



MORBID OBESITY: The Role of Bariatric Surgery

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**ICL—Willamette University
Tuesday
November 27, 2012**



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DISCLOSURES

Medical Director, Salem Hospital Bariatric Surgery Center

**(...regrettably, I have no other
relevant financial disclosures
...but am always open to them...)**



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SUMMARY OF TALK—pt. 1

- **FIRST HALF OF TALK**
 - **Obesity: definitions and classifications**
 - **The prevalence of obesity and MORBID obesity**
 - **Societal implications of obesity (bias)**
 - **Clinical implications of obesity: morbidity and mortality**
 - **Impact of obesity on health care economics**
 - **Treatment options: diets, exercise, and surgery**



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SUMMARY OF TALK—pt. 2

- **SECOND HALF OF TALK**
 - **Classification of types of bariatric surgery**
 - **Laparoscopic adjustable banding**
 - **Laparoscopic and Open Gastric bypass**
 - **Laparoscopic sleeve gastrectomy**
 - **Results of bariatric surgery: weight loss**
 - **Results of bariatric surgery:
improvement of medical illnesses**
 - **Complications of bariatric surgery**
 - **Conclusions**



Definition of “Morbid Obesity”

- **What is the Body Mass Index (BMI)?**
 - BMI = weight (kg) / [height (m)]²
 - ...or BMI = (weight (lbs) / [height (inches)]²) x 704
 - Me: height = 5’ 10” and weight 155 lbs:
 - BMI = (155 / [70 x 70]) x 704 = 22
- **Classification of Obesity based on BMI:**
 - BMI < 20: Underweight
 - BMI 20 – 25: Normal weight
 - BMI 26 – 30: Overweight
 - BMI 31 – 35: Class I obesity
 - BMI 36 – 40: Class II obesity (“Morbid obesity”)
 - BMI 41 – 50: Class III obesity (“Morbid obesity”)
 - BMI > 50: Super-morbid obesity

OBESITY IN AMERICA & THE WORLD



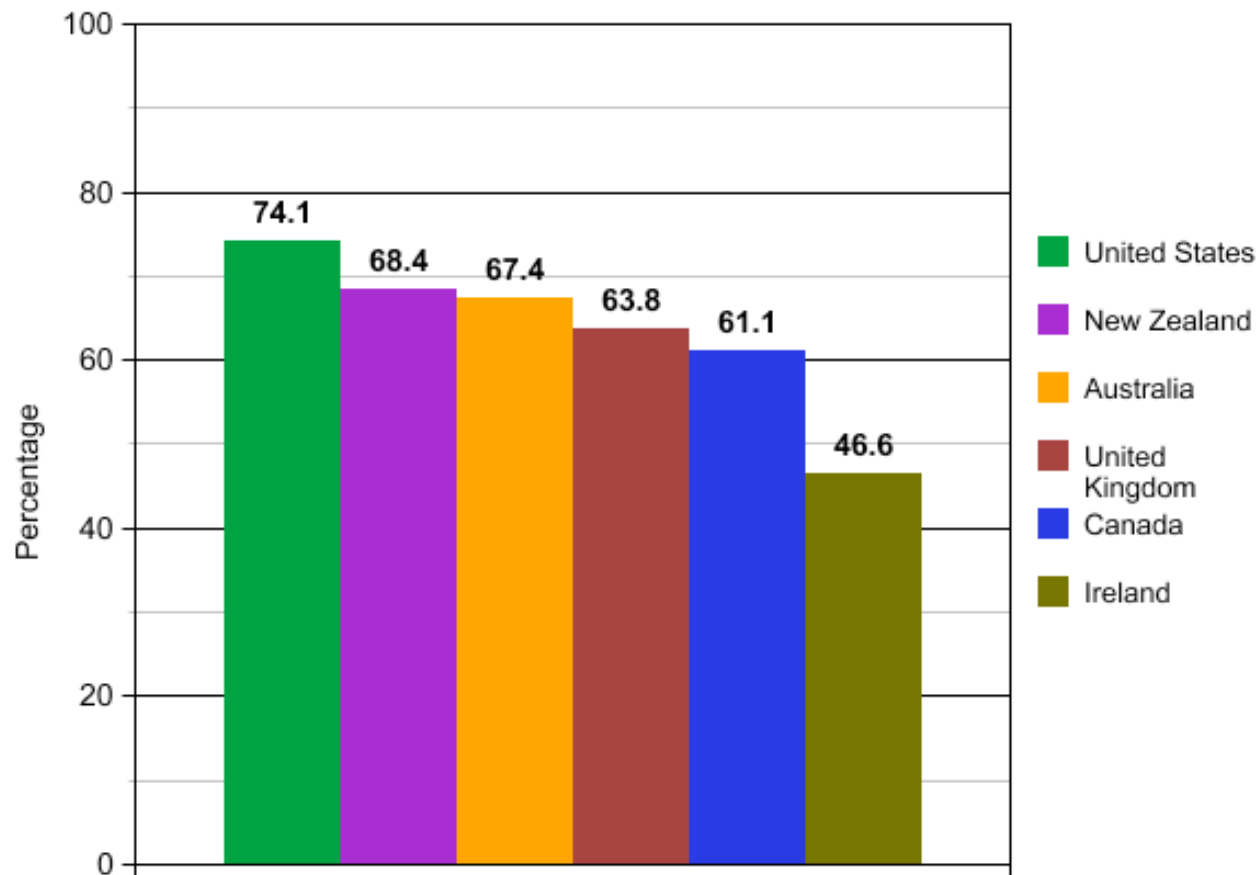
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“Overweight” in the Anglosphere

Prevalence of overweight people in the Anglosphere



SOURCE: World Health Organization, 2007



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PREVALENCE OF OBESITY

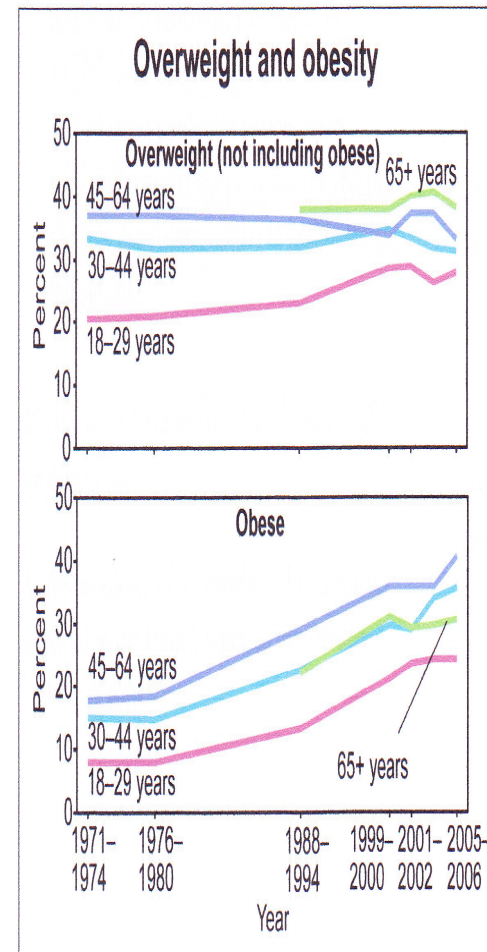
■ DEMOGRAPHICS OF OBESITY

■ Flegal et al, JAMA 2010:

■ **68%** of US adults are overweight or obese

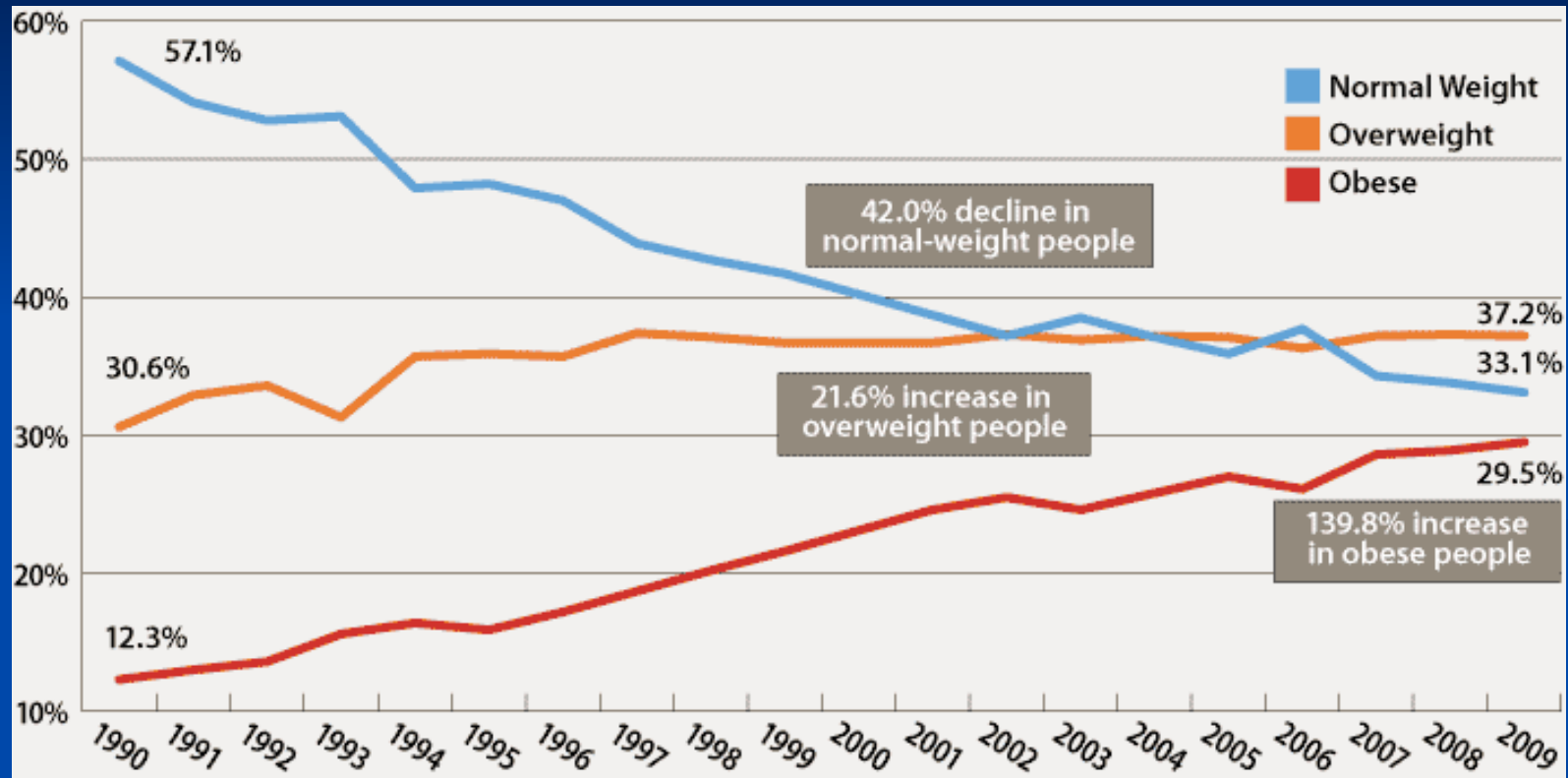
■ **5.7%** have BMI > 40 (Class III/Morbid Obesity)

Figure. Overweight and Obesity, by Age: United States, 1971–2006.



SOURCES: CDC/NCHS, Health, United States, 2008, Figure 7. Data from the National Health and Nutrition Examination Survey.

Put another way, we are... Shifting the “Weight of the Nation”

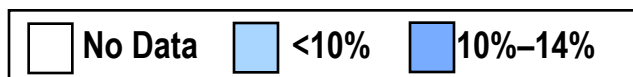
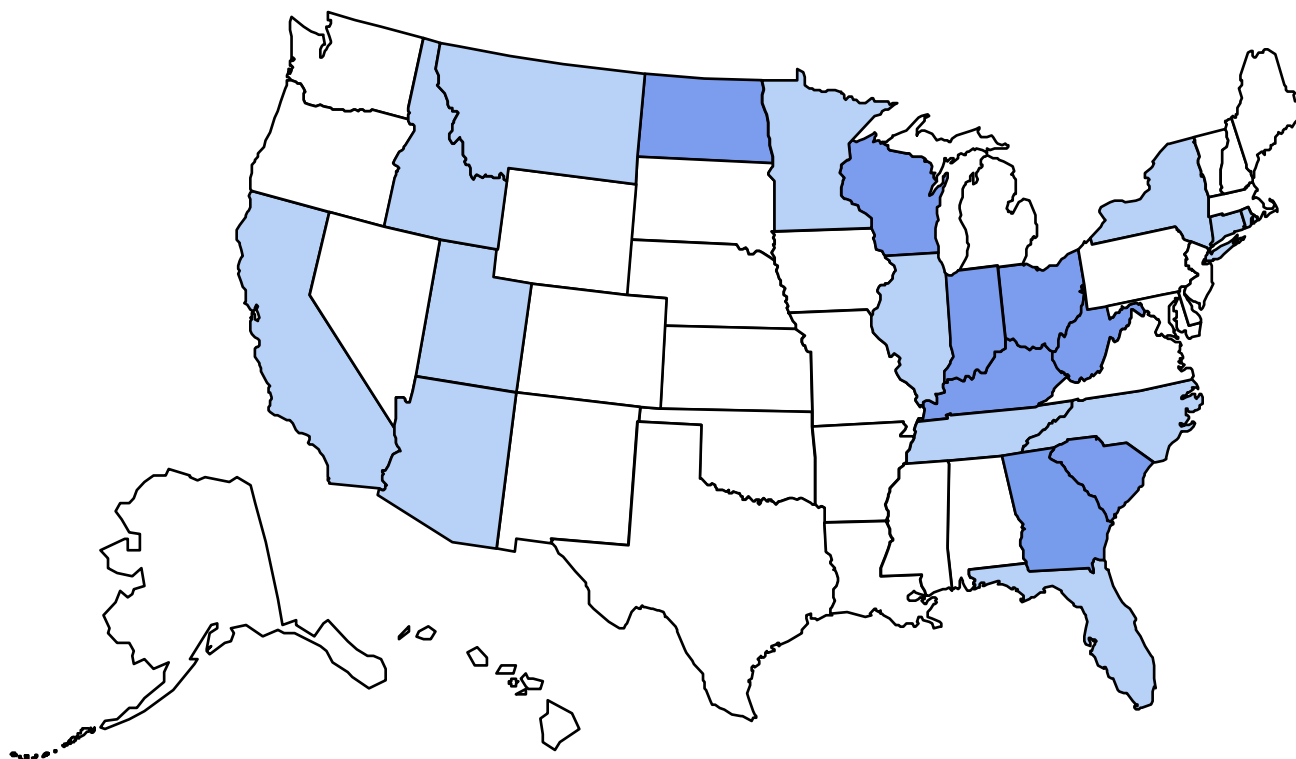


