Policy Strategies to Improve Diet and Reduce Cardiometabolic Disease

Renata Micha, RD PhD

Research Assistant Professor

Friedman School of Nutrition Science & Policy

NAOS 2015

October 6, 2015

Tufts UNIVERSITY | Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy

Disclosures

- Research support: NIH, Gates Foundation, Unilever.
- Ad hoc consultant: World Bank.

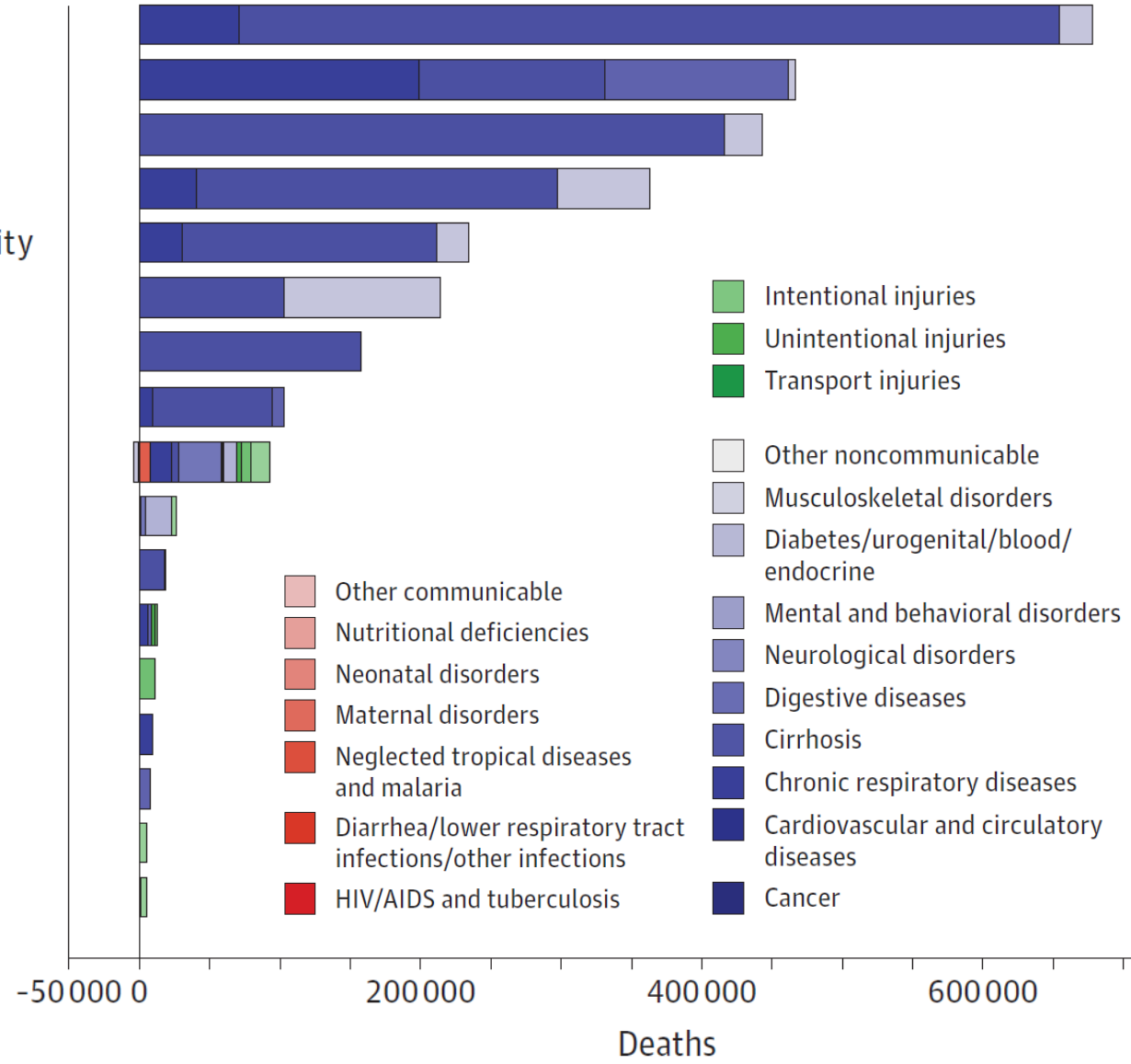
Diet and Global Burdens of Chronic Disease

- Worldwide burdens of NCDs, including cardiovascular disease, diabetes, and cancer, are on the rise.
  - By 2020, ~ 75% of all deaths worldwide and 60% of all DALYs will be attributed to chronic disease.
- Most chronic disease is premature and can be prevented or delayed.
- Identifying and targeting the modifiable risk factors with the greatest potential for reducing risk
  - Of major scientific and public health importance.
- Suboptimal dietary habits are a major preventable cause of chronic disease.

