



BMI and % body fat

BMI = 22.3



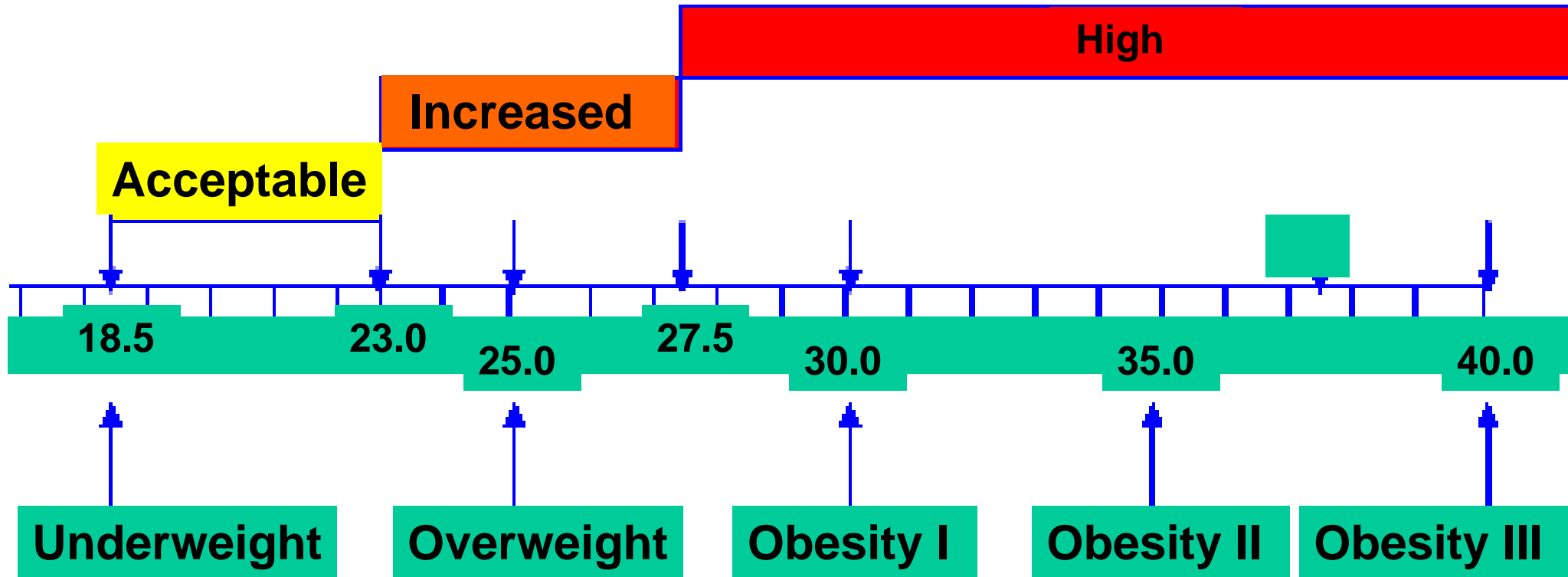
body fat

9.1 %

21.2 %

Source: THE LANCET • Vol
363 • January 10, 2004 •
www.thelancet.com

WHO recommended BMI cut offs for Asians 2004



WHO international classification retained with new subcategories:

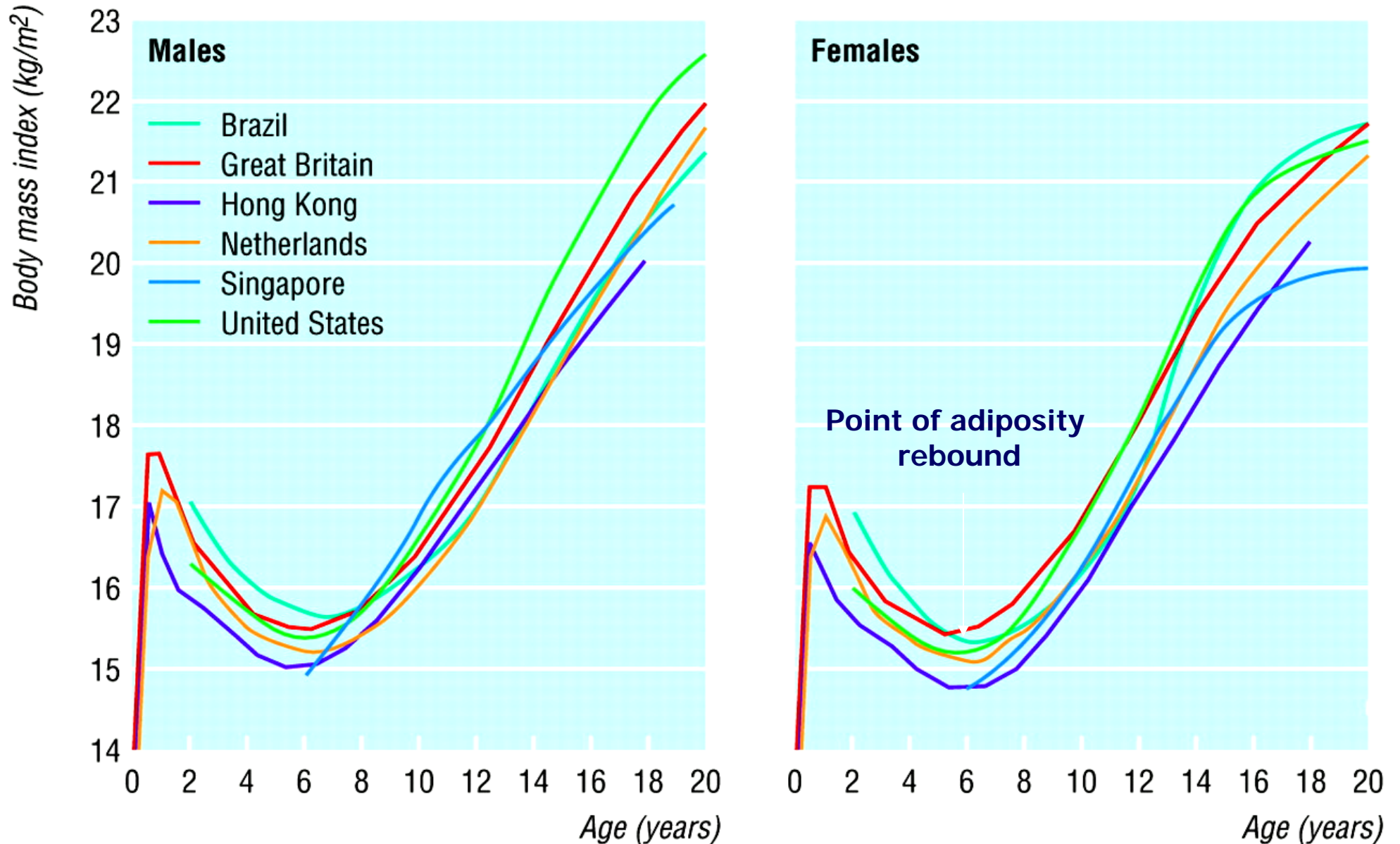
BMI < 18.5 – underweight

BMI 18.5-23 – increasing but acceptable risk

BMI 23–27.5 kg/m² – increased

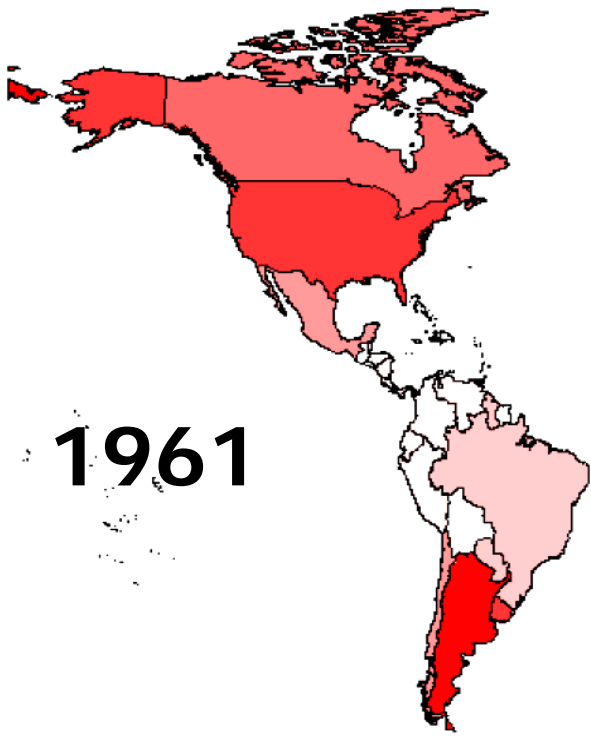
BMI >27.5 kg/m² - high risk.

