

# Early Life programming and nutrition

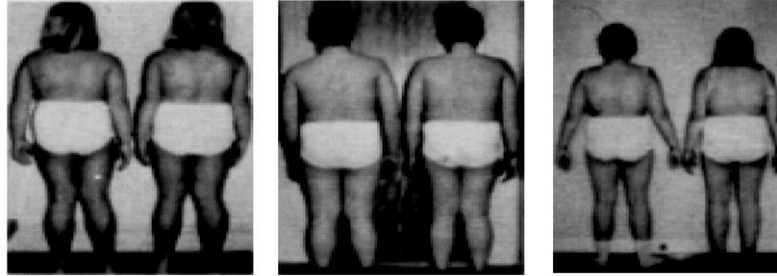
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# Potential conflict of interest disclosure

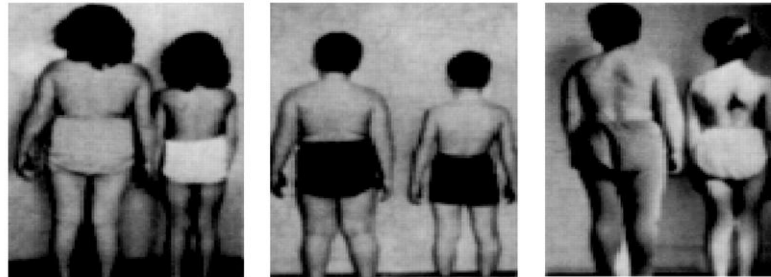
- No contract research with the private sector
- No advisory functions for corporations
- One PhD project on weaning and growth co-financed by Nutricia
- Explorations of collaborations of SA with Philips.

**Figure 1. Photographs from Borjeson<sup>14</sup> that portray the strong intrapair correlation in body mass in monozygotic or identical twins and a much lower intrapair correlation in dizygotic**

## **Body Mass in Twins**



**Monozygotic Twins (Intrapair Correlation = 0.66)**

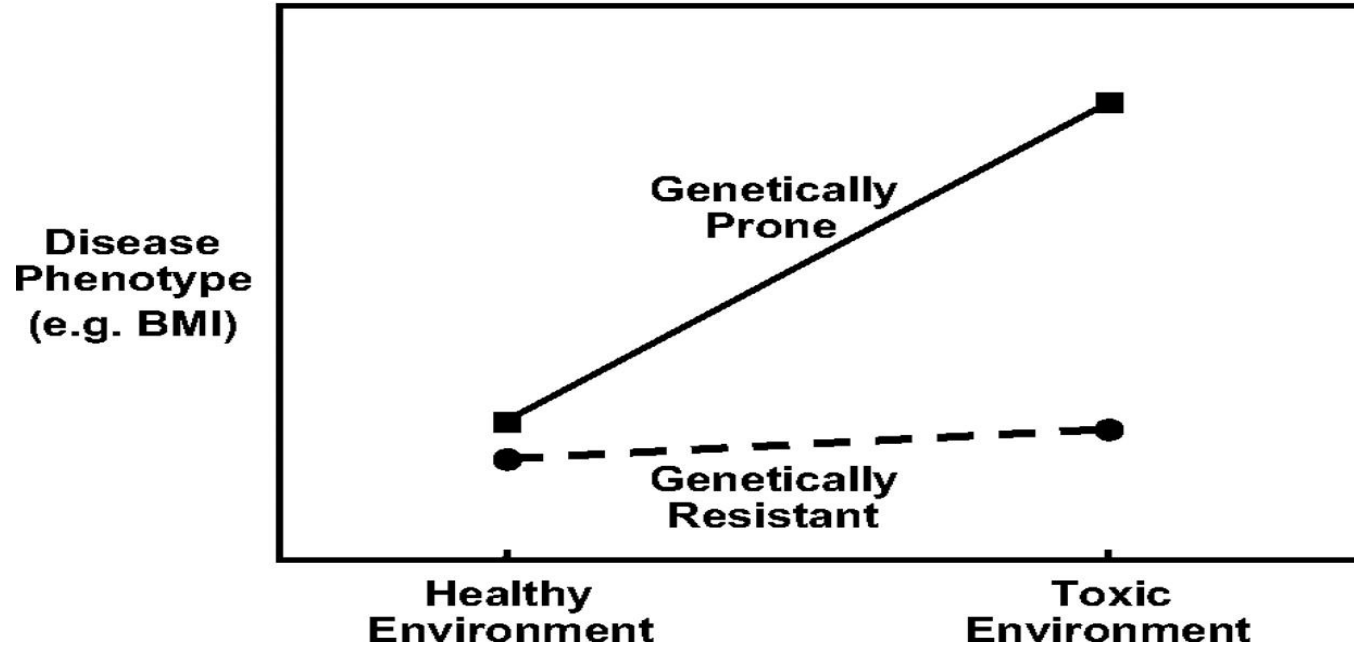


**Dizygotic Twins (Intrapair Correlation = 0.26)**

Allyn L. Mark Hypertension. 2008;51:1426-1434

Figure 2. A schematic diagram illustrating the interaction of environmental and genetic variance in complex multifactorial polygenic diseases involving the interaction of

## Interaction of Environmental and Genetic Variance in Multifactorial Diseases



Allyn L. Mark Hypertension. 2008;51:1426-1434

# THE POWER OF THE FIRST 1,000 DAYS

The right nutrition in the 1,000 days between a woman's pregnancy and her child's second birthday builds the foundation for a child's ability to grow, learn and thrive.

