



**TOO MUCH OF A GOOD
THING:
OBESITY AND DIABETES**

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Texas Tech University**

OBESITY ETIOLOGY

- **An energy imbalance between calories consumed and calories expended**
 - Global shift in diet towards energy-dense foods high in fat and sugars
 - Decreased physical activity due to the increasingly sedentary work, changing modes of transportation, and increasing urbanization.

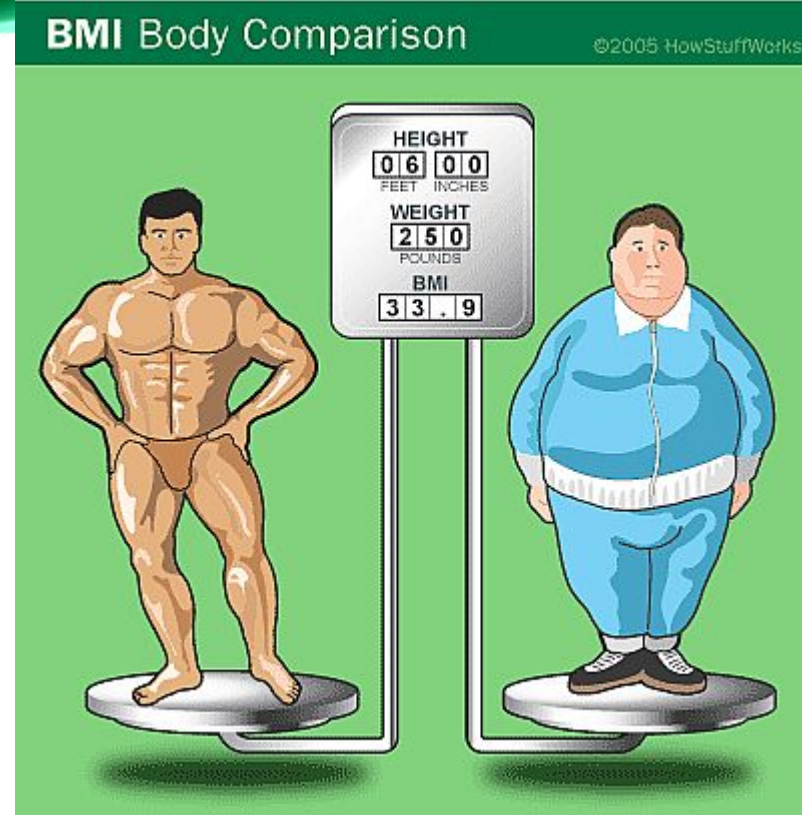
OVERWEIGHT & OBESITY

- **Overweight and obesity ranges are determined by calculating the "body mass index" (BMI)**
 - BMI = Weight (kg)/height (m²) or
 - BMI = Weight (lb)/height (in²) x 703

BMI

- **BMI correlates with the amount of body fat.**
- **BMI does not directly measure body fat.**

- Athletes may have a high BMI due to muscle mass without excess body fat
- Waist circumference >40 in men or >35 in women is abn'l



CLASSIFICATION OF OVERWEIGHT AND OBESITY BY BMI

Class	BMI kg/m ²
Underweight	<18.5
Normal	18.5-24.9
Overweight	25-29.9
Obesity I	30-34.9
Obesity II	35-39.9
Obesity III	≥40

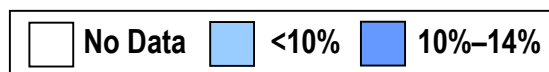
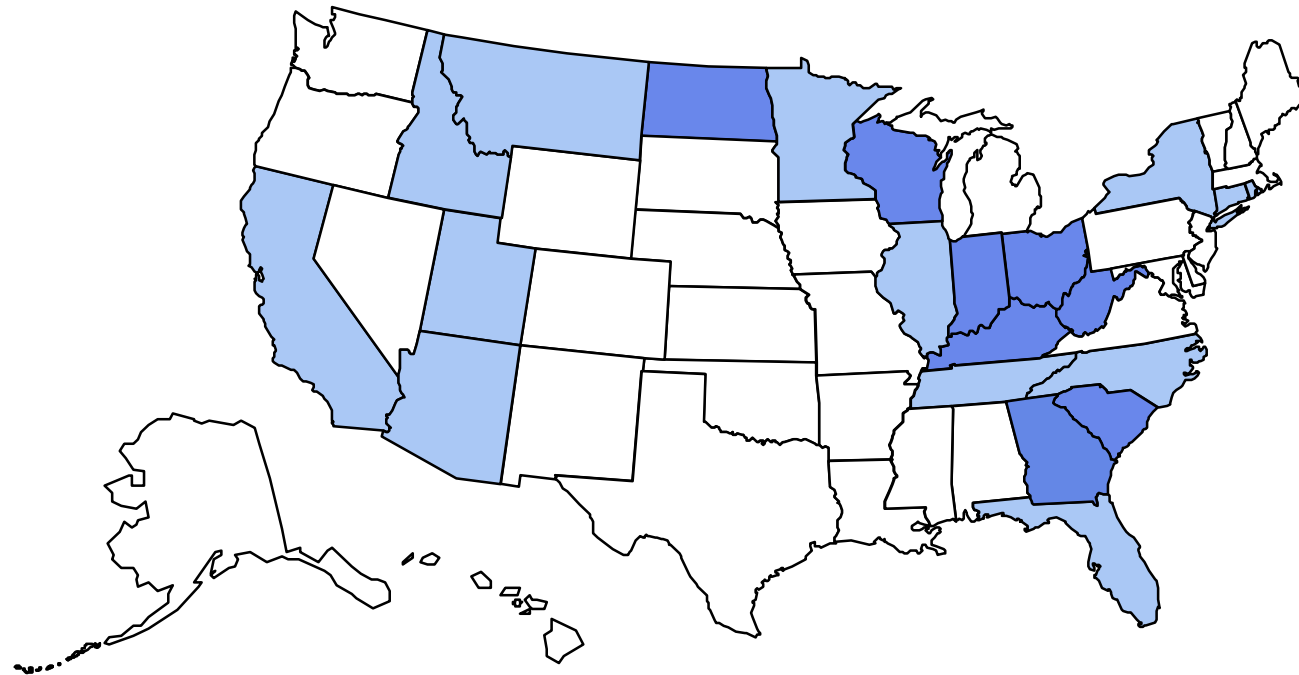
NORMAL WEIGHTS FOR BMI <25

Height	Normal Weight Pounds
5	<128
5'2"	<136
5'4"	<145
5'6"	<155
5'8"	<164
5'10"	<174
6'	<184

OBESITY TRENDS* AMONG U.S. ADULTS

BRFSS, 1985

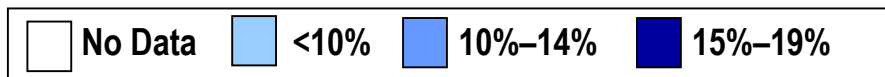
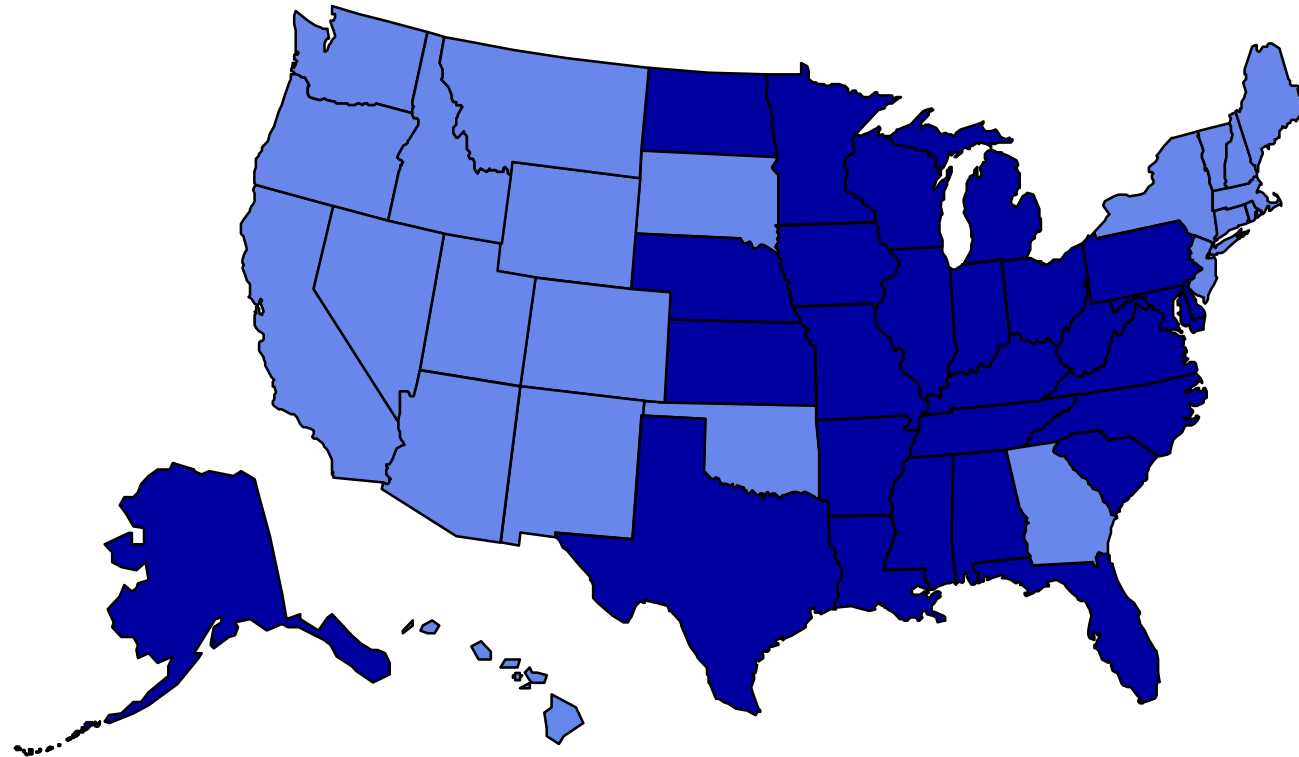
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



