



A Clinical & Public Health Framework For Food-Related Health

Food Matters: A Clinical Education and Advocacy Program

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Food Matters: A Healthcare Education and Advocacy Program



To inspire clinicians to:

Provide anticipatory guidance to patients and families about the importance of healthy foods and a healthy food system.

Work within health care facilities to create a healthy food service model that is recognized as integral to a preventive health agenda.

Work within the community at a local, regional and national level to promote policies that support the development of a healthy, accessible, and fair food system.

Components of the Food Matters Program

- **Clinical advisory group**
- **Clinical curriculum development and trainings**
- **Nationwide clinical network**
- **Maternal/Child health calendar**
- **Video for waiting rooms, clinics, exam rooms, community meetings**
- **Healthy Food in Health Care campaign for healthier, more sustainable foodservice**



Guiding Rationale | Healthcare Advocacy

Hospitals and healthcare professionals can be leaders and advocates for a food system that promotes public and environmental health.

Healthcare professionals have credibility, influence, and expertise.

Anti-smoking campaigns can be good models.



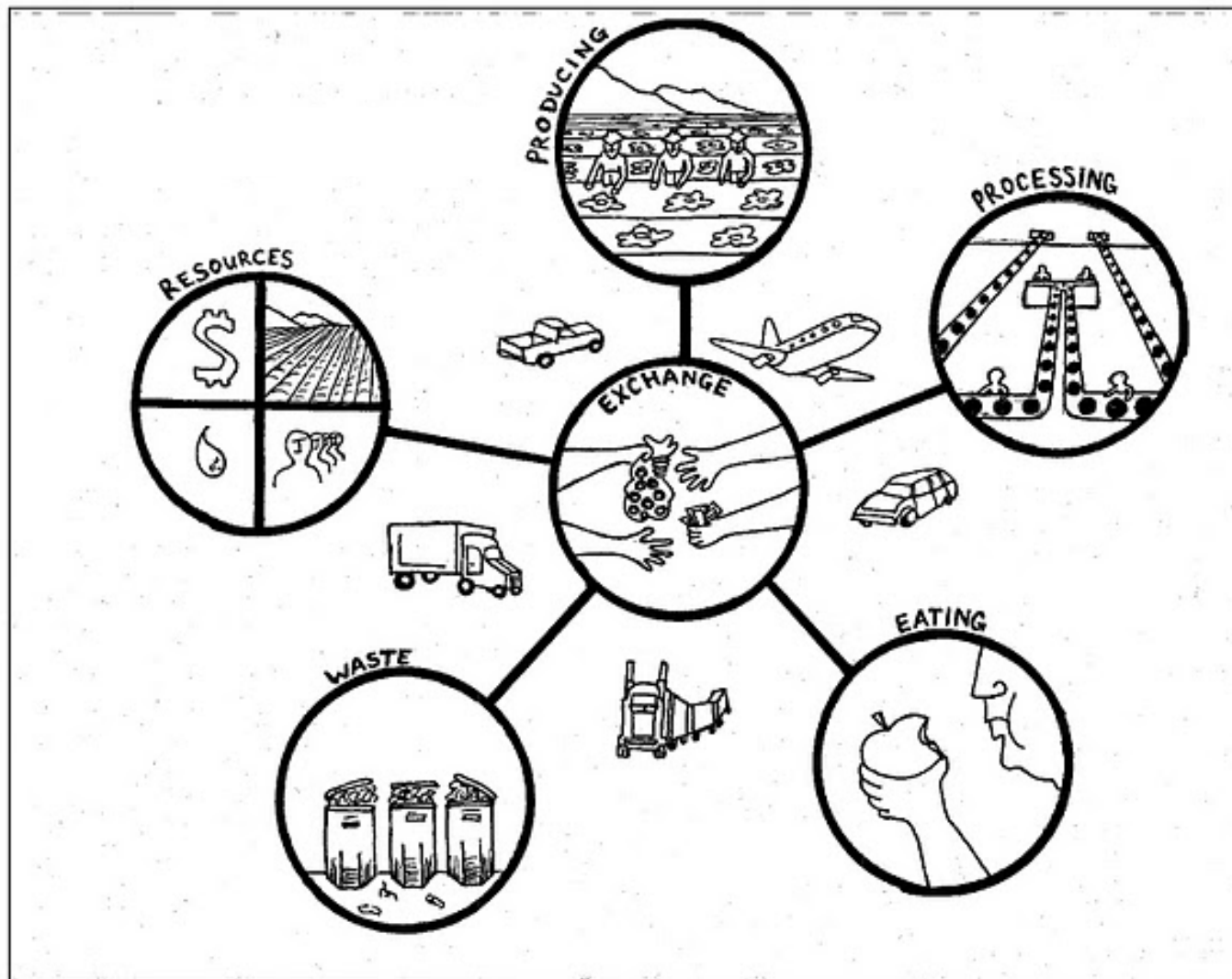
Outline

- Systems approach to food and health
- An ecologic framework for analysis and interventions
- Changes in the food system and dietary trends
- The Western diet and chronic diseases
- Healthy Diet – First foods and beyond
- Connecting the food system to environmental impacts
- A role for health care

Healthy food
comes from a food system that is
ecologically sound,
economically viable, and
socially responsible.

