DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

Body Mass Index Measurement in Schools

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2010 Connecticut Summer Symposium
Solving the Physical Activity and Nutrition Equation

www.cdc.gov/HealthyYouth

Body Mass Index Measurement in Schools
2010 CT Summer Symposium
Solving the PA and NTR Equation

The findings and conclusions in this presentation are those of the presenter and do not necessarily represent the views of the Centers for Disease Control and Prevention

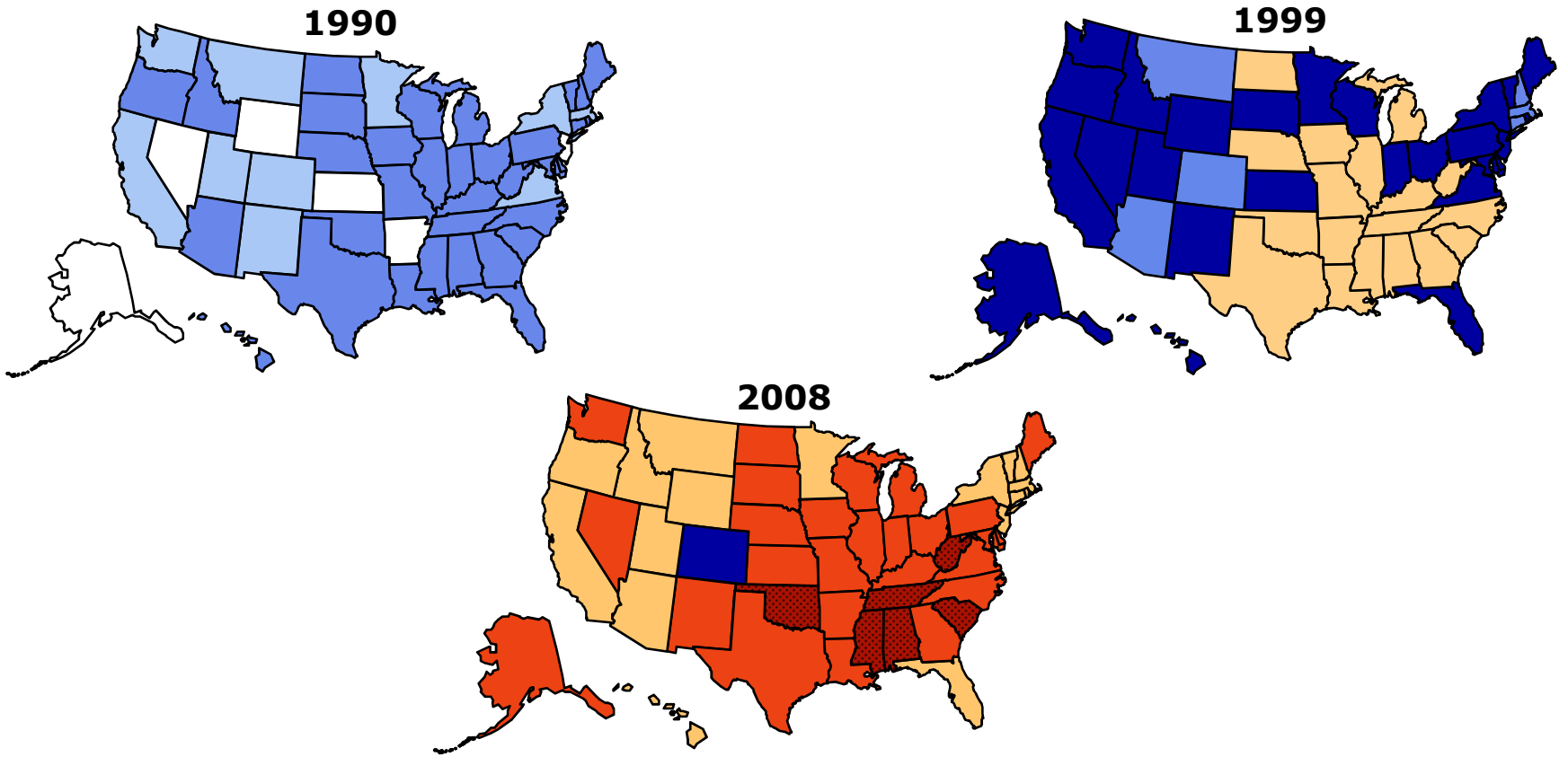
Overview

- **Childhood obesity trends and consequences**
- Addressing childhood obesity at schools
- School-based BMI measurement programs
- Current practices
- Concerns
- Research Findings
- Expert recommendations
- Considerations
- Safeguards

