

A Training Manual for Height and Weight Assessment



Height and Weight Measurement Procedures

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Training Manual Originally Developed by BMI Task Force
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Height and Weight Measurement Procedures

OBJECTIVES

The goal of this protocol for Body Mass Index (BMI) assessment for age is to certify participants in the measurement techniques described in this manual.

At the completion of this training the participant will be able to:

1. Set up measurement stations with all of the appropriate equipment
2. Check accuracy of the scales
3. Prepare student for measurement
4. Measure height and weight following proper procedure
5. Perform the steps of the weight measurement correctly
6. Perform the steps of the height measurement correctly
7. Apply the one-inch rule for height
8. Record/enter data into the electronic data entry system (www.achi.net)
9. Maintain students privacy and confidentiality
10. Print and distribute student health reports in a confidential manner

Height and Weight Measurement Procedures

DEFINITIONS

BMI – Body Mass Index

BMI =	$\frac{(\text{Weight in Pounds})}{[(\text{Height in Inches} \times \text{Height in Inches})]}$	x 703
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BMI =	$\frac{(\text{Weight in Kilograms})}{[(\text{Height in Meters} \times \text{Height in Meters})]}$	
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BMI for age assessment protocols- A detailed plan designed to describe appropriate procedure for assessment.

BMI for age assessment- Calculating the height and weight as in the definition for BMI and applying the CDC growth charts for age and gender.

BMI Percentile for Age - An indicator to assess the size and growth patterns of individual children based on the Centers for Disease Control and Prevention's (CDC) BMI-for-age growth charts for boys and girls.

Carpenter's square – An instrument for ensuring a level reading of height.

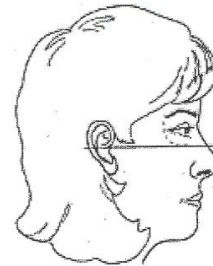
Certificate of completion - Document provided upon completion of BMI assessment training protocol.

Confidential - Information marked or intended for a specific person or persons.

Digital Scale – An instrument for measuring weight.

External Auditory Canal – Passageway that leads from the outside of the head to the tympanic membrane, or eardrum membrane, of each ear.

Frankfort Horizontal Plan – Imaginary line passing through the external ear canal and across the top of the lower bone of the eye socket, immediately under the eye.



Height – A standing measurement in inches or meters.

Medial Border – Relating to the middle or center.

Orbital Margin - The top of the lower bone of the eye socket.

Private - Not openly or in public.

Recorder - Person who writes down student heights and weights or enters measurements into database.

Height and Weight Measurement Procedures

DEFINITIONS (continued)

Scapulae – Two large, flat, triangular bones forming the back part of the shoulder; also called shoulder blade.

Stadiometer – Instrument for measuring standing height.

Student Health Report – A written notice to parents with student's health screening information.

Written Refusal – A document to school district requesting a child not be included in assessing BMI, provided by the parent or guardian.

Weight – A measurement in pounds or kilograms.

Height and Weight Measurement Procedures

RECOMMENDED EQUIPMENT

The equipment listed below is what is recommended for the accurate measurement of height and weight in Arkansas public and charter schools. The recommended equipment was tested in pilot schools across Arkansas and was shown to be accurate and reliable. The equipment recommended is listed below:

1. Stadiometers and Scales

Height will be measured using a stadiometer. Stadiometers can be either portable or permanently affixed to a wall. In general, it is recommended that portable stadiometers are used, so that schools can share equipment, and to avoid problems relating to proper installation of wall-mounted models. It is also recommended that digital scales be used over other models due to better precision of the measurements, and ease of reading the digital read-out.