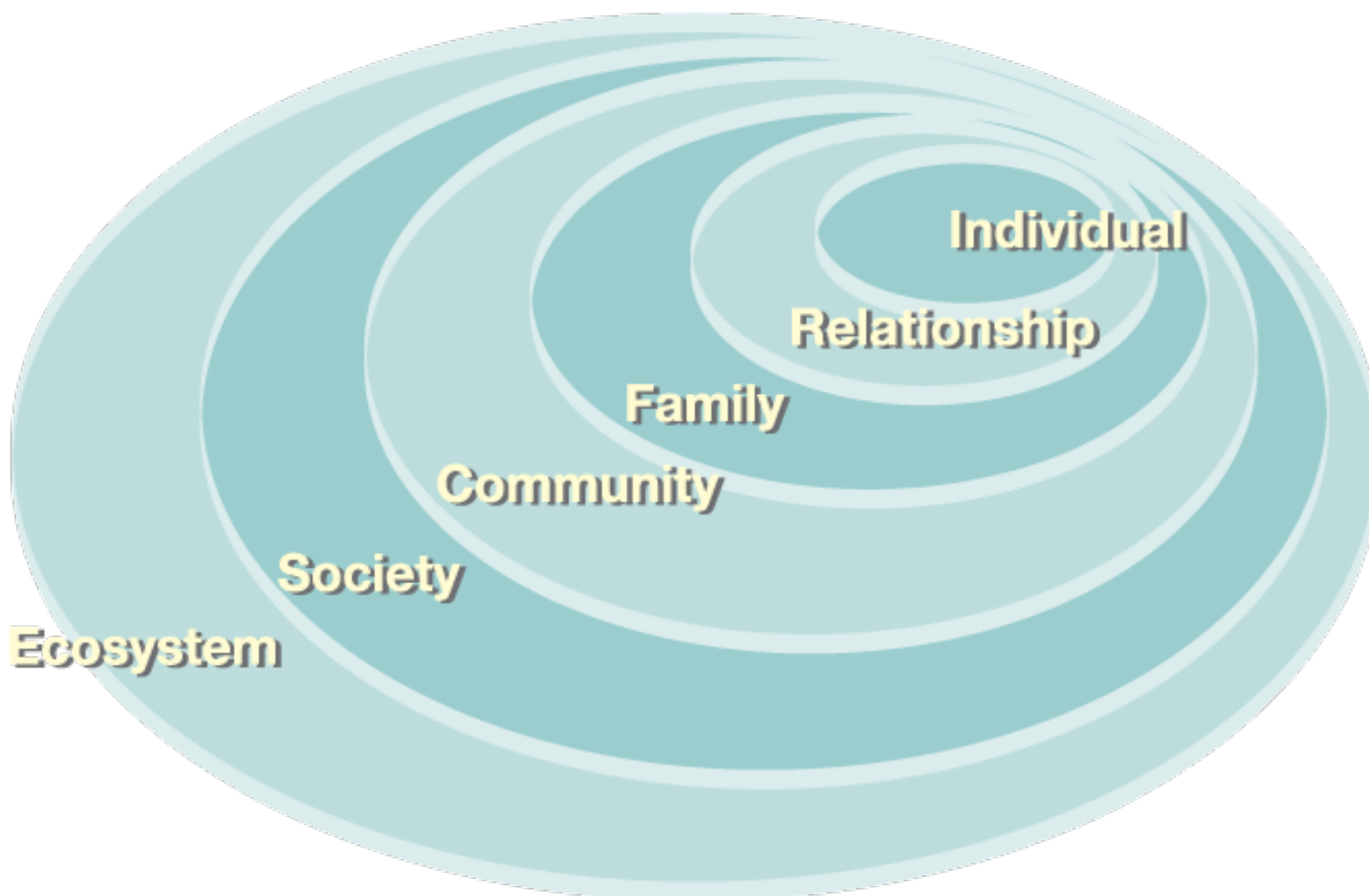


Guiding Rationale | A Food Systems Approach



Guiding Rationale | An Ecological Health Framework

The individual in the context of family, community, society and ecosystem



Developmental Origins of Adult Disease

“It is suggested that poor nutrition in early life increases susceptibility to the effects of an affluent diet. . .”

Barker DJ, Osmond C. Infant mortality, childhood nutrition, and ischaemic heart disease in England and Wales. *Lancet*. 1986 May 10;1(8489):1077-81.

THE LANCET, MAY 10, 1986

Epidemiology

INFANT MORTALITY, CHILDHOOD NUTRITION, AND ISCHAEMIC HEART DISEASE IN ENGLAND AND WALES

D. J. P. BARKER

C. OSMOND

MRC Environmental Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton SO9 4XY

Summary Although the rise in ischaemic heart disease in England and Wales has been associated with increasing prosperity, mortality rates are highest in the least affluent areas. On division of the country into two hundred and twelve local authority areas a strong geographical relation was found between ischaemic heart disease mortality rates in 1968–78 and infant mortality in 1921–25. Of the twenty-four other common causes of death only bronchitis, stomach cancer, and rheumatic heart disease were similarly related to infant mortality. These diseases are associated with poor living conditions and mortality from them is declining. Ischaemic heart disease is strongly correlated with both neonatal and postneonatal mortality. It is suggested that poor nutrition in early life increases susceptibility to the effects of an affluent diet.

Timing Matters

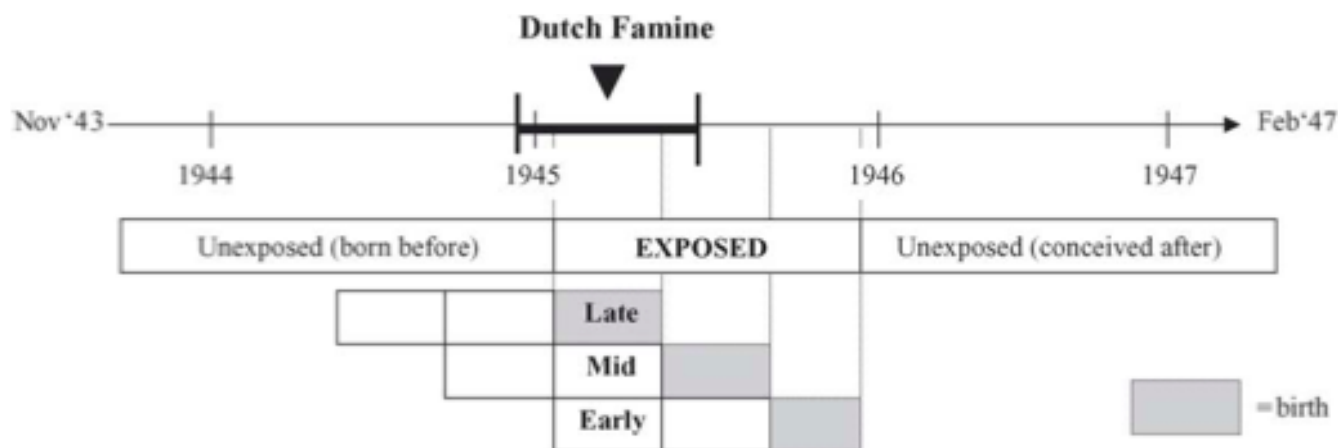
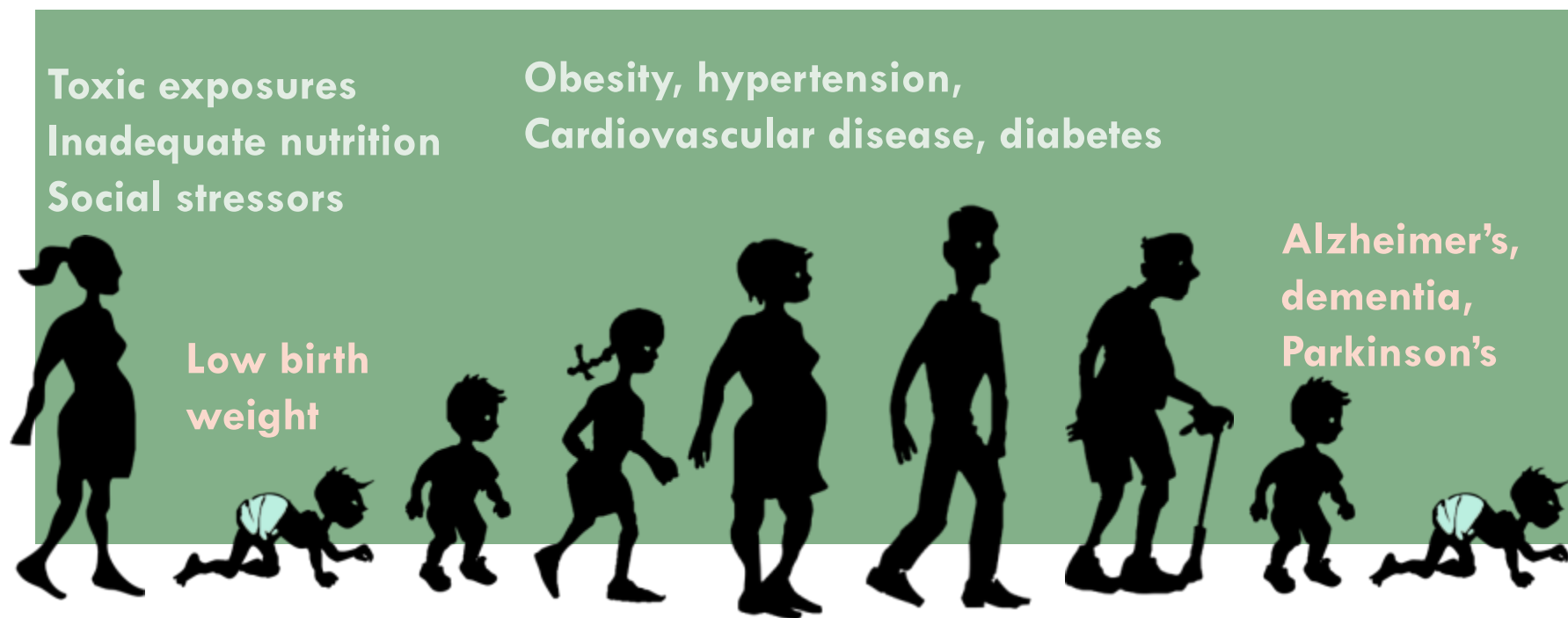


