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BMI - Body Mass Index: BMI for Children and Teens

(BMI for Children and Teens is sometimes referred to as "BMI-for-age.")

BMI is Used Differently with Children Than it is With Adults

In children and teens, body mass index is used to assess underweight, overweight, and risk for overweight. Children's body fatness changes over the years as they grow. Also, girls and boys differ in their body fatness as they mature. This is why BMI for children, also referred to as BMI-for-age, is gender and age specific.^{1, 2} BMI-for-age is plotted on gender specific growth charts. These charts are used for children and teens 2 – 20 years of age. For the 2000 CDC Growth Charts and Additional Information visit [CDC's National Center for Health Statistics](#).

Each of the CDC BMI-for-age gender specific charts contains a series of curved lines indicating specific percentiles. Healthcare professionals use the following established percentile cutoff points to identify underweight and overweight in children.

Underweight	BMI-for-age < 5th percentile
Normal	BMI-for-age 5th percentile to < 85th percentile
At risk of overweight	BMI-for-age 85th percentile to < 95th percentile
Overweight	BMI-for-age ≥ 95th percentile

BMI decreases during the preschool years, then increases into adulthood. The percentile curves show this pattern of growth.

What does it mean if my child is in the 60th percentile?

The 60th percentile means that compared to children of the same gender and age, 60% have a lower BMI.

Example

Let's look at the BMI for a boy as he grows. While his BMI changes, he remains at the 95th percentile BMI-for-age.

Age	BMI	Percentile
2 years	19.3	95 th
4 years	17.8	95 th
9 years	21.0	95 th
13 years	25.1	95 th

BMI - Body

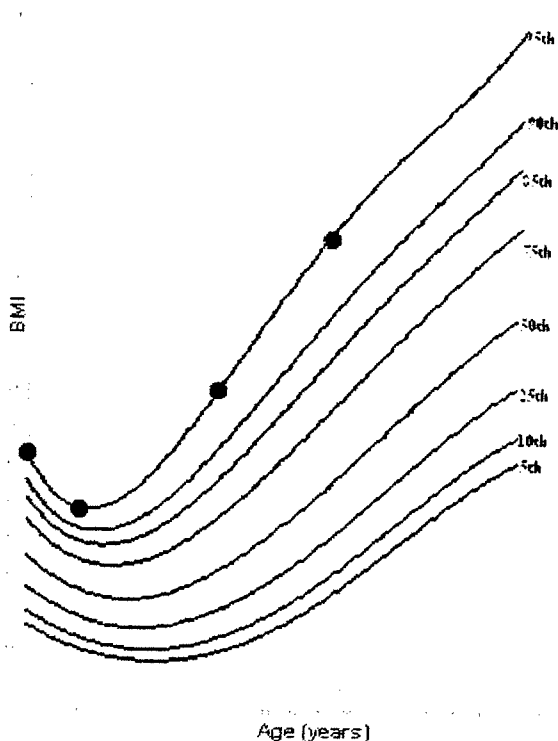
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We see how the boy's BMI declines during his preschool years and increases as he gets older.

Boys: 2 to 20 years



Why is BMI-for-age a useful tool?

BMI-for-Age is used for children and teens because of their rate of growth and development. It is a useful tool because

- BMI-for-age provides a reference for adolescents that can be used beyond puberty.
- BMI-for-age in children and adolescents compares well to laboratory measures of body fat.
- BMI-for-age can be used to track body size throughout life.

For the 2000 CDC Growth Charts and Additional Information visit CDC'S [National Center for Health Statistics](#).

For more information on how to use the growth charts visit [The Growth Chart Training Modules](#).

References

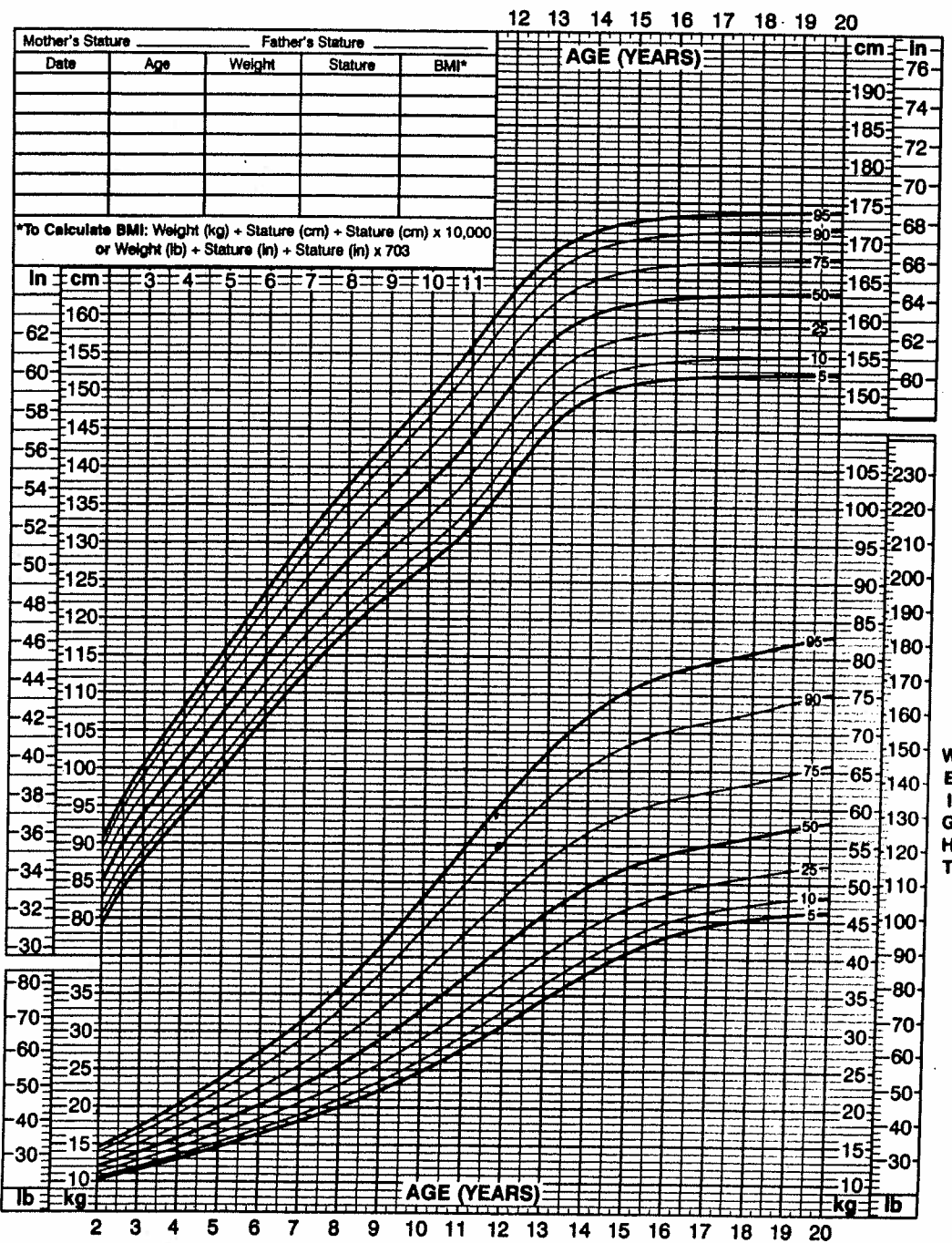
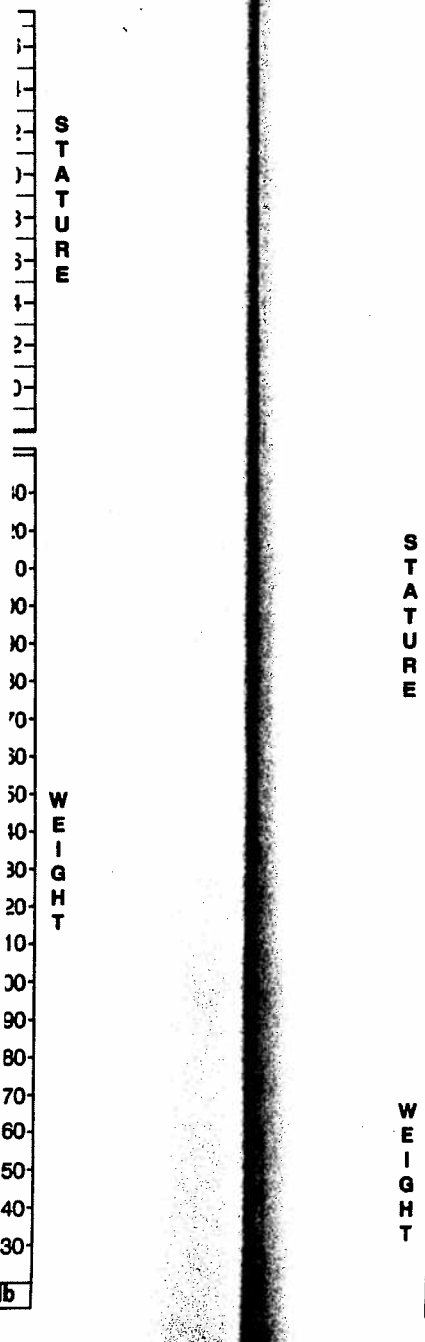
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Date last reviewed: 06/08/2005

2 to 20 years: Girls
 Stature-for-age and Weight-for-age percentiles

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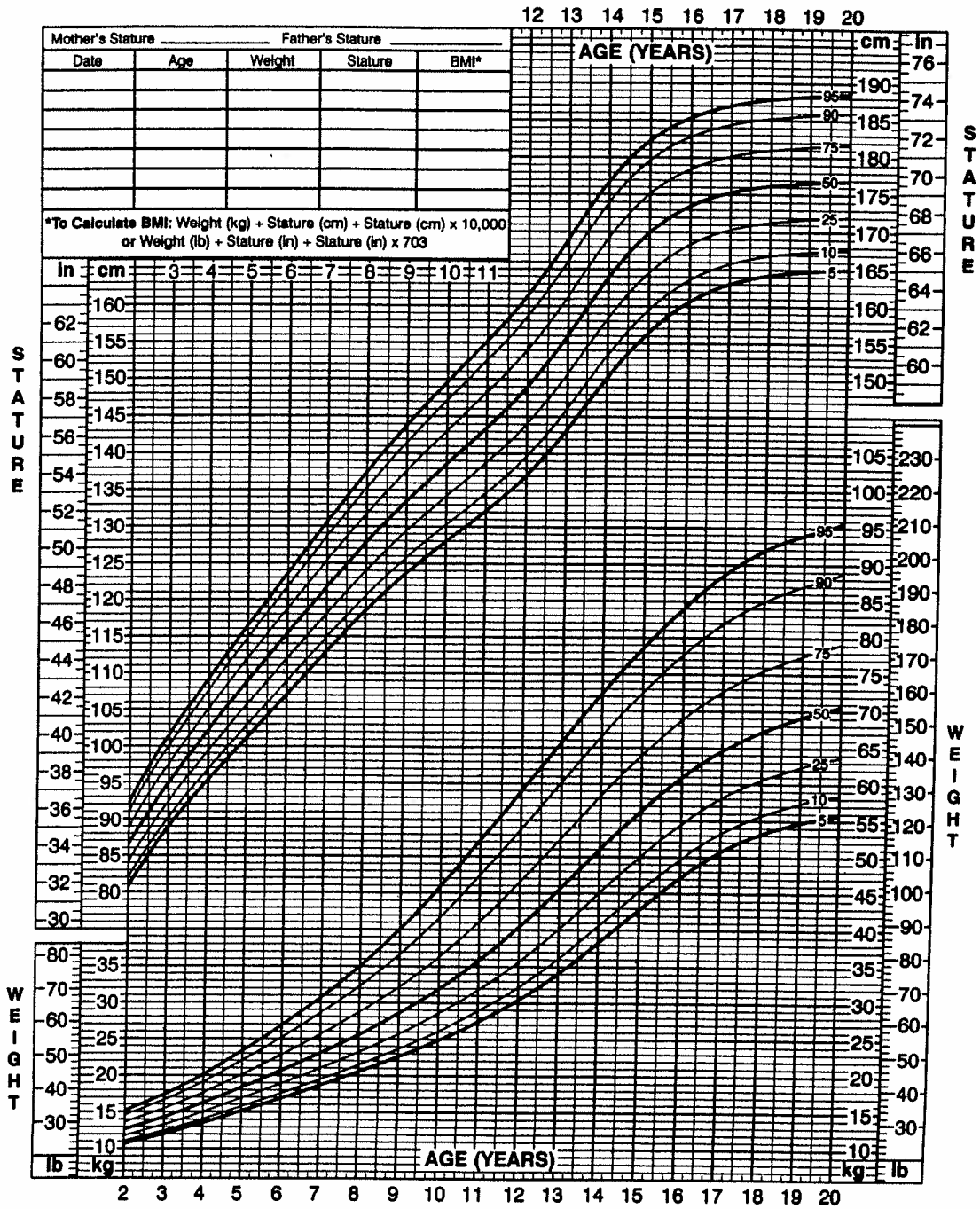
Revised and corrected November 21, 2000.

2 to 20 years: Girls. Length-for-age and Weight-for-age percentiles. Source: Developed by the National Center for Chronic Disease Prevention and Health Promotion (2000).

2 to 20 years: Boys
Stature-for-age and Weight-for-age percentiles

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Revised and corrected November 21, 2000.

2 to 20 years: Boys. Length-for-age and Weight-for-age percentiles. Source: Developed by the National Center for Chronic Disease Prevention and Health Promotion (2000).

Notifying Parents/Caregivers

The following is a sample letter which could be used to notify parents about a child's weight status.