Normal weight: BMI 21-25
Overweight: BMI 26-30
Obese: BMI > 31

Obesity Trends* Among U.S. Adults

BRFSS, 1985

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

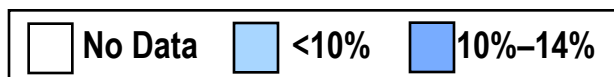
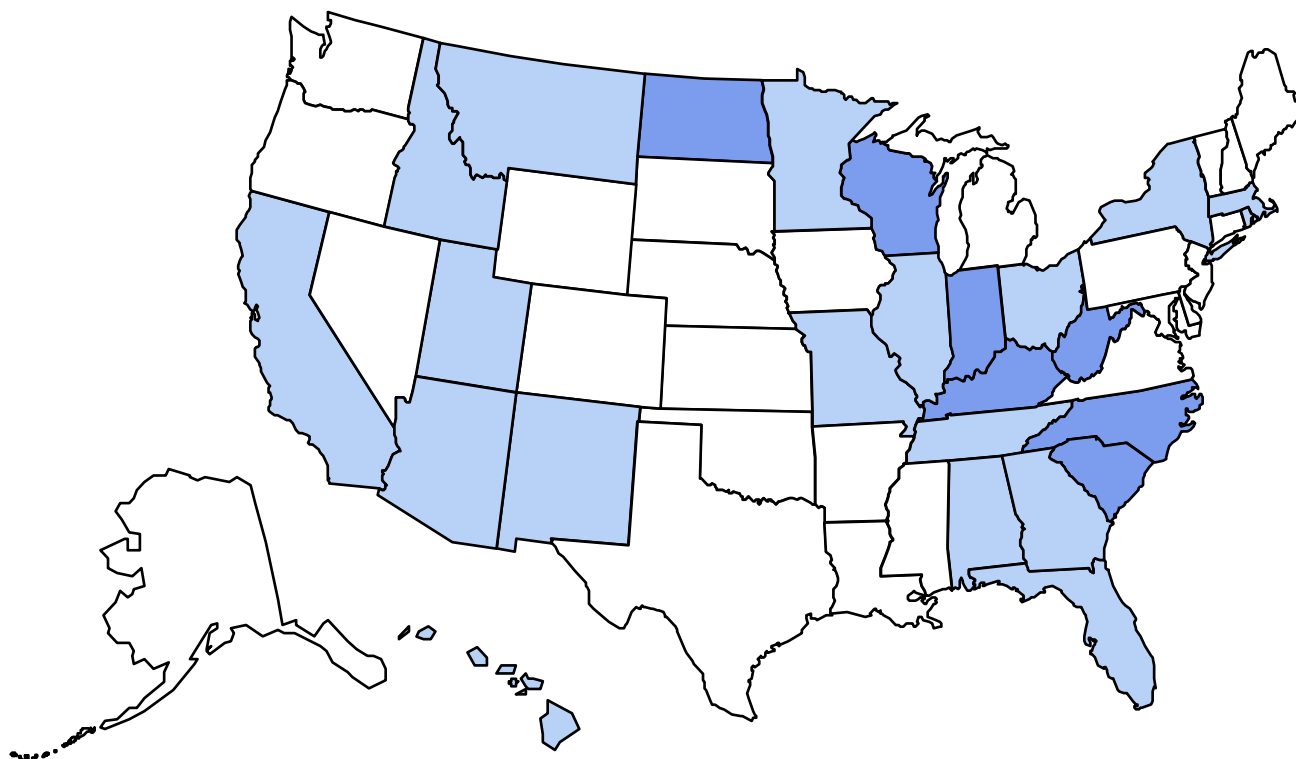


Source: CDC Behavioral Risk Factor Surveillance System.

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BRFSS, 1986

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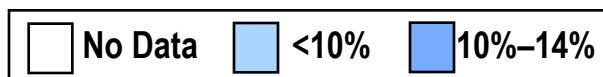
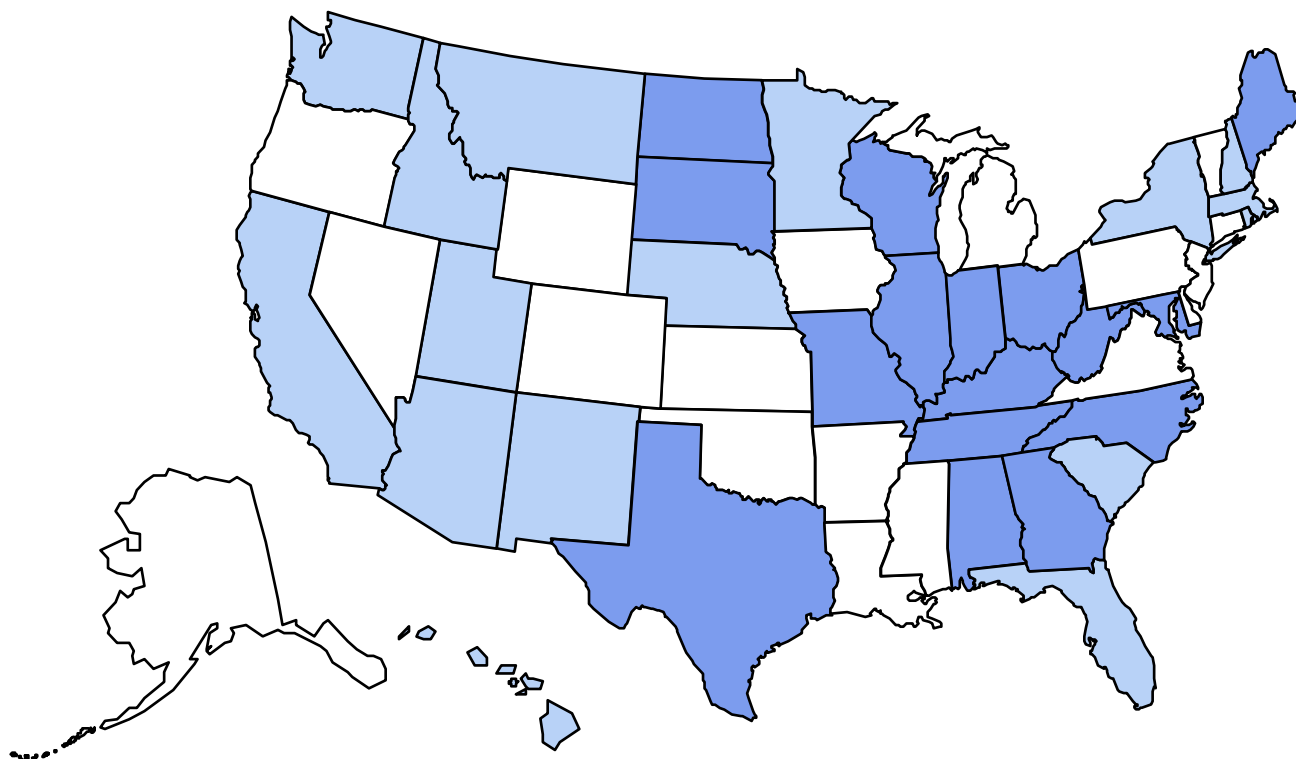


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Obesity Trends* Among U.S. Adults

BRFSS, 1987

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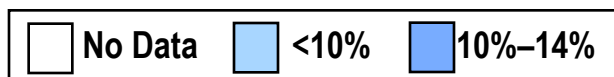
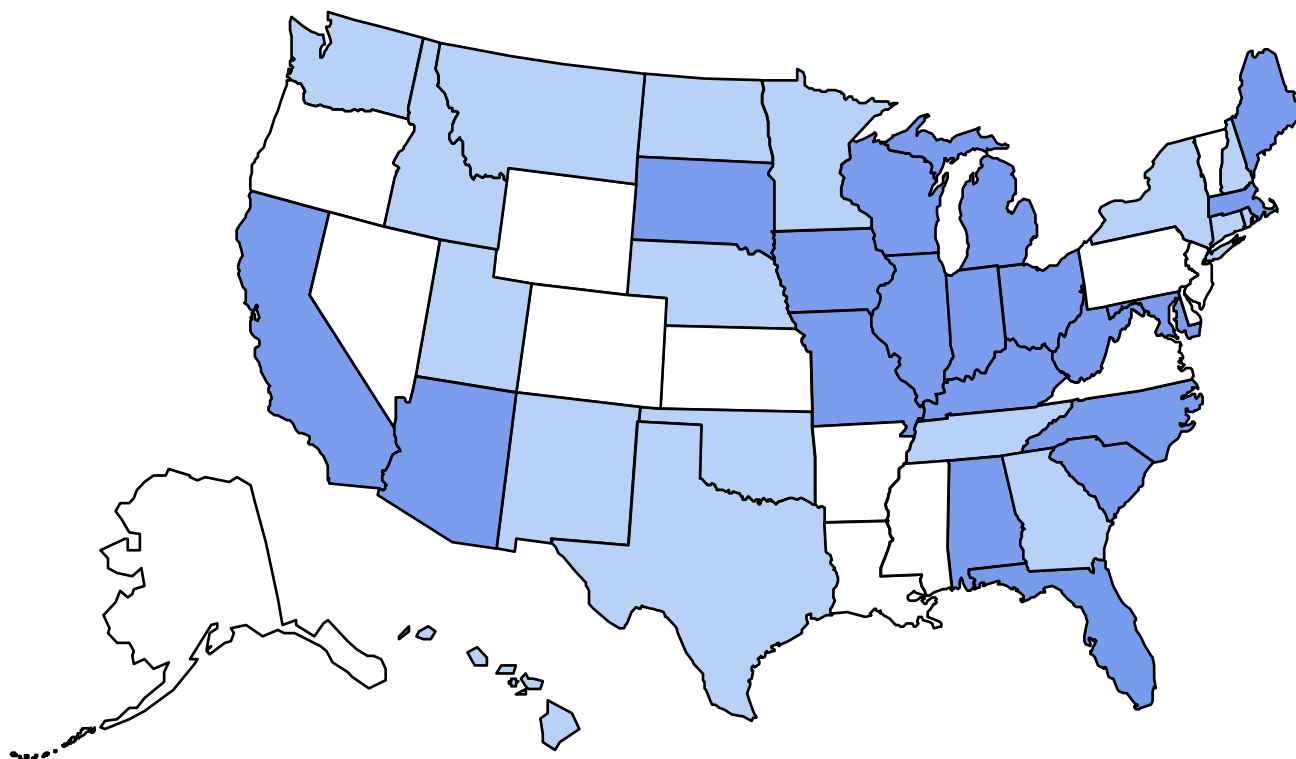


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1988

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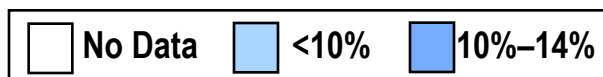
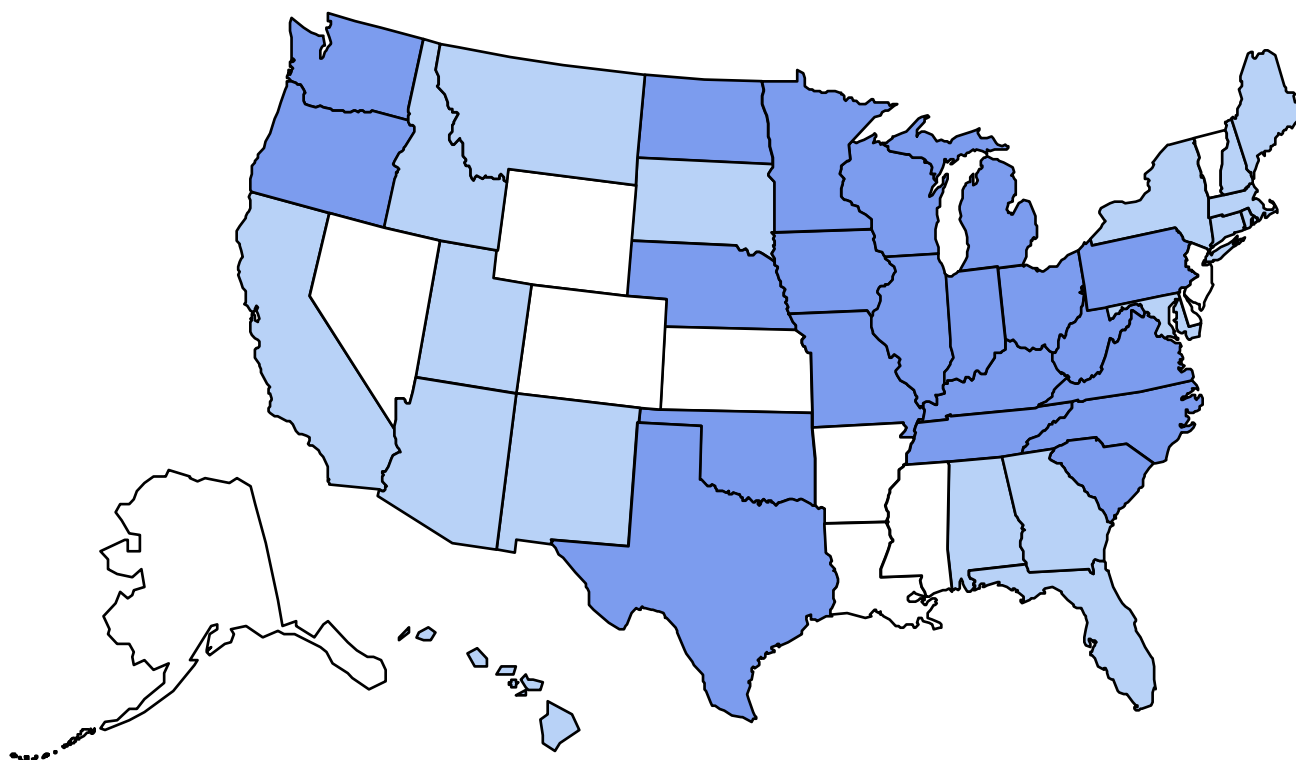