Fig. 1. The Dutch famine birth cohort: famine exposure and birth in relation to the timing of the Dutch famine.

Early gestation	Three-fold increase in coronary heart disease, more obesity
Mid gestation	Increase in obstructive airways disease
Late gestation	Impaired glucose tolerance

Painter RC, Roseboom TJ, Bleker OP. Prenatal exposure to the Dutch famine and disease in later life. *Reproductive Toxicology*. 2005 Sep-Oct;20(3):345-52.

Early Life Experiences Can Influence Later-life Health and Disease



Aging begins at conception

Trends in US food consumption

- 300 more daily calories than 25 yrs. ago
- Calories from added fats and oils increased by 69 % over 40 yrs.
- Sugar and sweeteners are about 36-40% of the growing consumption of carbohydrates; dramatic increase in HFCS consumption.
- Fewer than 1/4 of people in the US eat at least five servings of fruits and vegetables daily
- Meat consumption in the US is among the top three countries in the world. 22% is processed.

Environmentally-Driven Western Disease Cluster

- **Obesity/overweight**
 - 2/3 US adults, prevalence X2 in ~25 yrs
- **Pre/Diabetes**
 - 40% US adults. Prevalence DM ~X2 over 20 yrs
- **Cardiovascular disease**
 - Still leading cause of death
- **Metabolic syndrome**
 - Early signs of other cluster diseases; 35% adults, ~55%>60 yrs
 - Metabolic syndrome in childhood increases the risk of cardiovascular disease in adulthood 15 fold
- **Various kinds of cancer**

Mechanisms of Action Underlying Diet-Related Chronic Diseases

**Nutritional/
Environmental
Factors**



**Chronic
Disease**

Inflammation

Disrupted Insulin Signaling

Oxidative Stress

Other

Mechanisms of Action: Inflammation

Inflammation is a dimension of:

- Diabetes
- Metabolic syndrome
- Obesity
- Cardiovascular disease
- Some neurodegenerative disorders
- Other chronic illnesses, including cancer

Oxidative Stress



INTERNAL

Mitochondria
Activated Immune Cells
(phagocytes)

Reactive Oxygen
Species
(ROS)

EXTERNAL

- Tobacco smoke
- Industrial pollutants
- Ozone, particulate
- Pesticides
- Radiation
- Anesthetics
- Organic solvents
- Some pharmaceuticals
- High oxygen
- Food*