Changes in BMI with age 0-20 yrs (Cole et al, 2000)

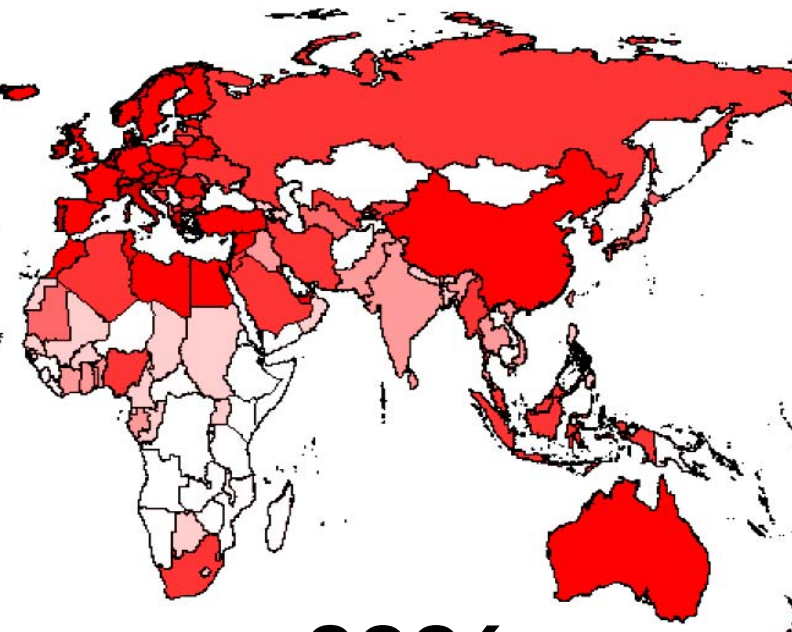
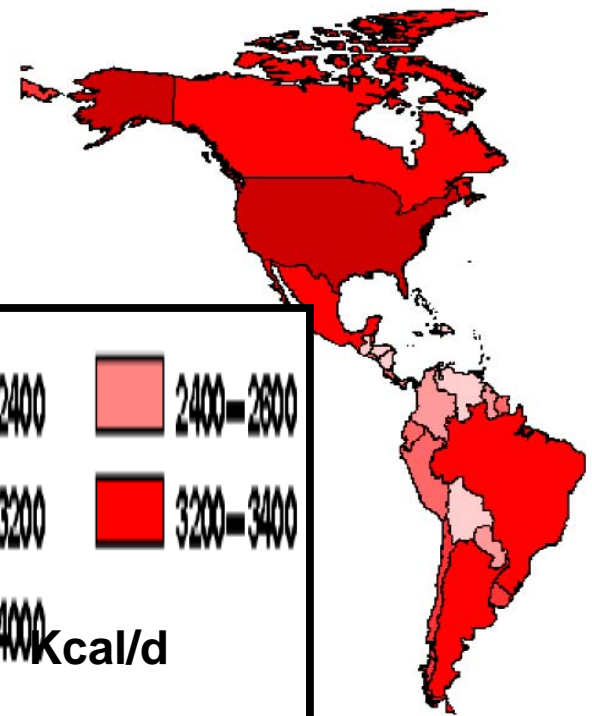
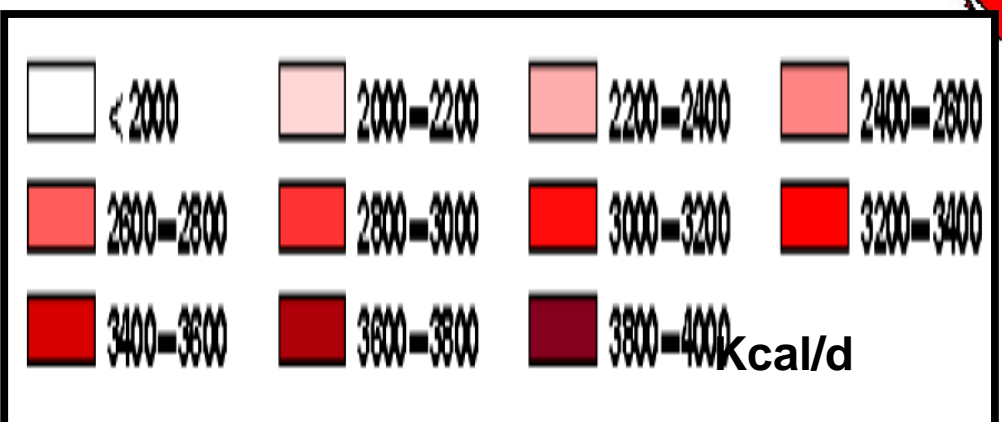
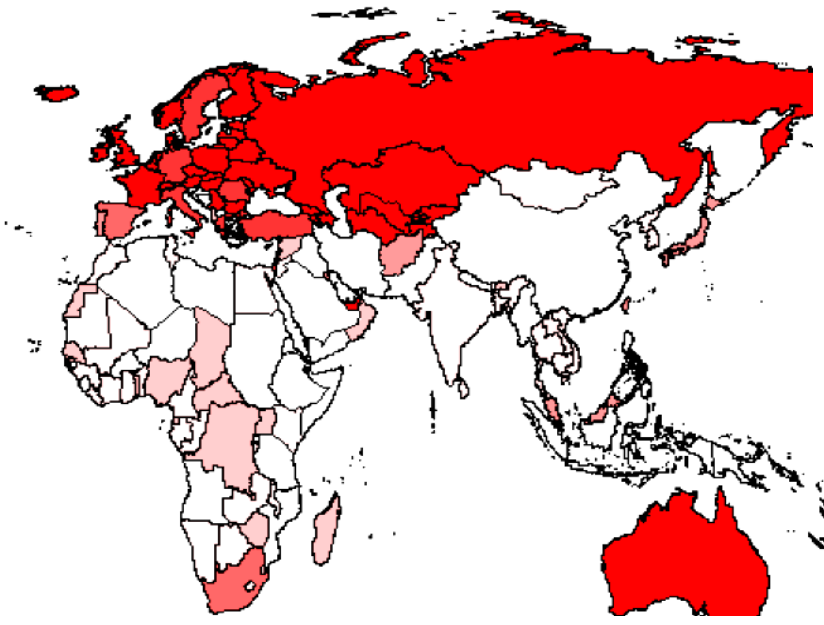


Dietary Energy Supply (DES)