Recommended Stadiometers and Scales:*

Stadiometers

a. 84" Yard Stick on Wood Board

Originally the Department of Corrections mounted an 84" metal yard stick onto an 86" wood board. To build your own stadiometer to the Department of Education's specifications see Appendix A. Taping the wood board to the wall with some type of strong adhesive tape (i.e. duct tape) is suggested for stability of the stadiometer. A carpenter's triangle is used for the headpiece. This arrangement allows that unit to be portable, as recommended. As a result of testing numerous plastic stadiometers in a similar price range, it was found that most of those models were not durable, especially the thin plastic headpieces. Therefore, in order to keep costs in a reasonable range, the board mounted metal yard stick with a hard plastic carpenter's triangle headpiece was tested and found to work quite well.



b. Shorr Board

The Shorr Measuring Board Stadiometer is top of the line, Gold Standard equipment commonly used in research settings. It offers accurate measurement due to the wide wooden head piece used for measuring height, thereby reducing the chances for measurement error commonly caused when a narrower head piece is used. The Shorr Board is sturdy and durable as it is handcrafted out of solid wood. It is also collapsible which allows it to be stowed away or transported easily.

Height and Weight Measurement Procedures

RECOMMENDED EQUIPMENT (continued)

Scales

a. Tanita HD-314 Scale

The Tanita HD-314 scale is a portable scale originally designed for home use but capable of withstanding heavy-duty use. It measures up to 330lbs, is lightweight for good portability, and has a digital read-out.



b. Tanita HD-351 Scale

The Tanita HD-351 scale is a portable scale originally designed for home use but capable of withstanding heavy-duty use. It measures up to 440lbs, is lightweight for good portability, and has a digital read-out. If using this scale it is recommended that a piece of colored taped be placed over the previous weight readout for confidentiality purposes.



2. Step Stool

It is recommended that each school purchase a two-height step stool for use with the height measurements. The accurate measurement of height requires that the measurer is able to read the measurement line at eye-level. Additionally, some measurers will not be tall enough to do this without standing on a step stool, even for elementary school children.

3. Batteries

Many scales require batteries. Usually AA batteries or lithium batteries are required, but you will need to check the type and number of batteries required for the scales used at your school.

4. Standard Weights for Checking Accuracy

At the beginning of each measurement day at the school, accuracy of the scales will be required. A known standardized weight must be placed on each scale. This weight (reading on the scale) should be logged on the calibration log with the corresponding date and time noted. If the recorded weight is more than half a pound higher or lower than the standard weight, the measurement should be repeated and re-recorded. If the recorded weight is more than half a pound different from the calibration weight, then you should change the batteries. If that does not correct the problem, then this scale should not be used for assessments.

NOTE: If you are using scales that measure in metric units, then the weight on the scale should be no more than 0.2 kg higher or lower than the standard weight.

5. Data Collection

There are two methods for data collection. They are:

- Direct data entry via web (recommended)
- On paper forms to be entered on web site at a later time.

Height and Weight Measurement Procedures

RECOMMENDED EQUIPMENT (continued)

6. Name Tags

The use of nametags for the children who are being measured is recommended. This helps to ensure that the correct data collection is completed for the corresponding child. It is also recommended that nametags are used for all staff involved in the collection of these data. This will identify the measurement team to the children and to the school staff.

7. Adhesive Tape

Duct tape, or similar adhesive (such as blue painter's tape) is recommended, to stabilize the wood-board mounted stadiometers to the wall if the 84" yard stick or similar stadiometer is used.

8. Office Supplies

The following general office supplies are recommended when performing the height and weight measurements in schools:

Baskets for the children's personal items
Black pens (if not doing direct data entry)
Extra, blank nametags
Paper clips

*Contact Act 1220 Coordinator or State School Nurse Consultant at 501-683-3600 for purchasing information or other equipment options.

Height and Weight Measurement Procedures

STANDARDIZED MEASUREMENT PROCEDURE

It is recommended that multiple stations be used, each consisting of one complete set of data collection equipment: 1 stadiometer (stabilized against the wall with duct tape if necessary), 1 scale (tested for accuracy), 1 step stool, data collection forms or computer, basket (for the child's personal items) and general office supplies. In order for an individual school to utilize multiple stations, several schools will need to share equipment and rotate that equipment from one school to the next. For the most accurate measurements, it is highly recommended that assessments be conducted on hard surface floors (i.e. gym floor, tile floors) and avoid floors that are carpeted.

1. Preparation of the Child

The child should be asked to remove as much outerwear as possible. Regardless of the clothing worn, the child should be asked to remove his/her shoes and will be measured either barefoot or wearing socks.