ANTIOXIDANTS

*Sufficient antioxidants keep
this process in check.*

TISSUE INJURY

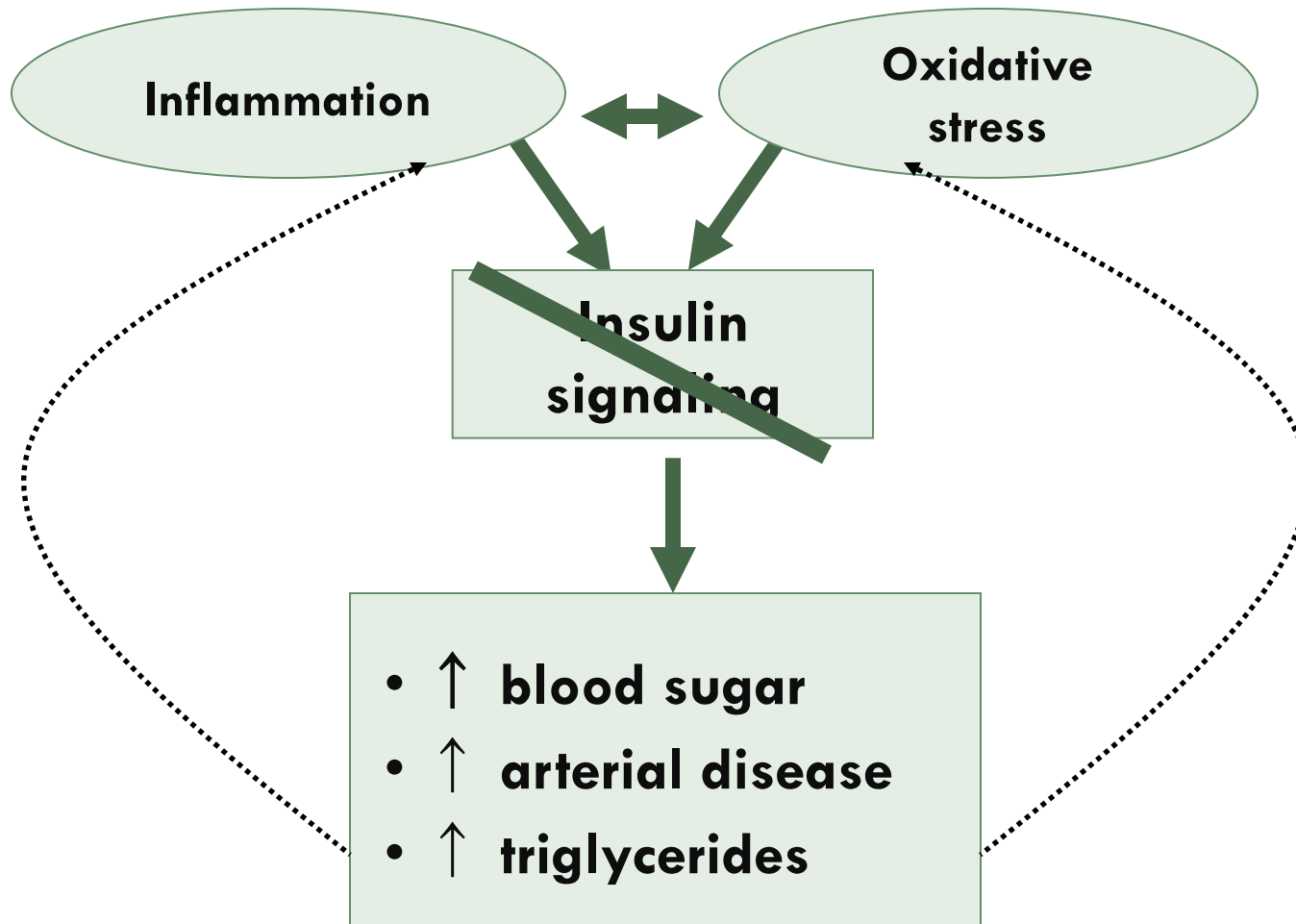
Insulin Signaling in Normal Metabolism

**Insulin
signaling**



- ↓ **blood sugar**
- ↓ **arterial disease**
- ↓ **triglycerides**

Disrupted Insulin Signaling = Inflammatory Metabolism

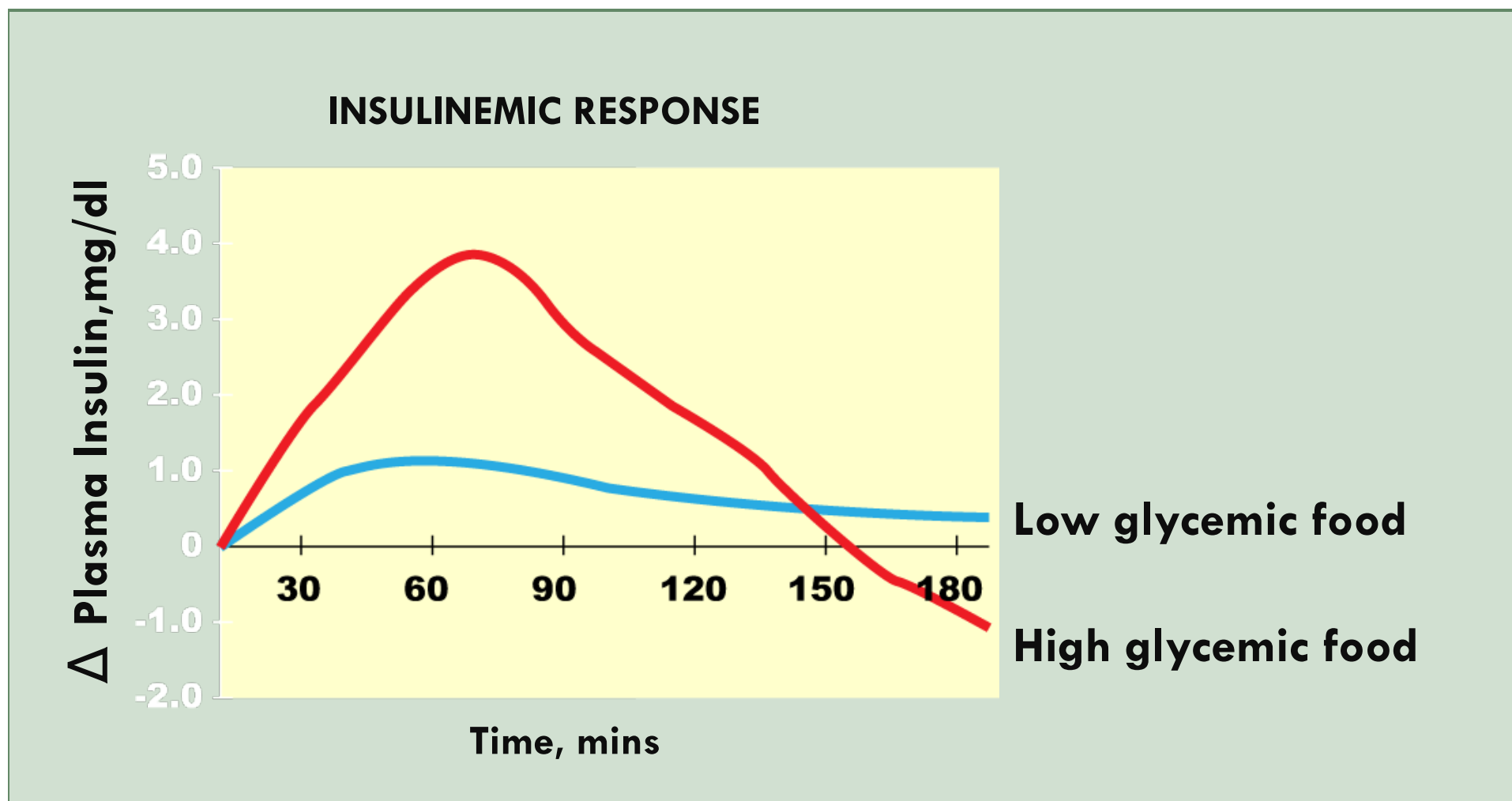


Some Increasingly Pervasive Nutrients Promote Inflammatory Metabolism



High Glycemic Carbohydrates

Increase the risk of chronic disease by breaking down quickly during digestion, rapidly releasing glucose (sugar) into the bloodstream.



Estimated intakes of total fructose , free fructose, and high-fructose corn syrup in relation to trends in the prevalence of overweight (■) and obesity (x) in the United States.