OBESITY TRENDS* AMONG U.S. ADULTS

BRFSS, 1995

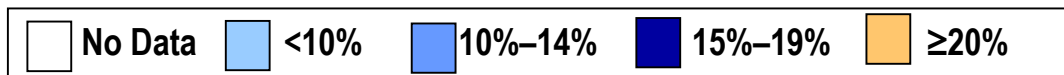
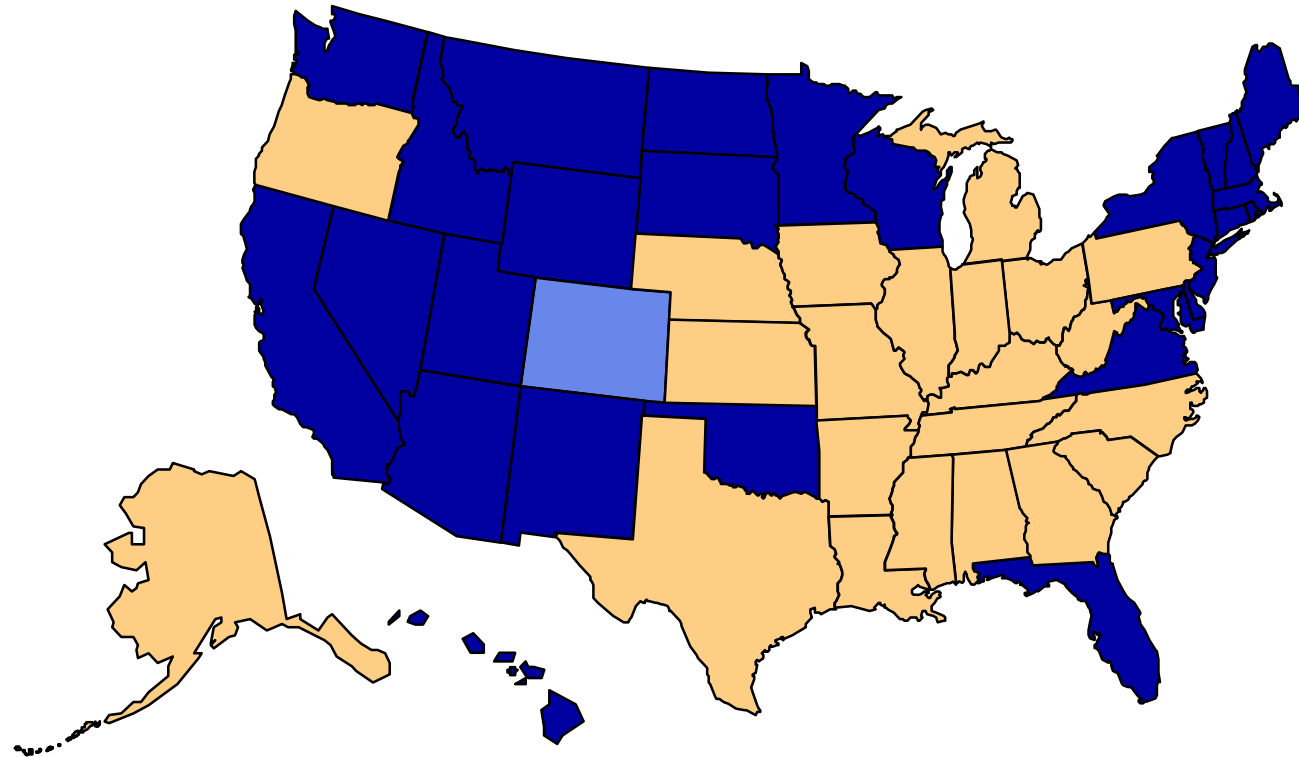
(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



OBESITY TRENDS* AMONG U.S. ADULTS

BRFSS, 2000

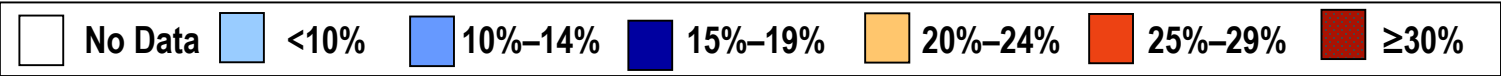
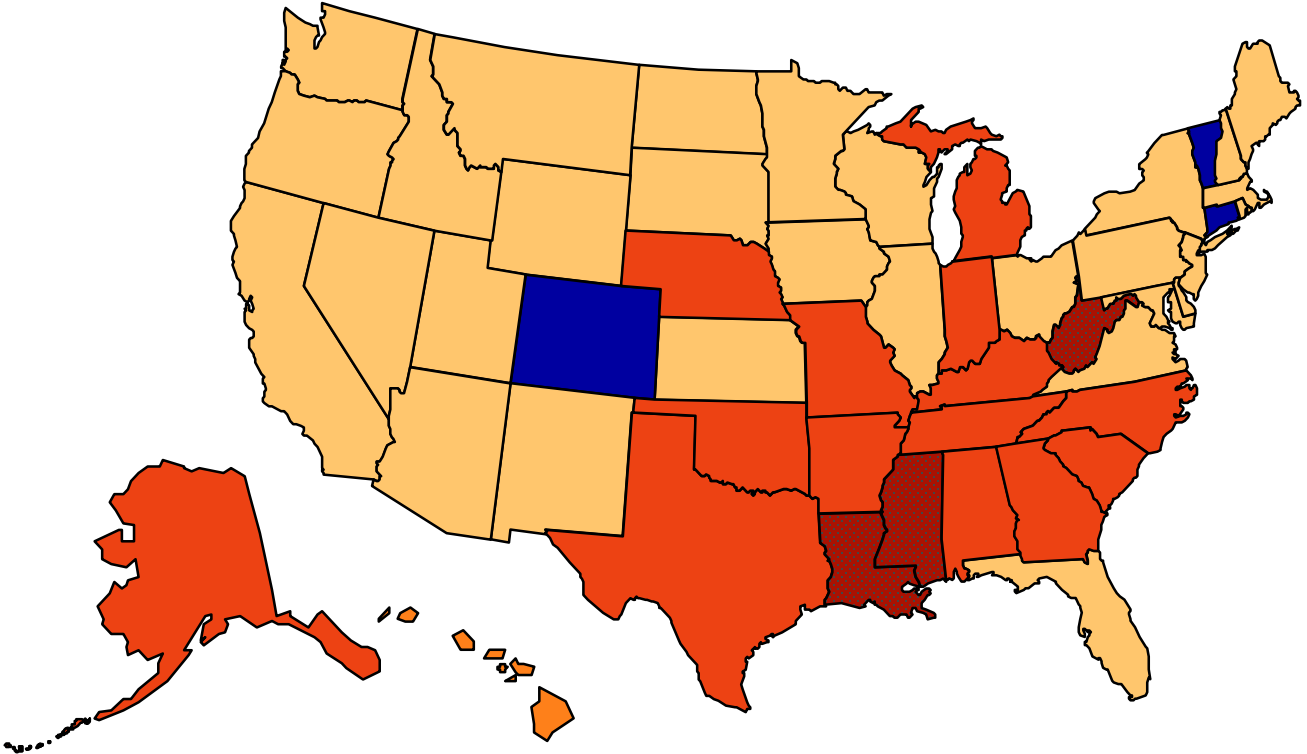
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OBESITY TRENDS* AMONG U.S. ADULTS

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

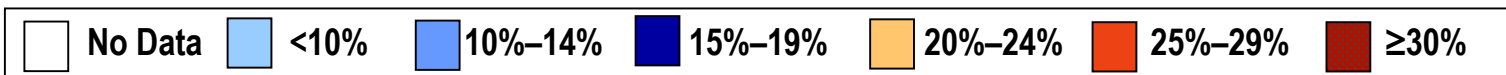
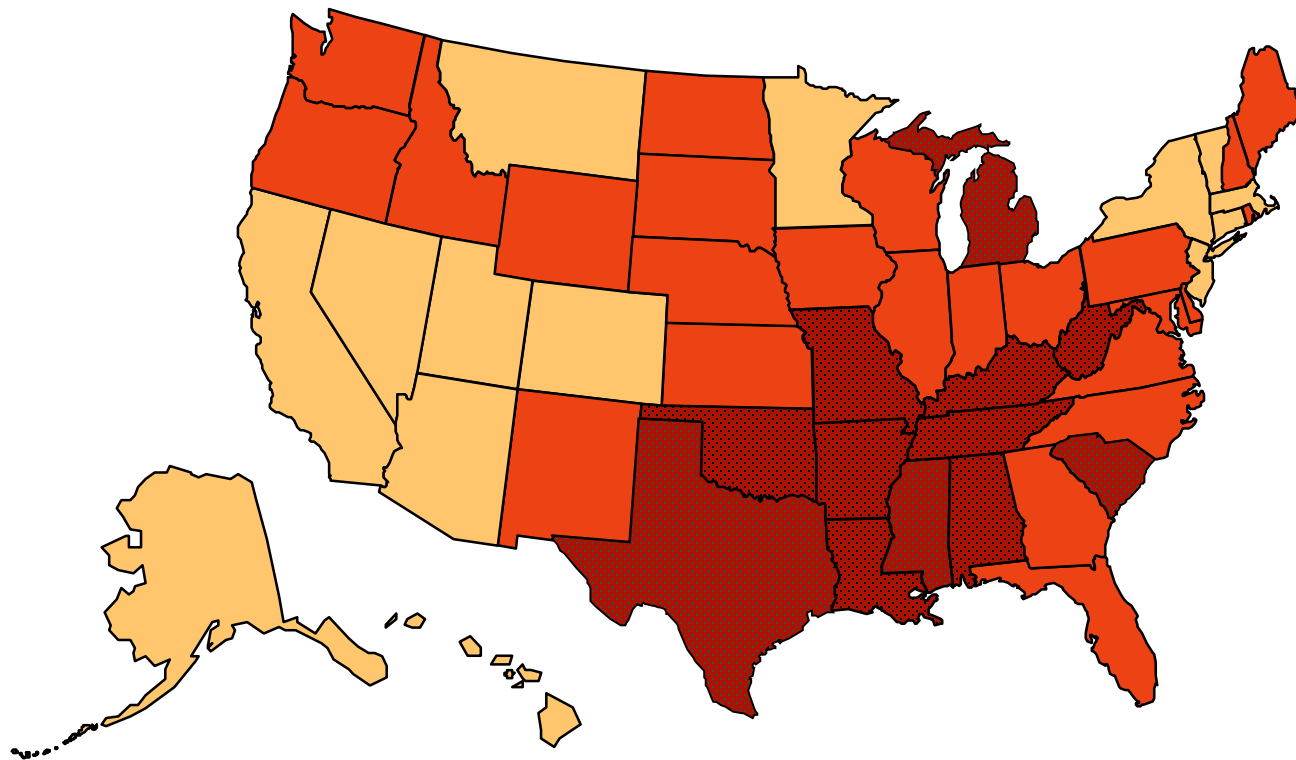
BRFSS, 2005