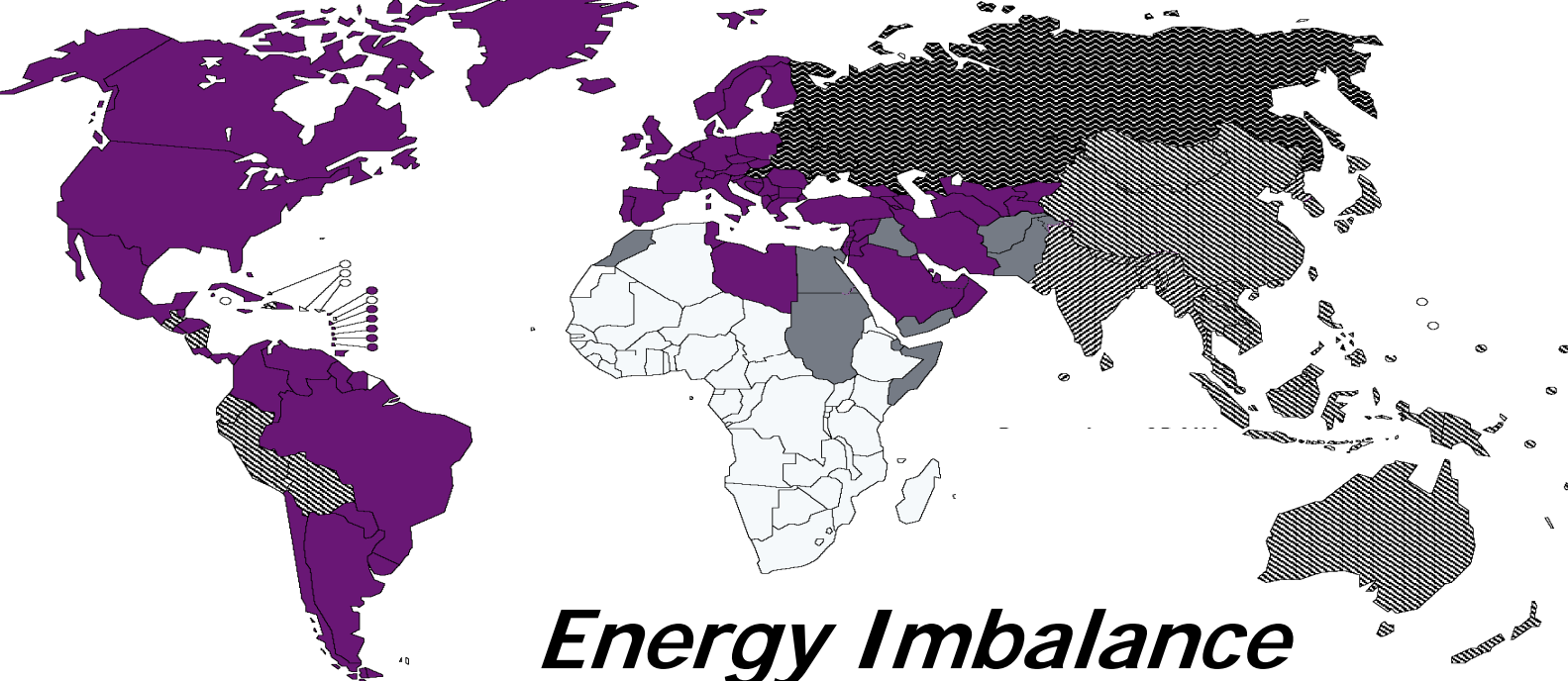
1961



1961

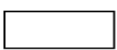








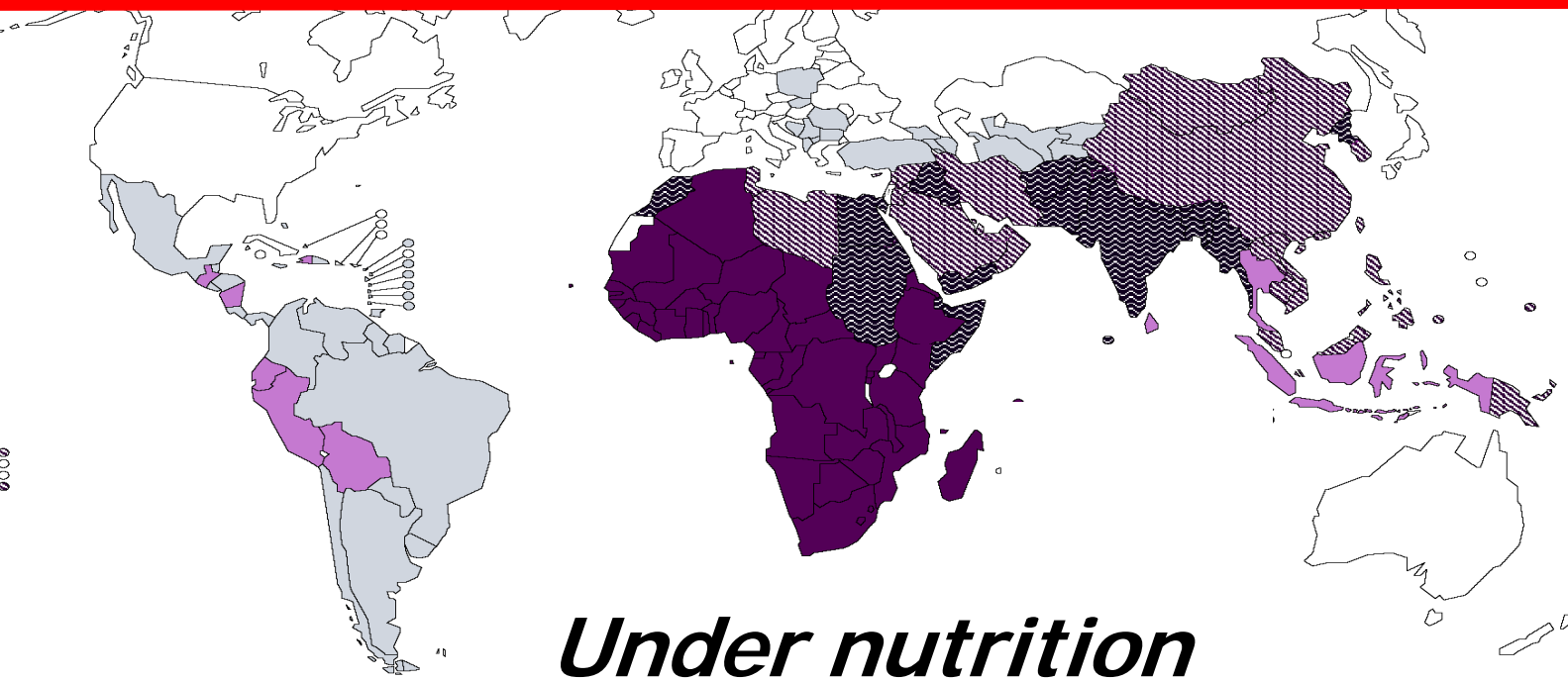
2006



Energy Imbalance

***% of total
DALYs lost***

-  <0.5%
-  0.5–0.9%
-  1–1.9%
-  2–3.9%
-  4–7.9%
-  8–15.9%
-  16%+



Under nutrition

National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants

Mariel M Finucane, Gretchen A Stevens,* Melanie J Cowan, Goodarz Danaei, John K Lin, Christopher J Paciorek, Gitanjali M Singh, Hialy R Gutierrez, Yuan Lu, Adil N Bahalim, Farshad Farzadfar, Leanne M Riley, Majid Ezzati, on behalf of the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Body Mass Index)†*

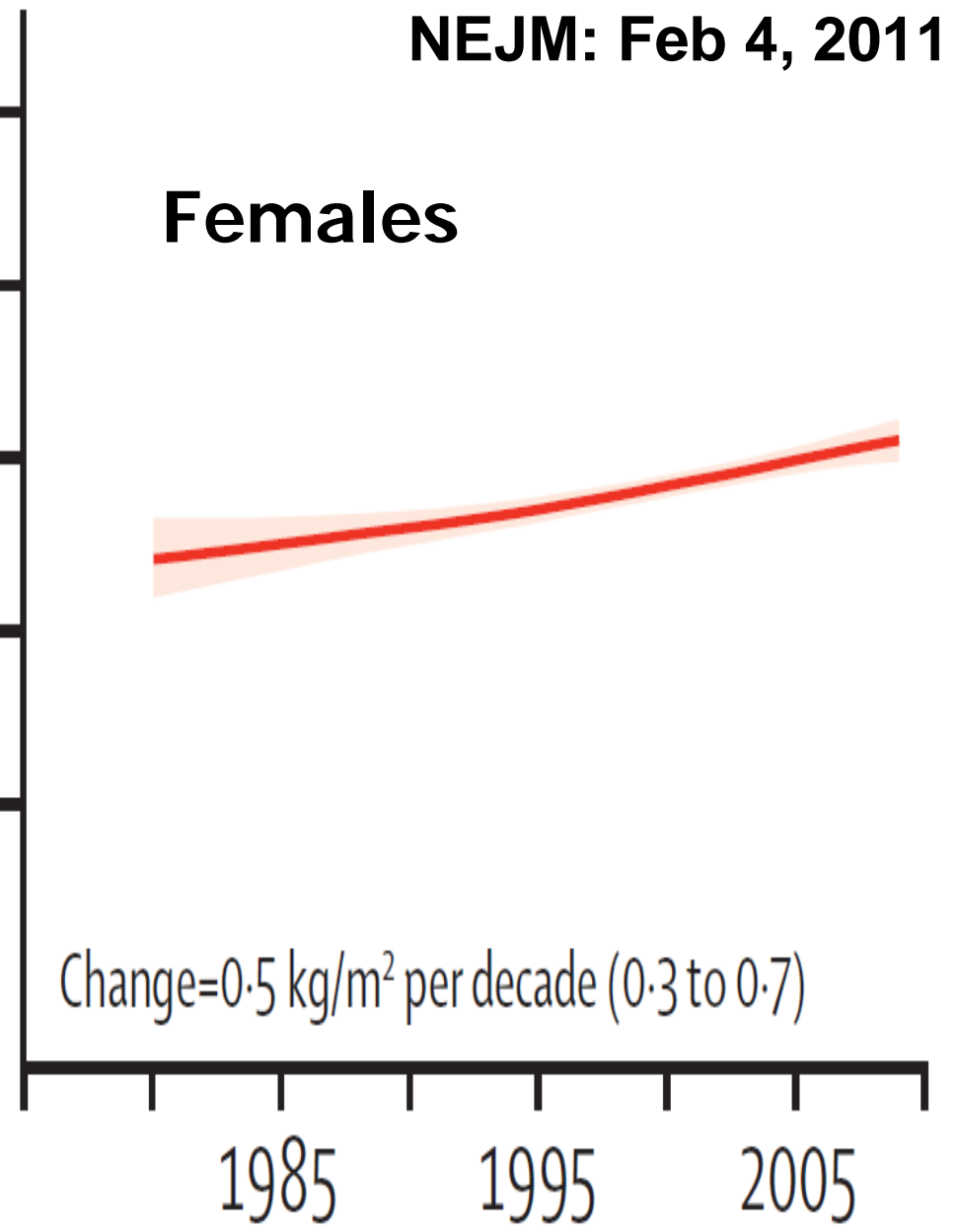
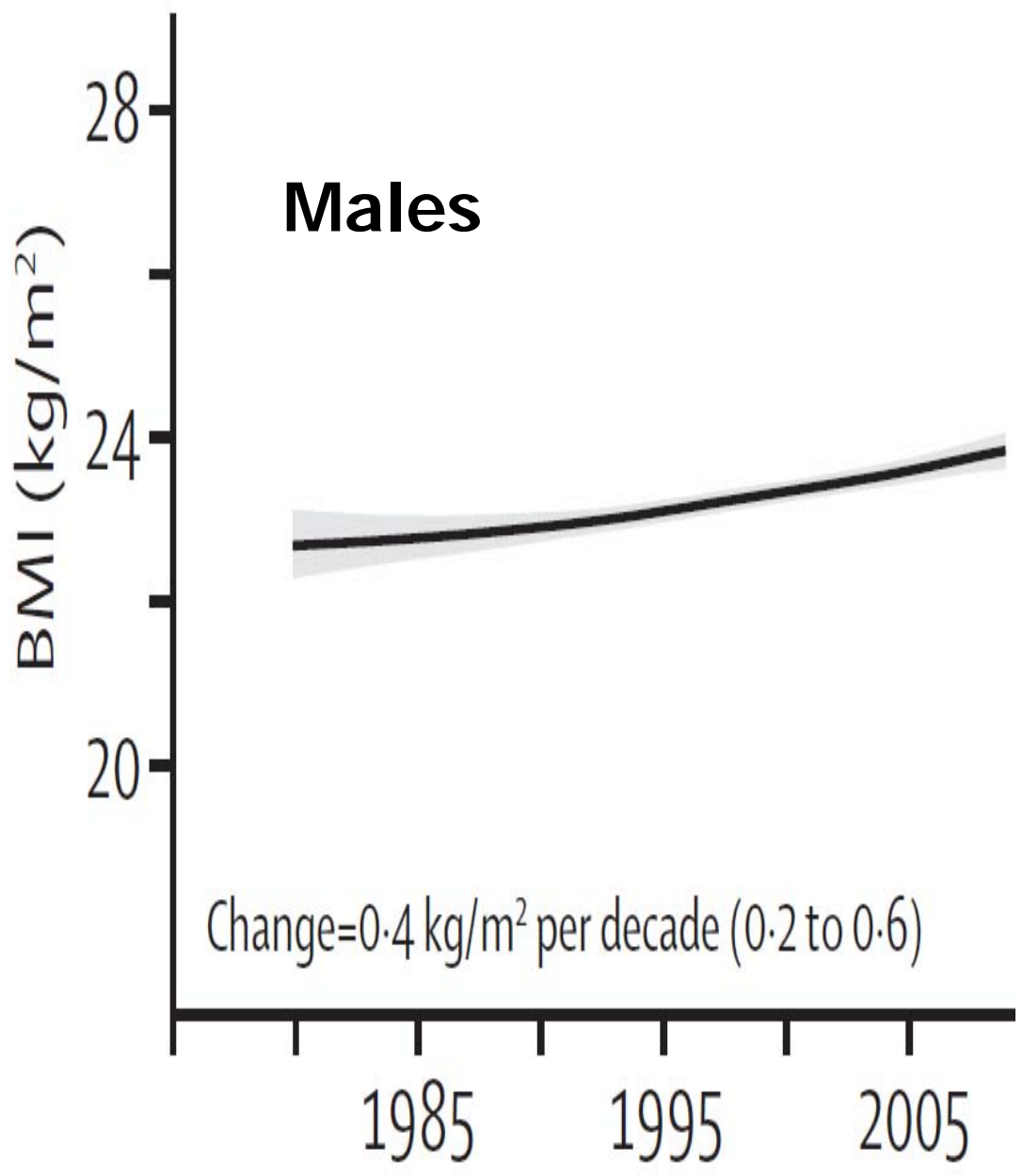
Trends and uncertainties of mean BMI for adults 20 years and older in 199 countries and territories. Data from published and unpublished health surveys (960 country-yrs 9.1 million participants)