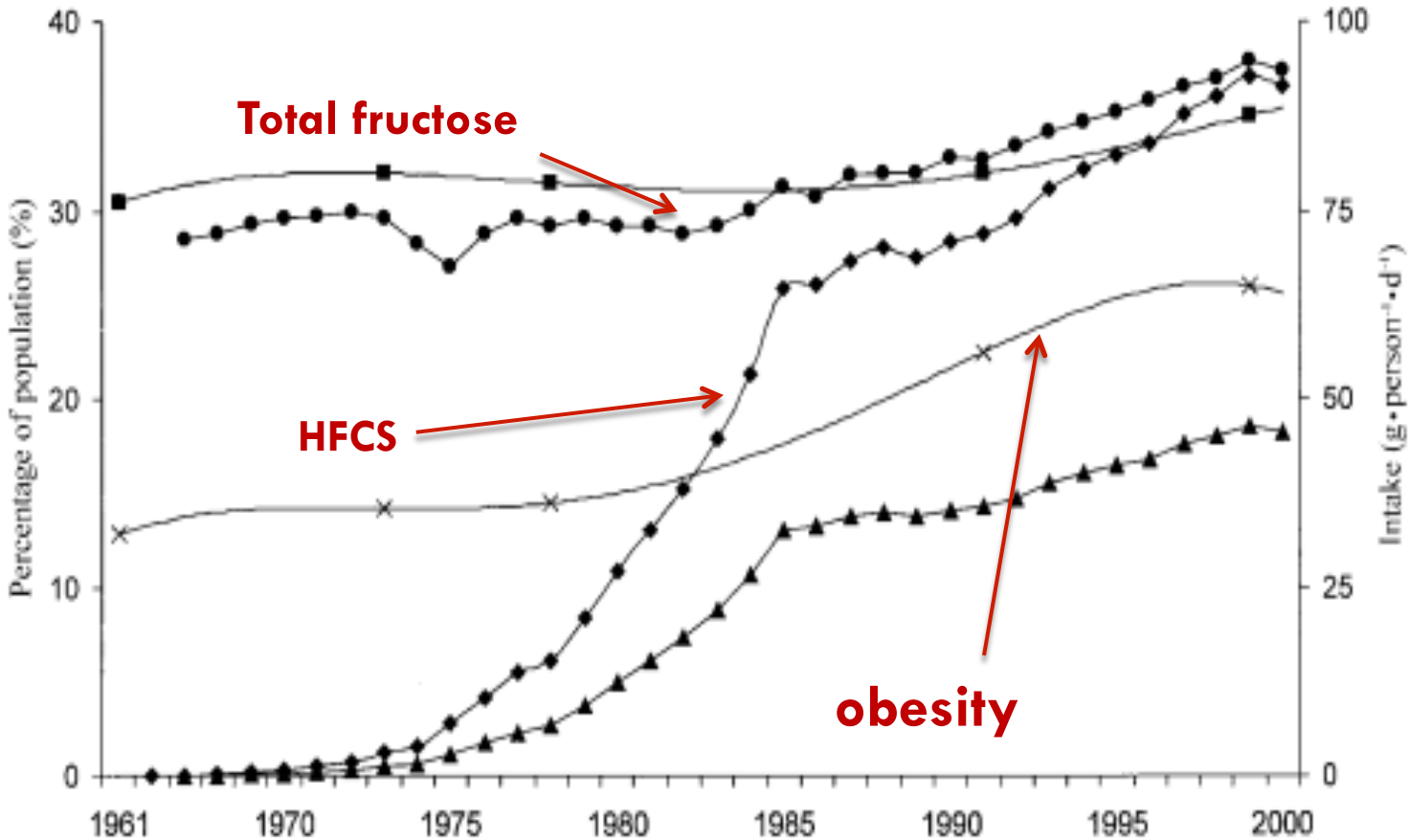
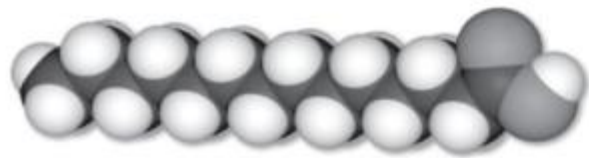


FIGURE 1. Estimated intakes of total fructose (●), free fructose (▲), and high-fructose corn syrup (HFCS, ◆) in relation to trends in the prevalence of overweight (■) and obesity (x) in the United States. Data from references 7 and 35.

HFCS and obesity

- Hepatic metabolism of fructose favors de novo lipogenesis.
- Unlike glucose, fructose does not stimulate insulin secretion or enhance leptin production. Because insulin and leptin play key roles in the regulation of food intake and body weight, this suggests that dietary fructose is likely to contribute to increased energy intake and weight gain.
- In addition, calorically sweetened beverages enhance caloric overconsumption.

Types of Fatty Acid



Saturated fat



Unsaturated fat

PUFA

MUFA

Omega 3

Omega 6

• Olive oil

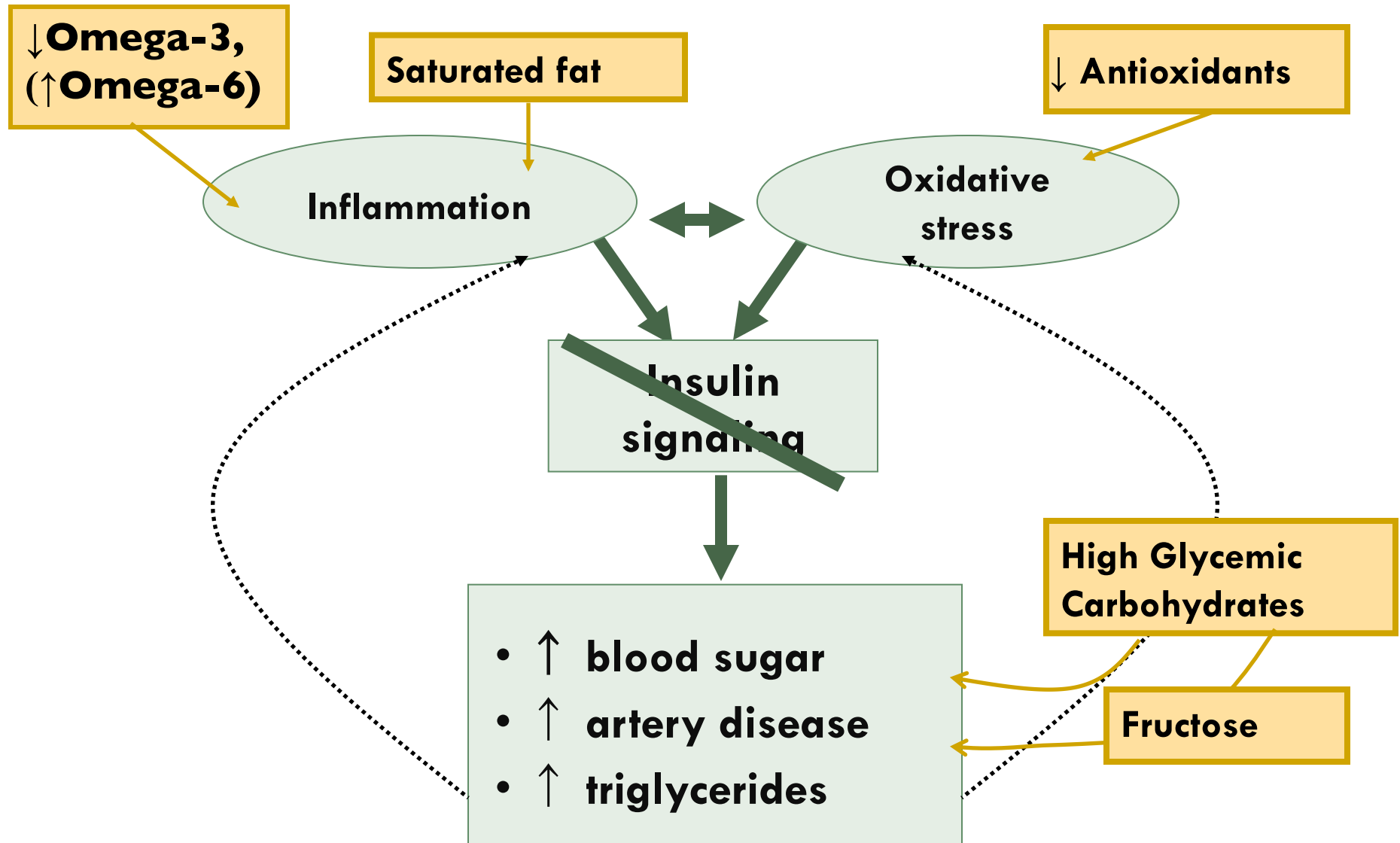
- Fish
- Canola, flax seeds
- Green vegetables
- Products from grazed animals
- Eggs from flax-fed chickens

