



Dietary Prevention of Cardiometabolic Diseases: Single Nutrients, Popular Diets, and Dietary Patterns

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The Global Nutrition Crisis



Health and wellbeing
Hunger, disparities
Health care costs and access
Government budgets
Private business, economic growth
Sustainability and climate change
National security

Our Food: The #1 Cause of Poor Health

Risk Factors

Dietary risks

Tobacco smoking

High blood pressure

High body mass index

Physical inactivity and low physical activity

High fasting plasma glucose

High total cholesterol

Ambient particulate matter pollution

Alcohol use

Drug use

Lead exposure

Occupational risks

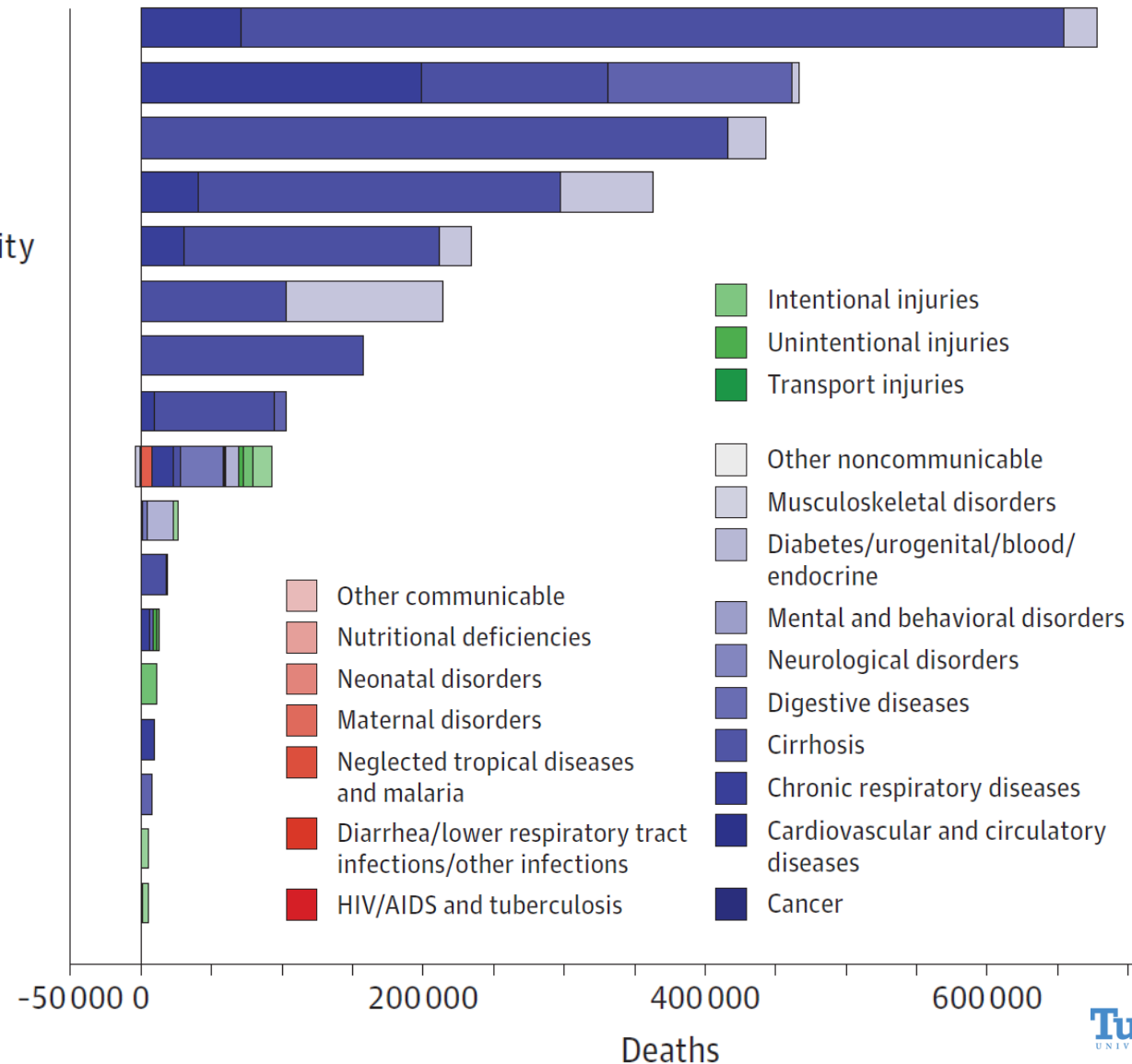
Low bone mineral density

Residential radon

Ambient ozone pollution

Intimate partner violence

Childhood sexual abuse



US Burden of Disease
Collaborators, JAMA 2013

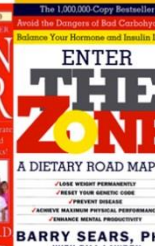
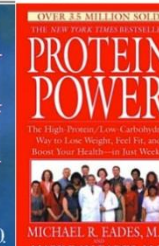
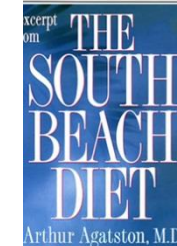
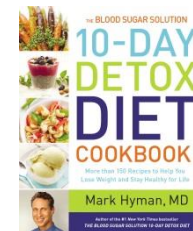
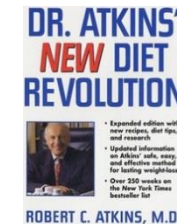
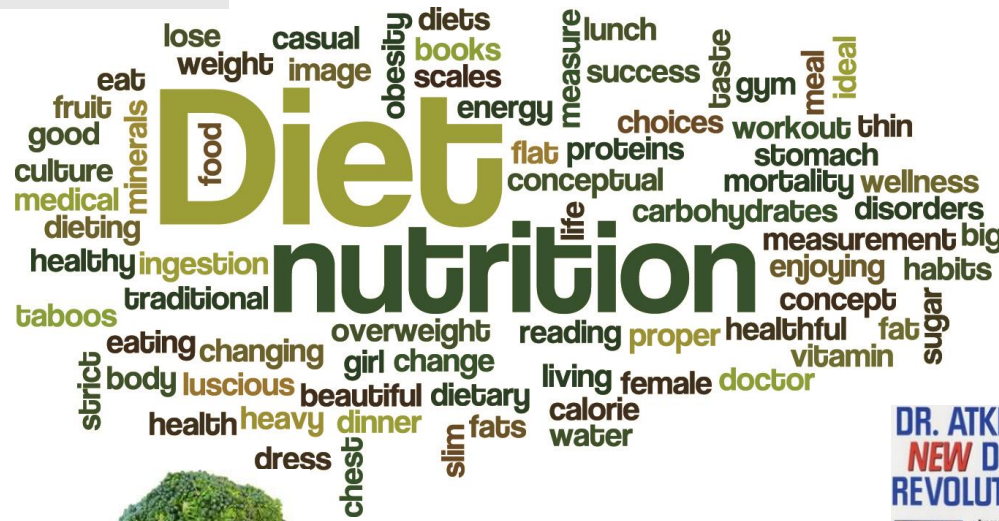
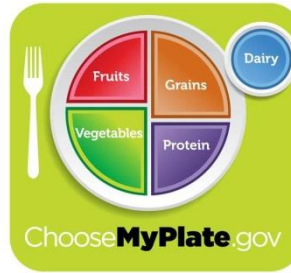
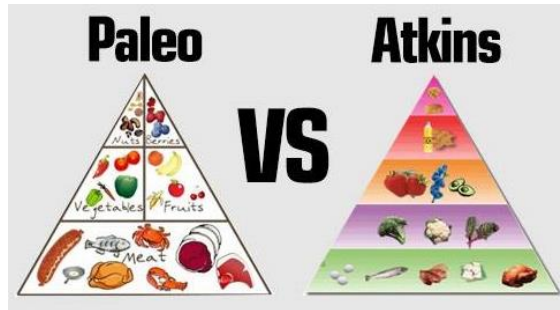


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Friedman School of
Nutrition Science and Policy

Nutrition: Passion and Confusion



Source: Google images

What is Driving Policy and Public Choices ?

