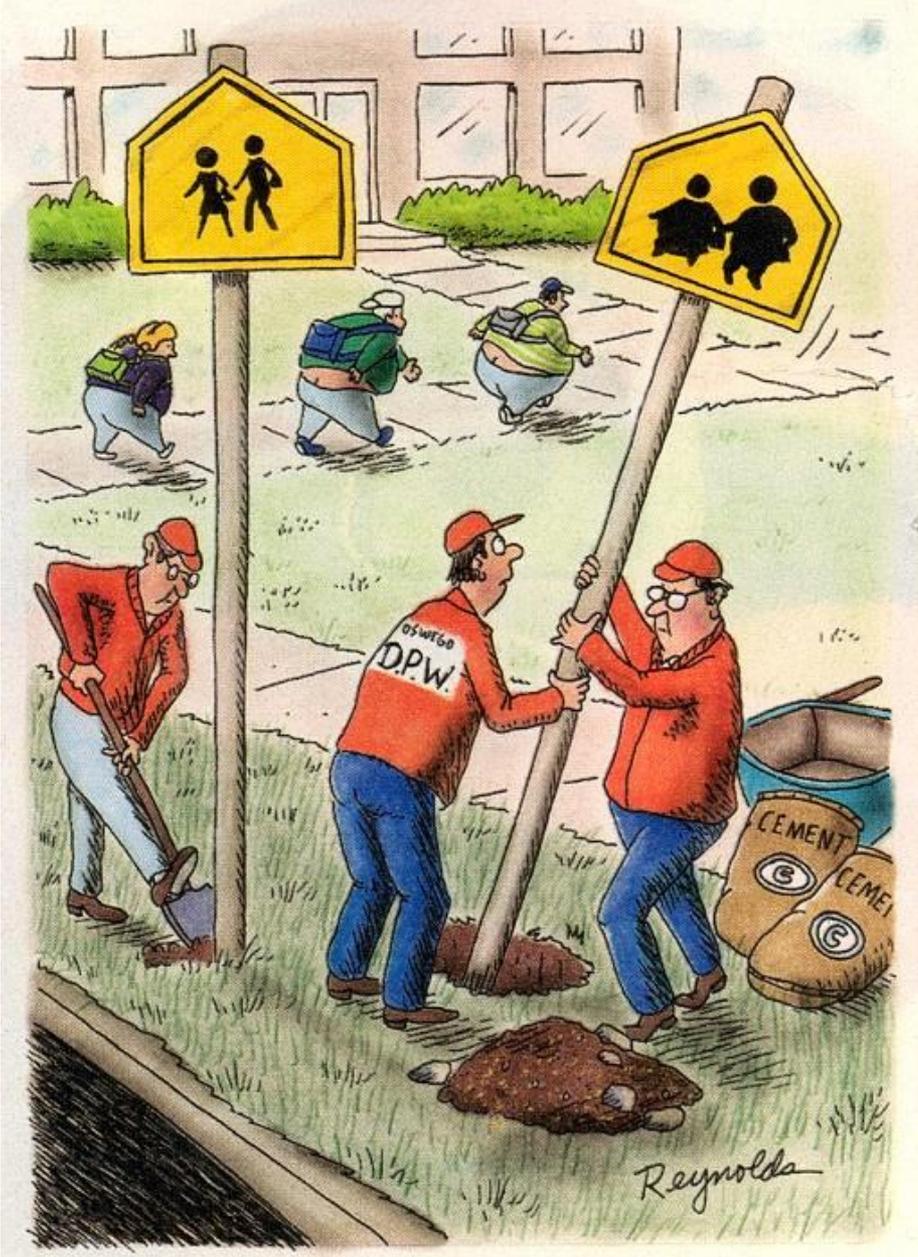
“This document is directed at a range of stakeholders with the intention of highlighting the central role that nutrition has on adolescent, maternal and infant well-being. This is an area that has traditionally been of low priority, but which has major implications for girls’ and women’s health as well as the health of their offspring.”

Recommendations of the Federation of Gynecology and Obstetrics (FIGO) Hanson et al, 2015

# Life Course Perspective: a new MCH paradigm



This is not prevention



# Determinants of Health



# Determinants of Health



# Life Course Perspective

## Key Concepts – T<sup>2</sup> E<sup>2</sup>

**Timeline**

**Timing**

**Environment**

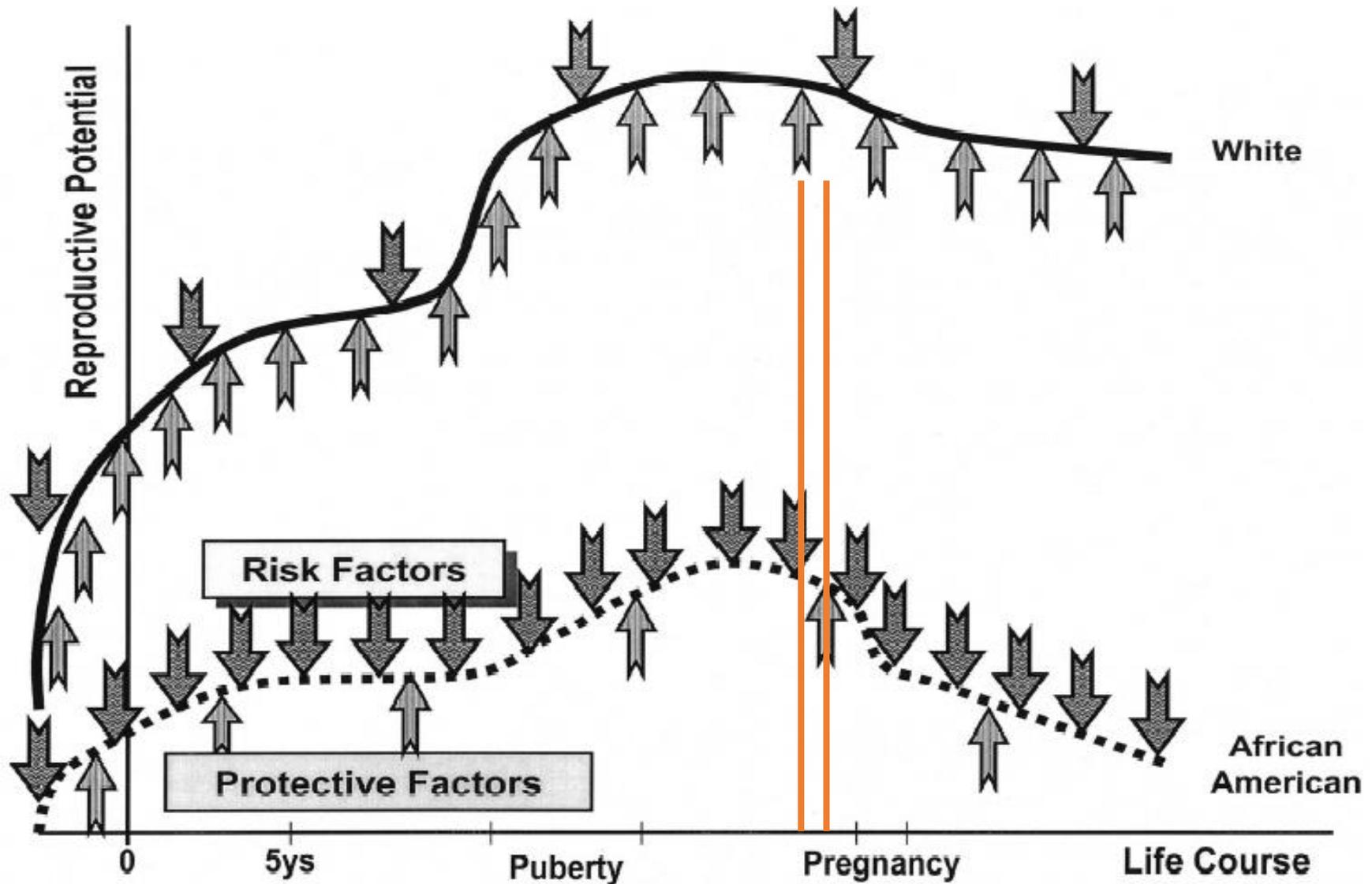
**Equity**

Kotelchuck & Fine, 2010

# **“T”imeline Concept**

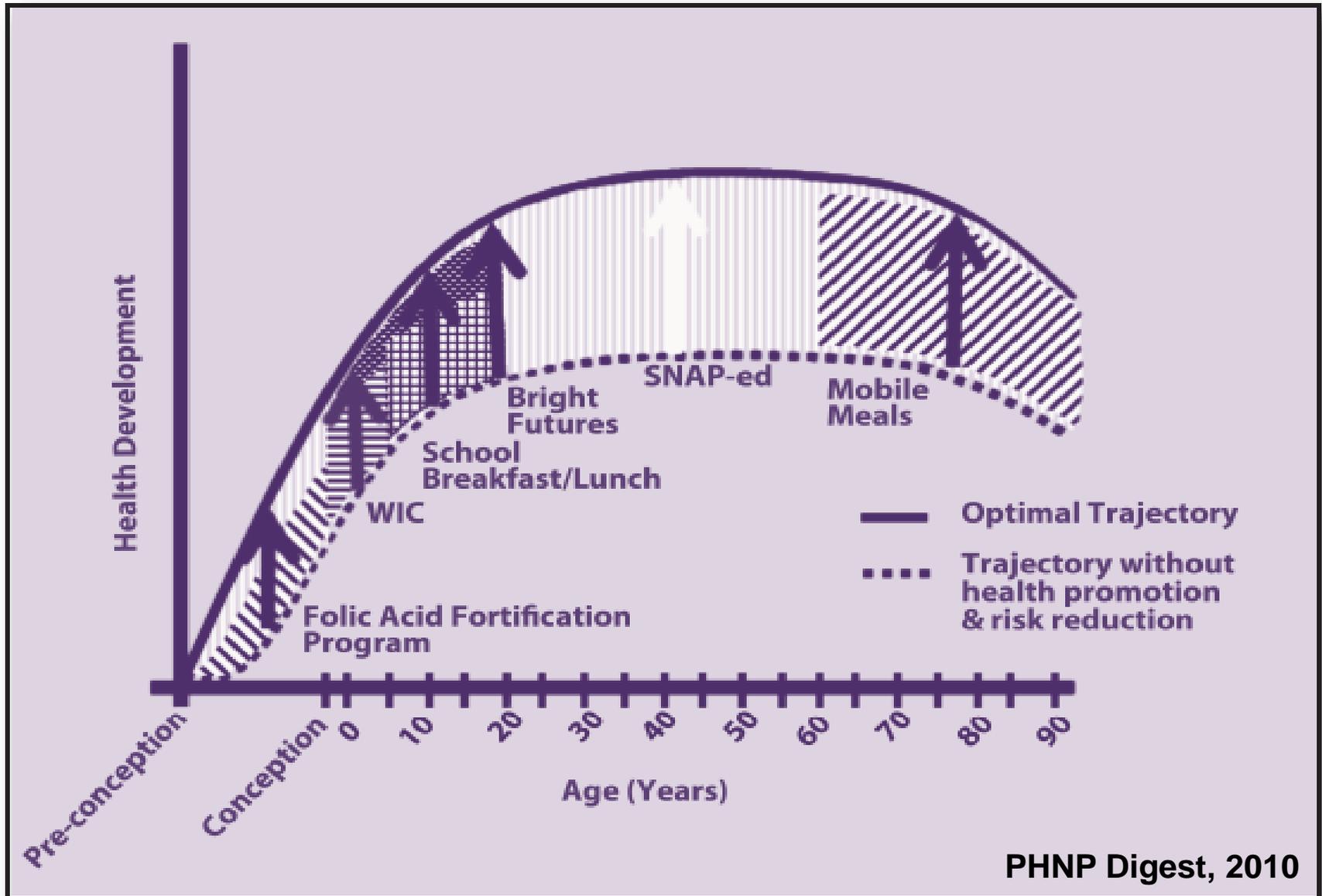
Conveys idea that today's exposures determine tomorrow's health - cumulative impacts over time.