Obesity Trends* Among U.S. Adults

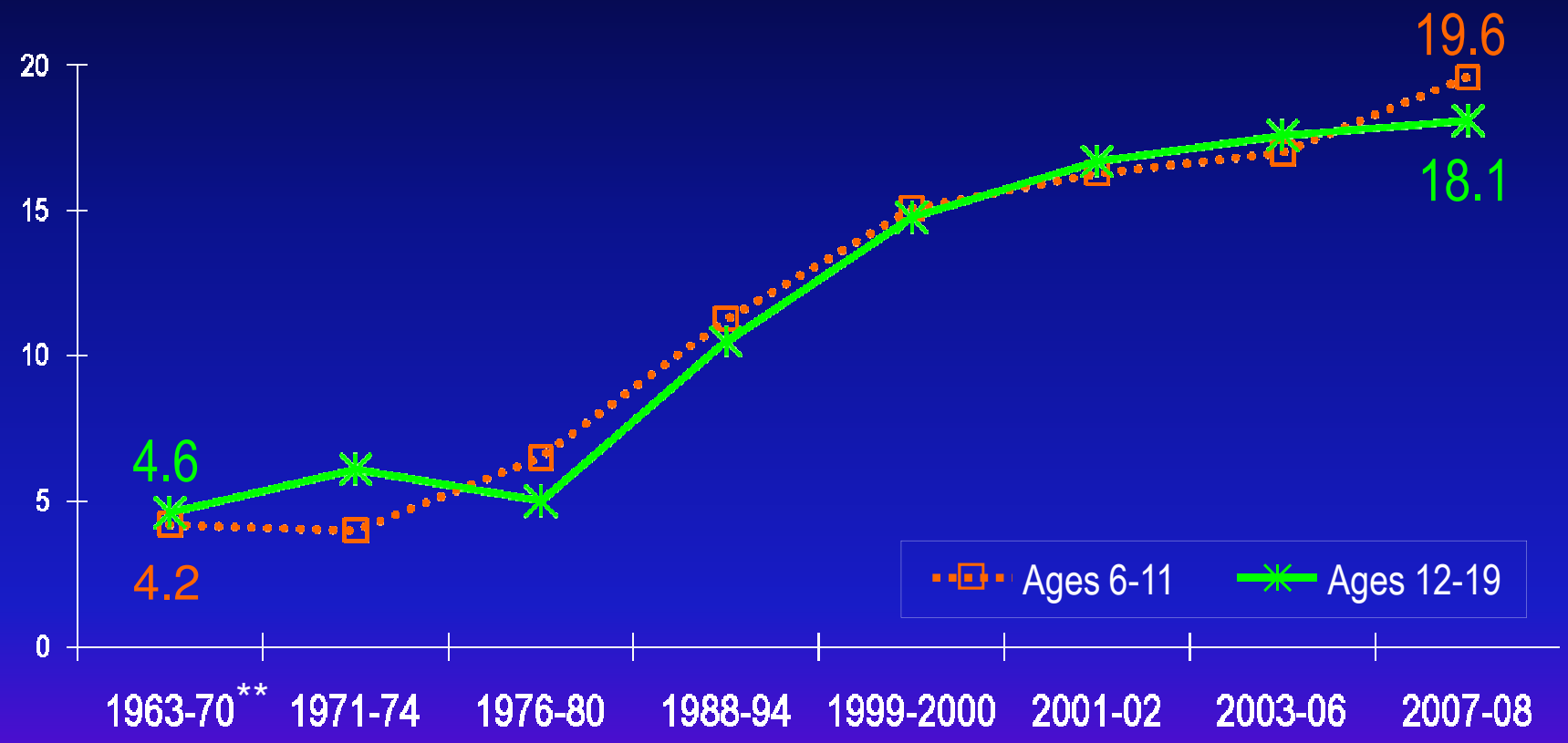
BRFSS, 1990, 1999, 2008

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



Source: CDC Behavioral Risk Factor Surveillance System.

Percentage of U.S. Children and Adolescents Who Were Obese, 1963-2008*



*≥95th percentile for BMI by age and sex based on 2000 CDC BMI-for-age growth charts.
**1963-1970 data are from 1963-1965 for children 6-11 years of age and from 1966-1970 for adolescents 12-17 years of age.
CDC, National Center for Health Statistics

U. S. Children Born in 2000

1 in 3

will develop Diabetes during lifetime

Narayan KMV et al. Lifetime risk for diabetes mellitus in the United States. JAMA. 2003;290(14):1884

Adverse Outcomes in Childhood Obesity

Metabolic
- Type 2 diabetes mellitus
- Metabolic syndrome

Orthopedic
- Slipped capital femoral epiphysis
- Blount's disease (Bow-legged)

Cardiovascular
- Dyslipidemia (high TRG, low HDL)
- Hypertension (high blood pressure)
- Left ventricular hypertrophy
- Atherosclerosis (hardening of arteries)

Psychological
- Depression
- Poor quality of life

Neurological
- Pseudotumor cerebri (severe headaches/vision)

Hepatic
- Non-alcoholic fatty liver disease
- Non-alcoholic steatohepatits (liver disease)

Pulmonary
- Obstructive sleep apnea (breathing cessation)
- Asthma

Renal
- Proteinuria (abmormal levels of protein in urine)

Daniels et al. 2005. Circulation. 2005;111:1999

School-based BMI Measurement Programs?