OBESITY TRENDS* AMONG U.S. ADULTS

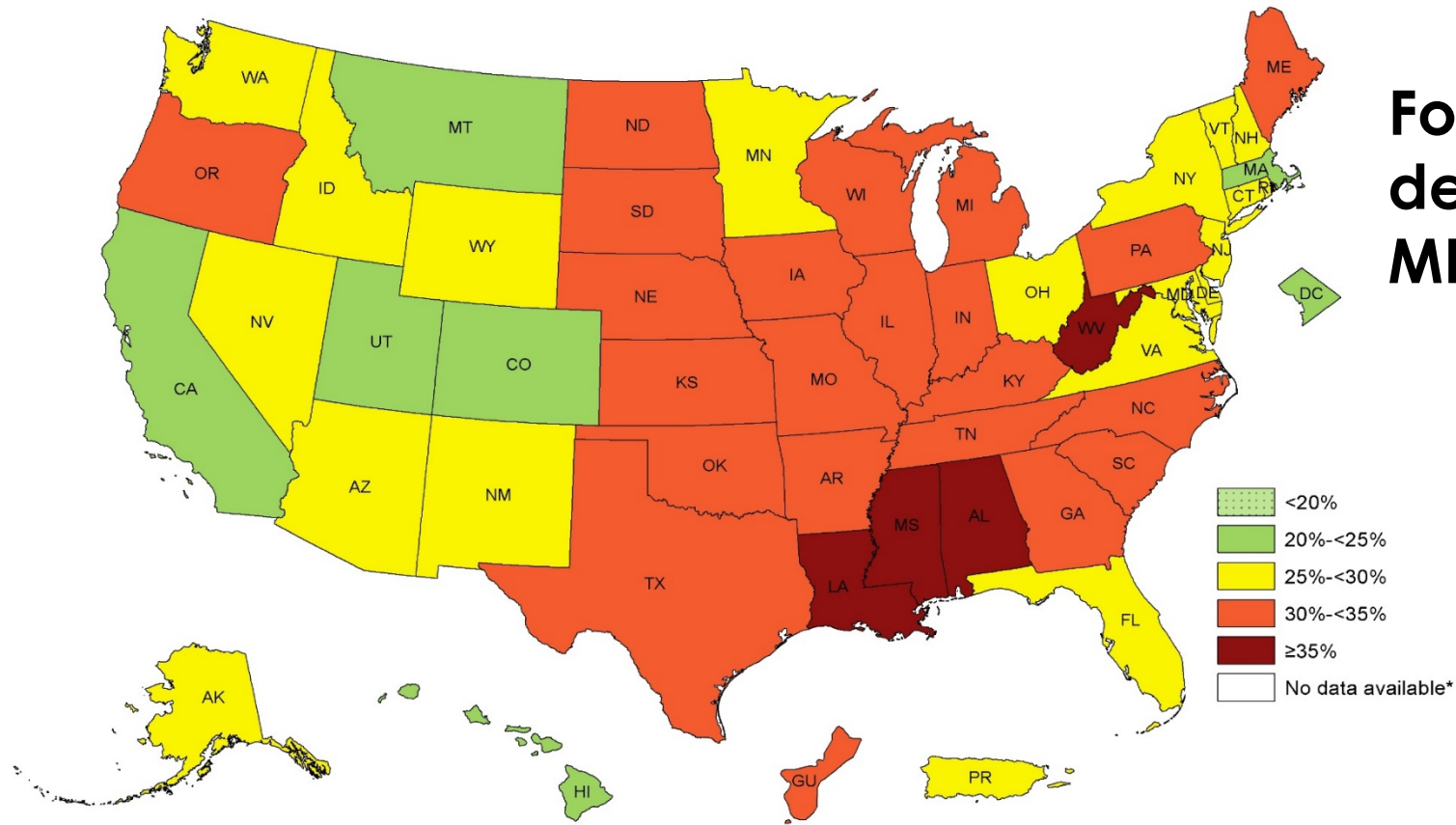
BRFSS, 2010

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



PREVALENCE OF SELF-REPORTED OBESITY AMONG U.S. ADULTS

BRFSS, 2015



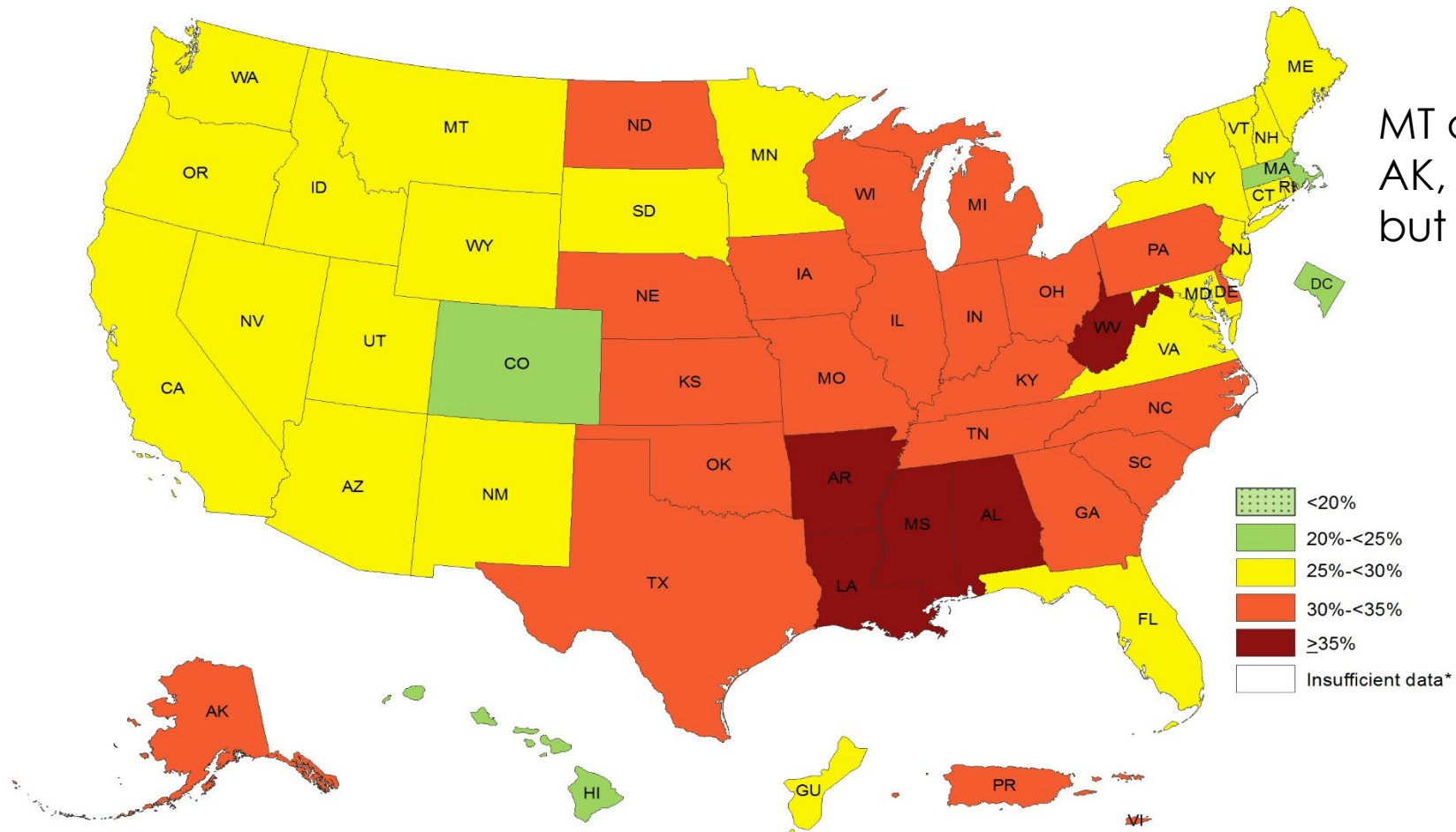
Four states actually decreased:
MN, MT, NY and OH!



[†] Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

PREVALENCE OF SELF-REPORTED OBESITY AMONG U.S. ADULTS

BRFSS, 2016



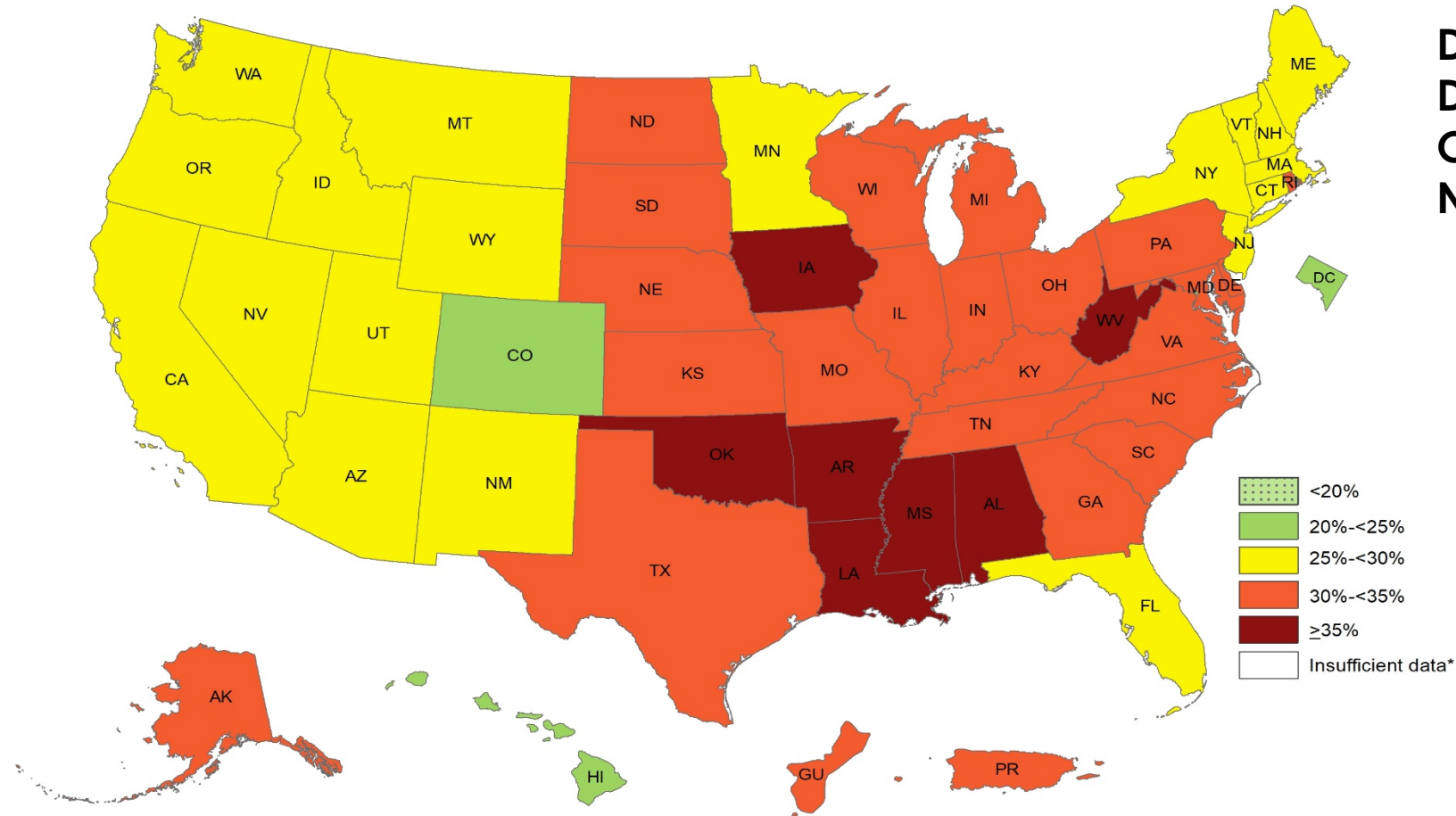
MT and OH worse again.
AK, DE, CA, UT, AR worse
but SD, OR, ME better

*Sample size <50 or the relative standard error (dividing the standard error by the prevalence) $\geq 30\%$.



PREVALENCE OF SELF-REPORTED OBESITY AMONG U.S. ADULTS

BRFSS, 2017



Down to just CO, HI, and DC at 20%
OK and IA >35%
No one got better.

