



National Health and Nutrition Examination Survey (NHANES)

National Youth Fitness Survey (NYFS) Body Measures Procedures Manual



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1. OVERVIEW OF BODY MEASURES (ANTHROPOMETRY)

1.1 Background of Anthropometric Measurements

Anthropometry is the study of the measurement of the human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue. The word “anthropometry” is derived from the Greek word “anthropo” meaning “human” and the Greek word “metron” meaning “measure” (Ulijaszek, 1994). The field of anthropometry encompasses a variety of human body measurements. Weight, stature (standing height), recumbent length, skinfold thicknesses, circumferences (head, waist, limb, etc.), limb lengths, and breadths (shoulder, wrist, etc.) are examples of anthropometric measures.

Several indexes and ratios can be derived from anthropometric measurements. Perhaps the most well-known indicator of body fatness is the body mass index or “BMI.” BMI values are calculated for National Youth Fitness Study (NYFS) participants using measured height and weight values as follows: weight (kilograms)/height (meters squared). BMI criteria in relation to the 2000 CDC sex-specific BMI-for-age growth charts are used to screen for weight categories: underweight (BMI values < 5th percentile), healthy weight (BMI values \geq 5th percentile < 85th), overweight (BMI values \geq 85 percentile < 95th), and obese (BMI values \geq 95th percentile) (Barlow, 2007).

Overweight and obesity in children and adolescents are major public health concerns nationally and globally. Approximately one of every three U.S. children and adolescents are now overweight or obese, placing them at greater risk of developing diabetes, cardiovascular disease, certain cancers, and other medical conditions over the course of their lives (Ogden, 2010). Targeted preventive efforts are considered to be more effective in overweight youths than in overweight adults (Styne, 2001). Promoting regular physical activity and a healthy lifestyle may help to prevent obesity. The NYFS is designed to provide a comprehensive picture of the physical health of children in the United States. The anthropometry included in the NYFS is a key component for examining the associations between body weight, body composition, and measures of physical activity and fitness in the U.S. youth population.

1.2 Purpose of Anthropometrics

The purpose of the NYFS anthropometry component is to collect high-quality body measurement data using standardized examination procedures and calibrated equipment. In order to ensure the collection of high-quality data, NYFS staff are trained to follow standardized examination

protocols, to calibrate equipment according to a prescribed schedule and method, and to measure and record the survey data with precision. Additionally, retraining sessions, gold standard examinations performed by expert examiners, and field observations are conducted on a regular basis to reinforce the importance of measurement precision and standardized data collection methodology.

1.3 Importance of Anthropometric Data

Anthropometry is a key component of nutrition status assessment in children and adults (Simko and Cowell, 1995). The NHANES anthropometry data have been used to track growth and weight trends in the U.S. population for more than 30 years (Flegal, 2002; Hedley, 2004). The anthropometric data for infants and children reflect general health status and dietary adequacy and are used to track trends in growth and development over time. The CDC has used NHANES anthropometric data to produce national reference standards or “growth charts” that are used extensively by pediatricians and researchers in the U.S. and abroad (Kuczmarski, 2002).

Epidemiological studies support the hypothesis that the relationship between adiposity and risk of disease begins early in life (Owens, 1998; Singh, 2008). Simple anthropometric measurements and indices such as BMI, waist circumference, and skinfold thickness remain the most commonly used tools for assessing body composition and fat patterning. The highly publicized NHANES data trends showing increases in overweight and obesity among U.S. children and adolescents underscore the importance of NHANES to provide continuous anthropometric data (Ogden, 2002). Anthropometric data collected in the NYFS will provide nationally representative body measures data to estimate the prevalence of overweight and obesity; study the associations between body weight, body composition, and measures of physical activity and fitness; and evaluate growth and development in U.S. children and adolescents.

1.4 Overview of NYFS Anthropometry Examination

All NYFS participants or sample persons (SPs) are eligible for the anthropometry examination component. The complete set of measurements includes weight, height, and arm lengths; waist, arm, and calf circumferences; and triceps, subscapular, and calf skinfolds. The anthropometry examination protocol and procedures are described in Chapter 3, Examination Protocol. Examination results are saved to the study database using the Integrated Survey Information System (ISIS) anthropometry computer application. Funding for the anthropometry examination component is provided solely by the National Center for Health Statistics (NCHS).

1.5 Role of Anthropometric Examiner and Recorder

The anthropometry component is staffed by trained examiners. The examiner will position the participant, take all measurements, and record the measurement as described in Chapter 3, Examination Protocol. Occasionally, another examiner may serve as a recorder to enter the examination results in the ISIS anthropometry component software application. The ISIS module is programmed to present the anthropometry data entry screens in the correct sequence based on the age of the participant as described in detail in Chapter 4, ISIS Data Entry. The ISIS interface is also preprogrammed with age- and gender-specific edit ranges for each measurement, based on previous NHANES data. This feature is designed to reduce data entry errors that may result from either incorrect measurement or data entry errors. Chapter 5 describes the quality control features of the ISIS anthropometry application. If a recorded value falls outside the preprogrammed edit range, the ISIS system will alert the examiner that the value is unusual. The examiner should always verify the measurement value before proceeding to the next measurement. If a measurement or recording error was made, the examiner/recorder will enter the correct value; if the original value is correct, the value is retained. Since NYFS includes participants aged 3-15 years of all shapes, sizes, and body builds, some unusual values are legitimate although measurement and recording errors do occasionally occur.