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BRFSS, 1989

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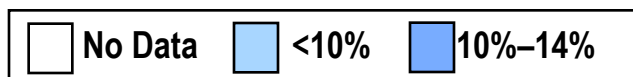
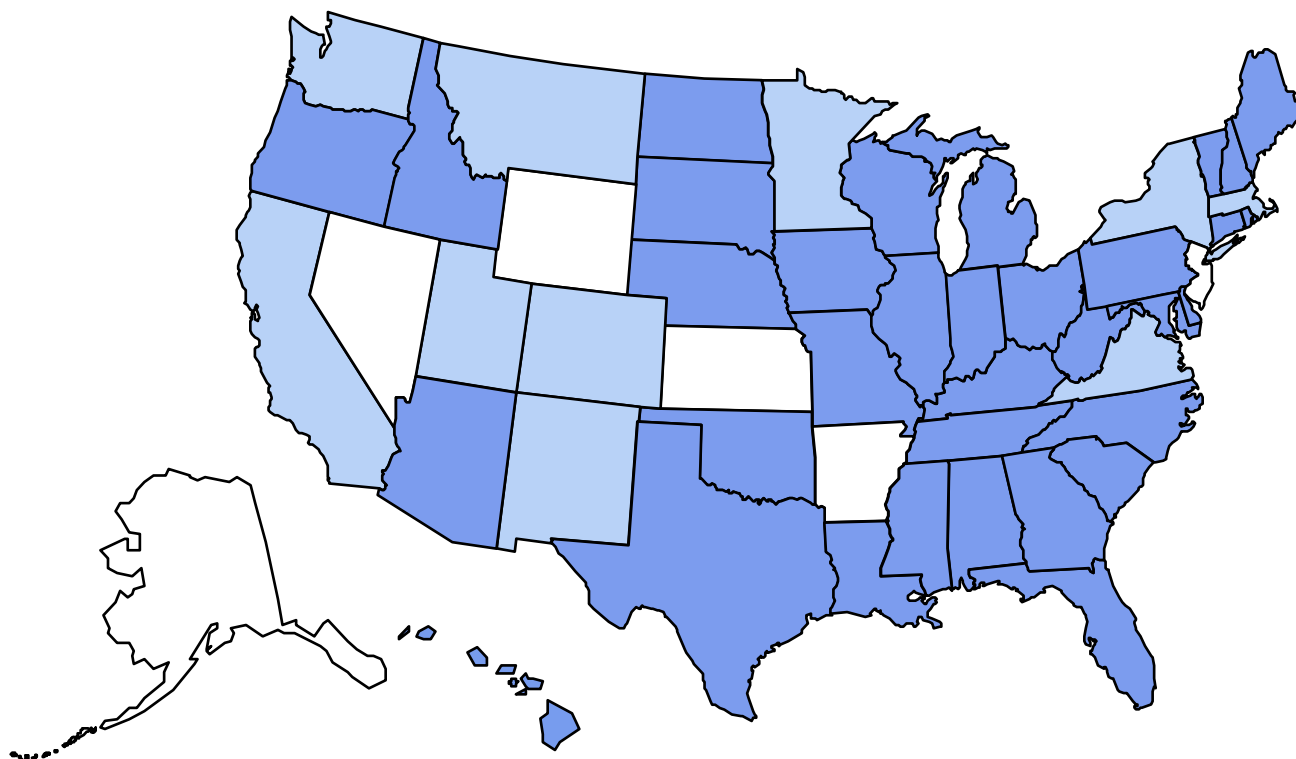


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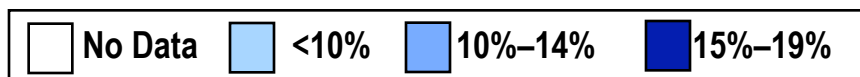
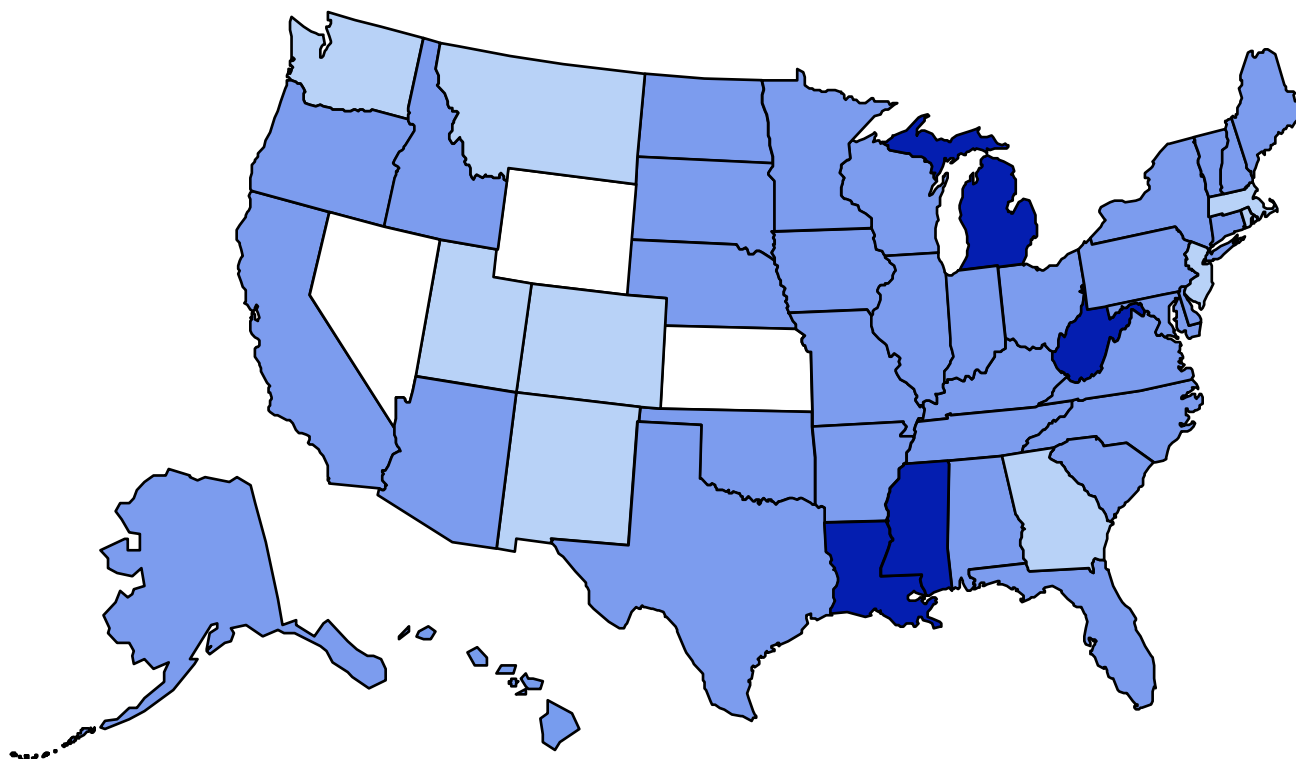


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1991

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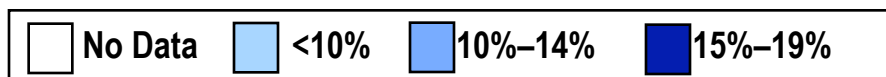
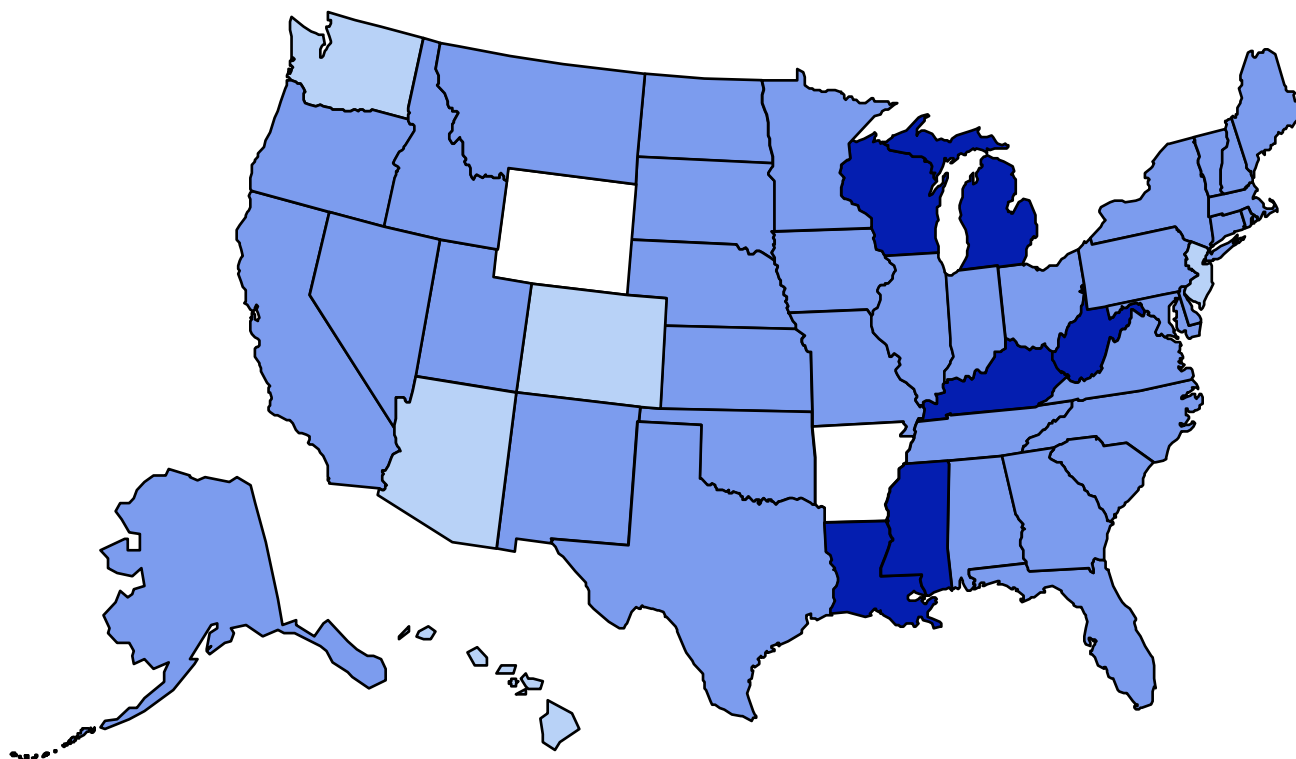


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1992

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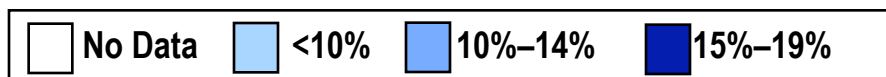
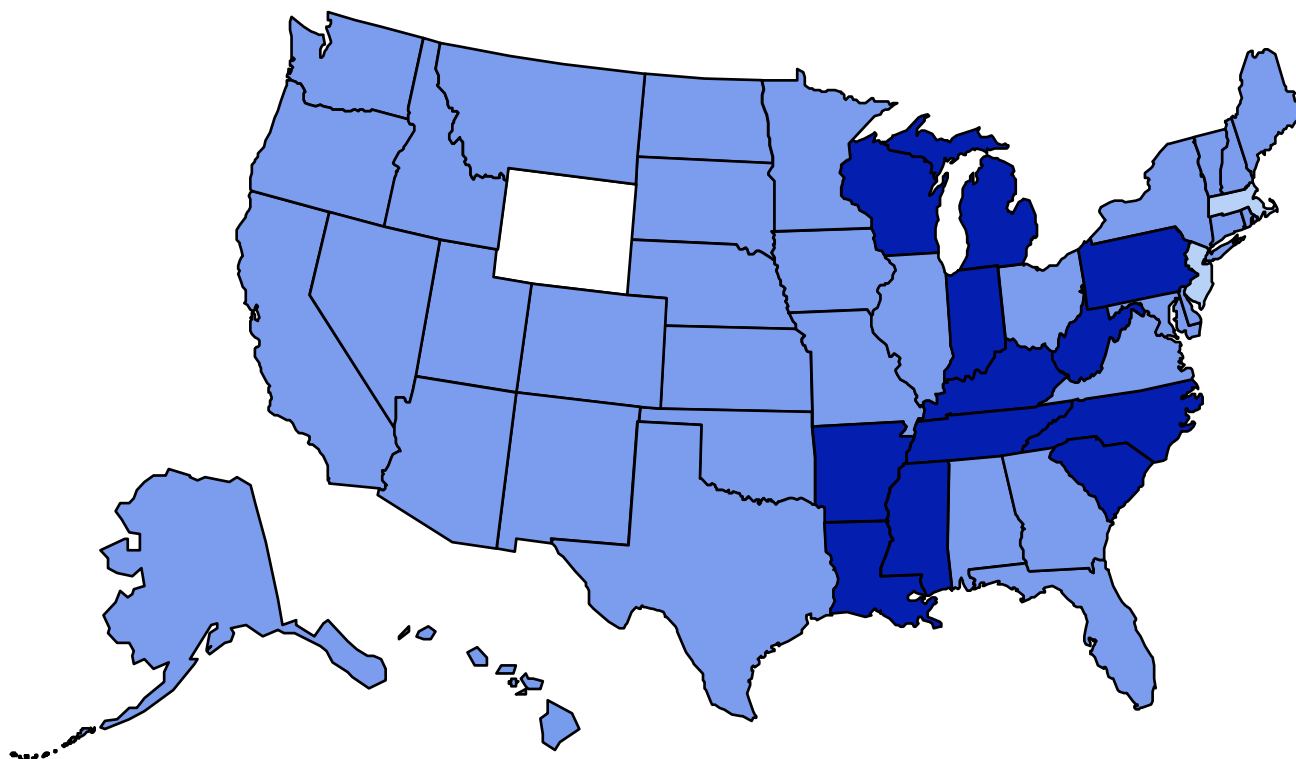


