

The Childhood Obesity Epidemic: Transmission Across Generations

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Childhood Obesity

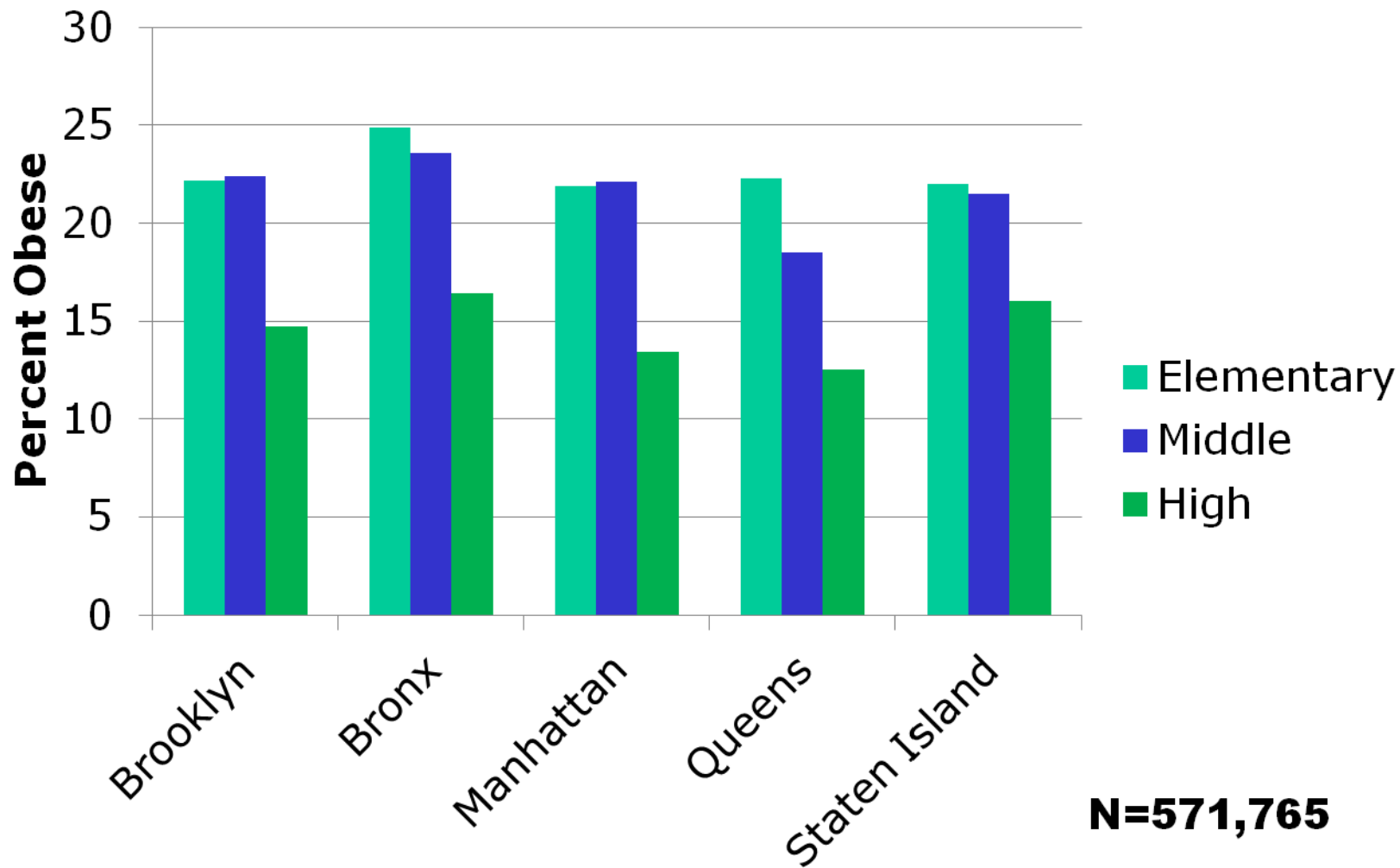
- Defined as an unhealthy excess of body fat.
- In childhood, obesity causes Type II Diabetes and metabolic syndrome.
- Childhood obesity tracks into adulthood, where obesity causes:
 - Cardio-vascular disease
 - Cancer
 - Type II diabetes
 - Sleep apnea....

