## DIABESITY

Suffolk VA, March 11, 2011

## Francine Ratner Kaufman, MD

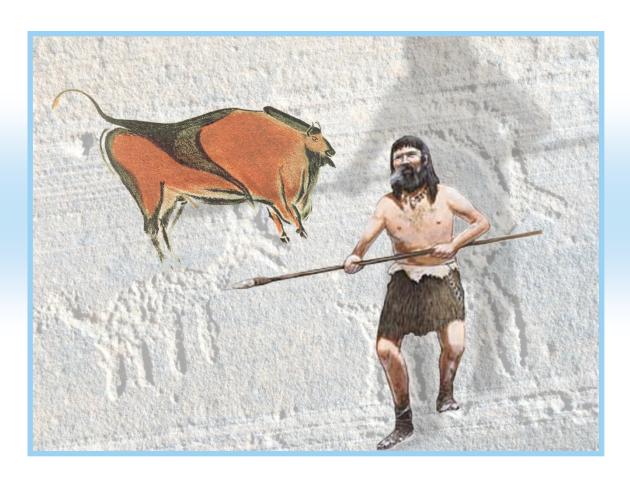
Chief Medical Officer of Medtronic Diabetes VP Global Medical, Clinical, Health Affairs

Distinguished Professor Emerita of Pediatrics and Communications, The Keck School of Medicine of the University of Southern California

> Center for Diabetes and Endocrinology, Childrens Hospital Los Angeles





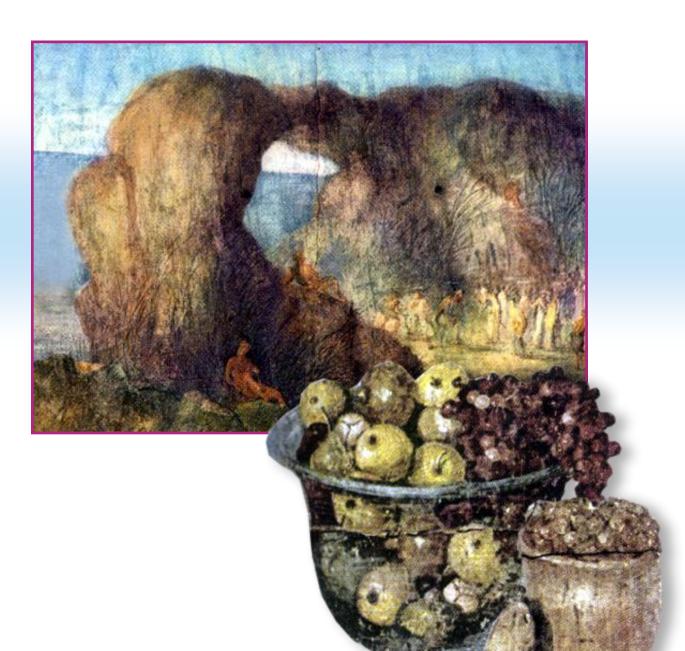


















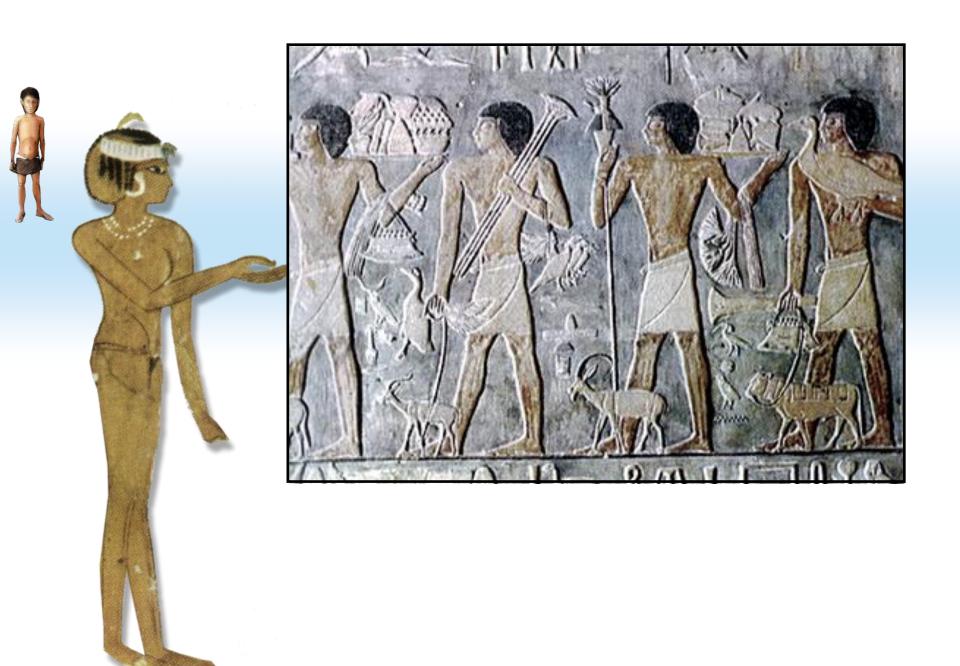




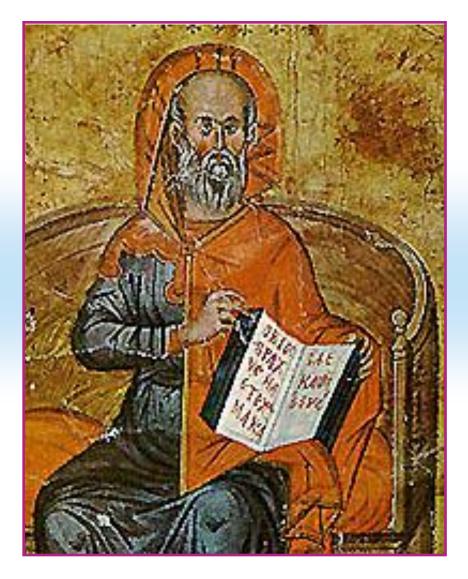


"There is nothing under the sun better for man than to eat, drink and be merry."