Nutrition and Health

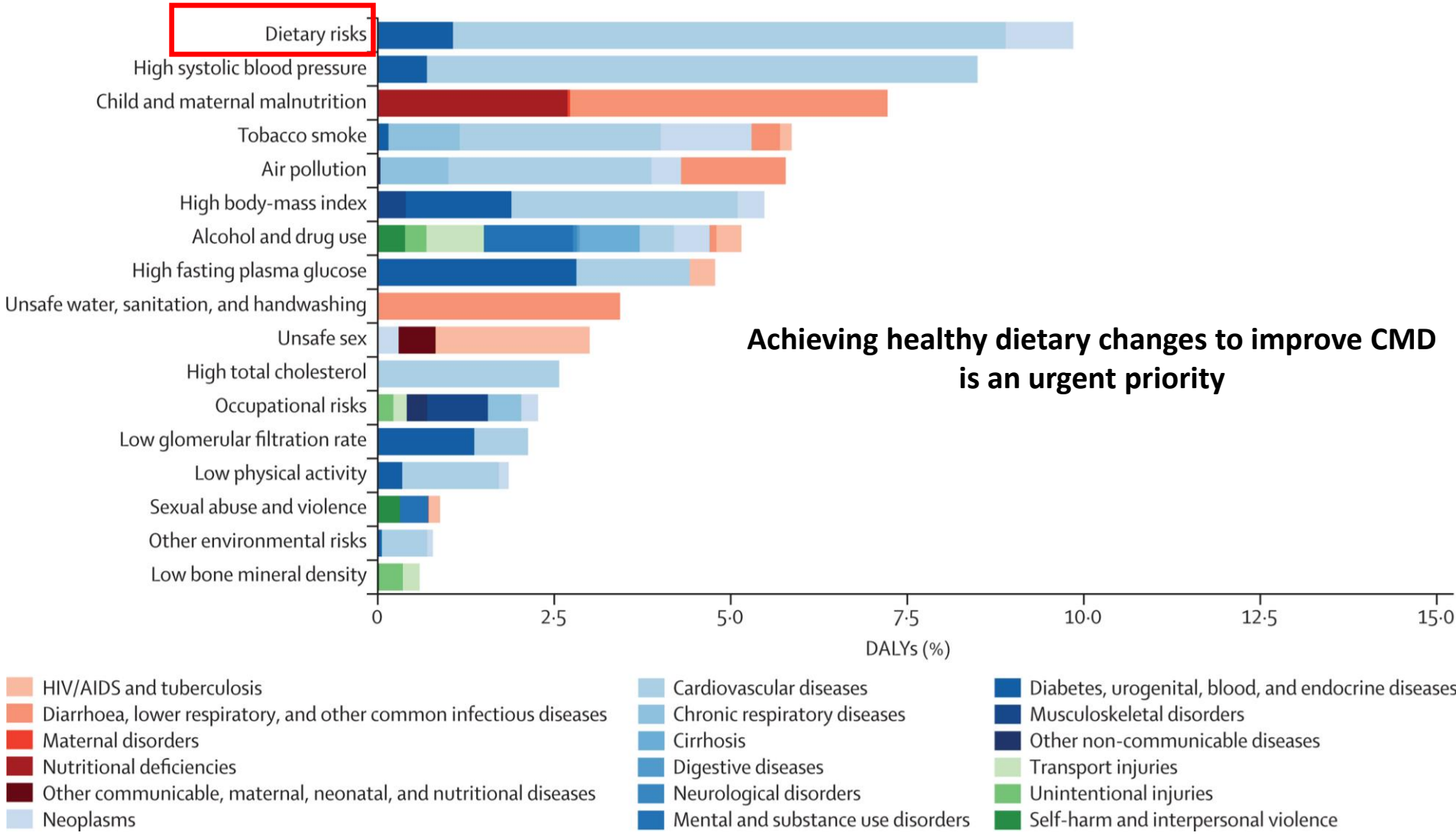
Risk Factors

- 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

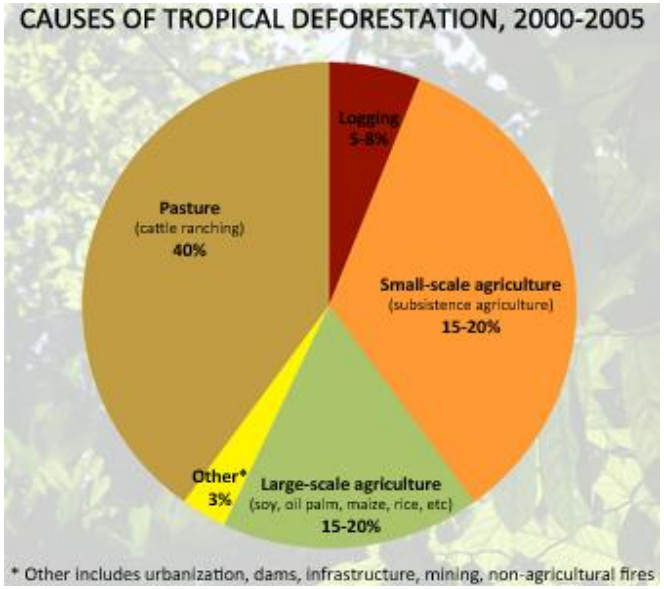
Nutrition and Health



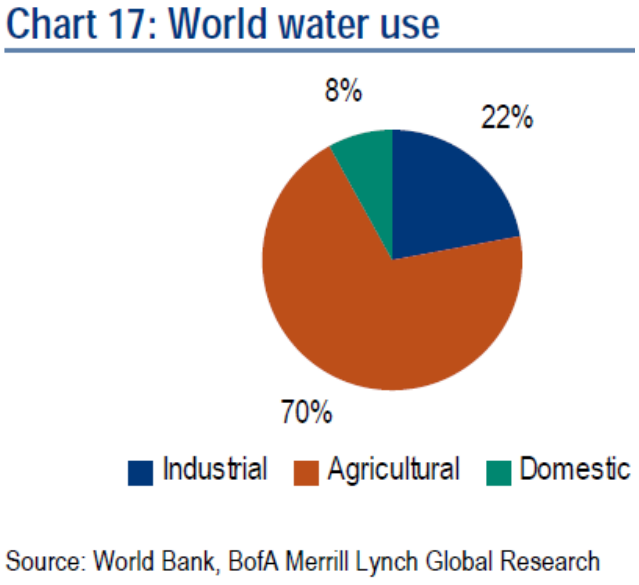
Achieving healthy dietary changes to improve CMD is an urgent priority