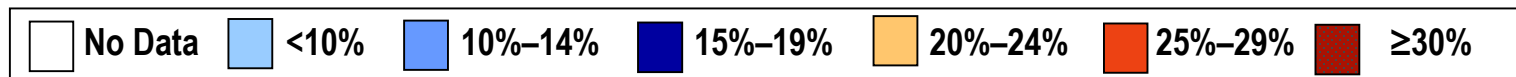
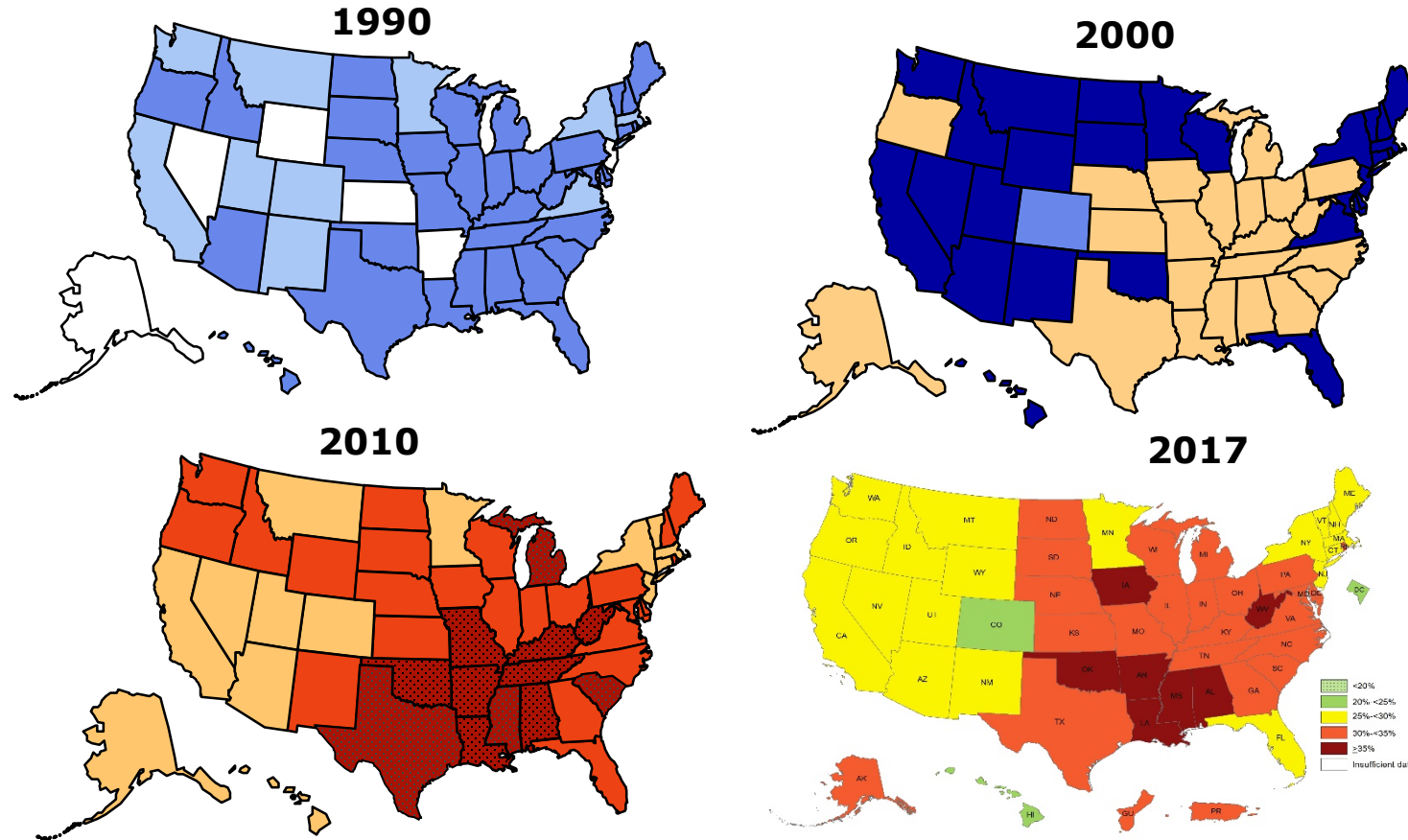
*Sample size <50 or the relative standard error (dividing the standard error by the prevalence) $\geq 30\%$.



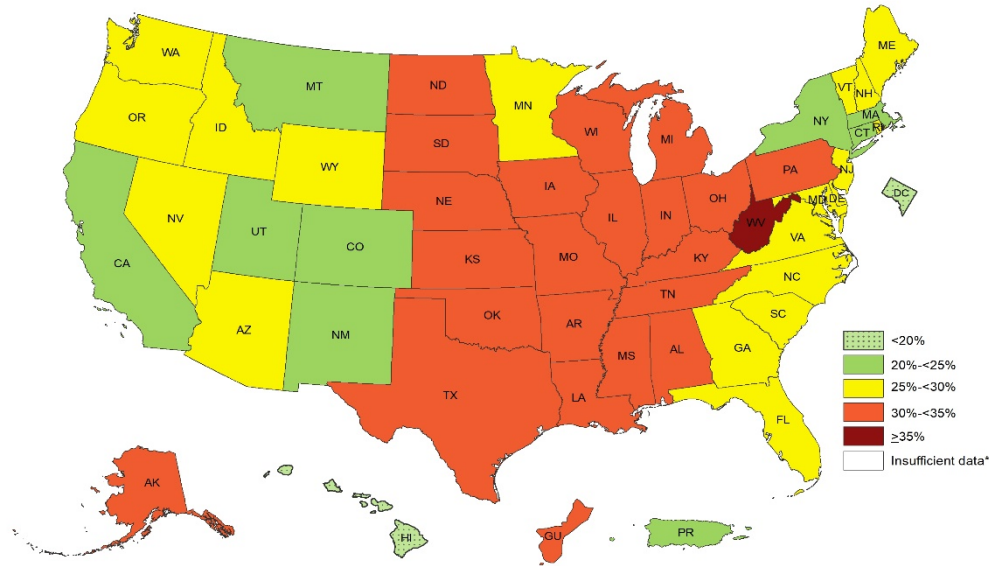
Obesity Trends* Among U.S. Adults

BRFSS, 1990, 2000, 2010, 2017

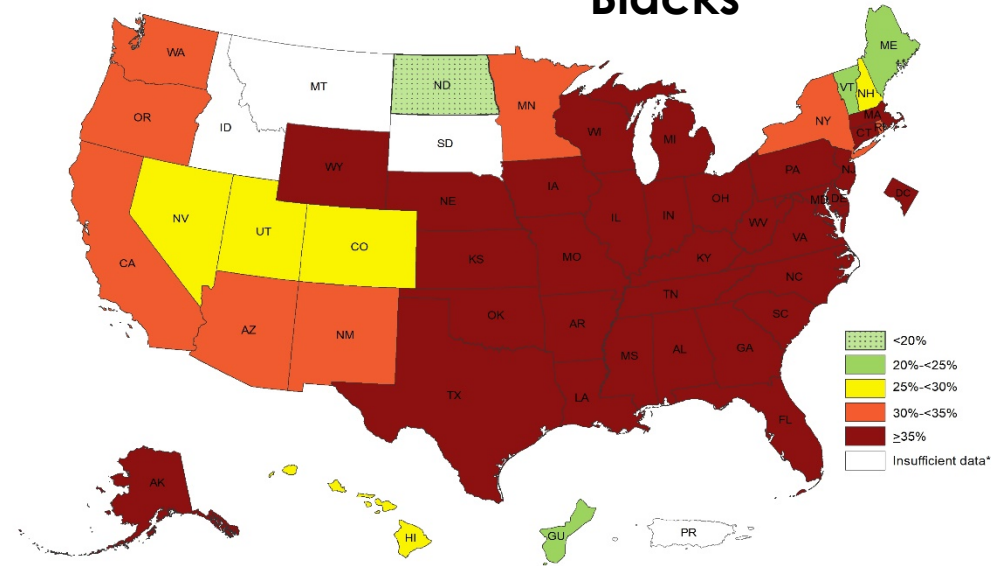
(*BMI ≥ 30 , or about 30 lbs. overweight for 5'4" person)



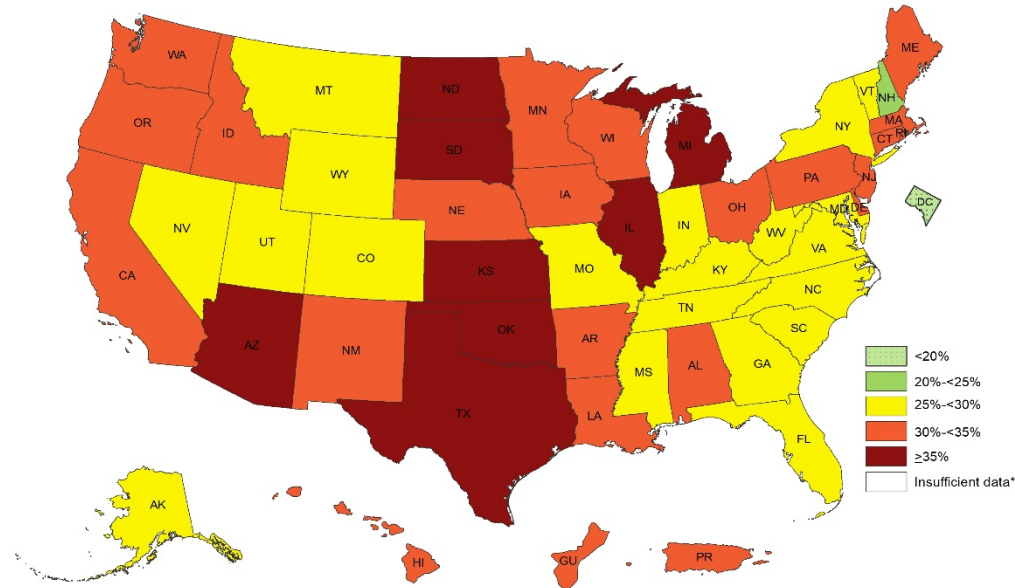
Whites



Blacks



Hispanics



Self-Reported Adult Obesity BRFSS, 2015-2017

OBESITY STATS NHANES 2016

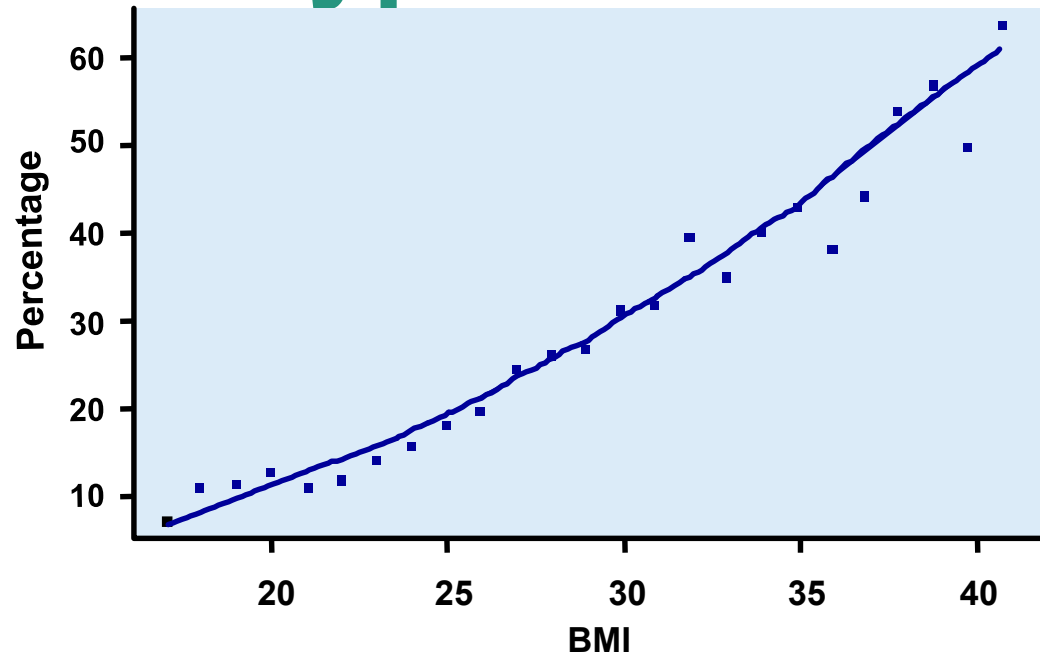
- **Over one-third of U.S. adults (39.8%) are obese (BMI \geq 30)**
- **71.6%** of adults age \geq 20 years are overweight or obese.(BMI \geq 25)
 - Black 55% and Hispanic 51% women have the highest risk
 - 18.5% of children age 2-19 years are obese
- 2008 medical costs from obesity: \$209 billion
- Annual medical costs for people with obesity \$2,741 higher than those of normal weight.