## 1 Pregnancy: Pre-pregnancy to birth

Babies developing in the womb draw all of their nutrients from their mother. If mom lacks key nutrients, so will her baby, putting the child's future health and development at risk.



## 2 Infancy: Birth to 6 months

Breast milk is superfood for babies. Not only is it the best nutrition an infant can get, but it also serves as the first immunization against illness and disease.



## 3 Toddlerhood: 6 months to 2 years

Nutrients from a variety of healthy foods are an essential complement to breast milk to ensure healthy growth and brain development.



The impact of good nutrition early in life can reach far into the future. Children who get the right nutrition in their first 1,000 days:

ARE 10x MORE likely to overcome the most life-threatening childhood diseases<sup>1</sup>



COMPLETE 4.6 more grades of school<sup>2</sup>



Go on to earn 21% more in wages as adults<sup>3</sup>



Are more likely as adults to have healthier families<sup>4</sup>



### SOURCES

1. Save the Children, Nutrition in the First 1,000 Days: State of the World's Mothers 2012.

2. Hoddinott, J. et al "Adult consequences of growth failure in early childhood." American Society for Nutrition, 2013.

3. Ibid.

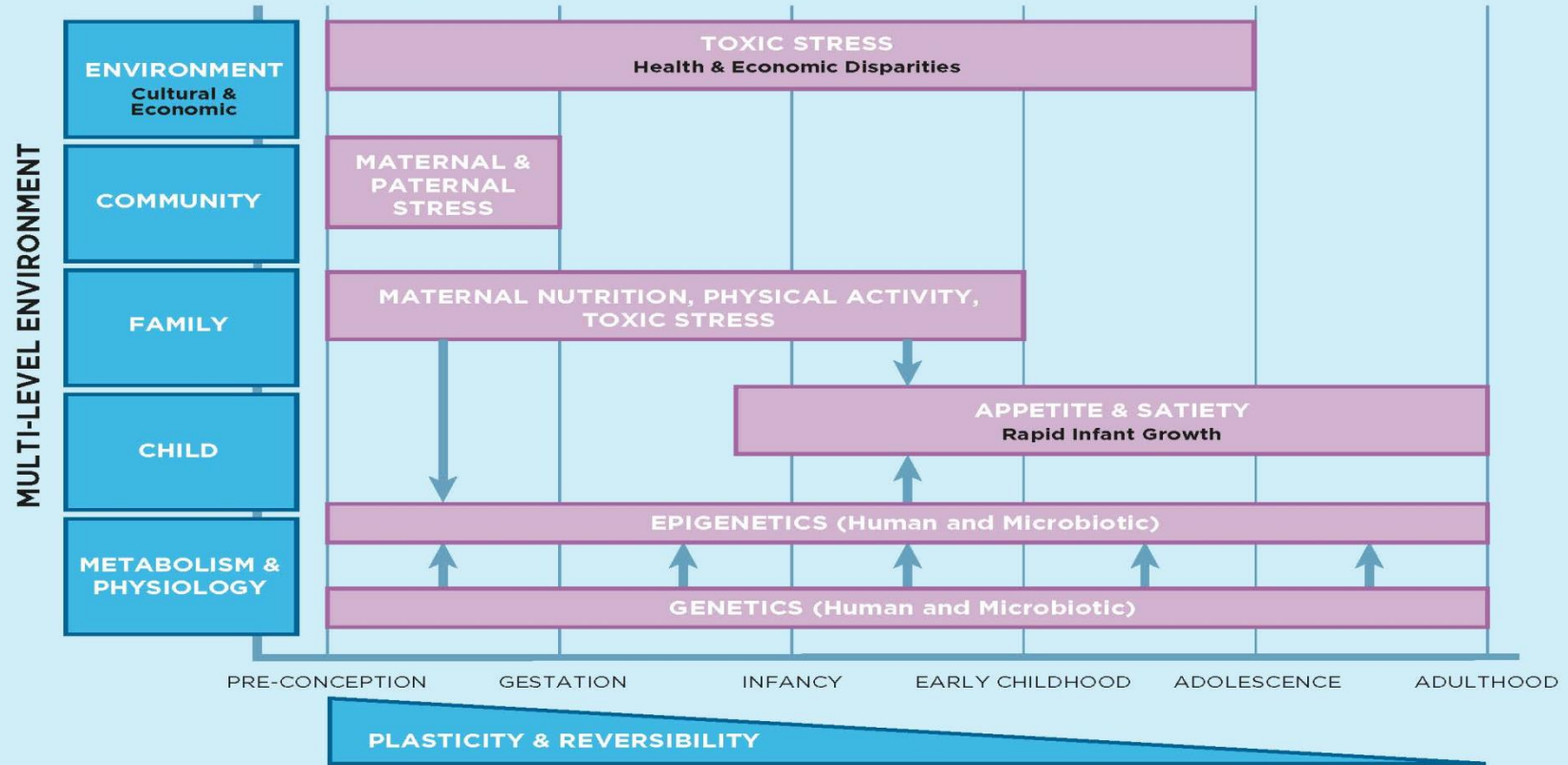
4. Ibid.