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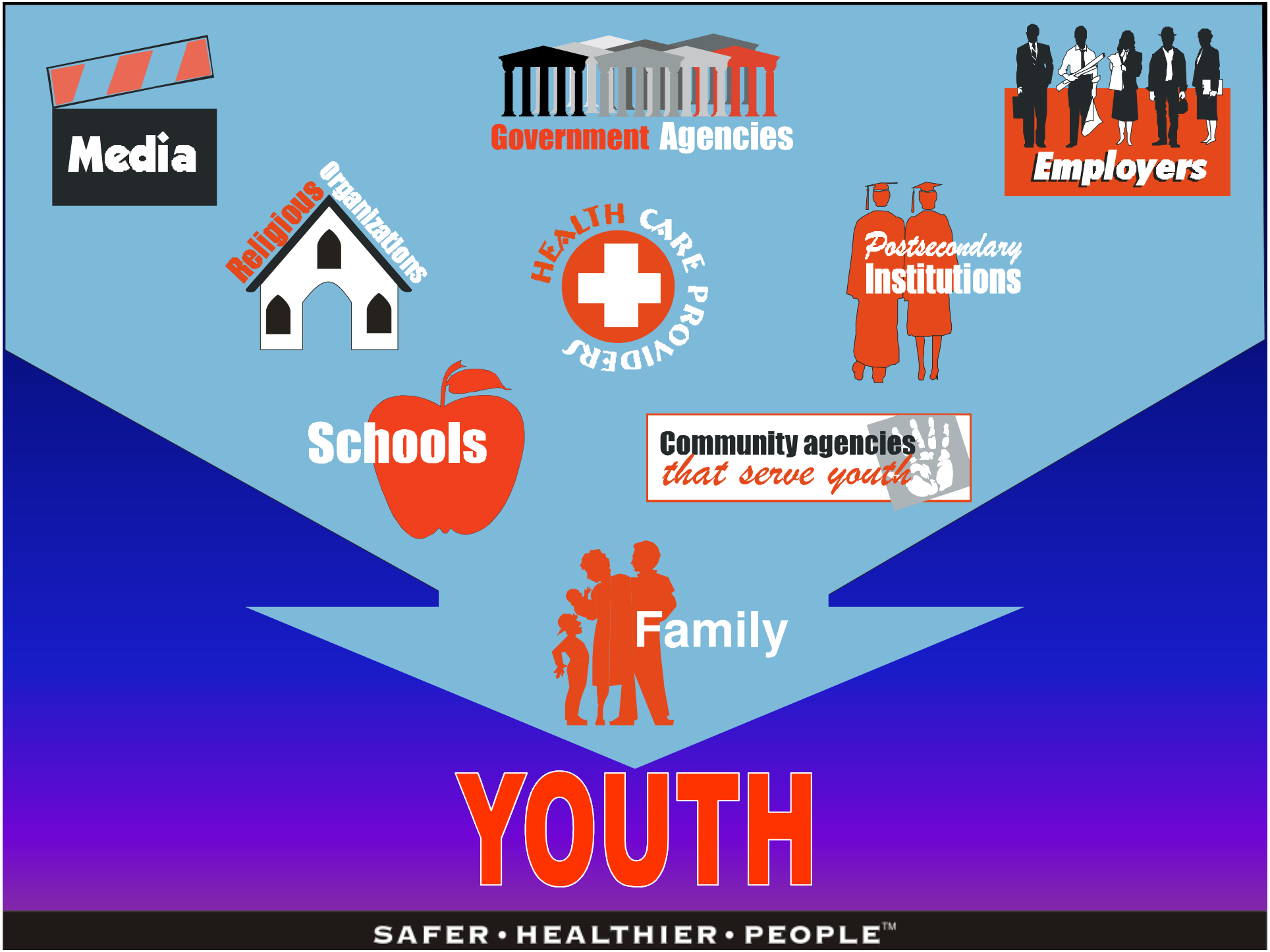
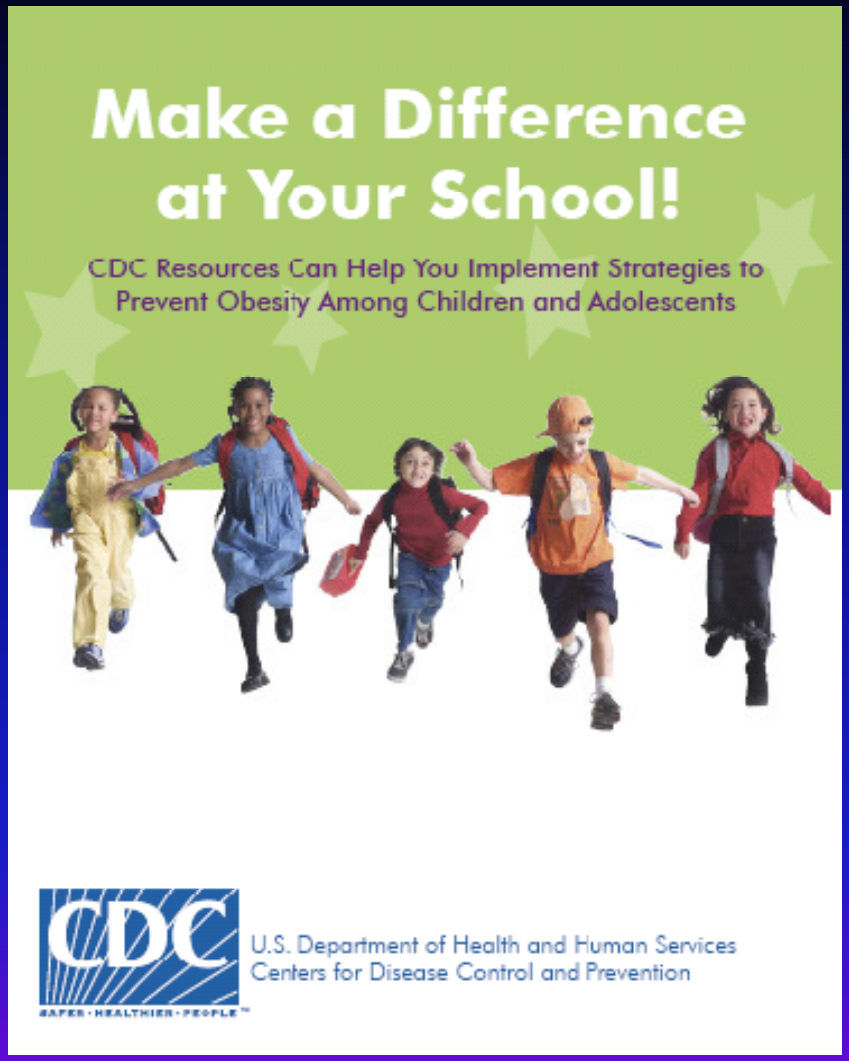

Media
Government Agencies
Employers
Religious Organizations
HEALTH CARE PROVIDERS
Postsecondary Institutions
Schools
Community agencies that serve youth
Family
YOUTH
SAFER • HEALTHIER • PEOPLE™

www.cdc.gov/HealthyYouth/KeyStrategies



- Strong wellness policies
- Coordinated School Health
- Self-assessment and planning for improvement
- School health council and coordinator
- High-quality health education
- High quality physical education
- Increased physical activity opportunities
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- Health promotion for staff

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Population Screening

The presumptive identification of persons with unrecognized disease or defect using tests, examinations, and other procedures that can be applied rapidly to sort out apparently well persons who probably have disease from those who probably do not.