# Timeline



Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective. *Matern Child Health J.* 2003;7:13-30.

# Timeline and Nutrition



PHNP Digest, 2010

Figure 1: Public Health Nutrition Programs Influence Health Development.

# “T”iming Concept

*Health trajectories are especially affected during critical periods in life.*

*The earliest exposures and experiences are most important.*

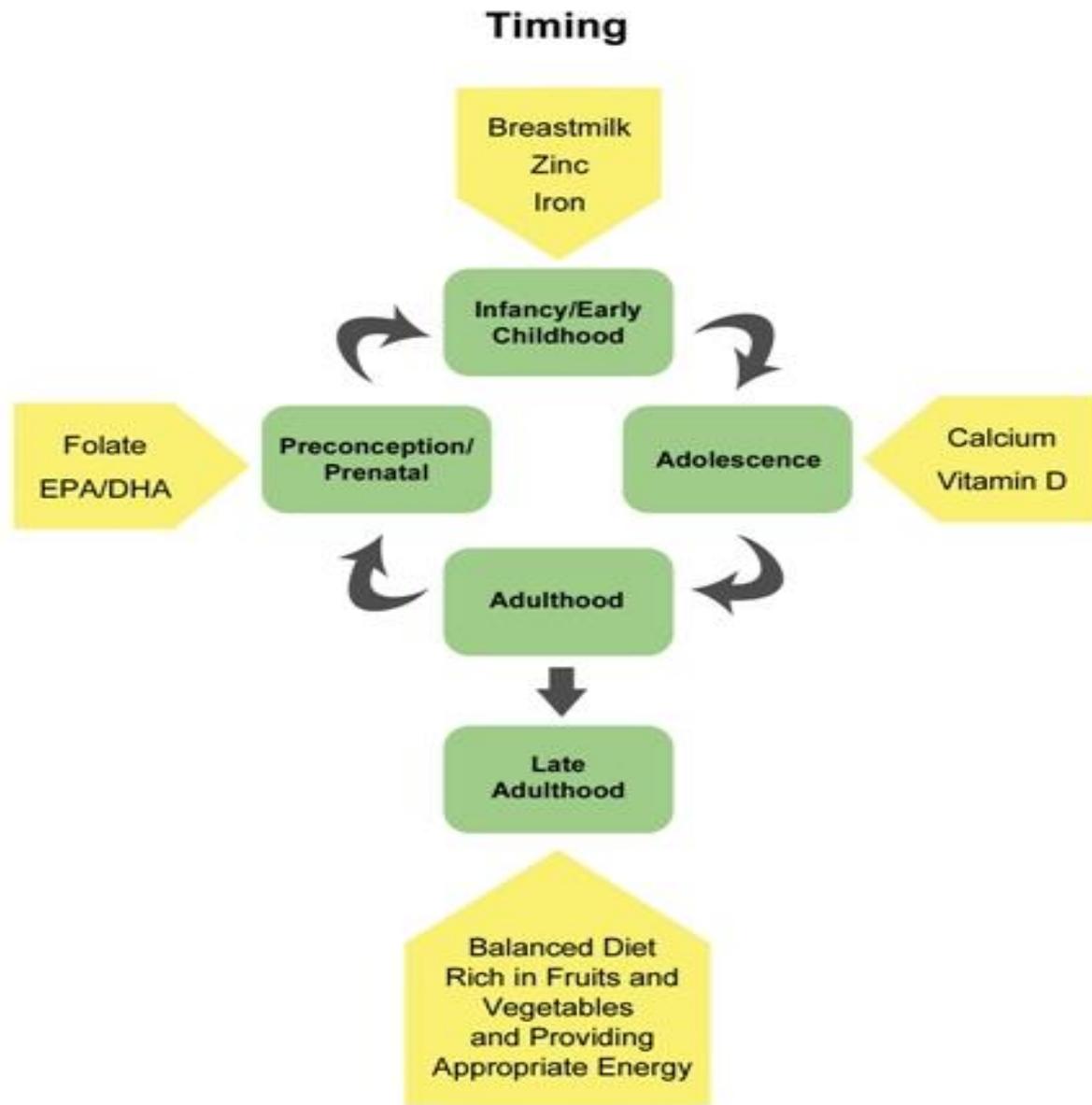


Figure 2. Examples of Key Foods/Nutrients Affecting Critical Periods

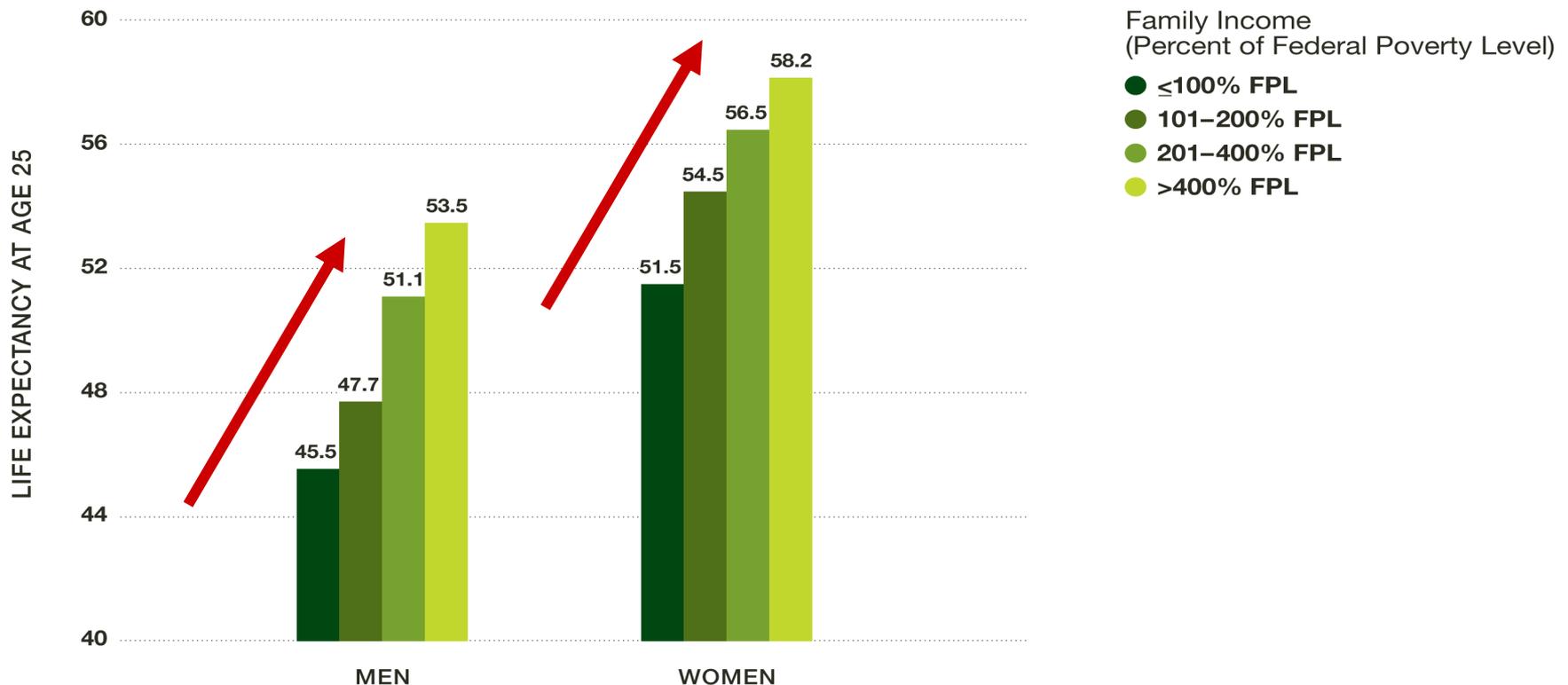
# “E”nvironment

*The broader community environment including the physical, social, and economic environments, strongly affects a person's capacity to be healthy.*

# Income Disparities

## Higher Income, Longer Life

Adult life expectancy\* increases with increasing income. Men and women in the highest-income group can expect to live at least six and a half years longer than poor men and women.



Prepared for the Robert Wood Johnson Foundation by the Center on Social Disparities in Health at the University of California, San Francisco; and Norman Johnson, U.S. Bureau of the Census.

Source: National Longitudinal Mortality Study, 1988-1998.

\*This chart describes the number of years that adults in different income groups can expect to live *beyond age 25*. For example, a 25-year-old woman whose family income is at or below 100 percent of the Federal Poverty Level can expect to live 51.5 more years and reach an age of 76.5 years.