Another important duty of the examiner is to position the participants during their examination. For example, when the waist circumference is determined, the examiner should use the mirror mounted on the wall to ensure that the tape measure lies parallel to the floor and snug but without compressing the skin. If a recorder is available, he or she needs to help the examiner position the participants during their examination. In this role, the recorder also alerts the examiner if the respondent needs to be repositioned. For example, when the waist circumference is determined, the recorder checks that the tape measure lies parallel to the floor and snug but without compressing the skin. The recorder also marks body sites that are measured by the examiner and hands equipment and supplies to the examiner when needed.

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2. EQUIPMENT

2.1 Equipment and Supplies

A brief description of the anthropometry component equipment and supplies is provided below. In addition, Exhibits 2-1 to 2-8 display photographs of these items for reference. At the beginning and end of each stand, the NYFS staff will take an inventory of all component-specific equipment and supplies. Any needed items should be noted on the inventory sheet and documented in the Unusual Field Occurrence or UFO system (refer to *UFO Utility Manual* for details).

2.1.1 Equipment

- Portable scale: The SECA 869 scale is used to measure weight in SPs 3 years and older. This scale is suitable for stationary or mobile use; the display unit is connected to the scale by a cable and can be moved as needed to a convenient spot for reading. The scale has a maximum capacity of 550 lbs/250 kgs.
- Stadiometer: The SECA 217 portable stadiometer is used to measure stature in SPs aged 3 years and older. It has a measuring range of 20-205 cm / 8–81 inches.
- Folding bench The folding bench is used as a seat for the SP during max-calf circumference and calf skinfold measurements.
- Calibration rod: A 100-centimeter metal rod is used to calibrate the stadiometer at the beginning of a stand and on a weekly basis.
- Skinfold caliper: A skinfold caliper is used to take subscapular, triceps, and calf skinfold measurements. Two skinfold calipers are available on each trailer. When not in use, each skinfold caliper is stored in a protective case.
- Step wedge standard: Readings taken from a metal, pyramid step wedge are used to calibrate the skinfold calipers at the beginning of a stand and on a weekly basis.
- Steel measuring tape: A retractable steel measuring tape is used to take length measurements.

- Height adjustment ruler:

A 15-centimeter plastic ruler is used to correct stature measurements when SPs have hair styles that interfere with the stadiometer headpiece placement, or when they are unwilling to remove their shoes. The examiner enters the height correction factor in ISIS, which automatically calculates an adjusted height value.

Exhibits 2-1 to 2-7 show photos of the anthropometry equipment.