Body Mass Index in Youth

- BMI = $\frac{\text{weight (kg)}}{(\text{height (m)})^2}$

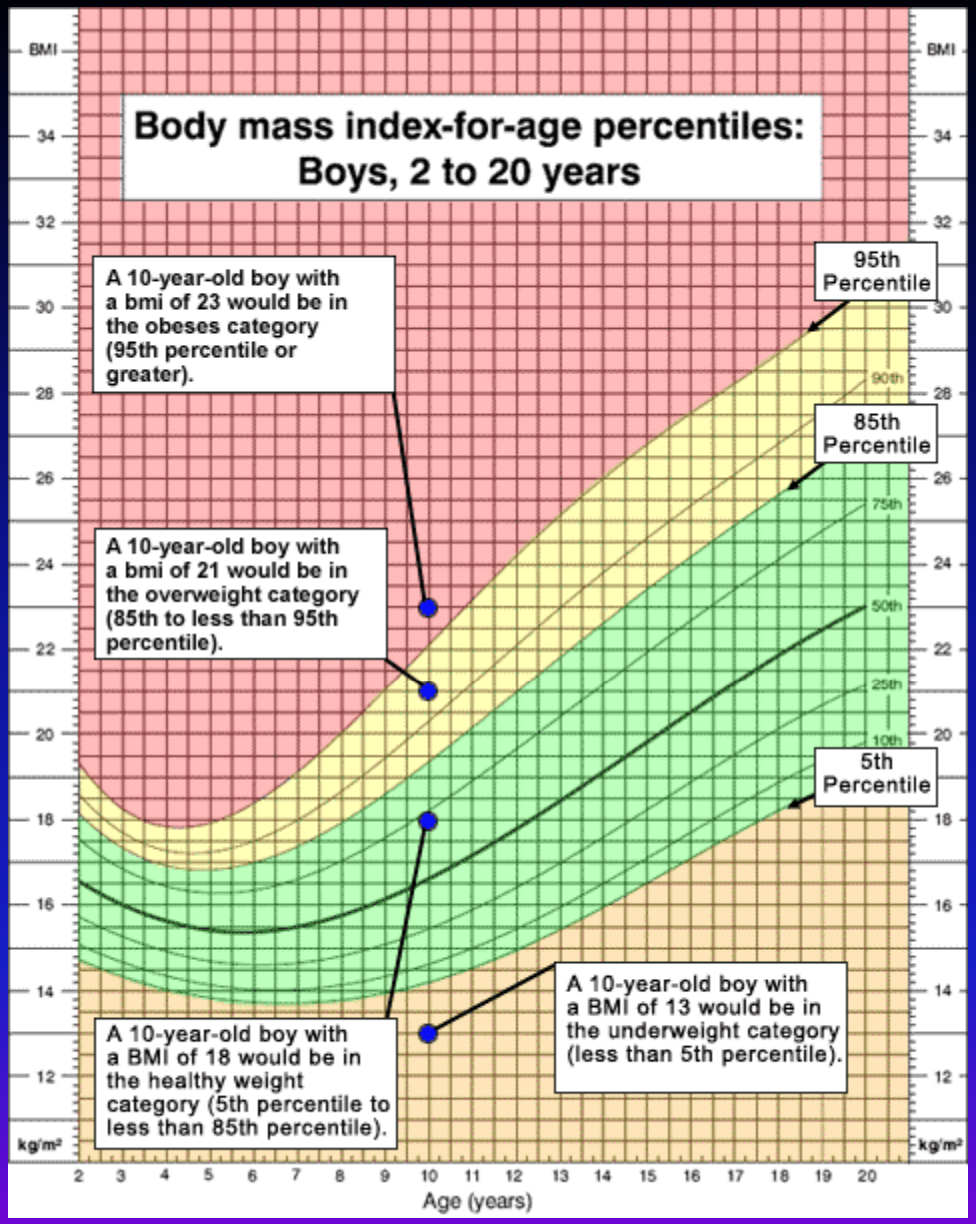
Is this enough information to calculate BMI?

- 45.3 kg (100 lb)
- 1.5 m (5 ft)

Body Mass Index in Youth

- BMI = $\frac{\text{weight (kg)}}{(\text{height (m)})^2}$

- BMI Percentile for age and gender (ages 2-20)


Body mass index-for-age percentiles:
Boys, 2 to 20 years
BMI
kg/m²
Age (years)
95th Percentile
90th
85th Percentile
75th
50th
25th
10th
5th Percentile
A 10-year-old boy with a bmi of 23 would be in the obeses category (95th percentile or greater).
A 10-year-old boy with a bmi of 21 would be in the overweight category (85th to less than 95th percentile).
A 10-year-old boy with a BMI of 18 would be in the healthy weight category (5th percentile to less than 85th percentile).
A 10-year-old boy with a BMI of 13 would be in the underweight category (less than 5th percentile).