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1993

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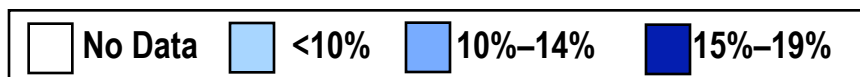
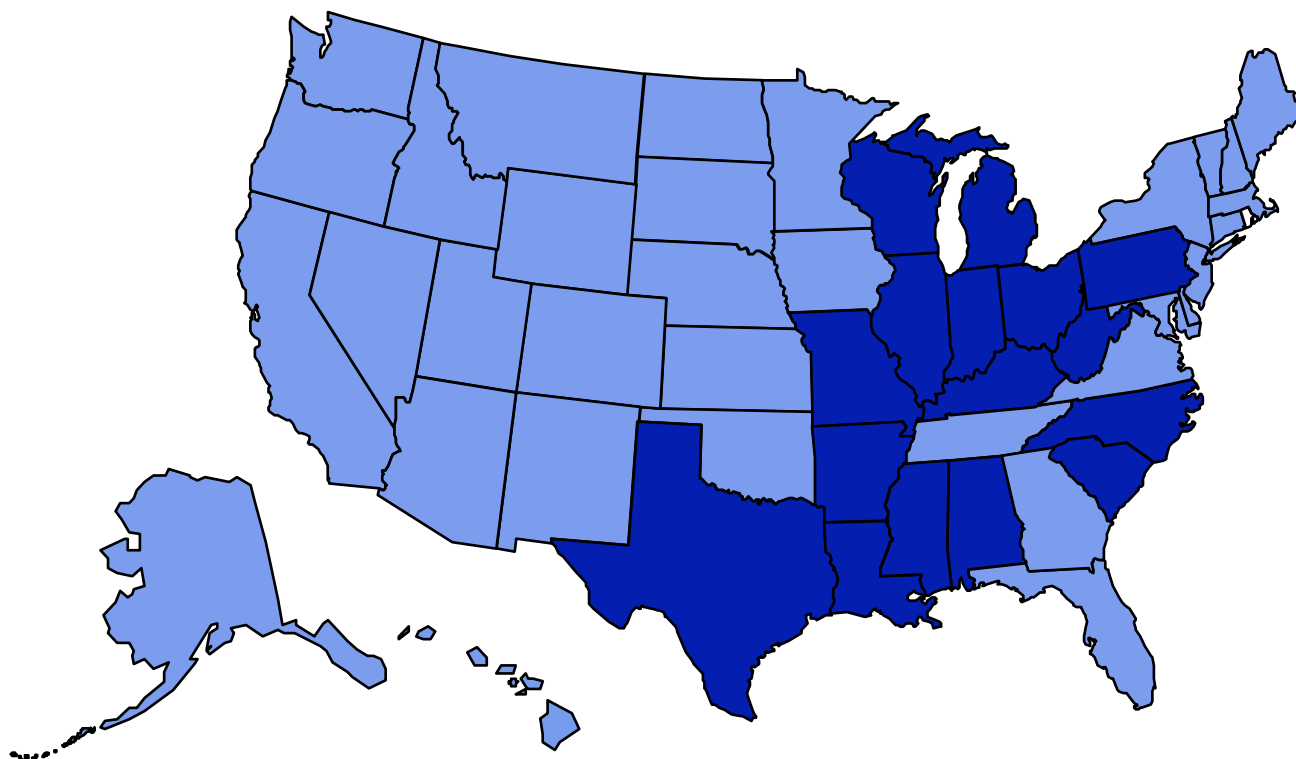


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1994

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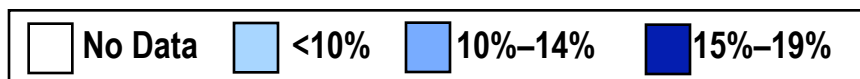
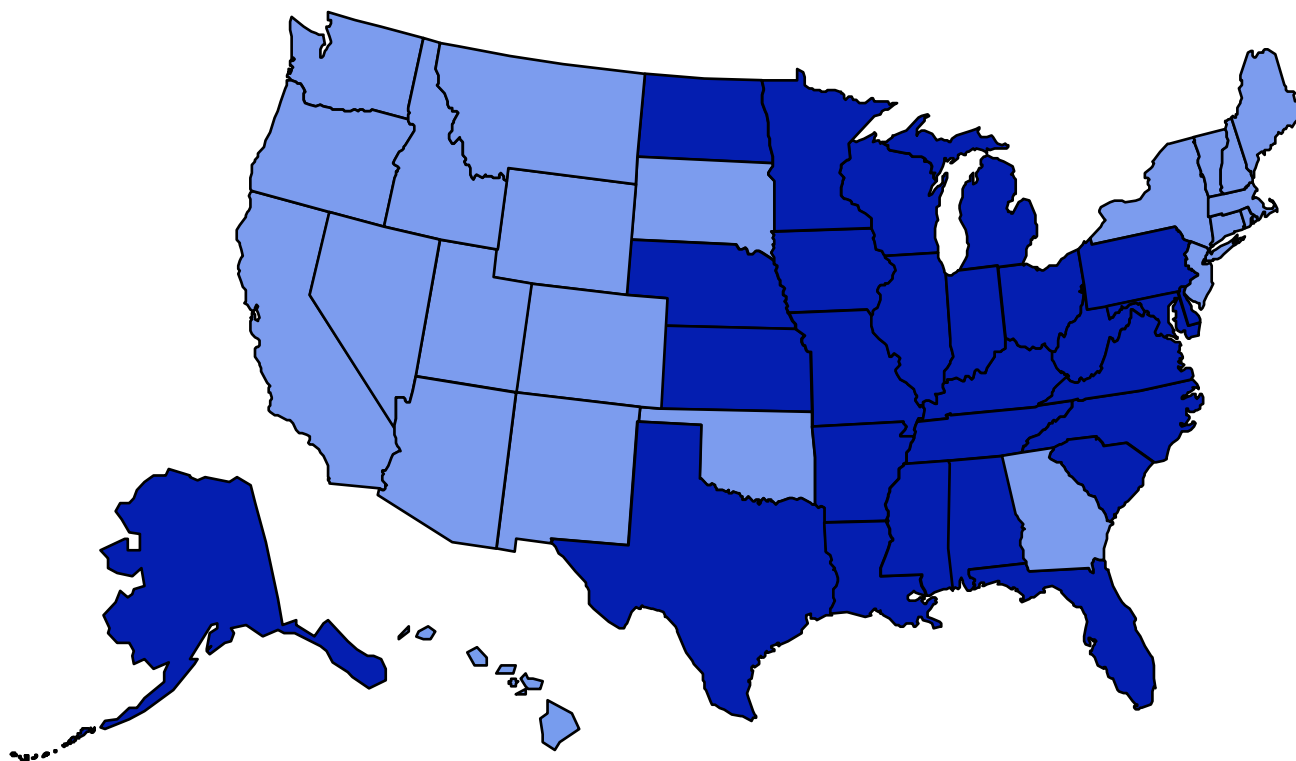


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1995

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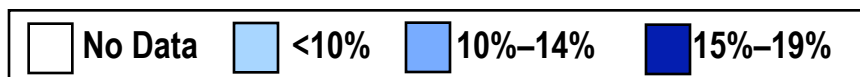
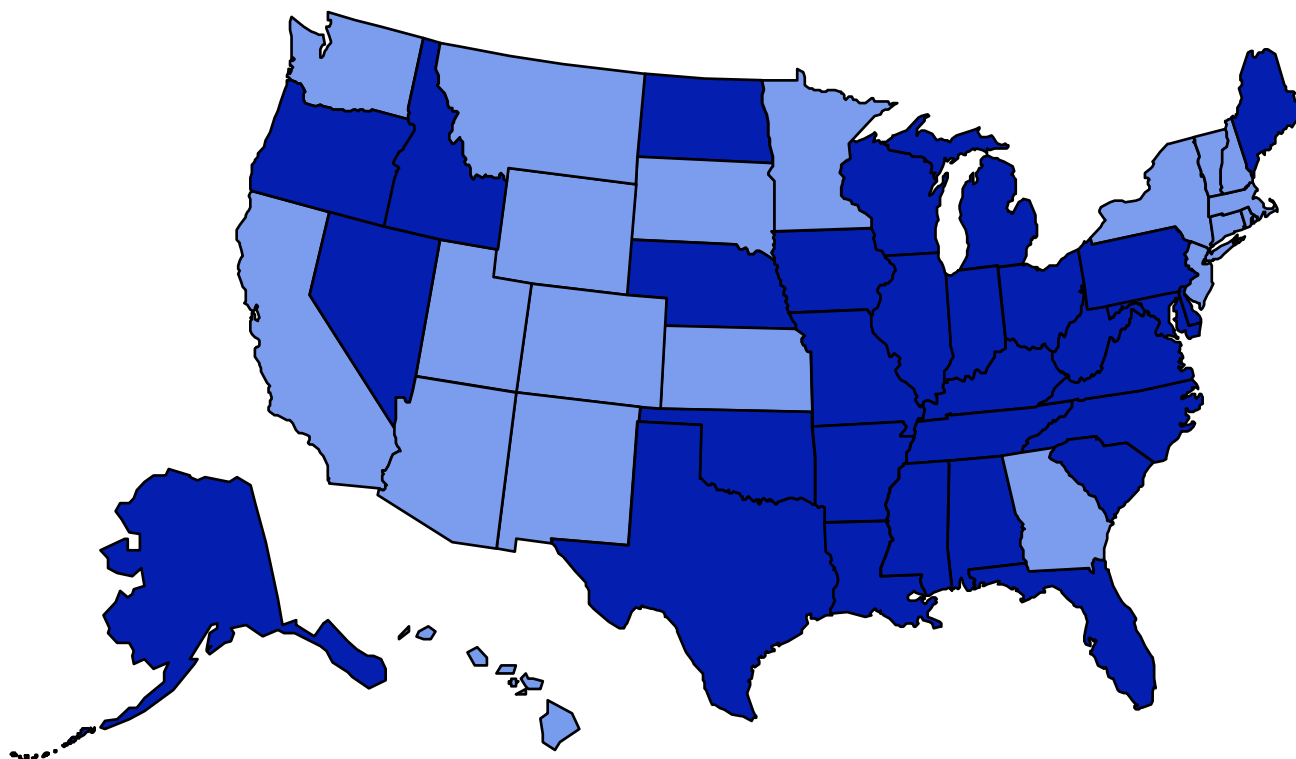


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1996

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

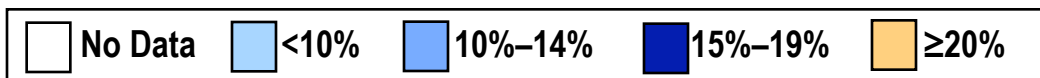
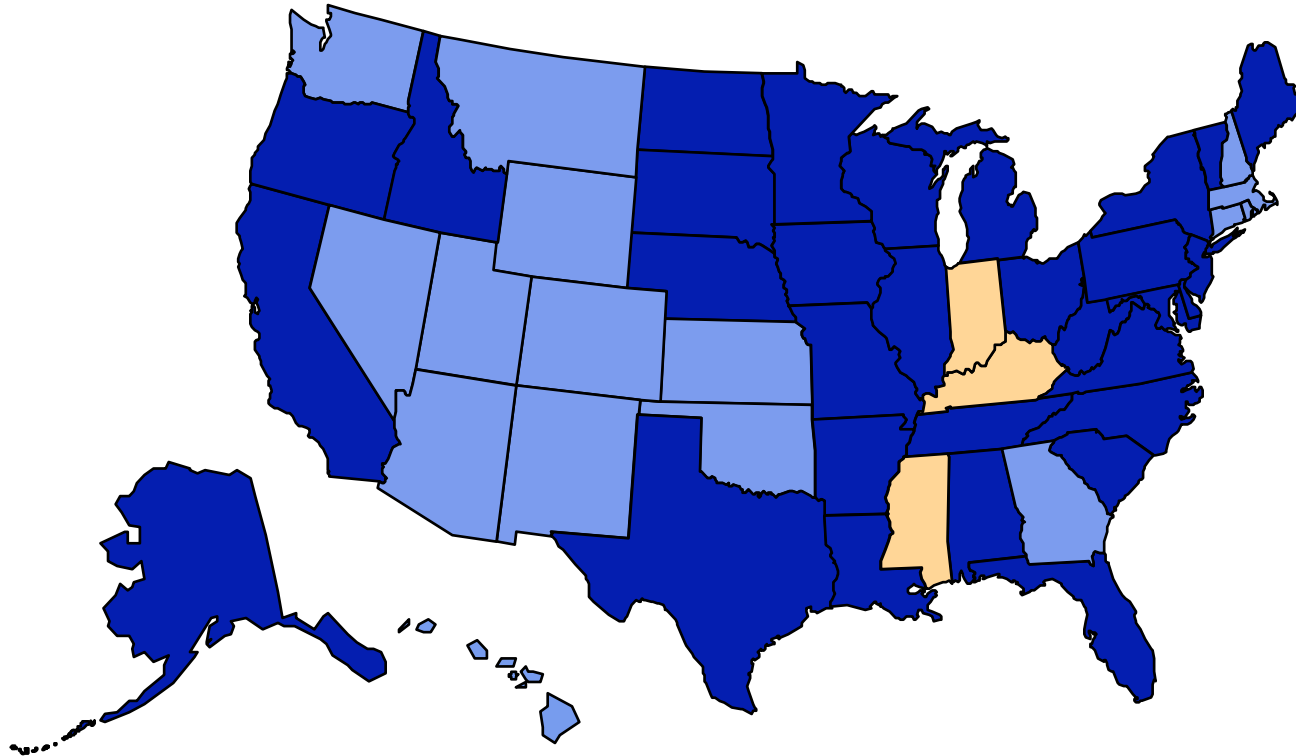


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1997

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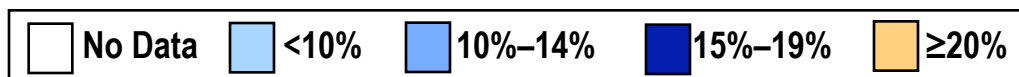
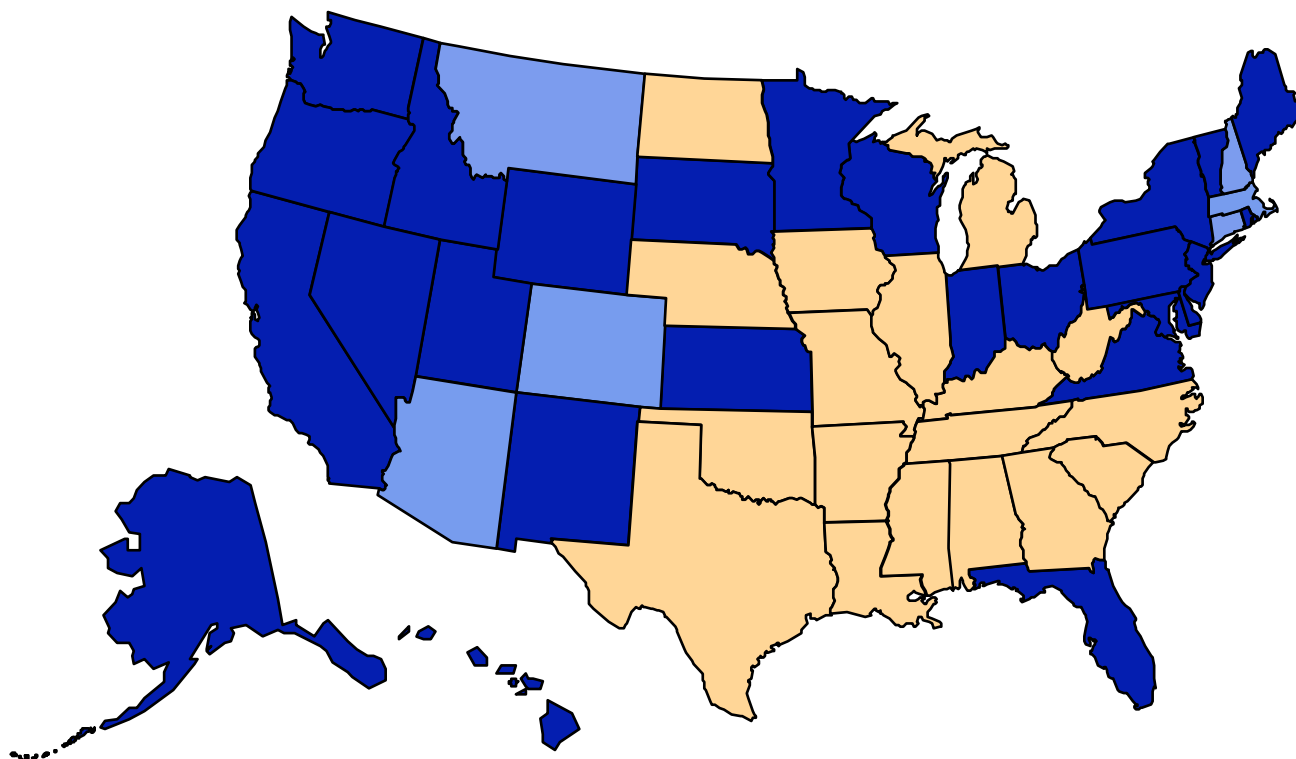