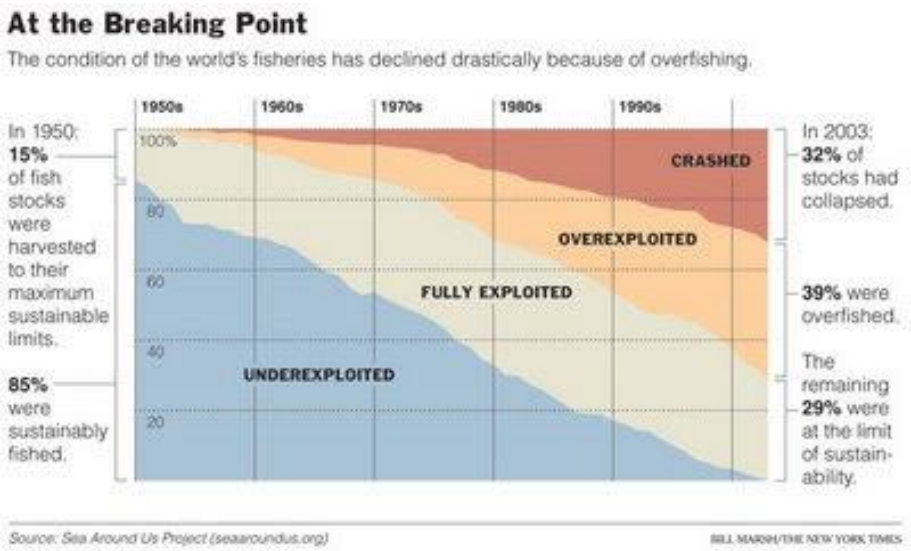
GBD 2013, Lancet 2015

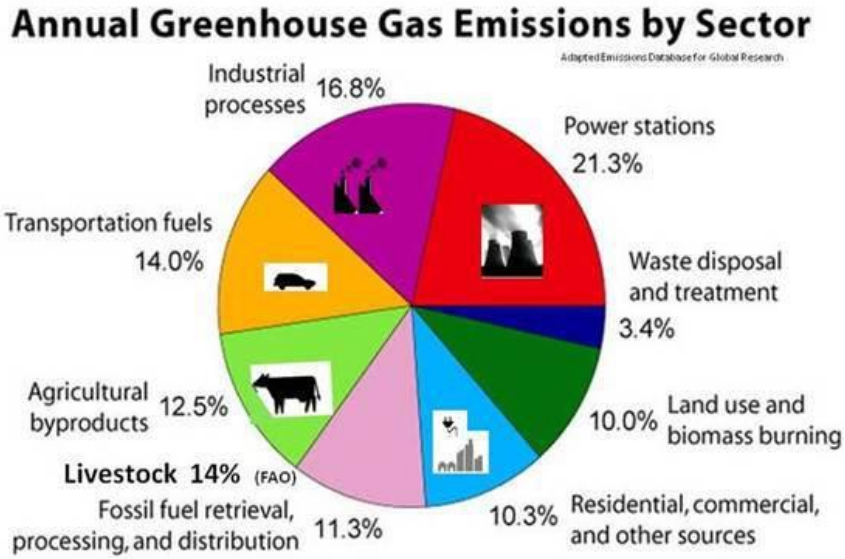
Nutrition and the Environment



http://rainforests.mongabay.com/0803.htm





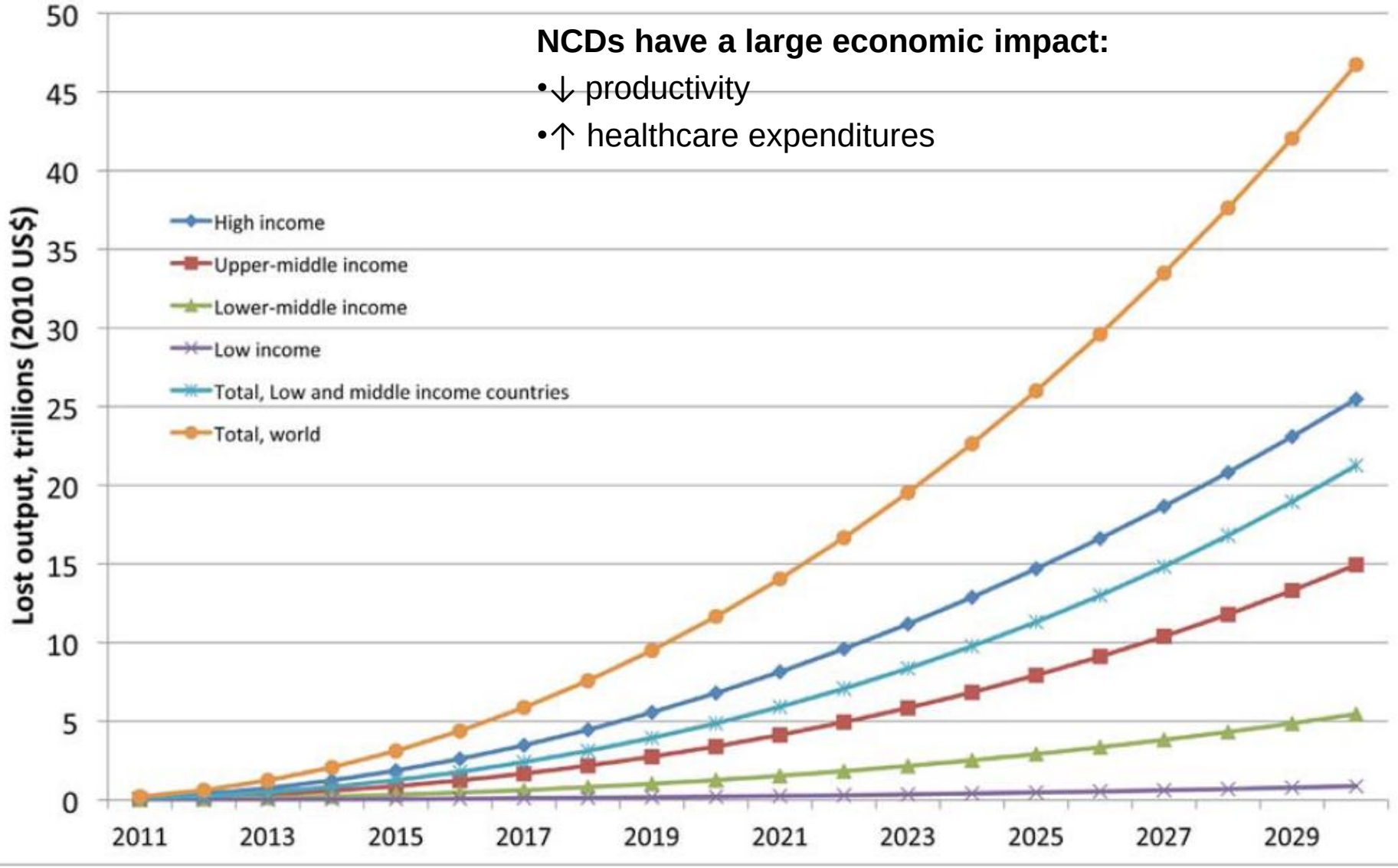


Modern agriculture and associated technological solutions to food and nutritional problems must be balanced against environmental costs. Nutrition Policy = Environmental Policy

Nutrition and the Economy

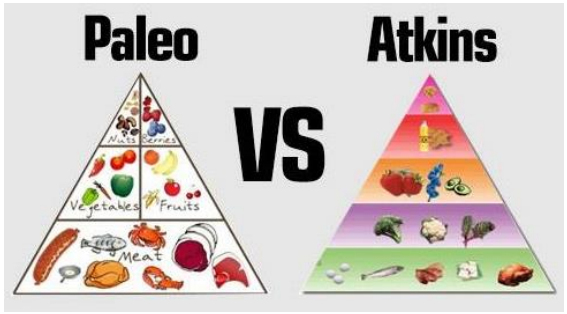
NCDs have a large economic impact:

- ↓ productivity
- ↑ healthcare expenditures



Source: World Economic Forum, 2011
http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf

Nutrition: Passion and Confusion



CENTER FOR Science IN THE Public Interest

BIGGEST LOSER

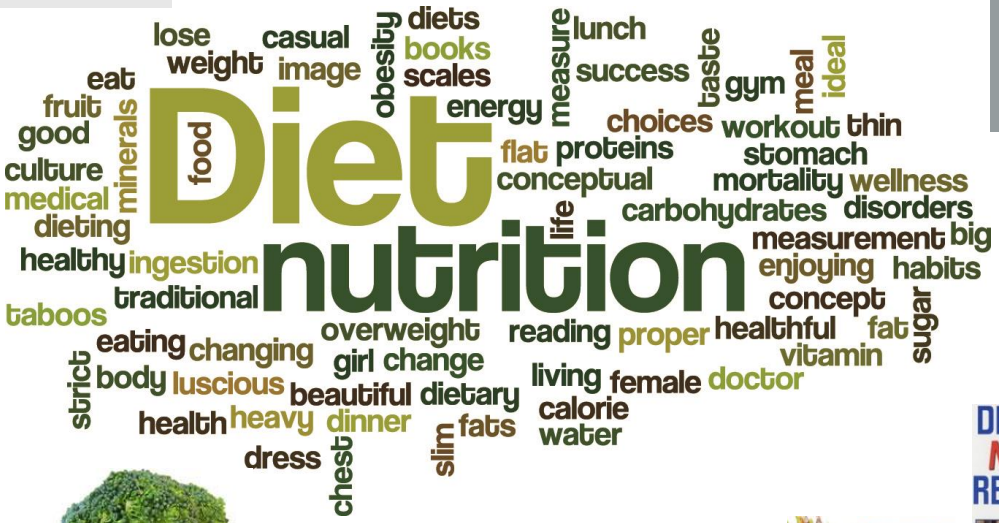
Weight Watchers

Nutrisystem

Jenny Craig

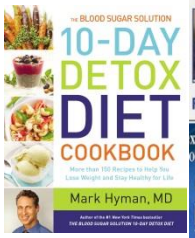
ATKINS

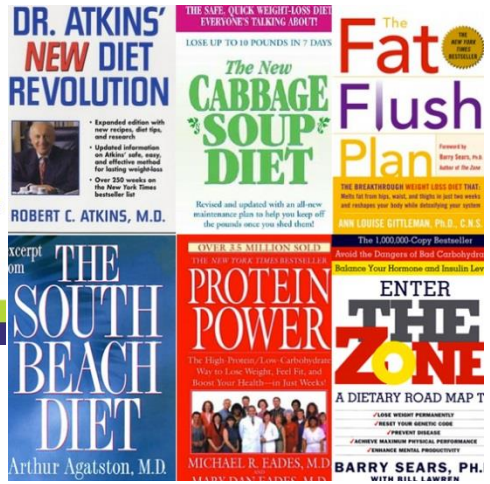
SOUTH BEACH diet



FOOD BABE

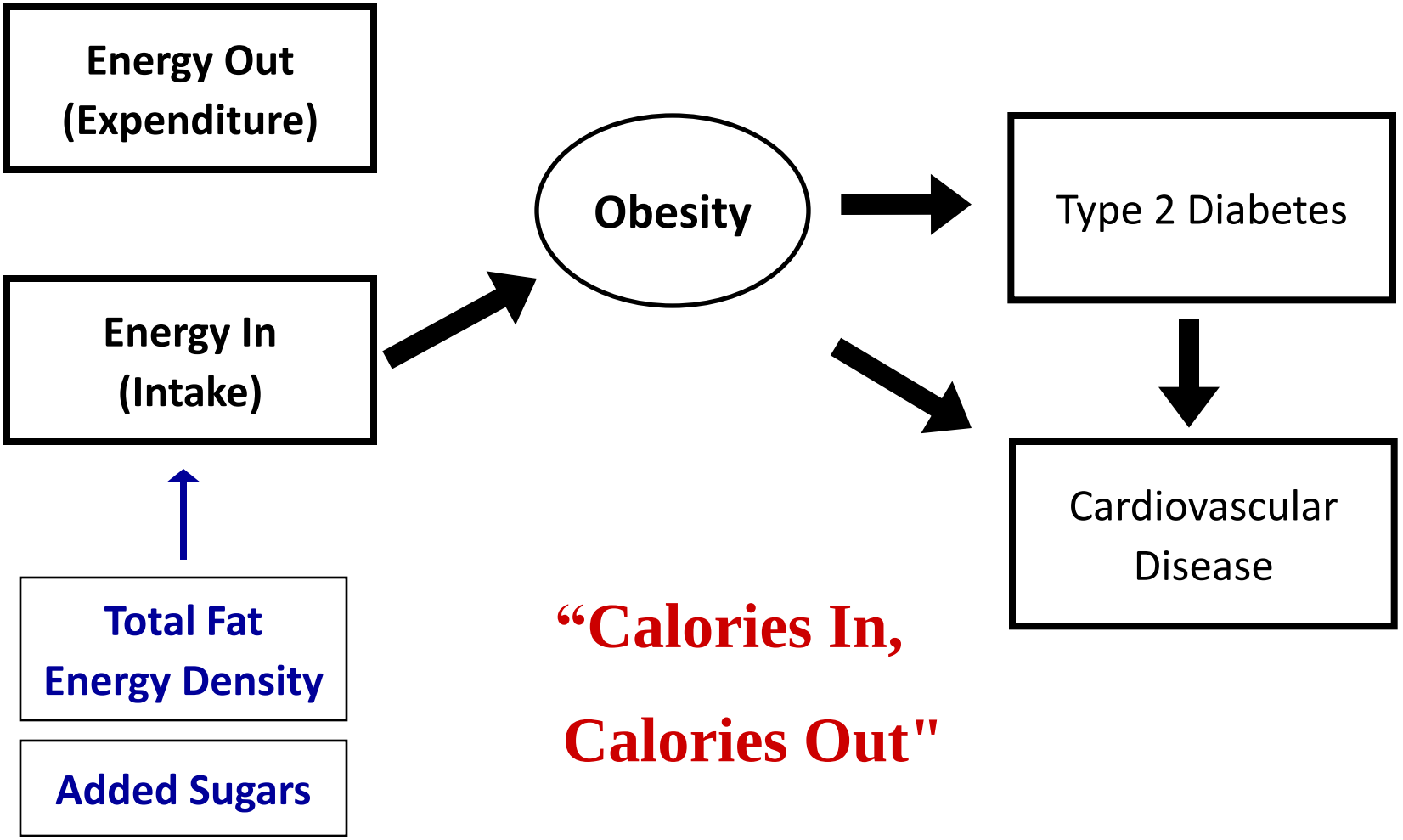
THE DR. OZ SHOW





Source: Google images

Diet & Obesity/Diabetes: Conventional Wisdom

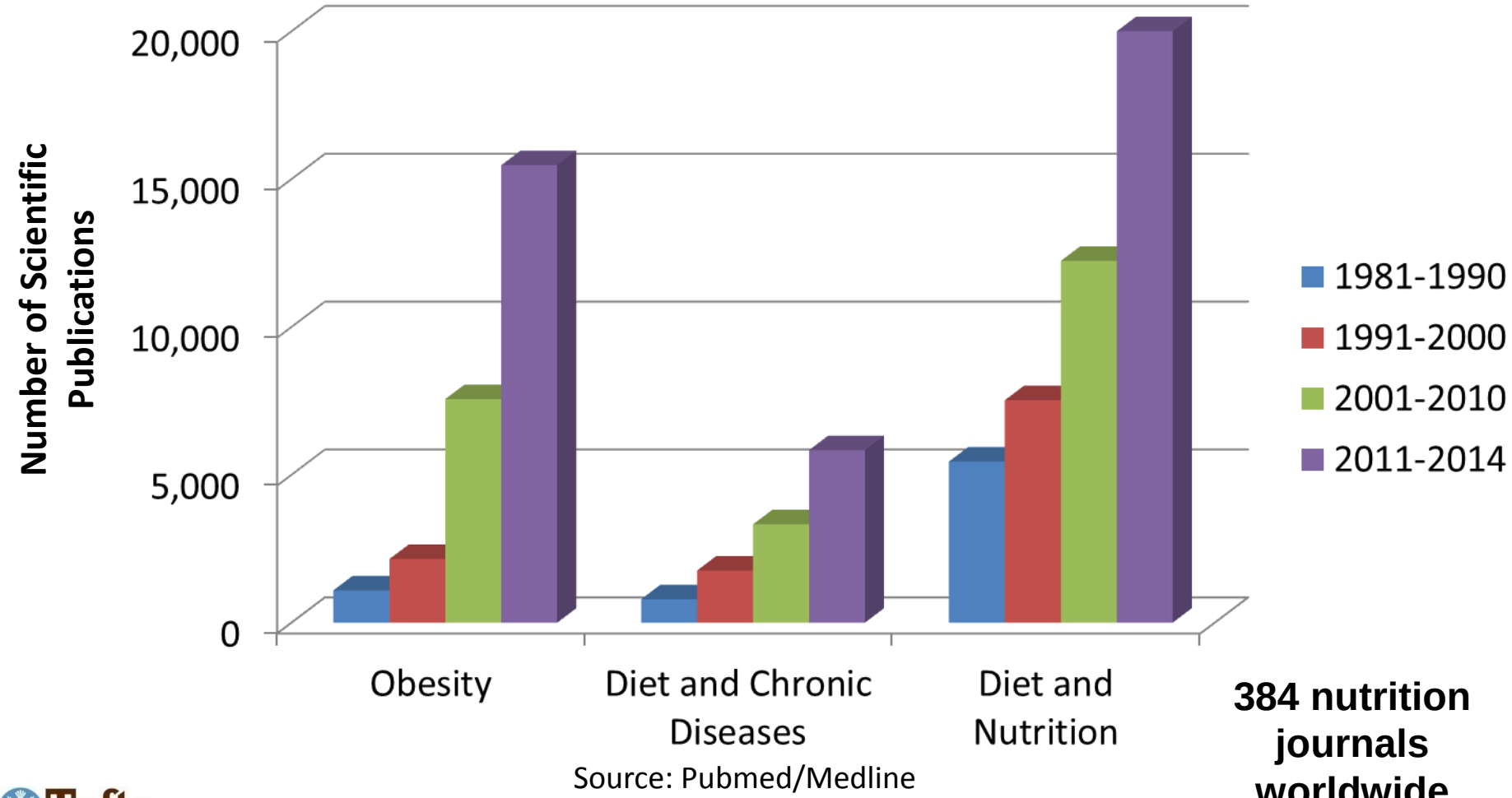


Calorie/Fat Focus Dominates Current Policy

- **Dietary Guidelines**: Extensive focus on “portion sizes”, “calorie control,” “low-fat”, “lean” choices.
- **Affordable Care Act (Obamacare)**: Mandated total calorie labeling on restaurants menus nationwide.
- **UK Front-of-Pack:** Total calories, total fat are first two items.
- **US FDA**: Proposed emphasis on total calories in Nutrition Facts; violations to nut-rich “Kind” bars for being “high-fat.”
- **National School-Lunch Program**: Banned whole milk, allows sugar-sweetened skim milk.
- **NIH Dietary Guidelines For Kids**: *Recommend* fat-free salad dressing, diet soda, trimmed beef; *caution* for eggs, vegetables with added fat, whole milk, nuts, tuna in oil.

Explosion of Nutrition Science

The importance of the nutrition agenda is reflected in the growth of scientific publications related to nutrition