Defining Childhood Overweight and Obesity

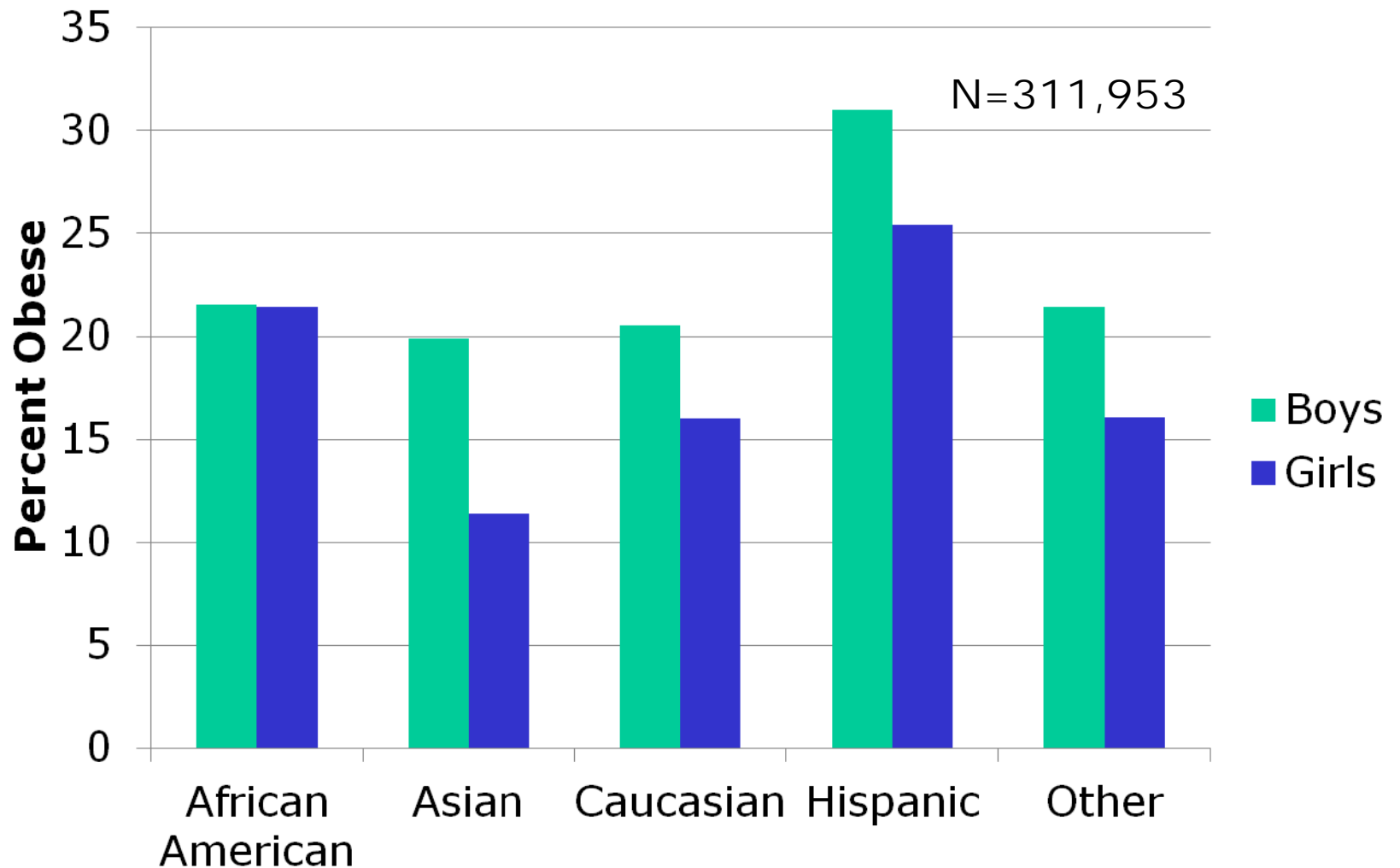
- Data on BMI for age and gender are compared to CDC growth chart data, which are based on national data from the past 30 years.
- A percentile compared to this standard national population is calculated.