Additionally, the child will be asked to empty his/her pockets and remove all jewelry or other objects. The child will be asked to remove eyeglasses, hair barrettes, and ties or rubber bands, if possible, so that accurate height and weight measurements can be obtained. A small box or basket should be provided at each measurement station for the child to place their personal items in until their measurements are complete.

2. Measurement Order

One measurement of weight and two measurements of height should be taken and entered on each child. Because the measurement of height requires greater skill to perform correctly, two measurements are required in order to reduce error and therefore obtain a more accurate calculation of BMI. If the difference between the two height measurements is greater than one inch, then a second set of two height measurements should be taken to try to obtain values within one inch of each other.

NOTE: If metric measures are used, the difference between the two height measurements should be no greater than 2 centimeters.

The measurements of weight and height should be measured in rotational order, as follows: 1st height, weight, 2nd height. If the difference between the two height measurements is greater than one inch (per above), then the child must be re-measured. If after two trials a pair of height measurements within the one-inch criteria cannot be achieved, then the child's assessment is considered "Unable to be Assessed". When entering this child's data into the web-entry, system click on "Unable to Assess". Then click, "Could not get two measurements in range after two repeats" and provide an explanation on the line(s) provided.

It is recommended that a team of two people perform the measurements together at each measurement station. One person should be designated as the measurer and the other person should be designated as the recorder. The measurer performs the weight and height measurements on the child, and recorder either records the data on the assessment form or directly enters the child's information into the web-entry system.

Height and Weight Measurement Procedures

STANDARDIZED MEASUREMENT PROCEDURE (continued)

3. Role of the Recorder

The measurer will take the first height measurement, and will call out the number to the recorder. The recorder will call the number back to the measurer to confirm the correct reading. Then the recorder will record that number on the data collection form or directly into the web-entry system in the space indicated for “1st Height”.

Next, the measurer will position the child for the weight measurement, and indicate to the recorder that the child is “ready”. The recorder will then obtain the number for the weight measurement from the read-out on the scale, and record that number on the data collection form or directly into the web-entry system in the space indicated for “Weight”.

The measurer will then re-measure the child’s height and the recorder will record the second height number in the space indicated for “2nd Height” using the same steps as used for the first height measurement.

NOTE: The reading for the weight measurement is NOT called out by either the measurer or the recorder in order to ensure that the child (and other staff or children who may be standing nearby) is not made aware of his/her weight measurement.

Since the height measurement is more subject to error, and is not generally considered to be sensitive data, those measurement readings are called out by the measurer and recorder to increase the overall accuracy of height measurements.

The recorder is responsible for checking the two sets of height measurements to determine if there is more than a one-inch difference between the two heights. If directly entering into the web-entry system, a message note will appear notifying the recorder if there is a more than a one-inch difference. If there is more than a one-inch difference, then the child must be re-measured as discussed in the “Standardized Measurement Order” section. If a re-measurement needs to be made, the recorder should place a single line through the entries for the first set of measurements, and initial the line if using the assessment form. Then the second set of two measurements is recorded on the lines provided for “3rd Height” and “4th Height.” If using the web-entry system, simply fill in the “3rd Height” and “4th Height” in the indicated places. Whether or not the one-inch criteria are achieved with the second set of two measurements, no additional height measurements will be taken.

Remember, if after two trials a pair of height measurements within the one-inch (>2cm) criteria cannot be achieved, then mark the “Unable to Assess” box and the “Could not get two measurements in range after two repeats” box.

Height and Weight Measurement Procedures

STANDARDIZED MEASUREMENT PROCEDURE (continued)

4. Weight Measurement

For the measurement of weight, the child will be asked to step up backwards onto the scale and stand still over the center of the scale with body weight evenly distributed between both feet. **In order to ensure confidentiality and to prevent the child from seeing his/her weight, it is required that the child step on the scale backward facing away from the readout.** The child's arms should be hanging freely by the sides of the body, with palms facing the thighs. The child should hold his/her head up, and face forward.

Weight is recorded to the nearest 0.2 pound using the recommended scale with a digital readout. Depending on the type of scale used, record to the nearest fraction of a pound, whole pound, pounds and ounces, kilograms or grams.