Dear Parent,

We recently weighed and measured the children in our school to determine how they are growing. Your child's weight was found to be low/high for his/her height and age. This does not necessarily mean your child is underweight/overweight, but your child may be at risk for this condition. The best person to evaluate your child's weight status is his/her regular doctor or health care provider.

We encourage you to make sure your child has annual medical checkups by a physician. The doctor will weigh and measure your child, may ask questions about your child's growth since birth, and may ask about the heights and weights of your child's close biological relatives. If your child is too thin/heavy, your doctor will tell you so. Ask your doctor for advice about good nutrition and physical activity.

If you do not have health insurance or access to health care, please contact us for information about possible medical services.

Please do not put your child on a weight gain/loss diet. For information on helping an underweight/overweight child, [insert information on obtaining a pamphlet].

If you have questions, please call me at [].

Cordially,
School Nurse

Pamphlets for Parents

"Childhood and Adolescent Obesity in America: What's a Parent to Do?" a pamphlet by Betty Holmes, MS, RD. June 1998. The cost is \$1.25 per copy. For more information or to place an order, contact the Office of Communications and Technology Resource Center, University of Wyoming: Phone (307) 766-2115. Fax (307) 766-2800. Available at the following website: <http://www.uwyo.edu/ag/ces/PUBS/b1066.pdf>.

"If My Child is Overweight, What Should I Do About It?" a pamphlet by Joanne P. Ikeda, MA, RD. 1998. The cost is \$4.00 per copy. For more information or to place an order, contact Division of Agriculture and Natural Resources, Communications Services & Publications, 6701 San Pablo Avenue, 2nd Floor, Oakland, CA 94608-1239 or call (800) 994-8849. See website: <http://danrcs.ucdavis.edu>.

"Helping Your Overweight Child" a pamphlet by the National Institutes of Health. Contact The Weight-control Information Network, 1 WIN Way, Bethesda, MD 20892-3665. Tel: (202) 828-1025 or (877) 946-4627, Email: win@info.niddk.nih.gov. Available at: <http://www.niddk.nih.gov/health/nutrit/pubs/helpchld.htm>.

The authors of this publication are Joanne P. Ikeda, MA, RD and Dr. Pat Crawford, DrPH, RD, Co-Directors of the Center for Weight and Health. Comments on this publication can be directed to jikedata@socrates.berkeley.edu, (510) 642-2790 or pbcrow@uclink4.berkeley.edu, (510) 642-5572. Funded in part by the California Nutrition Network. © September, 2000

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GUIDELINES FOR COLLECTING HEIGHTS AND WEIGHTS ON CHILDREN AND ADOLESCENTS IN SCHOOL SETTINGS

CENTER FOR WEIGHT AND HEALTH
COLLEGE OF NATURAL RESOURCES

UNIVERSITY OF CALIFORNIA
BERKELEY

Introduction

It may sometimes be necessary to weigh and measure children in school settings. In these situations, it is important to obtain accurate information. At the same time, it is important to avoid encouraging unrealistically thin body images and stigmatizing children as "fat," "heavy," or "skinny." Consider the question, "How can this task be done in a way that will promote body satisfaction, a positive body image, and high self-esteem in youngsters of all sizes and shapes?" The following guidelines were developed to help you measure students in a way that is sensitive and supportive as well as accurate.

Growth Charts

The purpose of weighing and measuring children is to determine if they are growing "normally." There is a wide range of heights and weights that are considered "normal" since children grow at very different rates even when they are the same age. The Centers for Disease Control and Prevention and the National Center for Health Statistics issued new growth charts for children in June, 2000. The revised growth charts consist of 16 charts (8 for girls and 8 for boys) including two new body mass index (BMI) charts. The charts can be accessed at the following website: <http://www.cdc.gov/growthcharts>. Be sure you have the new growth charts before beginning this task.

There is a wide range of heights and weights which are considered "normal" since children grow at different rates.

Setting

Each child should be weighed and measured in private with no other children present. Recruit an adult to record the measurements or do it yourself. Do not have another child do it. Consider having the child face away from the scale if s/he appears anxious about being weighed.

Comments to Children

Do not comment on the height or weight of a child at the time the measurements are being taken. Neutral comments such as "Thanks, you can get off the scale now" are appropriate. If a child makes a negative comment about his/her body, it is appropriate to say, "Kids' bodies come in lots of different sizes and shapes. If other kids are teasing you about your body, let's talk and see what we can do about it." Teachers and other school staff should discourage teasing by modeling and promoting respectful behavior. The philosophy "We respect the bodies of others even though they are different from our own" should guide words and actions. If a child asks, "Am I too fat?" or "Am I too skinny?" say that you don't know and suggest the child ask his/her doctor this question.

The philosophy
"We respect the bodies
of others even though
they are different from
our own" should guide
words and actions.

Not Making a Medical Diagnosis

Unless you are a licensed health care professional whose scope of practice includes diagnosing medical conditions, refrain from making a diagnosis of overweight or obesity. Labeling a child as "overweight," "too fat," "too thin," or "skinny" based on a single height/weight measurement at one point in time is inappropriate. In order to determine if a child is underweight, overweight or at risk of these conditions, standard practice is for a physician to gather additional medical information necessary for making a diagnosis.

Measuring Weight

Children should be weighed using a platform scale. This may be a beam balance scale or a digital (electronic load cell or strain gauge) scale. Check your equipment regularly to make sure you are getting accurate measurements. Scales should be calibrated on a routine basis. Calibration involves putting known weights on the scale to check accuracy.

Procedure:

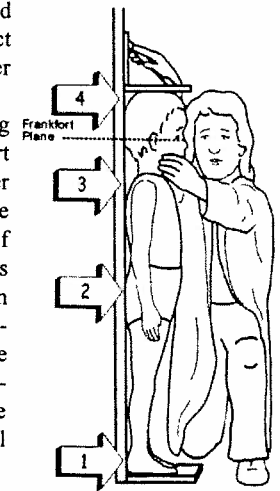
1. Ask child to remove outer clothing and shoes.
 2. Place the scale in the "zero" position before the child steps on the scale.
 3. Ask the child to stand still with both feet in the center of the platform.
 4. Record the measurement to the nearest 1/4 pound or 100 grams.
 5. Have the child step off the scale.
-

Measuring Height

A standing height board or stadiometer is required. This device has a flat vertical surface on which a measuring rule is attached. It also has a moveable headpiece and either a permanent surface to stand on or the entire device is mounted on the wall of a room with a level floor.

Procedure:

1. Before you begin, ask child to remove shoes, hat, and bulky clothing such as coats and sweaters. Ask the child to remove or undo hair styles and hair accessories that interfere with taking a measurement. In rare cases, a child may be unwilling to undo an intricate or costly hairstyle. In these situations, care should be taken to locate the actual crown of the head.
2. Direct the child to stand erect with shoulders level, hands at sides, thighs together, and weight evenly distributed on both feet. The child's feet should be flat on the floor or foot piece, with heels comfortably together and touching the base of the vertical board. There are four contact points between the body and the stadiometer: head, upper back, buttocks and heels (see arrows 1-4 on diagram).
3. Ask the child to adjust the angle of his/her head by moving the chin up or down in order to align head into the Frankfort Plane. The Frankfort Plane is an imaginary line from the lower margin of the eye socket to the notch above the tragus of the ear (the fleshy cartilage partly extending over the opening of the ear). This is best viewed and aligned when the viewer is directly to the side of and at the eye level of the child. When aligned correctly, the Frankfort Plane is parallel to the horizontal headpiece and perpendicular to the vertical back piece of the stadiometer. **NOTE:** When the chin is correctly positioned, the back of the head may not make contact with the board. In fact, in a very few individuals, only two points will make contact with the vertical backpiece.
4. Ask the child to breathe in and maintain his/her position. Lower the headpiece until it firmly touches the crown of the head and is at a right angle with the measurement surface. Check contact points to ensure that the lower body stays in the proper position and the heels remain flat. Some children may stand up on their toes, but verbal reminders are usually sufficient to get them in proper position.
5. Record height to the nearest 1/8th inch or 0.1cm.



CHILDHOOD OVERWEIGHT

A FACT SHEET FOR PROFESSIONALS

UNIVERSITY OF CALIFORNIA
BERKELEY

COOPERATIVE EXTENSION
DEPARTMENT OF NUTRITIONAL SCIENCES

Childhood Overweight Definitions

- Children at or above the 95th percentile of body mass index (BMI) by sex and age are considered overweight. Many call this group obese, although technically the term obesity refers to an excess in body fat relative to lean muscle mass. BMI measures how heavy the body is. There is a good, but not perfect, correlation between body fat and body heaviness.
- Children between the 85th and 94th percentile of BMI are considered at risk of being overweight.
- Body mass index (BMI) is weight (in kilograms) divided by height squared (in meters).

Consequences of Childhood Overweight

- Correlation between childhood and adult overweight
 - Fifty percent of overweight children/teens remain overweight as adults (1).
 - Approximately 26-41% of overweight preschool children will become overweight adults (2).
 - Obesity is associated with the development of diabetes, heart disease, hypertension and some cancers.
- Medical complications of extreme overweight in children (3):
 - Increased stress on weight bearing joints
 - Increased blood pressure
 - Risk of diabetes mellitus
- Psychological consequences of overweight:
 - Children are at increased risk for discrimination, low self-esteem and poor body image.
 - Adolescent girls are less likely to be accepted into college, less likely to be married, and less likely to be economically well off in adulthood (4).

Growing Prevalence of Childhood Overweight Nationally(5)

- There has been a substantial increase in the number of children who are overweight in the United States over the last 30 years, from 5% in the 60s to 11% in the 90s.
- Differences by age, race and sex in overweight prevalence in the 90s are as follows:

	<u>Females</u>	<u>Males</u>
Children Aged 6 to 11		
White	9.2%	10.3%
Black	16.4%	11.9%
Mexican-American	14.3%	14.6%
Children Aged 12 to 17		
White	8.5%	11.1%
Black	15.7%	10.7%
Mexican-American	14.3%	13.7%

Risk Factors for Childhood Overweight Which Cannot Be Changed

- Parental obesity
 - Children with two obese parents are more than six times as likely to become obese than children with non-obese parents (6).
 - Children with only one obese parent are twice as likely to become obese as adults (7).
- Socio-demographic factors
 - Among white children, those with parents of lower socioeconomic status are more likely to be overweight (8).
 - Girls without siblings are at greater risk for becoming overweight. For each sibling there is a 14% decreased likelihood (8).
 - Girls with older mothers are at increased risk of being overweight (8).

Risk Factors for Childhood Overweight Which Can Be Changed

- Parenting style: A high degree of parental control of diet is linked to a child's inability to regulate food intake, and to the amount of body fat in girls (9).
- Physical activity: Starting in adolescence, girls' physical activity declines 7.4% per year, while boys' activity decreases 2.7% per year (10).
- Television watching: Hours of television watching is associated with overweight in children (11,12). Over one fourth of children report watching four or more hours of television per day (13).
- Skipping meals: Children who ate more times per day were less likely to be heavy than children who ate fewer times per day (kilocalories were the same in both groups) (14).
- Eating patterns: Girls who ate while doing homework, ate while watching television, bought snacks, or ate when not hungry had higher caloric intakes than girls who did not report these behaviors (15).

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Descriptor

Descriptor Code:
705

Issued Date:

FOOD AND NUTRITION SERVICES MANAGEMENT

Rescinds:
610, 705, & 705.1

Issued:

BOARD POLICY

As we progress in promoting a sound Nutrition Education and healthy eating life style to our students and their families, the following policy and guidelines in the area of Food Service Operations and Nutritional Content shall be in effect:

The Guam Public School System, as the State Agency, shall seek to maintain participation in the United States Department of Agriculture, Food and Nutrition Service (USDA, FNS) Programs in accordance with the "*Child Nutrition and WIC Reauthorization Act of 2004*" (U.S. P.L. 108-269) and the "*Child Nutrition Act of 1966*" for all institutions, public and private, that participate in the Child Nutrition Programs and Food Distribution Programs. These Programs shall be supported by the Food and Nutrition Services Administrator who shall be held accountable for the effective support of the aforementioned programs. The Programs, as it applies at the school level, shall be held under the direct supervision of the Principal.

The Guam Public School System shall ensure the following regulations, as revised from time to time, are adhered and uniformly implemented in accordance with the respective Programs:

- **National School Lunch Program** 7 CFR Chapter II, Part 210
- **School Breakfast Program** 7 CFR, Chapter II, Part 220
- **Summer Food Service Program** 7 CFR, Chapter II, Part 225
- **Child and Adult Care Food Program** 7 CFR, Chapter II, Part 226
- **Nutrition Education and Training Program** 7 CFR, Chapter II, Part 227
- **State Administrative Expense Program** 7 CFR, Chapter II, Part 235
- **Cash in Lieu of Donated Food Program** 7 CFR, Chapter II, Part 240
- **Determining Eligibility for Free and Reduced Price Meals and Free Milk in Schools** 7 CFR, Chapter II, Part 245
- **Donation of Foods for use in the U.S., its Territories and Possessions, and areas under its Jurisdiction** 7 CFR, Chapter II, Part 250
- **The Emergency Food Assistance Program** 7 CFR, Chapter II, Part 251

NUTRITIONAL CONTENT AND FOOD SERVICE OPERATIONS

(School Food Authority)

Meal & Milk Pricing

The prices set for meals, snacks, and the price for milk shall be submitted to the Board for approval one (1) month prior to the opening of each School Year.

Operations

The daily operation of the cafeteria shall be the responsibility of the cafeteria Manager. The school principal shall be held accountable for the overall effective leadership and management of the cafeteria's operation. The Food and Nutrition Services Administrator shall provide guidance and support to the School Food Authority.