BMI Percentile	1994 – 2006	2007
85 – 94.9	At risk of overweight	Overweight
95 – 100	Overweight	Obese

Obesity in NYC School Children: 2007-2008 Fitnessgram Data



Childhood Obesity In NYC Elementary Schools (2007-2008)



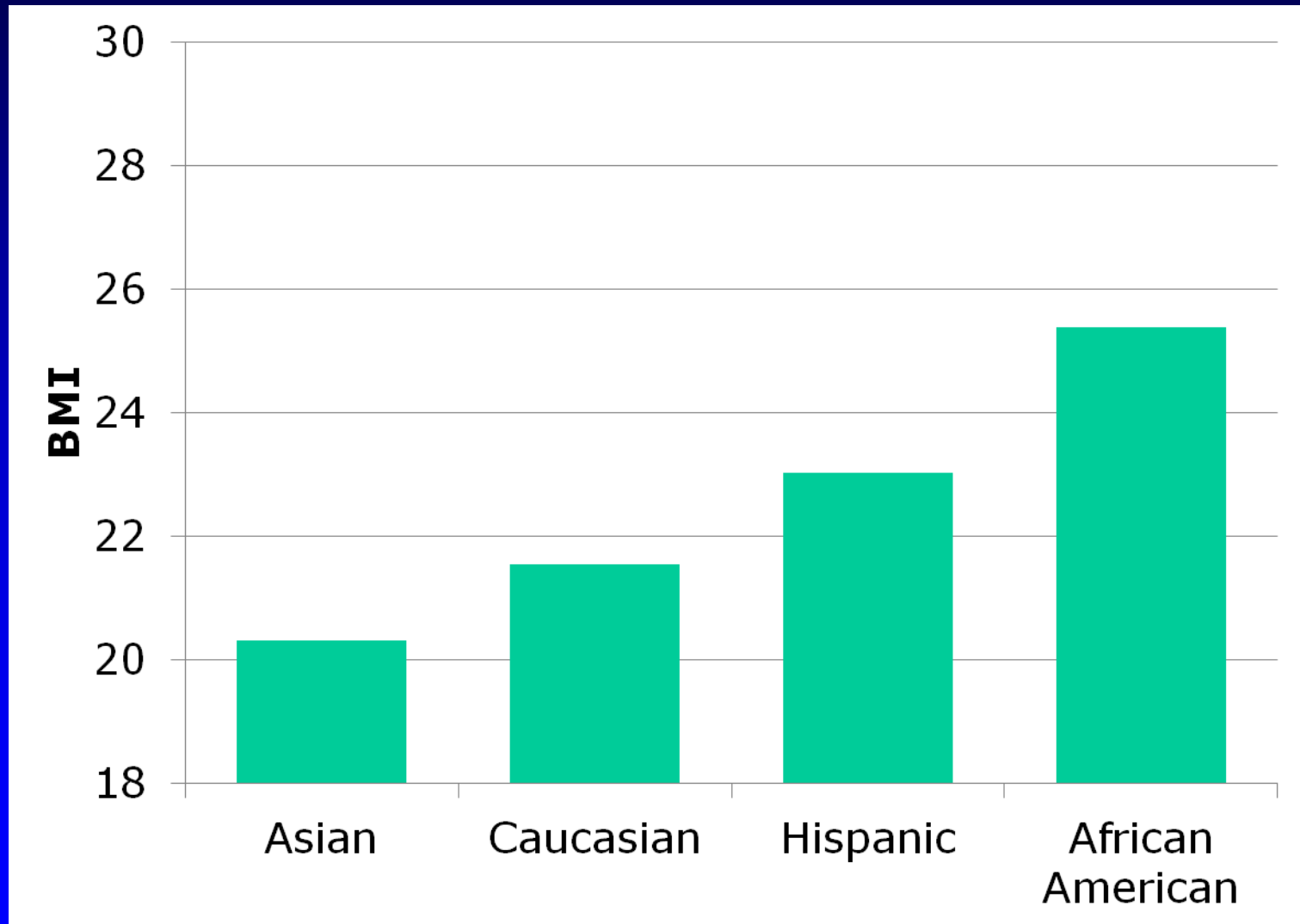
Origins of Childhood Obesity

An epidemic of 1,000 paper cuts, in that, there are a multitude of factors prodding children towards higher energy consumption and lower energy expenditure.