Policy Makers (LIC):

- Vitamin A
- Animal protein
- Iron
- Zinc
- “Diet diversity”

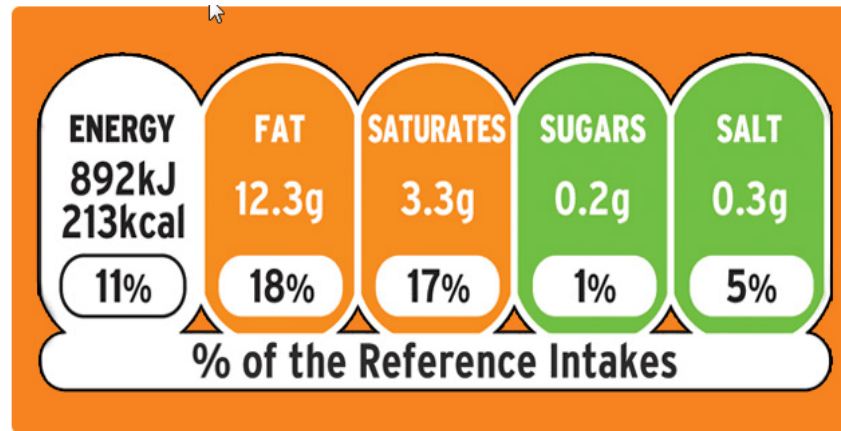
Policy Makers (MHIC):

- Total fat
- Saturated fat
- Cholesterol
- Total calories
- Added sugar

The Public (MHIC):

- Clean labels
- Processed food
- Gluten-free
- Organic
- Local
- Paleo
- Low-carb
- Vegetarian