OBESITY RISKS

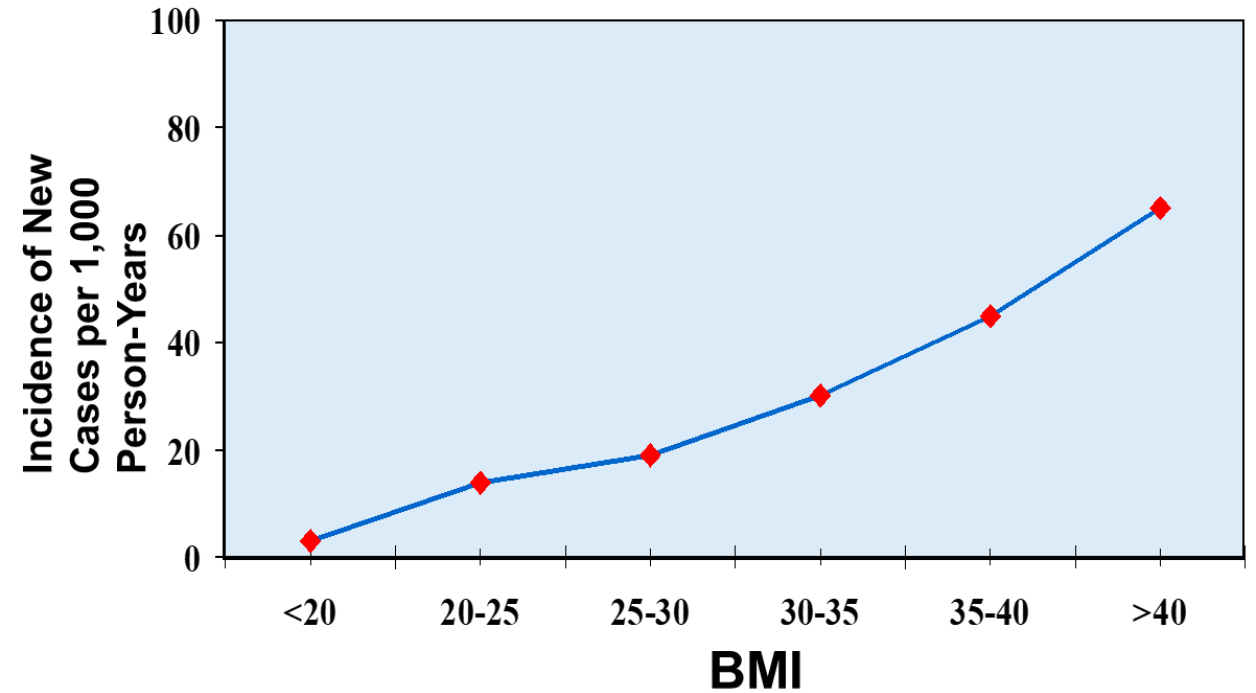
- **Type 2 Diabetes**
- **High Blood Pressure**
- **Increased Cholesterol**
- **Heart Disease**
- **Stroke**
- **Osteoarthritis**
- **Sleep Apnea**
- **Gallbladder Disease**
- **Breast, Colon, Prostate, & Uterine Cancers**



Hypertension



Diabetes



DIABETES

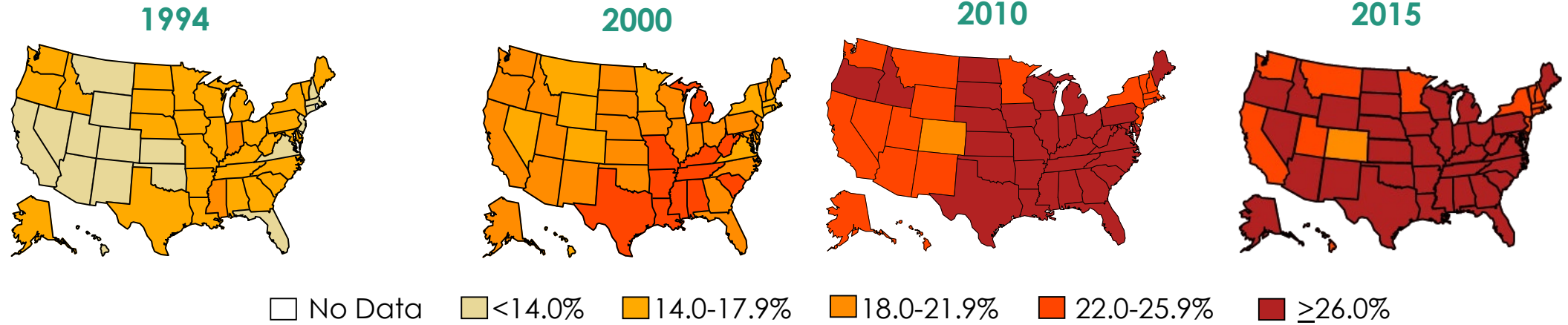
- **Diabetes Mellitus results when the pancreas produces insufficient insulin, or the body's cells fail to respond appropriately to insulin.**
- **Diabetes is diagnosed when the fasting blood glucose level is ≥ 126 mg/dl**
- **Pre diabetes is a fasting glucose ≥ 100 but < 126 mg/dl**

TYPES OF DIABETES

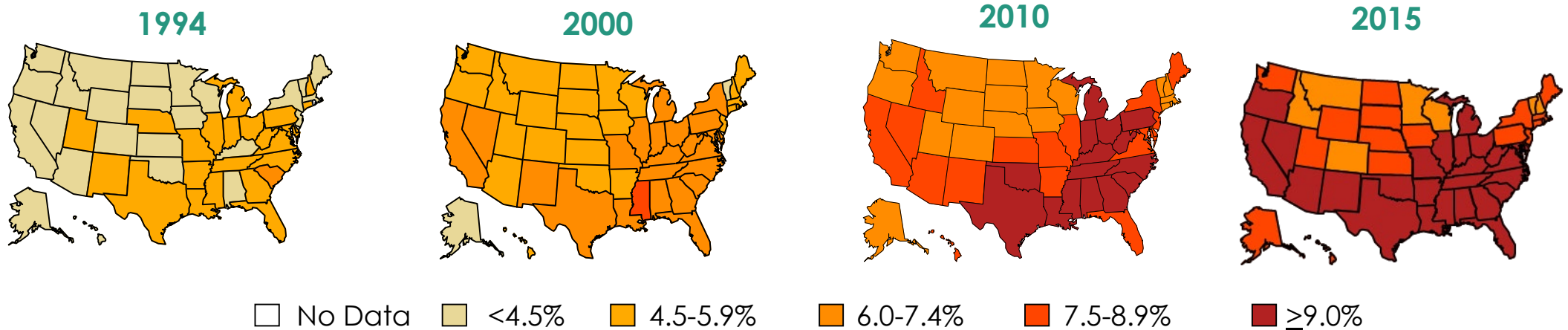
- **Type 1 Diabetes** (DM1)
Autoimmune destruction of insulin producing cells in the pancreas with a subsequent failure of insulin production.
- **Type 2 Diabetes** (DM2)
Insulin resistance (a condition in which the body fails to properly use insulin), combined with relative insulin deficiency.
- 5-10% of diabetes is DM1, 90-95% DM2

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among U.S. Adults

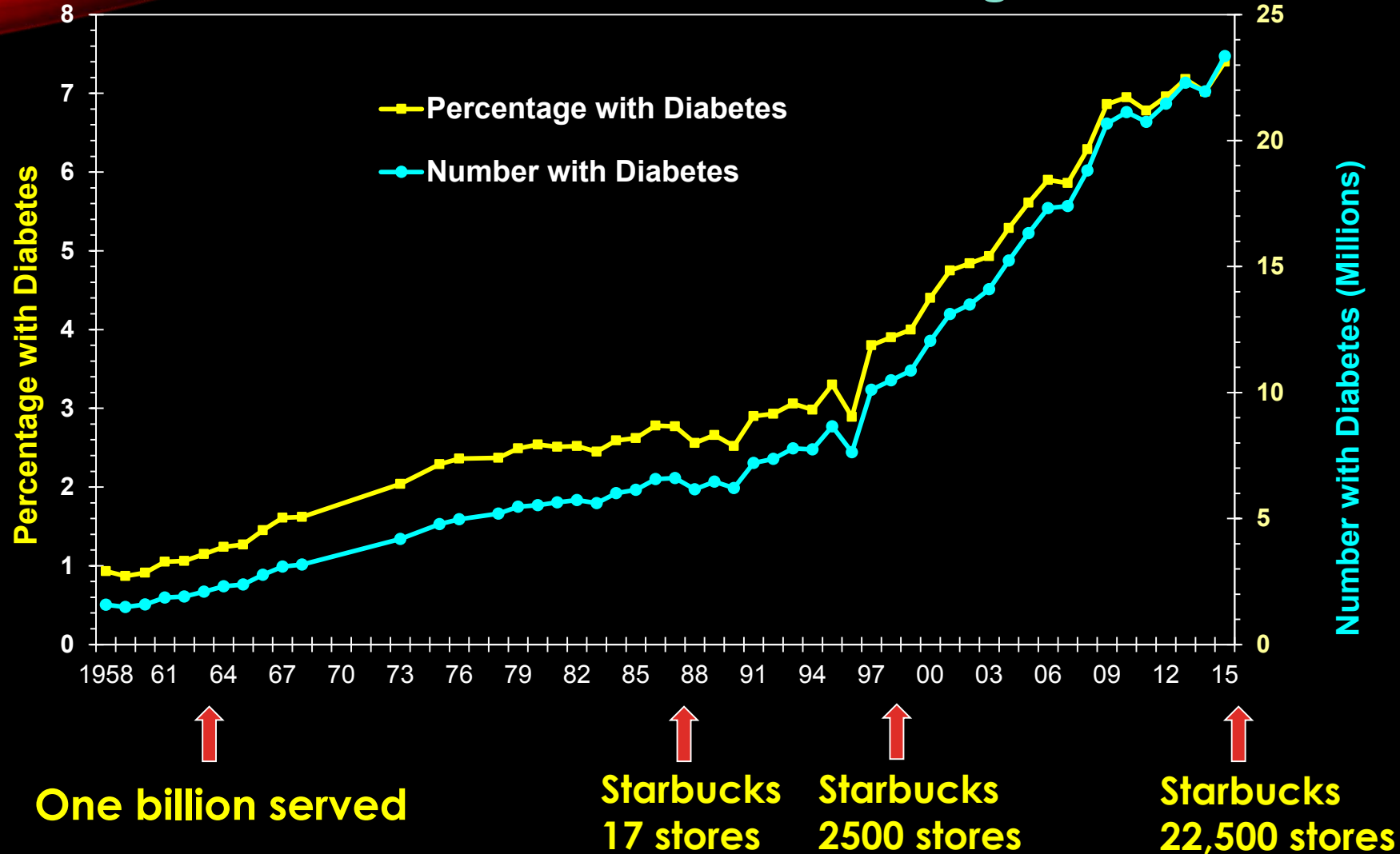
Obesity (BMI ≥ 30 kg/m²)