BMI-for-age Weight Status Categories

www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html

BMI –for–age Percentile Range	Weight Status Category
≥ 95th percentile	Obese
≥ 85th and < 95th percentile	Overweight
≥ 5th and < 85th percentile	Healthy weight
< 5th percentile	Underweight

Body Mass Index in Youth

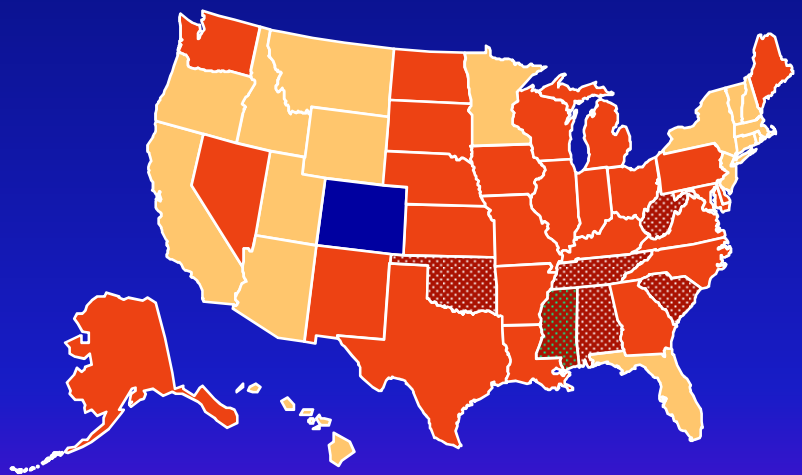
- BMI = $\frac{\text{weight (kg)}}{(\text{height (m)})^2}$

- BMI Percentile for age and gender (ages 2-20)

- BMI is only a screening tool

Purposes of School-Based BMI Measurement Programs

Surveillance

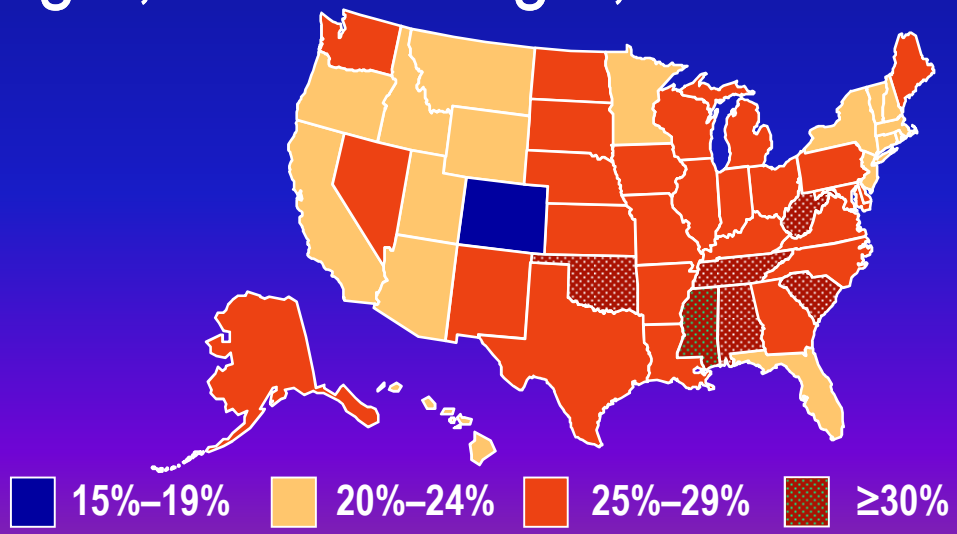


15%–19% 20%–24% 25%–29% ≥30%

Screening

Purposes of School-Based BMI Measurement Programs

Surveillance: Identify the percentage of students in a certain population (such as the entire school, school district, or state) who are obese, overweight, normal weight, and underweight



Benefits of BMI Surveillance

- Identify population trends and subgroups at greatest risk
- Create awareness among school staff and administrators of the need to address obesity
- Provide impetus to improve policies and practices to prevent obesity
- Monitor the effects of school-based interventions to prevent obesity
- Monitor progress toward achieving health objectives

Purposes of School-Based BMI Measurement Programs

Screening: Identify youth at risk of weight-related health problems; provide parents with their child's BMI results and recommend that youth at risk follow-up with a medical care provider

Who needs follow-up after BMI screening?

Youth who are classified as:

Underweight

BMI < 5th %

Overweight

85th % ≤ BMI < 95th %

Obese

BMI ≥ 95th %

Further Evaluation for BMI ≥ 85th %

- Medical History
  - Change in BMI percentile over time
- Family History
- Dietary Intake
- Physical Activity
- Physical Examination
  - Blood Pressure
  - Cholesterol
  - Fasting Glucose

Benefits of BMI Screening

- Correct misperceptions of parents and children about child's weight
- Motivate parents and children to make lifestyle changes
- Alert parents to the need to take at-risk children to medical care providers for further evaluation and, if needed, treatment
- Increase awareness among school staff of the need to address obesity

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How are BMI measurement programs being implemented?

Current Practices

- 22% of states required schools or school districts to measure students' height and weight or body mass
- 41% of school districts required schools to measure students' height and weight or body mass
- 42% of schools collected students' height and weight or body mass

Brener et al. 2006. *J Sch Helth.* 2007;77(8):464

State-Legislated BMI Measurement Programs in Schools

- BMI from representative sample (WV)
- BMI for all students every other year through 10th grade (AR)
- Body composition included in Fitnessgram results (CA, LA, SC, TX)
- BMI one of several required school screenings (FL, PA, TN)
- BMI part of required physical examination from medical care providers (IL, NY)
- State authorizes schools and school districts to collect data, if desired (VT)

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Concerns

BMI measurement programs might intensify negative and counterproductive focus on weight rather than healthy lifestyle, leading to increased:

- Stigma
- Dissatisfaction with body image
- Pressures to engage in harmful weight loss practices

Concerns

BMI screening programs may be ineffective and waste resources

- Inadequate follow-up
- Resources better spent on other prevention activities

BMI screening programs might distract attention from other school based obesity prevention activities

Concerns

Resources

- Hiring and training staff
- Staff time
- Purchasing equipment
- Data collection processes
- Parent communications
- **Establishing referral system**

Concerns?