5. Height Measurement

For the measurement of standing height, the child will be asked to stand with his/her back against the board. The back, scapulae and buttocks are in contact with the vertical board if possible, or whichever part of the body touches the board first. The weight of the child should be evenly distributed on both feet. The child will be asked to place the legs together, bringing the ankles or knees together, whichever comes together first (often they will come together simultaneously). If the child has knock-knees, the feet are separated so that the medial borders of the knees are in contact, but not overlapping.

The child is instructed to stand erect (stand up straight and look straight ahead). The child's position should be verified from both the FRONT and from the LEFT side of the body. Next, the child's head is positioned in the Frankfort Horizontal Plane. In this position, an imaginary line can be drawn from the bottom of the eye socket (orbital margin) to the external opening of the ear (external auditory canal).

The child will be asked to inhale deeply and hold his/her breath WHILE MAINTAINING the head and body in the same position. Sometimes a child will either lift his/her head or pull up onto the toes when taking the deep breath. If this happens, the measurer will need to re-position the body and head before taking the measurement.

The moveable headpiece is brought onto the upper most (superior) point on the head with sufficient pressure to compress the hair. After the measurement is obtained the child should be told they no longer need to hold his/her breath. The measurement is recorded to the nearest 1/8th of an inch, (or nearest 0.1cm, nearest 1/16 inch, or nearest mm, depending on the stadiometer used).

Height and Weight Measurement Procedures

RECORDING THE DATA

Whether using the paper assessment forms inputting the data directly into the web-entry system, the information needed is the same. There are three forms needed to be maintained by the assessors: (1) The ACHI Scale Accuracy Log (formerly called the ACHI Scale Calibration Log), (2) The ACHI Measurement Station Information Form, and (3) The ACHI Height and Weight Data Collection Form (or direct web-entry).

1. ACHI Scale Accuracy Log

This form is required to verify the accuracy of each scale to be used for measurements on the day of the scheduled measurement at each school. The scales should be placed in the exact location where measurements will take place and then verified in that location. Once verified, **DO NOT MOVE** the scales.

On the lines provided at the top of the scale accuracy log, fill in the name of the school, school district, and county. Fill in the date of the verification and the initials of the person performing the verification.

In the third column, fill in the scale number and/or model name/number of the scale. In the fourth column, fill in the station number if more than one station will be used at a school on the same day.

In the last three columns, fill in the weight readings obtained from the verification weights. Three known weights of increasing heaviness are used; however, the use of one known weight is sufficient if time and/or cost are an issue. To minimize the misreporting of a child's BMI due to faulty equipment, **verification with at least one known weight is extremely important.**

For each known weight used, the verification steps are as follows:

- a. Turn the scale on to "zero" the scale,
- b. Place a known weight in the center of the scale. If using more than one known weight, place the smallest one on the scale first.
- c. Record the scale reading in the appropriate column (i.e. if using a 5 lb known weight, record the scale readout in the 5 lb column) for the known weight used. If using more than one weight, repeat the steps until all of the known weights have been used.

If the recorded scale reading is more than half a pound (English measure) higher or lower than the known weight, the measurement should be repeated and re-recorded (on the next line of the form). If the scale reading remains more than half a pound different from the known weight, then that scale should not be used for measurements that day. **NOTE: If scales are used that measure in metric units, then the verification should be no more than 0.2 kg higher or lower than the known weight.**

RECORDING THE DATA (continued)

Height and Weight Measurement Procedures

2. Measurement Station Information Form

The Measurement Station Information Form was designed to document what stadiometers and scales are used at each station at each school, especially when more than one model is used at the same school. This is important because the type/model of equipment used determines the appropriate unit of measurement (e.g. centimeters or 1/8inch; fractions of pounds or whole pounds only, etc.).

After ensuring that the stations have been verified for accuracy, fill out the station information section in the web entry system. A station form is required for each station used. These details must be entered before any student data is entered. At the top of the form enter the station number as well as scale and stadiometer details. Click, "Save" to update the information. If any required information is not correct, the system will not save the information but rather post a "go back" message for the form to be corrected.