[www.thousanddays.org](http://www.thousanddays.org)

# EARLY ORIGINS OF OBESITY

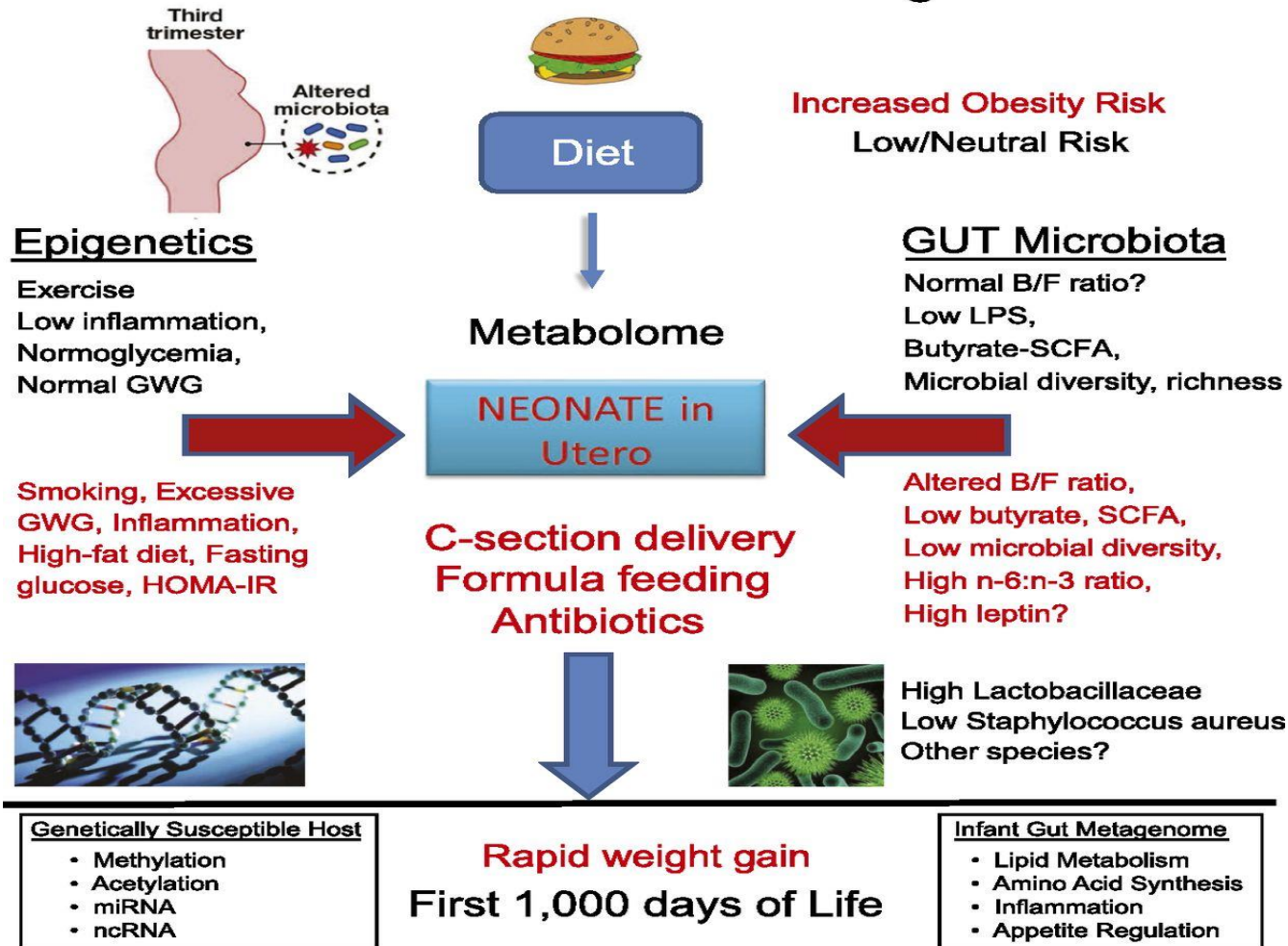
## The Role of Epigenetics and Opportunities for Intervention