Nutrition Advisory Council

A Nutrition Advisory Council appointed by the Superintendent of Education shall be responsible for advising and making recommendations to the Superintendent on food and nutrition education opportunities and requirements. The Council shall consist of parents, students, school administrators, teachers, and industry professionals. The Council shall be chaired by the Food and Nutrition Services Administrator.

Food with Minimal Nutritional Values

A. Food and beverages listed as Foods of Minimal Nutritional Value

Food and beverages listed as Foods of Minimal Nutritional Value (FMNV), as defined by the regulations of the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (7 CFR, Parts 210 & 220) are prohibited from being sold (to include vending machines), given away, or promoted at anytime during school hours of operation. Such a provision specifically precludes at anytime the sale or promotion of carbonated beverages, water-ices unless made with fruit 100% juice, ice cream or similar products, licorice, marshmallow candies, chewing gum, candies, fondant, spun candy and candy-coated popcorn, or related food items with minimal nutritional content. Foods with minimal nutritional values shall be identified by the Food and Nutrition Services Administrator in collaboration with the Nutrition Advisory Council consisting of parents, students, school administrators, teachers, and industry professionals.

B. Foods and beverages that meet the Minimum Nutritional Values

Foods that meet the minimum nutrition values include, but are not limited to, corn chips, beef jerky, popcorn, fruit, cheese & crackers, 100% fruit juices, peanuts, sunflower seeds, granola bars, low fat yogurt, pretzels, trail mix, low-fat and fat-free fluid milk, and similar food groups approved by USDA, FNS and the Food & Nutrition Services Administrator. Foods that meet the minimum nutritional values shall be identified by the Nutrition and Food Services Administrator in collaboration with the Nutrition Advisory Council consisting of parents, students, school administrators, teachers, and industry professionals.

C. Student Stores

Those Student Stores whose proceeds benefit the school or student organization approved by the school administrator, may sell food items of nutritional value as per 7 CFR, Parts 210 and 220, and approved for sell by the Food and Nutrition Services Administrator, after thirty (30) minutes after the last lunch period until the end of the school day.

D. Food Sales and Distribution

Food sales and distribution, by school approved school organizations for the benefit of these organizations may be allowed, but only after written permission is granted by the principal of the particular school. The student organization must prove that the food sold or distributed contains the minimum nutritional values so as to comply with the Federal Regulations contained in 7 CFR, Parts 210 and 220. The principal shall consult in writing with the Food and Nutrition Services Administrator to determine if the food sold or distributed is of sufficient nutritional value so as to comply with the Federal Regulations. Food sales or distribution shall occur only after the end of the last lunch period until the end of the school day.

E. Food Ticket Sales

Sales of tickets or other items are permissible provided all proceeds are used for the approved purposes of a school student organization and comply with the aforementioned policies.

Sales of tickets or other items by teachers, the administration or other individuals for purposes of generating funds for purposes other than use by school sponsored student organization are permitted only if approved by the Superintendent of Education.

F. Food Service Area

Schools must not design their food service area in such a way as to encourage or facilitate the choice or purchase of food with minimal nutritional value as a ready substitute for the program meals.

G. Compliance with US Dietary Guidelines

Foods sold or served in schools should assist students to comply with the dietary guidelines for Americans, by providing a variety of grains, fruits, vegetables, food low in saturated fat, trans-fat, cholesterol, sugars and salt.

H. Fresh Fruits/Vegetables and 100% Juice Machines

Fresh fruits and vegetables and other fresh fruit and vegetable (100% juice) juice machines are acceptable at all times.

I. Sale and Distribution of Food and Beverages

All food and beverages sold or distributed on campus at anytime must meet the Department of Public Health and Social Services' standards in regard to storage, preparation and serving; and must be approved by the Food and Nutrition Services Administrator.

J. Access to Safe Drinking Water

Students and staff will have access to safe, fresh drinking water throughout the school day. Fluoridated or bottled water should be made available for purchase by staff and students.

K. Non-Food Alternatives

School staff should encourage non-food alternatives as student rewards.

Milk

To ensure that our students receive a variety to include low-fat and non-fat fluid milk, schools shall include with every program meal served, half pint disposable container of fluid milk. The fluid milk's nutritional content shall at a minimum:

A. Milk Fluid Unflavored (white):

- a. Two percent (2%) reduced fat.
- b. Pasteurized.
- c. Must contain Vitamins A & D at levels specified by the US Food and Drug Administration.

B. Chocolate, Strawberry, and Vanilla Milk:

- a. One percent (1%) reduced fat.
- b. Pasteurized.
- c. Must contain Vitamins A & D at levels specified by the US Food and Drug Administration.

School Cafeterias

A. Designation of Eating Areas

Any student may eat in the school cafeteria or other designated place on campus.

B. Meal Prices

Meal prices will be established by the Superintendent in consultation with the Food and Nutrition Services Administrator and with the approval of the Board at the beginning of each school year.

C. Pricing of Healthy Foods

Healthy option foods should be competitively priced.

D. Posting of Meal Prices and Menus

Meal prices and menus will be conspicuously posted in each cafeteria or designated meal area.

E. Promotion of Nutrition and Nutrition Education

School Cafeteria and food service staff shall promote good nutrition and nutrition education by offering healthy food choices. Schools and the Food and Nutrition Services Division shall reinforce the promotion of good nutrition by reinforcing programs, paraphernalia, and activities to classrooms such as decorations, special promotions, and themes.

Nutrition and Food Services Operation

In order to support the school's nutrition and food services' operation as an essential partner in the educational mission of the district and its role in the district's comprehensive nutrition program, school administrators and in collaboration with the Food and Nutrition Services Administrator shall be responsible for:

- A. Encouraging all students to participate in the school's Nutrition Meal Programs.
- B. Providing varied and nutritious food choices consistent with the applicable federal government Dietary Guidelines for Americans.
- C. Providing adequate time and space to eat meals in a pleasant and safe environment. Schools shall ensure:
 - a. Seating is not overcrowded;
 - b. Rules for safe behavior are consistently enforced;

- c. Appropriate supervision is provided; and
- d. For recess held in conjunction with the lunch period, recess should be scheduled prior to the lunch period for elementary students.

Family and Community Involvement

In order to promote family and community involvement in supporting and reinforcing nutrition education in the schools, the school administrator is responsible for ensuring:

- A. Nutrition education materials and meal menus are made available to parents;
- B. Parents are encouraged to promote their child's participation in the school meals program. If their children do not participate in the school meal program, parents should provide their children with healthy snacks/meals;
- C. Families are invited to attend exhibitions of student nutrition projects or health fairs;
- D. Nutrition education curriculum includes homework that students can do with their families (e.g., reading and interpreting food labels, reading nutrition-related newsletters, preparing healthy recipes, etc);
- E. School staff are encouraged to cooperate with other agencies and community groups to provide opportunities for student projects related to nutrition, as appropriate; and
- F. School staff considers the various cultural preferences in development of nutrition education programs and food options.

Staff Development

Ongoing in-service and professional development training opportunities for staff in the area of food nutrition will be encouraged.

Program Evaluation

In order to evaluate the effectiveness of the school health program in promoting healthy eating and to implement program changes as necessary to increase its effectiveness, the Food and Nutrition Services Administrator shall be responsible for evaluating and assessing annually the Board Policy and Procedures are implemented, including a periodic assessment of the school meal program with input from students, parents and staff. The evaluation and assessment shall be submitted annually in report form to the Superintendent of Education and the Guam Education Policy Board one month prior to the opening of each school year.



GUAM PUBLIC SCHOOL SYSTEM
Food and Nutrition Services
Management Division
 P.O. Box DE
 Hågatña, Guam 96932
 Telephone: (671) 475-6400/9
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FAX COVERSHEET

TO: THE OFFICE OF SENATOR
MIKE CRUZ, MD
Attn: Ms. Elaine Dell'Isola

FROM: Shelly Blas, Food & Nutrition
Services

FAX NUMBER: 477-5984

TOTAL NO. OF PAGES INCLUDING
COVER:
 30

DATE: OCTOBER 17, 2005

RE: CDC BMI INFORMATION

URGENT FOR REVIEW PLEASE COMMENT PLEASE REPLY PLEASE RECYCLE

NOTES/COMMENTS:

Buenas yan Håfa Adal Enclosed is the BMI information from the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention. Should you have any additional questions or concerns please contact the Food and Nutrition Services Management Division at 475-6400-9. Thank you very much!

RECEIVED

DATE: 10/17/05
10/17/05

Using the BMI-for-Age Growth Charts

INTRODUCTION

The Body Mass Index (BMI)-for-age charts for boys and girls aged 2 to 20 years are a major addition to the new CDC Pediatric Growth Charts. For the first time there is a screening tool to assess risk of overweight and overweight in children and adolescents. This module presents the rationale behind the decision to include the BMI-for-age charts, discusses characteristics of the BMI-for-age charts, and provides an opportunity for practical application of calculating BMI, and plotting and interpreting BMI-for-age through case studies.

OBJECTIVES

- Describe the advantages of using the BMI-for-age charts as a screening tool to evaluate overweight and underweight in children and adolescents
- Calculate BMI using the metric and English methods
- Demonstrate an understanding of the use of the BMI-for-age chart by accurately plotting and interpreting BMI-for-age on the appropriate chart

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1. What is BMI?
 2. Advantages to using BMI-for-age as a screening tool for overweight and underweight
 3. Recommendations for using BMI to assess overweight
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 5. Recommended BMI-for-age cutoffs
 6. Calculating BMI
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 8. Visual assessment versus calculation of BMI
 9. Accuracy of measurements
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1. WHAT IS BMI?

- **An anthropometric index of weight and height**

Body Mass Index (BMI) is an anthropometric index of weight and height that is defined as body weight in kilograms divided by height in meters squared (Keys et al., 1972).

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

BMI is the commonly accepted index for classifying adiposity in adults and it is recommended for use with children and adolescents.

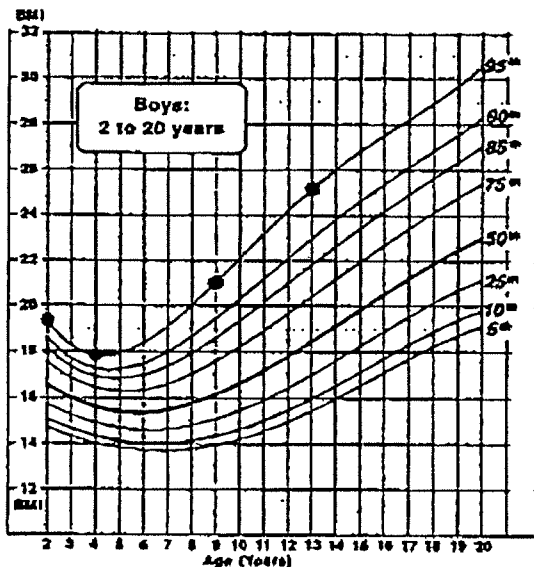
- **A screening tool**

Like weight-for-stature, BMI is a screening tool used to identify individuals who are underweight or overweight. BMI is NOT a diagnostic tool (Barlow and Dietz, 1998).

For example, a child who is relatively heavy may have a high BMI for his or her age or high weight-for-stature. To determine whether the child has excess fat, further assessment would be needed and that might include skinfold measurements. To determine a counseling strategy, assessments of diet, health, and physical activity are needed.

For children, BMI is gender specific and age specific (Hammer et al., 1991; Pietrobelli et al., 1998). Because BMI changes substantially as children get older, **BMI-for-age** is the measure used for children ages 2 to 20 years.

FOR CHILDREN, BMI DIFFERS BY AGE AND GENDER



Because adiposity varies with age and gender during childhood and adolescence, BMI is age and gender specific. As illustrated on this growth chart for boys, in a growth pattern established along the 95th percentile, BMI-for-age reached a minimum at 4 years of age and then increased with increasing age.

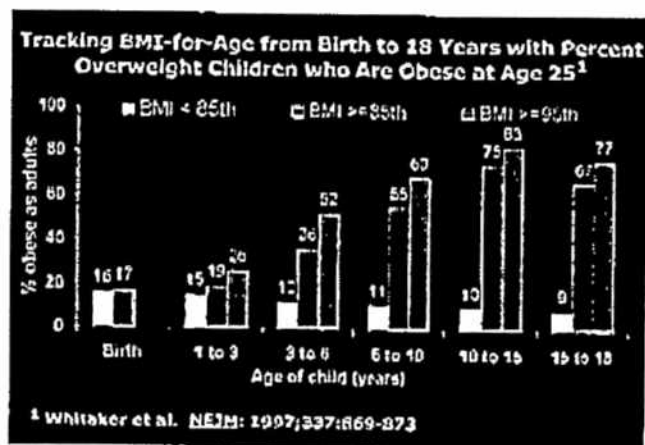
- **An indirect measure of body fatness**

BMI is not a direct measure of body fatness. However, BMI parallels changes obtained by direct measures of body fat such as underwater weighing and dual energy x-ray absorptiometry (DXA). BMI can be considered a proxy for measures of body fat.

2. ADVANTAGES TO USING BMI-FOR-AGE AS A SCREENING TOOL FOR OVERWEIGHT AND UNDERWEIGHT

There are several advantages to using BMI-for-age as a screening tool for overweight and underweight.