# Poverty is a Major Risk Factor for Sub-optimal Development

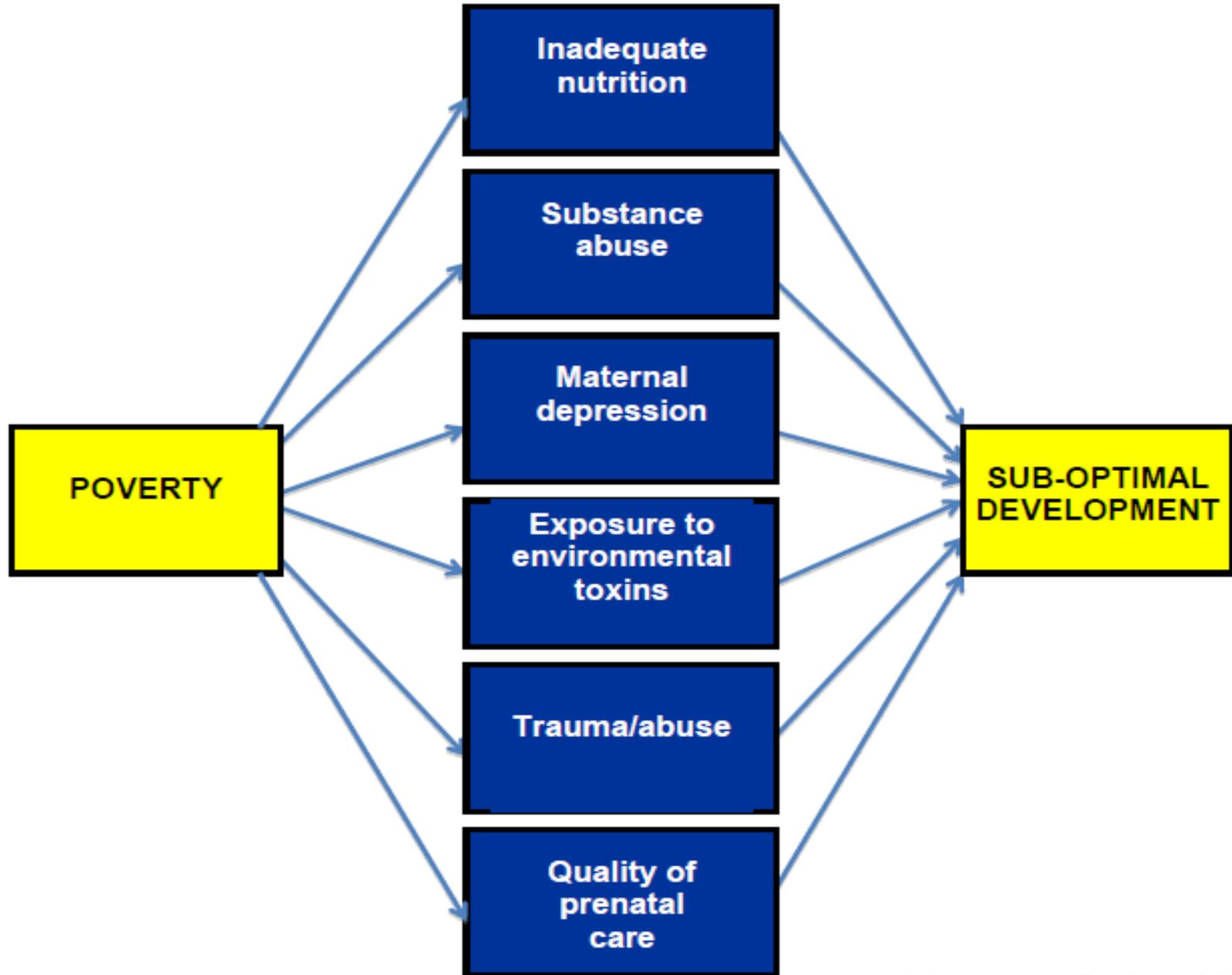
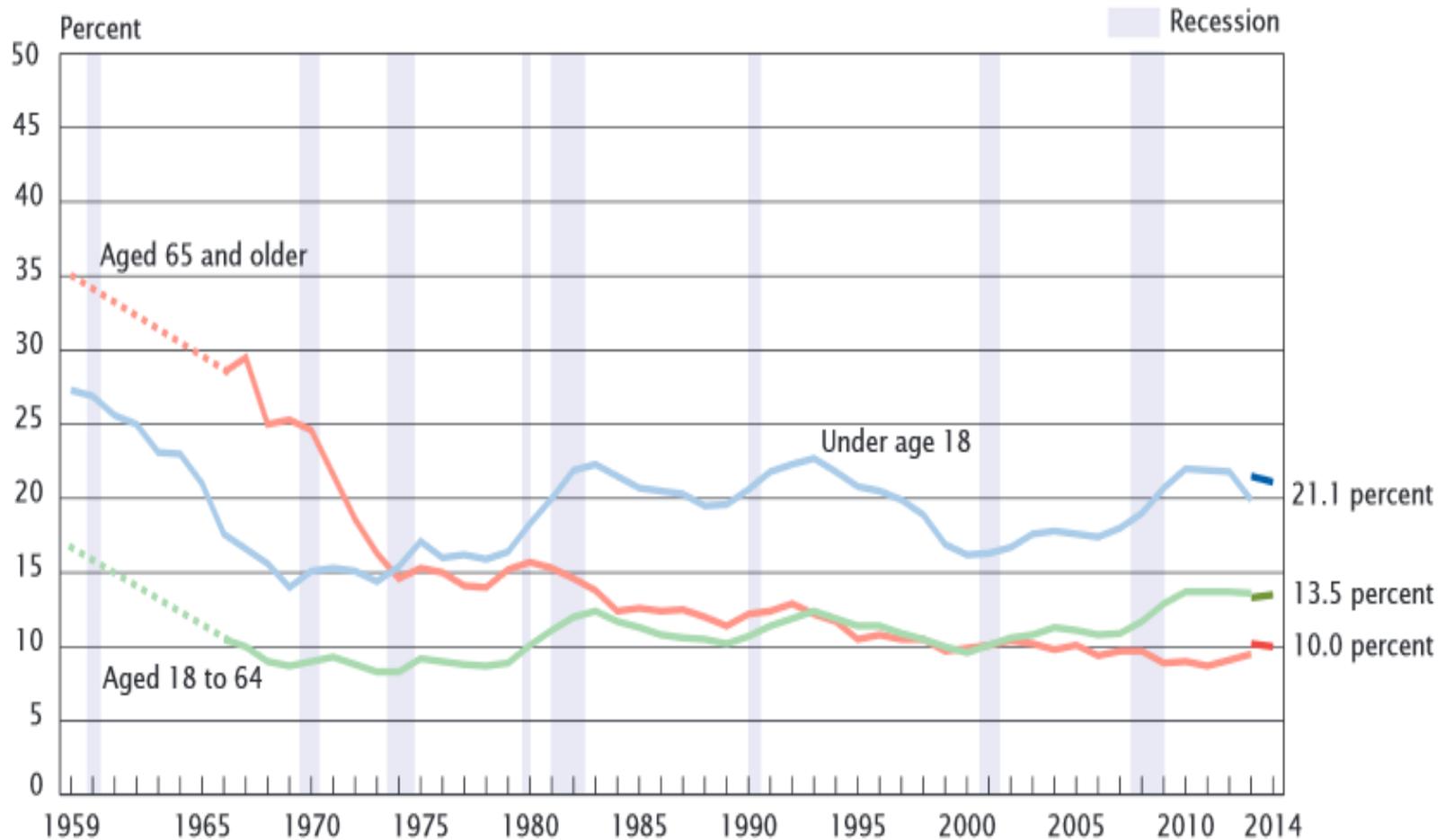


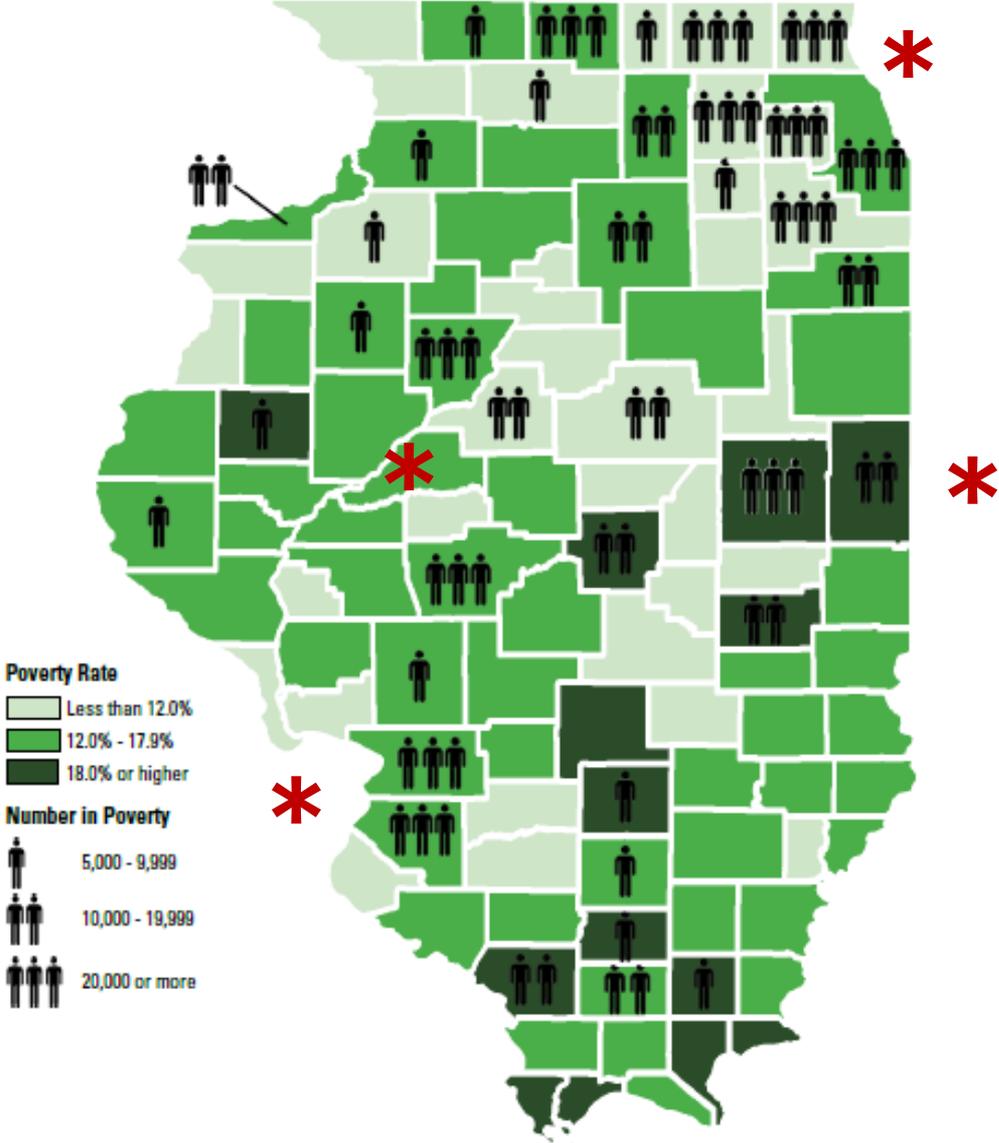
Figure 5.  
**Poverty Rates by Age: 1959 to 2014**



Note: The 2013 data reflect the implementation of the redesigned income questions. See Appendix D for more information. The data points are placed at the midpoints of the respective years. Data for people aged 18 to 64 and 65 and older are not available from 1960 to 1965. For information on recessions, see Appendix A. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see <[ftp://ftp2.census.gov/programs-surveys/cps/techdocs/cpsmar15.pdf](http://ftp2.census.gov/programs-surveys/cps/techdocs/cpsmar15.pdf)>.

Source: U.S. Census Bureau, Current Population Survey, 1960 to 2015 Annual Social and Economic Supplements.

# Illinois Poverty Map by County (2015)

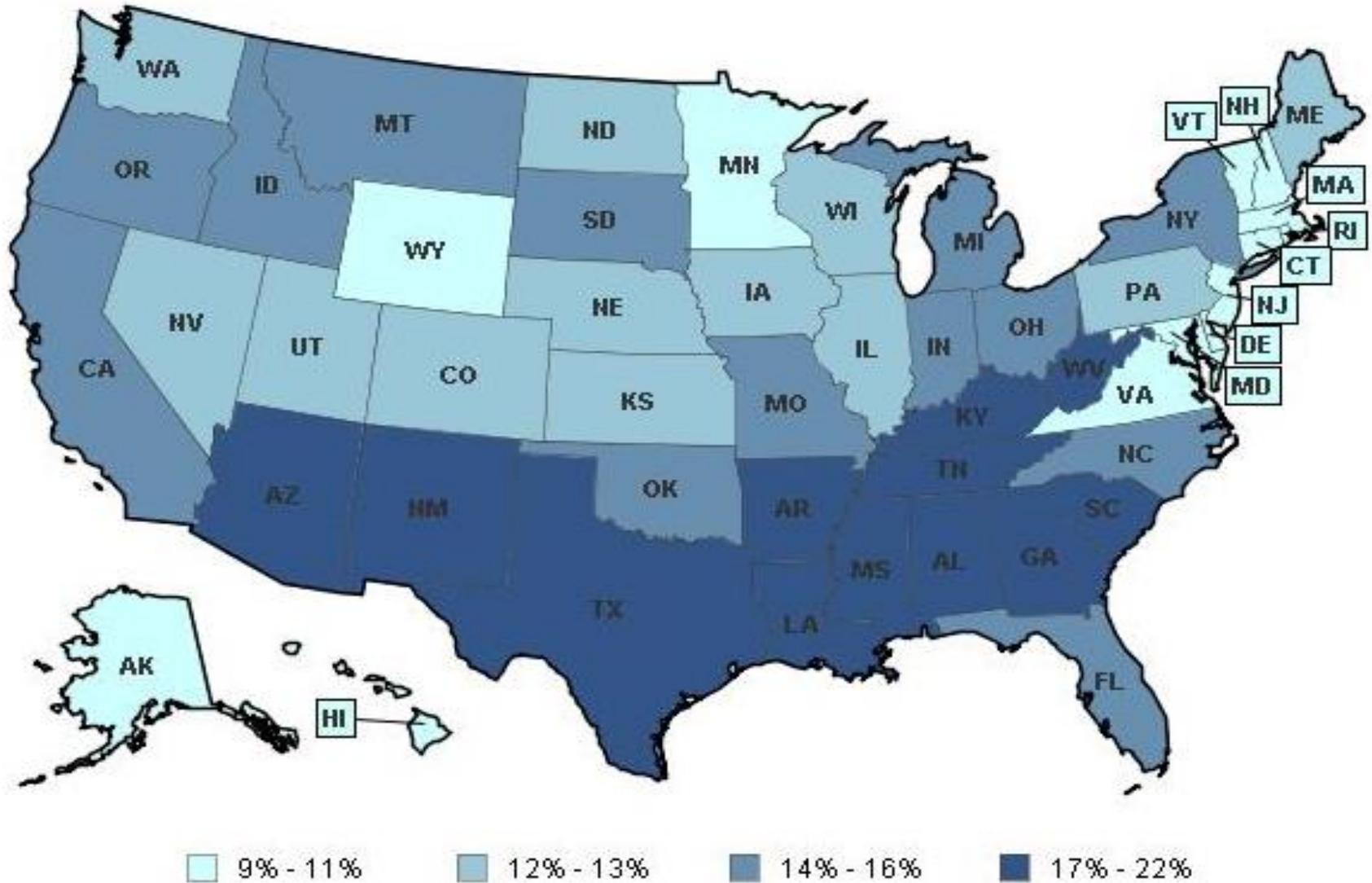


# “E”quity

The importance of addressing ***disparities in health and development*** across populations.