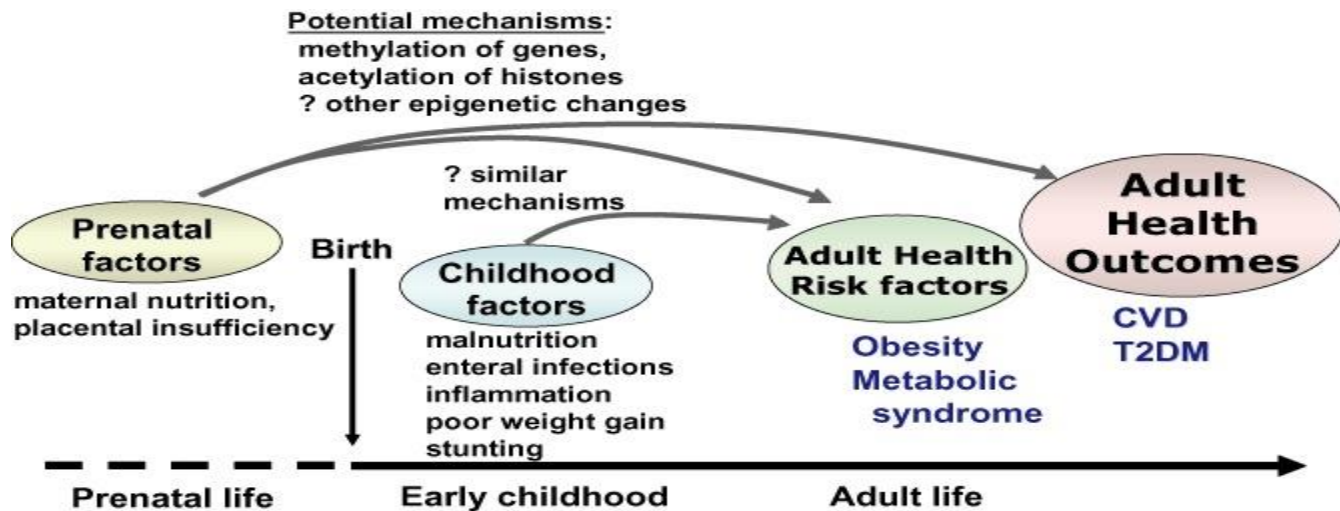


The model presented is intended to highlight the workshop objectives, rather than to be fully comprehensive. All levels of the internal and external environment interact with each other in a dynamic manner.