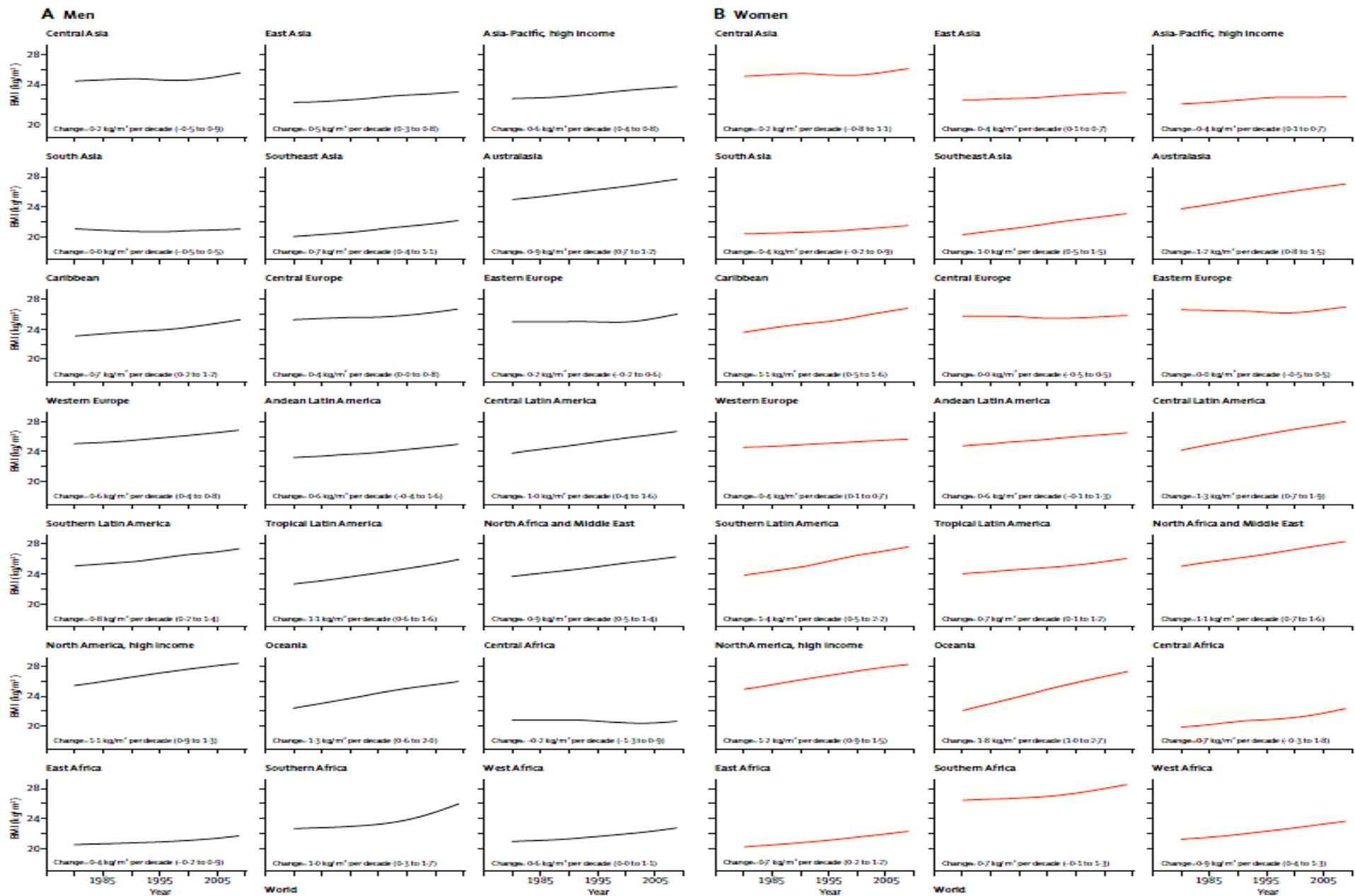
Bayesian hierarchical model to estimate mean BMI by age, country, and year, accounting for whether a study was nationally representative.

Published NEJM: Feb 4, 2011 DOI:10.1016/S0140- 6736(10)62037-5

Age-standardised mean BMI by gender 1980 - 2008

NEJM: Feb 4, 2011





Between 1980 -2008, mean BMI worldwide increased by 0.4 kg/m² per decade (95% CI 0.2–0.6) for men 0.5 kg/m² per decade (95% CI 0.3–0.7) for women.

National BMI change for women ranged from no change in 19 countries to increases > 2.0 kg/m² per decade in nine.

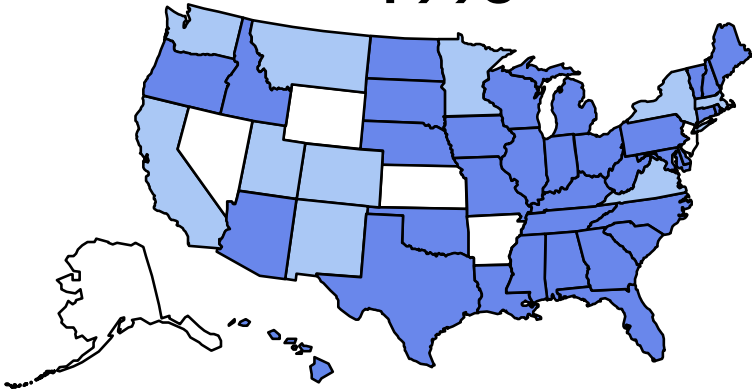
Male & female BMIs in 2008 were highest in Oceania reaching 34 kg/m² (32.8–35.0) for men and 35 kg/m² (33.6–36.3) for women in Nauru. The USA had the highest BMI of high-income countries.

Obesity Trends* Among U.S. Adults

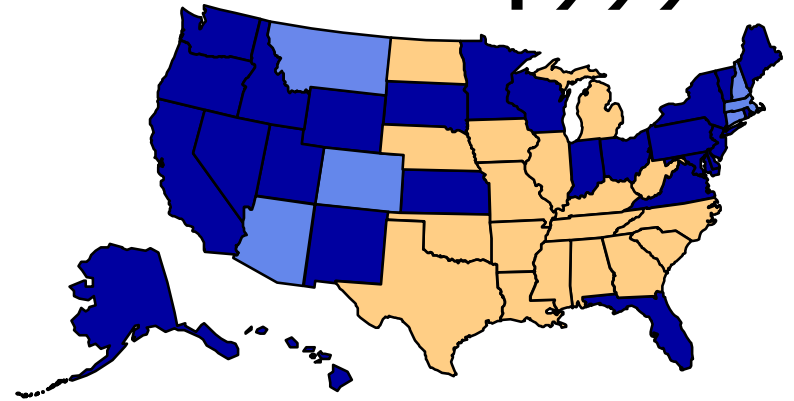
BRFSS, 1990, 1999, 2009

(*BMI ≥ 30 , or about 30 lbs. overweight for 5'4" person)

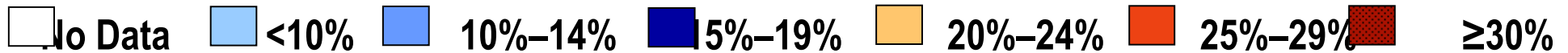
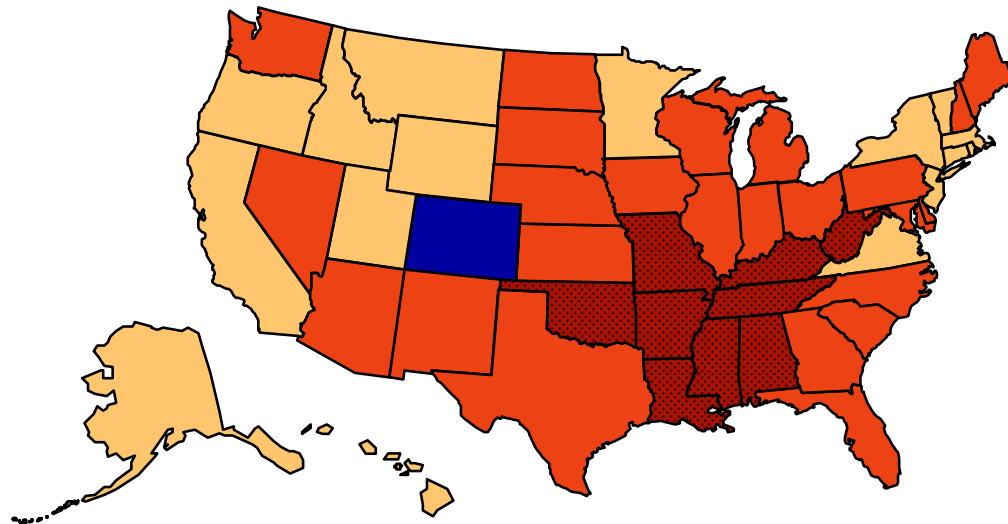
1990



1999



2009



In 2008, an estimated 1.46 billion adults (1.4–1.5) worldwide had BMI of 25 kg/m² or greater, of these 205 million men (193–217 million) and 297 million women (280–315 million) were obese.

Globally, mean BMI has increased since 1980. The trends since 1980, and mean population BMI in 2008, varied substantially between nations.

Interventions and policies that can curb or reverse the increase, and mitigate the health consequences of high BMI by targeting its metabolic mediators, are needed.

