



# BMI-THE 5<sup>TH</sup> VITAL SIGN

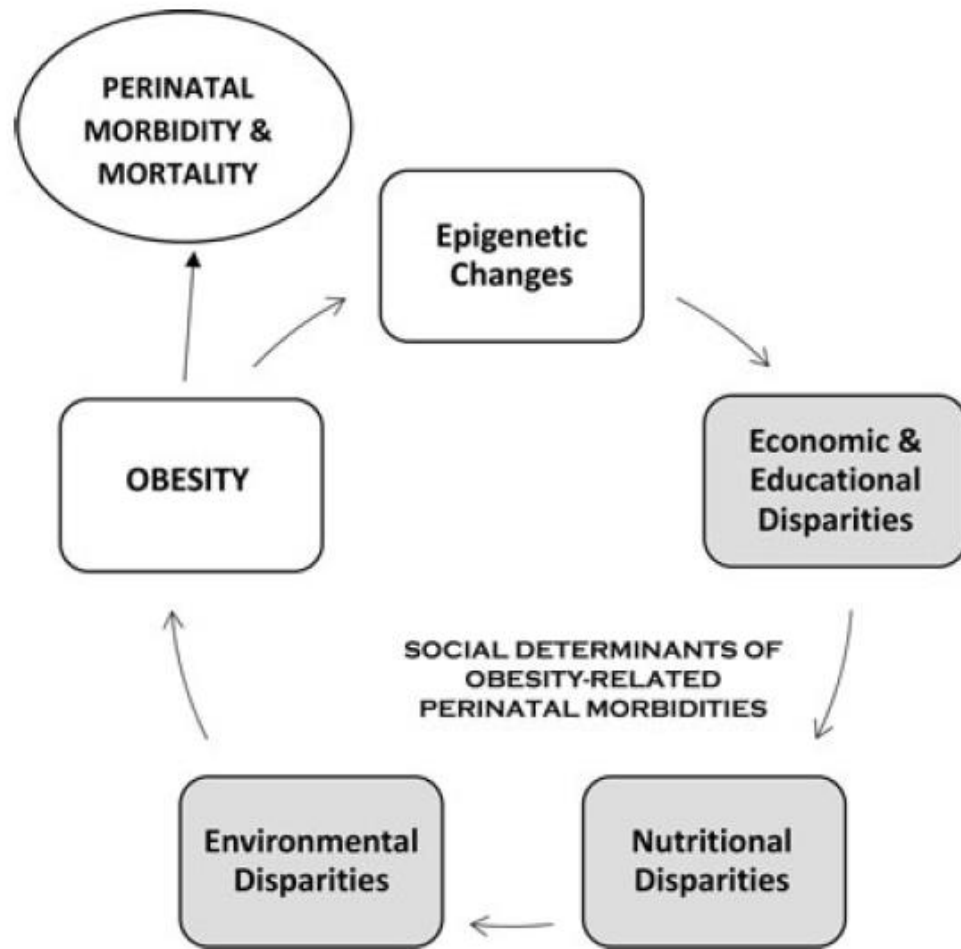
Cecilia Jevitt 2020

# Body Mass Index (BMI)

- A weight to height ratio
- **BMI** =  $\text{kg}/\text{m}^2$  where kg is a person's weight in kilograms and  $\text{m}^2$  is their height in metres squared
- Divided into categories based on associated health
  - Underweight  $<18.5$
  - Normal 18.5-24.9
  - Overweight 25-29.9
  - Obese  $\geq 30$

# Why measure weight?

- White adipose tissue is the largest endocrine organ in the human body. We measure the health of other systems, cardiac and respiratory, through vital signs. BMI should be one of several vital signs.
- Excess white adipose tissue produces inflammatory cytokines that damage health
- Excess white adipose tissue is associated with
  - Diabetes
  - Hypertension, cardiac disease
  - Venous thrombosis
  - Multiple poor perinatal outcomes
- Provider support and health education can help individuals maintain their own healthiest weight and mitigate associated risks



**Figure 1.** Social determinants of obesity-related perinatal morbidity and mortality.

BMI is one measure/assessment among many

We need to abandon ideas about obesity as gluttony or lack of will power.

Obesity is an adaptation to an environment that is physically polluted and emotionally distressing. It has genomic components.

But more about this in terms to come...