- **BMI-for-age provides a reference for adolescents not previously available.** When the 1977 NCHS growth charts were developed, weight-for-height percentiles were provided only for prepubescent girls up to 10 years and for boys up to 11.5 years (Hamill et al., 1979). BMI-for-age is the only indicator that allows us to plot a measure of weight and height with age on the same chart. BMI-for-age was not available in the 1977 charts. Age as well as stage of sexual maturity is highly correlated with body fatness (Daniels et al., 1997).
- **BMI-for-age is the measure that is consistent with the adult index** so it can be used continuously from 2 years of age to adulthood.
 - BMI-for-age is not used in the United States before 2 years of age to screen for growth. BMI values at younger ages have a weak association with adolescent or adult obesity (Whitaker et al., 1997; Guo et al., 1994).
- **BMI can be used to track body size throughout the life cycle.** This is important because BMI-for-age in childhood is a determinant of adulthood BMI.



The tracking of BMI that occurs from childhood to adulthood is clearly shown in data from a study by Robert Whitaker and colleagues (Whitaker et al., 1997). They examined the probability of obesity in young adults in relation to the presence or absence of overweight at various times during childhood. For example, in children 10 to 15 years old, 10% of those with a BMI-for-age < 85th percentile were obese at age 25 whereas 75% of those with a BMI-for-age \geq 85th percentile were obese as adults and 80% of those with a BMI-for-age \geq 95th percentile were obese at age 25. (The sample size for the study was 854.) From this study, it is clear that an overweight child is more likely than a child of normal weight to be obese as an adult.

Other studies have shown this same trend of tracking occurring from childhood to adulthood (Guo et al., 1999; Guo et al., 1994; Garn and LaVelle, 1985).

- **BMI-for-age relates to health risks.**
 - BMI-for-age correlates with clinical risk factors for cardiovascular disease including hyperlipidemia, elevated insulin and high blood pressure. Freedman and colleagues used data from the Bogalusa Heart Study and found that approximately 60% of 5 to 10 year-old children who were overweight had at least one biochemical or clinical risk factor for cardiovascular disease such as those just mentioned, and 20% had two or more risk factors (Freedman et al., 1999).
 - BMI-for-age during pubescence is related to lipid and lipoprotein levels and blood pressure in middle age (Must et al., 1992). Risk factors in children can become chronic diseases in adults.

- **BMI-for-age compares well with both weight-for-stature measurements and measures of body fat.**
 - A study completed by researchers at the CDC (Mei et al., 2002) compared the performance of BMI-for-age and weight-for-stature with fatness measured by dual energy x-ray absorptiometry (DXA), a direct measure of adiposity.
 - NHANES III data were used to test how well BMI-for-age predicts underweight (below the 15th percentile) and overweight (above the 85th percentile) relative to the traditional weight-for-stature in children 2 to 19 years old.
 - Both BMI-for-age and weight-for-stature performed equally well in screening for underweight and overweight among children 3 to 5 years of age.
 - For school-aged children (6 to 11 and 12 to 19 age groups), BMI-for-age was slightly better than weight-for-stature in predicting underweight and overweight.

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- Ratios of weight relative to stature such as BMI-for-age and weight-for-stature may be used as indirect measures of overweight that correlate with direct measures.
- CDC recommends the use of BMI-for-age for children aged 2 years and older. However, weight-for-stature performs equally well in pre-school aged children and can be used in this age group.
- BMI-for-age is significantly correlated with subcutaneous and total body fatness in adolescents (Barlow and Dietz, 1998).

3. RECOMMENDATIONS FOR USING BMI TO ASSESS OVERWEIGHT

Because of the numerous advantages of using BMI-for-age to assess overweight in children and adolescents, expert committees and advisory groups have recommended BMI-for-age as the accepted measure.

- In 1994, an expert committee on Clinical Guidelines for Overweight in Adolescent Preventive Services was convened by the Maternal and Child Health Bureau (MCHB), American Academy of Pediatrics and the American Medical Association with support from the Centers for Disease Control and Prevention, to advise Bright Futures: National Guidelines for Health Supervision of Infants, Children and Adolescents and Guidelines for Adolescent Preventive Services (GAPS) on the criteria for the identification of adolescent obesity. The committee recommended that BMI-for-age be used to routinely screen for overweight in adolescents (Himes and Dietz, 1994).
- In 1997, a consensus panel recommended that BMI for age be used routinely to screen children for overweight. They also recommended cutpoints of between the 85th and 95th percentiles to identify children and adolescents as at risk of overweight and at or above the 95th percentile to identify children and adolescents as overweight. (Barlow and Dietz, 1998).
- Also, in 1997, an international conference convened by the International Obesity Task Force concluded that BMI is a reasonable measure for assessing overweight in children and adolescents worldwide. (Dietz and Bellizzi, 1999; Bellizzi and Dietz, 1999).

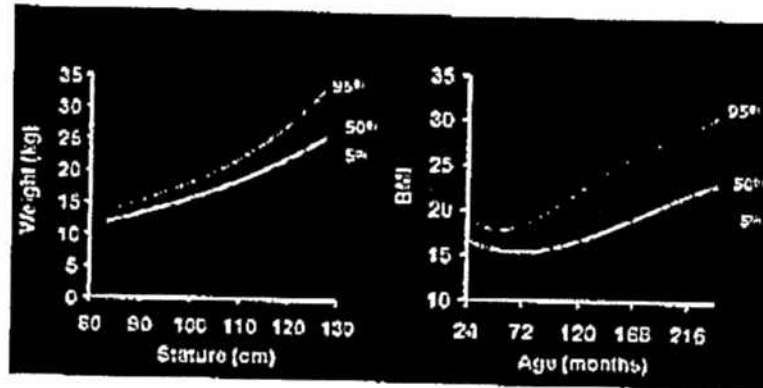
Dr. William Dietz discusses the rationale for the BMI cutpoints, the limitations and sensitivity of BMI-for-age. Dr. Dietz is the Director of the Division of Nutrition and Physical Activity, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, and was a member of the various expert committees on obesity.

Full text is included in the Appendix.



4. CHARACTERISTICS OF BMI-FOR-AGE

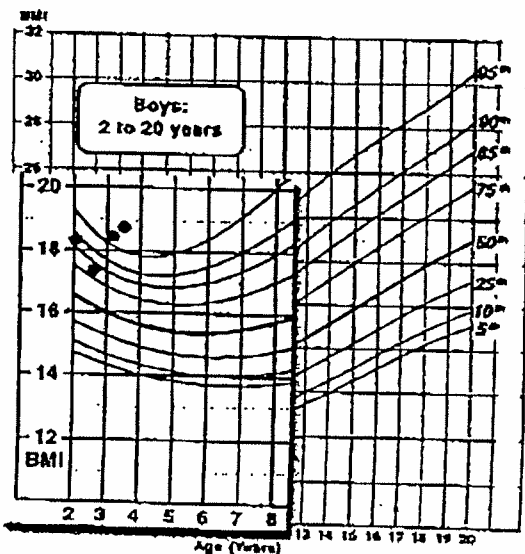
- The shape of the weight-for-stature curve versus the BMI-for-age curve



The shapes of the weight-for-stature and the BMI-for-age growth curves differ, as you can see. The weight-for-stature curve shows how weight increases in relation to stature. The 1977 weight-for-stature charts are limited to prepubescent boys under 11.5 years of age and statures of less than 145 cm and to prepubescent girls under 10 years of age and statures less than 137 cm (Hamill et al., 1979). The BMI-for-age chart shows age-related changes in growth and can be used up to age 20. With the BMI-for-age chart weight, stature and age of a child are considered whereas with the weight-for-stature chart, only weight and height are used.

- The shape of the BMI-for-age chart clearly illustrates "adiposity" rebound

BMI changes substantially with age. After about 1 year of age, BMI-for-age begins to decline and it continues falling during the preschool years until it reaches a minimum around 4 to 6 years of age. After 4 to 6 years of age, BMI-for-age begins a gradual increase through adolescence and most of adulthood. The rebound or increase in BMI that occurs after it reaches its lowest point is referred to as "adiposity" rebound (Whitaker et al., 1998; Rolland-Cachera et al., 1991; Rolland-Cachera et al., 1984). This is a normal pattern of growth that occurs in all children.



Age (months)	BMI
26	18.2
32	17.4
38	18.5
41	18.7

Here you see a section of the BMI-for-age chart for boys enlarged to show the shape of the curve in more detail. After 4 to 6 years of age, BMI-for-age begins a gradual increase through adolescence and most of adulthood. The rebound or increase in BMI that occurs after it reaches its lowest point is referred to as "adiposity" rebound (Whitaker et al., 1998; Rolland-Cachera et al., 1991; Rolland-Cachera et al., 1984). This is a normal pattern of growth that occurs in all children.

Recent research has shown that the age when the "adiposity" rebound occurs may be a critical period in childhood for the development of obesity as an adult (Whitaker et al., 1998). An early "adiposity" rebound, occurring before ages 4 to 6, is associated with obesity in adulthood. In the example shown here, adiposity rebound occurred at around age 3. BMI reached the lowest point at 32 months (2 years 8 months) and then began to increase.

However, studies have yet to determine whether the higher BMI in childhood is truly adipose tissue versus lean body mass or bone. Additional research is needed to further understand the impact of early adiposity rebound on adult obesity. (Note that we put the word adiposity in quotations when using it in this context since we do not know if it is truly adipose tissue.)

5. RECOMMENDED BMI-FOR-AGE CUTOFFS

\geq 95th percentile Overweight

85th to < 95th percentile Risk of overweight

< 5th percentile Underweight

The expert committees' recommendations are to classify BMI-for-age at or above the 95th percentile as overweight and between the 85th and 95th percentile as at risk of overweight (Himes and Dietz, 1994).

"Overweight" rather than obesity is the term preferred for describing children and adolescents with a BMI-for-age equal to or greater than the 95th percentile of BMI-for-age or weight-for-length.

The 85th percentile is included on the BMI-for-age and the weight-for-stature charts to identify those at risk of overweight.

The cutoff for underweight of less than the 5th percentile is based on recommendations by the World Health Organization Expert Committee on Physical Status (World Health Organization, 1996).

Classifications of Overweight and Underweight for Adults

Classification of overweight and underweight is different for adults than it is for children and adolescents. For adults, overweight and underweight categories are defined by fixed BMI cutpoints derived from morbidity and mortality data. Adults with low and very high BMIs are at a higher relative mortality risk compared to those with BMIs of 18.5 or greater and less than 30.0 (Strawbridge et al., 2000). For adults, BMI is not age- or gender-specific as it is for children and adolescents.

Clinical guidelines established in 1998 by the National Heart, Lung, and Blood Institute are as follows:

BMI less than 18.5	underweight
BMI of 18.5 through 24.9	normal
BMI of 25.0 through 29.9	overweight
BMI of 30.0 or greater	obese

Performance of BMI-for-Age As A Screening Tool

"The validity of selected cutoff points to identify adolescents with the highest percentage of body fat has been investigated. In general, common cutoff points for BMI and relative weight have low sensitivities but high specificities. For example, BMIs \geq 85th percentile has a sensitivity of 29% and 23% for identifying adolescent males and females, respectively, who are above the 90th percentile for percentage body fat; corresponding specificities are 99% and 100% (Himes and Bouchard, 1989). In screening for adolescent overweight, specificity may be more important than sensitivity. Maximizing specificity minimizes the proportion of adolescents who will be incorrectly considered overweight by the screen" (Himes and Dietz, 1994).

Recently it has been shown that cardiovascular risk factors are associated with the established BMI-for-age cutoffs. Freedman et al., (1999) found that approximately 60% of 5 to 10 year-old children with BMI-for-age values \geq the 95th percentile had at least one biochemical or clinical risk factor for cardiovascular disease such as hypertension, elevated insulin levels, and hyperlipidemia. Twenty percent of children had two or more risk factors.

6. CALCULATING BMI

BMI can be calculated using either the metric system or the English system.

CALCULATING BMI USING THE METRIC SYSTEM

$$\text{Formula: weight (kg) / [height (m)]}^2$$

$$\text{Calculation: [weight (kg) / height (cm) / height (cm)] x 10,000}$$

With the metric system, the formula for BMI is weight in kilograms divided by height in meters squared. Since height is commonly measured in centimeters, an alternate calculation formula, dividing the weight in kilograms by the height in centimeters squared, and then multiplying the result by 10,000, can be used.

It is necessary to multiply by 10,000 to convert BMI to meters since stature measurements are generally taken in centimeters. There are 100 centimeters in a meter and since stature is squared we must convert as such: $100 \times 100 = 10,000$.

When using a hand-held calculator:

- If your calculator has a square function, divide weight (kg) by height (cm) squared, multiply by 10,000 and round to one decimal place.
- If your calculator does not have a square function, divide weight by height twice as shown in the calculation formula above, multiply by 10,000 and round to one decimal place.

Calculations for BMI can be completed as a continuous equation. (Note that the formula for the latter calculation is on the CDC Clinical Growth Charts and will be the calculation used in this module).

Example: We know that Sam's weight is 16.9 kg and his height is 105.4 cm. What is Sam's BMI?

$$\text{Answer: } (16.9 \text{ kg} / 105.4 \text{ cm} / 105.4 \text{ cm}) \times 10,000 = 15.2$$

Practice calculating BMI using the metric system

Complete the following two calculations, rounding to one decimal place.

Calculation 1: Georgia's weight is 16.6 kg and her height is 99.1 cm. What is Georgia's BMI?

$$\text{Answer: } (16.6 \text{ kg} / 99.1 \text{ cm} / 99.1 \text{ cm}) \times 10,000 = 16.9$$

Calculation 2: Jose's weight is 18.3 kg and his height is 103.5 cm. What is Jose's BMI?

$$\text{Answer: } (18.3 \text{ kg} / 103.5 \text{ cm} / 103.5 \text{ cm}) \times 10,000 = 17.1$$

CALCULATING BMI USING THE ENGLISH SYSTEM

$$\text{Formula: weight (lb) / [height (in)]}^2 \times 703$$

$$\text{Calculation: [weight (lb) / height (in) / height (in)] x 703}$$

When using English measurements, ounces (oz) and fractions must be changed to decimal values. Then, calculate BMI by dividing weight in pounds (lbs) by height in inches (in) squared and multiplying by a conversion factor of 703.