***Inequality in access to resources*** has as much or more influence on health as genetics or personal choice..

# Geographic Disparities

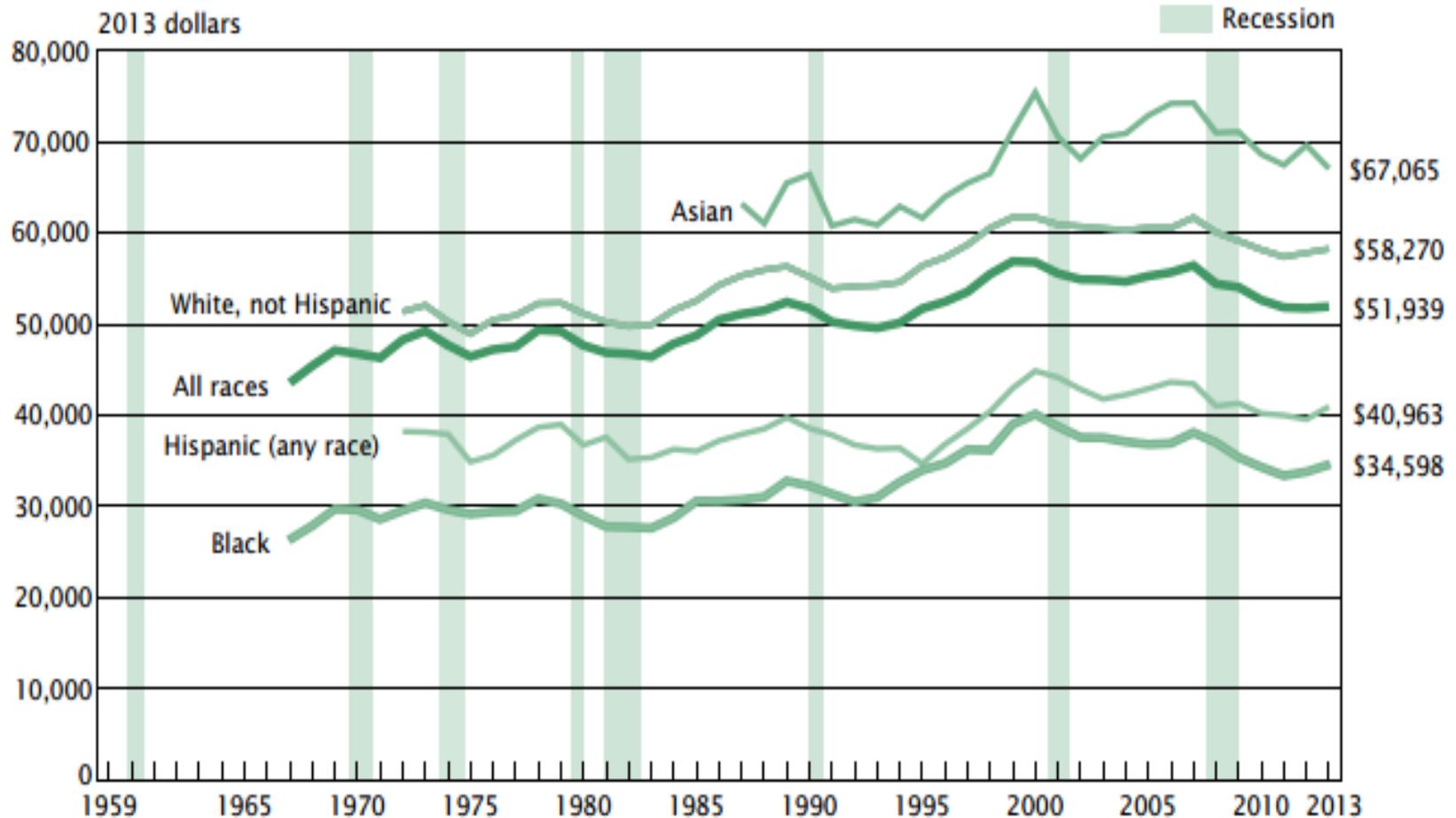


Population in poverty (Percent) - 2009

# Racial Disparities

Figure 1.

**Real Median Household Income by Race and Hispanic Origin: 1967 to 2013**

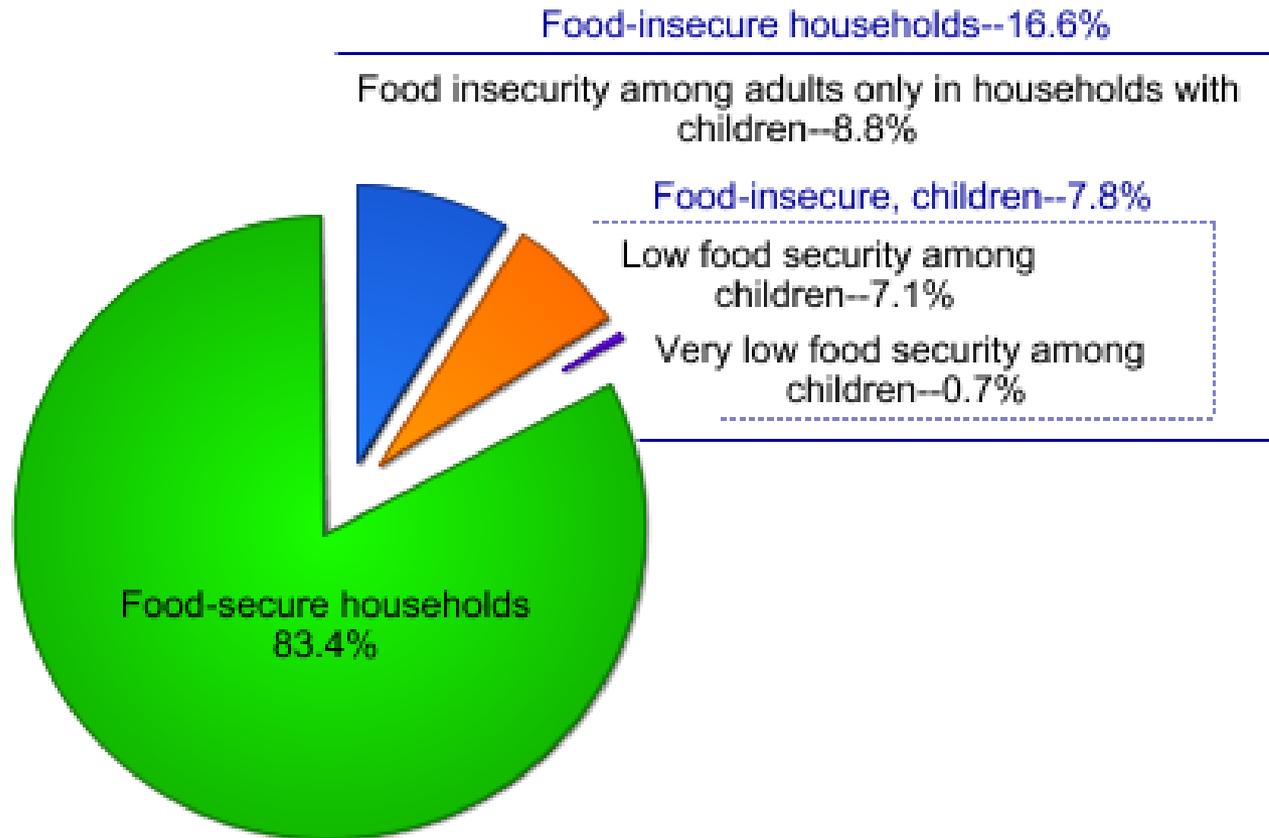


Note: Median household income data are not available prior to 1967. For more information on recessions, see Appendix A. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see <ftp://ftp2.census.gov/programs-surveys/cps/techdocs/cpsmar14.pdf>.

Source: U.S. Census Bureau, Current Population Survey, 1968 to 2014 Annual Social and Economic Supplements.

# Food Insecurity in the US

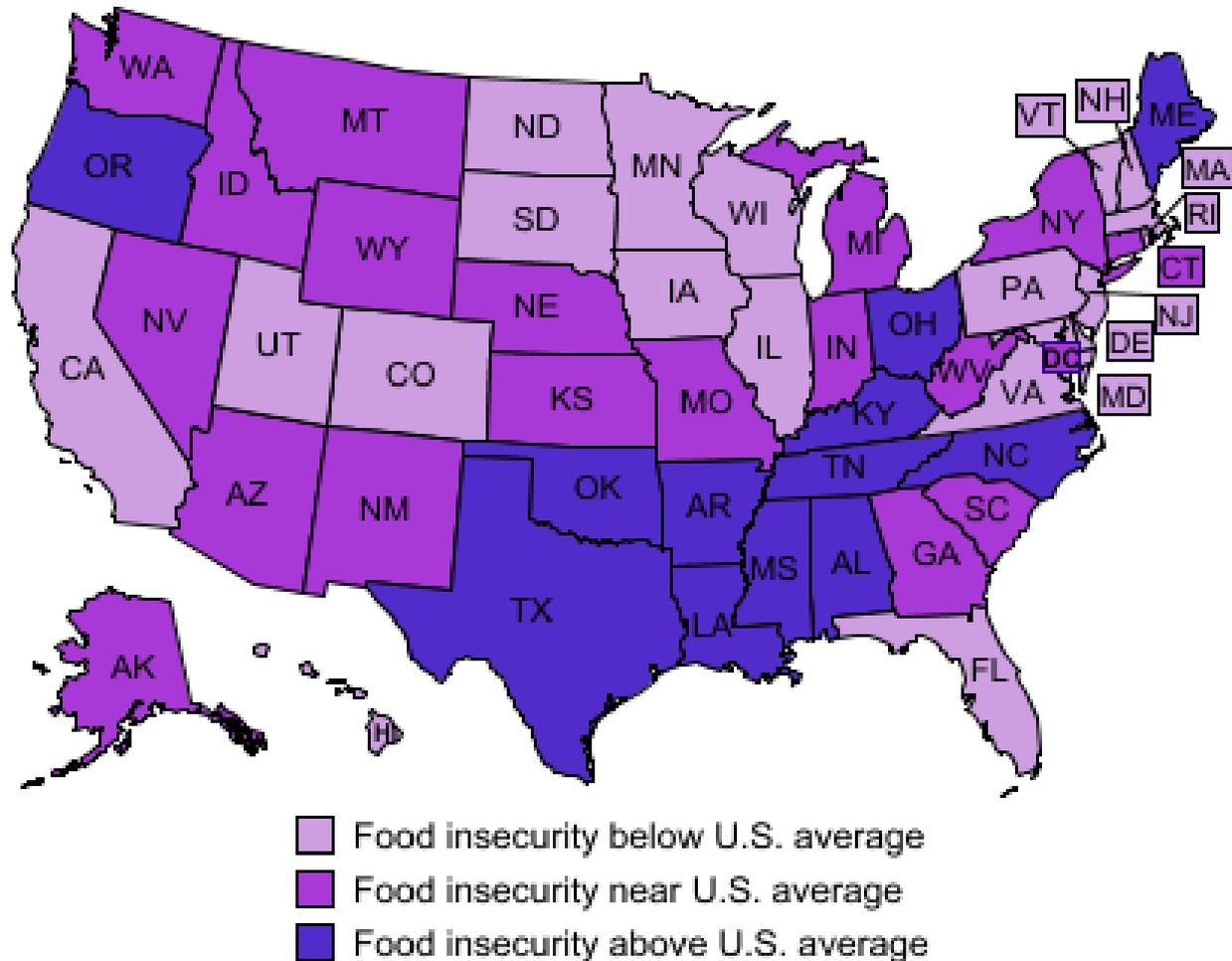
U.S. households with children by food security status of adults and children, 2015



Note: In most instances, when children are food insecure, the adults in the household are also food insecure.