Generation 1: mother

Generation 2: female fetus

Generation 3: ova

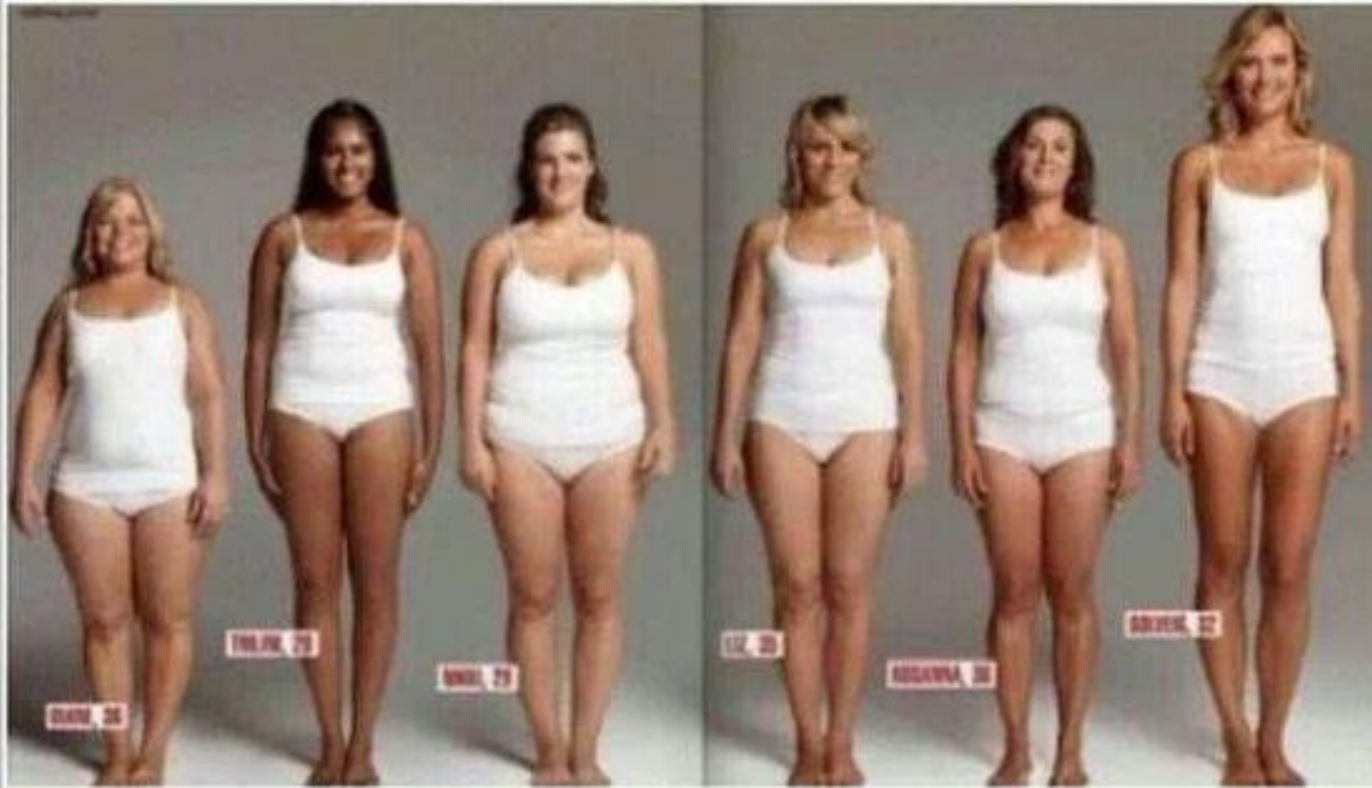


## Caring for 3 generations at once

A female fetus develops all her ova while in utero. There genome is shaped by the intrauterine environment.

Knowledgeable assessment and targeted health information and support can improve health for 3 generations during one pregnancy.

# 154LBS



ALL OF THESE WOMEN WEIGH THE SAME!

Weight measurement alone isn't adequate.

*BMI gives a rough measure of excess adipose tissue.*

# Why measure BMI? Or why not?

## PRO

- Single measure
- Reproducible
- Promoted by WHO for assessment of caloric adequacy
- International research standard
- Useful for anesthesia medication dose calculations

## Con

- Individuals with large muscle mass have inflated BMI
- Individuals with small skeletal mass have inflated BMI
- Doesn't account for location of adipose mass-abdominal most metabolically active
- Social stereotyping, fat shaming
- Same BMI ranges used for men and women when men have more muscle mass