Reductionist Focus Dominates Current Policy

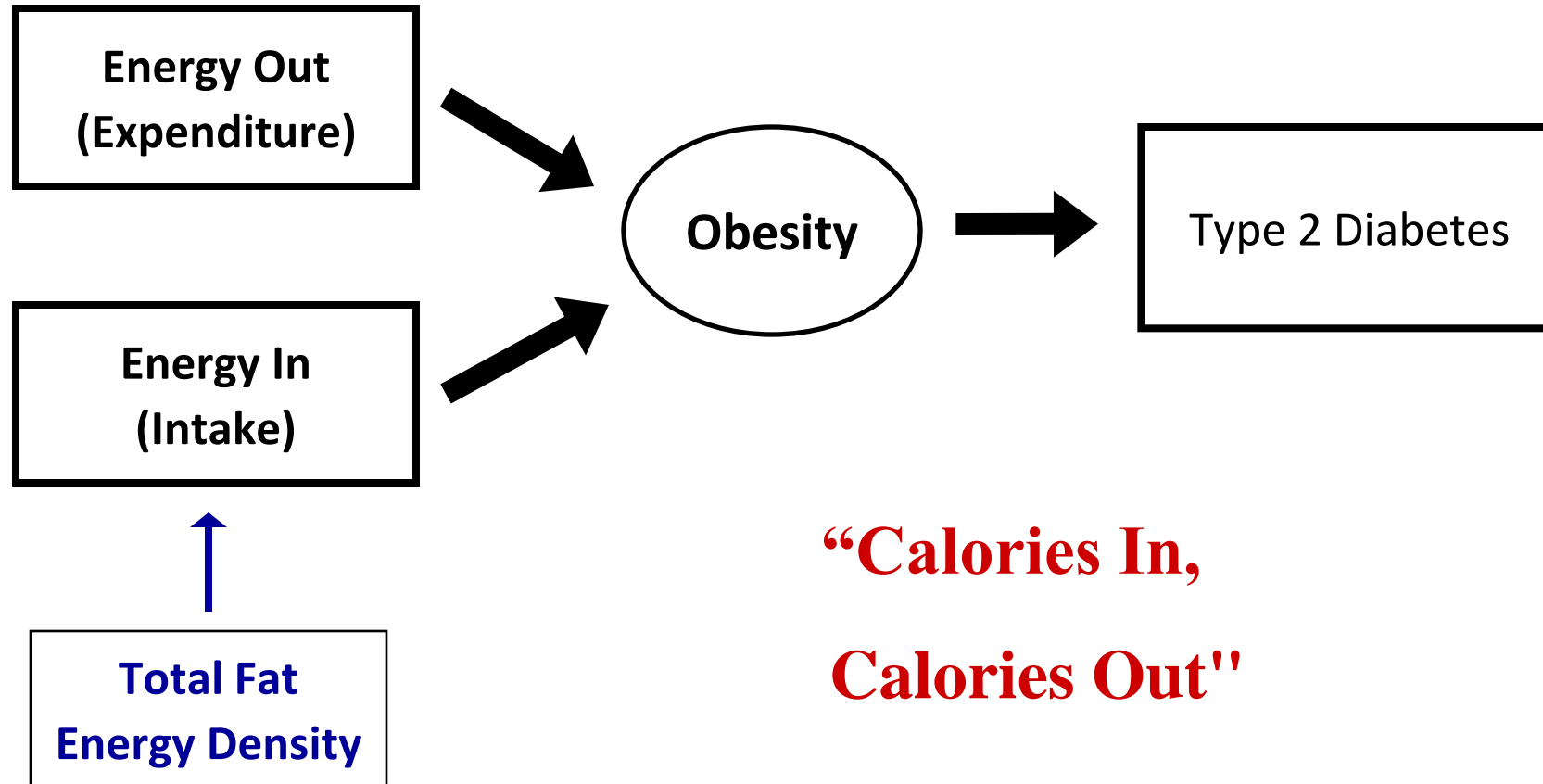


U.K. front-of-pack
“traffic light” label



Chile “black box”
warning labels

Diet & Obesity/Diabetes: Conventional Wisdom

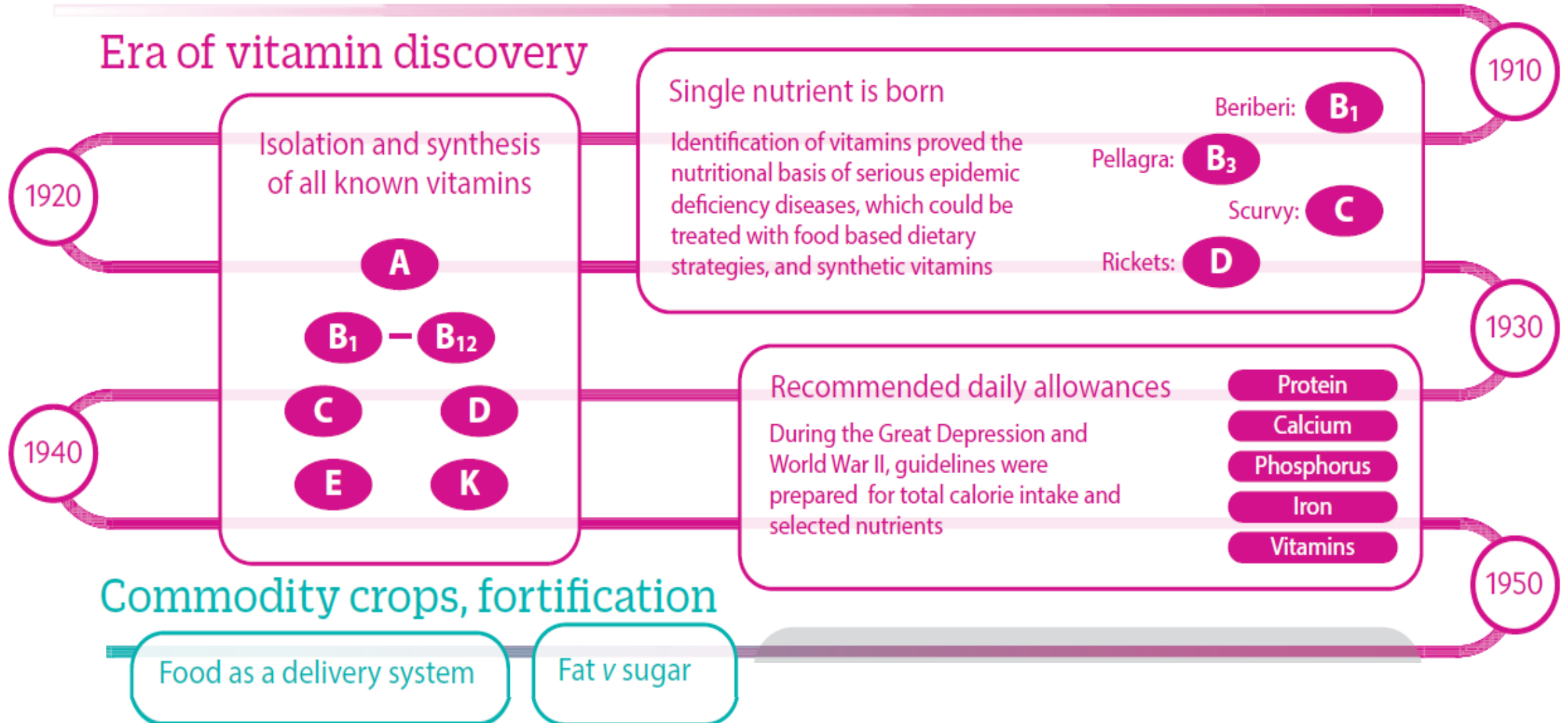


**“Calories In,
Calories Out”**

“You have to know the past to understand the present.” – Carl Sagan

“We are not makers of history. We are made by history.” – Martin Luther King, Jr.

1920s to 1950s: The Era of Vitamins, Nutrients



1960s to 1980s: Food as a Delivery System

Commodity crops, fortification

1960

Food as a delivery system

Nutrition policy and agricultural technology focused on increasing staple calories and selected micronutrient

Fat v sugar

Ultimately, the emphasis on fat won scientific and policy acceptance

Developing countries

Protein v calories

Scientists disagreed on the relevance of the calorie v protein component of infant and child malnutrition. Industry promotion of protein enriched formulas and baby foods in developing countries.

1970

Chronic diseases

1980

Dietary guidelines

Nutrition science and policy guidelines in high income nations shifted to try to address not only nutrient deficiencies but also chronic disease

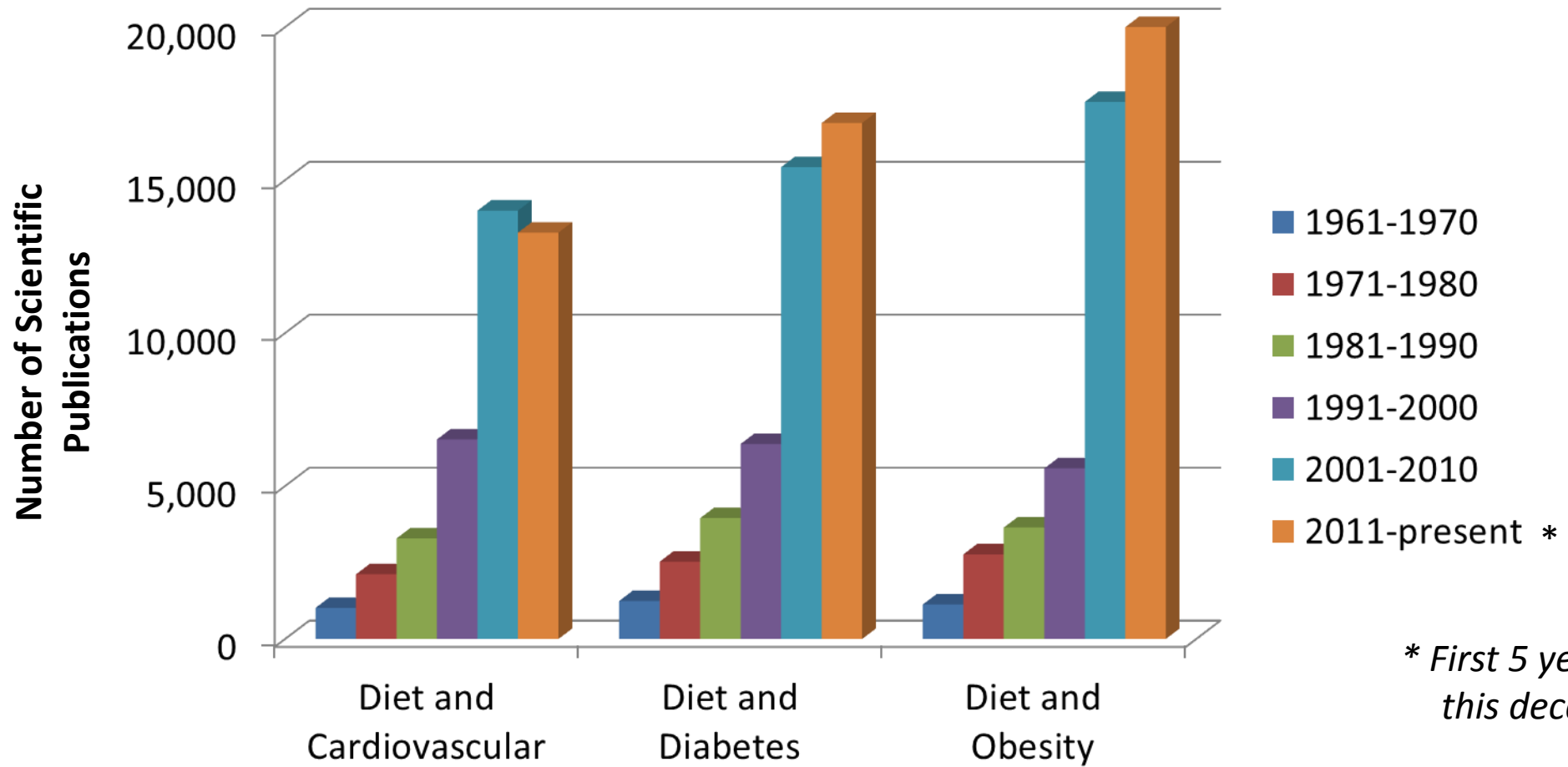
Action on hunger

Global community coalesced around elimination of hunger and micronutrient deficiency in lower income nations. In lower income nations, including widespread micronutrient supplementation and fortification.