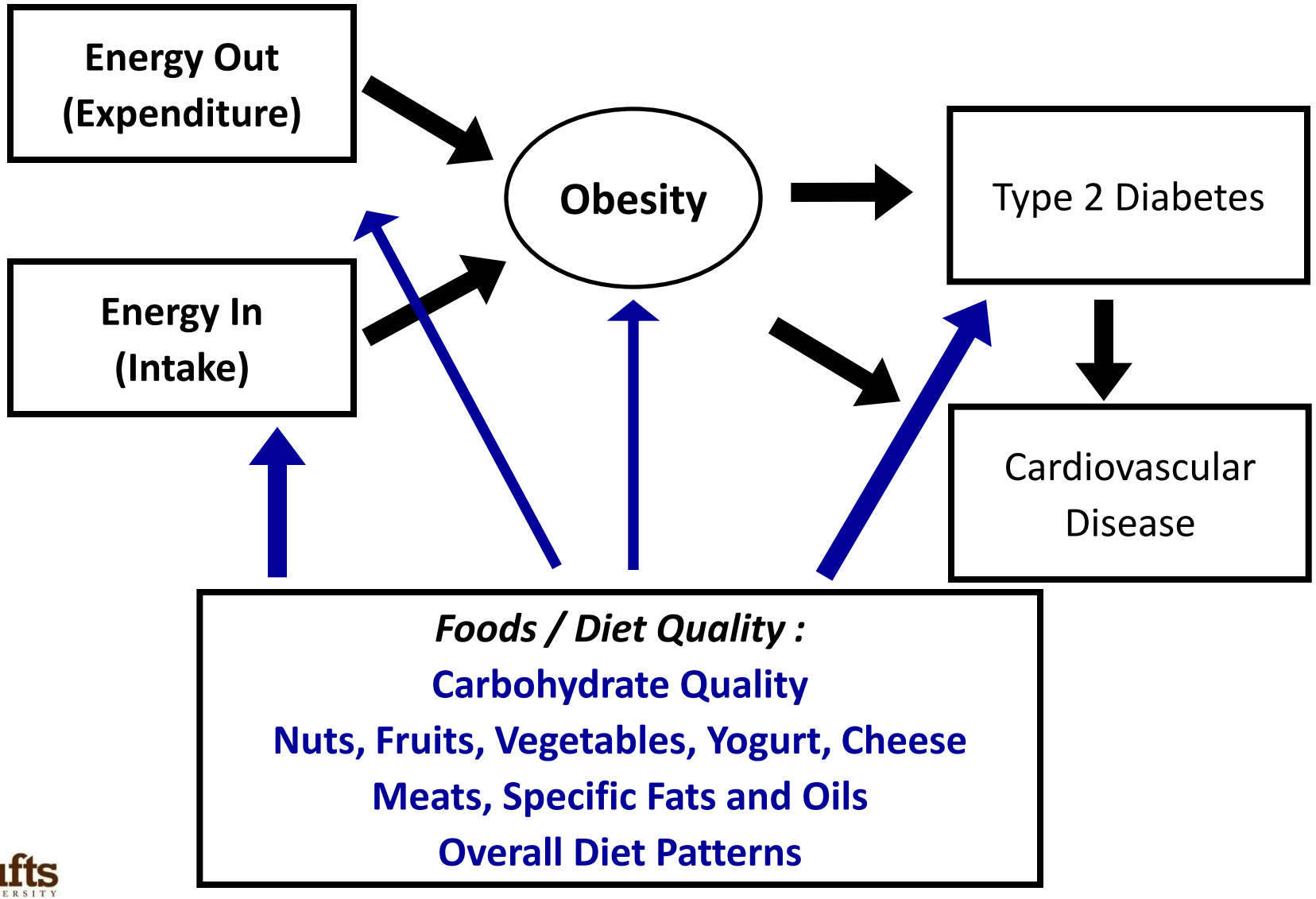


Source: Pubmed/Medline

384 nutrition journals worldwide

Tufts UNIVERSITY

Diet & Obesity/Diabetes: Modern Science



Tufts UNIVERSITY

Diet & Health: Modern Science

Diet composition focusing on foods and diet patterns, not individual nutrients or calories, represents a more actionable, evidence-based policy target

Refined Grains, Starches, Sugars

Fruits, Vegetables, Nuts

Whole grains, Beans

Yogurt, Cheese, Milk

Fish, Shellfish

Processed Meats, Red Meats

Vegetable Oils, Specific Fatty Acids

Coffee, Tea, Alcohol

Sugary Drinks, Juice

Minerals, Antioxidants, Phenolics, Phytochemicals

Food-Based Dietary Patterns

Food Processing, Preparation Methods

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

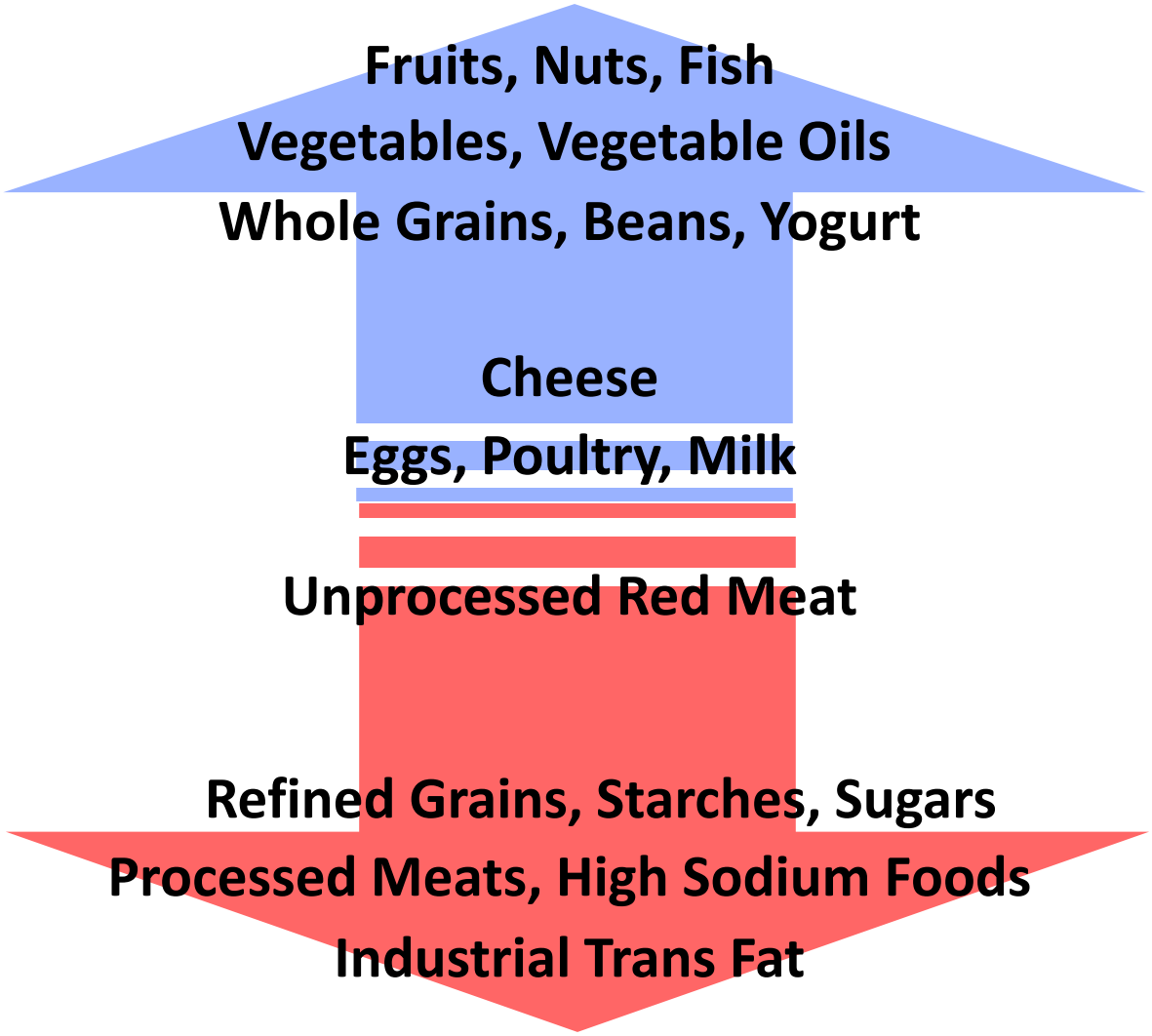
Thrombosis, Coagulation

Vascular Adhesion

Mozaffarian D, *in preparation*

Tufts UNIVERSITY

Dietary Priorities: Healthy Food Patterns



Mozaffarian D,
In preparation

Preventing Chronic Diseases: Food Patterns

Tufts UNIVERSITY

Nutrient Focus: Recipe for Confusion

Food Group	GO (Almost Anytime Foods)	SLOW (Sometimes Foods)	WHOA (Once in a While Foods)
	Nutrient-Dense ← Nutrient- and Calorie-Dense →		Calorie-Dense
Vegetables	Almost all fresh, frozen, and canned vegetables without added fat and sauces	All vegetables with added fat and sauces; oven-baked French fries; avocado	Fried potatoes, like French fries or hash browns; other deep-fried vegetables
Meats, Poultry, Fish, Eggs, Beans, and Nuts	Trimmed beef and pork; extra lean ground beef; chicken and turkey without skin; tuna canned in water; baked, broiled, steamed, grilled fish and shellfish; beans, split peas, lentils, tofu; egg whites and egg substitutes	Lean ground beef, broiled hamburgers; ham, Canadian bacon; chicken and turkey with skin; low-fat hot dogs; tuna canned in oil; peanut butter; nuts; whole eggs cooked without added fat	Untrimmed beef and pork; regular ground beef; fried hamburgers; ribs; bacon; fried chicken, chicken nuggets; hot dogs, lunch meats, pepperoni, sausage; fried fish and shellfish; whole eggs cooked with fat
Sweets and Snacks*		Ice milk bars; frozen fruit juice bars; low-fat or fat-free frozen yogurt and ice cream; fig bars, ginger snaps, baked chips; low-fat microwave popcorn; pretzels	Cookies and cakes; pies; cheese cake; ice cream; chocolate; candy; chips; buttered microwave popcorn
Fats/Condiments	Vinegar; ketchup; mustard; fat-free creamy salad dressing; fat-free mayonnaise; fat-free sour cream	Vegetable oil, olive oil, and oil-based salad dressing; soft margarine; low-fat creamy salad dressing; low-fat mayonnaise; low-fat sour cream**	Butter, stick margarine; lard; salt pork; gravy; regular creamy salad dressing; mayonnaise; tartar sauce; sour cream; cheese sauce; cream sauce; cream cheese dips
Beverages	Water, fat-free milk, or 1 percent low-fat milk; diet soda; unsweetened ice tea or diet iced tea and lemonade	2 percent low-fat milk; 100 percent fruit juice; sports drinks	Whole milk; regular soda; calorically sweetened iced teas and lemonade; fruit drinks with less than 100 percent fruit juice