**Ecclesiates** 







"If we could give every individual the right amount of nourishment, we would have the safest way to health." - Hipprocrates



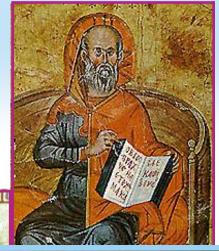




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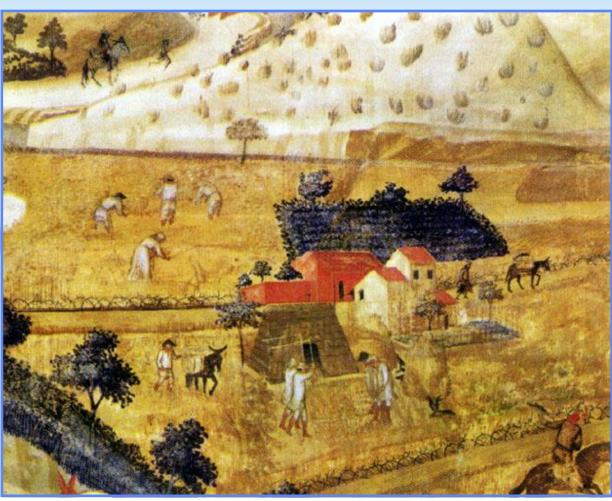












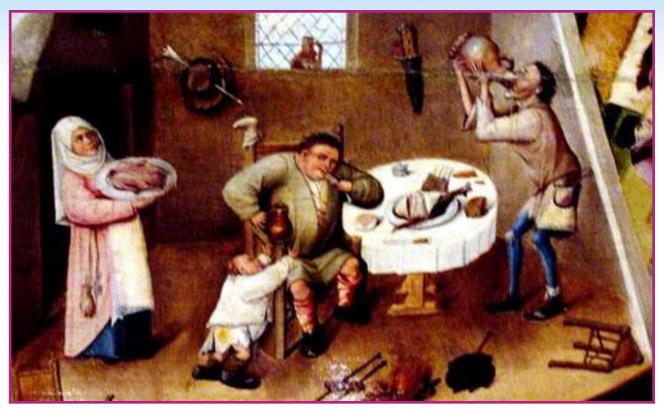




"Diet, ought to be an orderly course of nourishment for the preservation, recovery or continuance of the health of mankind."

**Thomas Moffett, MD London, 1655** 





"He Hath Eaten Me Out of House and Home"

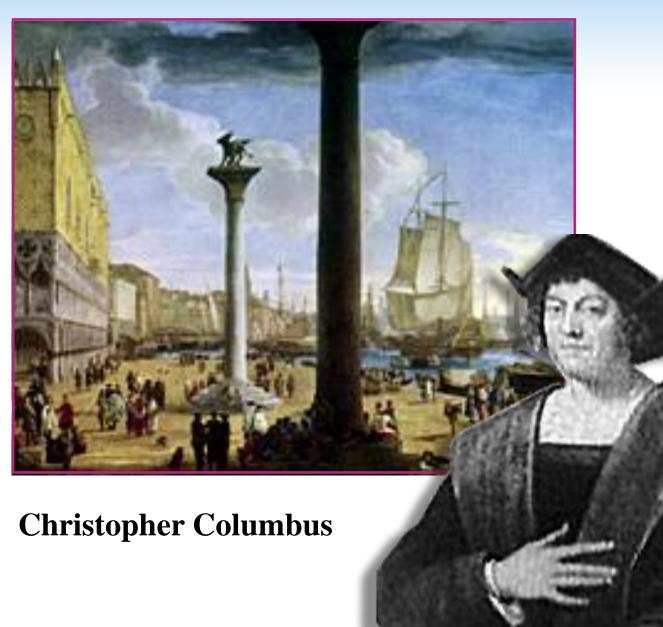
William Shakespeare (1564 - 1616) from "King Henry IV Part II", Act 2 Scene 1





