The following recommendations are based on a review of the literature regarding school-based BMI measurements. The detailed measurement protocols come from UC Berkeley, Center for Weight and Health. To ensure accurate and reliable BMI measurements there should be standardized procedures, training of personnel, and calibration of equipment.

The Children’s Health Collaborative recommends that schools in Del Norte County conduct BMI surveillance (to identify trends in groups) rather than screening (to identify and refer individuals).

**Timing of BMI measurements** (based on discussions with Children’s Health Collaborative)
BMI measurements should be obtained annually on students in grades K, 1, 3, 5, 7, and 9. Measurements should be obtained during the same month each year.
In Del Norte County measurements should occur during the same month as the California Fitness Test or within 1 month of the test.
Measurements should be obtained during a time of day that limits interruption of class time.

**Training of Personnel**
Training should include:
1. Proper use of equipment for accurate and precise measurement;
2. Review of forms/spreadsheets for the recording of information;
3. Emphasis on the importance of privacy and confidentiality for the students; and
4. Appropriate and sensitive communication with students regarding height and weight measurements (e.g. saying “Let’s check your weight” instead of “Let’s see how big you are”; reassuring students that kids’ bodies come in different sizes and shapes; avoid labels such as “obese”, “overweight”, “too thin”, or “too short”).

**Consent**
Parents should be given the option of declining permission to measure their child’s BMI. This can be done through active or passive parental consent. The decision to use active vs. passive consent will depend on the Del Norte County Unified School District Policies regarding consent.
- Active parental consent requires a signed consent from parents and only students who have a signed form will have their BMI measured.
- Passive parental consent involves sending a letter to all parents stating that all students in x grades will have their BMI measured unless parents send a written refusal.

**Data Collection**
1. Each student should be weighed and measured in private with no other students present. Measurements must not be conducted within sight or hearing distance of other students.
2. To decrease anxiety, all students should be weighed and measured facing away from the scales.
3. Weight should be obtained with an electronic or beam balance scale that is properly calibrated to the nearest ¼ pound.
4. Height should be obtained using a stadiometer- a wall mounted or portable unit solely designed to measure height to the nearest 1/8th inch. The stadiometer should include a vertical board, metric tape, and horizontal headpiece.
5. Students should remove shoes, jackets, other heavy clothing, and remove items from pockets. Hair accessories that interfere with height measurements should be removed.
6. One measurement of weight and two measurements of height should be taken and entered on each child. Because the measurement for height requires greater skill to perform correctly, two measurements are recommended to reduce error and obtain a more accurate BMI measurement.
Measurements should be obtained in the following order:
1st Height, Weight, 2nd Height.
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.

7. A team of 2 people (a measurer and a recorder) should perform the measurements together:
   a. 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 into the spreadsheet or web-entry system in the space indicated for “1st Height”. 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.
   b. 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 into the web-entry system in the space indicated for “Weight”. 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.
   c. The measurer will then re-measure the child’s height and the recorder will record the second height number in the space indicated for second Height” using the same steps as used for the first height measurement.
   d. 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, in which case 2 additional measurements would be obtained.

Weight Measurement Details:
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.

Height Measurement Details:
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 $\frac{1}{8}$th of an inch, (or nearest 0.1cm, nearest 1/16 inch, or nearest mm, depending on the stadiometer used).

A second height measurement will be obtained after the weight is obtained. The average of the 2 height measurements will be used to calculate the BMI. This will be programmed into Aries, so it will happen automatically.
Summary of Weight and Height Measurements
Order of Measurements 1st Height, Weight, 2nd Height

**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)

**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
- Height is recorded to the nearest 1/8\(^{\text{th}}\) inch (or appropriate unit for the stadiometer)
- Child is told to let breath out
- Repeat after obtaining weight
**Calculation of BMI**

The CDC has created an Excel spreadsheet intended for use by school, child care, and other professionals who want to compute Body Mass Index (BMI)-for-age for a group of up to 2000 children. This calculator computes BMI and BMI percentiles for individual children in a group using height and weight measurements, sex, date of birth, and date of measurement information that you enter, or import from a spreadsheet or data file. It provides a group summary of children’s BMI-for-age categories and graphs for Prevalence of Overweight and Obesity, and Prevalence of Overweight and Obesity by Sex. [http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/tool_for_schools.html](http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/tool_for_schools.html)

If not using the spreadsheet:
The formula for calculating BMI is:

\[
\text{BMI} = \frac{\text{Weight (lb)}}{\text{height (inches)}^2} \times 703
\]

The BMI-for-age percentile should be determined using the CDC growth chart.

**Reporting Results**

To maintain anonymity and confidentiality, results should only be reported in aggregate with no names. For the mandated fitness test in California, results cannot be released, when the group size is fewer than 10. Due to the similar nature of BMI testing, and that “body composition” is a component of the physical test, it is likely that the same rule may apply for BMI surveillance data.

References:


4. Cal PFT Regulations § 1043.8