Source: Calculated by ERS, USDA, using data from the December 2015 Current Population Survey Food Security Supplement.

## Prevalence of food insecurity, average 2013-15



Source: Calculated by ERS, USDA, using data from the December 2013, 2014, and 2015 Current Population Survey Food Security Supplements.

# Summary : Life Course Perspective

Access to health-promoting factors (**environment**) for all, (**equity**) protects during critical periods (**timing**) and assures optimal health early in life to promote lifelong health (**timeline**).

# Healthy People 2020: Overarching Goals

- Attain high-quality, longer lives free of **preventable disease, disability, injury, and premature death.**
- Achieve **health equity, eliminate disparities, and improve the health of all groups.**
- Create social and physical **environments** that promote good health for all.
- Promote quality of life, healthy development, and healthy behaviors **across all life stages.**

# Share your thoughts...



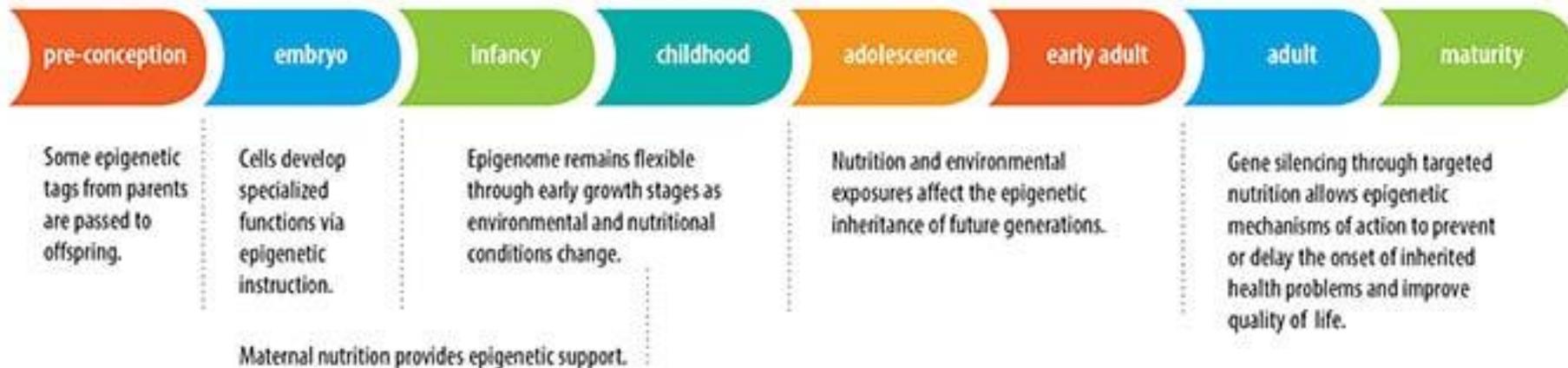
*In a few words, share how you can use the **life course perspective** to promote WIC services...*

# **The First 1,000 Days: What is the Role of Nutrition and Epigenetics?**

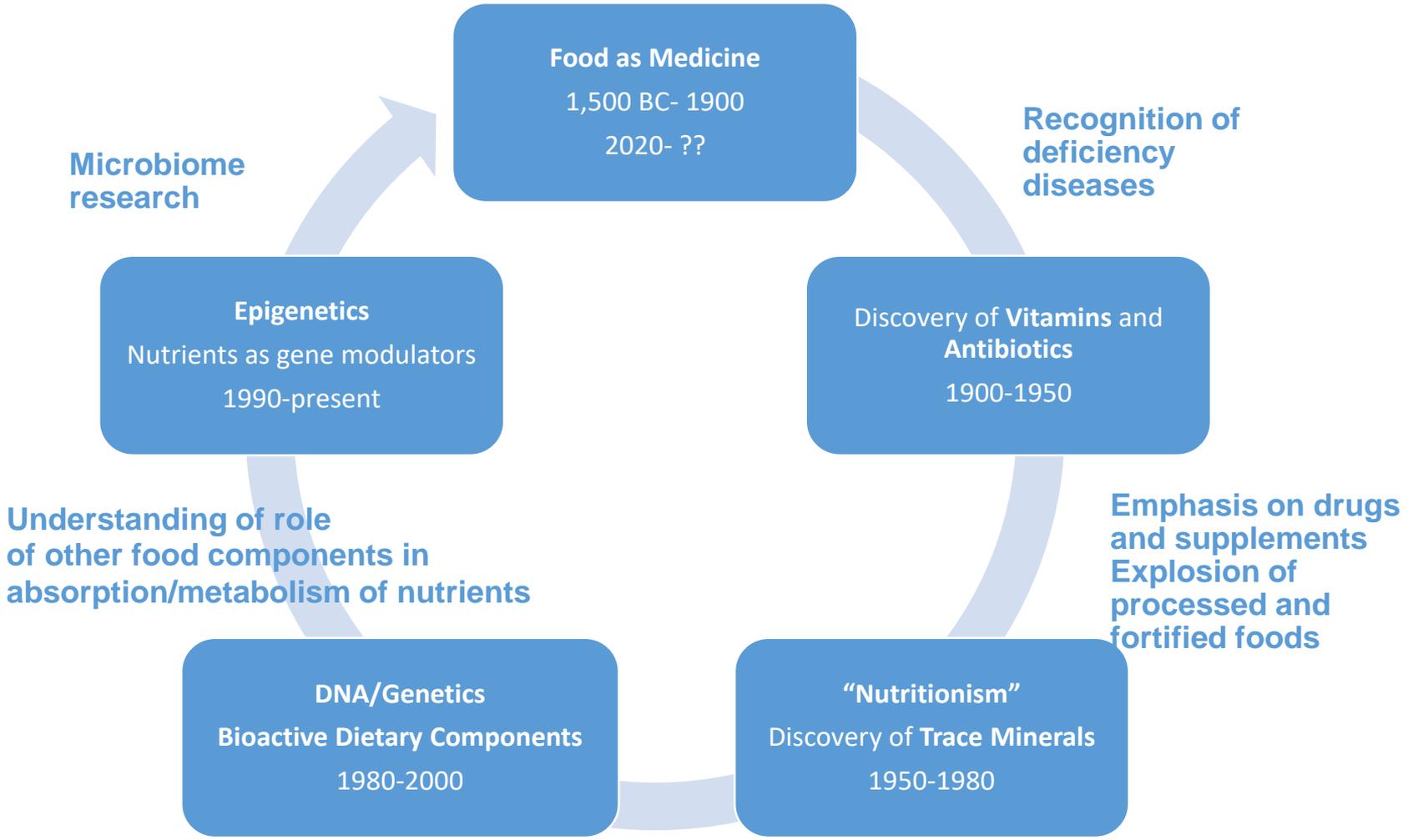


# Nutrition and Epigenetics

## your epigenetic life



# Evolution of the Importance of Food to Health



Taylor Baer M, Herman DR. From Epidemiology to Epigenetics: Evidence for the Importance of Nutrition to Optimal Health Development across the Life Course. In: The Life Course Health Development Handbook. Springer Publishing. In press.

# Epigenetics

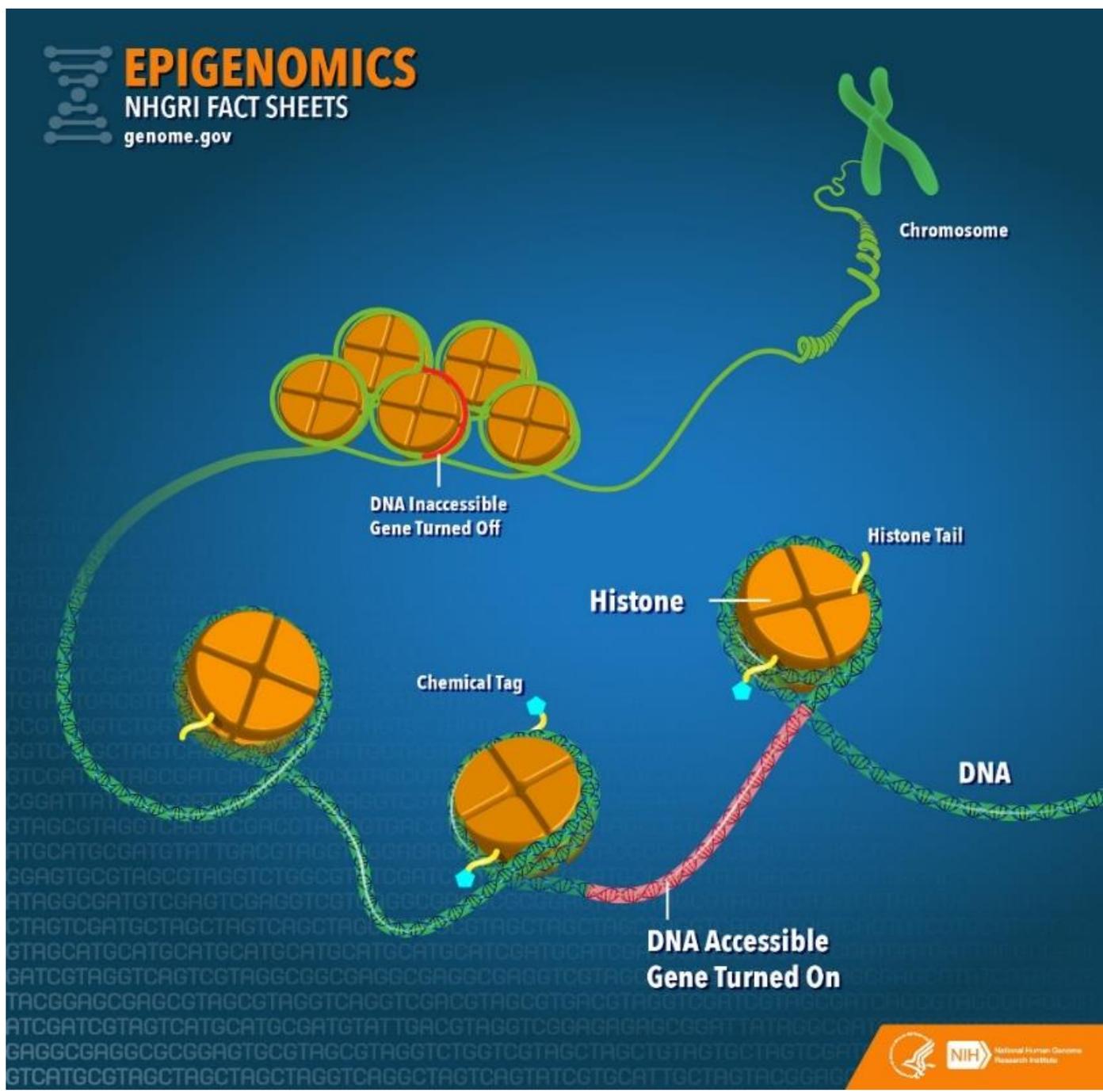
- Phenotypic diversity is shaped by both genetic and epigenetic mechanisms
- Cells undergo massive epigenetic reprogramming during development

# Nutrition and Epigenetics

- Epigenetics → **Combination of mechanisms** that gives long-term programming to genes
- Unlike genetic mechanisms (**gene sequence**), epigenetic mechanisms (gene function) are **DYNAMIC!**
- Therefore, **DIET** along with behavioral and nutritional strategies may serve as effective interventions to prevent and reverse harmful epigenetic changes.