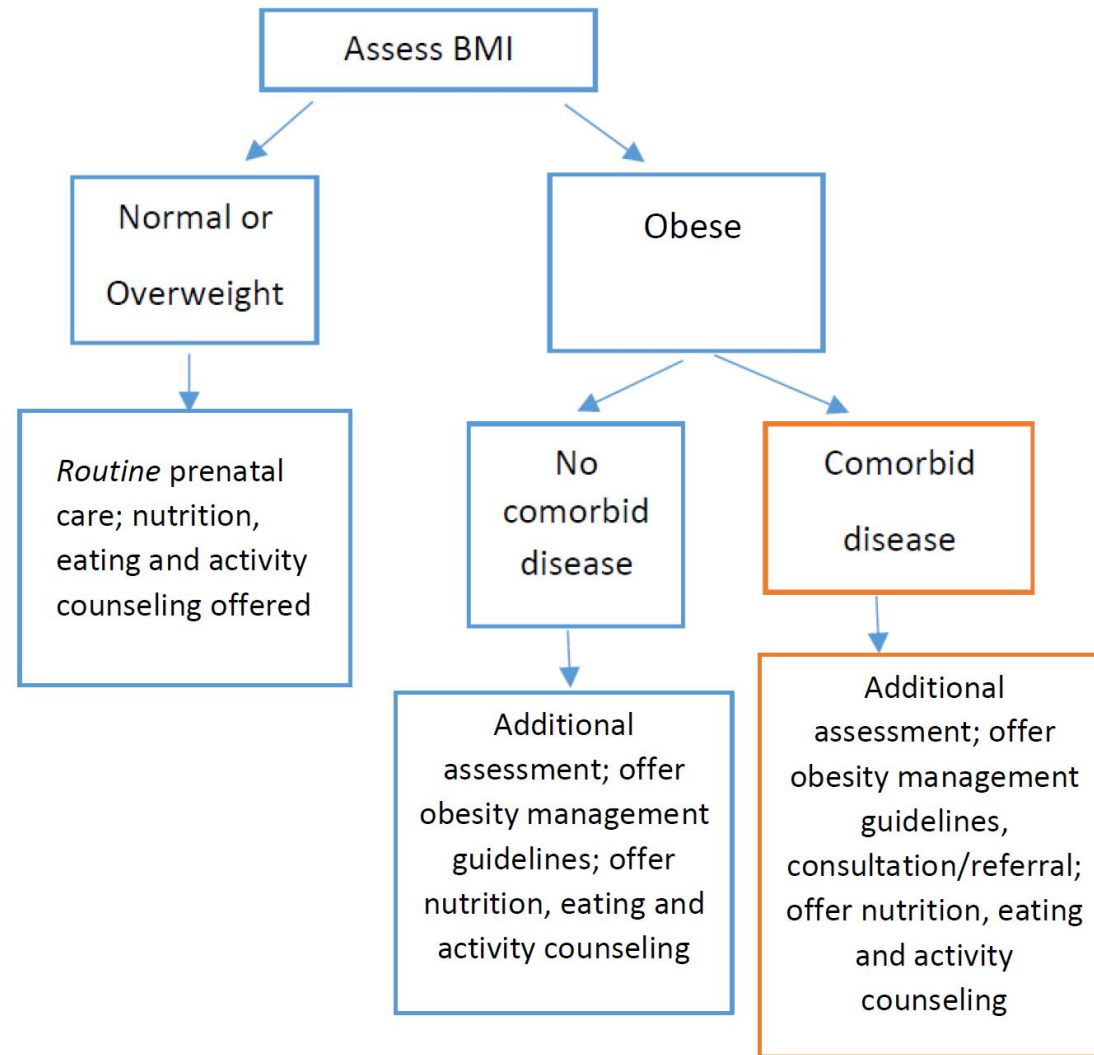
# BMI measurement in pregnancy

- International research standard is to use one of these weight measurements
  - Accurately recalled prepregnancy weight
  - Weight at first prenatal visit if within 1<sup>st</sup> trimester
- Measure height without shoes in clinic (stadiometer)
- Prepregnancy or 1<sup>st</sup> trimester BMI is the measurement that is used for risk calculation, not BMI calculated including prenatal weight gain
- Many electronic medical records recalculate BMI at each prenatal visit. Do not base clinical management on those BMI measurements.
- Weight gain in pregnancy above 2009 US IOM recommendations adds same risk as prepregnancy obesity



# Other field assessments of adipose tissue

- Waist measurement
  - measured with a non-stretchable tape to the nearest 0.1 cm, in a standing position during end-tidal expiration at the midpoint of the lowest rib cage and the iliac crest
  - $\geq 88$  cm (35 inches) in women indicates obesity
  - rough calculation: Aim for waist measurement to be  $\frac{1}{2}$  of height. A woman whose height is 63 inches would aim for a waist measurement of 32 inches.
  - Useful only in first trimester during pregnancy. Not used in perinatal research.
- Waist to hip ratio
  - calculated by dividing the waist circumference by the hip circumference
  - $\geq 0.85$  for women indicates obesity
  - Useful only in first trimester during pregnancy. Not used in perinatal research
- Skinfold thickness measured with calipers
  - Biceps, triceps, subscapular, suprailiac compared to population norm tables
  - Large variation in measurements
- Electrical bioimpedance analysis (BIA)
  - Machine measures the impedance (Z) to the flow of a low-electrical current (800  $\mu$ A), at a fixed frequency (50 kHz).
  - Affected by hydration and fluid shifts
  - NOT used during pregnancy





BMI is one part  
of a complete  
health  
assessment

It's not perfect, but it can  
be useful.

(Photo courtesy of Rudd  
Center for Food Policy  
and Obesity)