- When using a hand-held calculator, if your calculator has a square function, divide weight (lbs) by height (in) squared, multiply by 703 and round to one decimal place.
- If your calculator does not have a square function, divide weight by height twice as shown in the calculation above, multiply by 703 and round to one decimal place.

Calculations for BMI can be completed as a continuous equation. Note that the formula for the latter calculation is on the CDC Clinical Growth Charts and will be the calculation used in this module.

Example: Let's calculate Sam's BMI using the English numeric system. His weight is 37 pounds and 4 ounces and his height is 41 1/2 inches.

Convert ounces and fractions to decimals:

Weight of 37 lbs and 4 oz = 37.25 lbs (16 ounces = 1 pound so 4 oz/16 oz = 0.25).

Height = 41.5 in.

$$(37.25 \text{ lbs} / 41.5 \text{ in} / 41.5 \text{ in}) \times 703 = 15.2$$

Practice calculating BMI using the English system

Complete the following two calculations, rounding to one decimal place.

Calculation 1: Georgia's weight is 36 1/2 pounds and her height is 39 inches. What is Georgia's BMI?

Answer: Convert fractions to decimals:
Weight of 36 1/2 lbs = 36.5 lbs

$$(36.5 \text{ lbs} / 39 \text{ in} / 39 \text{ in}) \times 703 = 16.9$$

Calculation 2: Jose's weight is 40 1/4 pounds and his height is 40 3/4 inches. What is Jose's BMI?

Answer: Convert fractions to decimals:
Weight of 40 1/4 lbs = 40.25 lbs
Height of 40 3/4 in = 40.75 in

$$(40.25 \text{ lbs} / 40.75 \text{ in} / 40.75 \text{ in}) \times 703 = 17.0$$

Note: There is a difference of 0.1 between BMI calculations when using the metric system (17.1) versus the English system (17.0). This is due to the conversion factor.

7. OTHER METHODS TO OBTAIN BMI

- **CDC Table for Calculated Body Mass Index Values for Selected Heights and Weights for Ages 2 to 20**

In addition to calculations, BMI can also be determined by looking it up on the *CDC Table for Calculated Body Mass Index Values for Selected Heights and Weights for Ages 2 to 20* in which BMI has been calculated.

Example:

Using the metric system, find the BMI for a child with a weight of 17.0 kg and a height of 105.4 cm.

Using the English system, find the BMI for a child with a weight of 37.5 lb and a height of 41.5 in.

See BMI TABLE in Appendix.

- **Epi Info 2000 has an anthropometric data component called NUTSTAT that can be used to look at population-based data or group data.**
- **SAS program to calculate BMI and percentiles for all indices.**

8. VISUAL ASSESSMENT VERSUS CALCULATION OF BMI

- How accurately can you screen for risk of overweight in children by looking?

It has been said that "few medical conditions can be diagnosed as confidently by untrained individuals as gross obesity." Yet it is very difficult to distinguish children who are at risk of overweight from normal children. In childhood, the distinction is made more difficult by age-related physiological variations (Poskitt, 1995).

Take a look at three photos of preschool aged children to see how accurately you can screen for risk of overweight in children solely by looking at them. We want you to try to identify children with a BMI-for-age equal to or greater than the 85th percentile and less than the 95th percentile.

FIRST EXAMPLE



The first photo is of Mike, a 3 year-old boy. Does he appear:

1. Underweight
2. Normal
3. At risk of overweight
4. Overweight

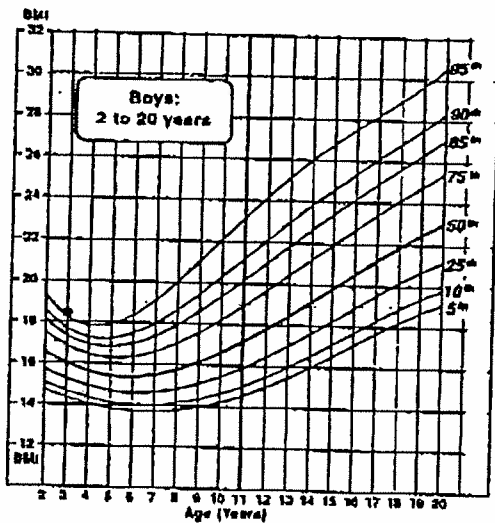
Let's assess for risk of overweight by calculating BMI.

Mike's height is 39.7 inches and his weight is 41.0 pounds.

$$\text{BMI} = (\text{weight} / \text{height}^2) \times 703$$

$$\text{Mike's BMI: } (41.0 / 39.7 / 39.7) \times 703 = 18.3$$

Now, plot his BMI on the appropriate chart for his age and interpret the findings.



Mike's BMI-for-age falls above the 95th percentile on the BMI-for-age chart for boys so he would be considered overweight.

SECOND EXAMPLE



Here is Mindy, a 4 year-old girl.
Does she appear:

1. Underweight
2. Normal
3. At risk of overweight
4. Overweight

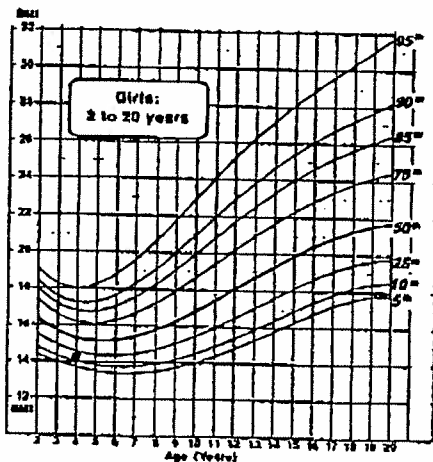
Let's assess for risk of overweight by calculating BMI.

Mindy's height is 41.9 inches and her weight is 35.5 pounds.

$BMI = (weight / height^2) \times 703$

Mindy's BMI: $(35.5 \text{ lbs} / 41.9 \text{ in} / 41.9 \text{ in}) \times 703 = 14.2$

Now, plot her BMI on the appropriate chart for her age and interpret the findings.



Plotted on the BMI-for-age chart for girls, Mindy's BMI-for-age falls just above the 10th percentile indicating that her BMI is within normal range.

THIRD EXAMPLE



Lisa is another 4 year-old girl.
Does she appear:

1. Underweight
2. Normal
3. At risk of overweight
4. Overweight

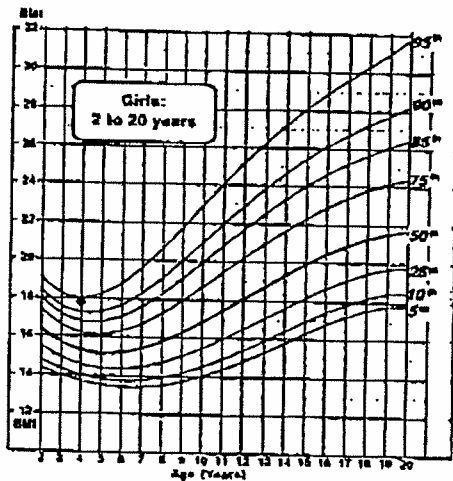
Let's assess for risk of overweight by calculating BMI.

Lisa's height is 39.2 Inches and her weight is 38.6 pounds.

$$\text{BMI} = (\text{weight} / \text{height}^2) \times 703$$

$$\text{Lisa's BMI: } (38.6 \text{ lbs} / 39.2 \text{ in} / 39.2 \text{ in}) \times 703 = 17.7$$

Now, plot her BMI on the appropriate chart for her age and Interpret the findings



Plotted on the BMI-for-age chart for girls, Lisa's BMI-for-age falls on the 94th percentile so she would be classified as at risk of overweight.

The point of this exercise is to demonstrate the difficulty of making a consistently accurate visual assessment of at risk of overweight. To make a consistently accurate determination of at risk of overweight, BMI must be determined and plotted on the appropriate growth chart for the appropriate age.

9. ACCURACY OF MEASUREMENTS

Measurements must be obtained and recorded accurately if they are to be used as an effective screening tool. Stature and weight should be measured following recommended protocols:

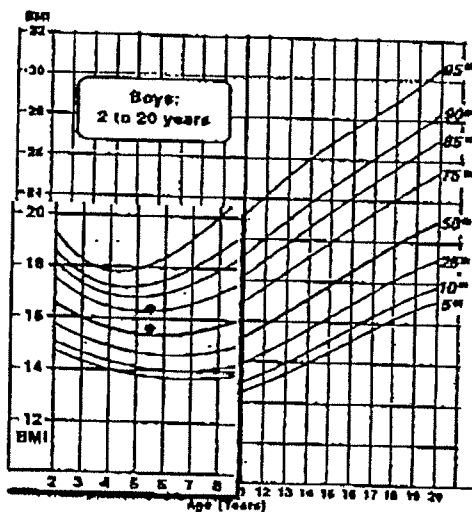
Stature: <http://www.cdc.gov/nccdphp/dnpa/bmi/meas-height.htm>

Weight: <http://www.cdc.gov/nccdphp/dnpa/bmi/meas-weight.htm>

The following examples illustrate the importance of accurate measurements and shows that inaccurate measurements can result in an inaccurate growth assessment.

EXAMPLE 1:

Sanjay is a 5.5-year-old boy, weighing 41.5 pounds with a height of 43.0 inches. His calculated BMI is 15.8. When plotted on the BMI-for-age chart for boys, his BMI falls just above the 50th percentile (shown by the green dot).

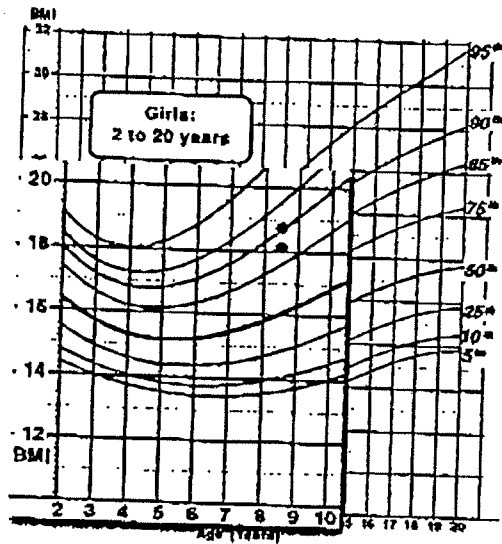


Inaccurate measurement

If his height were measured or recorded inaccurately at 42.25 inches (3/4 inch below his actual height of 43.0 inches), his BMI-for-age would be 16.3 and fall on the 75th percentile (shown by the red dot). In this example, the measurement error did not cause a change in classification because growth remained within the normal range but you see what could happen.

EXAMPLE 2:

Marla is an 8.5-year old girl with a weight of 58.0 pounds and a height of 47.5 inches. Her BMI is 18.1. When plotted on the BMI-for-age chart for girls, her BMI falls between the 75th and 85th percentiles (shown by the green dot).



Inaccurate measurement

If her weight were measured or recorded inaccurately at 60.0 pounds (2.0 pounds above her actual weight of 58.0 pounds), her BMI-for-age would be 18.7 and fall on the 85th percentile (shown by the red dot) and thus Maria would be considered at risk of overweight. An error in weight could occur if scales are not adequately maintained, standard protocol is not followed for weighing, or a recording error is made.

10. INTERPRETATION

Interpretation of the plotted BMI-for-age is based on the established cutoff values previously shown.

≥ 95th percentile Overweight

85th to < 95th percentile Risk of overweight

< 5th percentile Underweight

These percentiles indicate the rank of BMI in a group of 100 children of the same gender and age. For example, in a group of 100 children:

- 5 children will have a BMI-for-age that is at or above the 95th percentile
- 10 will have a BMI-for-age that is between the 85th and 95th percentiles
- 5 will have a BMI-for-age less than the 5 percentile, and
- 80 children will have a BMI-for-age that is within the normal range.

When assessing physical growth, it is desirable to have a series of accurate measurements to establish an observed growth pattern. Having a series of measurements takes into consideration short- and longer-term conditions and provides a context for individual measurements in interpretation.

Growth patterns that fall outside the established parameters, the 5th and 95th percentile for any given anthropometric indices, suggest the need to recheck measurements, plots, and calculations and make any necessary corrections or adjustments. If measurements are correct, further evaluation is needed to determine the cause.

11. SUMMARY

- BMI-for-age is the method recommended for screening overweight and underweight in children and adolescents from 2 to 20 years of age.
- BMI-for-age is a screening tool that may lead to further assessment to diagnose a specific health condition.
- For children, BMI is age and gender specific and nutritional status is identified based on percentiles. For adults, BMI is neither age nor gender specific and nutritional status is defined by fixed cut points.
- Periodic, accurate measurements and growth records are important elements of growth screening. An accurate interpretation of growth depends on the accuracy of weighing and measuring.

12. STEPS TO PLOT AND INTERPRET BMI-FOR-AGE

The six steps outlined here to plot and interpret BMI-for-age are similar to those used for a general growth assessment.

Step 1: Obtain accurate weights and height measurements

Step 2: Select the appropriate growth chart

(based on the age and gender of the child being weighed and measured)

Step 3: Record the data

Step 4: Calculate BMI

Step 5: Plot measurements

Step 6: Interpret the plotted measurements

An instruction sheet on *Using and Interpreting the CDC Growth Charts* contains detailed instructions for the above steps.