McGowan, Meaney, & Szyf (2008). Diet and epigenetic (re)programming of phenotypic difference in behavior. *Brain Research* 1237, 12-24.

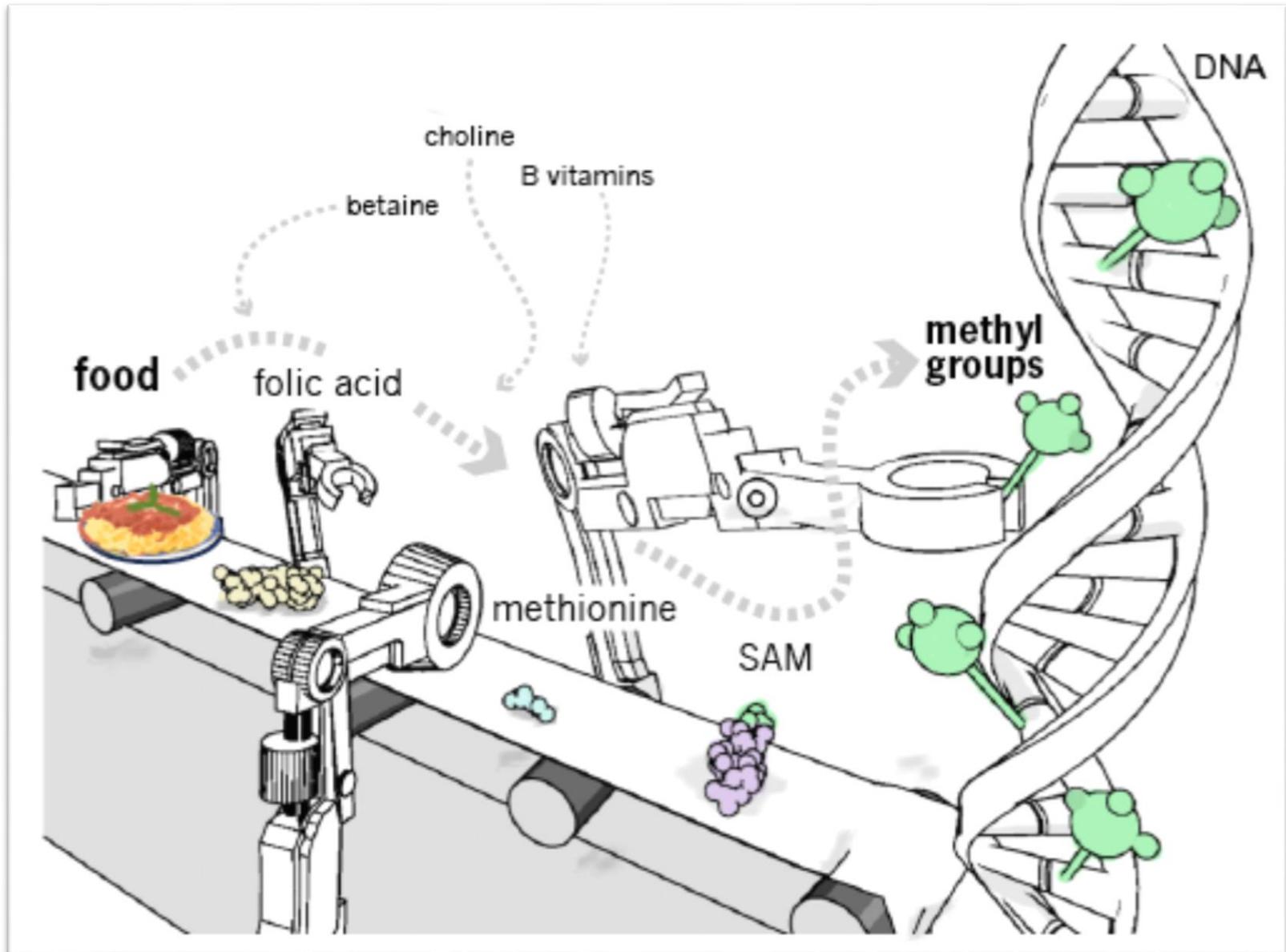
Epigenomics: the analysis of epigenetic changes across many genes in a cell or entire organism.



# What is the Epigenome?

- A multitude of chemical compounds that tell the genome what to do.
- DNA holds the instructions for building the proteins that carry out a variety of functions in a cell.
- Epigenomic compounds attach to DNA and modify its function.

# Nutrition and the Epigenome



# How Can WIC Affect the Epigenome?

## A Snapshot of the First 1,000 Days in America

### THE 10 BUILDING BLOCKS FOR NUTRITION



A healthy and nutritious diet for mothers during pregnancy



Good care for all mothers during pregnancy



Exclusive breastfeeding for the first 6 months



Nurturing, responsive care and feeding of babies and toddlers



The right foods introduced to babies at the right times



A healthy and nutritious diet for babies and toddlers



Water and other healthy beverages with no added sugars for toddlers



The right knowledge and skills for parents and caregivers to properly nourish young children



Consistent access to enough nutritious food for families of young children



Societal investments in the well-being of every baby and toddler

### HOW THE U.S. IS FARING

Nearly half of women gain an excessive amount of weight during pregnancy.

The U.S. has one of the highest maternal mortality rates of any wealthy country in the world.

Only 22% of infants are exclusively breastfed at 6 months.

Less than half of U.S. mothers receive any paid time off to care for their newborn.

Almost 40% of parents introduced solid foods to their babies too early.

1 in 4 toddlers are not getting enough iron in their diets—a key nutrient for brain development.

More than half of toddlers and preschoolers consume one or more sugar-sweetened beverage every day.

54% of mothers say they receive mixed messages about what to feed their young children.

1 in 5 children under the age of 6 live in families that struggle to put enough nutritious food on the table.

More than 25% of infants and toddlers live in poverty.

# Diet During Early Development



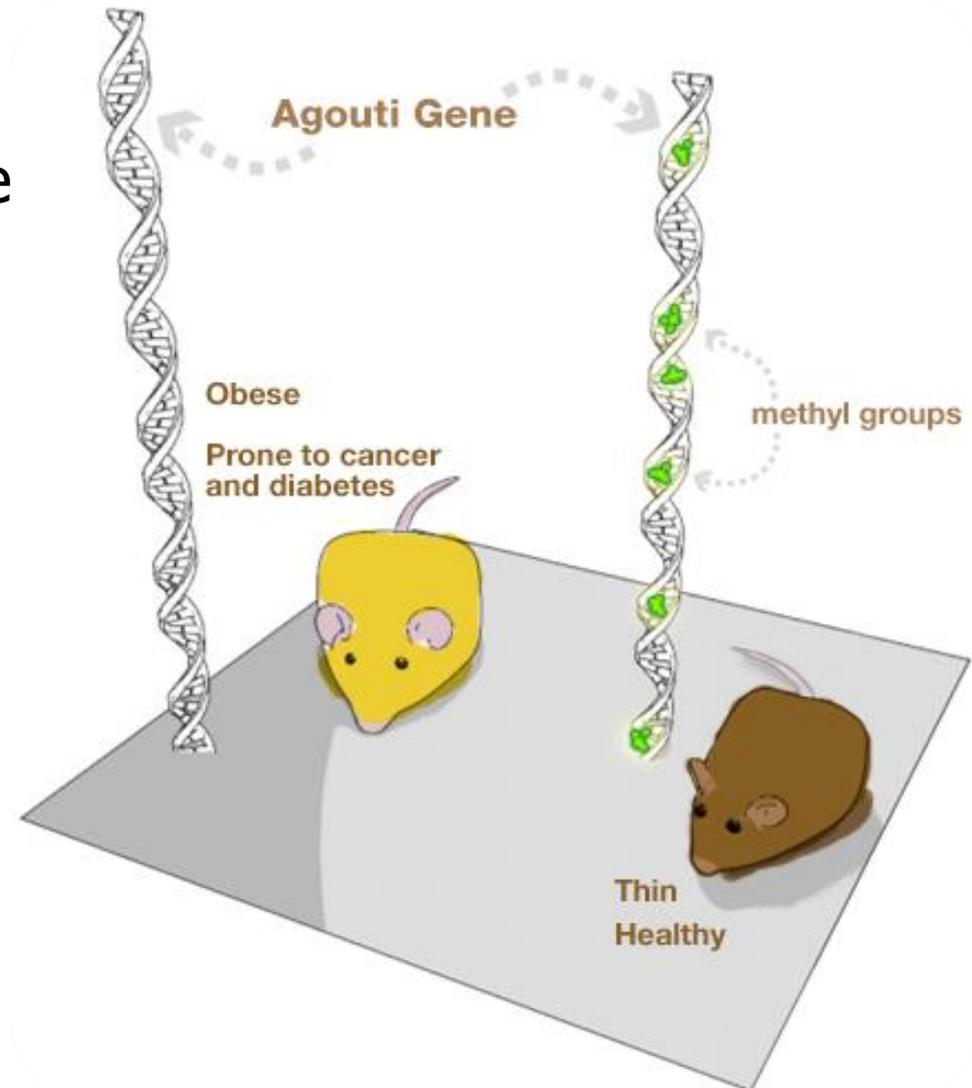
A mother's diet during pregnancy & diet as an infant can affect the epigenome into adulthood.

# Which WIC Foods Affect the Epigenome?

<b>Nutrient</b>	<b>Food Sources</b>	<b>Function</b>
Folic Acid	<b>Leafy vegetables</b> , sunflower seeds, baker's yeast, liver	Methionine synthesis
Vitamin B12	Meat, liver, shellfish, <b>milk</b>	Methionine synthesis
Vitamin B6	Meats, <b>whole grain products, vegetables</b> , nuts	Methionine synthesis
Choline	<b>Egg yolks</b> , liver, <b>soy</b> , cooked beef, chicken, veal, turkey	Methyl donor to SAM
Sulforaphane	<b>Broccoli</b>	Increased histone acetylation turning on anti-cancer genes
Butyrate	Produced in intestine when dietary <b>fiber</b> is fermented	Increased histone acetylation turning on 'protective' genes, increased lifespan

# We are what our parents ate...

- Yellow mouse:  
unmethylated agouti gene
  - Brown mouse:  
methylated agouti gene
- Genetically IDENTICAL
- Methyl-rich diet offered  
to pregnant yellow mice
- Offspring born brown  
and healthy



# Toxins and Supplements

These Two Mice are Genetically Identical and the Same Age



While pregnant, both of their mothers were fed Bisphenol A (BPA) but **DIFFERENT DIETS**:

The mother of this mouse received a **normal mouse diet**

The mother of this mouse received a diet **supplemented** with choline, folic acid, betaine and vitamin B12