Diabetes



Number and Percentage of U.S. Population with Diagnosed Diabetes, 1958-2015



CDC's Division of Diabetes Translation. United States Diabetes Surveillance System available at <http://www.cdc.gov/diabetes/data>

2015 US DM FACTS

- **30.3 million people had DM, or 9.4% of population of 321million.**
 - 8.3% in 2010
 - 23 million diagnosed, 7.2 million undiagnosed
- **Age ≥ 18 years, 12.2% with DM**
- **Age ≥ 65 years, 25.2% with DM**
- **7th leading cause of death**

PRE DM

- **34% of U.S. adults aged 18 years or older had prediabetes 2005–2008.**
- **48% of adults aged 65 years or older had pre DM.**

COMPLICATIONS OF DIABETES

Macrovascular

Brain

Cerebrovascular disease

- Transient ischemic attack
- Cerebrovascular accident
- Cognitive impairment

Heart

Coronary artery disease

- Coronary syndrome
- Myocardial infarction
- Congestive heart failure

Extremities

Peripheral vascular disease

- Ulceration
- Gangrene
- Amputation

Microvascular

Eye

Retinopathy

- Cataracts
- Glaucoma

Kidney

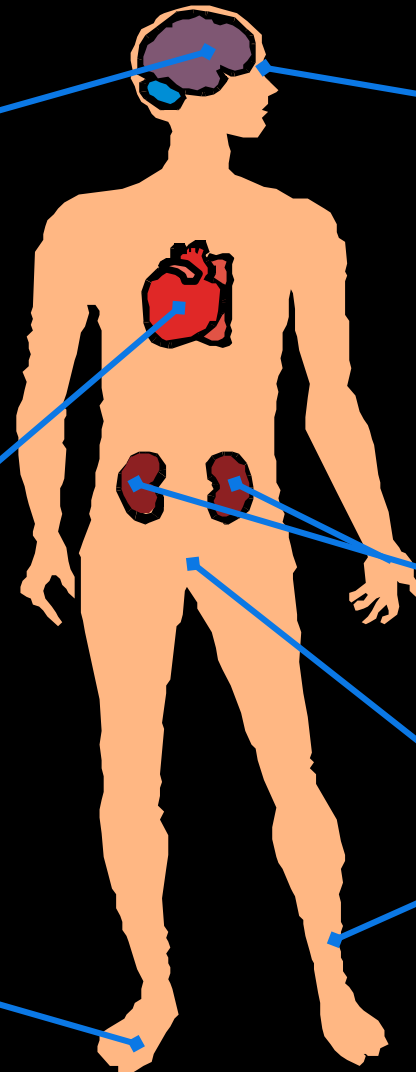
Nephropathy

- Microalbuminuria
- Gross albuminuria
- Kidney failure

Nerves

Neuropathy

- Peripheral
- Autonomic



EVERY 24 HOURS...

- 4,192 new cases of diabetes are diagnosed
- 296 non-traumatic lower limb amputations are performed
- 142 people begin treatment for end-stage renal disease
- 50 people develop blindness
- 693 people die of diabetes or diabetes is a contributing cause of death
- The majority of these were preventable!

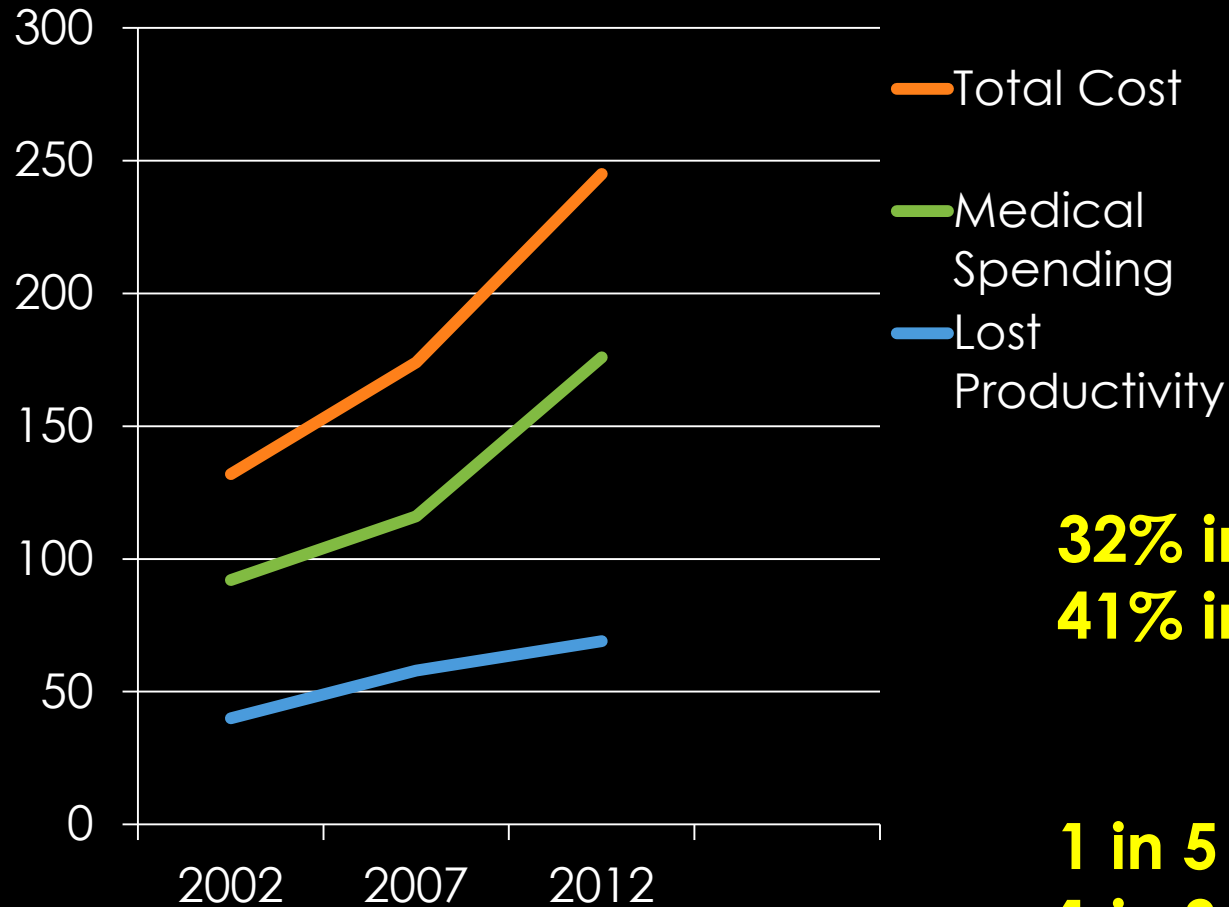


Derived from:

National Diabetes Statistics Report 2017

<https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>

US COST OF DM IN BILLIONS



**32% increase in 2007 and
41% increase in 2012**

**1 in 5 health care dollars and
1 in 3 Medicare dollars spent on DM
DM pts spend 2.3x more on health care**

HEALTH BENEFITS OF WEIGHT LOSS

- **Decreased glucose and insulin levels**
- **Decreased cardiovascular risk**
- **Decreased blood pressure**
- **Decreased bad cholesterol and triglycerides, increased good cholesterol**
- **Decreased severity of sleep apnea**
 - A 10% weight reduction is associated with a 50% reduction in severity of sleep apnea.
- **Reduced symptoms of degenerative joint disease**

DAILY CALORIE INTAKE

- **For active males to maintain weight:**

Wt (in pounds) x 15 (inactive x 13) = calories/day

- **For active females to maintain weight:**

Wt (in pounds) x 13 (inactive x 10) = calories/day

- Male 170# x 15 = 2550cal/d (2210)

- Female 140# x 13 = 1820cal/d (1400)

Big Mac = 570cal, Large fry = 540cal, McFlurry = 630cal Total = 1740 cal meal

Grande Frappuccino 400-500 cal

WEIGHT LOSS

- **Calories in – calories burned = weight gained or lost**
- **Each pound = 3500 calories**
- **To lose $\frac{1}{2}$ lb/wk, decrease 250 cal/day, for 1 lb/wk, decrease 500 cal/day**
- **You MUST count calories!**

CALORIES FOR WOMEN

Weight lbs	Calories for Inactive Weight Maintenance	Calories for Inactive Weight Loss	Calories for Active Weight Maintenance	Calories for Active Weight Loss
120	1200	700 - 950	1560	1060-1310
140	1400	900-1150	1820	1320-1570
160	1600	1100-1350	2080	1580-1830
180	1800	1300-1550	2340	2090-2120
200	2000	1500-1750	2600	2100-2350
220	2200	1700-1950	2860	2360-2610
240	2400	1900-2150	3120	2620-2870

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Serving Size

Number of servings

Nutrients in one serving

Amount Per Serving

Calories 250 Calories from Fat 110

	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	

• Calories

• Fat, Carbs, Protein

Protein 5g

Vitamin A 4% • Vitamin C 2%
Calcium 20% • Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories:	2,000	2,500
Total Fat	Less than	65g	80g	
Sat Fat	Less than	20g	25g	
Cholesterol	Less than	300mg	300mg	
Sodium	Less than	2,400mg	2,400mg	
Total Carbohydrate		300g	375g	
Dietary Fiber		25g	30g	

Calories per gram:

Fat 9 • Carbohydrates 4 • Protein 4

WHAT IS THE BEST DIET?