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Research on School-based BMI Measurement Programs

- Parents support school-based BMI measurement programs, but do not necessarily think it's the top priority for obesity prevention
- BMI screening improves the accuracy of parental perceptions
- Parents do not consistently follow-up with a medical care provider after receiving their child's screening results
- AR did not report increased weight-related teasing or dieting among students

Boutelle et al., *Obes Res*. 2004;12:1754; Brener et al., *Obes Res.* 2004;12:1866; Resnicow et al. *Prev Med.* 1993; 22:838;
Chomitz et al. *Arch Pediatr Adolesc Med*. 2003;157:765 ; U of AR for Medical Sciences. 2006. Year 2 evaluation: AR Act 1220 of 2003 to Combat Childhood Obesity

But…we need more answers!

- Physical, social, and psychological effects of screening programs
- Effects on weight-related behaviors of parents and students
- Effects on weight-related outcomes (BMI)
- Capacity of school staff to implement program
- Effects on school-based efforts to promote nutrition and physical activity
- Effectiveness of referral and treatment services for youth who are identified as requiring further evaluation
- Effectiveness of different methods for communicating BMI results and related risk information to parents and youth
- Cost-benefit analyses

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Expert Recommendations

BMI Surveillance

- Consistent Support[1,2]

BMI screening: Clinical Setting

- Recommended[3]

BMI screening: School Setting

- Mixed support[4-7]

1) APHA resolution on overweight in childhood, 2001: www.aphafoodandnutrition.org/pr/html; 2) IOM *Preventing Childhood Obesity: health in the balance*, 2005; 3) Barlow et al. *Pediatrics.* 2007;120:S164
4) IOM *Preventing Childhood Obesity: health in the balance*, 2005; 5) Taras et al. 2004. www.schoolhealth.org; 6) SNE. *J Nutr Educ Behav.* 2003;35:1; 7) NASN. 2002

AAP Criteria for School-Based Screening Programs

Disease	Undetected cases are common; new cases occur frequently; associated with adverse consequences	√
Screening Test	Sensitive, specific, and reliable	√
Screener	Well trained	√
Target Population	Focus on groups with high prevalence or in which early intervention will be most beneficial	√
Site	Appropriate for conducting screening and communicating results	√
Treatment	Effective Tx available, early intervention beneficial	?
Referral &Treatment	Positives receive a more definitive evaluation and, if indicated, appropriate treatment	?
Cost / Benefit Ratio	Benefit should outweigh expenses	?

What does all this mean?

CONS

PROS

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Ask Yourself:

- Why are the data collected? Surveillance? Screening?
- What will happen to the data?
- Have similar data already been collected (i.e. YRBS)?
- Can health behavior data be collected? PA or Ntr?
- Does the benefit outweigh the cost?
- Safe and supportive environment?
- Coordinated with a comprehensive set of strategies to prevent or reduce obesity?
- If screening, referral system in place?
- Will the process be evaluated?

What other data are available?

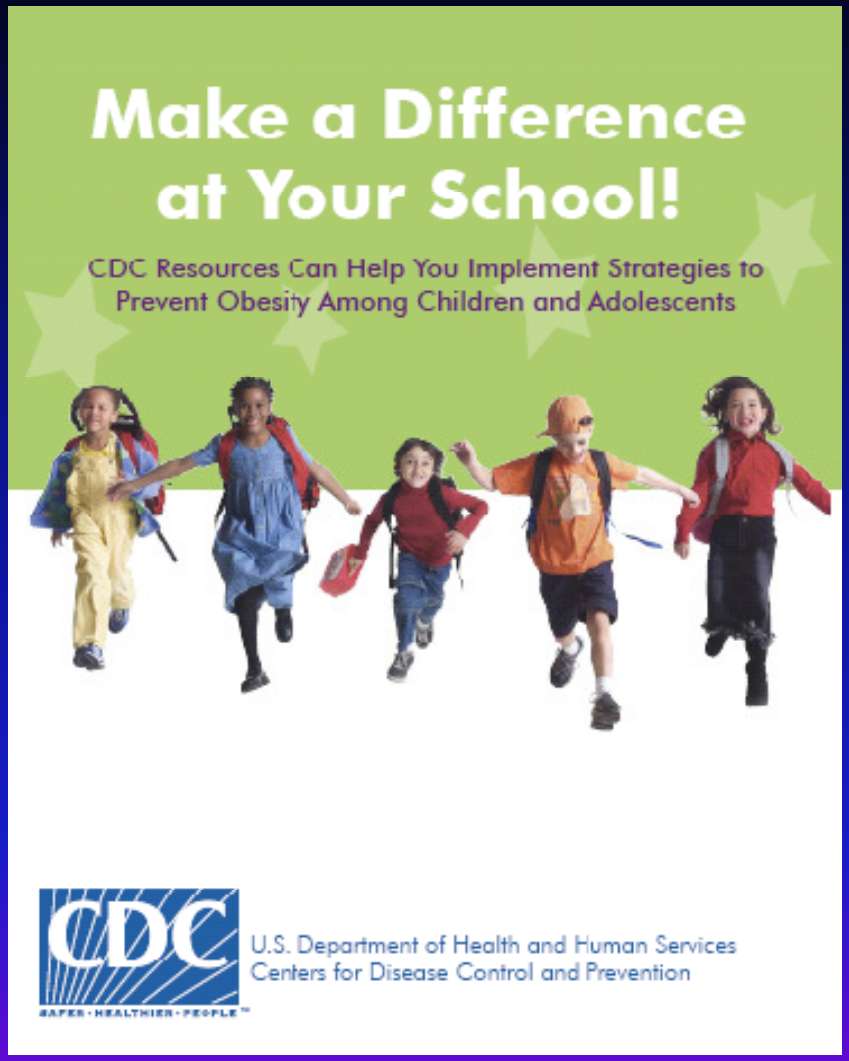
- Youth Risk Behavior Survey (YRBS)
  - height, weight, BMI
  - physical activity
  - dietary behaviors
- Local health department
- Research universities
- Physical activity and diet log or diaries
- School/District physical activity policies and programs