- Structural, economic, environment, biological and social prompts for eating and sedentary behaviors.

One of the paper cuts: Substantial data showing a mother's pre-pregnancy weight predicts the child's weight throughout childhood.

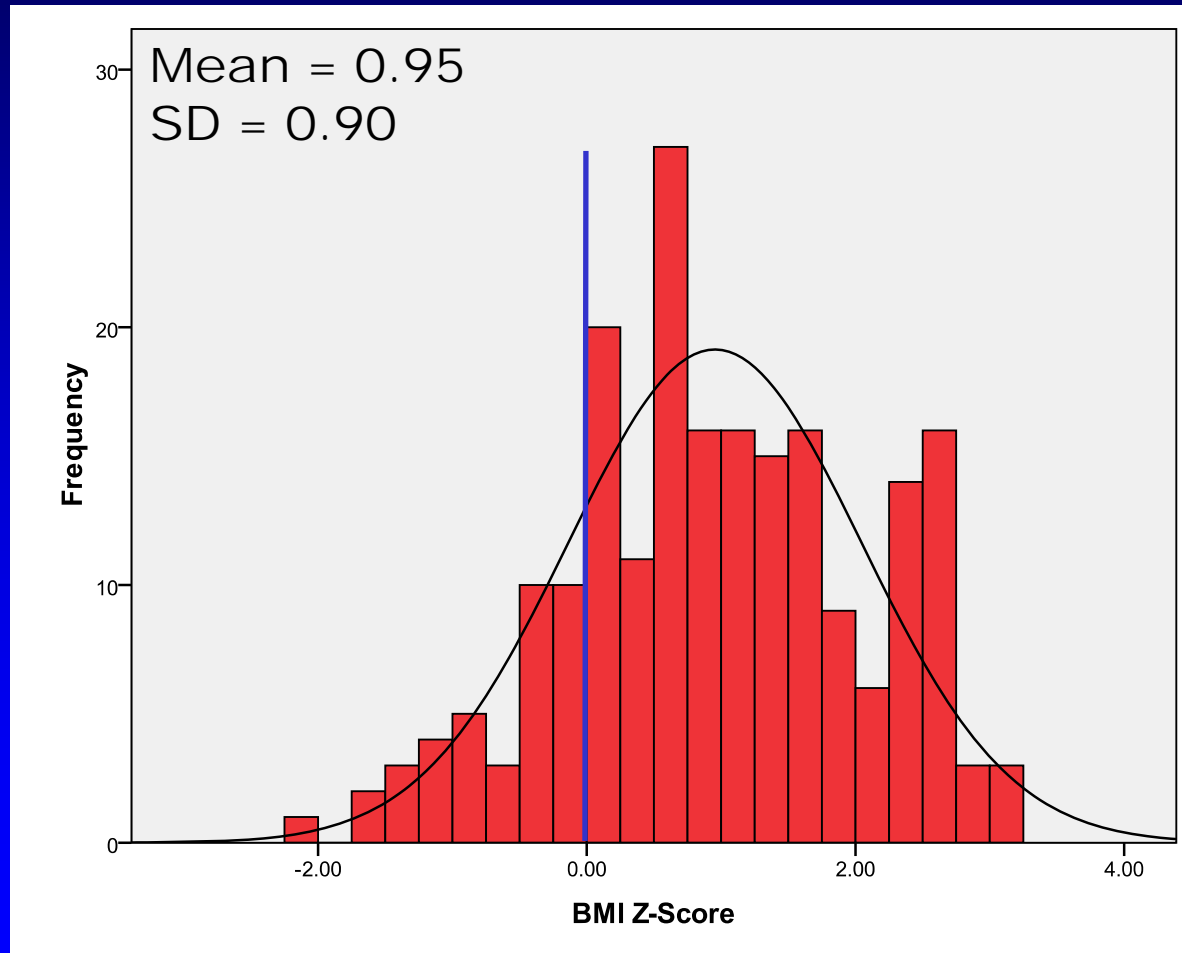
Mean BMI Among Women Age 18 - 44 in New York City (2002 - 2006)