The completion of this form will assist personnel in interpreting the data and, therefore, calculating accurate BMI values when units of measurement may be in question. This process should also assist school personnel in determining the correct unit of measurement for the equipment they are using, thereby increasing their comfort level with the measurement process.

3. Height and Weight Data Entry

Two methods of recording height and weight are acceptable. The same information is needed regardless of the method chosen.

The two methods are:

1. Record height and weight on the ACHI Height and Weight Data Collection form and then enter the information into the web-entry system
2. Directly enter the height and weight into the web-entry system at the time of the assessment.

The following student information is needed to calculate the BMI and to create the student health report sent home to parent/guardian:

- Student's full name
- Social Security Number (SSN) or School ID number
- Guardian name
- Student address
- Student grade
- Student gender
- Assessment date
- Date of birth

Height and Weight Measurement Procedures

RECORDING THE DATA (continued)

If a student has been previously assessed for BMI then the student information may already be in the web-entry system. If the information is already in the system, check the information for accuracy. This will help eliminate errors in the generation of the student health report.

Finally, the child's weight and both height measurements should be entered into the web-entry system where indicated. If the child is not able to be assessed, click the box for the appropriate reason why. These reasons include:

- Absent
- Child Refused
- Parent Refused
- Pregnancy
- Physically Disabled
- Wrong School
- No 2 Measurements within 1 Inch
- Weight Exceeded Scale
- Other

NOTE: For full compliance all "Unable to be Assessed" information must be entered into the web-entry system.

One of the changes resulting from Act 201 of 2007, allows parents the option to refuse weight and height measurements. If the parent wishes for their child not to participate, they must provide a written refusal to the school.

Height and Weight Measurement Procedures

SUMMARY OF MEASUREMENT PROCEDURE

- Set up measurement stations with the appropriate equipment
 - Computer with Internet access (if available)
 - Digital scale
 - Stadiometer, stabilized against the wall
 - Step stool
 - Basket and general office supplies
- Verify accuracy of the scales
- Prepare the child for measurements
 - Name tag
 - Remove outer wear, shoes, glasses, jewelry
 - Empty pockets
- Measure 1st height, weight, 2nd height
 - Measurer positions the child and performs the measurements in rotational order
 - Recorder verifies data entry (either paper record or web entry), then checks height measurements for one-inch (2cm) criteria
- Apply the one-inch (2cm) criteria for height; re-measure height if necessary

Height and Weight Measurement Procedures

SUMMARY OF WEIGHT MEASUREMENT

- Turn on the scale to “zero” the scale
- Place standard weight on the scale to ensure accuracy of the scale
- If the readout is more than one-half pound off the standard weight, change the batteries. Then place the standard weight on the scale again. If it is still off by more than a half a pound, do not use this scale.
- If scale is accurate, begin assessments
- Ask the child to remove extra layers of clothing, jewelry, and any items in his/her pockets
- Ask the child to step on the scale backwards (for confidentiality)
- Ensure that the body weight is evenly distributed between both feet
- Arms hang freely by the sides of the body, palms toward thighs
- Head is up and facing straight ahead
- Weight is recorded to nearest 0.2 pounds (or appropriate unit for the scale)

Height and Weight Measurement Procedures

SUMMARY OF HEIGHT MEASUREMENT

- Child stands with back against the board (or whatever part of the body touches the board first; may be more than one body part)
- Body weight is evenly distributed on both feet
- Arms hang freely by the sides of the body, palms facing the thighs
- Legs are placed together, bringing knees or ankles together
- Child stands erect; head is up and facing straight ahead
- Verify body position front and left
- Position head in Frankfort Horizontal Plane
- Child inhales deeply holding his/her breath WITHOUT moving head or body
- Bring headpiece down onto the upper most point on the head; compress the hair
- Child is told to let breath out
- Height is recorded to the nearest 1/8th inch (or appropriate unit for the stadiometer)
- Repeat after obtaining weight