# Modern Western Living





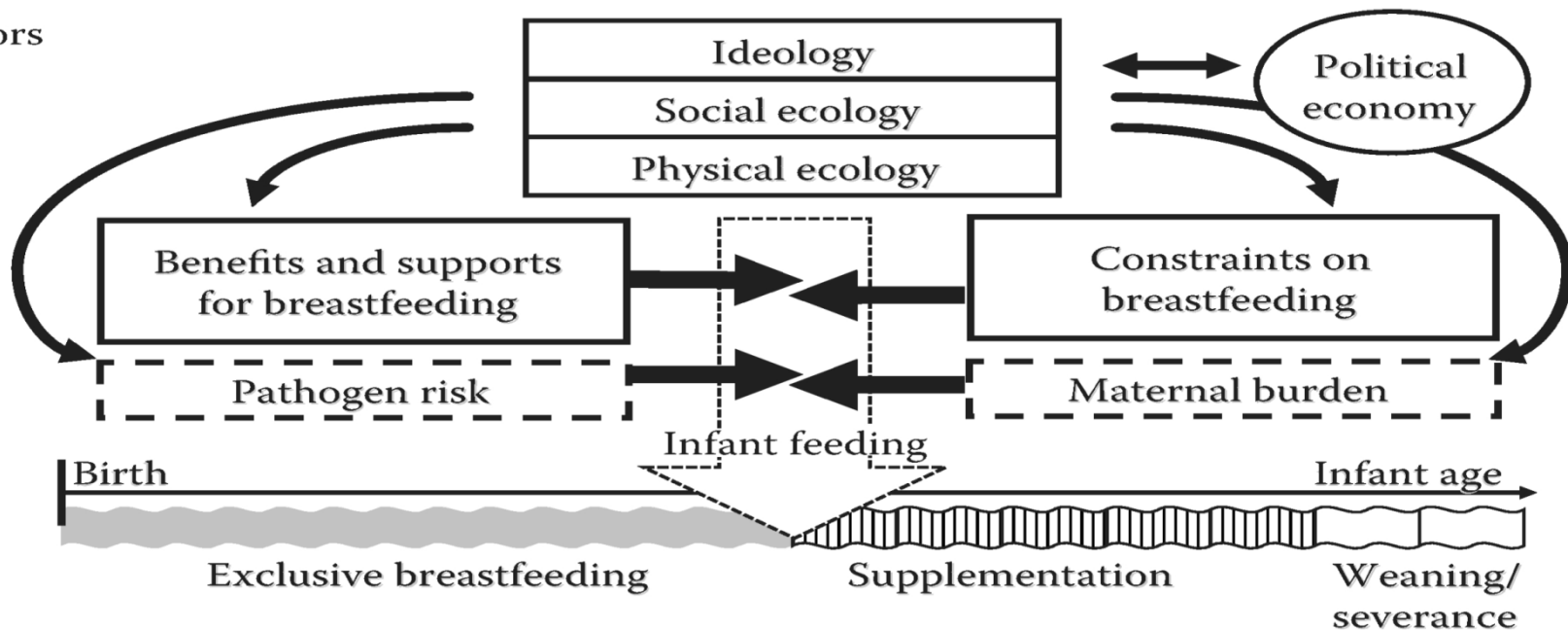


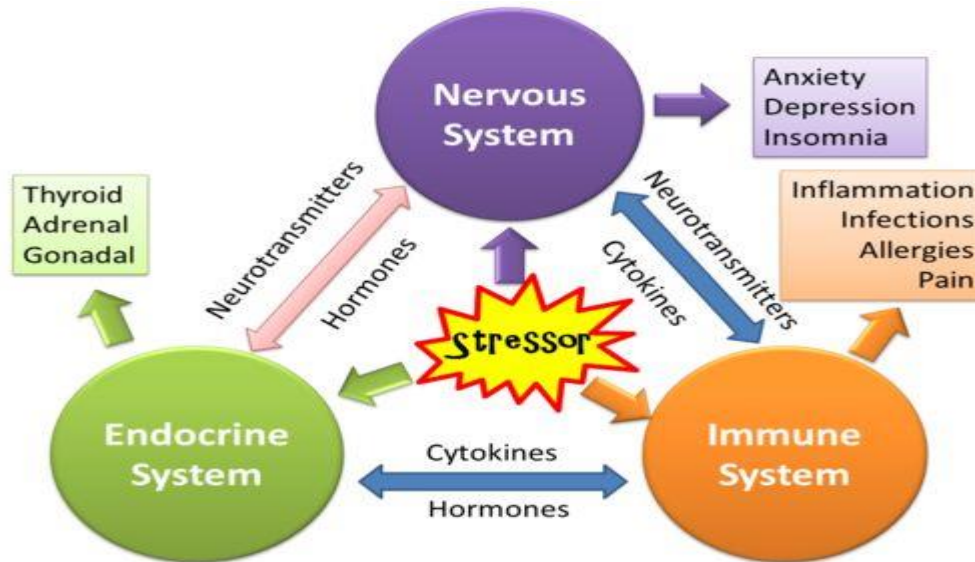
Cultural factors

Macro/  
structural

Community/  
household

Proximal





## Early Life Social Environment

Responsive caregiving

SES

Family functioning

Trauma

Buffering  
from  
supportive  
adult

### Prenatal antigenic environment

- Placental transfer of antibodies

### Immune System

- Cytokine balance/ inflammatory tone
- T Cell maturation and proliferation

### Postnatal antigenic environment

- Transfer of antibodies in breast milk
- Exposure to allergens

### Neuroendocrine Stress Response

- HPA Reactivity
- Hormones/glucocorticoids

Shared  
chemical  
language, e.g.,  
cytokines,  
cortisol

### Brain Development

- Neurogenesis, neural plasticity, signaling
- Homeostatic control
- Coordination of stress response