DIETS

DietM	Carbs	Fat	Wt loss	1yr Drop out rate
Zone	Moderate decrease	Moderate decrease	3.5#	23-35%
Ornish	High	Low	4.8#	22-32%
Weight Watchers	Decreased	Decreased	8.8#	35-39%
Jenny Craig	Decreased	Decreased	10#	35-40%
Atkins	Low	High	10.3#	12-42%
Mediterranean	Decreased	Healthy fats	7.3#	7%

MEDITERRANEAN DIET

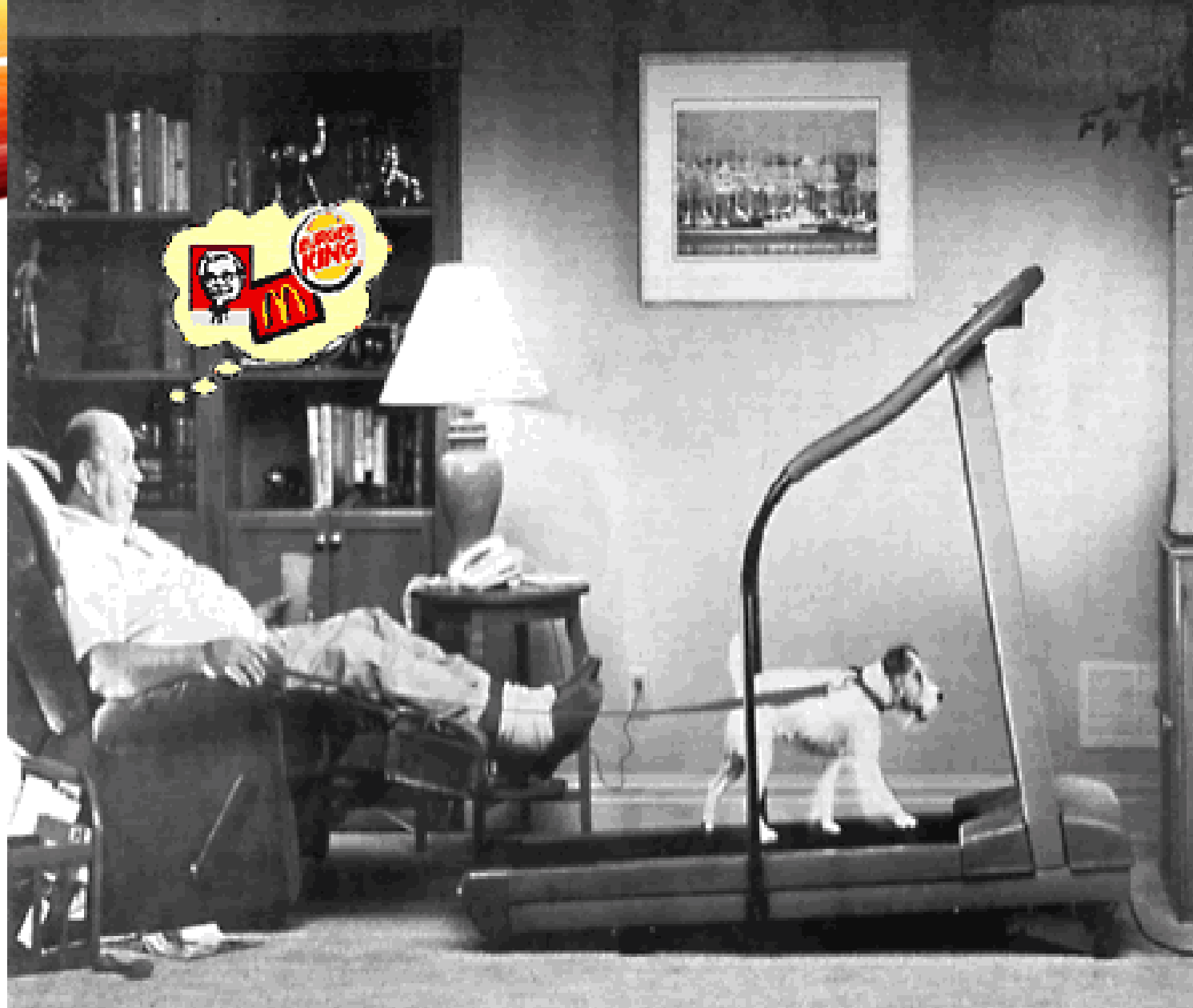
- Fruits and vegetables, whole grains, legumes and nuts
- Replacing butter with olive oil and canola oil
- Using herbs and spices instead of salt
- Limiting red meat to a few times a month
- Eating fish and poultry at least twice a week
- Drinking red wine in moderation (optional)
- Getting plenty of exercise



BASIC GUIDELINES

- **Don't drink any calories**
 - NO juice, milk, soda, alcohol, sweetened or sports drinks
- **Cut down on total calories**
 - Less breads, pastas, potatoes, rice, tortillas
 - Increase portions of green vegetables
 - Eat healthy fruits: berries, cherries, grapefruit, apples, pears (avoid pineapple, watermelon, mango)
 - Eat lean meats – chicken and fish, less red meat





Physical Activity: Impact on Comorbidities

- Enhances cardiorespiratory fitness
- Improves cholesterol and triglycerides
- Reduces blood pressure
- Increases insulin sensitivity
- Improves blood glucose control
- Decreases anxiety & depression
- Improves insomnia
- **Combined diet and exercise is most successful for weight loss and maintenance**



CALORIES BURNED DURING PHYSICAL ACTIVITIES

Activity	Calories Burned in an Hour	
	Man	Woman
Light Activity:	300	240
Cleaning house		
Office work		
Playing baseball		
Playing golf		
Moderate Activity:	460	370
Walking briskly (3.5 mph)		
Gardening		
Cycling (5.5 mph)		
Dancing		
Playing basketball		

Dietary Guidelines for Americans, USDA, DHHS, 3rd edition, 1990 (adapted from McArdle et al., "Exercise Physiology," 1986).

CALORIES BURNED DURING PHYSICAL ACTIVITIES

Activity	Calories Burned in an Hour	
	Man	Woman
Strenuous Activity:	730	580
Jogging (9 min/mile)		
Playing football		
Swimming		
Very Strenuous Activity:	920	740
Running (7 min/mile)		
Racquetball		
Skiing		

Dietary Guidelines for Americans, USDA, DHHS, 3rd edition, 1990 (adapted from McArdle et al., "Exercise Physiology," 1986).

WEIGHT LOSS MEDS

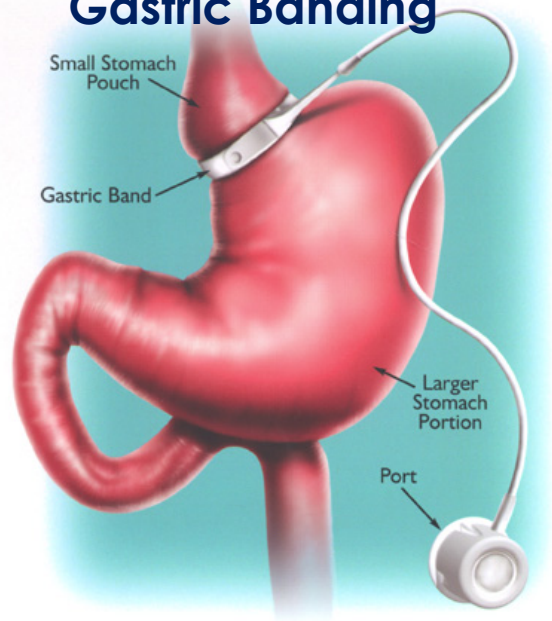
Drug	Class	Side Effects	Wt loss	\$/mn
Phentermine	Amphetamine Derivative	Anxiety, hallucinations, irregular heart beats, pulmonary HTN, heart valve abn'l (12wk treatment only)	10#	\$45
Orlistat Ali/Xenical	Lipase inhibitor	Diarrhea, 25% fecal incontinence and malabsorption of vitamins	3%	\$164
Lorcaserin (Belviaq)	Serotonin agonist	HA, dizzy, addictive, cognitive impairment, suicidal ideation, heart valve abn'l	3-5%	\$200
Phentermine/Topiramate (Qsymia)	Amphetamine/ Seizure med	30-40%drop out, Tachycardia, acidosis, cognitive impairment, increase suicide	7-9%	\$180
Naltrexone/bupropion (Contrave)	Opioid antagonist/ Antidepressant	Increased suicide, HTN, constipation, headache, vomiting, dizziness, insomnia, dry mouth and diarrhea	5%	\$234
Liraglutide (Saxenda)	GLP-1	Nausea, abdominal pain, ?thyroid cancer, pancreatitis	5-10%	\$1000

WEIGHT LOSS SURGERY

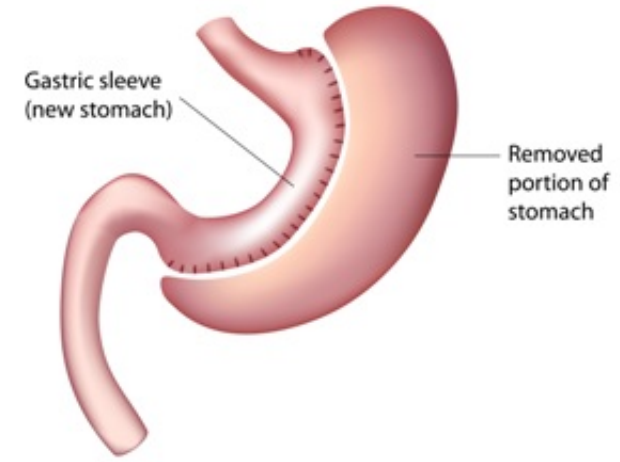
Option for limited number of patients with clinically severe obesity.

- BMI ≥ 40 or ≥ 35 with comorbid conditions
- Reserved for patients in whom medical therapy has failed
- Gastric restriction or gastric bypass

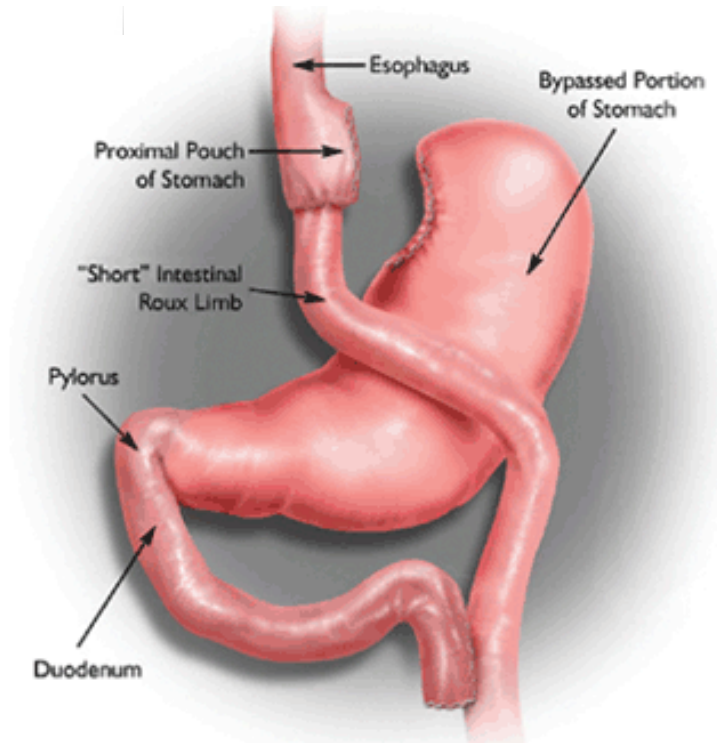
Gastric Banding



Vertical Sleeve Gastrectomy



Roux-en-Y Gastric Bypass

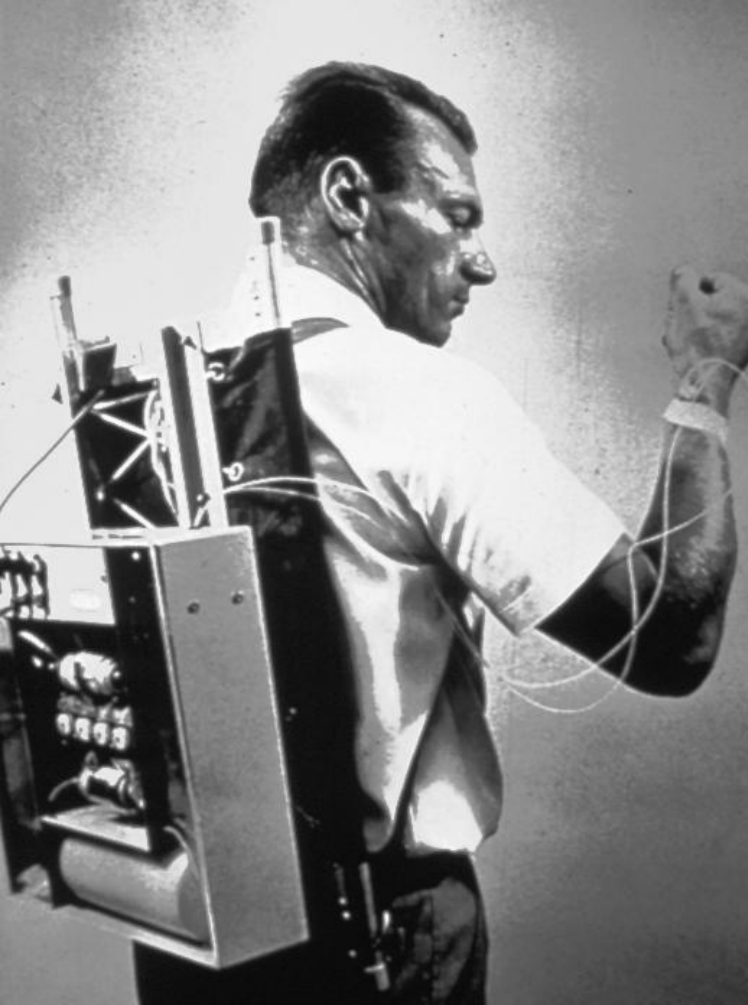


WEIGHT LOSS SURGERY

	Excess wt loss	Side effects	Resolution of DM	Cost
Banding	36-87%	Nausea/vomiting	54-65%	17-25K
Sleeve	50-60%	Nausea/vomiting, staple release	50%	15-25K
Bypass	60-80%	Nausea/vomiting, diarrhea, malnutrition, vitamin malabsorption	80-100%	25-35K