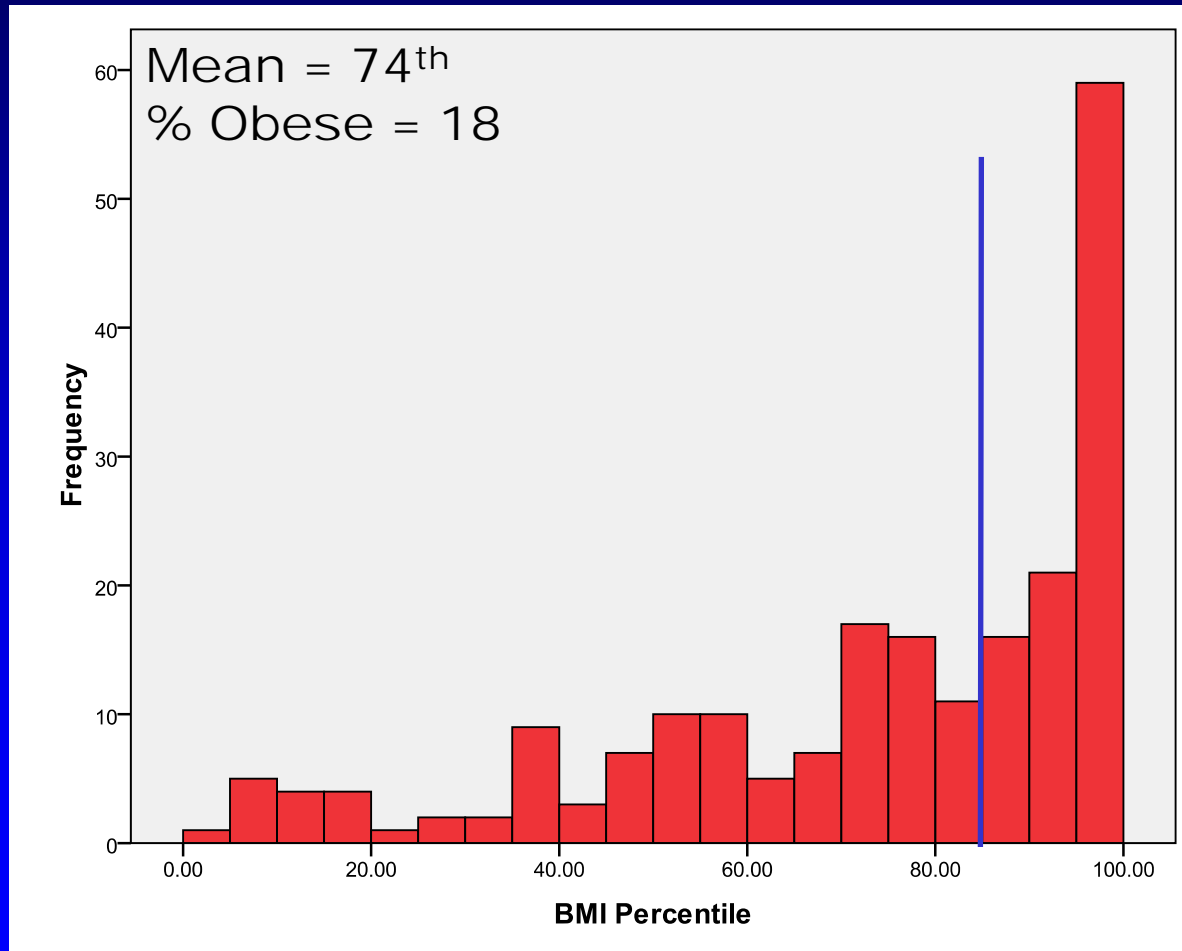
Columbia Center for Children's Environmental Health (CCCEH)