1990



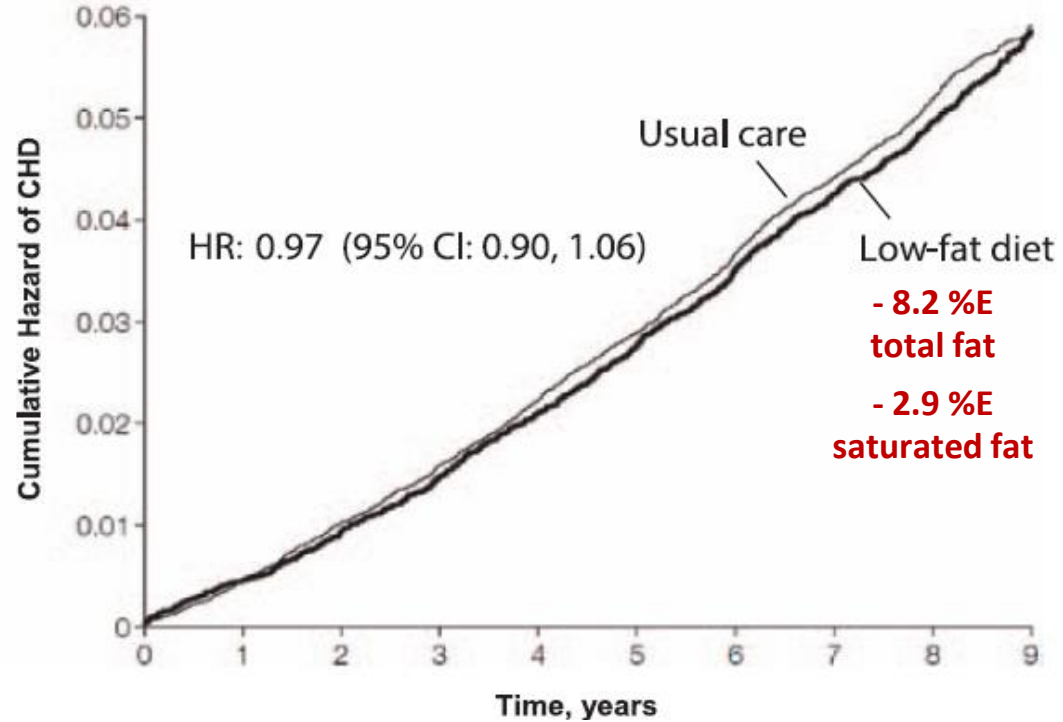
Explosion of Nutrition Science



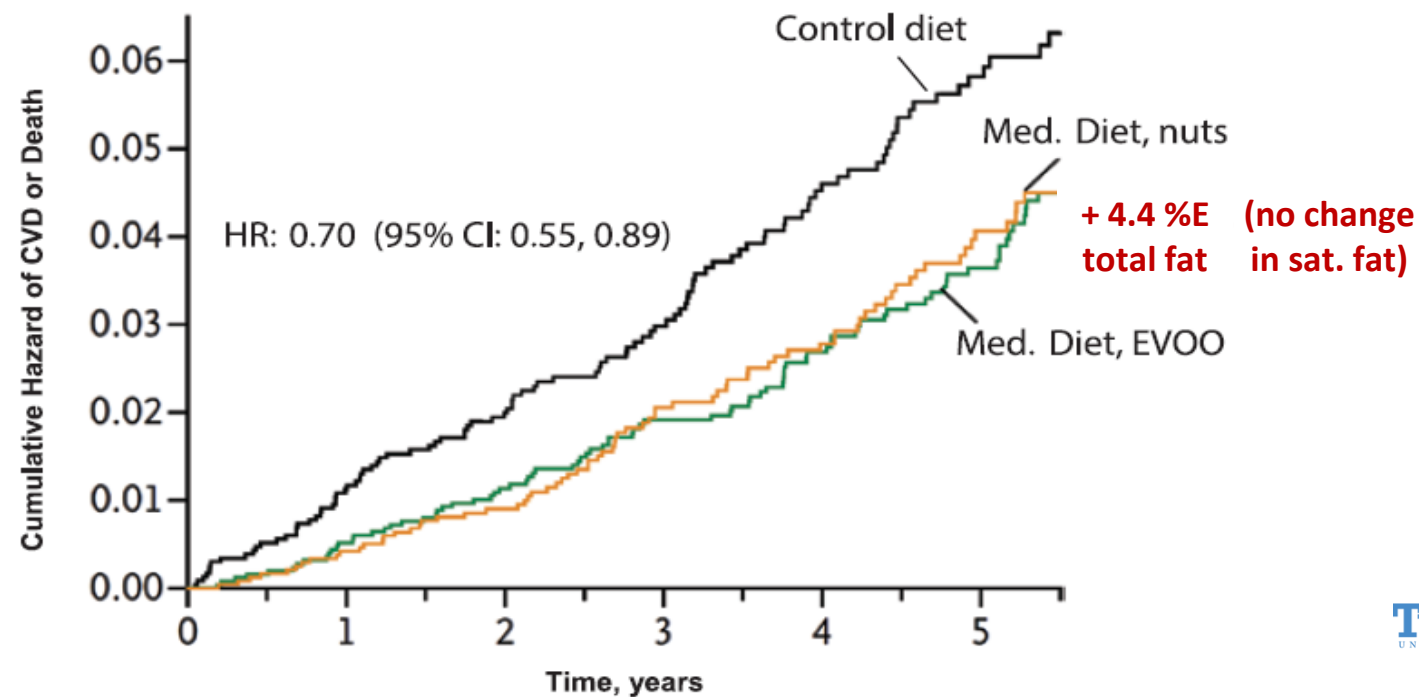
** First 5 years of this decade*

Source: Pubmed/Medline
(to Aug 2016)