Individual-  
Moderators:  
•Genetics  
•Coping  
•Development

## Health & Developmental Outcomes

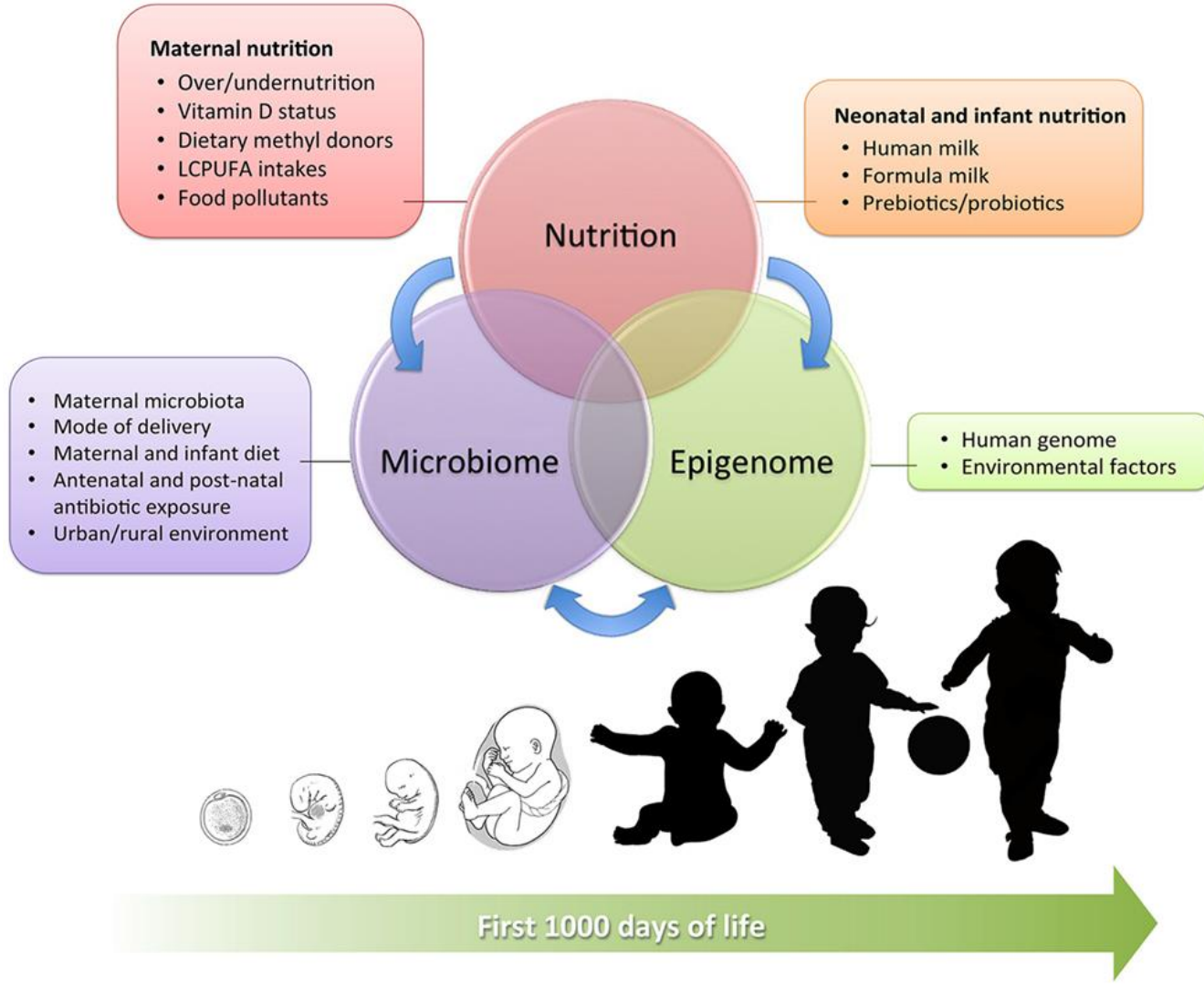
Infectious  
disease risk

Chronic disease  
risk

Cognition, learning  
& memory

Behavior/emotion  
regulation

Psychological  
functioning



## Dutch Hunger Winter, 1944-1945 (n=2,414)

Women were exposed to famine in early, mid, and late gestation.

The effects on infants later in life:

Early gestation:

- heart disease
- raised lipids
- altered clotting
- obesity

Mid gestation:

- obstructive airways
- microalbuminuria

Late gestation:

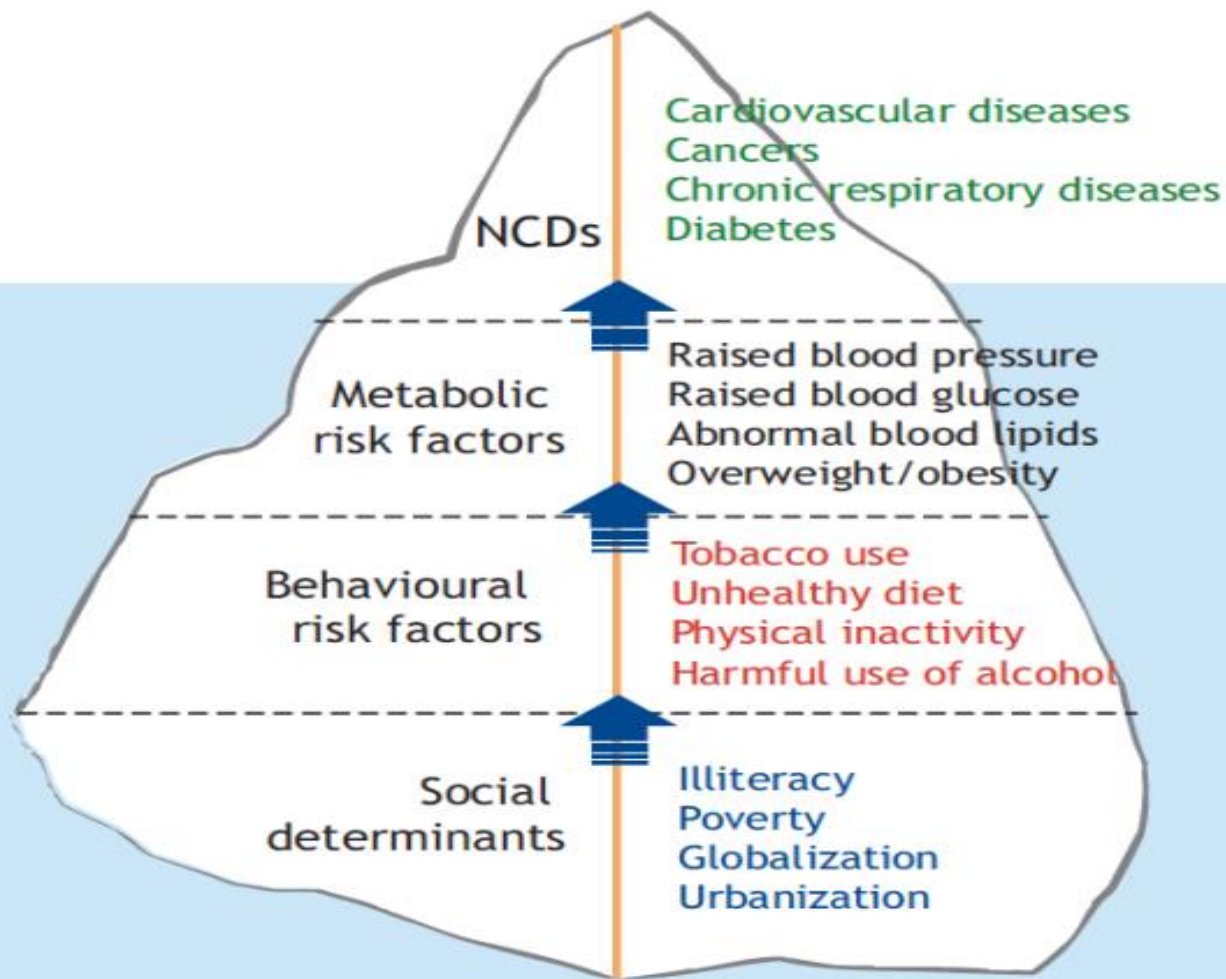
- decreased glucose tolerance



Source: UnDo.Net. 2016.

“...maternal undernutrition...has important effects on health in later life but that the timing of the nutritional insult determines which organ system is affected.”

Painter et al. 2005. *Reproductive Toxicology* 20(3): 345-352.

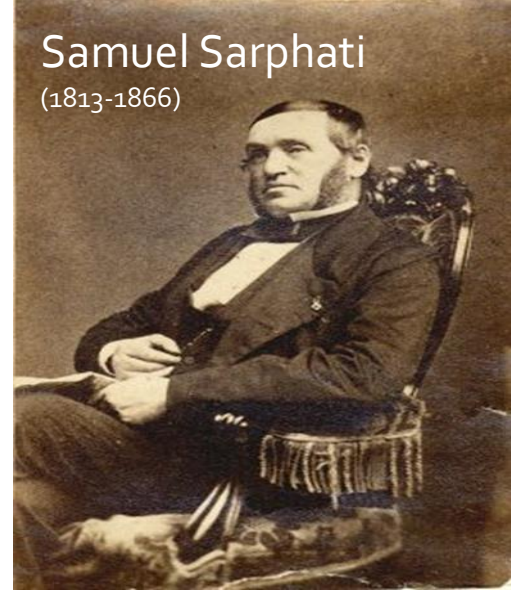




# Samuel Sarphati

- Amsterdams physician, entrepreneur and visionary
- Combination of research, policy and practice
- Tackling upstream determinants of disease

Samuel Sarphati  
(1813-1866)



# Sarphati Amsterdam's Mission & Vision

## Mission

Conduct innovative interdisciplinary research beneficial to effective and sustainable prevention of non-communicable diseases.

## Vision

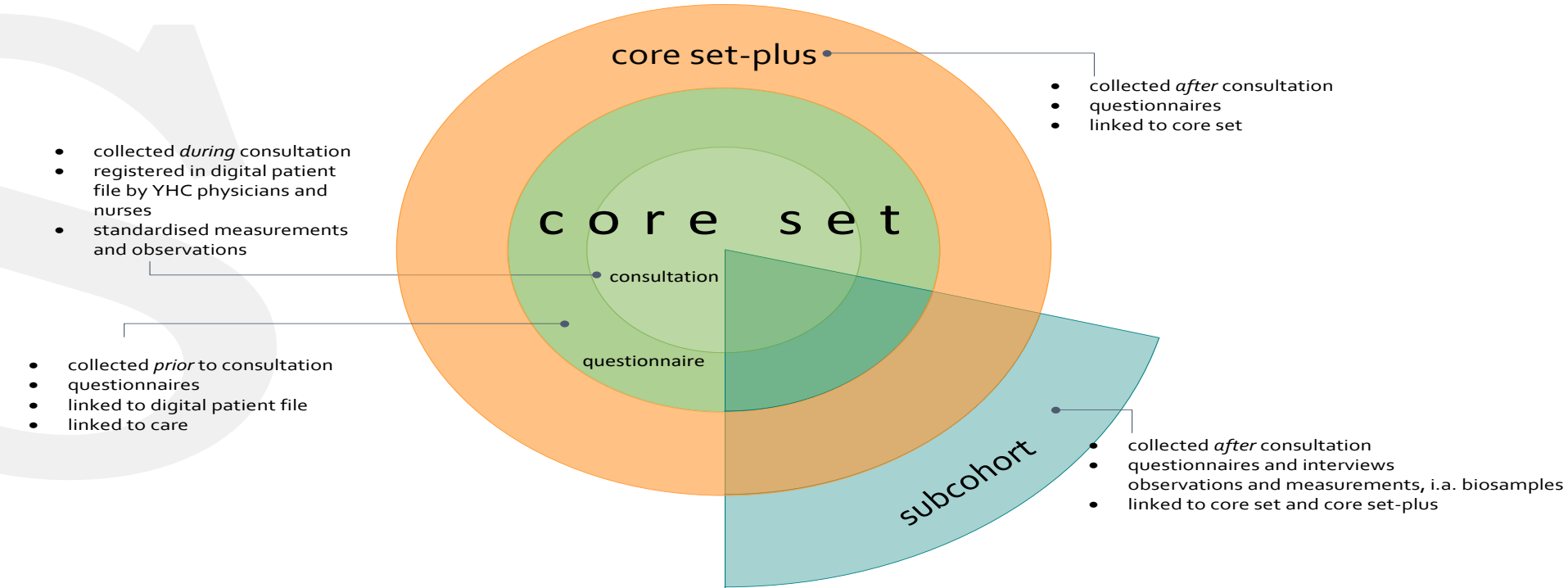
Sarphati Amsterdam provides a unique and high-quality research infrastructure that combines excellent scientific expertise from several disciplines. Sarphati Amsterdam contributes to the ambitious goal of the city of Amsterdam to improve the health behaviour and quality of life of its residents.