- A birth cohort of African American and Dominican children from N. Manhattan and S. Bronx, launched in 1997.
- Followed from the 3rd trimester until age 10-11.
- Intensive collection of environmental data and biological samples.
- Anthropometric data collected at ages 5, 7 and 10-11.
- Physical activity and diet data collected at age 10-11

Body Size at Age 7 in CCCEH : BMI Z-score



Body Size at Age 7 in CCCEH : BMI Percentile



Maternal Body Size, Birth Weight and the Child's Weight at Age 7

Risk Factor	Weight (kg) at Age 7 Beta, P-value
Mother's pre-pregnancy weight (per Kg)	0.06, <0.001
Birth weight	
Tertile 1	Ref
Tertile 2	1.30, 0.42
Tertile 3	3.01, 0.06

Adjusted for exact age, gender, race/ethnicity, mother's receipt of public assistance, and mother's place of birth

Fat Mass versus Fat Free Mass

- Body Composition
 - Fat mass – adipose tissue.
 - Fat free mass – not adipose tissue (e.g. organs, bones, muscles, connective tissue).
- In adults, fat mass is associated with higher mortality and fat free mass is associated with lower mortality.
- In the CCCEH body composition is measured using bio-impedance.

Fat Mass versus Fat Free Mass

Risk Factor	Fat Mass Beta, P- value	Fat Free Mass Beta, P-value
Mother's pre-pregnancy weight (per Kg)	0.03, 0.001	0.03, <0.001

Fat Mass versus Fat Free Mass

Risk Factor	Fat Mass Beta, P- value	Fat Free Mass Beta, P-value
Mother's pre-pregnancy weight (per Kg)	0.03, 0.001	0.03, <0.001
Birth weight		
Tertile 1	Ref	Ref
Tertile 2	0.36, 0.69	0.94, 0.25
Tertile 3	1.21 0.16	1.80, 0.03

Fat Mass versus Fat Free Mass

Risk Factor	Fat Mass Beta, P- value	Fat Free Mass Beta, P-value
Mother's pre-pregnancy weight (per Kg)	0.03, 0.001	0.03, <0.001
Birth weight		
Tertile 1	Ref	Ref
Tertile 2	0.36, 0.69	0.94, 0.25
Tertile 3	1.21 0.16	1.80, 0.03

Adjusted for exact age, gender, race/ethnicity, mother's receipt of public assistance, and mother's place of birth

Understanding the Role of Mother's Pre-pregnancy Weight

Does mother's pre-pregnancy weight predict the child's weight because;

1) It is a proxy for mother's current weight and an obese-ogenic home environment,

or

2) It somehow programs the child for weight gain?

Understanding the Role of Mother's Pre-pregnancy Weight

Risk Factor	Weight Beta*, P-value	Fat Mass Beta*, P-value	Fat Free Mass Beta*, P-value
Mother's pre-pregnancy weight (per Kg)	0.10, 0.001	0.06, 0.001	0.04, 0.002

* Adjusting for mother's current BMI, fat mass, fat free mass, receipt of public assistance and child's age at examination, gender, race/ethnicity, and birth weight.

Conclusions

- Mother's pre-pregnancy weight and the child's birth weight predict the child's weight at age 7.
- These factors influence both fat mass and lean mass.
- Effect of maternal pre-pregnancy weight appears to be independent of current weight.

Collaborators

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