Example Case Study

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The following case is an example of an anthropometric assessment of "Sam's" physical growth using the steps recommended to determine, plot and interpret BMI-for-age. You can choose to view this example using the metric system or the English system.

PLOTTING AND INTERPRETING BMI-FOR-AGE USING THE METRIC SYSTEM

A Case Study of 'Sam'

Step 1. Obtain accurate weights and height measurements

Date of Birth (DOB): 9/15/94

Date of Visit (DOV): 4/4/98

Weight = 16.9 kg

Height = 105.4 cm

Step 2. Select the appropriate growth chart

Because Sam is a normal 3.5 years old, a standing height was obtained. The appropriate chart to use is the 'Boys 2 to 20 BMI-for-age' chart.

Step 3. Record the data

On the data entry table found on the clinical growth chart, information relevant to the growth chart is recorded. Here data has been recorded for the date of visit, the child's age, weight and height at the visit.

<i>Date</i>	<i>Age</i>	<i>Weight</i>	<i>Stature</i>	<i>BMI</i>
4/4/98	3.5 yrs	16.9 kg	105.4 cm	

Step 4. Calculate BMI

Calculate BMI at the time of the clinic visit.

$$BMI = (\text{weight} / \text{height} / \text{height}) \times 10,000$$

$$BMI: (16.9 \text{ kg} / 105.4 \text{ cm} / 105.4 \text{ cm}) \times 10,000 = 15.2$$

Then the BMI of 15.2 is entered on the data entry table.

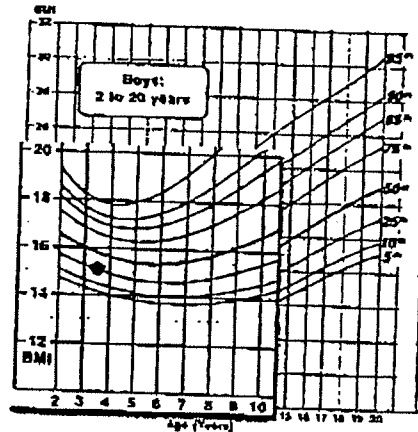
<i>Date</i>	<i>Age</i>	<i>Weight</i>	<i>Stature</i>	<i>BMI</i>
4/4/98	3.5 yrs	16.9 kg	105.4 cm	15.2

Step 5. Plot measurements

All the necessary information is recorded and Sam's BMI can be plotted. On the BMI-for-age chart, find Sam's age on the horizontal axis and visually draw a vertical line up from that

point. Then find his BMI on the vertical axis and visually draw a horizontal line across from that point. The point where the two intersect represents Sam's BMI-for-age.

When plotted on the growth chart, Sam's BMI-for-age falls just below the 25th percentile curve.



Step 6. Interpret the plotted measurements

Since Sam's BMI-for-age falls just below the 25th percentile curve, this means that of 100 children with the same gender and age as Sam's, fewer than 25 children have a BMI-for-age lower than his and more than 75 have a BMI-for-age higher than his. Sam is not overweight, underweight or at risk of overweight.

When a child's plotted measurement falls between the 5th and 85th percentiles it is considered to be within the normal range. Sam's BMI-for-age is in the normal range based on this measurement.

PLOTTING AND INTERPRETING BMI-FOR-AGE USING THE ENGLISH SYSTEM

A Case Study of 'Sam'

Step 1. Obtain accurate weights and height measurements

Date of Birth (DOB): 9/15/94
 Date of Visit (DOV): 4/4/98
 Weight: 37 pounds 4 ounces
 Height: 41 1/2 Inches

Step 2. Select the appropriate growth chart

Because Sam is a normal 3.5 years old, a standing height was obtained. The appropriate chart to use is the 'Boys 2 to 20 BMI-for-age' chart.

Step 3. Record the data

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On the data entry table found on the clinical growth chart, information relevant to the growth chart is recorded. Here data has been recorded for the date of visit, the child's age, weight and height at the visit.

<i>Date</i>	<i>Age</i>	<i>Weight</i>	<i>Stature</i>	<i>BMI</i>
4/4/98	3.5 yrs	37.25 lbs	41.5 in	

Step 4. Calculate BMI

Calculate BMI at the time of the clinic visit.

Convert ounces and fractions to decimals:

Weight of 37 lbs and 4oz = 37.25 lbs (16 ounces = 1 pound so 4oz/16 oz = 0.25).

Height = 41.5 in

$BMI = (\text{weight} / \text{height} / \text{height}) \times 703$

$BMI: (37.25 \text{ lbs} / 41.5 \text{ in} / 41.5 \text{ in}) \times 703 = 15.2$

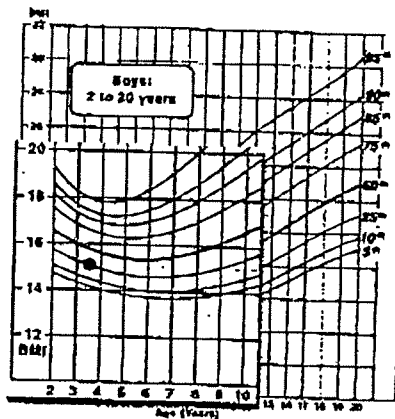
Then the BMI of 15.2 is entered on the data entry table.

<i>Date</i>	<i>Age</i>	<i>Weight</i>	<i>Stature</i>	<i>BMI</i>
4/4/98	3.5 yrs	37.25 lbs	41.5 in	15.2

Step 5. Plot measurements

All the necessary information is recorded and Sam's BMI can be plotted. On the BMI-for-age chart, find Sam's age on the horizontal axis and visually draw a vertical line up from that point. Then find his BMI on the vertical axis and visually draw a horizontal line across from that point. The point where the two intersect represents Sam's BMI-for-age.

When plotted on the growth chart, Sam's BMI-for-age falls just below the 25th percentile curve.



Step 6. Interpret the plotted measurements

Since Sam's BMI-for-age falls just below the 25th percentile curve, this means that of 100 children with the same gender and age as Sam, fewer than 25 children have a BMI lower than his. Sam is neither overweight, underweight nor at risk of overweight.

When a child's plotted measurement falls between the 5th and 85th percentiles it is considered to be in the normal range. Sam's BMI-for-age is in the normal range based on this measurement.

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RESOURCES

CDC Table for Calculated Body Mass Index Values for Selected Heights and Weights for Ages 2 to 20: <http://www.cdc.gov/nccdphp/dnpa/bmi/00binaries/bmi-tables.pdf>

Epi Info 2000 with NUTSTAT: <http://www.cdc.gov/epiinfo/>

Instruction sheet for CDC Growth Charts

Measuring height/stature: <http://www.cdc.gov/nccdphp/dnpa/bmi/meas-height.htm>

Measuring weight: <http://www.cdc.gov/nccdphp/dnpa/bmi/meas-weight.htm>

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GLOSSARY

Anthropometric/Anthropometry: the science that deals with the measurement of the size, weight, and proportions of the human body.

Adiposity: the amount of fat in the body, expressed either as total fat mass (in kg) or the fraction (percentage) of total body fat.

Dual energy x-ray absorptiometry (DXA): a relatively new technology to directly measure body composition. DXA uses two x-ray energies to measure body fat, muscle, and bone mineral; considered more accurate and valid than underwater weighing.

Height: also referred to as stature; distance from the crown of the head to the surface on which the individual is standing; measured when the child/adolescent is not wearing shoes.

Hyperlipidemia: a general term for elevated concentrations of any or all of the lipids in plasma, e.g., hypercholesterolemia; a risk factor for cardiovascular disease.

Lipids: a family of compounds that includes triglycerides, phospholipids, and sterols.

Lipoprotein: a diverse class of particles containing varying amounts of triglycerides, cholesterol, phospholipids, and protein that solubilize lipids for blood transport.

Overweight: describes excess body weight; preferred term for describing excess body weight in children and adolescents.

APPENDIX

WILLIAM DIETZ, MD, PHD

Director, Division of Nutrition and Physical Activity
Centers for Disease Control and Prevention

The Body Mass Index (or BMI) is used to identify overweight and at risk of overweight in children and adolescents. The criteria we use are that a BMI between the 85th and 95th percentiles for age and gender identifies children at risk of overweight, and a BMI greater than or equal to the 95th percentile identifies children or teenagers who are overweight. The rationale for the use of these criteria is that a BMI at the 95th percentile in the U.S. population corresponds to a BMI of 30 in a young adult. In a young adult, a BMI greater than or equal to 30 is considered obesity.

In addition, a BMI at the 85th percentile in a young adult identifies a young adult with a BMI of 25, which is considered the top end of normal weight.

Therefore, the criteria used in children and teenagers do correspond (roughly) to the criteria used in adults for the identification of obesity and overweight.

There are several potential limitations to Body Mass Index which require that it not be used as the exclusive standard by which to judge a child at risk of overweight or obesity. The first limitation is that, as you know, BMI is weight divided by height squared.

Weight and height do not directly measure body fatness, so that an additional criteria that should be used for determining whether somebody who is overweight (as indicated by BMI greater than the 95th percentile) is also overfat, is a measure of a skinfold thickness -- like the tricep skinfold thickness. This will help differentiate children and teenagers who are both overweight and overfat from those who are overweight because of increased muscle mass or bone mass.

One of the questions is how sensitive and specific the BMI is for the identification of children with increased fatness. We compared body fatness in children and teenagers measured by DEXA (which is a definitive measure of body composition) with children with a BMI over the 95th percentile. The overwhelming majority of those children -- 95 percent of those children with a BMI greater than the 95th percentile -- also had increases in percent body fat compared to the general population.

The second consideration is how valid Body Mass Index is as a predictor of risk.

We know, from studies of 5 to 10 year-old children whose BMI is greater than the 95th percentile, that 60 percent have at least one additional cardiovascular disease risk factor -- like elevated systolic or diastolic blood pressure, elevated cholesterol or triglycerides, or elevated insulin levels. In addition about 15 percent of those same children (with a BMI greater than the 95th percentile) have two or more risk factors.

Therefore, BMI not only identifies children who have increased body fatness, but in addition BMI also indicates that those children who are overweight have associated risk factors.

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BMI TABLE

Calculated Body Mass Index

29"-43" and 35 lbs.-43 lbs.

Height Cm In	Weight		<small>Whenever a cent's specific height or weight measurement is not listed, round to the closest number in the field.</small>																
	Kg	Lb	15.9	16.1	16.3	16.6	16.8	17.0	17.2	17.5	17.7	17.9	18.1	18.4	18.6	18.8	19.1	19.3	19.5
	Lb	Kg	35	35.5	36	36.5	37	37.5	38	38.5	39	39.5	40	40.5	41	41.5	42	42.5	43
73.7 29			29.3	29.7	30.1	30.5	30.9	31.3	31.8	32.2	32.6	33.0	33.4	33.9	34.3	34.7			
74.9 29.5			28.3	28.7	29.1	29.5	29.9	30.3	30.7	31.1	31.5	31.9	32.3	32.7	33.1	33.5	33.9	34.3	34.7
76.2 30			27.3	27.7	28.1	28.5	28.9	29.3	29.7	30.1	30.5	30.9	31.2	31.6	32.0	32.4	32.8	33.2	33.6
77.5 30.5			26.5	26.8	27.2	27.6	28.0	28.3	28.7	29.1	29.5	29.9	30.2	30.6	31.0	31.4	31.7	32.1	32.5
78.7 31			25.8	26.0	26.3	26.7	27.1	27.4	27.8	28.2	28.5	28.9	29.3	29.6	30.0	30.4	30.7	31.1	31.5
80.0 31.5			24.8	25.2	25.5	25.9	26.2	26.6	26.9	27.3	27.6	28.0	28.3	28.7	29.1	29.4	29.8	30.1	30.5
81.3 32			24.0	24.4	24.7	25.1	25.4	25.7	26.1	26.4	26.8	27.1	27.5	27.8	28.2	28.5	28.8	29.2	29.5
82.6 32.5			23.3	23.6	24.0	24.3	24.6	25.0	25.3	25.6	26.0	26.3	26.6	27.0	27.3	27.6	28.0	28.3	28.6
83.8 33			22.6	22.9	23.2	23.6	23.9	24.2	24.5	24.9	25.2	25.5	25.8	26.1	26.5	26.8	27.1	27.4	27.8
85.1 33.5			21.9	22.2	22.6	22.9	23.2	23.5	23.9	24.1	24.4	24.7	25.1	25.4	25.7	26.0	26.3	26.6	26.9
86.4 34			21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4	23.7	24.0	24.3	24.6	24.9	25.2	25.5	25.8	26.2
87.6 34.5			20.7	21.0	21.3	21.6	21.9	22.2	22.4	22.7	23.0	23.3	23.6	23.9	24.2	24.5	24.8	25.1	25.4
88.9 35			20.1	20.4	20.7	20.9	21.2	21.5	21.8	22.1	22.4	22.7	23.0	23.2	23.5	23.8	24.1	24.4	24.7
90.2 35.5			19.5	19.8	20.1	20.4	20.8	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.8	23.2	23.4	23.7	24.0
91.4 36			19.0	19.3	19.5	19.8	20.1	20.3	20.6	20.9	21.2	21.4	21.7	22.0	22.2	22.5	22.8	23.1	23.3
92.7 36.5			18.5	18.7	19.0	19.3	19.5	19.8	20.1	20.3	20.6	20.8	21.1	21.4	21.6	21.9	22.2	22.4	22.7
94.0 37			18.0	18.2	18.5	18.7	19.0	19.3	19.5	19.8	20.0	20.3	20.5	20.8	21.1	21.3	21.6	21.8	22.1
95.3 37.5			17.5	17.7	18.0	18.2	18.5	18.7	19.0	19.2	19.5	19.7	20.0	20.2	20.5	20.7	21.0	21.2	21.5
96.5 38			17.0	17.3	17.5	17.8	18.0	18.3	18.5	18.7	19.0	19.2	19.5	19.7	20.0	20.2	20.4	20.7	20.9
97.8 38.5			16.5	16.8	17.1	17.3	17.6	17.8	18.0	18.3	18.5	18.7	19.0	19.2	19.4	19.7	19.9	20.2	20.4
99.1 39			16.2	16.4	16.6	16.9	17.1	17.3	17.6	17.8	18.0	18.3	18.5	18.7	19.0	19.2	19.4	19.6	19.9
100.3 39.5			15.8	16.0	16.2	16.4	16.7	16.9	17.1	17.3	17.6	17.8	18.0	18.2	18.5	18.7	18.9	19.2	19.4
101.6 40			15.4	15.6	15.8	16.0	16.3	16.5	16.7	16.9	17.1	17.4	17.6	17.8	18.0	18.2	18.5	18.7	18.9
102.9 40.5			15.0	15.2	15.4	15.6	15.9	16.1	16.3	16.5	16.7	16.9	17.1	17.4	17.6	17.8	18.0	18.2	18.4
104.1 41			14.6	14.8	15.1	15.3	15.5	15.7	15.9	16.1	16.3	16.5	16.7	16.9	17.1	17.4	17.6	17.8	18.0
105.4 41.5			14.3	14.5	14.7	14.9	15.1	15.3	15.5	15.7	15.9	16.1	16.3	16.5	16.7	16.9	17.1	17.3	17.6
106.7 42			13.9	14.1	14.3	14.5	14.7	14.9	15.1	15.3	15.5	15.7	15.9	16.1	16.3	16.5	16.7	16.9	17.1
108.0 42.5			13.6	13.8	14.0	14.2	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.3	16.5	16.7
109.2 43			13.3	13.5	13.7	13.9	14.1	14.3	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4