CDC Guidance
A Safe and Supportive Environment

- Universal Bullying Prevention Program
- Curricula emphasizing health not weight & reinforcing physical activity and healthy eating
- Staff receive professional development and resources they need to provide useful guidance to students with weight-related concerns
- Comprehensive set of strategies to prevent and reduce obesity

Haller, et al, ed. *The Role of Michigan Schools in Promoting Healthy Weight*. 2001

www.cdc.gov/HealthyYouth/KeyStrategies



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SHI
School Health Index
A Self-Assessment and Planning Guide
Elementary School
2005
CDC
SCHOOL EMPLOYEE
A Guide for Protecting WELLNESS
the Assets of Our Nation's Schools
NUTRITION STANDARDS FOR FOODS IN SCHOOLS
Leading the Way Toward Healthier Youth
PECAT
Physical Education Curriculum Analysis Tool
CDC
U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
MAKING IT HAPPEN!
SCHOOL NUTRITION SUCCESS STORIES
Youth Physical Activity
Guidelines Toolkit
Be Active and Play 60 Minutes Every Day!
www.cdc.gov/HealthyYouth
HECAT
Health Education Curriculum Analysis Tool
CDC
Department of Health and Human Services
Centers for Disease Control and Prevention
NASBE
Fit, Healthy, and Ready to Learn
A SCHOOL HEALTH POLICY GUIDE

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CDC Guidance
Safeguards for BMI Measurement Programs

Surveillance and Screening

1. Introduce program and obtain parental consent

2. Train staff in administering the program

3. Protect student privacy

4. Accurately measure height and weight

Haller et al, ed. *The Role of Michigan Schools in Promoting Healthy Weight*. 2001
Crawford et al. *Weighing the risks and benefits of BMI reporting in the school setting. 2006. nature.berkeley.edu/cwh/PDFs/BMI_reoprt_cards.pdf*

CDC Guidance
Safeguards for BMI Measurement Programs

Surveillance and Screening

5. Accurately calculate BMI

6. Develop efficient data collection procedures

7. Avoid using BMI results to evaluate student or teacher performance

8. Evaluate BMI Measurement Program

Haller, Petersmarck, Warber, ed. *The Role of Michigan Schools in Promoting Healthy Weight*. 2001
Crawford et al. *Weighing the risks and benefits of BMI reporting in the school setting. 2006. nature.berkeley.edu/cwh/PDFs/BMI_reoprt_cards.pdf*

CDC's Children's BMI Tool for Schools

Example of Measurements Tab:

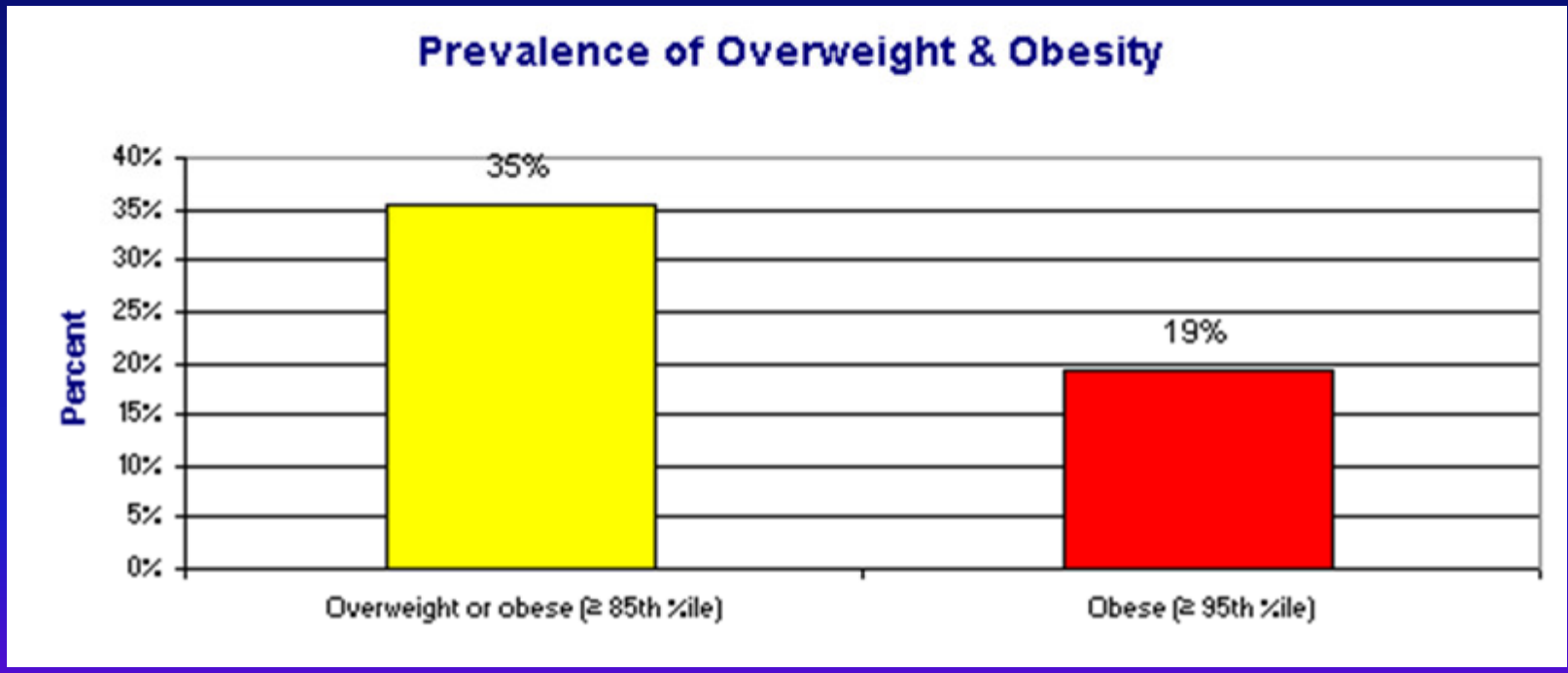
ID (optional)	Name (optional)	Sex	Date of birth	Date of measurement	Height		Weight	BMI	BMI %ile
					Feet	Inches	Pounds		
1	Jane Doe	F	4/27/1998	10/1/2007	4	10.25	83.5	17.3	63.0
2	Carlos Rodriguez	M	3/7/1998	10/1/2007	4	7.375	127	29.1	99.2
3		F	6/2/1998	10/1/2007	4	5.125	64	15.9	39.9
4	John Smith	M	6/2/1998	10/1/2007	4	8.375	67.5	14.9	19.1
5		F	6/11/1998	10/1/2007	4	3.25	76.75	20.5	90.8