Exhibit 2-1. Portable scale SECA 869



Exhibit 2-2. Stadiometer SECA 217



Exhibit 2-3. Skinfold caliper



Exhibit 2-4. Steel measuring tape



Exhibit 2-5. Folding bench



Exhibit 2-6. Height adjustment ruler



Exhibit 2-7. Step wedge standard

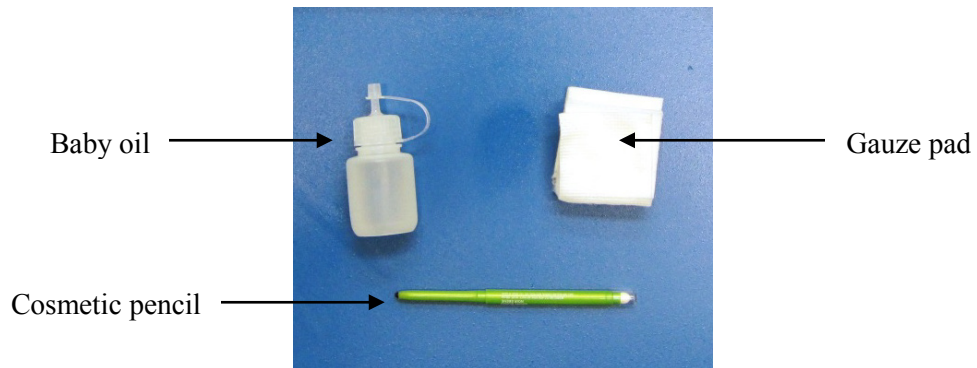


2.1.2 Supplies

<ul style="list-style-type: none"> ■ Black/white cosmetic pencil: 	<p>A wax-based cosmetic pencil is used to indicate the anatomic landmarks for certain measurements. The examiner will use an appropriate color so that the markings are clearly visible on the SP’s skin.</p>
<ul style="list-style-type: none"> ■ Drop dispenser: 	<p>A small dropper bottle is used to dispense baby oil to remove the cosmetic pencil marks.</p>
<ul style="list-style-type: none"> ■ Baby oil: 	<p>Baby oil is supplied for removing cosmetic pencil marks from the SP’s skin. A small drop dispenser holds the oil for use during exams. Refills are obtained from a larger bottle of baby oil that is stored in the cabinet drawer.</p>
<ul style="list-style-type: none"> ■ Gauze pads: 	<p>Gauze pads are used to wipe off cosmetic pencil marks with baby oil.</p>
<ul style="list-style-type: none"> ■ Alcohol wipes: 	<p>Prepackaged alcohol wipes are used daily by the technologist to clean the surface of equipment such as the skinfold calipers and tape measures.</p>
<ul style="list-style-type: none"> ■ Bleach disinfectant: wipes (Sani Cloth): 	<p>A container of bleach disinfectant wipes is provided for cleaning the surface area of the stadiometer and other areas that require disinfection as needed.</p>
<ul style="list-style-type: none"> ■ AA batteries: 	<p>Each portable scale is powered by six AA batteries. The batteries are removed at the end of a stand and replaced at the beginning of a stand.</p>

Exhibit 2-8 shows a photo of the anthropometry supplies.

Exhibit 2-8. Anthropometry supplies



2.2 Equipment Care and Maintenance

Follow the procedures below to ensure that the anthropometry equipment functions properly and remains hygienic throughout the stand.

Start of Stand and Daily

- Clean the surface of the **skinfold calipers** and **tape measures** with alcohol wipes.
- Clean **all surface areas of the scale and stadiometer** with bleach disinfectant wipes. Use paper towels or the scrub brush if necessary.

NOTE: The Formula 409 cleaner can be used to remove dirt, but it is not suitable for use as a **disinfectant**.

- Clean the **display unit of the scale** with a dry cloth or paper towel.

NOTE: Do not allow any fluid to drip into the housing of the display unit.

- Check that the headpiece of the stadiometer slides smoothly along the measurement column.

2.3 Equipment Malfunctions

All equipment malfunctions or repair needs must be reported promptly to the home office component specialist. If the issue is computer-related and cannot be resolved, please contact the home office ISIS support staff.

Equipment issues should be documented in the Unusual Field Occurrence (UFO) system and Equipment Tracking System (ETS) as appropriate. Refer to the *UFO Utility Manual* and *ETS User Guide* for details. The component specialist will contact the equipment manufacturer for assistance.

A complete set of backup anthropometry equipment is kept at the home office for training and ISIS testing purposes. Some backup equipment for the anthropometry component is kept in each trailer for use until the malfunctioning equipment can be repaired or replaced.

If ISIS is completely unavailable for use during a session, the examiner can still perform the component. The examiner should record all measurements on the Body Measures Recording Form (see Appendix A). Several copies of the form should be kept in the cabinet drawer. The NYFS staff can obtain additional copies in the Blank Forms Directory or via an email request to the home office component specialist. Examiners should print all hard-copy form data legibly. The Body Measures Recording Form can be faxed or mailed to the home office. The component specialist will then complete a Back-End-Edit-Request (BEER) to add the data to the study database.

2.4 Setup Procedures

The following procedures describe how to set up the anthropometry equipment and supplies at the start of a stand.

2.4.1 Calibration Weights

- A set of calibration weights is kept in the body measures room of the mobile examination center (MEC).
- Use the weights to verify the calibration of the portable scales (see Chapter 5, Quality Control, Section 5.2, Equipment Calibrations).

2.4.2 Portable Scale

- Calibrate the portable scales using the calibration weights (see Chapter 5, Quality Control, Section 5.2, Equipment Calibrations).

2.4.3 Stadiometer

- Calibrate the stadiometer using the calibration rod (see Chapter 5, Quality Control, Section 5.2, Equipment Calibrations).
- Slide the headpiece of the stadiometer to the top of the measurement column.

2.4.4 Skinfold Caliper

- Remove the skinfold calipers from storage and ensure that they are accessible in both rooms.
- Calibrate both skinfold calipers using the step wedge standard (see Chapter 5, Quality Control, Section 5.2, Equipment Calibrations).

2.4.5 Measurement Tapes and Ruler

- Remove the steel measuring tapes and height adjustment rulers from storage and ensure that they are accessible in both rooms.

2.4.6 Supplies

- Ensure that the following supplies are accessible in both rooms: cosmetic pencils, drop dispenser filled with baby oil, gauze pads, and masking tape.
- Ensure that the following additional supplies are available in both rooms: alcohol wipes, cotton cloth, and bleach disinfectant wipes.
- Remove the bungee cord and designated soft padding from each computer monitor and store this in the anthropometry storage container.
- Ensure that a small trash can is available in both rooms.

2.5 Teardown Procedures

At the end of the stand, follow the procedures described below to pack up the anthropometry equipment for travel to the next stand. The storage containers will need to be retrieved from the belly compartment and brought to the exam rooms.

2.5.1 Portable Scale

- Calibrate the scale using the calibration weights (see Chapter 5, Quality Control, Section 5.2, Equipment Calibrations).
- Disconnect the batteries in each portable scale.

2.5.2 Stadiometer

- Disassemble the stadiometers.
- Place them in their protective cases and store them.

2.5.3 Skinfold Caliper

- Place the skinfold calipers in their protective cases and store each one in the appropriate exam room storage container.