Self-Test Questions (Answers are provided on the following page)

1. True or false: BMI-for-age is a diagnostic tool used to identify children and adolescents who are underweight and overweight.

2. True or false: BMI is age specific for children and adolescents, ages 2 to 20. Thus, BMI-for-age is the measure used to classify children and adolescents as underweight or overweight.

3. True or false: John is 22 months old. BMI-for-age can be used to determine if he is underweight or overweight?

4. True or false: The BMI-for-age chart provides a reference for adolescents that previously did not exist.

5. Which statement does NOT accurately describe an advantage of using BMI-for-age to screen for overweight and underweight in children and adolescents.

- a. BMI-for-age can be used to track overweight from childhood into adulthood
- b. BMI-for-age correlates well with clinical risk factors for cardiovascular disease
- c. BMI-for-age measures body fat
- d. BMI-for-age provides a reference for adolescents not previously available

6. The weight-for-stature curve differs from the BMI-for-age curve in the following ways: (check all that apply)

- a. the weight-for-stature curve does not show age-related changes while the BMI-for-age chart does show age related changes.
- b. the weight-for-stature chart can be used to classify children as overweight or underweight while the BMI-for-age chart can be used to classify children as overweight only.
- c. the weight-for-stature curve does not show the decline in weight relative to age that occurs in early childhood while the BMI-for-age chart clearly shows this decline.

7. True or false: "Adiposity" rebound usually occurs between 2 to 6 years of age.

Answers to Self-Test Questions

1. True or false: BMI-for-age is a diagnostic tool used to identify children and adolescents who are underweight and overweight.

Answer: False

BMI-for-age is a SCREENING tool used to identify children and adolescents who are underweight and overweight. It is not a diagnostic tool.

2. True or false: BMI is age specific for children and adolescents, ages 2 to 20. Thus, BMI-for-age is the measure used to classify children and adolescents as underweight or overweight.

Answer: True

BMI changes substantially for children as age increases so the measure used to screen for overweight and underweight is BMI-for-age. BMI-for-age is gender specific for children and adolescents. This is unlike BMI for adults that is neither age nor gender specific and for which cutoff points of BMI of 25 and 30 have been established to identify overweight and obesity, respectively.

3. True or false: John is 22 months old. BMI-for-age can be used to determine if he is underweight or overweight?

Answer: False

BMI-for-age is used to screen children and adolescents age 2 to 20 years for underweight or overweight. BMI is not used with children younger than 2 years as there is not sufficient evidence to suggest that there is an association between BMI at ages younger than 2 years and BMI in adolescence or adults.

4. True or false: The BMI-for-age chart provides a reference for adolescents that previously did not exist.

Answer: True

BMI-for-age was not available in the 1977 growth charts and the 1977 weight-for-stature charts were limited to use with prepubescent boys under 11.5 years of age and to prepubescent girls under 10 years of age.

5. Which statement does NOT accurately describe an advantage of using BMI-for-age to screen for overweight and underweight in children and adolescents.

- a. BMI-for-age can be used to track overweight from childhood into adulthood
- b. BMI-for-age correlates well with clinical risk factors for cardiovascular disease
- c. BMI-for-age measures body fat
- d. BMI-for-age provides a reference for adolescents not previously available

Answer: C

BMI-for-age is not a direct measure of body fat but rather it is a proxy for body fat. One of the advantages of using BMI-for-age is that it compares well with direct measures of body fat such as *dual energy x-ray absorptometry (DEXA)*.

6. The weight-for-stature curve differs from the BMI-for-age curve in the following ways: (check all that apply)

- a. the weight-for-stature curve does not show age-related changes while the BMI-for-age chart does show age related changes.
- b. the weight-for-stature chart can be used to classify children as overweight or underweight while the BMI-for-age chart can be used to classify children as overweight only.
- c. the weight-for-stature curve does not show the decline in weight relative to age that occurs in early childhood while the BMI-for-age chart clearly shows this decline.

Answer: a and c accurately describe the differences between the weight-for-stature chart and the BMI-for-age chart

7. True or false: "Adiposity" rebound usually occurs between 2 to 6 years of age.

Answer: False

"Adiposity" rebound usually occurs between 4 to 6 years of age when BMI-for-age reaches a minimum before beginning a gradual increase into adulthood. However, "adiposity" rebound can occur earlier than 4. Research indicates that an early "adiposity" rebound is associated with an increased risk of adult obesity.

[END OF MODULE]

Bill: Check body mass index of schoolchildren

Policy requires schools to be healthier

By Steve Lintiaco
Pacific Daily News
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Because of their weight problem, Guam residents have heart attacks about 10 years sooner than the average resident of the United States, said Sen. Mike Cruz, a surgeon who is chairman of the legislative health committee.

"That is not something to be proud of," he said. While much has been made of the hospital's supply and personnel problems, Cruz said he believes the real crisis in medicine is the fact that Guam is not a healthy community.

The Legislature yesterday held a public hearing on a bill introduced by Cruz that would allow the schools to determine whether public school students are overweight and pass that information on to their parents.

Determining a child's body mass index, as the bill proposes to do, is a start to address the very significant problem of obesity on Guam, said Dr. Keith Horinouchi, a clinical preventionist and nutrition specialist with the Seventh-day Adventist Wellness Center.

Horinouchi said he is surprised to see young people developing ailments commonly associated with adults, such as diabetes, high cholesterol and high blood pressure.

It is "quite common" for an 11-year-old child on Guam to develop type 2 diabetes, he said.

Rachel Leon Guerrero, an associate professor of nutrition at

the University of Guam, said obesity clearly has become a problem on Guam but there is no data available to describe the extent of the problem.

The bill is well-timed, considering federally mandated changes that already are happening in the public schools, acting Superintendent Luis Reyes stated in written testimony to the finance committee.

The federal "School Wellness Policy," which applies to any place that receives federally subsidized school meals, requires Guam to develop a wellness policy by the beginning of next school year.

Goals must be set for nutrition education, physical activity, campus food and other activities to promote student wellness.

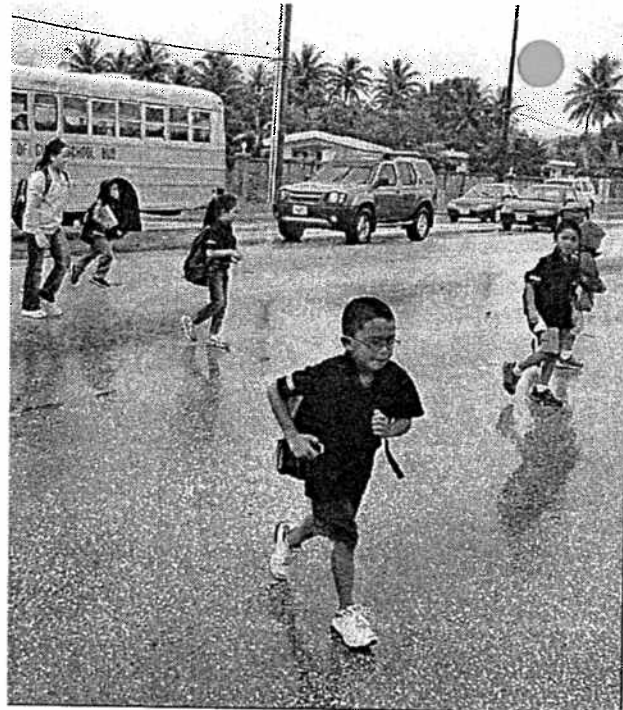
The Guam school board in July adopted policies that prohibit soda and junk food from being sold on school campuses, and limits the sale of other foods that compete with the lunch and breakfast program.

"This is just a start" to a healthier community, Cruz said about his bill.

To illustrate the obesity problem here, Cruz made mention to a historical photo of a carabao race on Guam that is on the wall of the hospital cafeteria. There is not one overweight person pictured in the crowd, he said.

He also was critical of eating habits.

"Since when is SPAM cultural?" he asked. "That is some of the worst food you can eat. ... Someone has to say it."



Ric A. Eusebio/Pacific Daily News/reusebio@guampdn.com

Ordot after disembarking a Department of Public Works

est procedures

IT WORKS

partment of Administration implemented new procedure for random drug tests.

one person is in charge of testing at the Department of Administration. The day of the test that person will tell a private contractor that a certain number of employees are to be tested.

There is a database of government employee names, a computer program at the lab will generate a list of employees to be tested. The lab will give the list to the DOA drug testing official. The DOA drug testing official

will contact the agency heads only to tell them that random drug testing will be conducted and to ensure employees will be at the work site at a certain time. Names of the employees to be tested will not be released and the director is not to inform employees that a drug test will be performed.

▲ Lab technicians from the private drug-testing lab will go to the work site within hours of DOA's request for random drug tests and call the employees to be tested.

Department of Administration

Zita Pangelinan, president of Pacific Human Resources, said the standard drug-testing processes practiced by many private companies normally limit the number of people who know about the test.

"We would poll the names, and contact the employer and say we will be there for screening, and when we arrive on site we'll have the names, so no one knows who's going to be tested until we get there," Pangelinan said.

Martinez said the new process DOA officials have adopted is similar to the standard practiced by private companies, which limits the number of people knowing about a random drug test.

Martinez said she and other officials all are hoping that this process will ensure drug users are caught.

"With this new process there's less than a handful of people, including the lab technicians, who know, so the leaks issue will be addressed."

a bus driver for several years, 42, said. "So I was curious how he could be a bus driver so long. I thought they must have a drug test because they are parents."

and other parents yesterday it's nice to hear that the government doesn't want to crack down on bus drivers, especially those who deal with the community and safety.

Puno of Mongmong said he was glad that the government is dealing with the finances to do the tests.

aid before they don't have the money to do the tests. Are they going to have the money this time?

z said the governor has money in an account to pay for drug testing. He will test as often as the law allows, but we'd like to test once a month," Martinez said.

WHAT'S YOUR BMI?

How to calculate Body Mass Index

Determine your height in inches and multiply that number by itself. If you are 62 inches tall, multiply 62 by 62.

Divide your weight, in pounds, by the number from step 1.

Multiply that number by 703. This is your Body Mass Index.

The same formula is used for children and adults, but the results are applied differently. To determine whether children are heavy for their age, their BMI must be compared to specially prepared tables that take into account age.

There are separate tables for boys and girls. Charts can be downloaded at the Centers for Disease Control and Prevention Web site: www.cdc.gov/growthcharts/

Click on the link to "clinical growth charts," then find the "BMI for age" charts for boys or girls. For adults, a BMI between 18.5 and 24.9 is considered normal. A BMI of 25 to 29.9 is con-

sidered overweight, and a BMI 30 or higher is considered obese.

HEALTH TIPS

▲ Children should not restrict calories to lose weight — this can stunt growth and retard learning.

▲ Children who are encouraged to be active tend to enjoy their activities more than those who are told to exercise.

▲ Turn off the TV, video games, and the computer and encourage your children to do something. Remember to take one step at a time, especially if your children are not usually active.

▲ Encourage your children to bike, play ball, or go for a walk with friends, or take a 10-minute activity break while doing homework, watching TV, or playing computer or video games. You also can motivate your children to participate in school-organized sports and P.E. classes.

▲ If you're involved, your children are more likely to get involved.

Anti-obesity bill gets wide support

By Gerardo R. Partido
Variety News Staff

MEMBERS of the island's medical community yesterday expressed support for Bill 164, which provides for measures to combat obesity among students and young people on island.

Dr. Maria Teresa M. Bondoc, provider services manager for StayWell's healthwatch program, supports the bill, testifying that Type 2 diabetes, previously considered an adult disease, has increased dramatically in children and adolescents.