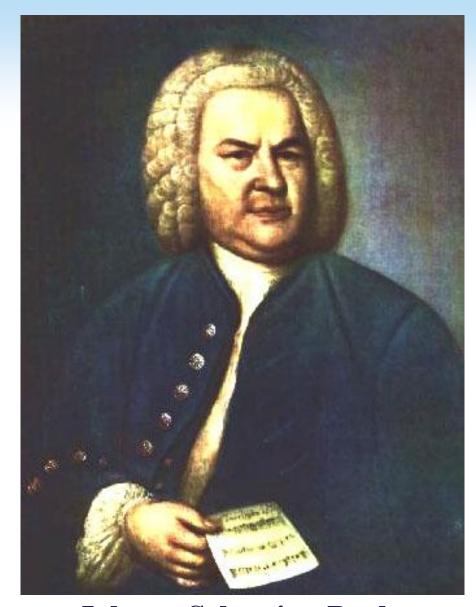
**King Henry IV Crowned in 1509** 











Johann Sebastian Bach 1685-1750



















## **The Slaughter House**

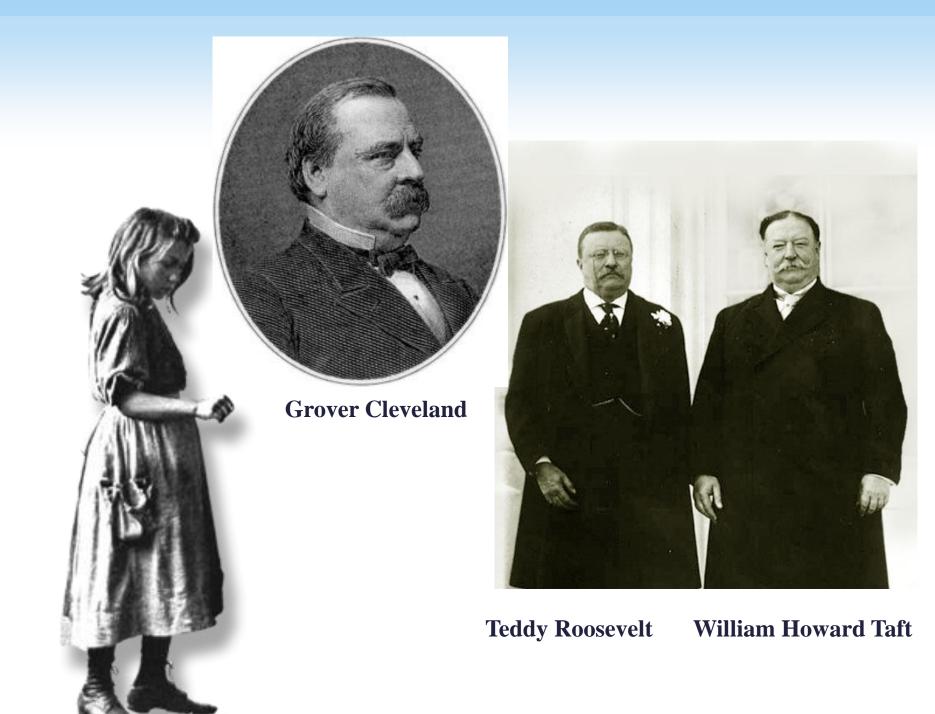




The Jungle by Upton Sinclair 1906









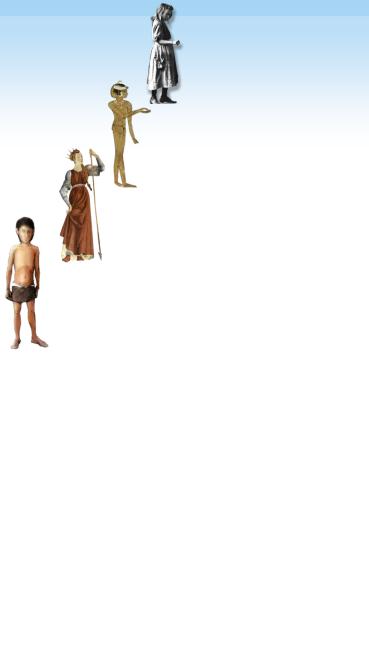


Lillian Russell

















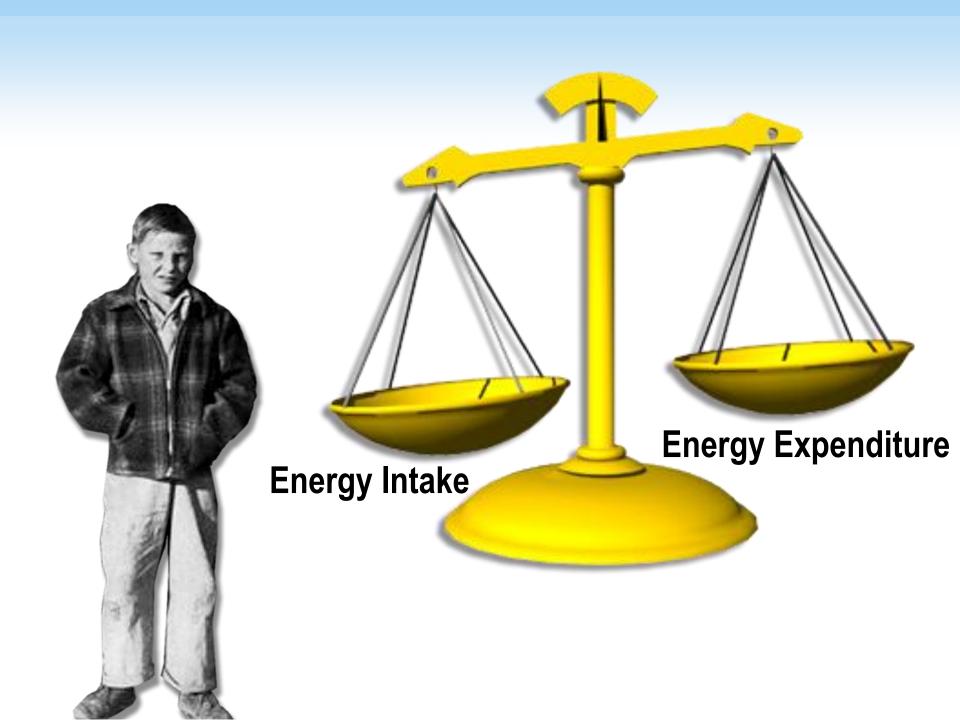


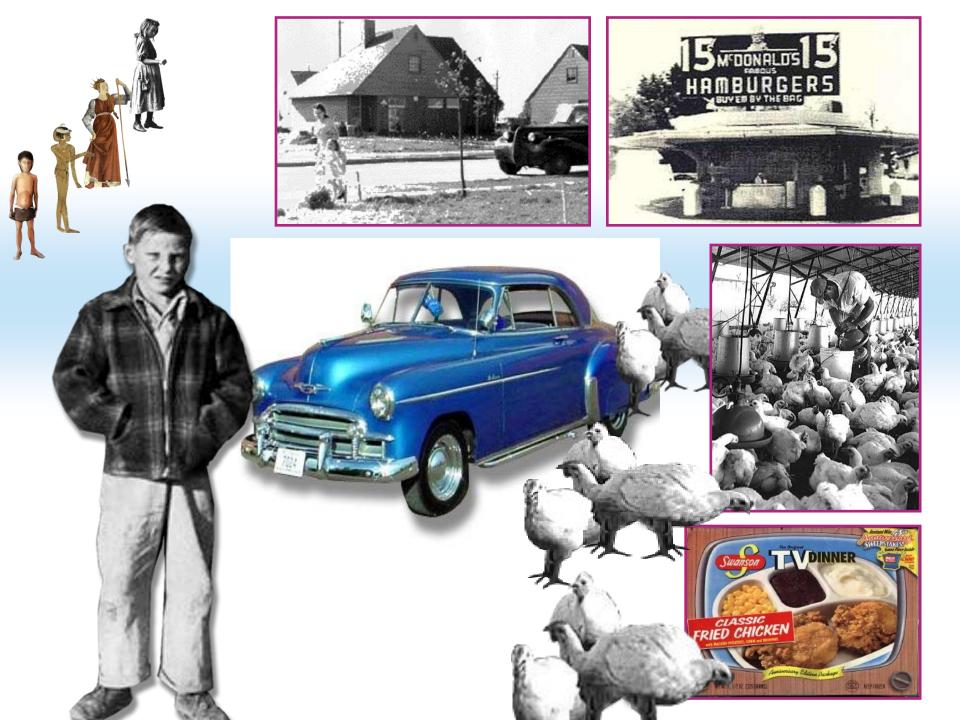