Global epidemic of obesity

“The epidemic of obesity, with its attendant comorbidities --- heart disease, hypertension, stroke, and diabetes --- is not a problem limited to industrialized countries” – WHO TRS 916

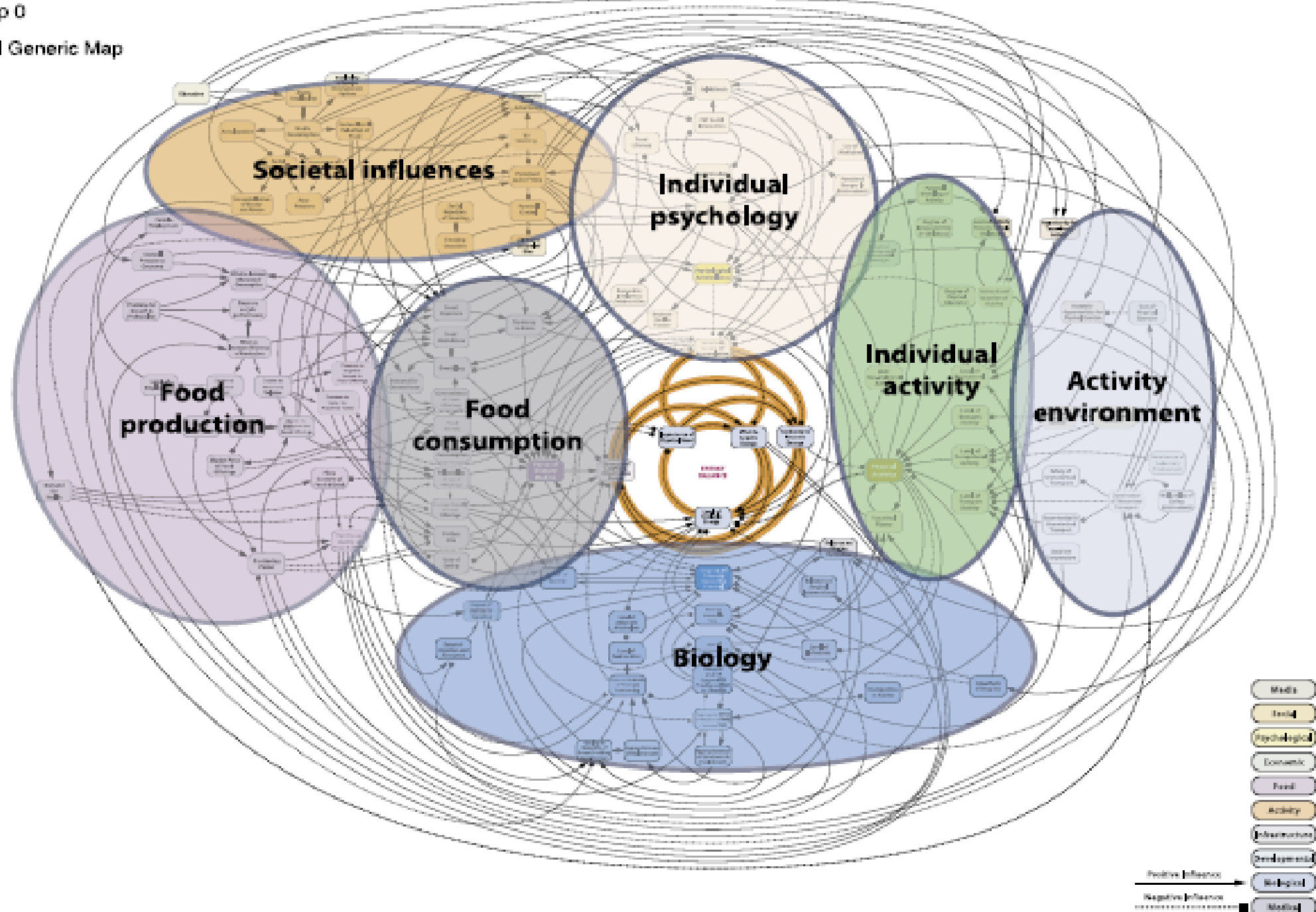
300 million BMI > 30

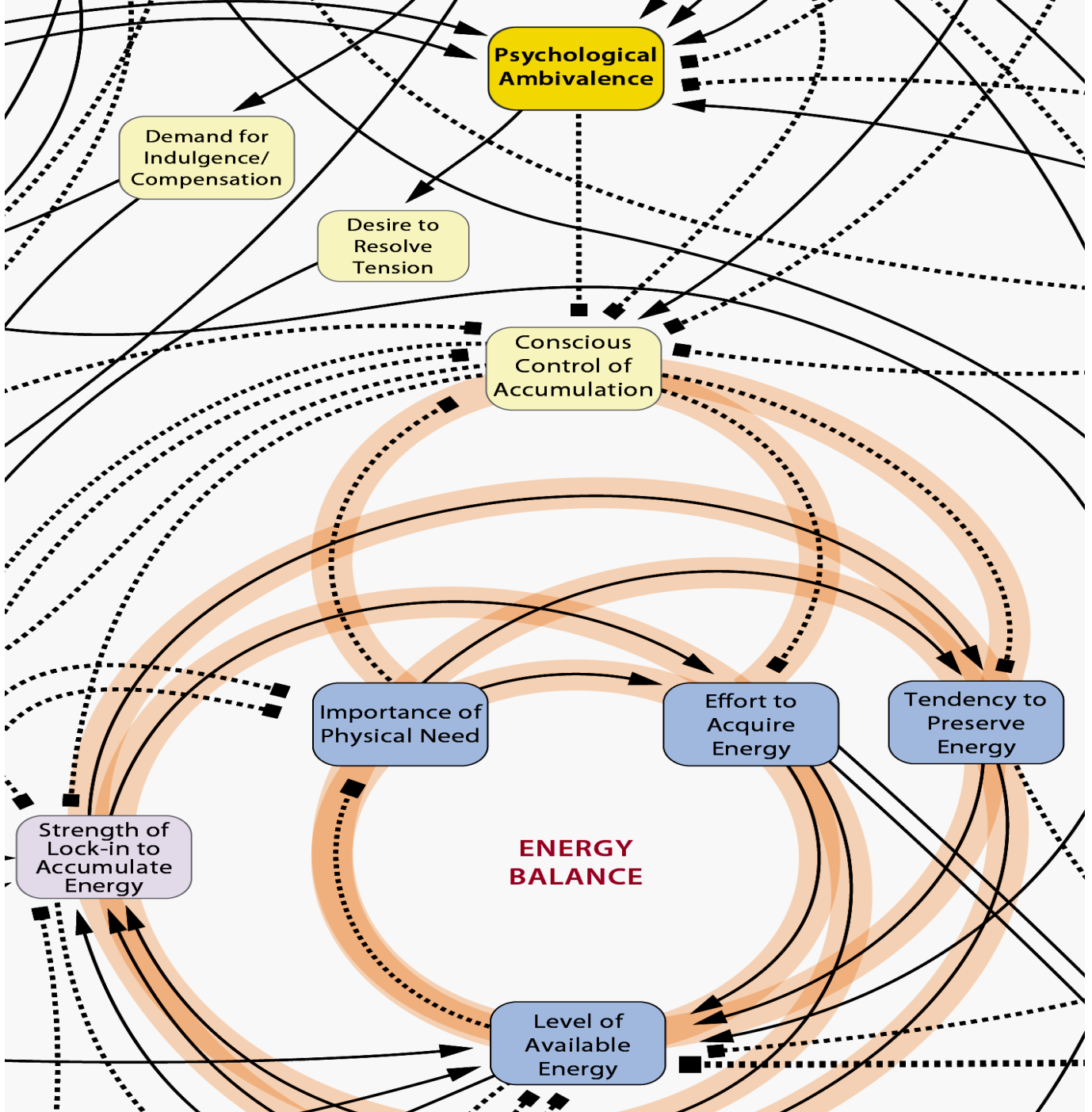
1.5 billion BMI > 25

1.7 billion BMI > 23

155 m school-age children overweight

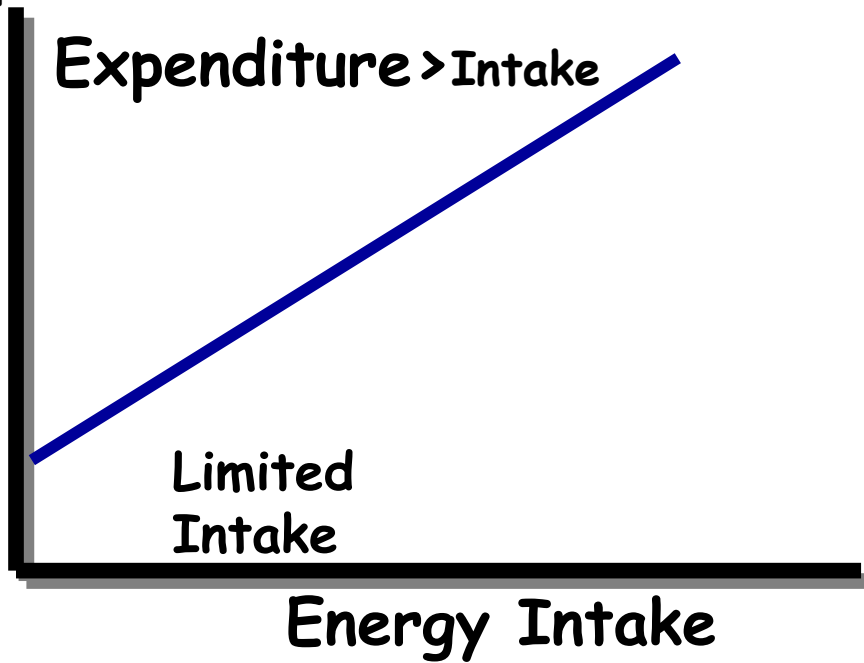
22 m under 5yrs overweight





Primitive Life

Energy Expenditure

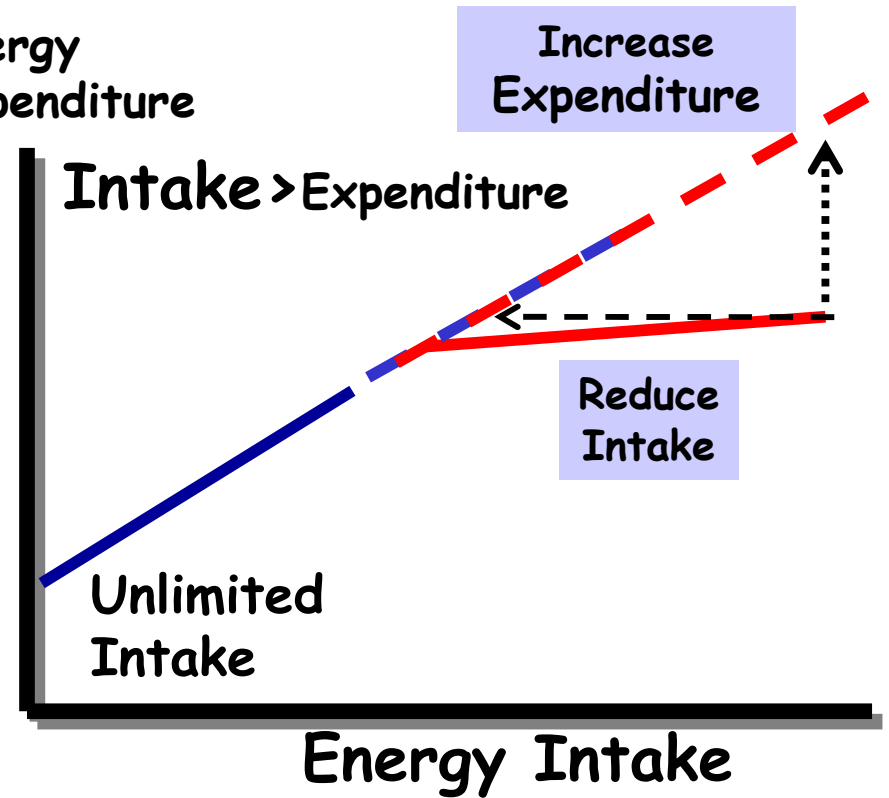


Low Energy Stores
(body fat)



Modern Life

Energy Expenditure



Increase in Energy Stores
Energy balance established
at unhealthy weight.





**Joint WHO/FAO expert consultation
on diet, nutrition and the
prevention of chronic diseases**



Geneva, Switzerland
28 January – 1 February 2002

Diet, nutrition and the prevention of chronic diseases

Report of the Joint WHO/FAO expert consultation



www.who.int/hpr/nutrition/ExpertConsultationGE.htm

Levels of prevention





Joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases



Nutrient recommendations for the prevention of excess weight gain and obesity

Evidence	Decreases risk	None	Increases risk