2.5.4 Measurement Tapes and Ruler

- Place the steel measuring tapes and height adjustment rulers in the storage container designated for each exam room.

2.5.5 Supplies

- Place the following supplies in the storage container designated for the appropriate exam room: cosmetic pencils, drop dispenser filled with baby oil, gauze pads, and alcohol wipes.
- To avoid spillage during travel, ensure that the drop dispensers and the large refill bottle of baby oil are securely closed and placed in a plastic bag in the storage container.
- Enclose the computer monitor in the designated soft padding and strap a bungee cord loosely around this to hold it in place without stressing the hardware.
- Discard any trash in the room.

3. EXAMINATION PROTOCOL

3.1 Eligibility Criteria

All NYFS sample persons (SPs) are eligible for the Anthropometry or Body Measurement component. Table 3-1 lists the required measurements.

Table 3-1. Body measurements by age category

Measurements	Age Range
Height	3-15
Weight	3-15
Upper arm length	3-15
Arm circumference	3-15
Waist circumference	3-15
Maximal calf circumference	3-15
Calf skinfold	3-15
Triceps skinfold	3-15
Subscapular skinfold	3-15

3.2 Pre-examination Procedures

If possible, prepare the room for the examination before the SP enters the room. Ensure that all supplies needed for the exam are available and accessible: cosmetic pencil, gauze pads, baby oil, steel measuring tape, and skinfold caliper.

When the SP enters the room, introduce yourself (and the recorder if he or she is available) and close the exam room curtain. The examiner/recorder will open the anthropometry component in ISIS and log the SP into the ISIS system. The anthropometry component requires no formal or standard script. However, the examiner will provide a brief introduction to the examination, such as the following:

“I am going to take a number of body measurements, such as height and weight. I will also measure your waist, arm, and calf circumferences; your arm length; and take some skinfold measurements. To take these measures accurately, I will make marks on your skin using a cosmetic pencil. I will later remove the marks with baby oil. Some of these measurements will require adjusting your clothes. For example, I will be asking you to take your arm out of your shirt so that I can measure a

skinfold on your back. I may also ask you to lower the waistband of your pants so that I can obtain a waist measurement next to the skin. ”

IMPORTANT: Prior to initiating the first measurement, **ask the SP to take off his or her shoes and remove any items from his or her pockets.**

3.3 General Guidelines for Measuring and Recording

Follow the guidelines below when taking anthropometric measurements and subsequently recording the data into ISIS:

1. **Always tell the SP and the parent or guardian what you are going to do before you do it.** Explain what you are doing and why, such as when adjusting the SP’s clothing to take the skinfold measurements. **Do not comment about the SP’s body in any way.** Maintain professionalism at all times.
2. **Measure the right side of the body.** If the SP has a physical disability or abnormality on the right side, you should still attempt to measure the right side. Take measurements on the left side **only** when the SP has a cast, prosthesis, or amputation on the appropriate right limb, or when for some other reason the measurement cannot be taken accurately on the right side.
3. **Turn the SP in the direction needed for a given measurement.** This promotes efficiency during the examination by saving time and avoiding unnecessary movement on your part. In other words, do not move yourself around the SP.
4. **Avoid parallax when taking measurement readings.** Parallax describes the phenomenon where an observer reads a different value on a measuring device depending on the angle from which it is viewed. Parallax is a common cause of data error especially for measurements obtained using the skinfold calipers and measurement tape. You should read the measurement with your line of sight directly in front of the value rather than at an angle or from even slightly off to the side.
5. **Record all measurements (except skinfolds) to the nearest tenth of a centimeter (0.1 cm). Record skinfold measurements to the nearest tenth of a millimeter (0.1 mm).** For quality control purposes, the computer will read each number aloud immediately following data entry. ISIS will also alert you to any values that fall below the 1st percentile or above the 99th percentile based on NHANES data. Always verify the result before advancing to the next measure.

3.4 Examination Procedures

This section describes the anthropometry examination procedures. The protocol includes a total of nine body measures.

3.4.1 Standing Height

Standing height is an assessment of maximum vertical size. This stature measurement is collected on all SPs who are able to stand unassisted. Standing height is measured using a stadiometer with a fixed vertical bar and an adjustable headpiece.

1. **Position the SP:** Direct the SP to the stadiometer platform. Ask him or her to remove any hair ornaments, jewelry, buns, or braids from the top of the head. Exhibit 3-1 depicts the correct position for the measurement of standing height. First, have the SP stand up straight with the body weight evenly distributed and both feet flat on the platform. Instruct the SP to stand with the **heels together and toes apart**. The toes should point slightly outward at approximately a 60° angle. Check that the back of the **head, shoulder blades, buttocks, and heels make contact with the backboard**.

NOTE: Depending on the overall body conformation of the individual, all four contact points – head, shoulders, buttocks, and heels – may not touch the stadiometer backboard. For example, some overweight SPs cannot stand straight while touching all four contact points to the backboard. In such instances it is important to obtain the best measurement possible according to the protocol. If you cannot ensure that the SP's trunk remains vertical above the waist, the arms and shoulders are relaxed, and the head lies in the Frankfort plane, then add the comment "NS," Not Straight, to the stature measure in ISIS.