WHI



PREDIMED



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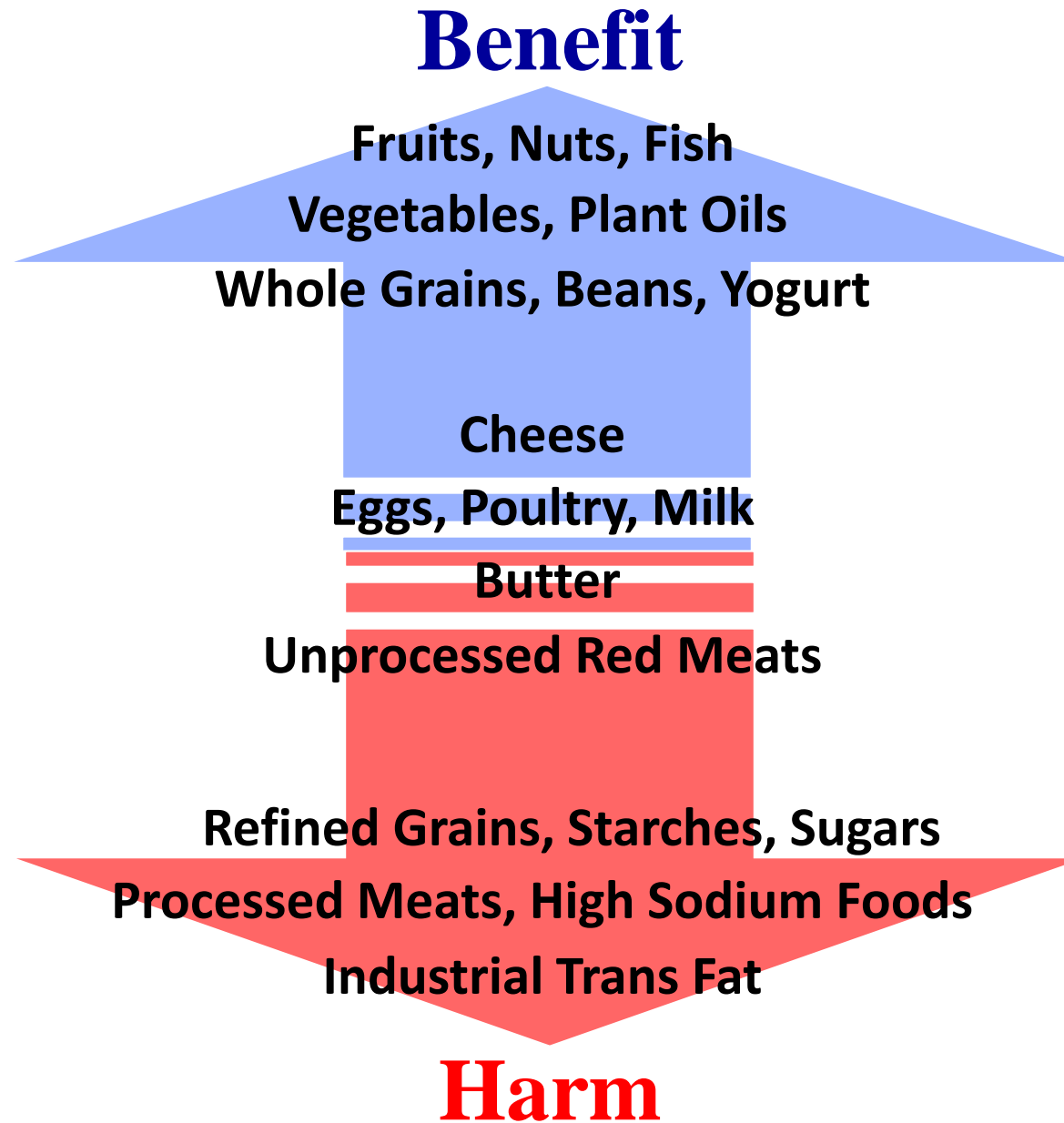
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Lesson #1. Priorities: Foods and Food Patterns

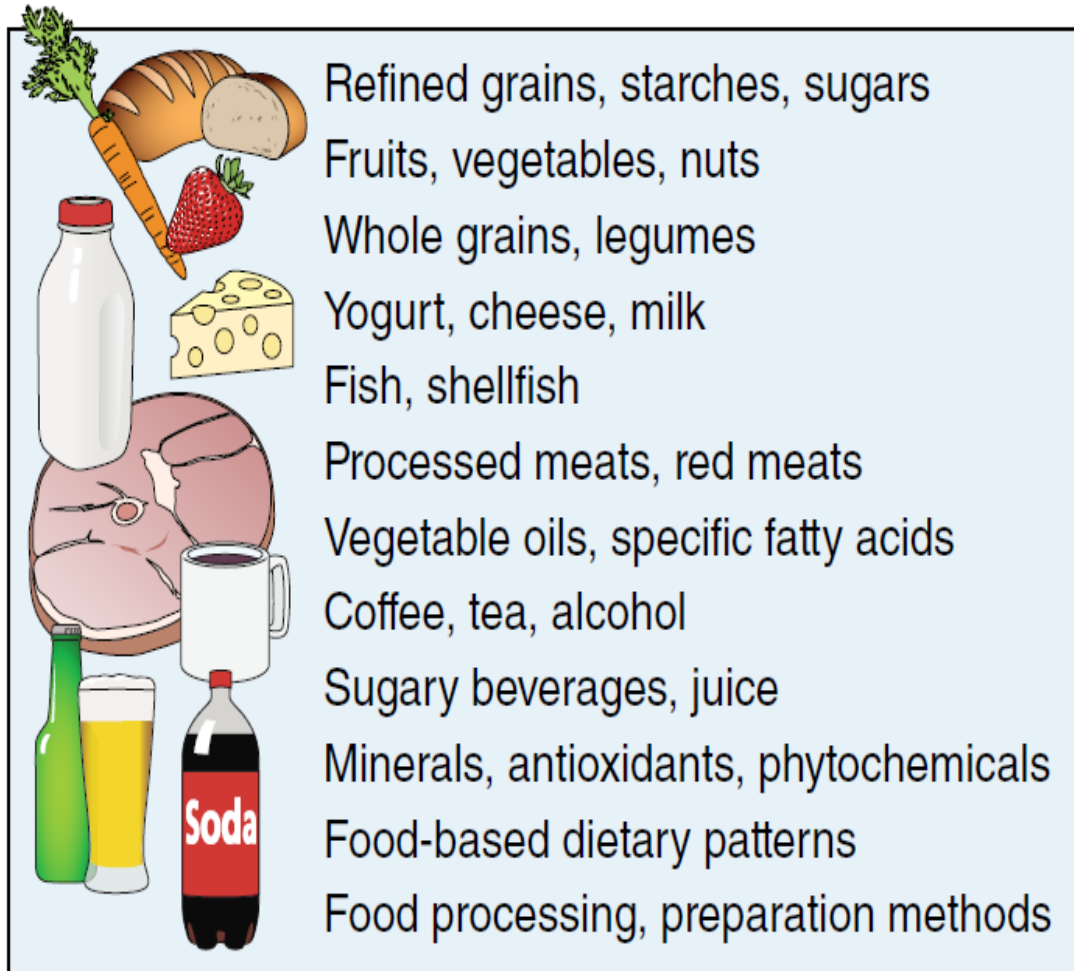


Dietary Priorities: Healthy Food Patterns

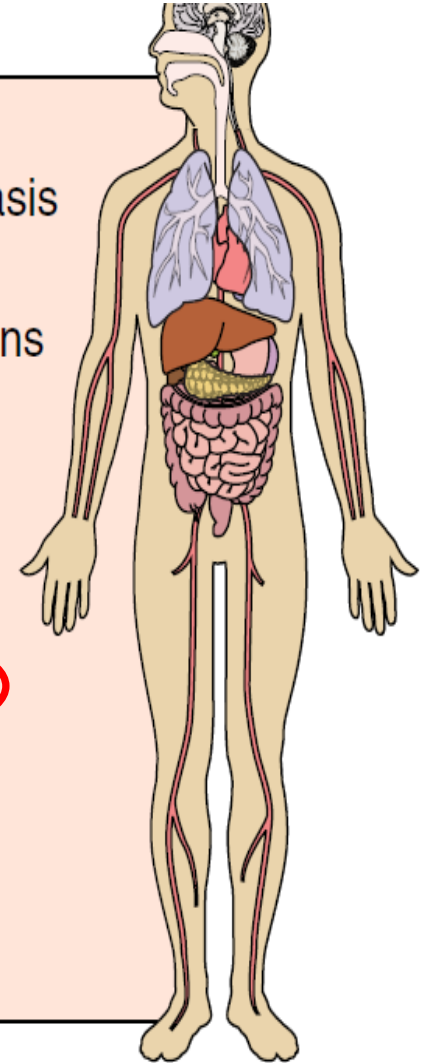


Mozaffarian D,
Circulation 2016

Lesson #2. Diet & Health: Complex Pathways



Blood pressure
Glucose-insulin homeostasis
Liver fat synthesis
Blood lipids, apolipoproteins
Endothelial function
Systemic inflammation
Brain reward, craving
Gut microbiome
Satiety, hunger, obesity
Adipocyte function
Cardiac function
Thrombosis, coagulation
Vasular adhesion