Convincing	Regular physical activity High dietary NSP (fibre) intake		Increased intake energy-dense foods Sedentary lifestyles
Probable	Home and school environments that support healthy food choices for children**		Heavy marketing of energy-dense foods** and fast-foods Adverse socio-economic conditions (for women in developed world) Sugar-sweetened drinks /juices
Possible	Low glycemic index foods Breastfeeding	Protein content of the diet	Large portion sizes High proportion of food prepared outside the home (western countries) Restraint/disinhibition eating pattern

Energy dense foods are high in fat &/or sugar. **Low energy density (or energy dilute) foods** are high in fibre and water, such as fruit, legumes, vegetables & whole grain cereals, as well as lean meat and fish.

www.who.int/hpr/nutrition/ExpertConsultationGE.htm

Principal nutrient/food changes

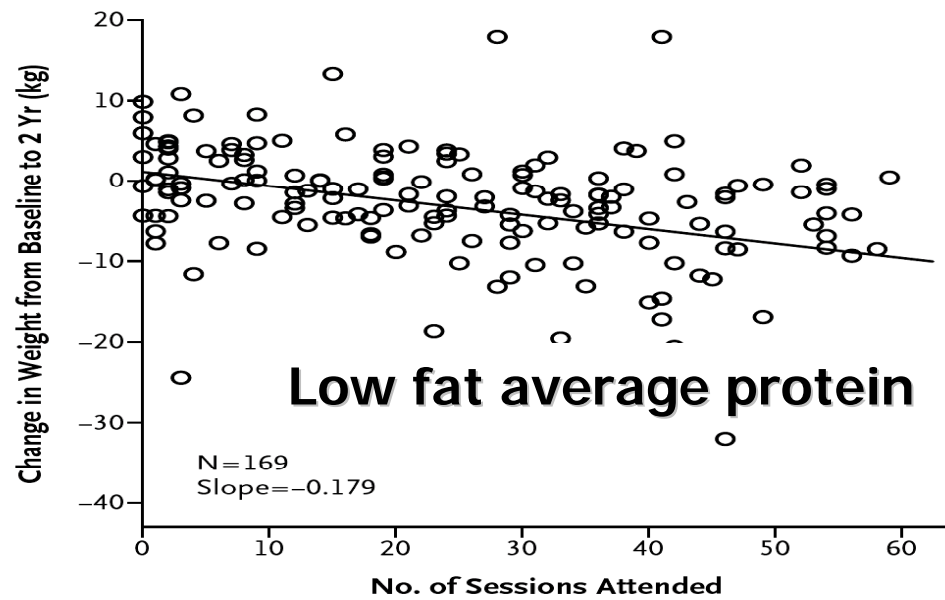
Reduce

- Total fat
- Saturated Fats (C14,C16)
- Trans fatty acids
- Free sugars
- Refined starches
- Sodium/salt
- Preserved meats

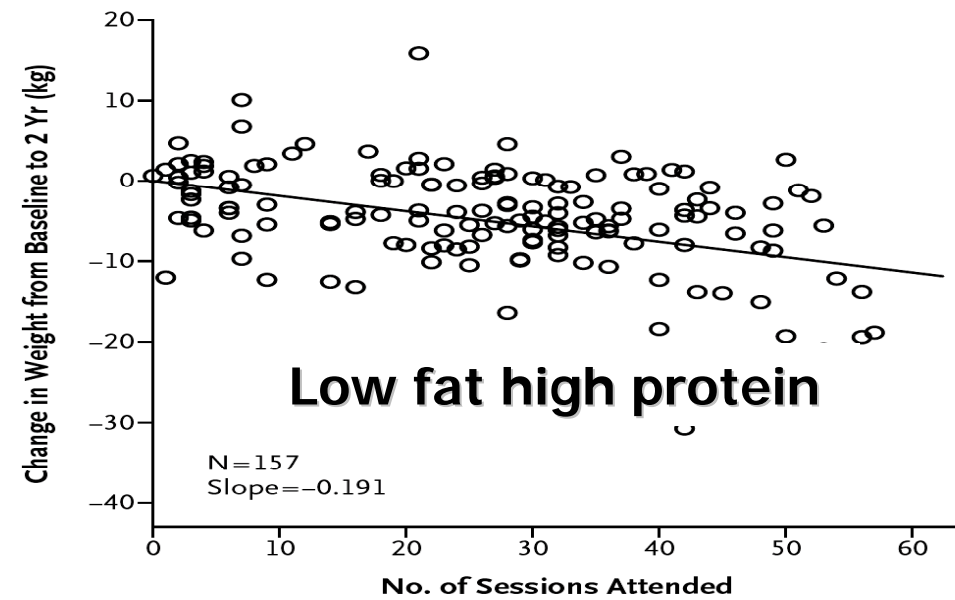
Increase

- Vegetables,
- Fruits, legumes
- Fibre/NSP
- ω - 3 fatty ac (LNA,EPA,DHA)
- Iron/iodine
- Zinc/folate?
- PHYSICAL ACTIVITY