- Fast & processed food
- Grain-fed animal products
- Corn, soy, sunflower
- Safflower, peanut oils

Properties of Fatty Acids

	Omega-3	Omega-6	Saturated
Food System	<ul style="list-style-type: none"> ▪ Perishable ▪ Short shelf life ▪ ↑ in pasture-fed animals 	<ul style="list-style-type: none"> ▪ Durable ▪ Long shelf life ▪ Processed foods 	<ul style="list-style-type: none"> ▪ ↑ in factory-farmed animals
Immune Properties	Anti-inflammatory	Inflammatory & Anti-inflammatory	Inflammatory
Evolutionary Context	Recent marked decline	Recent marked increase	

Disrupted Insulin Signaling = Inflammatory Metabolism



The Importance of Early Nutrition: In the Womb & Infancy

Developmental programming

- Epigenetic: DNA methylation, histone modification, RNA interference
- Establish “set points” of various phenotypic traits; program immune system, etc.
- Influence susceptibility to adult disease; e.g. obesity, metabolic syndrome, diabetes, cancer, neurodegenerative disease, etc.

Impact of low glycemic load diet in overweight/obese pregnant women

- n=46, interventional study; Low-GL Diet:
 - Longer pregnancy duration
 - (delivery <38 weeks 13% vs. 48%)
 - Greater Infant Head Circumference
 - Lower maternal triglycerides and cholesterol (Rhodes, 2010)
- Similar findings in subsequent observational analyses (e.g. Carmichael, 2013)

Dietary interventions may help prevent premature births and other adverse maternal and infant outcomes.

Maternal High Glucose and Increased Risk of Diabetes in Children

- Prenatal exposure to high levels of maternal blood glucose reduces insulin sensitivity in infants
- Gestational diabetes associated with increased risk of Type 2 diabetes in children; not entirely explained by BMI
- Rationale for focus on healthy food in pregnant women as a driver of health of future generations

Breast Feeding Advantages: Infant

- Reduced infectious disease
 - pneumonia, gastroenteritis, otitis media, other
- Lower risk of type 1 diabetes;
type 2 diabetes if mother does not have diabetes
- > 6 mo. decreases the risk of childhood cancer
 - leukemia, Hodgkins, neuroblastoma
- Lower risk of inflammatory bowel disease
- Improved neurological development and lower asthma risk
(inconsistent evidence)

Breast Feeding Advantages: Maternal

- Less postpartum bleeding
- Earlier return to pre-pregnancy weight
- Improved bone strength; decreased risk of hip fracture later in life
- Reduced ovarian and pre-menopausal breast cancer
- Birth control
- Women who don't breastfeed have increased risk of type 2 diabetes

Influence of Nutrition on Chronic Disease

- Increase risks
 - saturated and trans fats
 - high glycemic carbohydrates
 - lack of fruits/vegetables/omega 3s
 - excess omega 6s?
- Reduce risks
 - fruits, vegetables, nuts
 - omega 3s, monounsaturated FA
 - low glycemic carbohydrate
 - “Mediterranean-type” diet



Benefits of Mediterranean-Type Diet on Chronic Disease Risk

Clinical intervention studies

- 70% ↓ heart attacks, cardiac death & total mortality DeLogeril, 94
- 60% ↓ cardiac events in CVD patients* Ornish, 98
- ~50% ↓ metabolic syndrome Esposito, 04
- ↓ insulin resistance Esposito, 04
- ↓ weight Esposito, 04



*10% low fat, vegetarian diet + exercise, stress reduction

Benefits of Mediterranean-Type Diet on Chronic Disease Risk

Prospective observation studies

- 80% ↓ diabetes *Martinez-Gonzalez, 08*
- ~31% ↓ all-cause & cardiovascular mortality,
- 22% ↓ cancer mortality** *calculated from Sofi, 08*
- ↓ Alzheimer's onset/mortality *Scarmeas, 07; Lourida, 2013*
- 25-30% ↓ Parkinson's disease *Gao, 07*



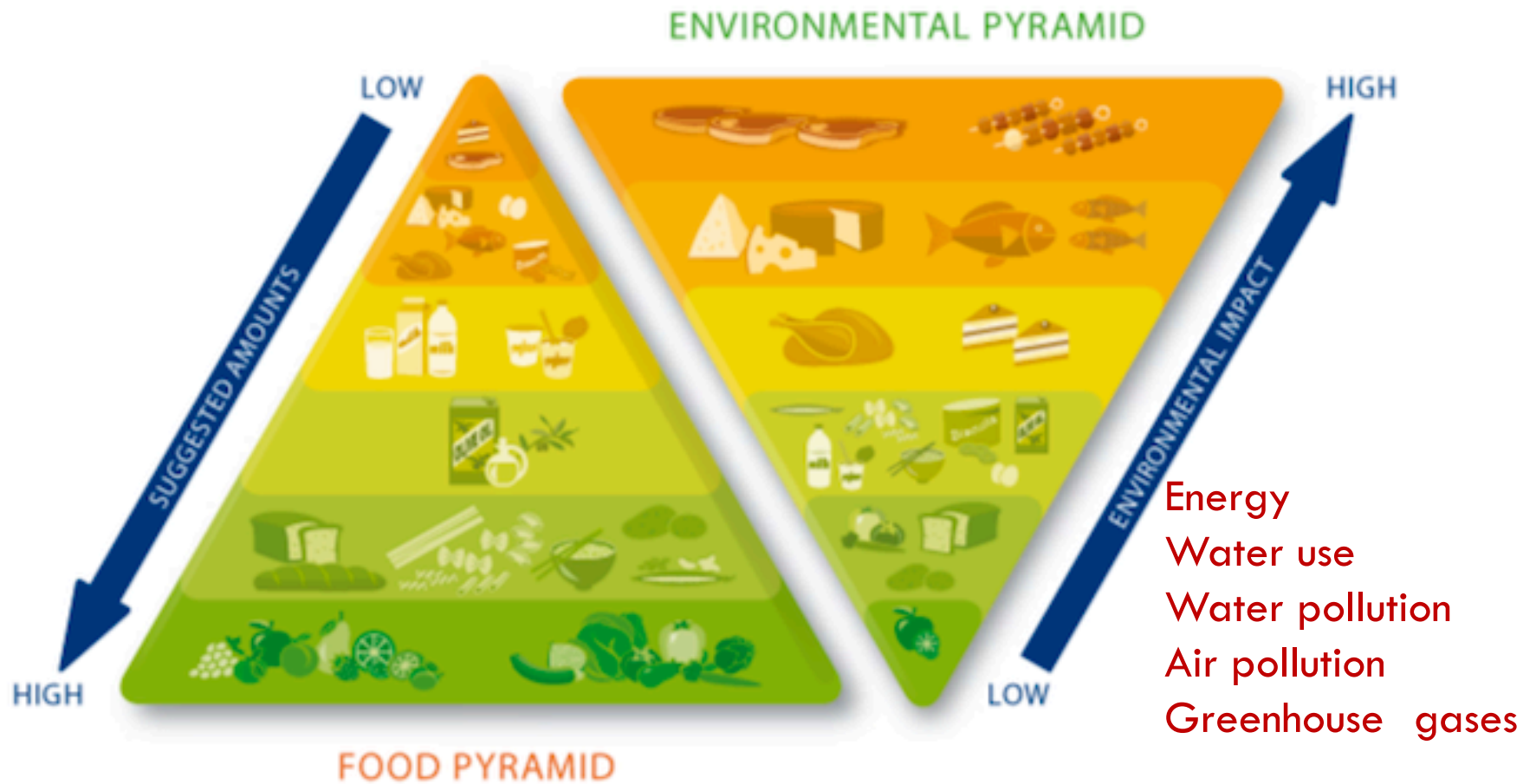
Global food system



- Accounts for approximately one third of all climate changing green house gas emissions through land use change and direct emissions
- Farm animal production accounts for about 18% of global greenhouse gas emissions
- A major contributor to unsustainable, excessive water consumption. Livestock alone accounts for more than 8 percent of global water use.