Lesson #3. Food and Obesity: More than Calories

- Hunger, fullness
- Glucose, insulin, other hormonal responses
- Liver *de novo* fat synthesis (conversion of starch and sugar to fat)
- Brain reward, craving
- Gut microbiome (bacteria) responses
- Body's metabolic rate (energy *out*)

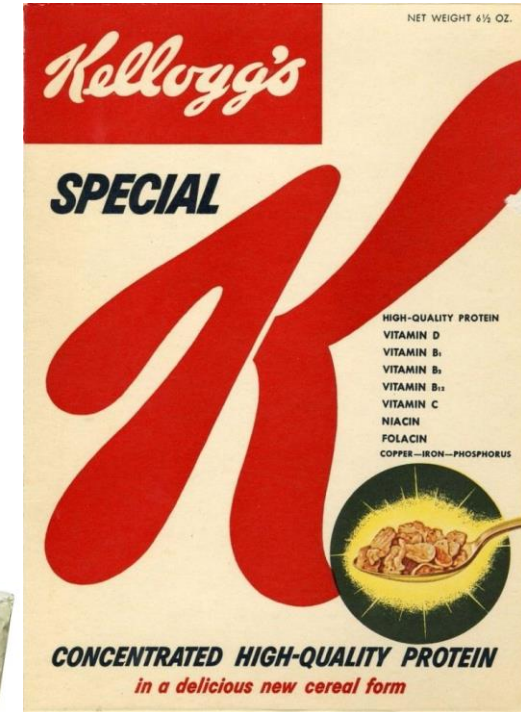
**All Calories
are Not
Created Equal**

e.g., Browning AJCN 2011; Ebbeling JAMA 2012; Poutahidis Plos ONE 2013; Lennerz AJCN 2013; Ludwig JAMA 2014; Hallberg Diabetes Therapy 2018; Gardner JAMA 2018; etc.

Calories, Fat, Single Nutrients: Misleading

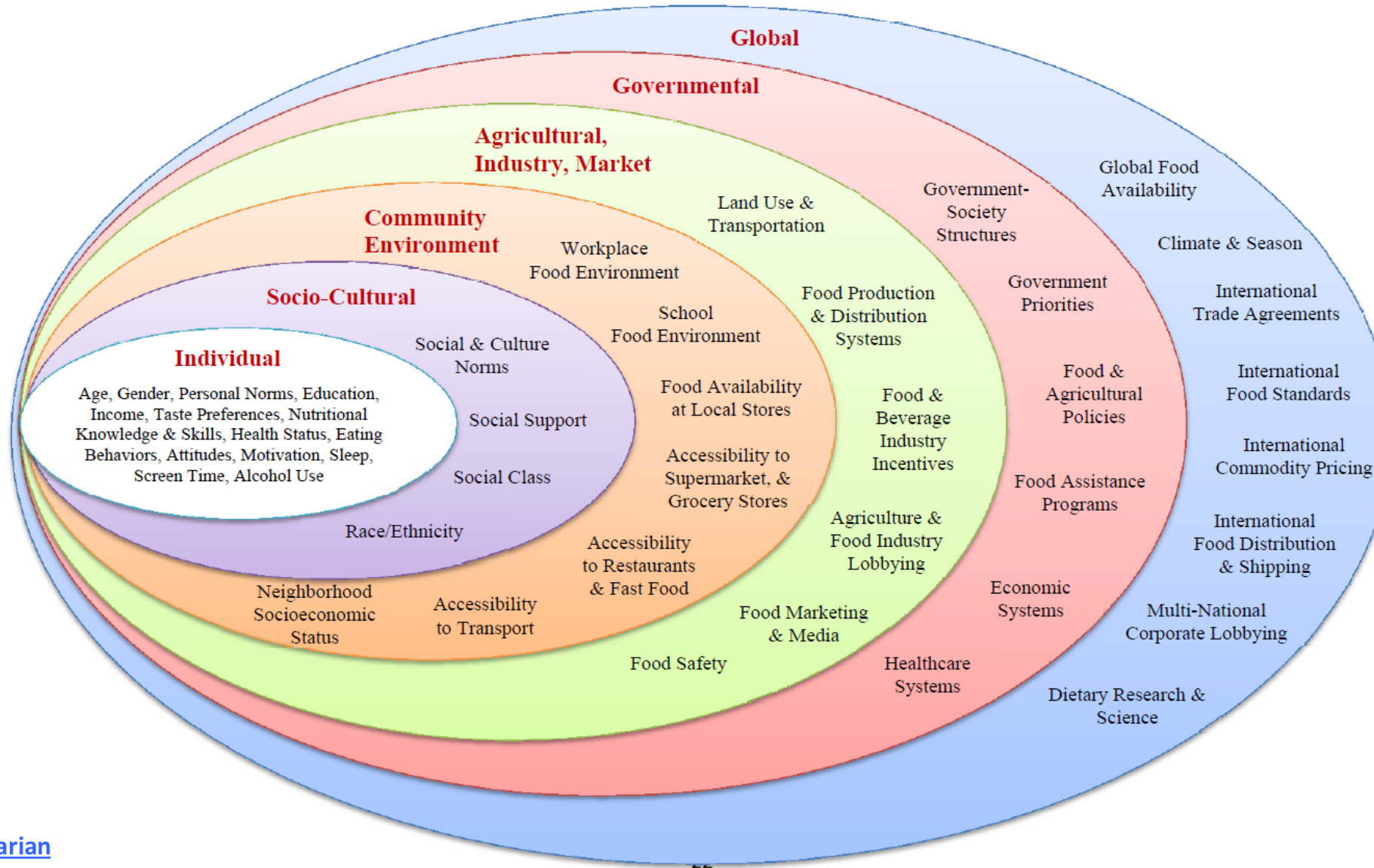


- Low calorie = “Less weight gain”
- Fat free = “Healthy”
- Low saturated fat = “Healthy”
- Vitamin fortified = “Good for you”