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 1999

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

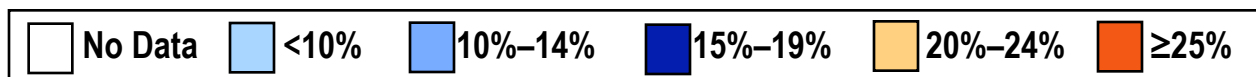
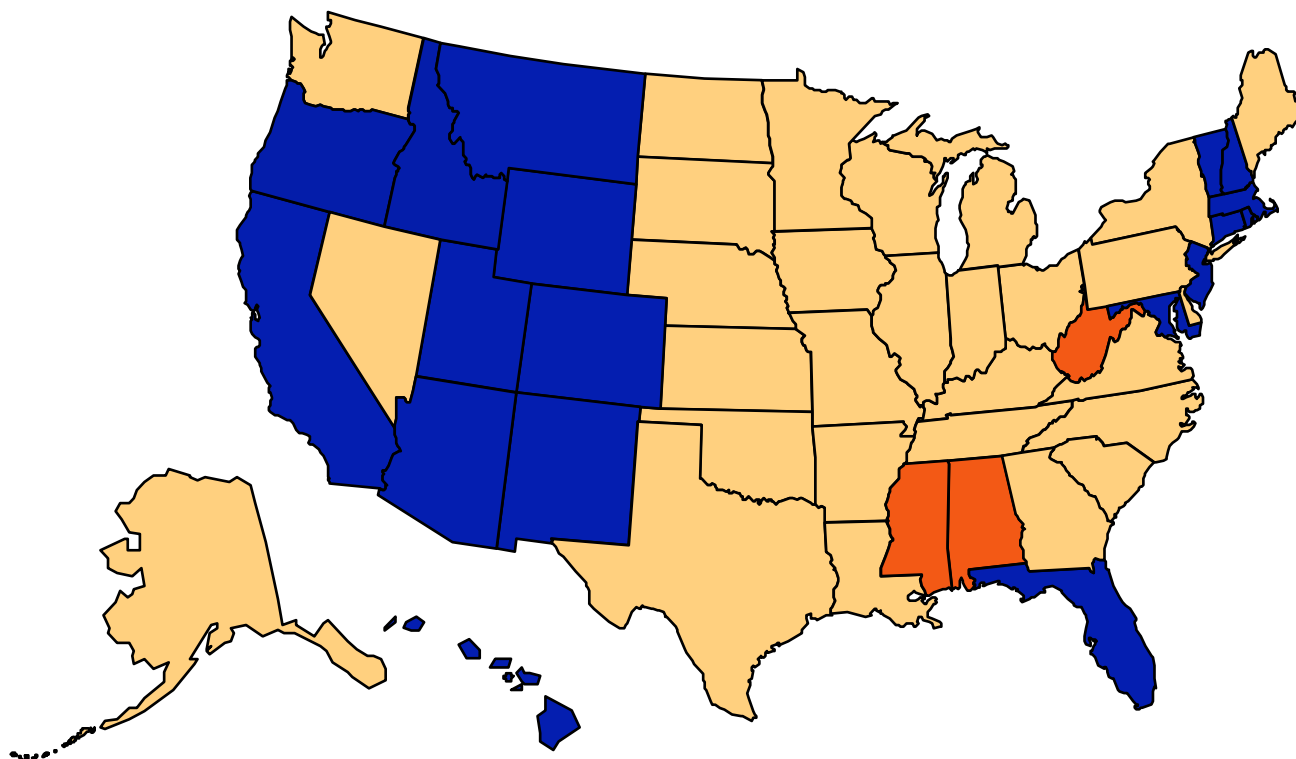


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 2002

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

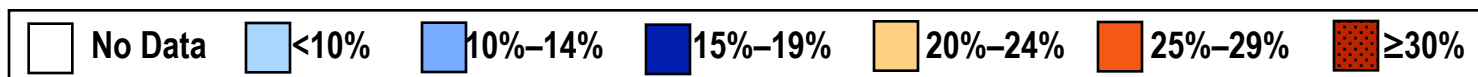
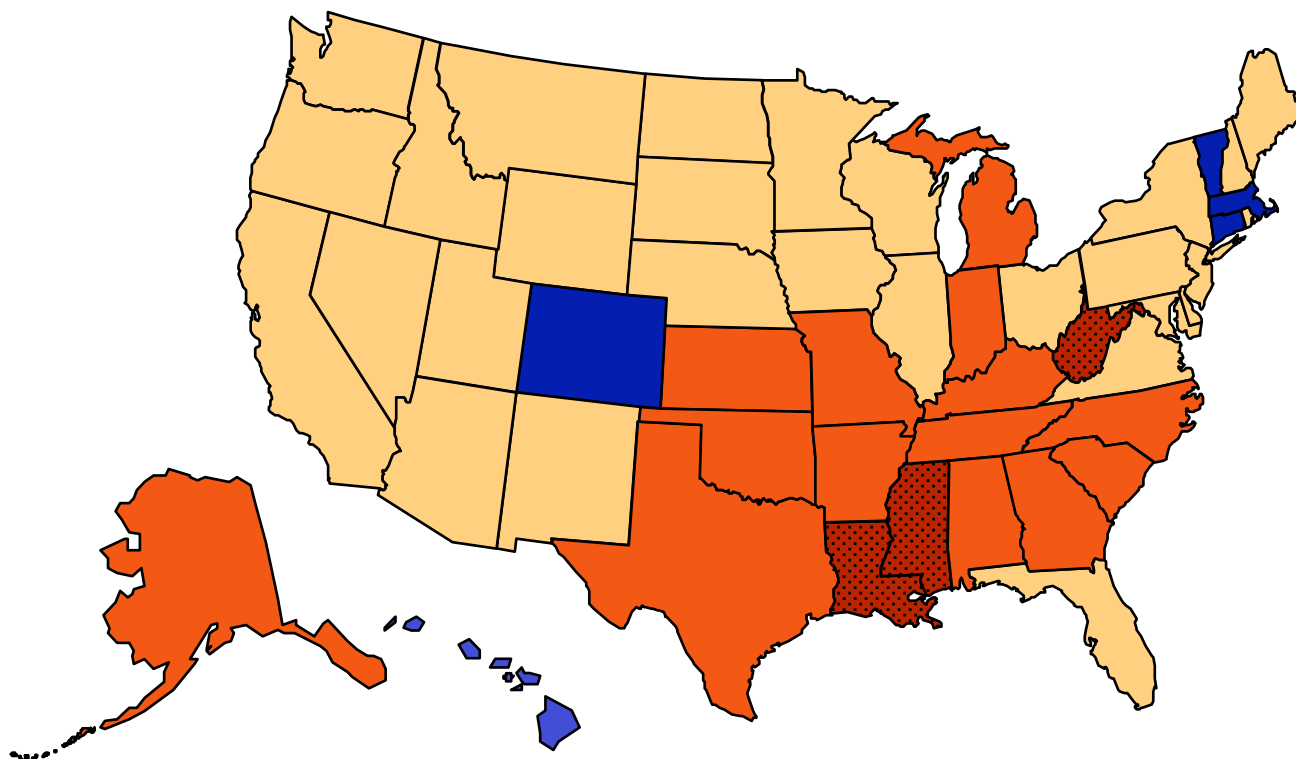


Source: CDC Behavioral Risk Factor Surveillance System.

Obesity Trends* Among U.S. Adults

BRFSS, 2005

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

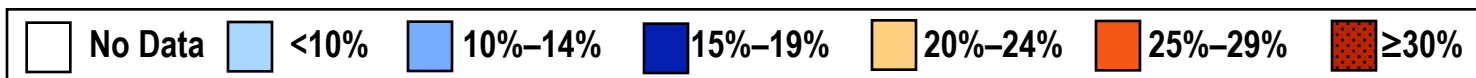
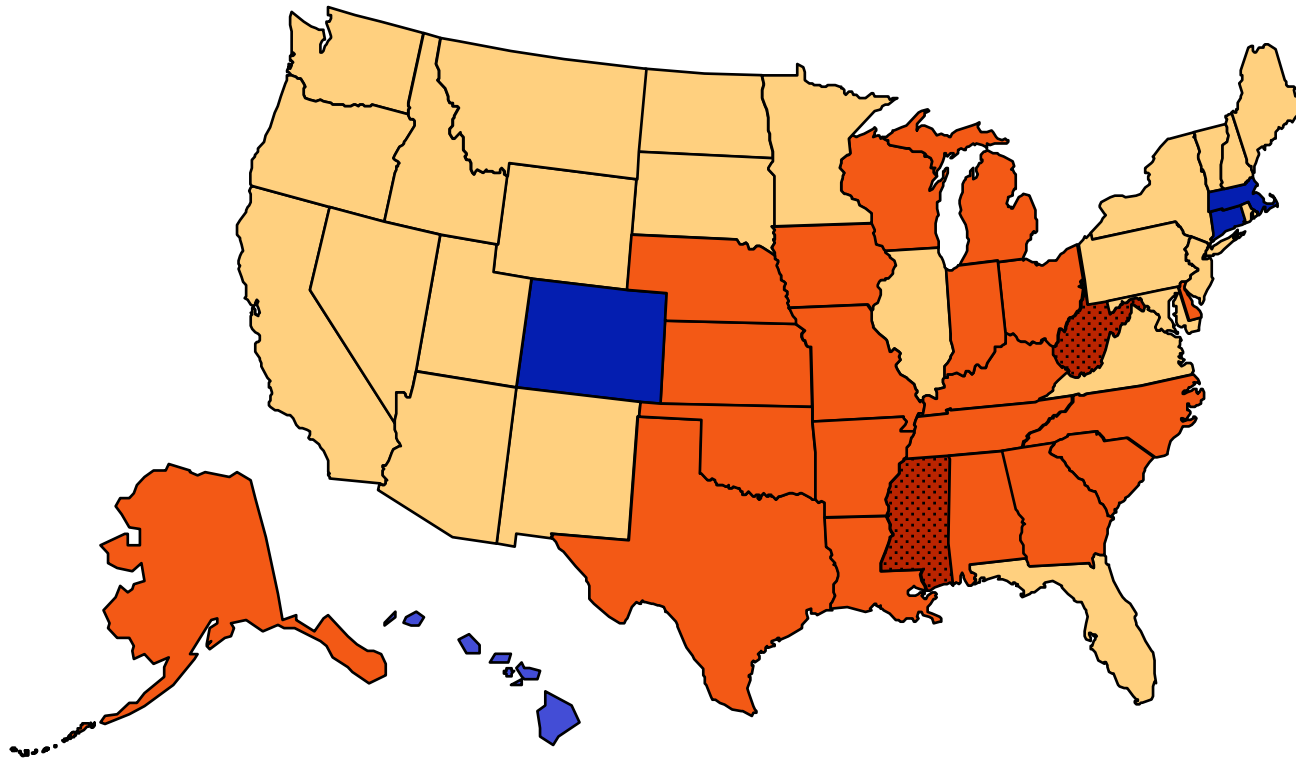


Source: Behavioral Risk Factor Surveillance System, CDC.

Obesity Trends* Among U.S. Adults

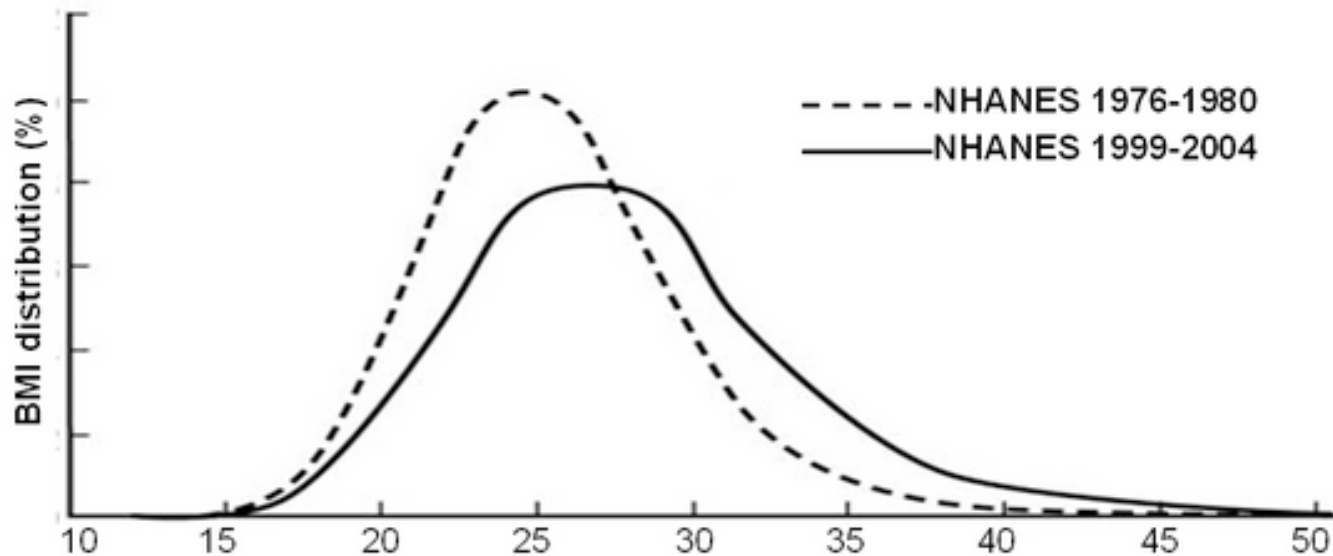
BRFSS, 2006

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



Source: Behavioral Risk Factor Surveillance System, CDC.