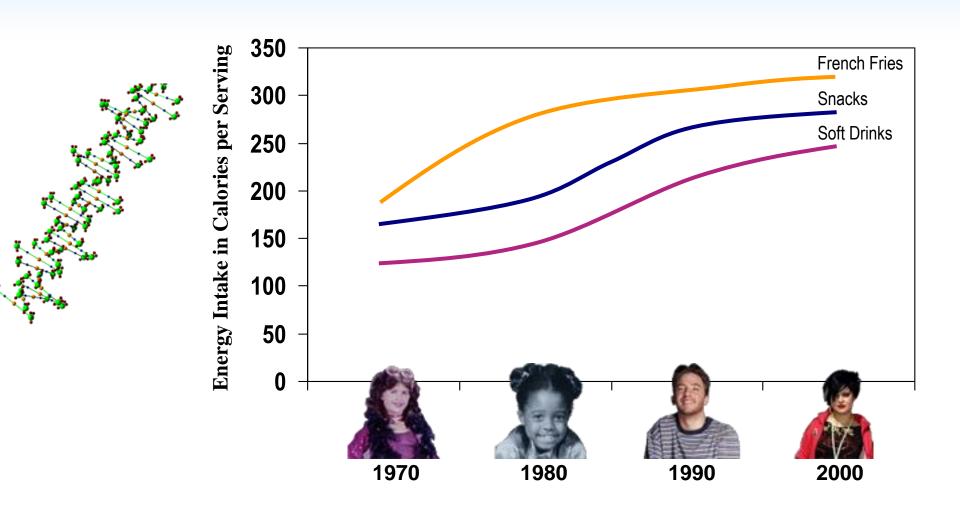






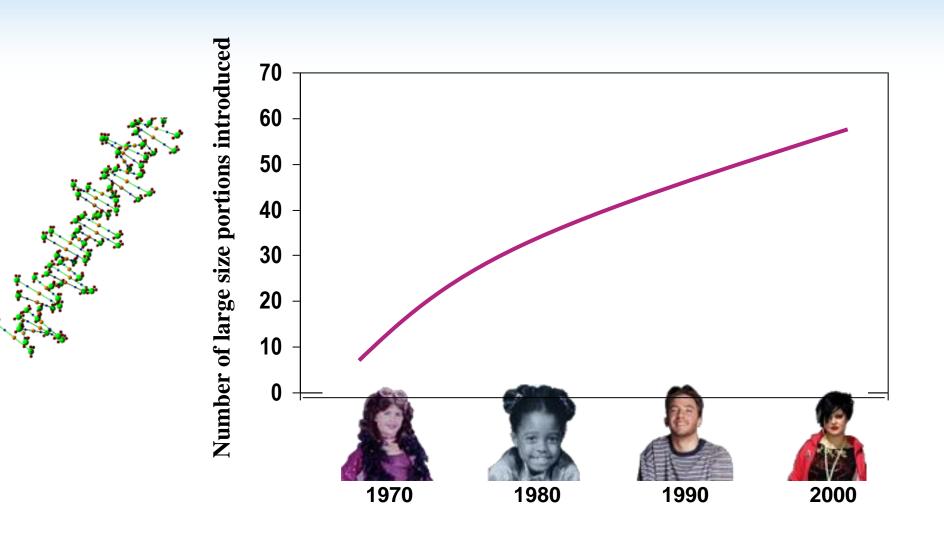


## Total Energy Intake



Nielsen, Popkin JAMA 2003; 289:452

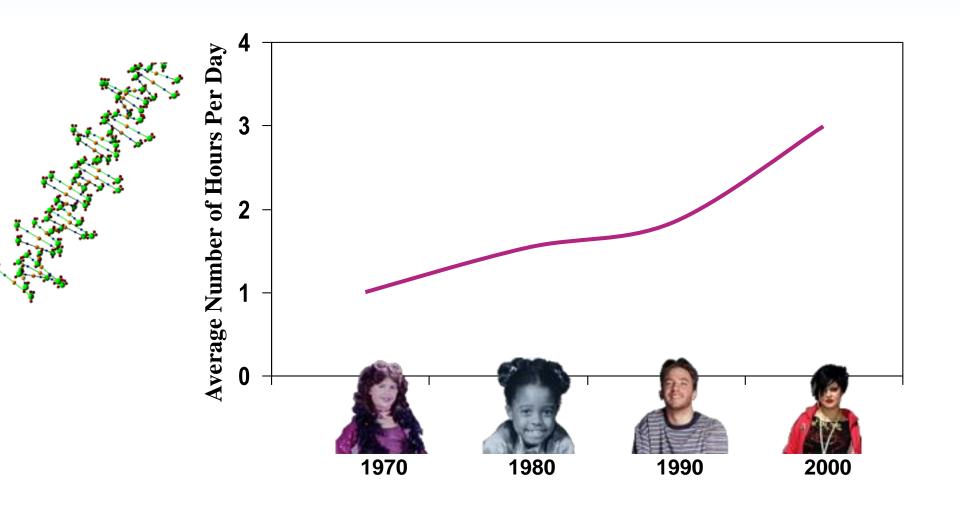
## Introduction of New, Larger Portions



Young LR, Nestle M: AJPH 2002;

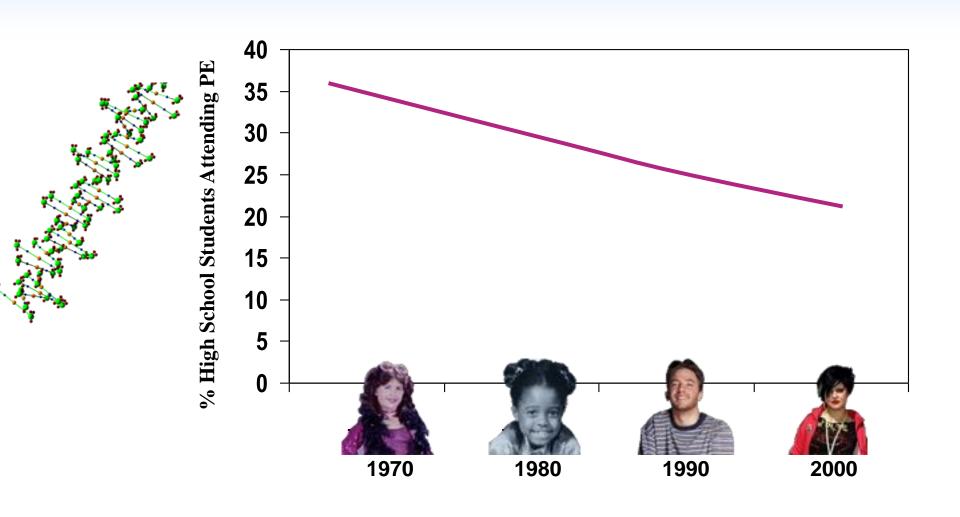
92:246

## **Television Viewing**



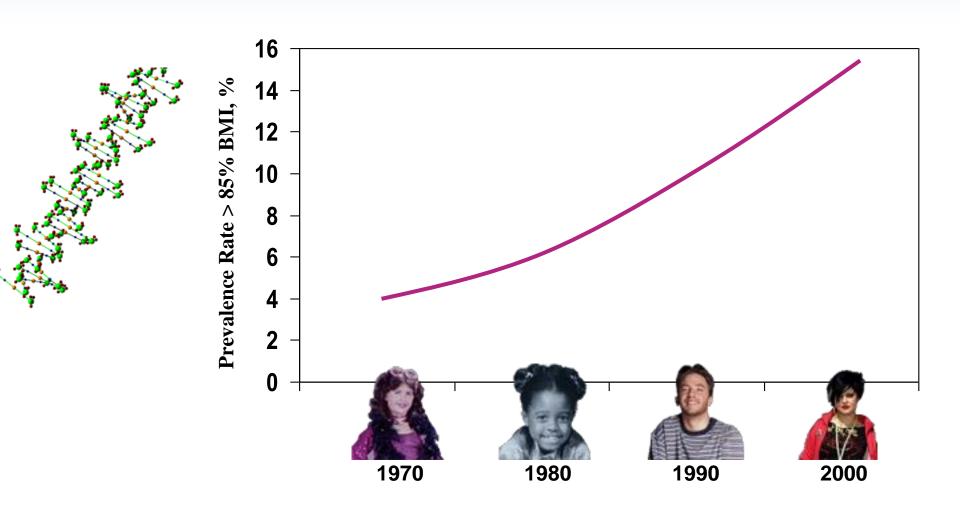
Task Force Report, LA County DHS, 2002 lapublichealth.org/mch