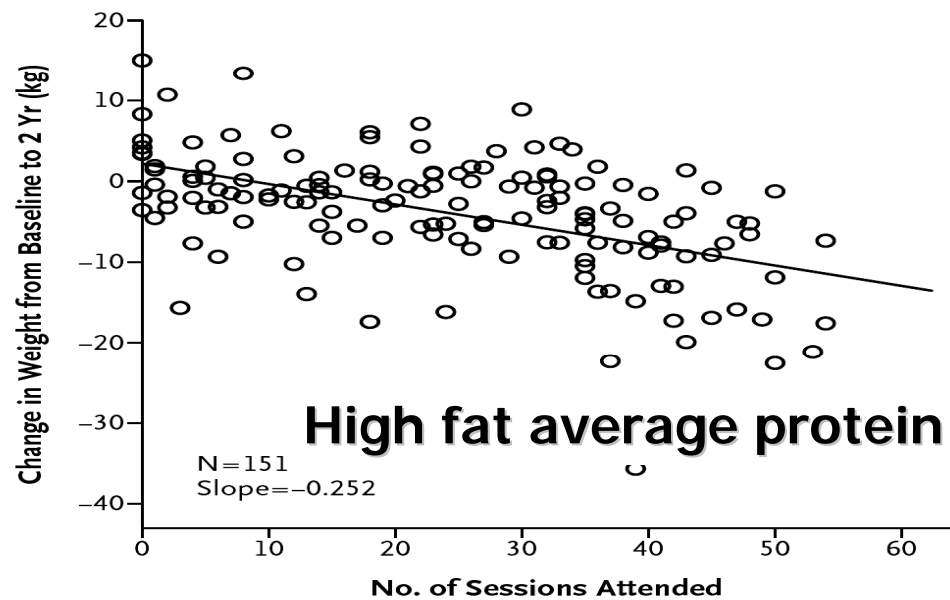
A Low-Fat, Average-Protein



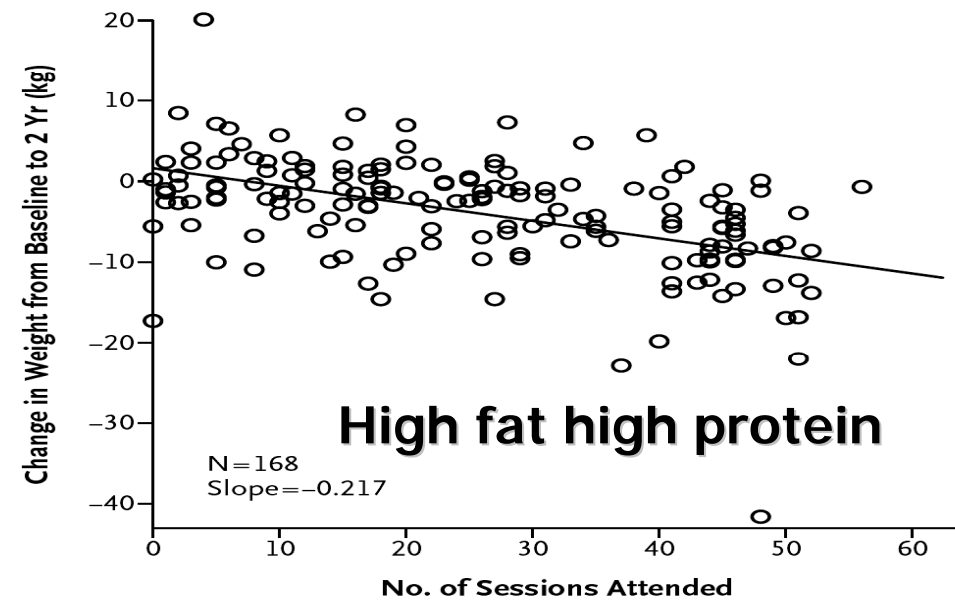
B Low-Fat, High-Protein



C High-Fat, Average-Protein



D High-Fat, High-Protein



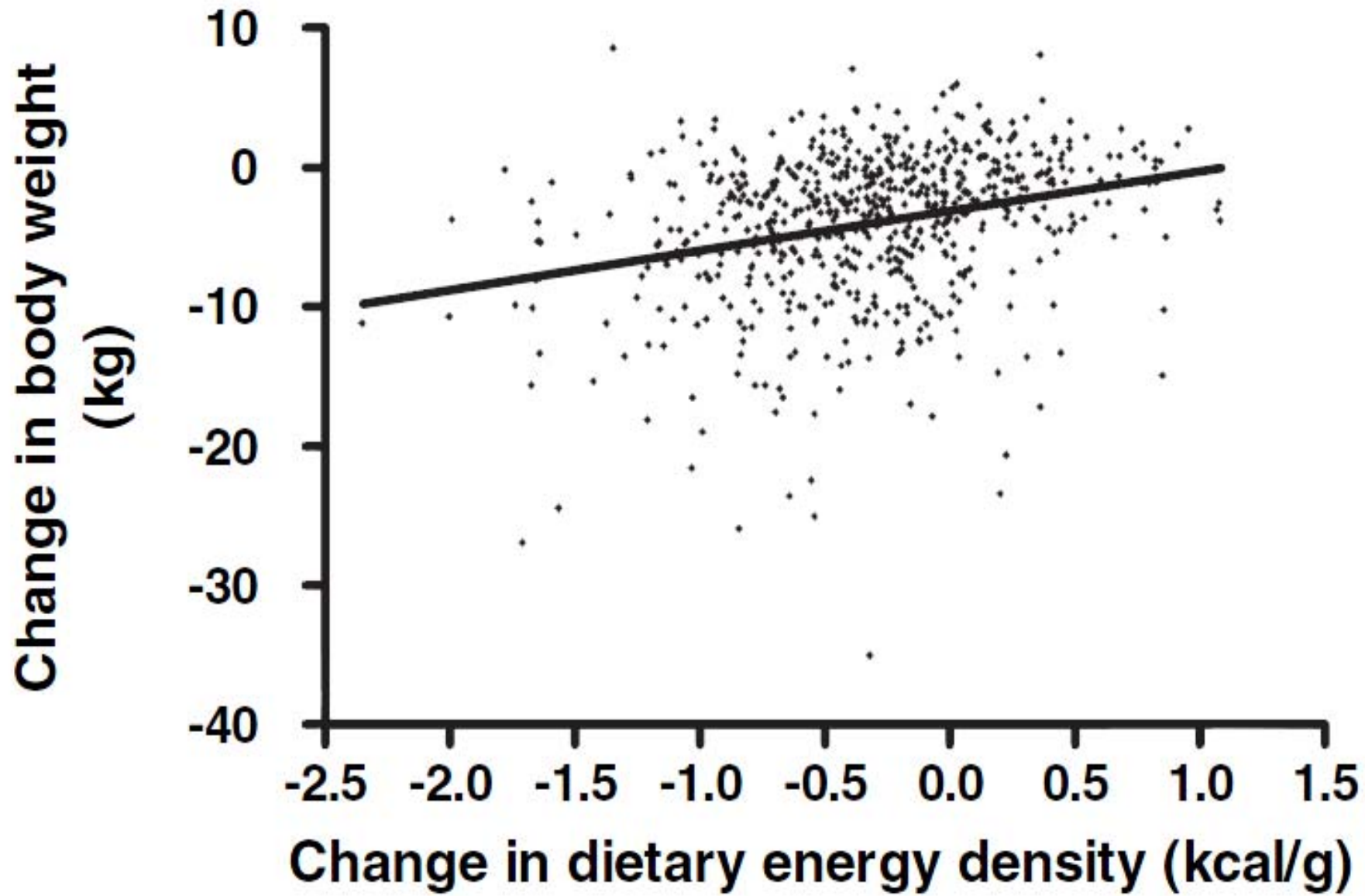
Reductions in dietary energy density are associated with weight loss in overweight and obese participants in the PREMIER trial¹⁻⁴

Jenny H Ledikwe, Barbara J Rolls, Helen Smiciklas-Wright, Diane C Mitchell, Jamy D Ard, Catherine Champagne, Njeri Karanja, Pao-Hwa Lin, Victor J Stevens, and Lawrence J Appel **Am J Clin Nutr 2007;85:1212-21.**

Objective: examined the effects of behavioral interventions on ED values and explored how 6-mo ED changes relate to BW.

Design: prospective study of 658 adults participating in the PREMIER trial, an 18-mo randomized, controlled, behavioral hypertensive persons were randomly assigned to 1 of 3 groups: the established group received monthly sessions implementing well-established hypertension recommendations and the Dietary Approaches to Stop Hypertension (DASH) increase plant foods, lower intake of meats, sugar, fats and sodium. Weight of food taken increased but Kcal intake dropped.

Both large and modest reductions in energy density were associated with weight loss & better diet quality.



Reduction in consumption of sugar-sweetened beverages is associated with weight loss: the PREMIER trial¹⁻³

Liwei Chen, Lawrence J Appel, Catherine Loria, Pao-Hwa Lin, Catherine M Champagne, Patricia J Elmer, Jamy D Ard, Diane Mitchell, Bryan C Batch, Laura P Svetkey, and Benjamin Caballero **Am J Clin Nutr 2009;89:1299-306.**

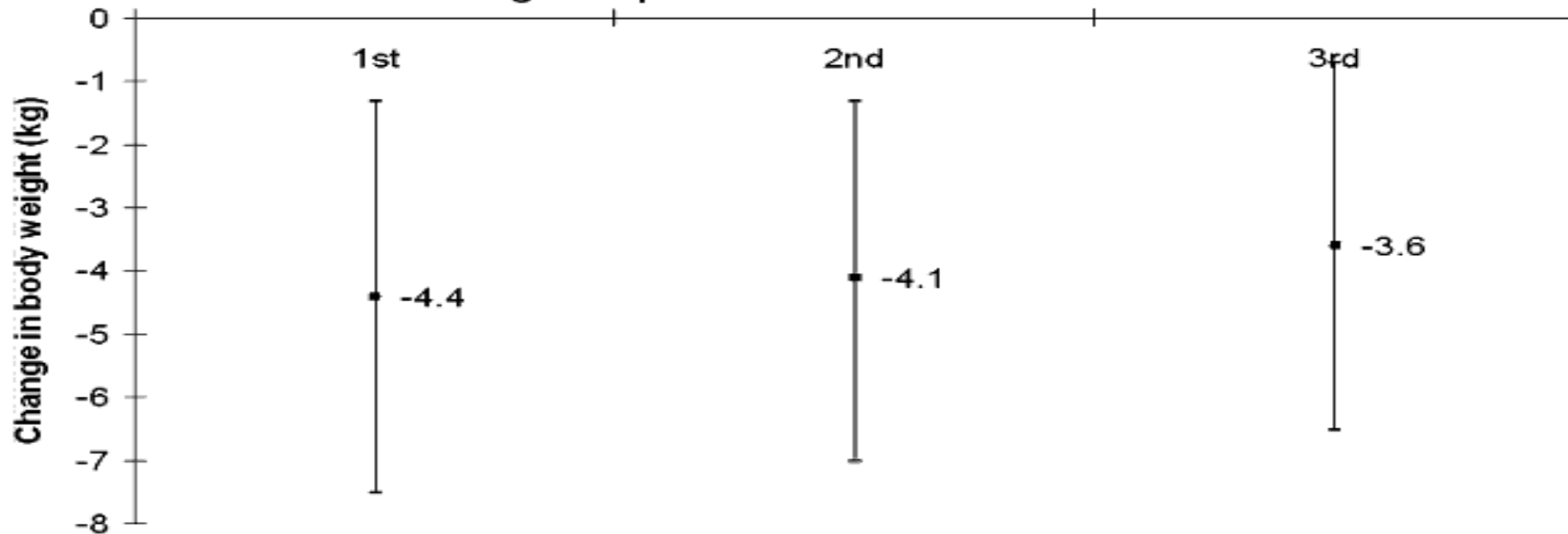
Objective: examine how changes in beverage consumption affect weight change among adults.