Summary of children's BMI-for-age

	Boys	Girls	Total
Number of children assessed:	99	87	**186**
Underweight (< 5th %ile)	2%	0%	**1%**
Normal BMI (5th - 85th %ile)	56%	76%	**63%**
Overweight or obese (≥ 85th %ile)*	42%	24%	**35%**
Obese (≥ 95th %ile)	*26%*	*10%*	***19%***

CDC's Children's BMI Tool for Schools

www.cdc.gov/HealthyYouth/Obesity/BMI



CDC Guidance
Safeguards for BMI Measurement Programs

Additional Screening Safeguards

1. Resources for safe and effective follow-up

2. Provide parents a clear explanation of BMI results

Haller, Petersmarck, Warber, ed. *The Role of Michigan Schools in Promoting Healthy Weight*. 2001
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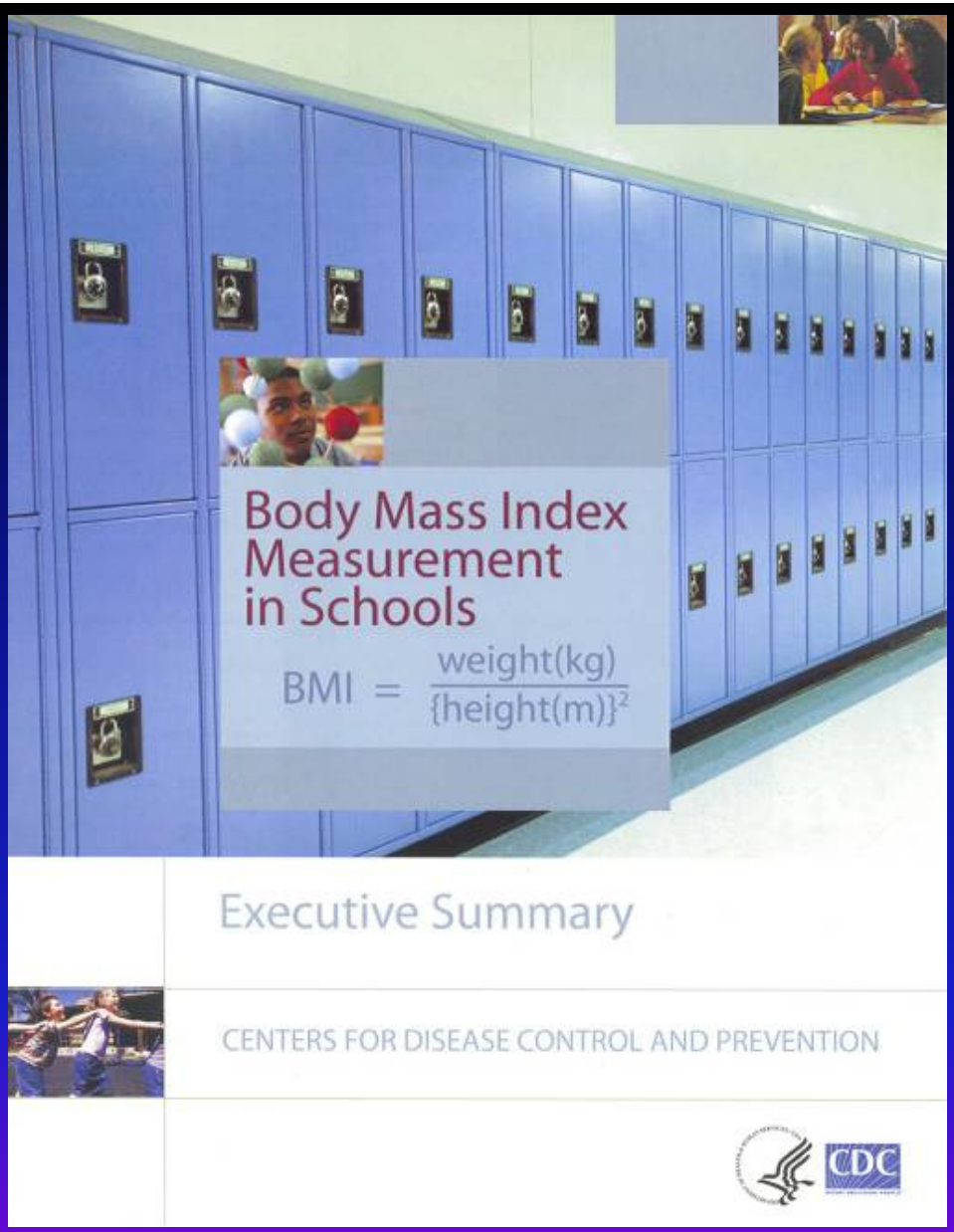
Conclusion



www.cdc.gov/HealthyYouth/Obesity/BMI

THANK YOU!

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