Second, align the head in the **Frankfort horizontal plane**. The head is in the Frankfort plane when the **horizontal** line from the ear canal to the lower border of the orbit of the eye is parallel to the floor and perpendicular to the vertical backboard (Exhibit 3-1). Many people will assume this position naturally, but for some SPs the examiner may need to gently tilt the head up or down to achieve the proper alignment. Instruct the SP to look straight ahead.

Next, lower the stadiometer headpiece so that it rests firmly on top of the participant's head, with sufficient pressure to compress the hair. Instruct the SP to stand as tall as possible, **take a deep breath**, and hold this position. The act of taking a deep breath helps straighten the spine to yield a more consistent and reproducible stature measurement. Notice that the inhalation will cause the headpiece to rise slightly.

NOTE: Some SPs have hair styles including a barrette, bun, or braid that will interfere with the placement of the stadiometer headpiece. Other SPs may refuse to remove their shoes for the height measurement. In these cases, while the SP remains positioned on the stadiometer platform, measure the hairpiece and/or the shoe heel

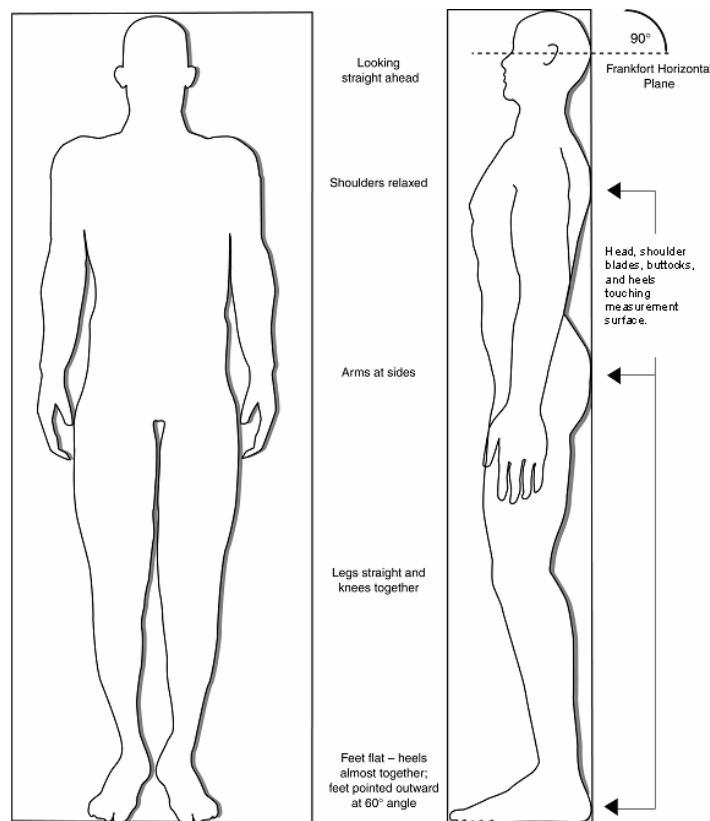
with the 15-cm height adjustment ruler. Enter this number in the Height Correction Above/Below Waist field on the screen. ISIS will use this correction factor to automatically calculate an adjusted height value.

2. **Record the Result:**

- i. **One examiner:** While the SP is correctly positioned and holding the breath, read the measurement and enter the number on the ISIS screen. Tell the SP to release the breath as you hold the headpiece in position.
- ii. **One examiner and one recorder:** While the SP is correctly positioned and holding the breath, call the result to the recorder, who will enter this number on the ISIS. Tell the SP to release the breath as you hold the headpiece in position.

Wait for the computer to repeat the measurement aloud. After verifying the correct value, have the SP relax. Slide the headpiece to the top of the measurement column in preparation for the next participant.

Exhibit 3-1. Standing height position



3.4.2 Weight

Participants will be weighed in kilograms using a scale. At the end of the examination, ISIS will display the weight in both kilograms and pounds for the examiner/recorder to share with the SP and the SP's parent or guardian if he or she wants to know the result. The procedures for obtaining the weight measurement are as follows:

1. **Position the SP:** Press the start key with no load on the scale, direct the SP to stand in the center of the scale, hands at sides, and looking straight ahead.

The portable scale can accurately weigh up to 550 pounds. If the examinee weighs more than this, obtain the weight using two portable scales:

- Have the SP stand with one foot on each portable scale.
- Combine the two results to approximate the weight.
- Enter the total in the Weight field on the screen.
- If the SP exceeds the capacity of **both** portable scales (550 lbs. each), code the weight measure as Exceeds Capacity (EC) in ISIS.

2. **Record the Result:**

- **One examiner:** After the SP is correctly positioned and the readout on the scale becomes stable, press the hold tare key, read the weight in kilograms, and enter the number on the ISIS screen. Ask the SP to step off the scale.
- **One examiner and one recorder:** After the SP is correctly positioned and the readout on the scale becomes stable, press the hold tare key, read the weight in kilograms to the recorder, and the recorder will enter this number on the ISIS screen. Ask the SP to step off the scale.