# The Effect of Fathers' Diets on Children's Health



**Where is the "F" in WIC?**

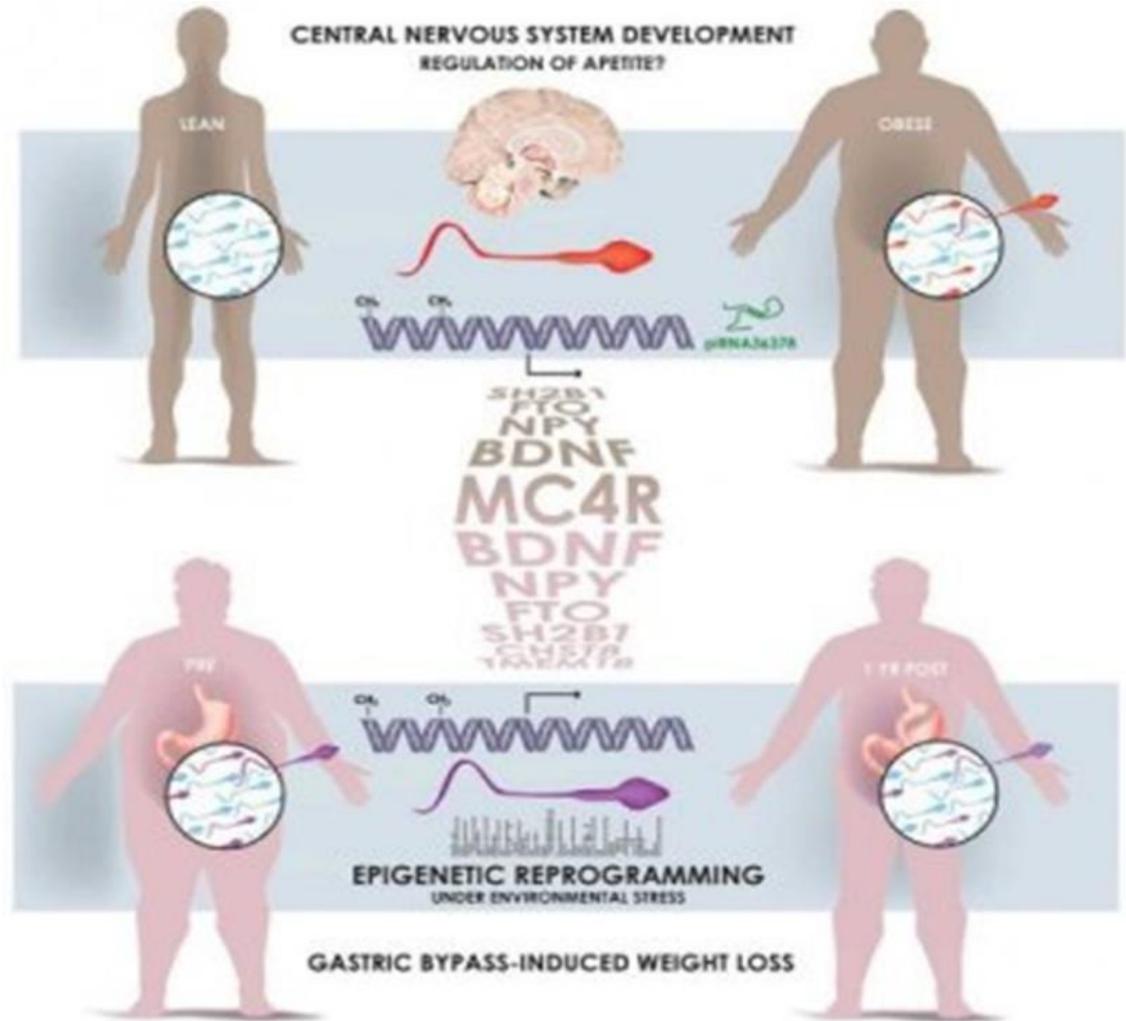
# Paternal Diet and Children's Mental Health



- Cross-generational study, male rats allowed to eat abundant amounts of food compared to those with access to 25% fewer calories
- Offspring of food-limited rats were lighter, ate less, showed less evidence of anxiety

# Dads Also Eats for Two

- Sperm from obese men carry distinct epigenetic signature compared to lean men
- Sperm cells of lean and obese men possess different epigenetic marks in gene regions of appetite control





# Paternal Diet and Long-term Health



KEEP CALM

ITS

QUIZ TIME

**Q1.**

**Nutrition can affect how our genes are expressed.**

**a. True**

**b. False**

**Q2.**

**Which of the following foods in the WIC food package can affect the epigenome?**

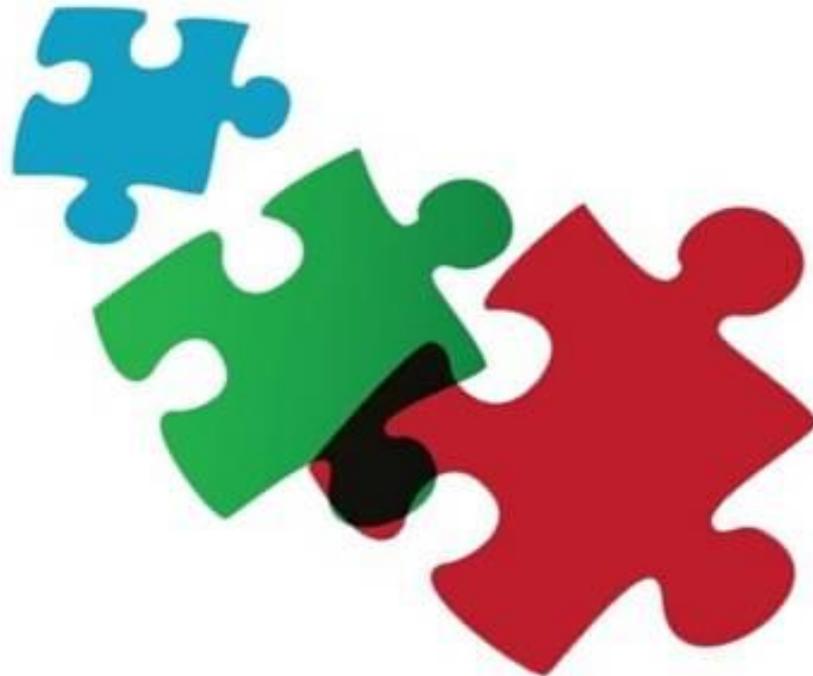
- a. Whole grains**
- b. Fruits and vegetables**
- c. Milk**
- d. Eggs**
- e. All of the above**

**Q3.**

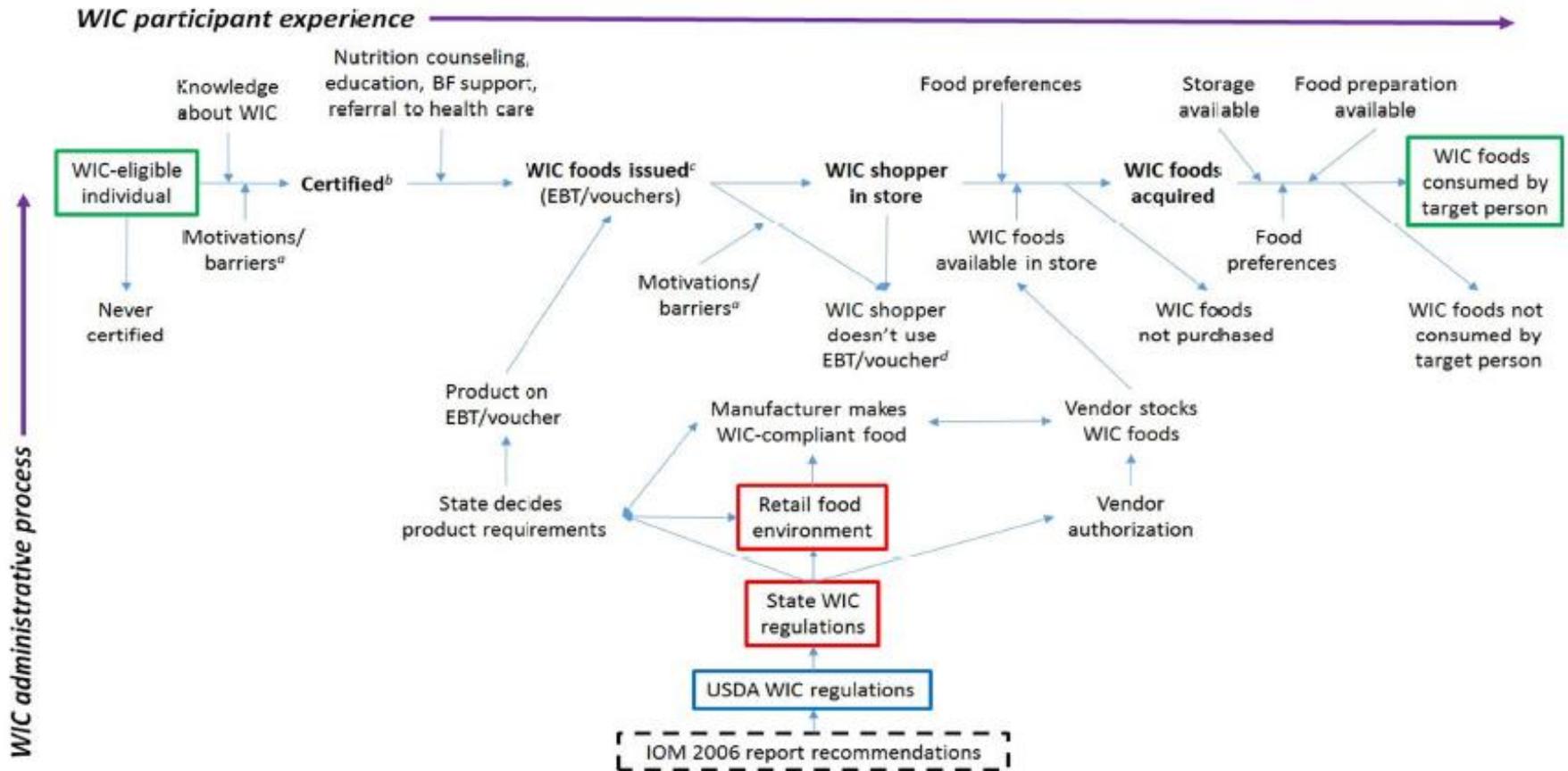
**The diet of fathers prenatally is important because it can affect children's:**

- a. Lifespan**
- b. Chances to get diabetes**
- c. Chances to become obese**
- d. Chances to have mental health issues**
- e. All of the above**