## Physical Activity in School

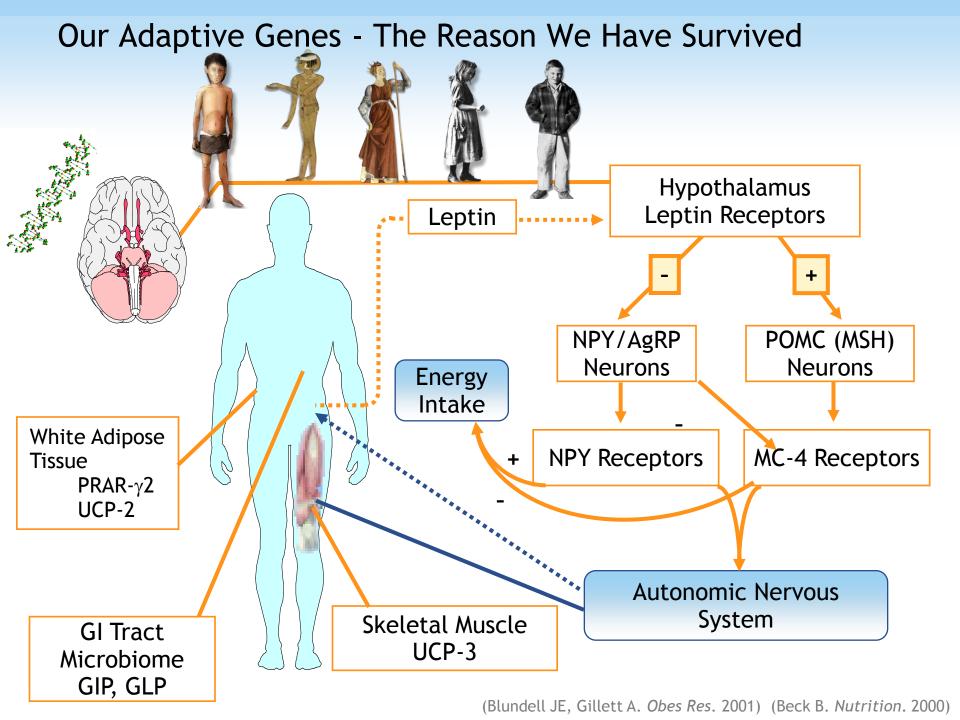


Source: CDC, National Youth Risk Behavior Survey

# Trends In Obesity Prevalence Among Adolescents in the U.S.



Ogden CL et al, JAMA 2002



#### Socio-ecological Model

Home

Communities

Health Care Access, Adherence

Schools and Child Care

Worksites

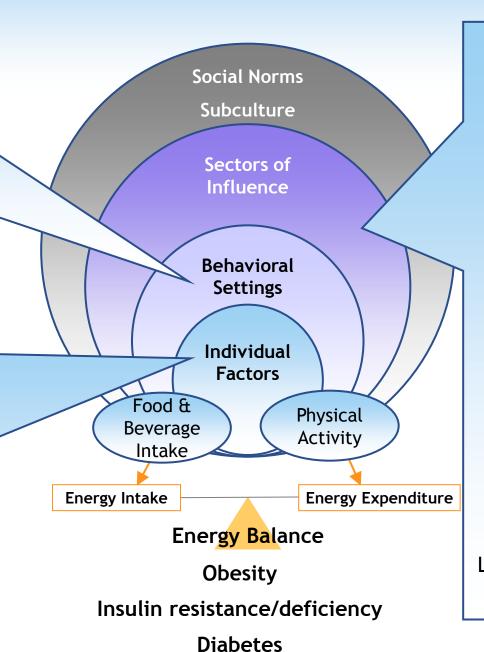
Age, Sex, SES, Race/Ethnicity

Culture

Psychosocial Factors - Stress

Genes, Gene-Environment Interactions

Intrauterine Environment



**Built Environment** 

Government

**Public Health** 

Agriculture

Education

Media

Land Use and Transportation

Communities

**Foundations** 

Industry

Food

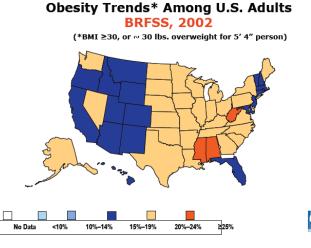
Beverage

Retail

Leisure and Recreation

Entertainment

### Increase in Adult Obesity Driving the Type 2 Epidemic

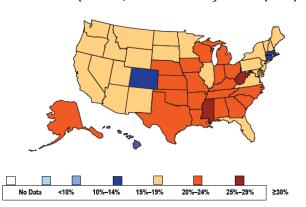




Courses CDC Behavioral Birls Factor Conscillance Contam

#### Obesity Trends\* Among U.S. Adults **BRFSS, 2006**

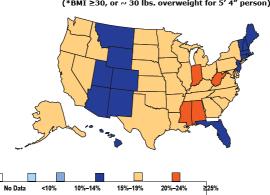
(\*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)





#### Obesity Trends\* Among U.S. Adults **BRFSS, 2003**

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

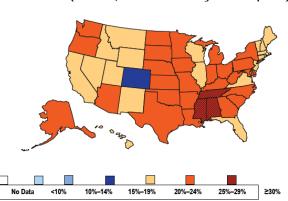




Source: CDC Behavioral Risk Factor Surveillance System.

#### Obesity Trends\* Among U.S. Adults **BRFSS, 2007**

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





Source: Behavioral Risk Factor Surveillance System, CDC.

#### 6th Grade

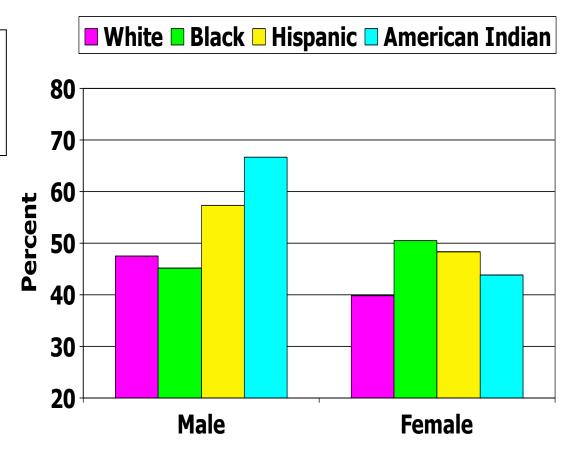
# Percent with BMI ≥ 85th Percentile by Gender and Race/Ethnicity

**Diabetes Care 29;212;2006** 

**Diabetes Care 32:953;2009** 

6367 participants

Total 50% Males 52% Females 47%



### THE NIH-Funded HEALTHY MIDDLE SCHOOL STUDY

prodominataly minarity students 4th grade students

o grade students - predominately minority students
Distribution of Chycomic Disk Easters by PMI Dorsontile

Distribution of	Glycemic Risk	Factors by BM	I Percentile

Distribution of	Glycemic Risk	Factors by BMI	Percentile
	< 85	85 - 94	≥ 95

93.3 (6.8)

**15.5%** 

p < .0001§

**12.8 (7.5)** 

3.0%

p < .0001§

Diabetes Care 32:953;2009

94.5 (6.6)