www.nhlbi.nih.gov/health/public/heart/obesity/wecan/downloads/go-slow-whoa.pdf

Nutrient Focus: Recipe for Manipulation

- **Low calorie = “Less weight gain”**
- **Fat free = “Healthy"**
- **Low saturated fat = "Healthy"**

Nutrient Focus: Recipe for Manipulation

- **Fortified = "Healthy"**
- **Vitamins = "Healthy"**

Dietary Guidelines Advisory Committee 2015

- Emphasis on **healthful, food-based diet patterns**:
  - ↑ fruits, vegetables, whole grains, seafood, beans, dairy.
  - ↓ red & processed meats, added sugars & refined grains.

- "Reducing total fat… does ***not*** lower CVD risk… Dietary advice should put the emphasis on optimizing types of dietary fat and ***not*** reducing total fat."

- ↓ total fat also ***not*** recommended for obesity prevention. "Low-fat or non-fat products with high amounts of refined grains and added sugars should be ***discouraged***."

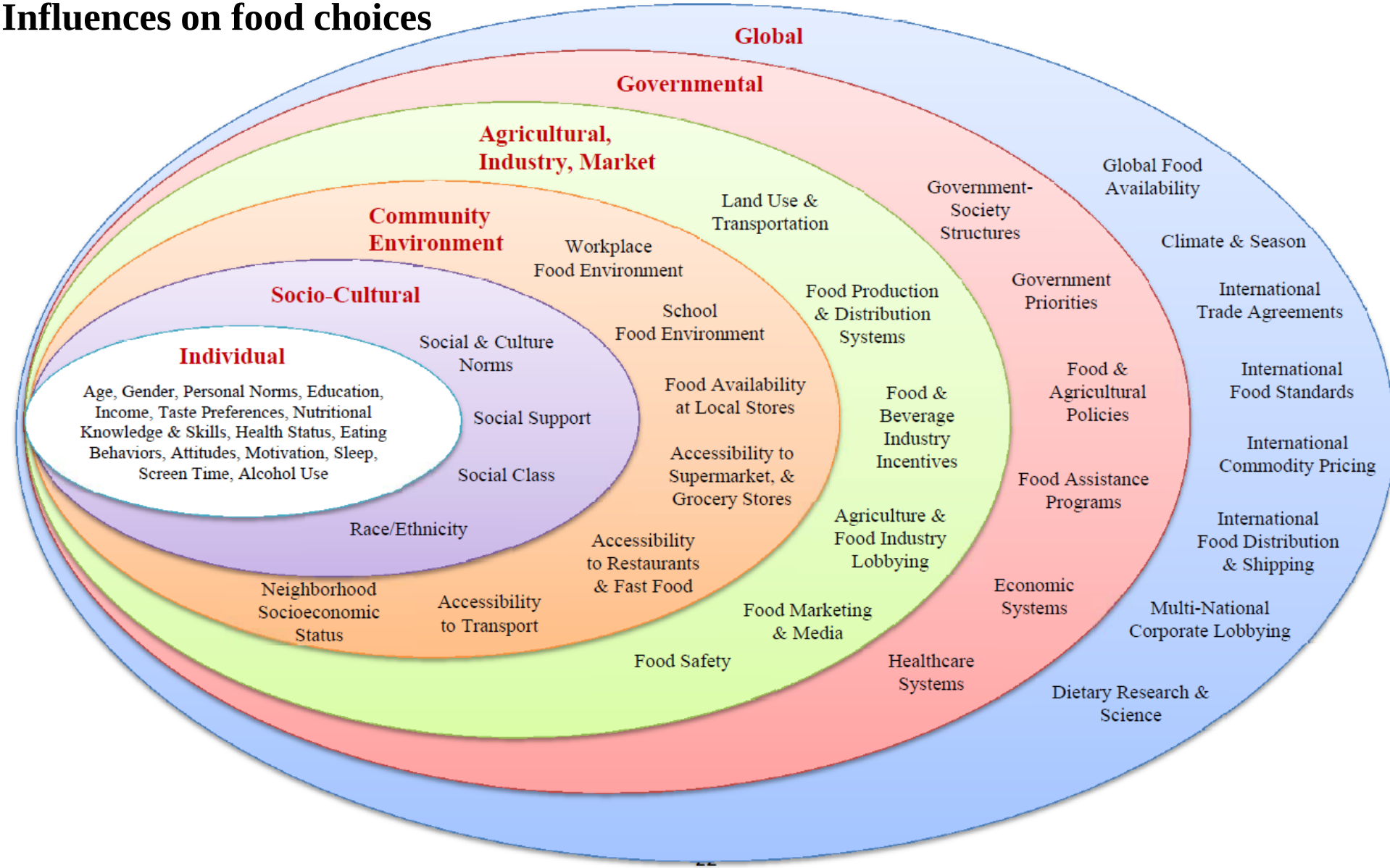
- **With these quiet statements, the DGAC has the potential to reverse nearly 4 decades of nutrition policy that prioritized single nutrient approaches, including reduced total dietary fat.**

www.health.gov/dietaryguidelines/2015-scientific-report/

Mozaffarian & Ludwig, JAMA 2015

Barriers and Opportunities for Healthy Eating

Influences on food choices



Tufts UNIVERSITY

Afshin A, Micha R et al, The Handbook for Global Health Policy, 2014

Strategies to Address Suboptimal Diet

- Focus on **nutrition education:**
  - Dietary guidelines
  - Food package labeling
- Place responsibility for healthier diets on an individual's ability to make informed choices
- Do not address the complex, powerful environmental determinants of dietary habits.

✧ Given the key roles of social and environmental factors in shaping dietary habits, population-based approaches should be a crucial component of efforts to improve diet.

✧ Effective strategies can be designed and implemented at the local level (e.g., schools, workplaces, community), as well as regionally, at the state level, and at national and supranational levels.

Evidence-Based Population Approaches to Improve Diet

Media and Education	• Sustained, focused media and education campaigns, utilizing multiple modes, for increasing consumption of specific healthful foods or reducing consumption of specific less healthful foods or beverages, either alone (IIaB) or as part of multi-component strategies (IB). • On-site supermarket and grocery store educational programs to support the purchase of healthier foods (IIaB).
Labeling and Information	• Mandated nutrition facts panels or front-of-pack labels/icons as a means to influence industry behavior and product formulations (IIaB).
School Procurement Policies	• School-based interventions focused on increasing healthful foods and drinks, restricting unhealthful foods and drinks, and implementing nutrition standards for school meals (IIaA).
Workplaces	• Comprehensive worksite wellness programs with nutrition, physical activity, and tobacco cessation/prevention components (IIaA). • Increased availability of healthier food/beverage options and/or strong nutrition standards for foods and beverages served, in combination with vending machine prompts, labels, or icons to select healthier choices (IIaB).