Lesson #4. Policy & Systems Changes

**Policy
Innovation
Culture**

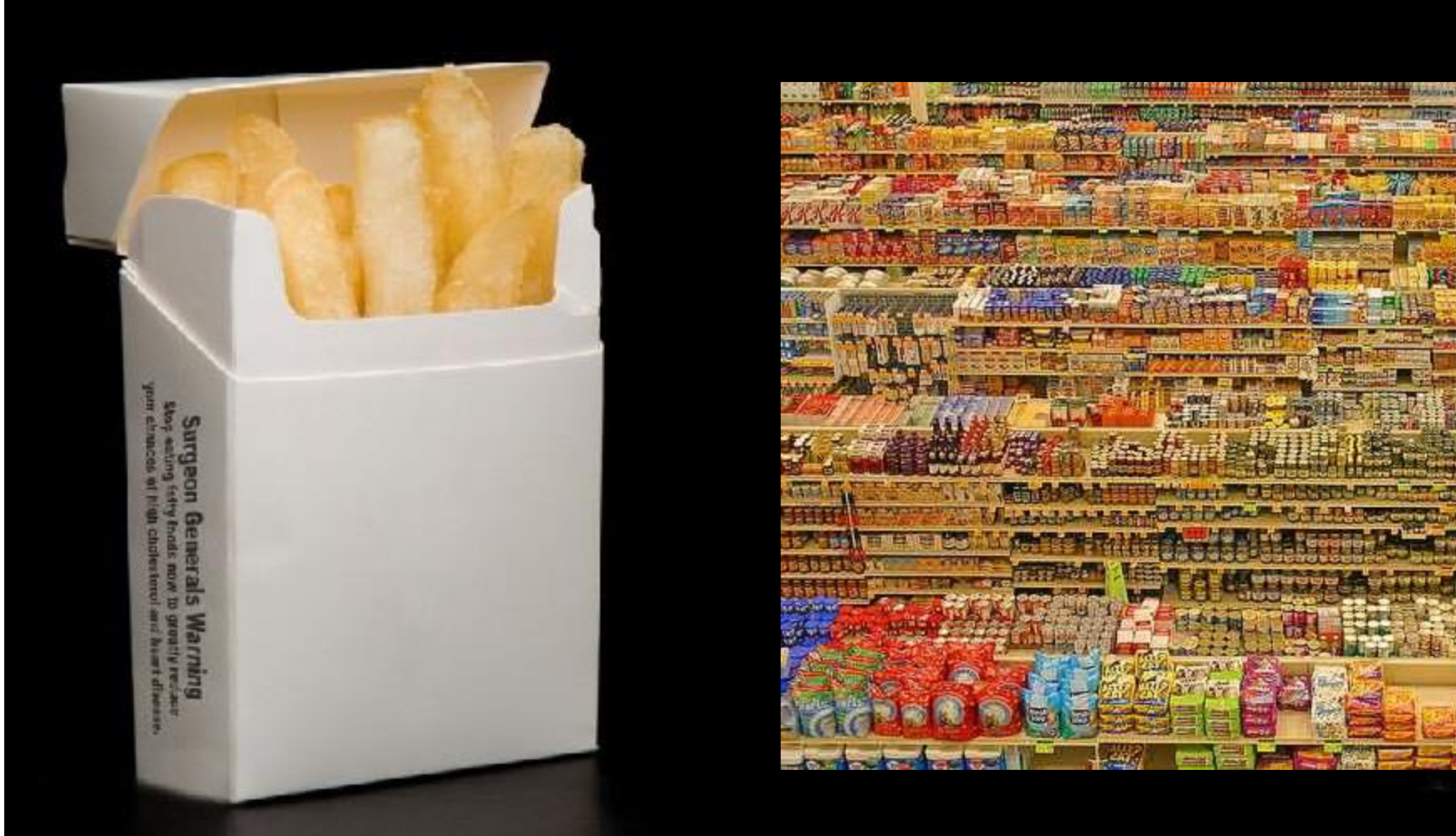


“Best Buy” Policies

www.food-price.org

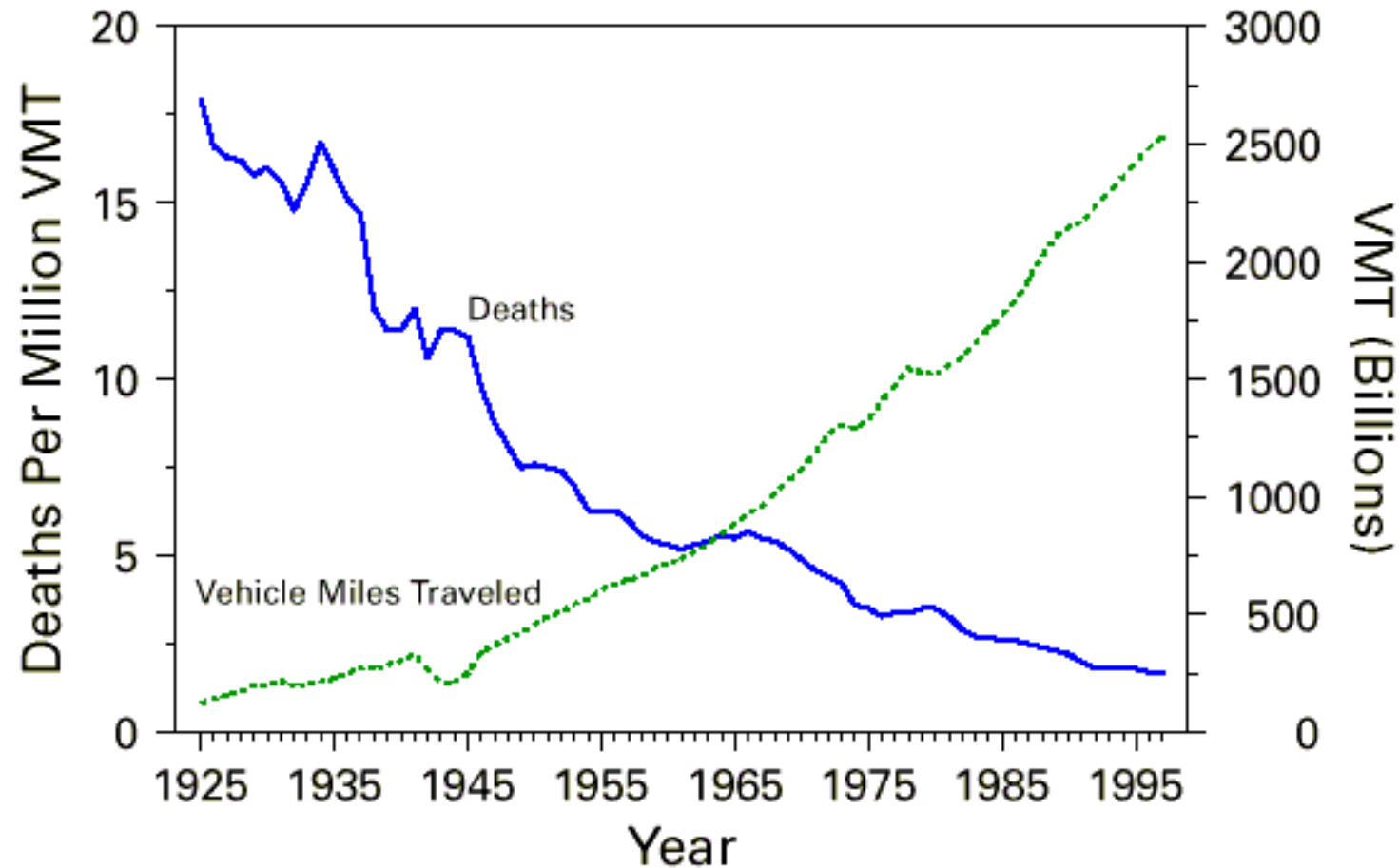
Research & Innovation	Healthcare Systems	Economic Incentives	Schools	Worksite Wellness	Standards and Labeling
<ul style="list-style-type: none">• Fundamental discovery• Microbiome• Bioactives• Big data, technology• Policy translation• Public-private partnerships	<ul style="list-style-type: none">• Electronic records• Medical education• F&V Rx• Medically tailored meals• Patient incentives• Billing & quality metrics	<ul style="list-style-type: none">• Taxes on SSBs, sugar, salt• Retail consumer incentives• Govt food programs (SNAP, WIC)• Industry (R&D, marketing, etc.)	<ul style="list-style-type: none">• School meal standards• Competitive food standards• F&V provision• School gardens	<ul style="list-style-type: none">• Healthy food incentives• Technology wellness platforms• Cafeteria nudges• Meal & vending standards	<ul style="list-style-type: none">• “Healthy” foods• Qualified health claims• Additives (trans fat, salt, sugar)• Marketing to children• Menu and FOP labels

Lessons From Past Public Health Successes: Big Tobacco?