20.8%

22.1 (15.8)

**19.6%** 

$$< 85$$
  $85 - 94$   $\ge 95$   $(N=3221)$   $(N=1255)$   $(N=1882)$ 

92.8 (6.7)

**13.5%** 

8.4 (5.2)

0.8%

Diabetes Care 29;212;2006

Fasting glucose

(mg/dL)†

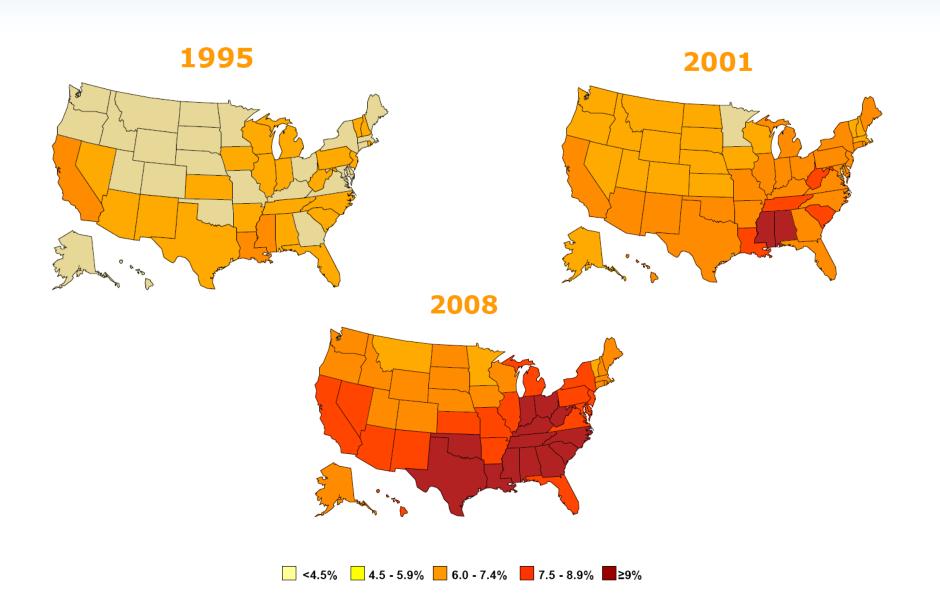
Fasting glucose ≥ 100

Fasting insulin

 $(\mu U/mL)$ †

Fasting insulin ≥ 30

## Diabetes Prevalence



## The March to Type 2 Diabetes

Adults: 2/3
Obese

Kids:31.7% BMI > 85th %ile

16.9% Obese

Adults: 74 Million

Kids: Prediabetes

15-40% IFG 25% IGT Adults: 1.6 Million/yr

26 Million total

Kids: 3900/ year

6%W, 67% AI

Adults: 7% All Targets

Kids: 45% A1C<7%,

**26% HTN** 

59% Dyslipidemia

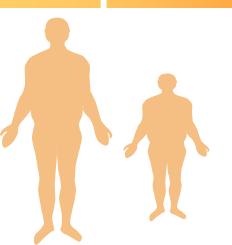
- Family History
- Environmental Factors
- Genes, SES,
   Race/ethnicity, culture
- Health care access
- In utero exposures

Obesity

Insulin sensitivity 75% normal glucose tolerance
Beta-cell function 2Xs

Insulin sensitivity \$\psi\$ 75%
Impaired glucose tolerance
Beta-cell \$\psi\$ 50%

Insulin sensitivity \$\\$50\% Diabetes
Beta-cell \$\\$75\%



Accumulate
 Metabolic
 Syndrome Risk
 Factors

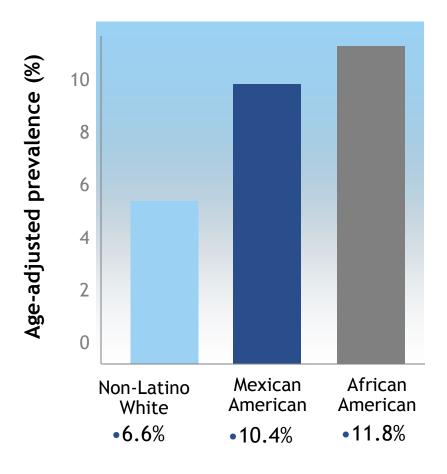


Care 28: 638, 2005 JCEM 86: 66, 2001

Care 27: 547, 2004

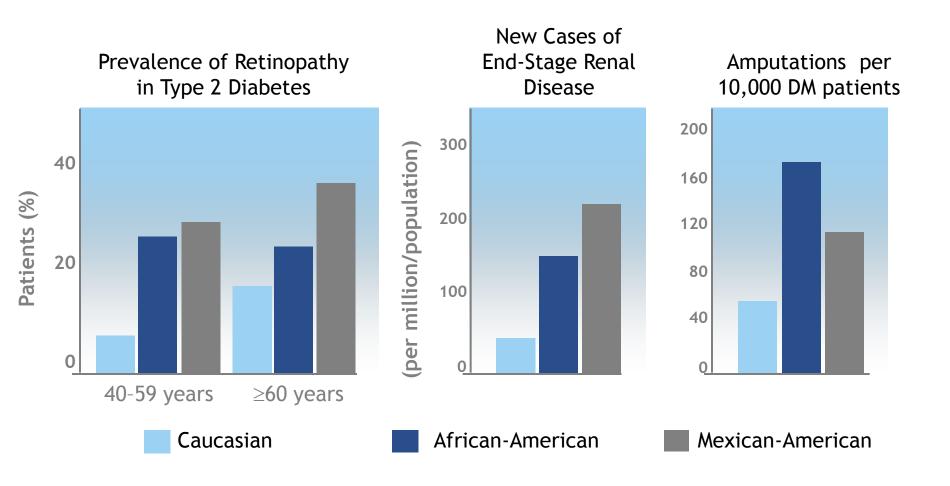
## **Prevalence of Diabetes**

**D**iabetes Prevalence



- Men
  - 12.0 million, or 11.2%
- Women
  - 11.5 million, or 10.2%

## Prevalence of Complications in Type 2 Diabetes



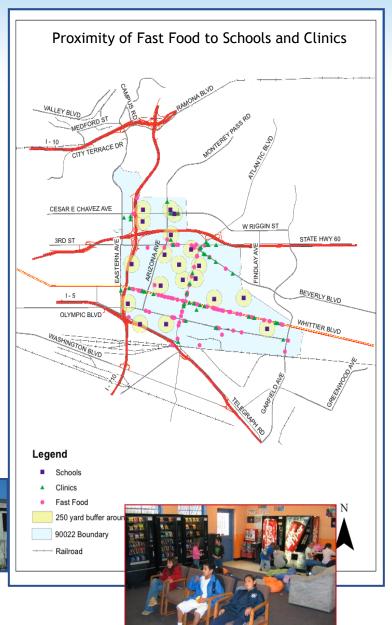
Klein et al. In: Harris et al, eds. Diabetes in America, 2nd ed. 1995. Reiber et al. In: Harris et al, eds. Diabetes in America, 2nd ed. 1995. USRDS. Am J Kidney Dis. 1994;24:879.