Height and Weight Measurement Procedures

RESOURCES

Arkansas Specific Web Sites

Arkansas 21st Century Network
<http://www.yale.edu/21c/arkansas>

Arkansas Center for Health Improvement
<http://www.achi.net>

Arkansas Child Health Advisory Committee
<http://www.healthy.arkansas.gov/programsServices/familyHealth/ChildAndAdolescentHealth/CoordinatedSchoolHealth/Pages/CHAC.aspx>

Arkansas Coordinated School Health
<http://www.arkansascsh.org>

Arkansas Department of Education
<http://ArkansasEd.org>

Arkansas Department of Health
<http://www.healthyarkansas.com>

Arkansas Government Act 1220 of 2003
<http://www.arkleg.state.ar.us/assembly/2003/R/Acts/Act1220.pdf>

Arkansas Government Act 29 of 2003
<http://www.arkleg.state.ar.us/assembly/2003/S2/Acts/Act29.pdf>

Arkansas Government Act 201 of 2007
<http://www.arkleg.state.ar.us/assembly/2007/R/Acts/Act201.pdf>

Arkansas Governor's Council on Fitness
<http://www.arkansasfitness.com>

Healthy Arkansas Initiative
<http://www.arkansas.gov/ha>

Height and Weight Measurement Procedures

RESOURCES (continued)

National Web Sites

General

Action for Healthy Kids

http://take.actionforhealthykids.org/site/Clubs?club_id=1102&pg=main

Alliance for a Healthier Generation

<http://healthiergeneration.org/>

American Obesity Association

<http://www.obesity.org>

International Obesity Task Force

<http://www.iof.org>

National Association of School Nurses

<http://www.nasn.org>

National Heart, Lung, and Blood Institute

http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm

Robert Wood Johnson Foundation Center to Prevent Childhood Obesity

<http://www.reversechildhoodobesity.org/>

The Weight-Control Information Network, National Institutes of Health (NIH)

<http://www.niddk.nih.gov/health/nutrit/win.htm>

Assessment

Annie E. Casey Foundation- Kids Count

<http://www.aecf.org/kidscount>

National Center for Chronic Diseases Prevention Health Promotion Nutrition and Physical Activity

<http://www.cdc.gov/nccdphp/dnpa/index.htm>

US Census- American Fact Finder

http://factfinder.census.gov/home/saff/main.html?_lang=en

Community

CDC School Health Policies and Program Study

<http://www.cdc.gov/nccdphp/dash/shpps/>

Institute for Economic Advancement - Census State Data Center

<http://www.aiea.ualr.edu/census/default.html>

School Health Index

<http://www.cdc.gov/HealthyYouth/SHI/>

Height and Weight Measurement Procedures

RESOURCES (continued)

For Kids and Parents

Body and Mind

<http://www.bam.gov>

Kidnetic

<http://www.kidnetic.com/>

Nemours Foundation: Kids Health

<http://www.kidshealth.org>

Smart Mouth - Center for Science in the Public Interest

<http://www.smart-mouth.org/>

Teen Growth

<http://www.teengrowth.com/>

Verb

<http://www.cdc.gov/youthcampaign/>

For Physical Activity

Active Living by Design - University of North Carolina - School of Public Health

<http://www.activelivingbydesign.org/>

America Walks

<http://www.americawalks.org/>

American Alliance for Health, Physical Education, Recreation and Dance

<http://www.aahperd.org/>

Human Kinetics

<http://www.humankinetics.com/>

Let's Move

<http://www.letsmove.gov/>

National Center for Bicycling and Walking

<http://www.bikewalk.org>

Partnership for Walk able America - Walk to School

<http://www.walktoschool.org/index.cfm>

Height and Weight Measurement Procedures

RESOURCES (continued)

For Nutrition

BMI Calculator

http://www.kidsnutrition.org/consumer/nyc/vol1_03/bmi_calculator.htm

Food Pyramid Guide

http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=1

Nutrition Counseling Education Services

<http://www.ncescatalog.com>

Tools for Patients and Providers

2000 CDC Growth Charts

<http://cdc.gov/growthcharts>

American Dietary Guidelines

<http://www.health.gov/dietaryguidelines/>

Healthy People 2020 Toolkit

<http://www.healthypeople.gov/hp2020/>