Tufts UNIVERSITY

Adapted from Mozaffarian *et al* 2012 Circulation

Evidence-Based Population Approaches to Improve Diet

Local Environment	• Increased availability of supermarkets near homes (IIaB).
Restrictions and Mandates	• Restrictions on television advertisements for less healthful foods or beverages advertised to children (IIB). • Restrictions on advertising and marketing of less healthful foods or beverages near schools and public places frequented by youths (IIaB). • General nutrition standards for foods and beverages marketed and advertised to children in any fashion, including on-package promotion (IIaB). • Regulatory policies to reduce specific nutrients in foods (e.g., trans-fats, salt, certain fats) (IIB).
Economic Incentives	• Subsidy strategies to lower prices of more healthful foods and beverages (IIA). • Tax strategies to increase prices of less healthful foods and beverages (IIaB).

The AHA evidence grading system is: **Class I:** evidence for and/or general agreement that the intervention is beneficial, useful, and effective; the intervention should be performed. **Class II:** conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the intervention. **Class IIa:** weight of evidence/opinion is in favor of usefulness/efficacy; it is reasonable to perform the intervention. **Class IIb:** usefulness/efficacy is less well established by evidence/opinion; the intervention may be considered. **Class III:** there is evidence and/or general agreement that the intervention is not useful/effective and in some cases may be harmful. The weight of evidence in support of the recommendation is classified as follows: **Level of Evidence A:** data derived from multiple randomized clinical trials or, given the nature of population interventions, from well-designed quasi-experimental studies combined with supportive evidence from several other types of studies. **Level of Evidence B:** data derived from a single randomized trial or nonrandomized studies. **Level of Evidence C:** only consensus opinion of experts, case studies, or standard-of-care.

Policy Opportunities

- **Mass Media Campaigns**
  - Mostly quasi-experimental interventions.
  - Overall, mass media campaigns appeared effective in improving diet.
    - Increase in fruit and vegetable consumption by 0.25 servings/d (0.15-0.35) (n=5)
  - Important gaps: effectiveness on diet targets other than fruits, vegetables, or salt; effect of varying intensity and coverage; and impact of on disparities.

- **Labeling: menu labels, nutrition facts, icons**
  - 98 RCTs or quasi-experimental interventions.
  - Menu/point-of-purchase labels: No significant effects on sales or intake, regardless of label format, diet target (e.g. total calories, total fat, dietary fiber), target population, food establishment setting, or mandatory vs. voluntary nature of labeling.
  - Most common targets: Calories (n=23, -3.4% [95%CI -8.2, 1.3]), total fat (n=8, -4.5% [-14.7, 5.6]), saturated fat (n=4, -6.4% [-29.5, 16.7]).
  - When industry reformulations evaluated: Labeling reduced sodium (n=5, -4.7% [-8.8, -0.6]), but not total calorie (n=5), saturated fat (n=3), cholesterol (n=3), or fiber (n=3) contents.

Afshin *et al* 2015 Curr Cardiol Rep

Policy Opportunities

- **School Procurement Policies**
  - 76 RCTs or quasi-experimental interventions.
  - Increased healthful foods and drinks (34 studies): US/Canada (n=14), Europe (n=18), Iran (n=1), Korea (n=1); median f/u 9 mo's.
    - Overall effective, esp. for F&V.
  - Restricting unhealthful foods and drinks (26 studies): US/Canada (n=18), Europe (n=6), Korea (n=2); median f/u 23 mo's.
    - Overall effective. Laws and government policies appeared more effective than local programs; and single component more than multi-component.
  - Nutrition standards for school meals (22 studies): (nutrient content, portion size, food standards): US/Can. (n=16), Europe (n=6); median f/u 23 mo's.
    - Conflicting results, no consistent patterns seen.

Afshin *et al* 2015 Curr Cardiol Rep

Policy Opportunities

- **Worksite Wellness Programs**
  - 89 RCTs or quasi-experimental interventions.
  - Duration: weeks to decades.
  - Typical components: employee steering committees, group education classes, promotional/education materials (newsletters, signs, brochures), health risk assessments, weight loss competitions, group exercise classes, signs to promote stair use, and cafeteria changes (increased availability of healthy foods, nutrition labeling).
  - Many, but not all, improved diet (especially fruits and vegetables) and/or reduced adiposity (especially when comprehensive & multicomponent).
  - Effect sizes generally small to modest .

Tufts UNIVERSITY

Afshin *et al* 2015 Curr Cardiol Rep

Policy Opportunities

- **Local Built Environment**
  - 150+ cross-sectional studies: Inverse associations of supermarkets with adiposity; mixed associations for other food outlets (grocery stores, convenience stores, full-service restaurants, fast-food restaurants).
  - 20 prospective (observational or quasi-experimental) studies: Inconsistent for both diet and obesity, mostly US studies in both adults and children
  - Generally inconclusive

- **Food Pricing / Economic Incentives**
  - 30 studies: 23 intervention trials (in supermarkets, school/workplace cafeterias, restaurants; in US, New Zealand, Netherlands, France, South Africa) and 7 prospective cohorts (all community-based; all in the US).

Afshin *et al* 2015 Curr Cardiol Rep

Food Pricing / Economic Incentives

	American Heart Association	U.S. Preventive Services Task Force	CDC Community Guide	Change in % intake for each 10% price change
Subsidies				
To increase fruits and vegetables	Class I Evidence A	Grade A, High Level of Certainty	Strong Evidence, Strongly Recommended	14% (11-17%)
To increase other healthful foods	Class I Evidence A	Grade A, High Level of Certainty	Strong Evidence, Strongly Recommended	16% (10-23%)
To increase healthful beverages	Class IIb Evidence B	Grade C, Moderate Certainty	Insufficient Evidence	
Taxation				
To decrease SSBs	Class IIa Evidence B	Grade B, Moderate Certainty	Sufficient Evidence – Recommended	7% (3-10%)
To decrease unhealthful foods	Class IIb Evidence B	Grade C, Moderate Certainty	Insufficient Evidence	3% (1-5%)

Afshin et al., *submitted*

The Real Cost of Food – Dietary Taxes and Subsidies to Improve Public Health

- Prevailing prices do not reflect the **true societal costs** of foods.
  - Diet-related chronic diseases account for substantial health care expenditures & decrease in productivity (& thus international competitiveness of a country's economy)
  - Individuals with healthy diets have ↓ health costs and longer, more productive lives (contributing to ↑ tax revenue).
- Both negative health and economic consequences of poor nutrition could be mitigated by a national system of subsides and taxes to facilitate more sensible dietary choices.
  - Not to reduce total calories.
- Such strategies incentivize healthier options while still allowing for consumer choice, in contrast to bans or restrictions that may be perceived as intrusive.
- Most prior food tax proposals have targeted 1 or a limited number of food products; e.g., SSBs.
- Although beneficial, those proposals do not address the full public health challenge of poor diets and diet-related disease:
  - Arise from fundamentally unhealthful eating patterns across a range of beverage and food categories.

The Real Cost of Food – Dietary Taxes and Subsidies to Improve Public Health

An alternative, potentially more effective approach:

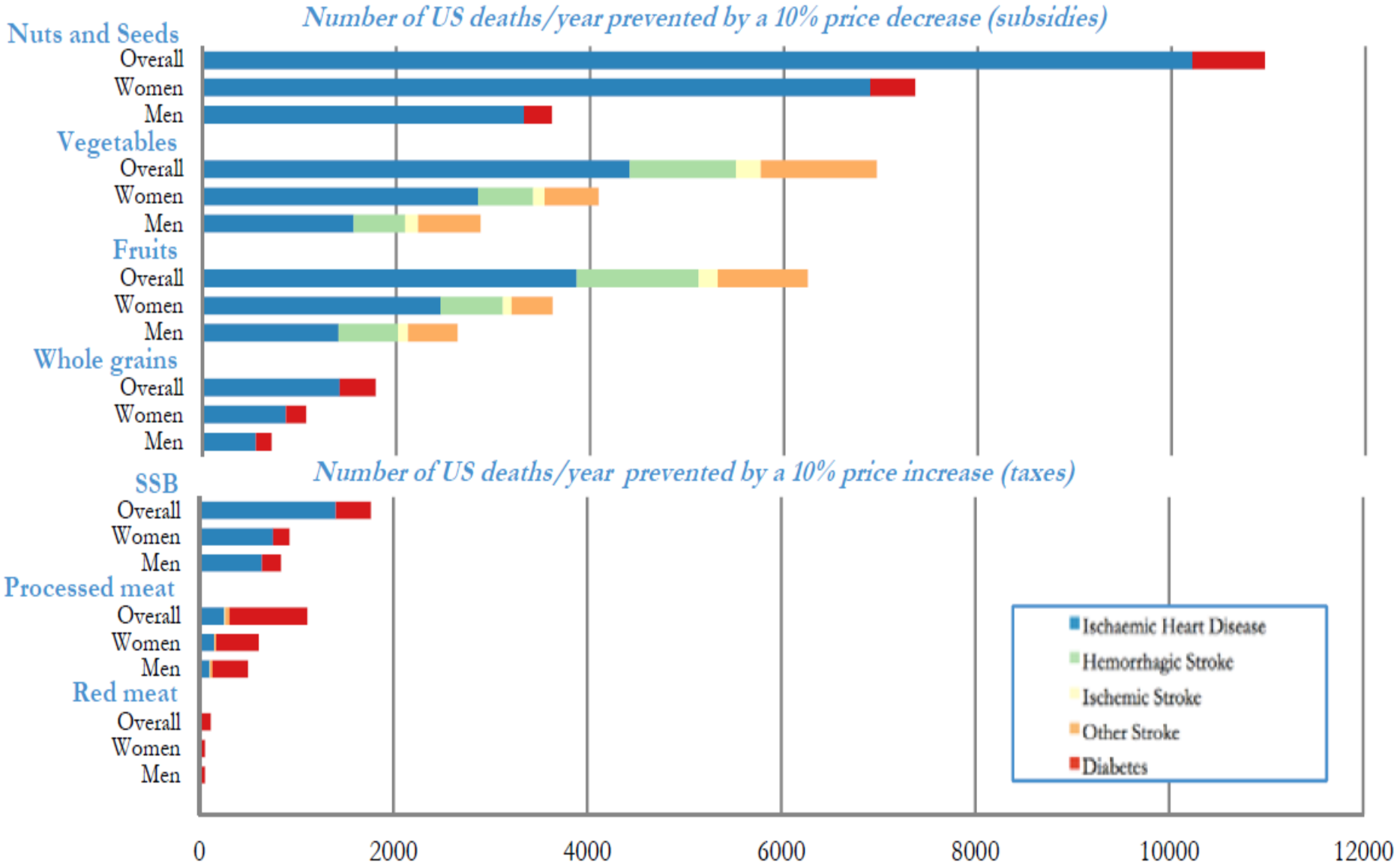
	Packaged and supermarket foods	**Restaurant and other food service establishments**
Simple Flat Tax (10 to 30%)	Most packaged foods (e.g., nearly all foods with a label).	Most chain restaurants, large cafeteria vendors, and other similar food service establishments.
Subsidy (from tax revenue)	Minimally processed healthful foods, such as fruits, nuts, vegetables, beans, seafood, plain yogurt, vegetable oils, and minimally processed whole grains.	School lunch and afterschool programs.

This combined approach, with incentives and disincentives, could address both excesses and deficiencies in the prevailing diet.

Tufts UNIVERSITY

Mozaffarian, Rogoff, & Ludwig, JAMA 2014

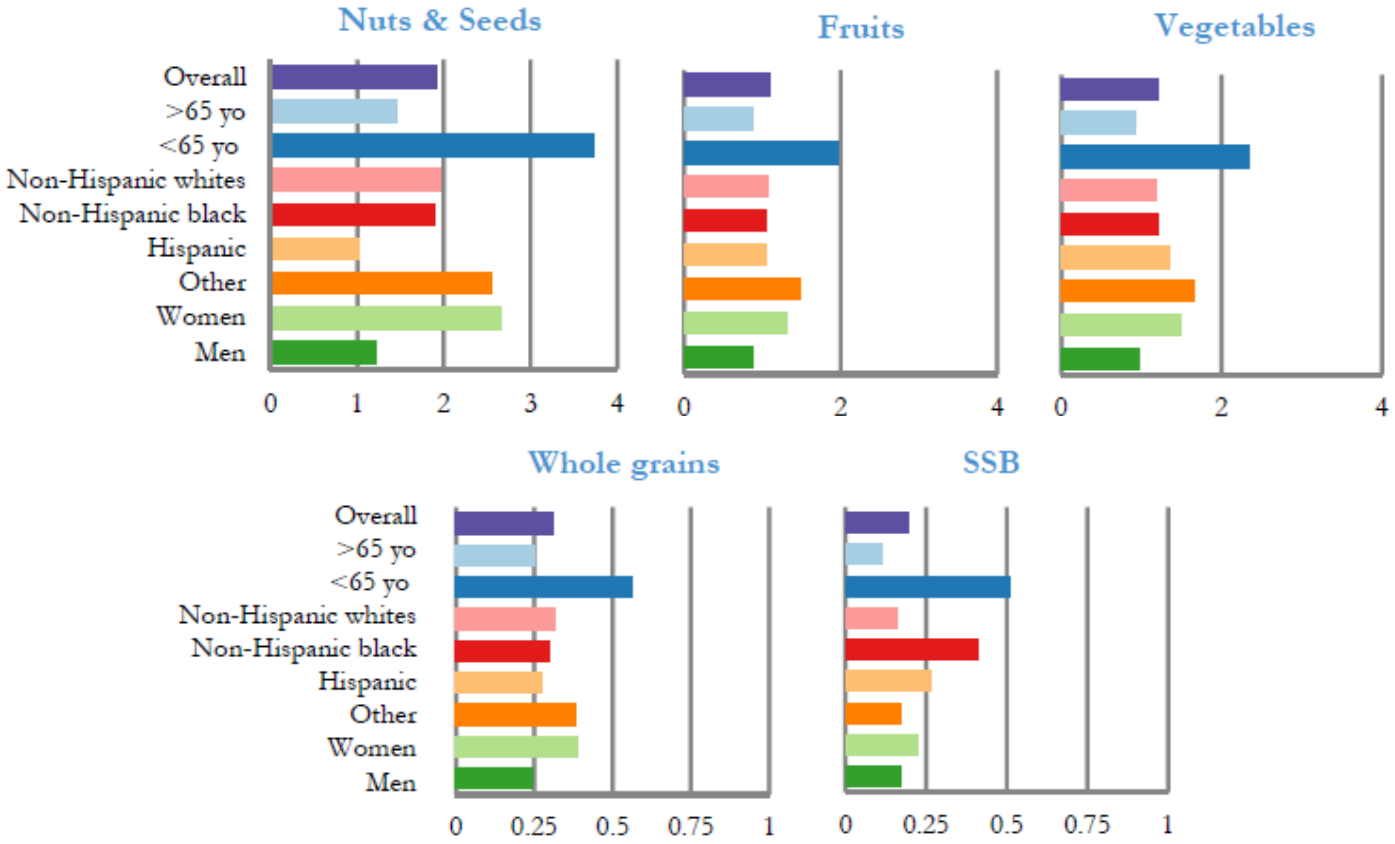
US Cardiometabolic Deaths Prevented by 10% Subsidy or Tax



Tufts UNIVERSITY

Penalvo et al., Spring AHA 2015 (abstract)

Propotional Reduction in US Cardiometabolic Deaths Attributable to a 10% Subsidy or Tax



- **10% price change in 7 foods would reduce cardiometabolic mortality by 4.95% (joint PAF).**
- **30% price change: prevent 86,000 cardiometabolic deaths, or 14.2% of all CMD deaths.**
- **The resulting economic benefits could be even greater, including potential major reductions in direct health care expenditures & possible improvements in economic productivity.**

Tufts UNIVERSITY

Penalvo et al., Spring AHA 2015 (abstract)

Dietary Policy Priorities

The current epidemic of nutrition-related disease requires a multifaceted approach

- National tax and subsidy framework to reflect the real costs of food.
- Strong health-aligned incentives in all food assistance programs.
- Industry incentives (and discentives) to develop and market healthier foods.
- Comprehensive school and workplace wellness programs.
- Quality standards on salt and trans fat; marketing to children.
- Long-term agricultural policies for production, storage, transport, and sales of healthier foods.
- Modernize dietary guidelines to match the science.

Tufts UNIVERSITY

AHA Scientific Statement: Population Approaches to Improve Diet, Physical Activity, and Smoking Habits. Mozaffarian et al., Circulation 2012