Shifting the BMI curve to the right



	Overweight	Obese	Extremely Obese
1976-1980	32.1 ± 0.6	15.0 ± 0.4	1.4 ± 0.1
2003-2004	33.4 ± 1.2	32.9 ± 1.3	5.1 ± 0.6



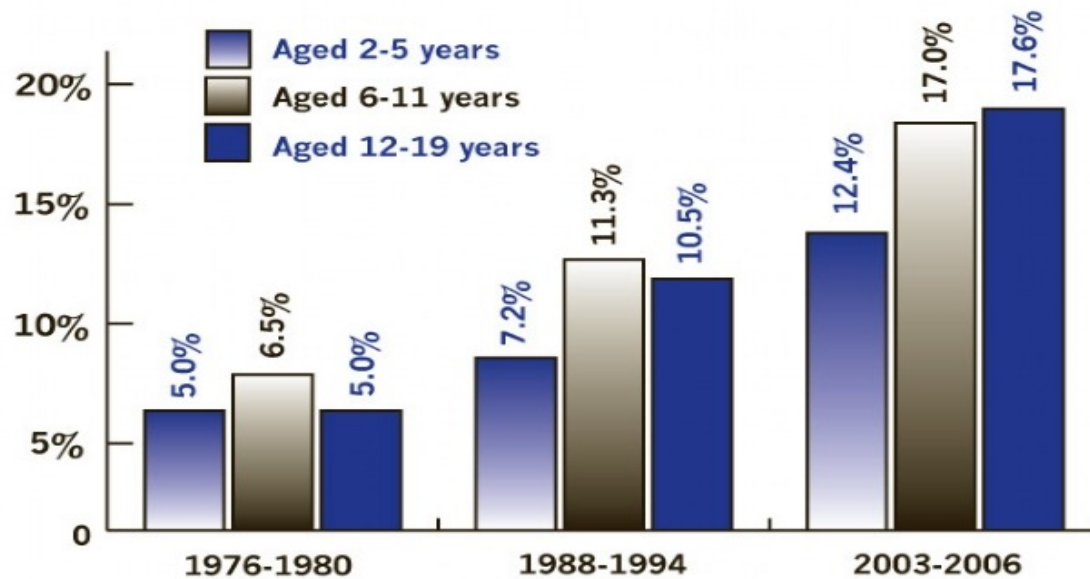
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Rising rates of obesity in Children

Prevalence of Obesity* Among U.S. Children and Adolescents (Aged 2-19 Years)
National Health and Nutrition Examination Surveys



* Sex - and age - specific BMI \geq 95th percentile based on the CDC growth charts.

Source: Centers for Disease Control and Prevention. "Overweight and Obesity."
(<http://www.cdc.gov/nccdphp/Dnpa/obesity/childhood/prevalence.htm>).



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OBESITY AND SOCIETAL BIAS

“The assumption that weight is dependent on will power leads to the common belief that obesity is the result of character defects within the individual who is obese...”

“...studies have shown that individuals with obesity are perceived as lazy, slow, dirty, stupid, ugly, sloppy, and as having poor willpower.”

“...these studies show that these negative stereotypes are prevalent in children as young as 6 years old.”

Adapted from *Bariatric Surgery: A Primer for Your Medical Practice*; ed. FA Farraye, RA Forse (2006)



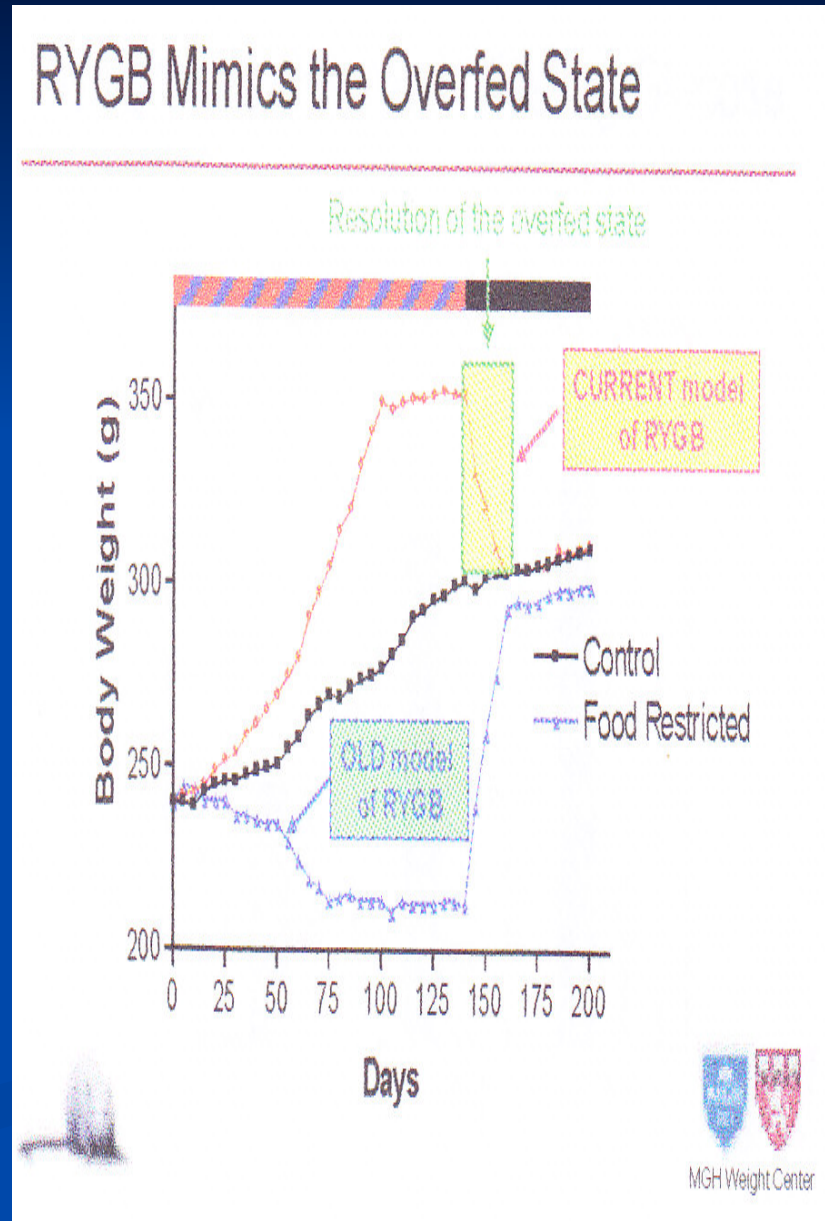
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WHAT CAUSES OBESITY?

- COMPLEX MULTI-FACTORIAL ETIOLOGY FOR OBESITY
- Lee Kaplan (GI, Mass Gen Hosp): mouse model → defending a pre-defined Body Fat “Set Point”
 - Ad lib fed mice gain weight throughout their lives
 - “Overfed” and “Underfed” (calorie restricted) mice reach new respective set points
 - Resumption of ad lib diet causes animals to return to their age-appropriate weight (NOT their starting weight)
 - RYGBP appears to mimic drop from “overfed” state
- Mech of action for Bariatric Surgery
 - Probably not simply “restrictive” or “malabsorptive”
 - Probably a “hormonal” manipulation



Obesity is killing us...slowly!

<u>Ranking</u>	<u>Cause of Disease</u>	<u># Deaths</u>	<u>% Total</u>
1 18%	Smoking	435,000	
2 16%	Obesity/Poor diet	400,000	

Source: CDC (Centers for Disease Control), 2000 data



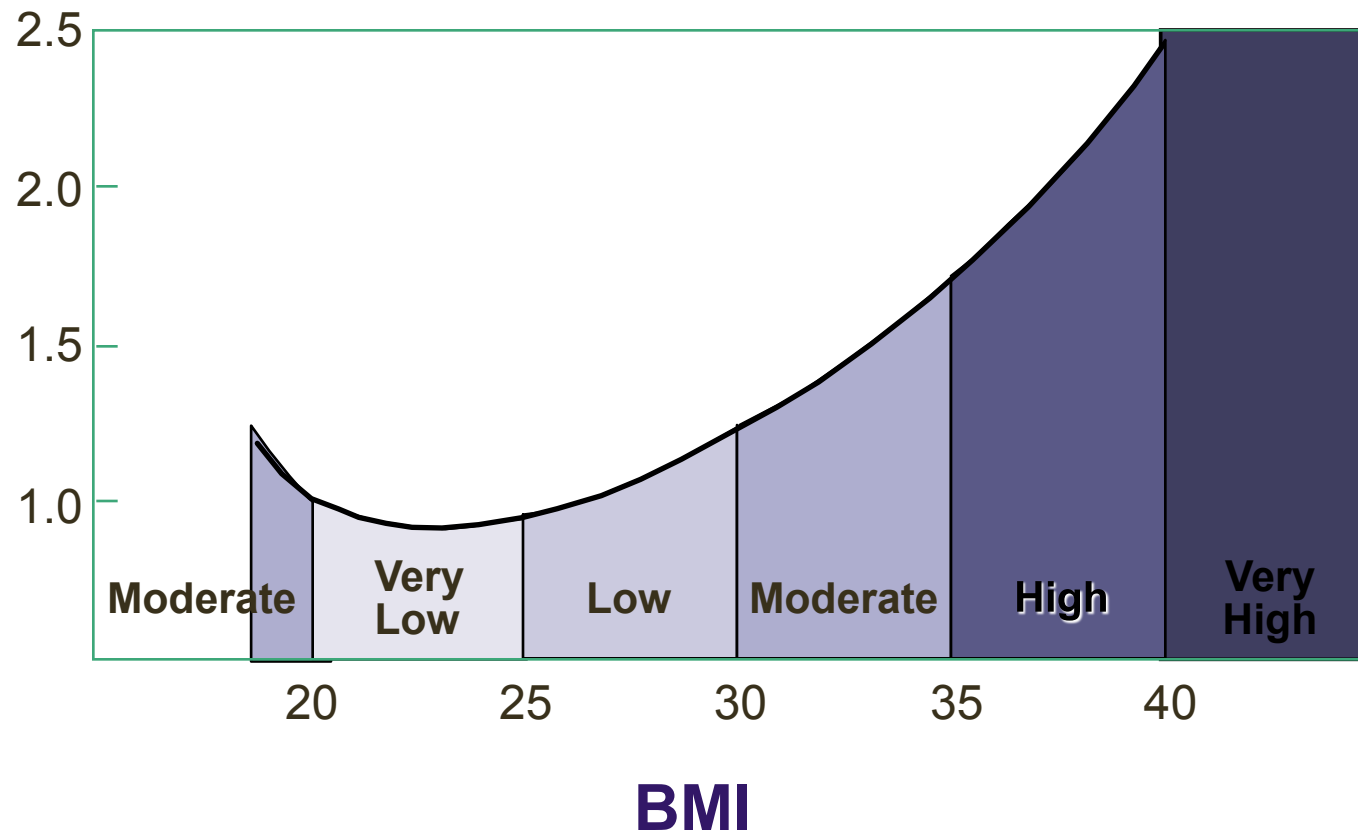
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Morbid obesity kills even faster!

Obesity and mortality risk



Source: Gray DS. *Med Clin North Am.* 1989;73(1):1-13.

How does Morbid Obesity kill?

Other significant illnesses caused by obesity

- **Diabetes Type 2**
- **Hypertension**
- Lipid disorders
- **Heart disease**
- **Asthma**
- **Sleep apnea**
- Gallstones
- NASH (non-alcoholic steatohepatitis)
- Urinary incontinence
- **Gastroesophageal reflux**
- Osteoarthritis and gout
- **Infertility and menstrual problems**
- Obstetric complications
- Low back pain
- DVT & thromboembolism
- Depression
- Immobility
- **Cancer (breast, colorectal, prostate, endometrial, etc.)**
- Venous/stasis ulcers
- Skin infections



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Morbid obesity

Lifetime risk of obesity related co-morbidity



DISEASE	LIFETIME RISK
Diabetes	14-20%
Hypertension	25-55%
High Cholesterol	35-53%
Cardiac Disease	10-15%
Sleep Apnea	10-20%
Arthritis	20-25%
Depression	70-90%
Stress Incontinence	50%



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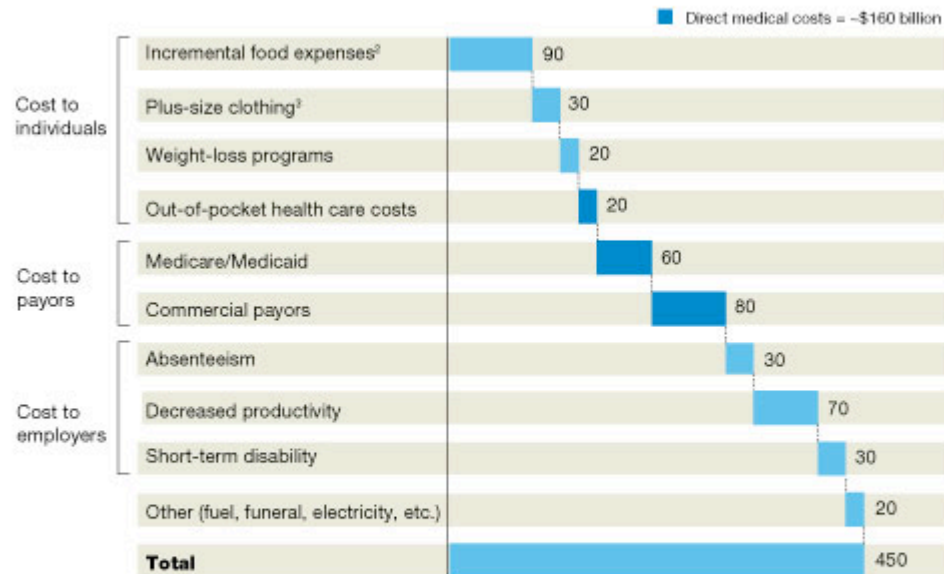
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THE ECONOMIC COSTS OF OBESITY

- Obesity accounts for 12% of the US health care budget!!
- Costs related to obesity are now TWICE the costs related to tobacco-related illnesses!!