Design: prospective study of 810 adults participating in the PREMIER trial, an 18-mo randomized, controlled, behavioral intervention trial. Measurements (weight, height, and 24-h dietary recall) were made at baseline, 6 mo, and 18 mo.

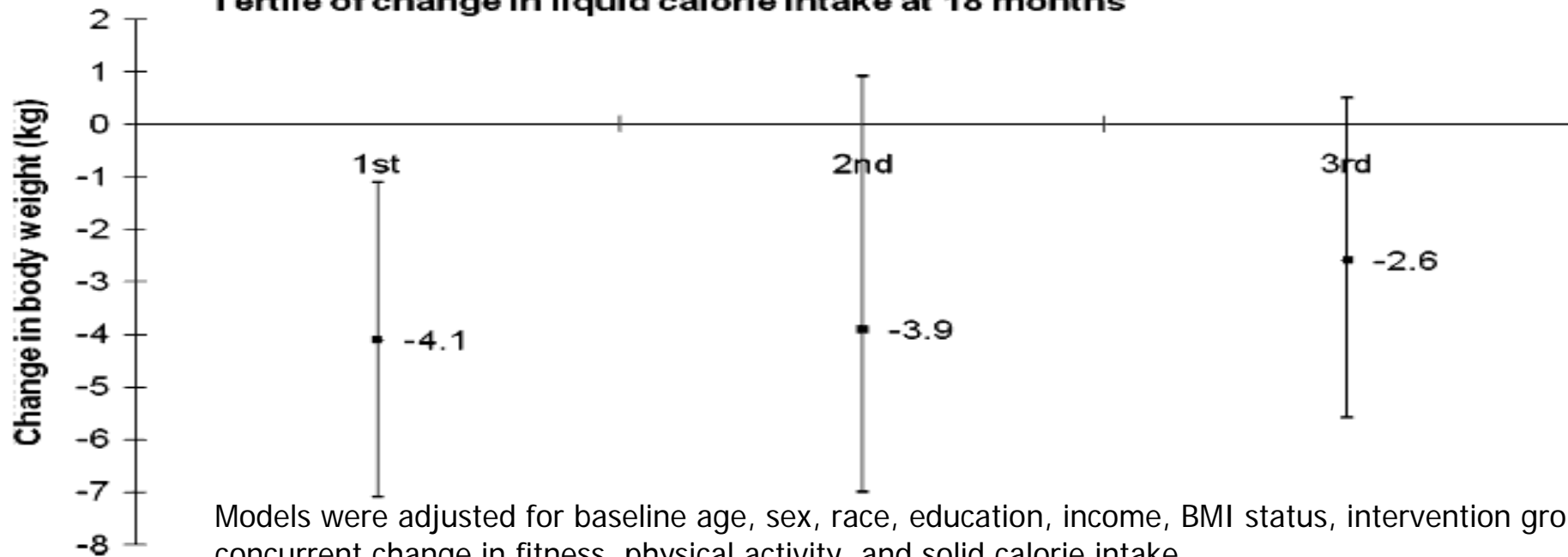
Results: Liquid calorie intake had a stronger effect on weight loss than did solid calorie intake. Intake of sugar-sweetened beverages (SSBs) was significantly associated with weight.

A reduction in SSB intake of 1 serving/d associated with a loss of 0.49 kg (0.11-0.82) $p < 0.006$ at 6 mo and of 0.65 kg (0.22- 1.09; $p < 0.003$) at 18 mo.

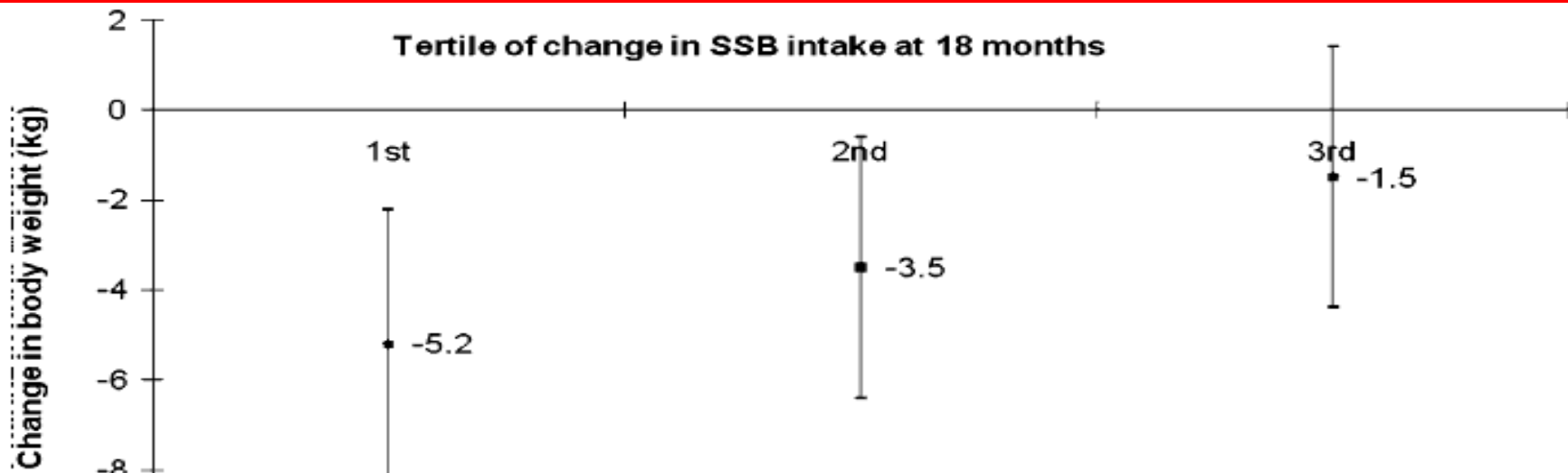
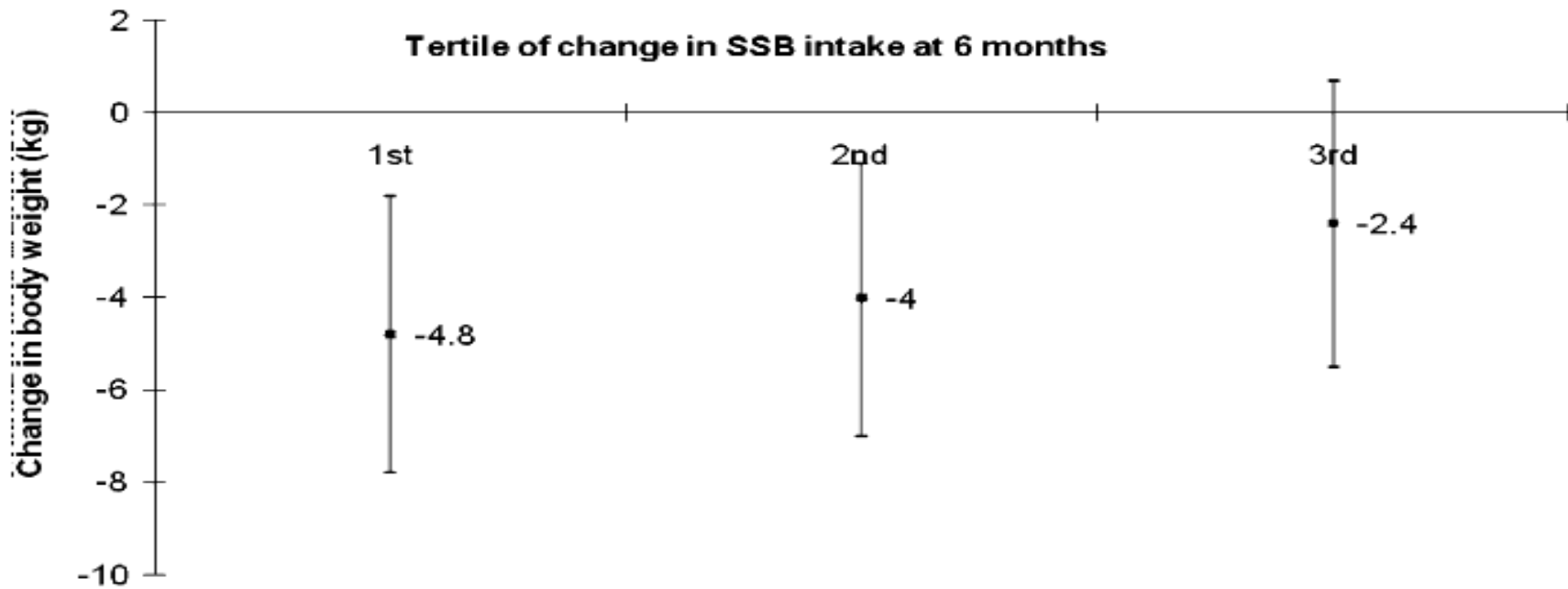
Tertile of change in liquid calorie intake at 6 months



Tertile of change in liquid calorie intake at 18 months



Models were adjusted for baseline age, sex, race, education, income, BMI status, intervention groups, concurrent change in fitness, physical activity, and solid calorie intake



Model-adjusted mean 6-mo weight change and 95% CIs (6 mo – baseline) by tertile of 6-mo sugar-sweetened beverage (SSB) intake change and 18-mo weight change (18 mo – baseline) by tertile of 18-mo SSB intake change.

Principal nutrient/food changes

Reduce

- Total fat
- Saturated Fats (C14,C16)
- Trans fatty acids
- Free sugars
- Refined starches
- Sodium/salt
- Preserved meats

Increase

- Vegetables,
- Fruits, legumes
- Fibre/NSP
- ω - 3 fatty ac (LNA,EPA,DHA)
- Iron/iodine
- Zinc/folate?
- PHYSICAL ACTIVITY

Principal nutrient/food changes

Reduce

TOTAL ENERGY

Increase

- Vegetables,
- Fruits, legumes
- Fibre/NSP
- ω - 3 fatty ac (LNA,EPA,DHA)
- Iron/iodine
- Zinc/folate?
- **PHYSICAL ACTIVITY**

Life Course approach to address obesity risk