"Overweight adolescents have a 70 percent chance of becoming overweight or obese adults. This increases to 80 percent if one or more parent is overweight or obese. Overweight or obese adults are at risk for a number of health problems including heart disease, Type 2 diabetes, high blood pressure, and some forms of cancer," Bondoc said during yesterday's public hearing on the bill.

In addition, Bondoc said there are also psychological effects such as perceived social discrimination, poor self-esteem, and depression.

Dr. Lee H. Meadows of the Guam SDA Clinic testified that there is an epidemic of obesity not only in the U.S. but also in

Guam.

At least 15 percent of children and adolescents in the U.S. alone are overweight, three times as many as in the 1980s.

The prevalence is higher among ethnic groups, of which the percentage could go up to as high as 30 percent.

"We must recognize that we have a problem both in the public health level and the individual level. Current insurance programs do not even include treatment of obesity. We don't even call children fat or obese. We call them overweight to be politically correct. This bill provides for both the recognition of the problem at the government level and the individual level," Meadows said.

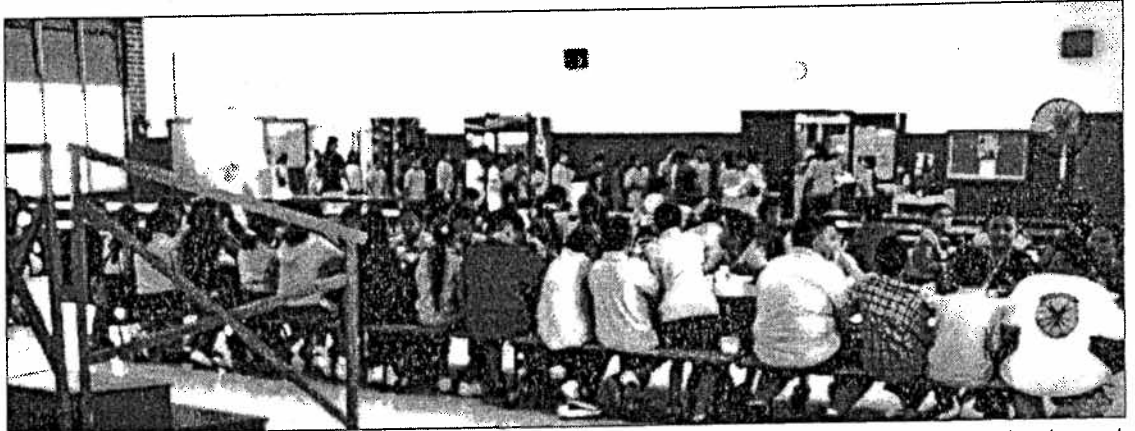
He added that many doctors are trained to recognize an overweight child, but not what to do with the problem in terms of nutritional change or behavioral modification.

"Doctors also don't have much access to children. Often, they come in every few years or so for a physical examination," Meadows said.

Ideally, Meadows said the problem should be addressed by the Department of Public Health and Social Services.

"But again, DPHSS lacks resources," he said.

GPSS makes strides in school nutrition



GPSS seeks to achieve optimal nutrition through its school breakfast, lunch, and after-school snack programs served in public school cafeterias.
Photo by Gerardo R. Partido

By Gerardo R. Partido
Variety News Staff

THE Guam Public School System has made great strides in improving school nutrition.

This was the assurance given yesterday by acting Superintendent of Education Luis S. N. Reyes in a written testimony submitted to the Legislature supporting Bill 164, which seeks to combat obesity among students.

According to Reyes, the Guam Education Policy Board already passed a policy that places detailed requirements for all public schools to promote sound nutrition education and healthy eating lifestyles among students and their families.

These guidelines require nutri-

tion education at all grade levels from pre-school through grade 12, non-food rewards and incentives used to encourage student achievement, and optimal nutrition through school breakfast, lunch, and after-school snack programs.

In addition, GPSS now prohibits foods of minimal nutrition value from being sold, distributed, or promoted at anytime during school hours of operation, including those in vending machines and ready-to-eat foods.

Moreover, an advisory council has been formed that shall be responsible for advising and making recommendations on food and nutrition education opportunities. This council consists of par-

ents, students, school administrators, teachers, school health counselors, nurses and industry professionals.

At George Washington High School in school year 2002, the average daily number of participants in the school lunch program was about 112 students.

But as a result of the implementation of "My Healthy Meals" and "My Healthy Meals Plus" programs, the school has seen an increase of over 1,000 students participating daily in the child nutrition program this school year.

"The increase in the average daily participation is widespread throughout Guam's public schools, most especially in our secondary schools," Reyes testified.

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Support strong for measure to curb child obesity

by Sabrina Salas Matanane, KUAM News

Wednesday, October 12, 2005

Those who testified on legislation that would help curb childhood obesity for the most part were in support of the measure. Bill 164 would require the Guam Public School System to implement the body mass index. It furthermore would mandate the school system to provide a confidential report to the student's parents or legal guardians.

Additionally the BMI would be used as a tool to collect data for health officials to assess the general health of students by developing a comprehensive nutrition and physical fitness plan. National statistics show that childhood obesity is an epidemic, being not only a concern in the U.S. mainland, but also locally.

"This problem provides both the recognition of this problem at the government level and at the individual level and I think that's a very strong positive," said Dr. Lee Meadows. Also commenting on the matter was dietician Dr. Rachel Taitano Leon Guerrero, who said, "Here on Guam we see the problem growing but we actually don't have any hard data to show that this happening this bill would actually allow for us to get a baseline on how many children are actually obese."

The GPSS testified in support of the intent of the legislation. Ike Santos, testifying on behalf of acting superintendent Luis Reyes, said that the bill was timely since the School System is in the midst of fully implementing the U.S. Department of Agriculture's school wellness policy. The BMI is used to assess underweight, overweight and at risk for overweight children and teens.

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Mike Cruz proposes bill to address obesity schoolchildren



by Sabrina Salas Matanane, KUAM News
Monday, July 11, 2005

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A new bill was introduced last week that seeks to open parents' eyes to the dangerous obesity epidemic on Guam. It's no secret that being overweight is a major concern in America, but what many don't realize is that Guam leads the world in obesity cases.

According to statistics provided by the Department of Public Health and Social Services, diabetes (an obesity-related illness) has been one of the top ten causes of death in the territory from 1985-2002. Local doctor and senator Mike Cruz (R) has introduced a bill to address the issue.

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"Obesity is a major epidemic not only in the nation or the United States here on Guam. And on Guam we lead the nation some of the obesity such as diabetes, hypertension, and myocardial disease such as heart disease."

What many find alarming is the fact that obesity is a growing trend among adolescents. Nationwide, obesity in children has tripled in just the last decade. As a result, children as young as 11 years old have been diagnosed with obesity.

Senator Cruz, who sits as chairman of the Legislative Committee on Health and support of fellow physicians and Guam Public School System superintendent is proposing a bill that would shed light on obesity in local schools modeled after similar legislation passed in Arkansas, would require the release of private health reports to parents of public school children.

"A report on a student's body mass index in a very confidential or confidential manner to parents or legal guardians to help them in understanding where the child stands in regards to their peers in regards to their weight," the senator added.

Dr. Keith Horinouchi, a nutritionist at Guam Seventh-Day Adventist Hospital said, "We need to think prevention and there is no better opportunity than now to help our children and youth."

KUAM's Janjeera Hail contributed to this report

Other Date(s): 10/12/2005

Time: 5 p.m.

Contact Info: 475-1802

**Committee on Finance, Taxation
and Commerce public hearing**

**Public Hearings
10/12/2005**

Where:

28th Guam Legislature

Legislature's public hearing room
undefined,

Description: 9:30 a.m. Oct. 12, Legislature's public hearing room, Hagatna. Bill 156 postponed; Bill 162, relative to emergency and non-emergency use of an ambulance primarily for transportation, conducting building inspections, review of building plans and issuing Guam Fire Department permits; Bill 164, relative to providing confidential report of a student's body mass index and written information to parents or legal guardians of students who have a BMI above normal range and provide for a comprehensive nutrition and physical fitness plan utilizing the BMI; Bill 166, streamlining the process to make available existing funding for Guam Memorial Hospital Authority; Bill 167, an act to subdivide and transfer a portion of Block 1, Tract 268, Yona from Guam Waterworks Authority and to the Guam Public School System to establish a satellite school campus and to appropriate \$150,000 from the General Fund fiscal 2005 appropriations to GPSS for the transfer of the chattel interest of eight buildings containing 16 classrooms and other ancillary structures from St. Francis School to GPSS and for site work repair, renovation and outfitting of structures in preparation for 2005-2006 school year and to further subdivide and transfer a portion of the parcel to the Yona mayor's office for maintaining existing multi-purpose field and providing the Yona community with additional park and recreational opportunities. Copies of these bills are available at the Legislature's Web site: http://guamlegislature.com/28th_Guam_Legislature/Bills-Introduced-28th.htm. For written testimony or special accommodations, call the office of Sen. Edward Calvo, 475-8801/2 or e-mail: sencalvo@eccocomm.com.

Date: 10/12/2005 through 10/12/2005

Other Date(s): 10/12/2005

Time: 9:30 a.m.




Contact Info: 475-8801/2

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I MINA'BENTE OCHO NA LIHESLATURAN GUÅHAN
2005 (FIRST) Regular Session

Bill No. 164 (EC)

Introduced by:

Mike Cruz, M.D. 
L. F. Kasperbauer 
J. A. Lujan 

AN ACT TO AMEND SECTION 3207, ARTICLE 2, DIVISION 2, TITLE 17 OF THE GUAM CODE ANNOTATED, RELATIVE TO PROVIDING A CONFIDENTIAL REPORT OF A STUDENT'S BODY MASS INDEX AND WRITTEN INFORMATION TO PARENTS OR LEGAL GUARDIANS OF STUDENTS WHO HAVE A BODY MASS INDEX ABOVE THE NORMAL RANGE, AND PROVIDE FOR A COMPREHENSIVE NUTRITION AND PHYSICAL FITNESS PLAN UTILIZING THE BODY MASS INDEX.

1 BE IT ENACTED BY THE PEOPLE OF GUAM:

2 Section 1. Legislative Findings and Intent. *I Liheslaturan Guåhan*
3 finds that obesity is a major health problem on Guam. *I Liheslaturan*
4 *Guåhan* further finds that childhood obesity is a growing health concern on
5 Guam. The Surgeon General of the United States has determined that
6 overweight and obesity in children and adolescents has tripled in the last
7 two decades.

8 Guam leads the nation in heart disease and obesity related ailments,
9 such as diabetes. It impacts not only health, but also the financial expense
10 of treating these illnesses. Steps need to be taken now to improve the

1 health of our future generation, as well as reduce future health costs for the
2 coming generation.

3 Health professionals often use a Body Mass Index (BMI) 'growth
4 chart' to help them assess whether a child or adolescent is overweight.
5 Therefore, it is the intent of *I Liheslaturan Guåhan* to implement the Body
6 Mass Index in Guam's Public School System and provide a confidential
7 report to the student's parents or legal guardians. Additionally, the BMI
8 shall be a tool to collect data for health officials to assess the general health
9 of students by developing a Comprehensive Nutrition and Physical Fitness
10 Plan.

11 **Section 2. Section 3207, Article 2, Division 2, Title 17 of the Guam**
12 **Code Annotated is hereby *amended* to read as follows:**

13 **§ 3207. Physical Fitness.** The Board shall develop a physical fitness
14 program for all students in the elementary and secondary schools, taking
15 into consideration the age, sex and health condition of students. Such
16 program shall include a periodical physical fitness achievement test, and,
17 as feasible, intramural and other athletic competition. As part of the
18 physical fitness program, schools shall provide parents or legal guardians
19 periodic reports of their child's body mass index (BMI), which shall be
20 computed and distributed to parents or legal guardians in such a manner
21 that respects the student's privacy. The computation of the BMI must be
22 done properly in a uniform standard, such as the University of California
23 Berkeley's 'Guidelines for Collecting Heights and Weights on Children and

1 Adolescents in School Settings.' The report must also include: an
2 explanation that body mass index is only a screening tool, not an
3 evaluative tool for diagnosing a person as overweight; an explanation of
4 the connection between a body mass index that is above the normal range
5 and obesity, diabetes, and other health problems, together with references
6 to local community health programs for nutrition and physical activity
7 resources; and the suggestion that the parent seek a primary care
8 provider's evaluation. Such program shall be implemented in accordance
9 with the availability of facilities and personnel.

10 For purposes of this section, *Body Mass Index (BMI)* is a calculation
11 that uses a child's height, age, and weight to estimate how much body fat
12 he or she has compared to population-referenced standards.

13 **Section 3. Comprehensive Nutrition and Physical Fitness Plan.**

14 The Guam Public School System shall utilize the BMI to develop a
15 Comprehensive Nutrition and Physical Fitness Plan, which shall be
16 approved by the Guam Education Policy Board. The objectives of this plan
17 may include, but are not limited to, the adoption of rules and training for
18 the physical activity of students, nutrition education, the school lunch
19 program, increasing awareness of healthy eating choices, and study the
20 healthfulness of the school environment.

21 The Guam Education Policy Board shall submit the plan to *I*
22 *Liheslaturan Guåhan* with recommendations for any legislation by June 1,
23 2006.

1 **Section 5. Appropriation.** The sum of \$150,000.00 shall be
2 appropriated from the Healthy Futures Funds to the Guam Public School
3 Systems to develop a Comprehensive Nutrition and Physical Fitness Plan.

4 **Section 6. Severability.** *If any provision of this Law or its*
5 *application to any person or circumstance is found to be invalid or contrary*
6 *to law, such invalidity shall not affect other provisions or applications of*
7 *this Law, which can be given effect without the invalid provisions or*
8 *application, and to this end the provisions of this Law are severable.*