Estimated increased spending associated with obesity in the United States¹
\$ billion



¹Rounded estimates.

²Based on estimated cost of incremental calorie intake to maintain obese weight.

³Based on incremental costs of plus-size clothing.

Source: McKinsey analysis; Centers for Disease Control and Prevention; 2006 National Health Expenditure Accounts; Euromonitor

WELL, WHY DIDN'T YOU SAY SO?



I WANT YOU
TO LOSE
SOME
WEIGHT



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Success rates of various treatments

Treatment	Average weight loss (percent total)	Percent weight loss maintained at 5 years
Placebo	4-6%	0
Diet/behavior	8-12%	0
Drug therapy	≤10%	10%
Bariatric surgery	≥50%	85%



Sources: Eliosoff, 1997; Sjostrom, 2000



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INTERMISSION AND QUESTIONS



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BARIATRIC OPERATIONS AND THEIR BENEFITS



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Surgical options

Restrictive procedures

- Goal: Decrease size of the stomach to cause early “fullness”
 - ▷ *Laparoscopic adjustable gastric banding (LAPBAND)*
 - ▷ Vertical banded gastroplasty (no longer favored)
 - ▷ *Sleeve gastrectomy*

Malabsorptive procedures

- Goal: Bypass a segment of the intestine to decrease the amount of ingested calories that are absorbed by the body
 - ▷ Jejunio-ileal bypass (discouraged!)

Combination procedures

- Goal: Combines advantages of both of the above
 - ▷ *Open Roux-en-Y gastric bypass*
 - ▷ *Laparoscopic Roux-en-Y gastric bypass*
 - ▷ Biliopancreatic diversion with duodenal switch

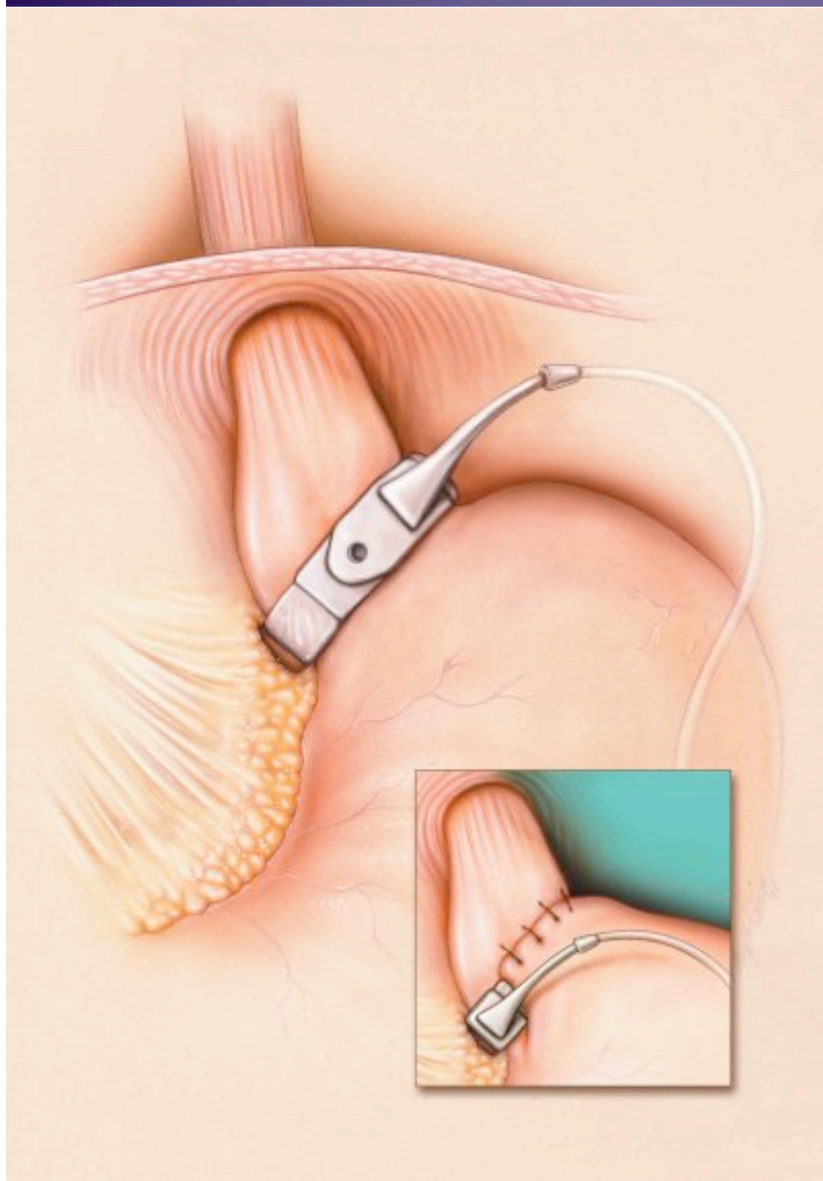


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How the LAP-BAND system works



- Restrictive procedure
- FDA approved in 6/2001
- Silicone band placed around upper part of the stomach
 - Small pouch is created
 - Stomach holds less food
 - Feel full faster and longer



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LAP BAND

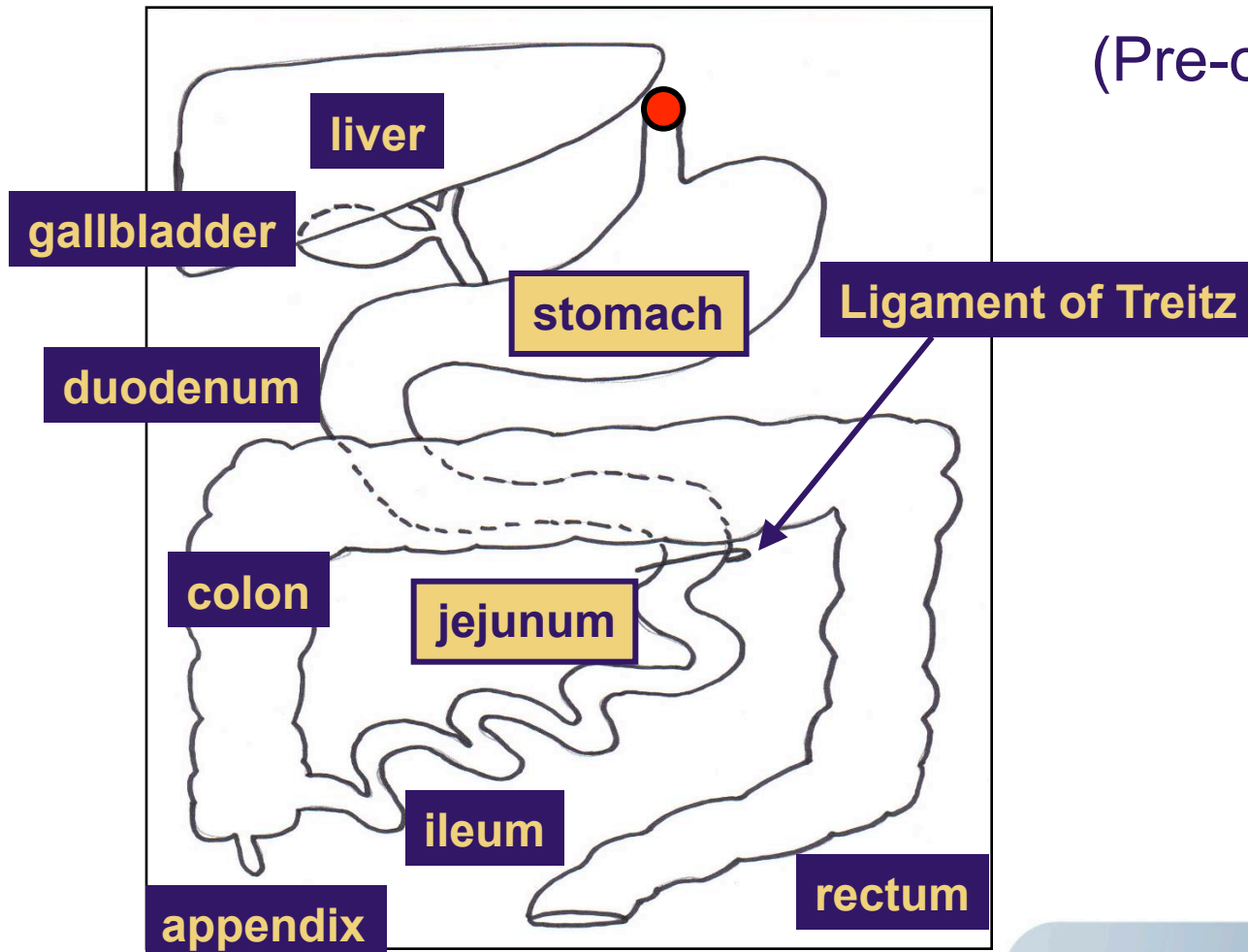


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Roux-en Y gastric bypass



(Pre-op anatomy)

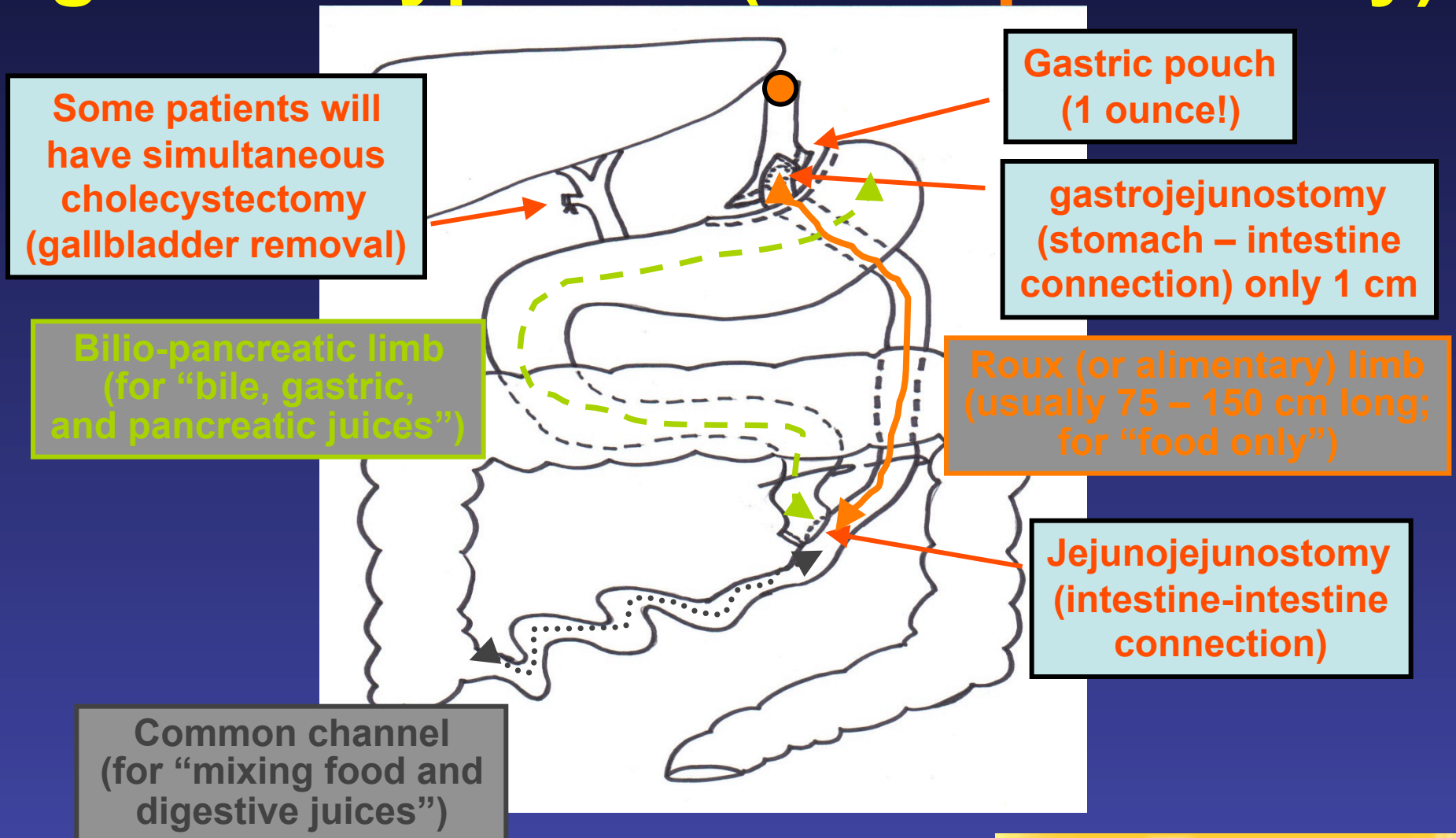


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What is a Roux-en Y gastric bypass? (Postop anatomy)



Roux-en-Y gastric-bypass



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Stomach size before bariatric surgery



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Stomach size after bariatric surgery



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Stomach size – new vs. old



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Laparoscopic Sleeve Gastrectomy