Lessons From Past Public Health Successes: Car Accidents

FIGURE 1. Motor-vehicle–related deaths per million vehicle miles traveled (VMT) and annual VMT, by year — United States, 1925–1997



**90% reduction in deaths
per vehicle mile traveled
in the 20th century**

*How was this
accomplished?*



Lessons From Past Public Health Successes: Car Accidents

- **Driver (consumer):**

- Education.
- Licensing.
- Limits on phone use, texting.

- **Car (product):**

- Active: seat belts, child seats, motorcycle helmets.
- Passive: padded interiors, collapsible steering columns, shatterproof glass, air bags.
- Crash safety standards.
- Safety inspections.

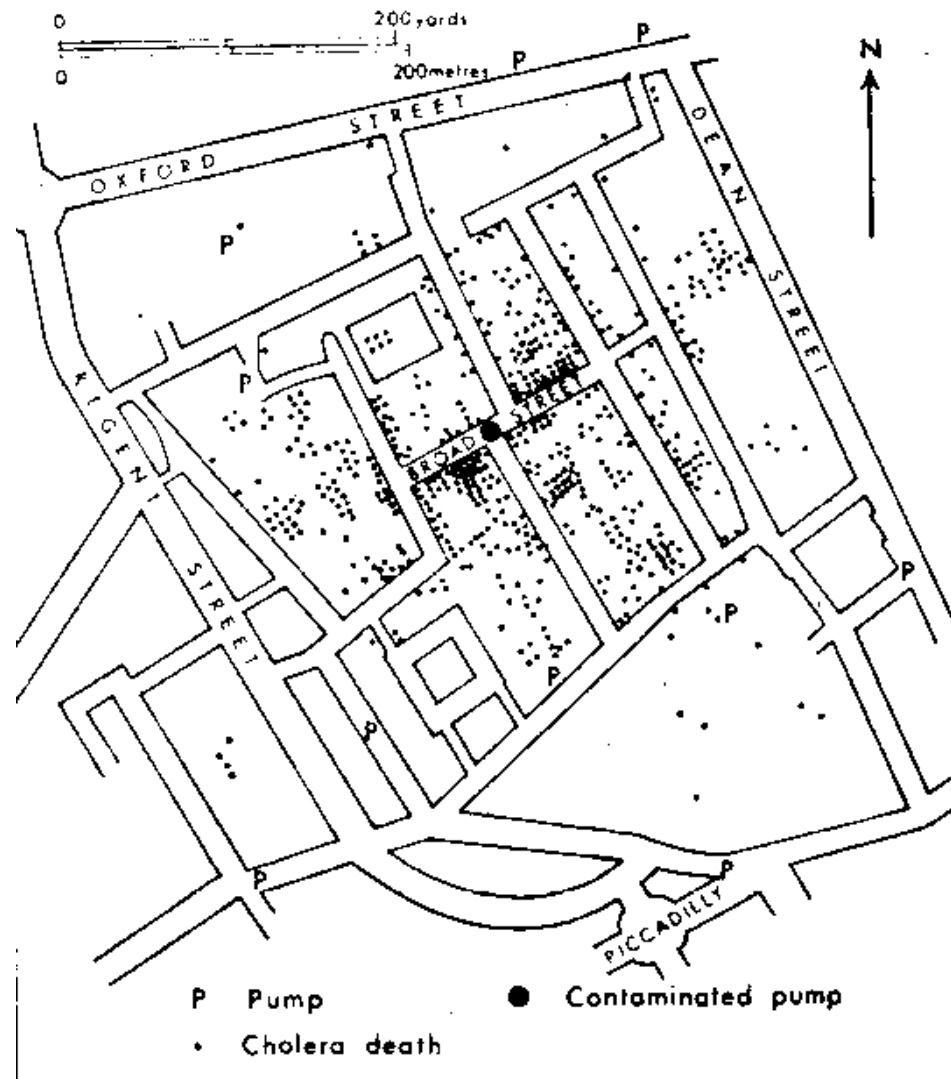
- **Road (environment):**

- Road engineering, guard rails, rumble strips.
- Speed limits.
- Stop signs, stop lights, caution signs.

- **Culture:**

- Designated driver campaign.
- Drunk-driving legislation.
- Private advocacy, e.g. MADD.

John Snow, London Cholera Epidemic, 1854



Snow, J. *On the Mode of Communication of Cholera*, C.F. Cheffins, London 1855

Next Directions

Dietary interactions

These include diet-microbiome-host interactions; effects of specific fatty acids, flavonoids, and fermented foods; and divergent relations of different foods with long term weight gain, and powerful influences of place and social status.

Quality over quantity

For long term weight control, quality and types of foods have different effects and are a more relevant focus than calorie counting.

Processing and additives

Need for rigorous study of possible long term health effects of many modern shifts in crop breeding, agriculture, livestock, food processing, and additives.

Diet-risk pathways

The diversity of pathways increasingly calls into question the wisdom of reliance on any single surrogate outcome

Blood pressure

Glycemic control

Inflammation

Oxidative stress

Endothelial health

Lipids

Hepatic function

Adipocyte metabolism

Cardiac function

Muscle health

Brain reward

Gut microbiota

Metabolic expenditure

Public health

Future nutrition policy must unite modern scientific advances on dietary priorities with creative new approaches for trusted public communication and modern evidence on effective systems level behavior change

Welcome, John Hancock Vitality Program members!

If you're interested in enhancing your health by improving your diet, you've come to the right place. Your membership provides you with free access to the Tufts Health & Nutrition newsletter, where you will find a wide range of articles that will help you get and stay on the right track. You can start eating better and feeling better today!



Current Issue: April 2016



Cover Story:

Extra Vitamin D No Help
in Preventing Seniors'
Falls

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[Read Full Issue >](#)

[Back Issue Archive >](#)

NUTRITION 101

The Basics & Glossary

READER POLL

What is your favorite
fruit for an afternoon snack?

My favorite fruit is the apple! (73 votes) 51%

I really enjoy cantaloupes. (16 votes) 11%

Bananas are by far the best! (45 votes) 32%

I love dates and need one too. (8 votes) 6%

[See Recent Polls](#)

Favorite Recipes

1 of 3



Fish Tacos
Without Frying



Caffeine Doesn't Cause Heart Jitters

The popular notion - reflected in doctors' advice and clinical guidelines - that caffeine can cause your heart to "skip a beat" is probably wrong. A new study, the first of its kind to actually



Protein at Breakfast and Lunch Boosts Muscle Mass

Study suggests benefits of spreading out protein intake.

Americans' craze for plenty of



Nuts Improve Cholesterol Levels

Study helps explain how nuts combat cardiovascular disease.