In addition, exam staff should follow the procedures described below when applicable:

- **Small children:** Children who cannot stand alone on the scale will be weighed with the assistance of an adult. The parent or guardian will stand alone on the scale while the examiner clicks the **Tare** button on the scale. This sets the scale readout to zero. The child is then handed to the adult on the scale. In this way the scale will read only the child's weight.

NOTE: Weight and clothing comments are available to provide information regarding the clothing and or medical appliances worn by the SP during the weight measurements.

- **Weight Comments**

- - **EC = Exceeds Capacity:** Select EC if you cannot enter the weight because: (1) the SP exceeds the capacity of the scale **and** (2) the SP exceeds the capacity of two scales when standing with one foot on each scale.
- - **CNO = Could Not Obtain:** Select CNO if you cannot obtain the weight for a reason other than EC.
- - **MA = Medical Appliance:** Select MA if you successfully obtained the weight but the SP wore a medical appliance that could not be removed, such as a cast or prosthesis.
- - **SH = Shoes:** Select SH if you successfully obtained the weight, but the SP refused to remove his or her shoes in order to step on the scale.

- **Clothing comments**

NOTE: The NYFS participants are asked to wear “light short-sleeved T-shirts and shorts.” When a participant is not wearing the light clothing during the weight measurement, ask the SP to change to the mobile center (MC) light clothing. Select the following comment code if weight is measured when the SP is not wearing the light clothing.

- - **CL = Clothing:** Select CL if you successfully obtained the weight but the SP wore street clothes instead of the recommended NYFS clothing (shorts and T-shirt, or MC light clothing).

3.4.3 Upper Arm Length

In this study, the length of the upper arm is measured in part to obtain reliable arm circumference and skinfold measurements (Sections 3.4.4 and 3.4.7.2, respectively). Exam staff will measure the upper arm length on all participants.

1. **Position the SP:** Direct the SP to turn away from you. Ask him or her to stand upright with the weight evenly distributed on both feet; the right arm bent 90° at the elbow, and the right palm facing up. Demonstrate the correct position if necessary (Exhibit 3-2).
2. **Mark the measurement site:** Locate the end of the spine of the right scapula by following the scapula out to the arm until it makes a sharp V-turn to the front of the body (Exhibit 3-3). Using the cosmetic pencil, make a horizontal line on the **uppermost edge of the posterior border** of the spine extending from the acromion process (see Exhibit 3-4).
3. **Take the measurement:** Hold the zero end of the measuring tape at this mark and extend the tape down the **center** of the posterior surface of the arm to the tip of the

olecranon process, the bony part of the mid-elbow (Exhibit 3-5). Take the measurement to the nearest 0.1 cm.

IMPORTANT: The tape must be centered on the posterior surface of the arm. Exhibit 3-6 shows the correct placement of the measuring tape centered on the posterior surface of the arm, whereas Exhibit 3-7 shows the measuring tape placed incorrectly.

4. **Record the result:**

- i. **One examiner:** Read the measurement and record the measured value to the nearest 0.1 cm on the ISIS screen.

Mark the midpoint: Once the upper arm length is entered, the application will divide the measurement in half to determine the midpoint of the measured length. Replace the zero end of the measuring tape at the upper arm measurement site and then extend the tape down to the olecranon process again. Find the midpoint and use the cosmetic pencil to make a horizontal mark. Cross this mark with a perpendicular line centered on the posterior surface of the arm (see Exhibit 3-5). This mark defines the site at which the arm circumference and triceps skinfold will be measured. Finally, tell the SP to relax the right arm. Proceed to the arm circumference measure.

- ii. **One examiner and one recorder:** Call the result to the recorder, who will enter this number on the ISIS screen. Keep the measuring tape in position.

Mark the midpoint: After the recorder enters the result, the application will divide the value in half to calculate the midpoint of the measured length. A computer-generated voice will repeat the measurement aloud and call out the midpoint. While the examiner holds the tape in place, the recorder will make a horizontal mark at the midpoint and cross this mark with a **perpendicular line centered** on the posterior surface of the arm (see Exhibit 3-5). This mark defines the site at which the arm circumference will be measured. Thus the examiner may need to remove the tape to allow the recorder to complete the appropriate cross mark. Finally, tell the SP to relax the right arm. Proceed to the arm circumference measure.