## The Community - Characteristics of 90022

- Population Size: 68,688
- The population is Latino
- 95% of residents live under 185% of Federal Poverty
- Percent of children in grades
  5, 7 & 9 -
  - BMI > 85TH: 44.6%
  - BMI >85<95TH: 30.0%
  - BMI > 95TH: 25.4%







#### Access to Full Service Markets

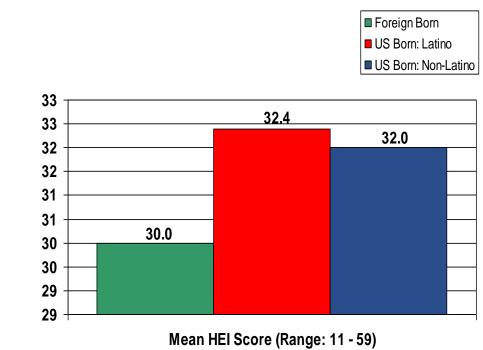
- There is one full service grocery store for:
  - 7,795 people in metropolitan Los Angeles¹
  - 13,738 people in East Los Angeles
  - 19,061 people in South Los Angeles

2002, 4 Xs more supermarkets in White compared to Black neighborhoods





## The lower the score the better Healthy Eating Index – Adults\*



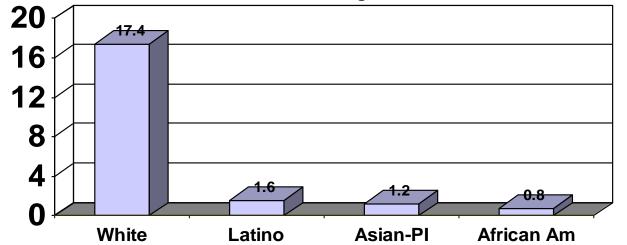
\* 1 vs. 2 (p=.002); 1 vs. 3 (p<.001)

## The Environment and Health Disparities - in LA

- Teens with no access to a safe park
  - 30% of lower-income
  - 29.3% of Latino
  - 30.2% of African
  - 20% from affluent families
  - 22% of White



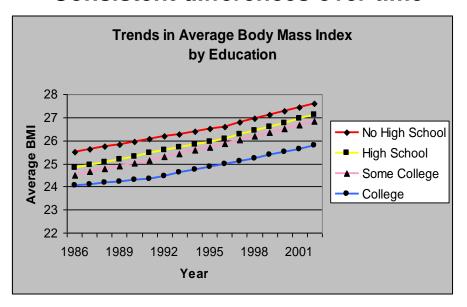




park acres per 1,000 population

### Adult Trends in Obesity and Diabetes by Education Level

- 20 yrs, similar gain over groups
- Consistent differences over time



- California Health Survey, 2007
- Prevalence rates

	obesity	diabetes
8 <sup>th</sup> grade	30.3	14.8
College	14.9	5.1

## How SES and Education Affect Obesity/Diabetes

#### Low SES

- Food insecurity and inability to afford healthy foo
- Inadequate time to prepare healthy foods and exercise
- Challenge of coping with inadequate resources -
  - Stress associated with adverse health outcomes
- Low Educational Level
  - Less awareness/understanding of healthy diet and exercise
  - Less skill in accessing available resources
  - Worse job → less personal ability to adopt/maintain healthy behaviors





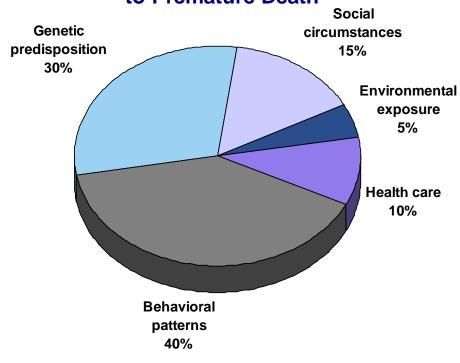
## The State of U.S. Population Health

#### Population health status continues to deteriorate

#### **Key Drivers of Health Status**

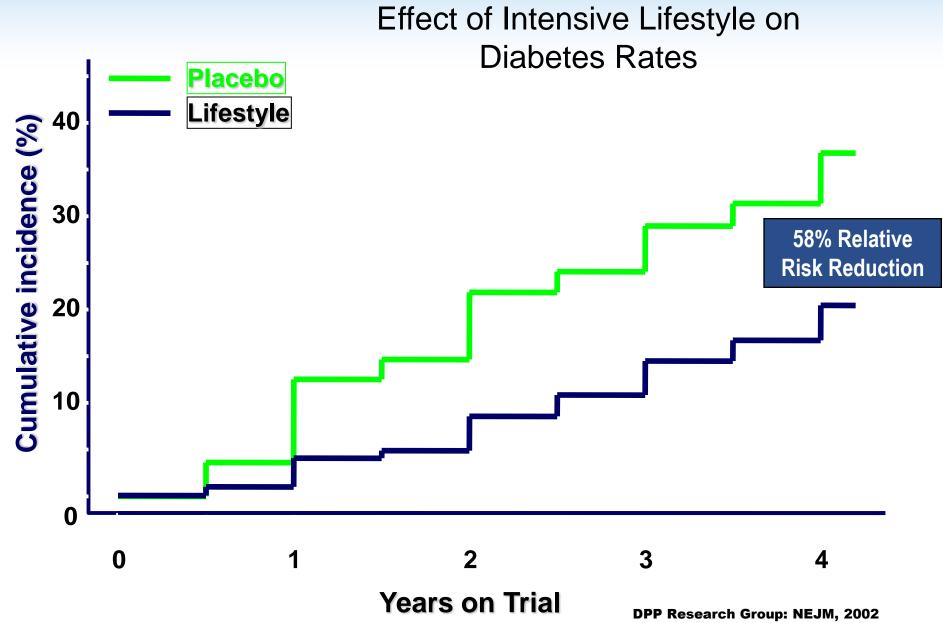
Driver	Prevalence
Obesity	66% obese or overweight
Physical Activity	28% inactive
Smoking	23% smokers
Stress	36% high stress
Aging	22% > 55 years, aging population