Sarphati's knowledge and infrastructure are of high interest to students, researchers, policy makers and companies globally, which further strengthens Amsterdam's profile as a knowledge city.

# Sarphati Cohort: general information

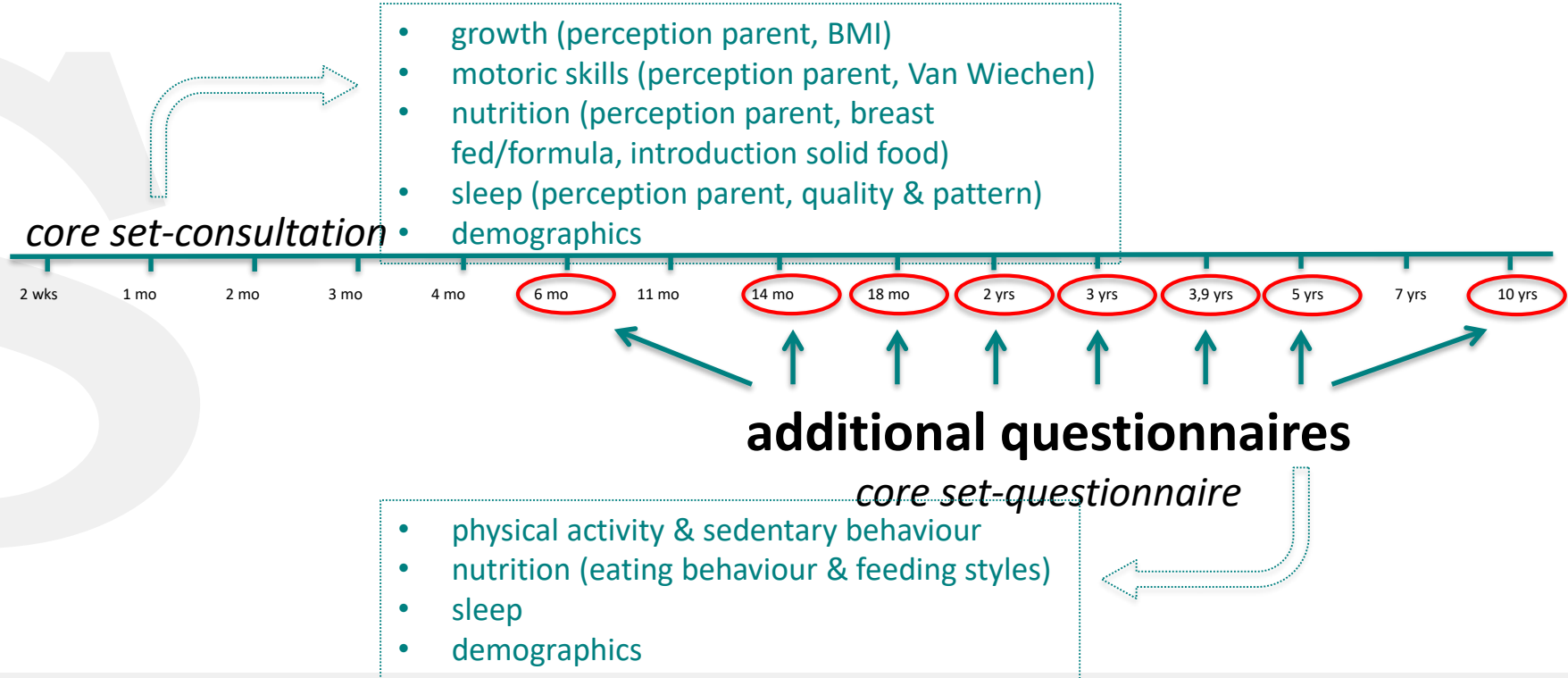
- A large-scale, **multi-ethnic** cohort study for long-term monitoring of the development of **all children in Amsterdam (0 – 19 years)**
- **dynamic: ~11,000 children born in Amsterdam annually are added to the cohort**
- **Innovative data collection** through youth health care registration

# Data collection Sarphati Cohort through Youth Health Care



# Sarphati Cohort

## Data collection during & around YHC consultations



# Conclusions

- Nutrition in early life has life-long consequences
- Ensuring optimal nutrition during the first 1000 days is a challenge
- Targeted approaches and mixed research methods necessary.



# SECTION YOUTH AND LIFESTYLE