Interconnections Between Nutrition and Environmental Impacts

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Barilla Centre for Food and Nutrition
www.barillacfn.com

A Food Systems Approach Food Environments

WORKING TRENDS, ACTION AGENDA

By Kelly D. Brownell, Rogan Kersh, David S. Ludwig, Robert C. Post, Rebecca M. Puhl, Marlene B. Schwartz, and Walter C. Willett

Personal Responsibility And Obesity: A Constructive Approach To A Controversial Issue

ABSTRACT The concept of personal responsibility has been central to social, legal, and political approaches to obesity. It evokes language of blame, weakness, and vice and is a leading basis for inadequate government efforts, given the importance of environmental conditions in explaining high rates of obesity. These environmental conditions can override individual physical and psychological regulatory systems that might otherwise stand in the way of weight gain and obesity, hence undermining personal responsibility, narrowing choices, and eroding personal freedoms. Personal responsibility can be embraced as a value by placing priority on legislative and regulatory actions such as improving school nutrition, menu labeling, altering industry marketing practices, and even such controversial measures as the use of food taxes that create healthier defaults, thus supporting responsible behavior and bridging the divide between views based on individualistic versus collective responsibility.

Two of the most important words in the national discourse about obesity are "personal responsibility." Much rests on how these words are interpreted and how the concept of personal responsibility affects national policy.

How Views Of Personal Responsibility Shape National Policy
The notion that obesity is caused by the irresponsibility of individuals, and hence not our behavior or weak or unproductive government policies, is the centerpiece of food industry arguments against government action. Its conceptual cousin is that government intervention unfairly demonizes industry, promotes a "nanny" state, and intrudes on personal freedoms. This libertarian call for freedom was the tobacco industry's first line of defense against regulation. It is frequently sounded today by the

food industry and its allies, often in terms of vice and virtue that are deeply rooted in American history and that cut problems like obesity, smoking, heavy drinking, and poverty as personal failures.

The food industry script is clear. A Wall Street Journal op-ed piece opposing taxes on sugared beverages by Coca-Cola's chief executive officer stated, "Americans need to be more active and take greater responsibility for their diets."¹ This position is also exemplified by a debate in the *Bioscience* on the role governments should play in guiding food and nutrition choices. Government intervention was opposed by the director general of the Food and Drink Federation in comments evoking totalitarian language: "Such an argument has a disturbing echo of our recent past and what our parents experienced during postwar rationing, arguably the last time that governments considered every aspect of our food provision."² Industry had some early success with these

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REPORT BRIEF • SEPTEMBER 2009

LOCAL GOVERNMENT ACTIONS TO PREVENT CHILDHOOD OBESITY

In the United States, 16.3 percent of children and adolescents between the ages of two and 19 are obese. This epidemic has exploded over just three decades. Among children two to five years old, obesity prevalence increased from 5 percent to 12.4 percent; among children six to 11, it increased from 6.5 percent to 17 percent; and among adolescents 12 to 19 years old, it increased from 5 percent to 17.6 percent (see Figure 1). The prevalence of obesity is so high that it may reduce the life expectancy of today's generation of children and diminish the overall quality of their lives. Obese children and adolescents are more likely than their lower-weight counterparts to develop hypertension, high cholesterol, and type 2 diabetes when they are young, and they are more likely to be obese as adults.

In 2008, the Institute of Medicine (IOM) Committee on Childhood Obesity Prevention Actions for Local Governments was convened to identify promising ways to address this problem on what may well be the epidemic's frontlines. The good news is that there are numerous actions that show potential for use by local governments. Of course, parents and other adult caregivers play a fundamental role in tracking children about healthy behaviors, in modeling those behaviors, and in making decisions for children when needed. But those positive efforts can be undermined by local environments that are poorly suited to supporting healthy behaviors—and may even promote unhealthy behavior. For example, many communities lack ready sources of healthy food choices, such as supermarkets and grocery stores. Or they may not provide safe places for children to walk or play. In such communities, even the most motivated child or adolescent may find it difficult to act in healthy ways.

... local governments are ideally positioned to promote behaviors that will help children and adolescents reach and maintain healthy weights.