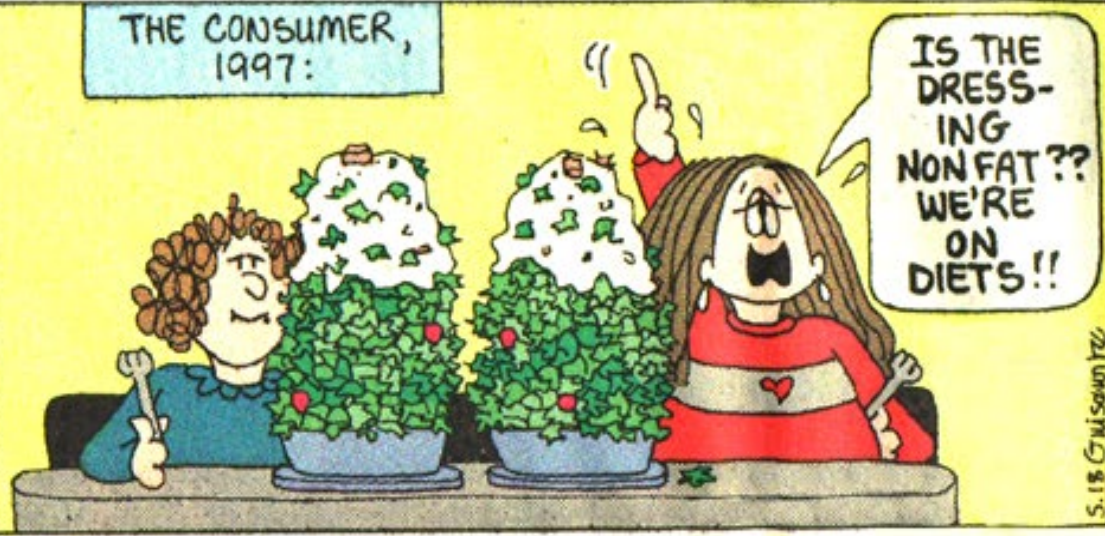
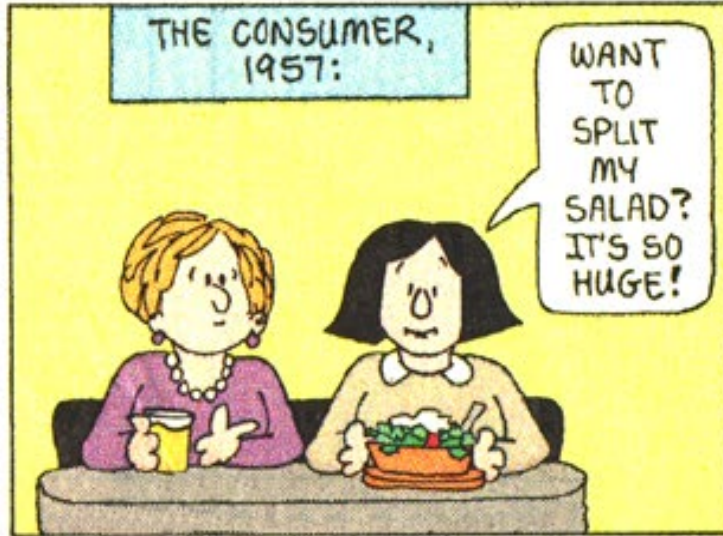
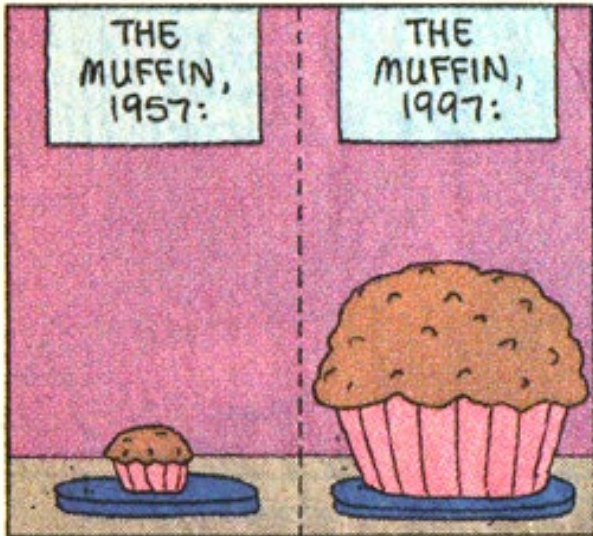
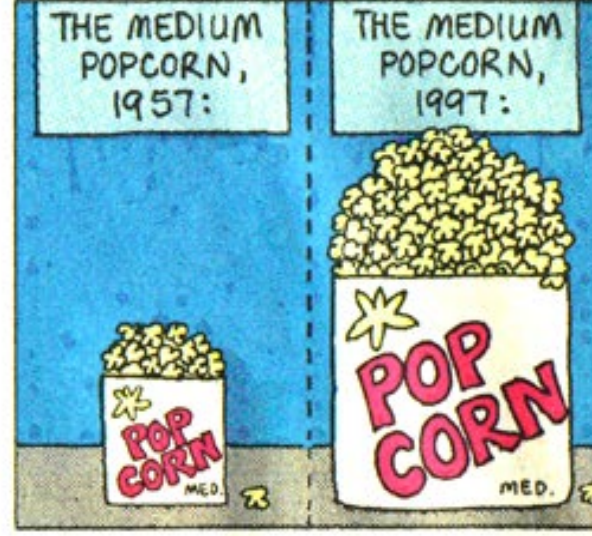
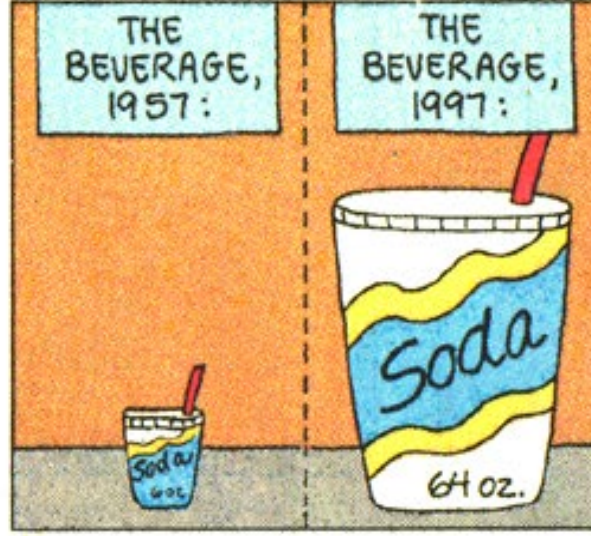
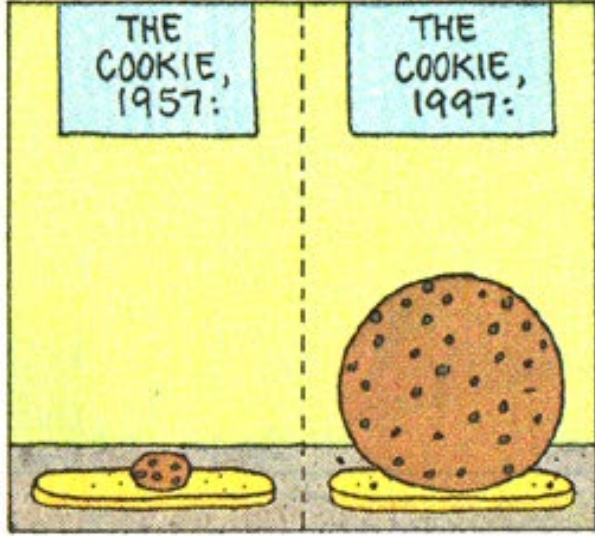
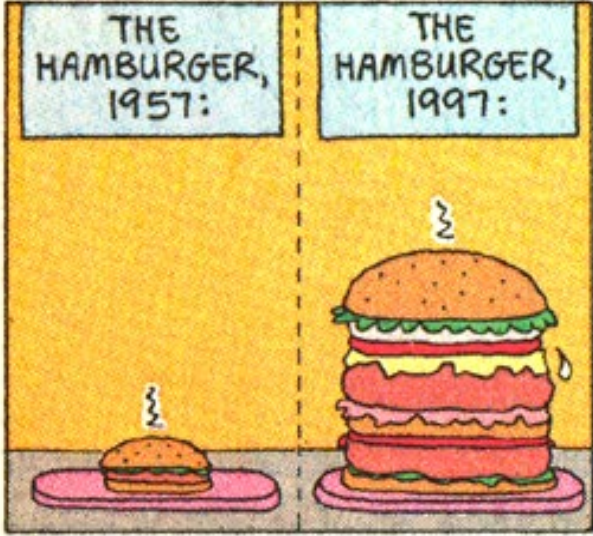
DIABETES TREATMENT

- **Diet, Diet, Diet and Exercise – DM can be cured with wt loss. No med cures Diabetes**
- **First line – Metformin**
- **Second line - add GLP-1 and/or SGLT-2**
 - GLP-1 Liraglutide (Victoza), Semaglutide (Ozempic) Dulaglutide (Trulicity), Exenatide (Bydureon)
 - SGLT-1 – Empagliflozin (Jardiance), Canagliflozin (Invokana)
- **All treatment now about decreasing risk of heart attack and stroke so even if on insulin should be on the above meds and all have weight loss.**
- **Education is key! Go to a DM education class.**



CATHY

By Cathy Guisewite



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S. 18 C. GUISEWITE

A close-up photograph of a butterfly with yellow and black wings feeding on a red flower. The butterfly is positioned in the lower right quadrant of the image, facing left. The flower is a vibrant red color with yellow centers. The background is a soft, out-of-focus green. The text "THANK YOU!" is written in large, bold, yellow letters at the top right. The text "Questions?" is written in red, bold letters to the right of the butterfly. The text "Tamis.Bright@ttuhsc.edu" is written in yellow, bold letters at the bottom right.

THANK YOU!

Questions?

Tamis.Bright@ttuhsc.edu