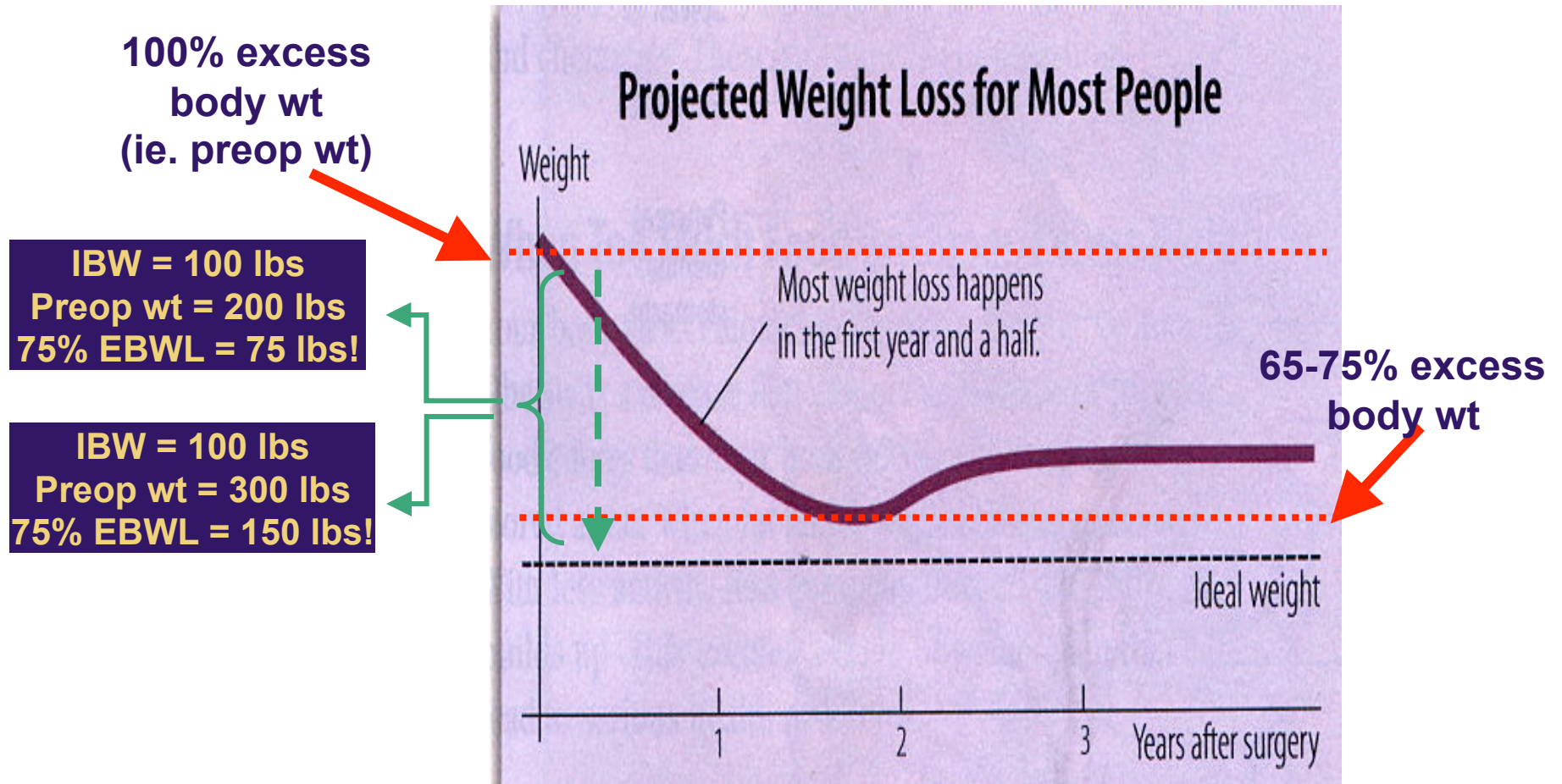


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Durable long-term weight loss?



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Long-term excess weight loss

Operation	1 year	2 years	5 years
Lap RYGB ¹	74%	80%	75%
Lap Band ²	33%	40%	53%
Lap Sleeve Gastrectomy ³	63%	65%	60%

¹ Wittgrove AC and Clark GW. Obesity Surgery. 2000;10:233

² Himpens J. et al. Arch Surg. 2011; 146 (7): 802 – 7.

³ Deitel M. et al. SOARD. 2011; 7: 749 – 59.



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Improvement after bariatric surgery

Table 4. Change in Obesity-Related Comorbidity

Comorbidity	Total Patients	Aggravated (%)	Unchanged (%)	Improved (%)	Resolved (%)
OA/DJD	64	2	10	47	41
Hyperlipidemia	62	0	4	33	63
GERD	58	0	4	24	72
Hypertension	57	0	12	18	70
Sleep apnea	44	2	5	19	74
Depression	36	8	37	47	8
Peripheral edema	31	0	4	55	41
Urinary incontinence	18	0	11	39	44
Asthma	18	6	12	69	13
Diabetes	18	0	0	18	82
Anxiety	7	0	50	17	33
Venous insufficiency	7	0	71	29	0
Gout	7	0	14	14	72

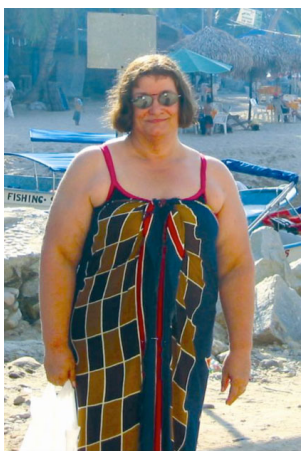
Adapted from Ref. 32. DJD, degenerative joint disease; GERD, gastro-esophageal reflux disease; OA, osteoarthritis.



“It’s just like riding a bike ...

**I used to love to ride.
But I’d gained so much
weight I just couldn’t. After
years of trying to lose weight,
I decided surgery was the
answer. Weight-loss surgery
at Salem Hospital helped me
lose 120 lbs. and I feel terrific.
My husband surprised me
with a new bicycle. Now we
go riding together all the
time. I just completed a thirty
mile ride and felt like I could
have ridden thirty more.”**

–Mary Grobe



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RISKS



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Risks of surgery—all patients:

- **Risks of anesthesia in any morbidly obese patient**
 - **Deep venous thrombosis (DVT): clot in leg veins (1 – 2 %)**
 - **Pulmonary embolus: clot breaks off & goes to the lung (0.5 %)**
 - **Pneumonia: need for the ventilator**



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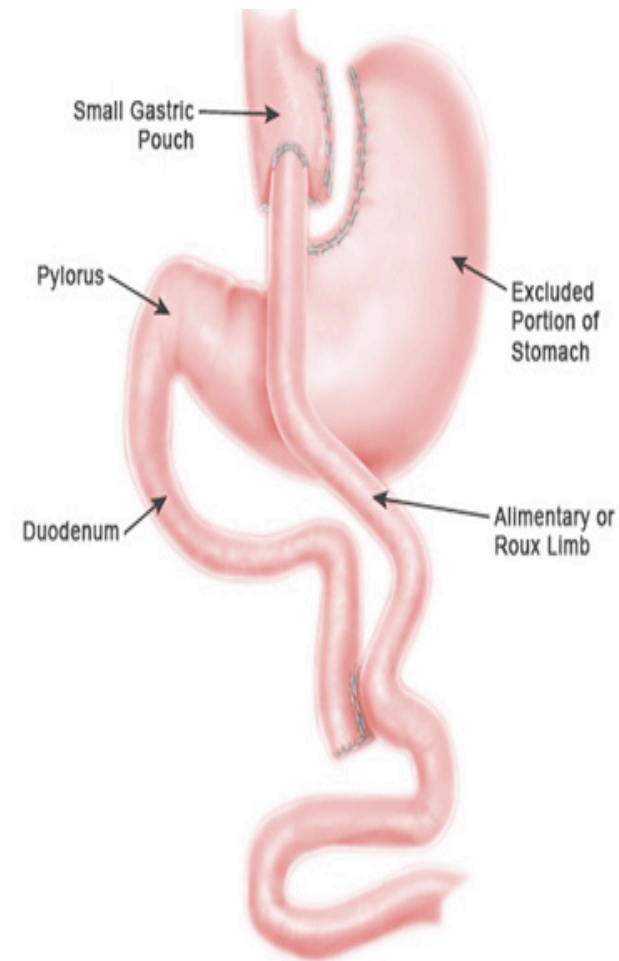
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Risks of surgery—Gastric Bypass:

➤ Risks of gastric bypass

- Leak (US: 1 – 3 %)
- Wound infection or seroma (fluid collection)
- Bowel obstruction (US: 1 – 3 %)
- Stricture: narrowing at the stomach-small intestine connection (US: 5 – 15%)
- Bleeding (1 – 5 %)
- ***Death*** (US: 0.5 – 2 %)
- Nutritional deficiencies:
 - Iron-deficiency anemia, low calcium
 - Vitamin deficiencies (thiamine, B12)



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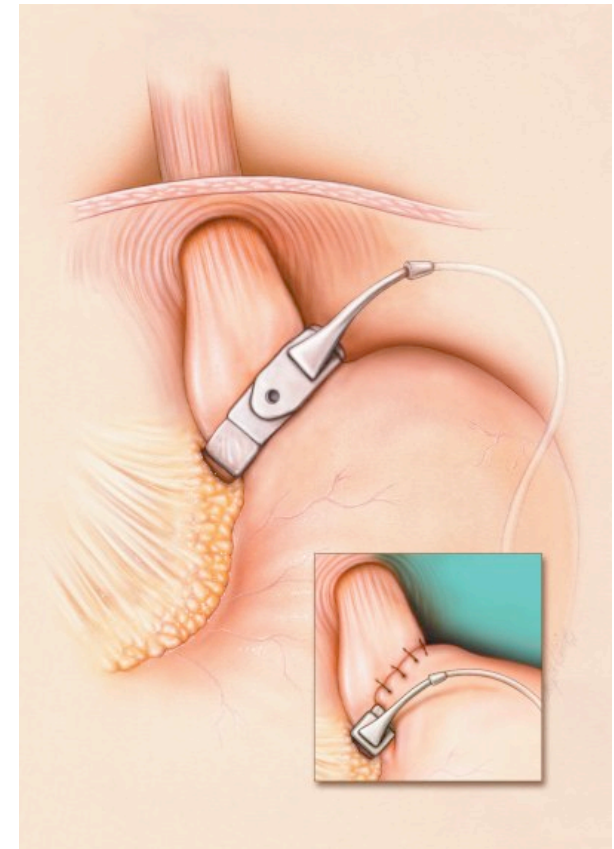
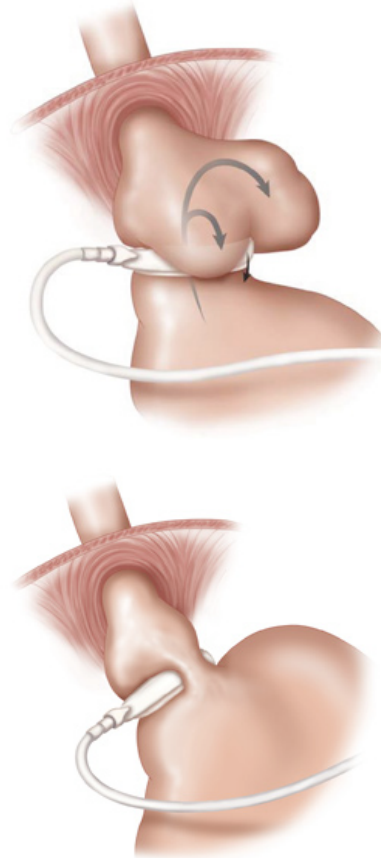
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Risks of surgery—Lap Band:

Overall, 4—6%

- Band slippage
- Band erosion
- Port site problems



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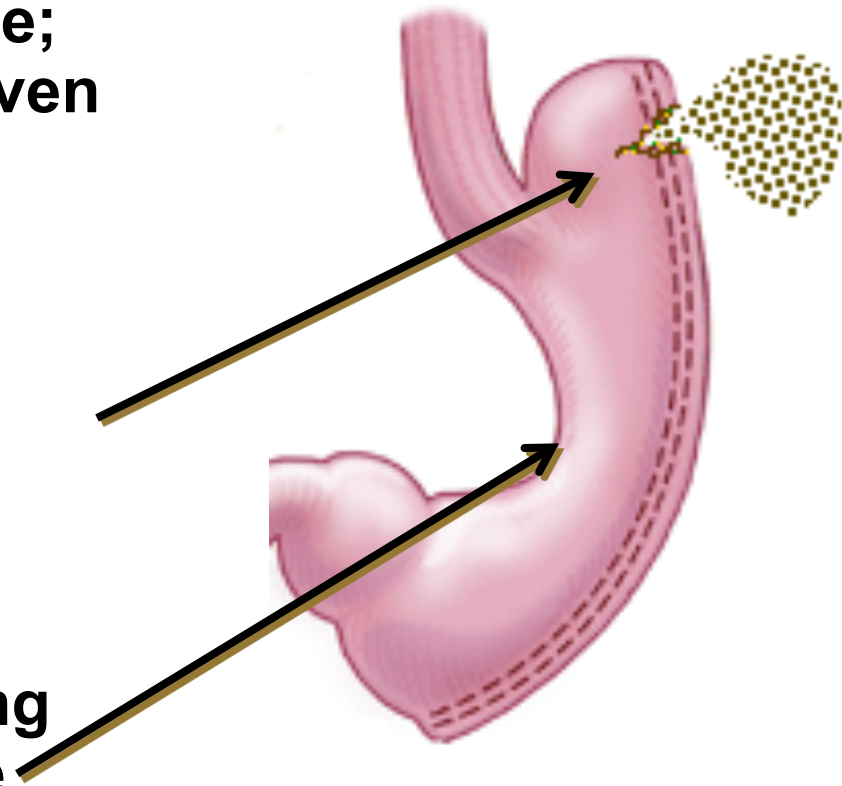
Risks of Surgery--Sleeve gastrectomy:

❖ **Acid reflux (6.8%)**
(contraindication to sleeve;
may start after surgery even
if not present before
surgery)

❖ **Leaks (1 – 7%; average
1.3%; can be VERY
difficult to close)**

❖ **Stricture (tight narrowing
at the midportion of the
stomach tube)**

❖ **Bleeding (2.0%)**



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Comparison of lap band vs sleeve vs bypass

LAP BAND	GASTRIC SLEEVE	GASTRIC BYPASS
Less Invasive	Moderately invasive	Significantly invasive
Reversible	Irreversible	Irreversible
Adjustable	Not Adjustable	Not Adjustable
Slower weight loss (50-60 percent)	Intermediate weight loss (60-70 percent)	Faster weight loss (65-75 percent)
More Follow up	Less Follow up	Less Follow up
More Dietary compliance required	Moderate dietary compliance required	Less Dietary compliance required
Lower risk	Intermediate risk	Higher risk
No anatomic rearrangement	Some anatomic rearrangement with gastric staple line	Anatomic rearrangement with bypass



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“There is no such thing as a free lunch!”

Gastric bypass:
Best weight loss
Highest risk

Gastric Sleeve:
Better Weight loss
Slightly lower risk

Gastric Band:
Least weight loss
Lowest risk

RISKS



BENEFITS



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FINAL THOUGHTS



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Evaluation process



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SUMMARY AND CONCLUSIONS:

- **Obesity is a disease caused by multiple factors, including genetics, environment, and physiology.**
- **Current non-surgical treatments for Morbid Obesity are limited in their success in terms of long-term weight loss maintenance.**
- **While the exact mechanisms by which each type of Bariatric Surgery seems to work has not yet been fully elucidated, it currently offers the best treatment for this devastating disease.**
- **Furthermore, Bariatric Surgery gives us a tool by which to explore the mechanisms of weight and metabolic regulation by the body, and thereby discover less invasive methods for treatment of obesity.**
- **Surgery is NOT a viable population-based treatment option for obesity; PREVENTION will have to be the key.**



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QUESTIONS?



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