Exhibit 3-2. SP position for upper arm length and midpoint

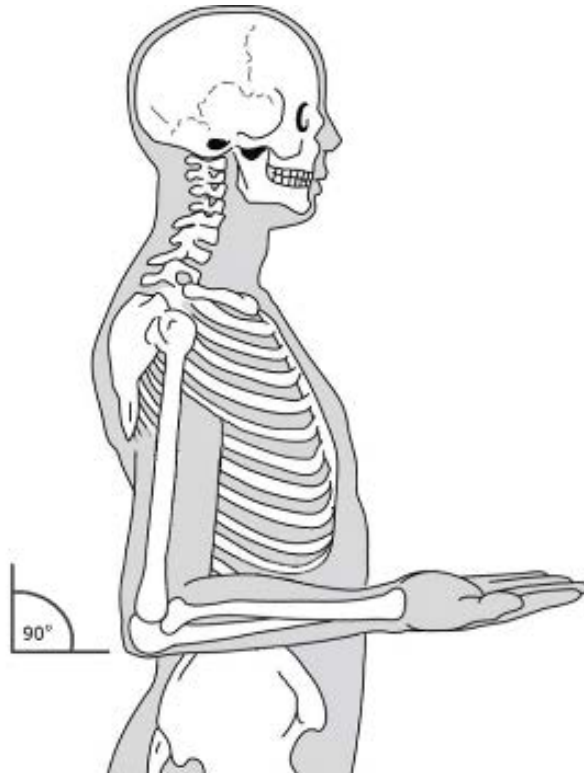


Exhibit 3-3. Upper arm bony landmarks

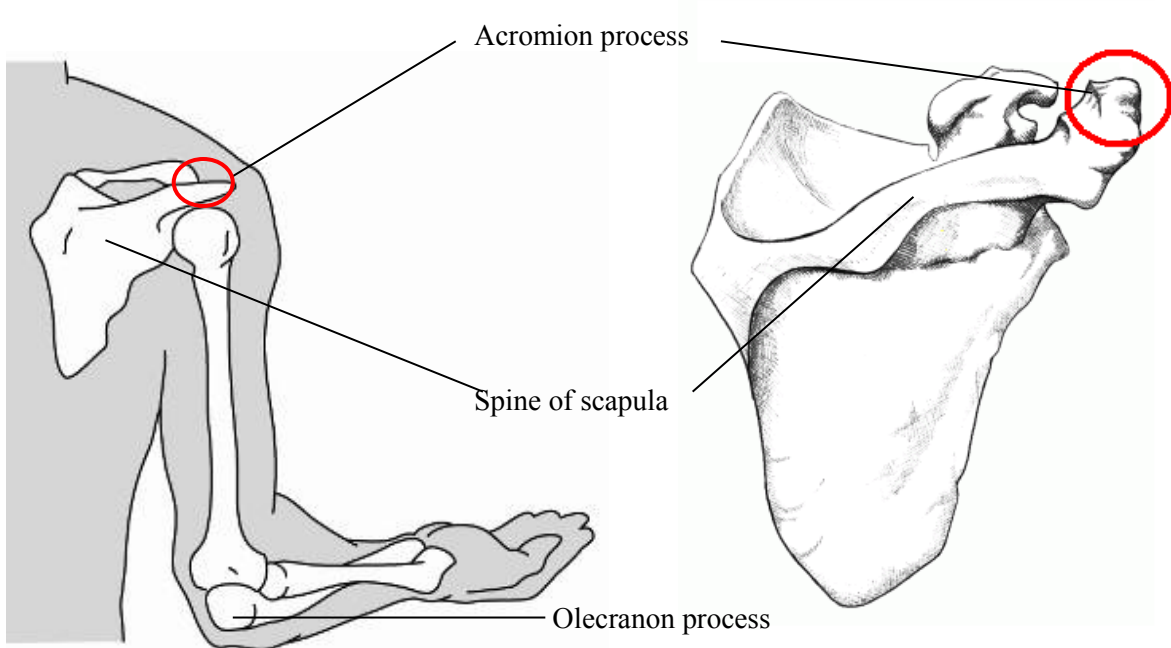


Exhibit 3-4. Marking spine extending from acromion process



Exhibit 3-5. Marking upper arm length midpoint



Exhibit 3-6. **CORRECT** tape placement for upper arm length



Exhibit 3-7. **INCORRECT** tape placement for upper arm length



3.4.4 Arm Circumference

The NYFS anthropometry protocol calls for three circumference measures: arm, calf, and abdominal or waist circumference. The arm circumference is measured on the right arm at the level of the upper arm midpoint mark. The examiner/recorder makes this mark on the posterior surface of the arm immediately after measuring the upper arm length. The procedures for making the arm circumference mark are explained in Section 3.4.3, Upper Arm Length shown earlier. This section describes the procedures for measuring the arm circumference:

1. **Position the SP:** Ask the SP to turn so that you stand **facing** his or her right side. Have the participant stand upright with the weight evenly distributed on both feet, the shoulders relaxed, and the right arm hanging loosely at the sides. Flexing or tightening the arm muscles will yield an inaccurate measurement.
2. **Take the measurement:** Continue to stand **facing the right side** of the SP. Do not stand behind the SP for this measurement. Wrap the measuring tape around the arm at the level of the upper arm midpoint mark. Position the tape **perpendicular** to the long axis of the upper arm. Pull the two ends of the overlapping tape together so that the zero end sits below the measurement value and the result lies on the lateral aspect of the arm (not the posterior surface). Check that the tape fits snugly around the arm but does not compress the skin. Exhibit 3-8 shows the arm circumference measurement. Take the measurement to the nearest 0.1 cm.