# **Improving WIC Participation: A Community Systems Approach**



# The WIC Participant Experience



# Barriers to WIC Participation and Redemption

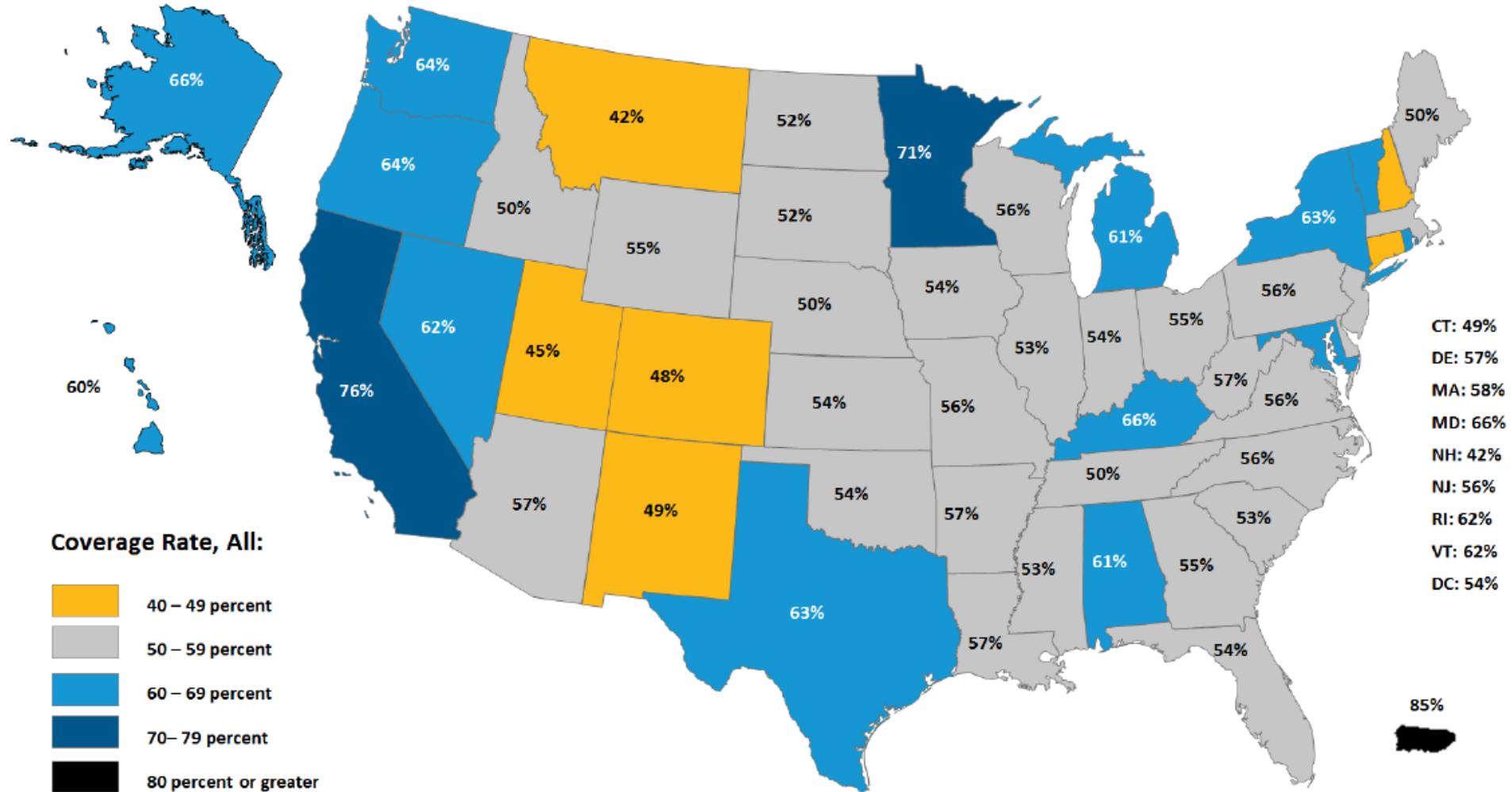
## Barriers to Participation

- Long wait times; crowded physical environment
- Lack of transportation
- Belief that family is ineligible; changing eligibility restrictions
- Program requires too much effort, difficult paperwork
- Language barriers

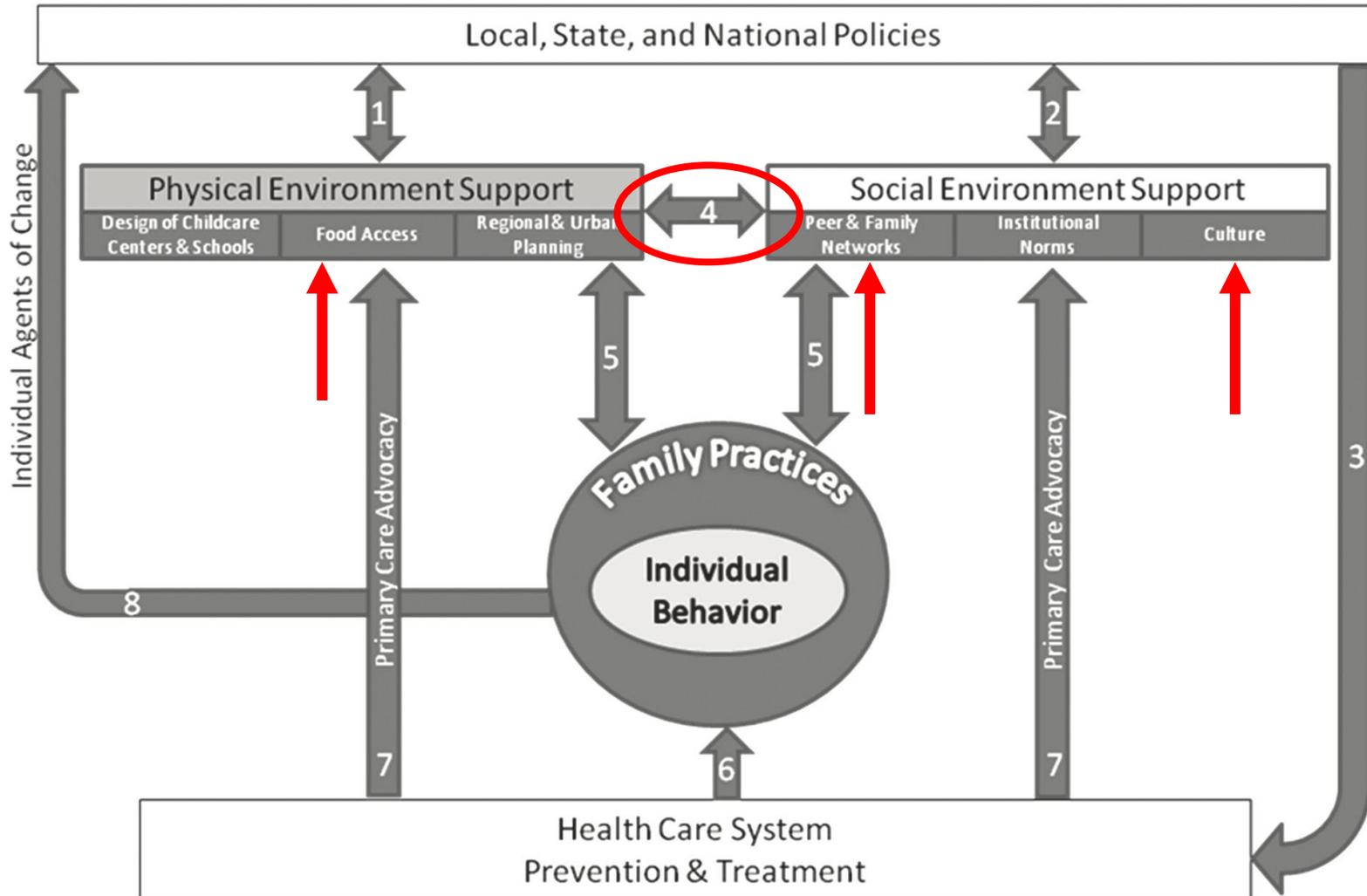
## Barriers to Redemption

- Embarrassment, negative interactions in stores
- Gaps in knowledge (e.g., determining amount of F/V with CVV)
- Limited selection of WIC foods at local vendors; products not available in allowable forms
- Vendor challenges anticipating demand and maintaining adequate supply of some WIC foods
- Maintaining food freshness at the vendor (particularly small vendors)

# WIC Coverage Rates for All Participants by State, 2013

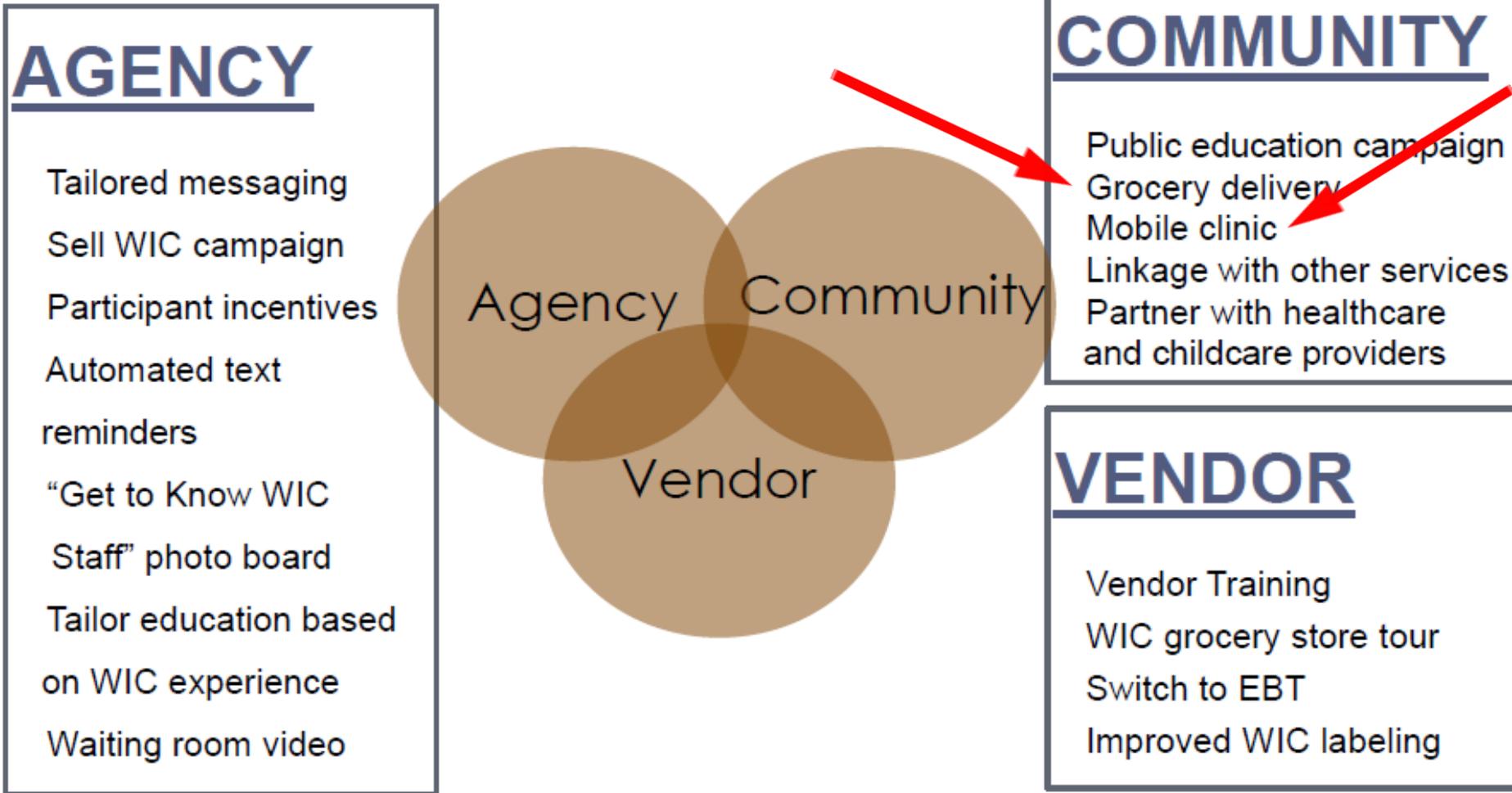


# Community Systems Framework to Promote Healthy Families



# Suggested Solutions

Mentioned by caregivers, WIC staff, and vendors



## Pregnancy

- Engage in early prenatal, post-natal, and inter-conceptual care
- Achieve healthy gestational weight gain
- Post-partum return towards a healthy weight
- Prepare to breast feed

## Infancy

- Initiate and maintain breast feeding
- Appropriate introduction of other beverages and foods
- Support for healthy sleep patterns
- Support for appropriate soothing, not always using food
- Support for motor development
- Avoid excessive weight gain in infancy
- Avoid screen time

## Toddler Years

- Active play at least one hour per day, limitation of screen time
- Consumption of healthy foods, snacks, and un-sweetened beverages in appropriate portion sizes
- Healthy nutrition and activity standards in childcare settings
- Limit screen time

# Early Life Systems: Key Intervention Behavior Targets



# What about the Millennials?

A blue-tinted photograph showing the silhouettes of a woman, a young child, and a stroller. The woman is pushing the stroller, and the child is walking alongside her. They are in a room with a tiled floor and a wall of vertical panels.

Finding Time:  
Millennial Parents, Poverty, and Rising Costs



<http://younginvincibles.org/>

# Preventive Care? Prenatal Care?

In response to a survey by Young  
Invincibles, responses were....

“What is that?”

“No instant gratification”

So, how can we better engage this  
demographic?

# What did Emma eat that is part of the WIC Food Package?



# Take home message...



# You Are What your Grandparents Ate...



# Thank you!