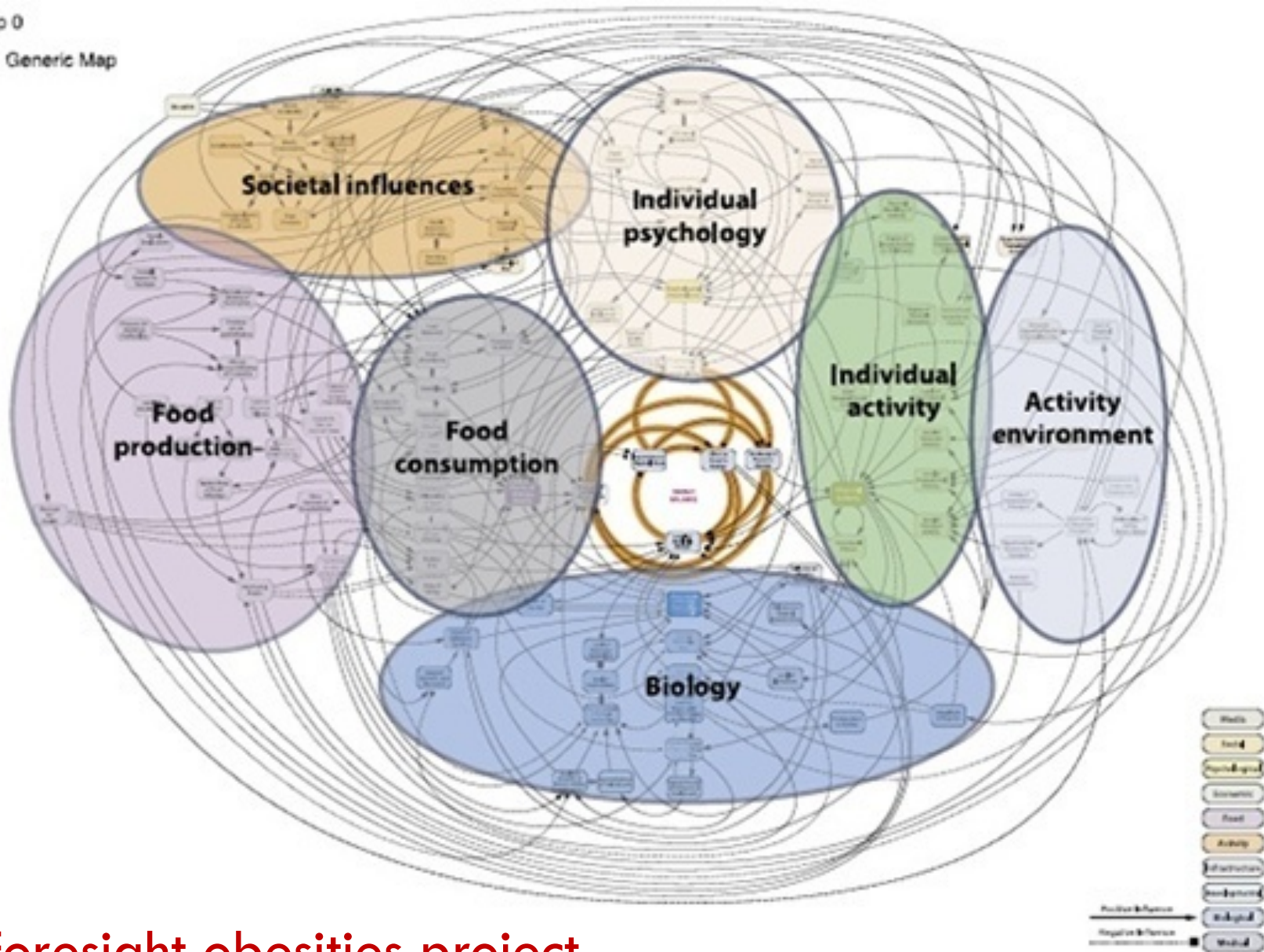
FIGURE 1: PREVALENCE OF OBESITY AMONG CHILDREN, 1971-2006

Year	Ages 2-5	Ages 6-11	Ages 12-19
1971-1974	5%	6.5%	5%
1975-1980	~7%	~8%	~6%
1985-1994	~10%	~12%	~8%
2003-2006	12.4%	17%	17.6%

SOURCE: Centers for Disease Control and Prevention, National Health and Nutrition Examination Survey

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Map 0
Full Generic Map



Foresight obesities project

A Food System Approach Advertising

\$25-30 billion per year

Twice the amount needed to provide health and nutrition for everyone in the world.

-UNDP 1998



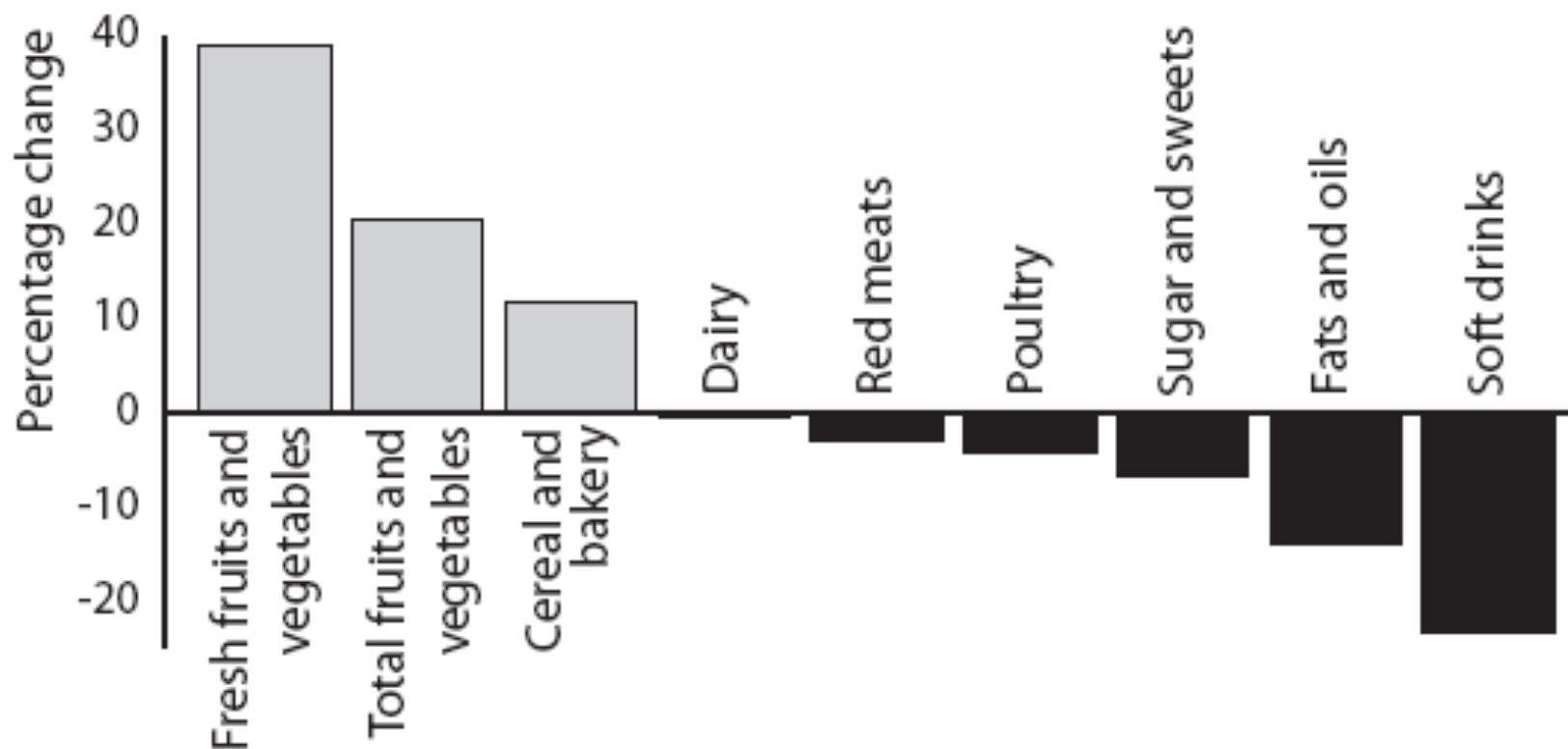
\$12 billion per year

aimed at marketing to children; often make inappropriate health claims

A Food System Approach

Economic Drivers of Food Choice

Change in food prices, 1985–2000
(real dollars)



Source: USDA ERS FoodReview, Vol. 25, Issue 3. Converted to real dollars.

A Food System Approach Access and Availability

Food deserts

- Urban and rural communities with economic and transportation barriers to accessing healthy food



Hunger in America

- Over 49 million Americans live in households that are “food insecure”
- US minimum wage = \$7.25/hour



HEALTH AND
ENVIRONMENTAL COSTS ARE
NOT REFLECTED IN THE PRICE
OF FOOD OR ACCOUNTED
FOR IN THE FOOD SYSTEM