## Proportional Contribution to Premature Death



Schroeder S. N Engl J Med 2007;357:1221-1228

## **U.S. Diabetes Prevention Program**



### Chronic Care Model

Community

Health System

Resources and Policies

Health Care Organization

Self-Management Support Delivery System Design

Decision Support Clinical Information Systems

Informed, Activated Patient

Productive Interactions

Prepared, Proactive Practice Team

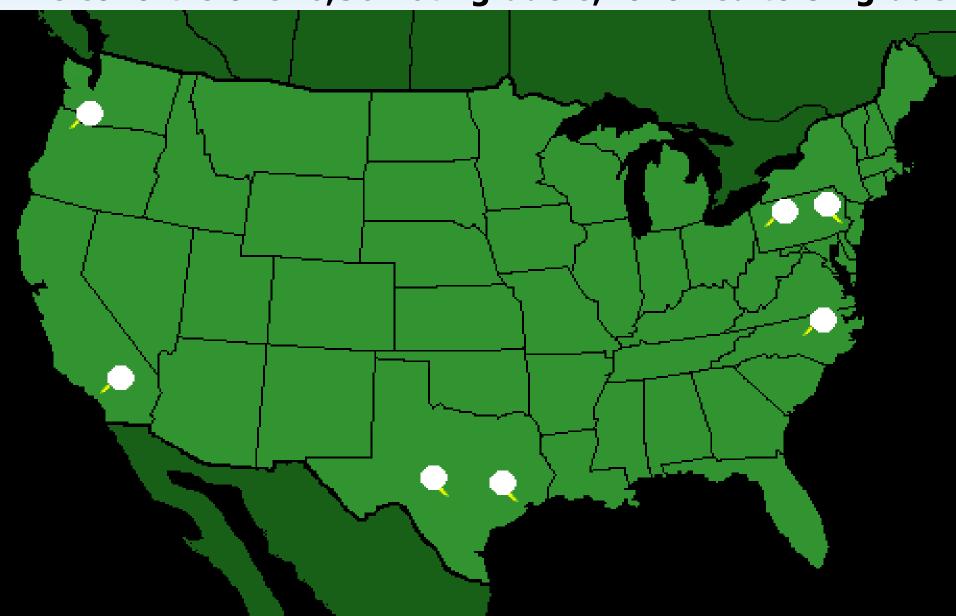
#### **Improved Outcomes**

Clinician-reported use of CCM associated with lower A1c (p=0.2) For every unit of CCM used, 0.30% decrease in A1c

## **HEALTHY Study**



The cohort is over 6,367 6th graders, followed to 8<sup>th</sup> grade



# HEALTHY Intervention Program www.healthystudy.org

#### **Nutrition**

- Implementation of goals and strategies
- Food service staff training
- Taste tests
- Learning activities
- Cafeteria improvements and messaging
- Research dietitian on center staff

#### **Behavior**

- Brief classroom-based lessons and activities
- Teacher training
- 1 aide per school
- Family outreach newsletters
- School break family plans and materials
- Health promotion coordinator on center staff

#### **Physical Education**

- Lesson plans
- Equipment
- 1 teacher aide per school
- PE teacher training
- Physical activity coordinator on center staff

#### Communications/Social-Marketing

- School-wide messaging posters, announcements, banners
- Events and activities
- Student peer assistants
- Student development of media campaigns

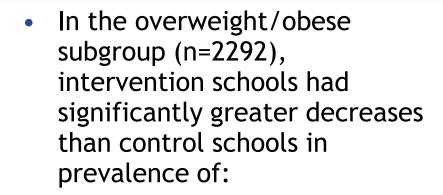


### **6th Grade Baseline Data**

Age (years)	11.8 (0.6)
Gender (% male)	48.1%
Race/Ethnicity	
Hispanic	<b>53.2</b> %
Black	21.7%
White	16.8%
Other	8.2%
Household education <hs grad<="" td=""><td><b>52.6</b>%</td></hs>	<b>52.6</b> %
Family history diabetes	16.0%
BMI ≥ 85 <sup>th</sup> percentile	49.3%
Fasting glucose ≥ 100 mg/dL	<b>15.7</b> %
Insulin ≥ 30 µU/mL	5.6%

#### **HEALTHY RESULTS**

- The prevalence of obesity declined more in intervention schools (p=0.05)
- BMI z-score, prevalence of large waist circumference and fasting insulin fell significantly in intervention schools (p=0.04)



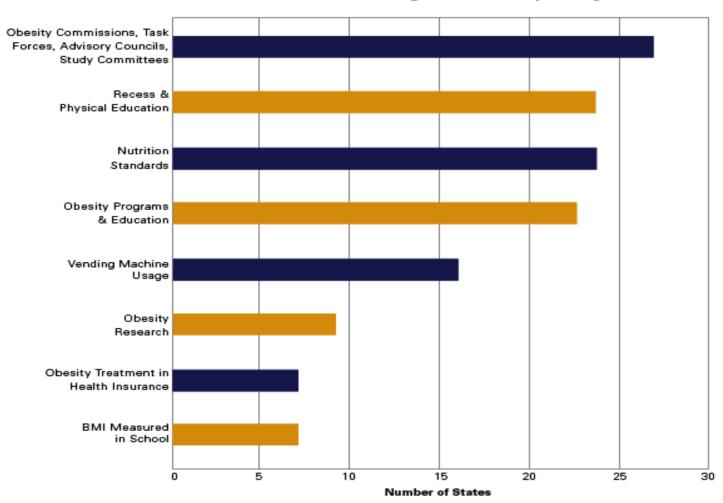
- Obesity (p=0.04)
- Large waist circumference (p=0.03)
- Insulin (p=0.04)





# Obesity Control Legislation Enacted in States, 2006

#### Enacted Obesity Control Legislation By Type (August 2006)



Intervention	Definition	Public Health Benefits	Why	Why Not
Food labeling in restaurants	Nutritional content on menu	Informs consumers	Make informed choices and understand	Difficult to provide accurate information

## California 11th Lowest % of Obese Adults 28th Highest % of Obese and Overweight Children in the U.S.

- Provide healthy foods and beverages to students at schools
- •Increase the availability of affordable healthy foods in all communities
- •Increase the frequency, intensity, and duration of physical activity at school
- Improve access to safe and healthy places to live, work, learn, and play
- •Encourage employers to provide workplace wellness programs
- Implement walkable communities
- •Utilize transit-oriented development, schools and supermarkets near public transportation
- Use zoning/planning to promote safe and healthy foods and activities
- Revamp food assistance programs



#### Socio-ecological Model

Insurance Diabetes
Equipment and
Education

Diabetes Cost Reduction Act -SB 64

State Diabetes Program

Medi\_cal Program

AB 942 -Glucagon in School

SB1305 Home Sharps Law

**Social Norms** Subculture Sectors of Influence **Behavioral Settings** Individual **Factors** Food & **Physical** Beverage **Activity** Intake **Energy Intake Energy Expenditure Energy Balance** Obesity

**Diabetes** 

- 2003 The Soda Ban
  - 2005 Healthy Vending Policy in Schools
- 2007 Grants for Refrigerators to Sell Vegetables
  - 2008 Transfats banned
- 2008 Mandatory PE Minutes - all kids/all years
- 2008 Menu Labeling in Restaurants
- 2009 No Building of Fast Food Restaurants
- 2010 Remove Sports Drinks from Schools

Medical Research

Technology