3. **Record the result:**
 - i. **One examiner:** Read the measurement and enter this number on the ISIS screen. Remove the tape measure and proceed to the waist circumference measure.
 - ii. **One examiner and one recorder:** Call the result to the recorder, who will enter this number on the ISIS screen. Remove the tape measure and proceed to the waist circumference measure.

Exhibit 3-8. Arm circumference



3.4.5 Abdominal (Waist) Circumference

Waist circumference is a measurement of the abdomen at a specific anatomical landmark. Participants will be asked to lower the waist of their clothing and the measurement will be taken with the tape placed directly on the skin.

1. **Position the SP:** Instruct the participant to gather her or his shirt above the waist, cross the arms, and place the hands on opposite shoulders. Demonstrate the desired position of the arms. It may help to tell the participant to “think of giving yourself a hug.” If necessary, lower the pants and underclothing to slightly below the waist. Again, always tell the participant what you are going to do before you do it.
2. **Measurement:** Stand on the participant’s right side. Palpate the hip area to locate the right ilium of the pelvis. To locate the iliac crest, it may help to work your way up the iliac from the front of the hip. With the cosmetic pencil, draw a horizontal line just above the uppermost lateral border of the right ilium (the crest). Cross this mark at the midaxillary line which extends from the armpit down the side of the torso. Exhibit 3-9 shows the measurement site correctly marked for the waist circumference.
3. **Take the measurement:** Extend the measuring tape around the waist. Position the tape in a horizontal plane at the level of the measurement mark. Use the framed mirror

to ensure correct horizontal alignment of the measuring tape. This is especially useful when measuring overweight participants. Check that the tape sits parallel to the floor and lies snug but does not compress the skin. Always position the zero end of the tape below the section containing the measurement value (Exhibit 3-10). Read the measurement at the end of the participant's normal expiration.

4. **Record the result:**

- **One examiner:** Read the measurement and record the measurement to the nearest 0.1 cm.
- **One examiner and one recorder:** While the examiner remains on the SP's right side, the recorder will come around to the SP's left side to check the placement of the tape. The examiner will call the result to the recorder, who will enter this number on the ISIS screen. Remove the tape measure and erase the cosmetic pencil mark from the SP's skin with a few drops of baby oil on a piece of gauze. If this measure cannot be obtained or if the participant refuses this measure, select the corresponding option on the screen.

Exhibit 3-9. Waist circumference mark

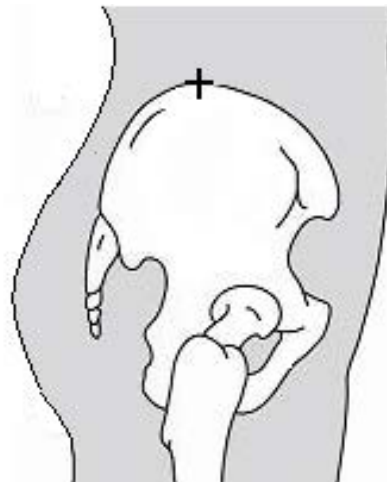
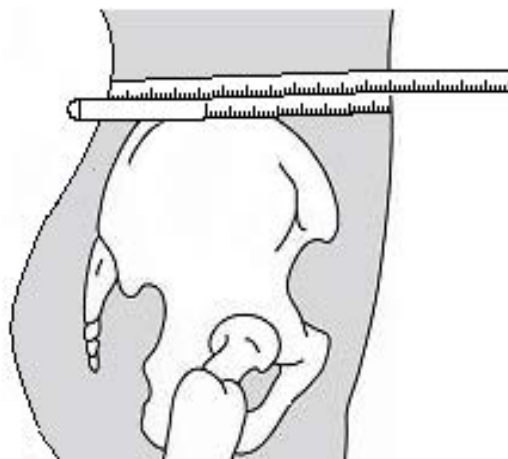


Exhibit 3-10. Measuring tape position for waist circumference



3.4.6 Maximal Calf Circumference

To reliably measure the calf skinfold, the maximal calf circumference must first be measured in which the medial calf skinfold site could be located and marked. Measure the maximal calf circumference on the right calf.

1. **Position the SP:** Ask the SP to sit on the bench or chair, hang his or her right leg loosely with the knee flexed at a 90° angle. Flexing or tightening the leg muscles will yield an inaccurate measurement.
2. **Mark the measurement site:** Place the measuring tape around the calf and move it up and down to locate the maximum circumference in a plane perpendicular to the long axis of the calf (see Exhibit 3-11). Hold the zero end of the tape below the measurement value, snugly but not tight.
3. **Record the Result:**
 - **One examiner:** Make a horizontal mark on the inside surface of the calf. Cross this mark with a perpendicular line centered on the medial surface of the calf (see Exhibit 3-12). Record the measurement to the nearest 0.1 cm.
 - **One examiner and one recorder:** Call the result to the recorder, who will enter this number on the ISIS screen. Keep the measuring tape in position.

Mark the medial calf skinfold site: While the examiner holds the tape in place, the recorder will make a horizontal mark on the inside surface of the calf. Cross this mark with a perpendicular line centered on the medial surface of the calf.

Exhibit 3-11. Location of calf measuring site



Exhibit 3-12. Calf skinfold mark

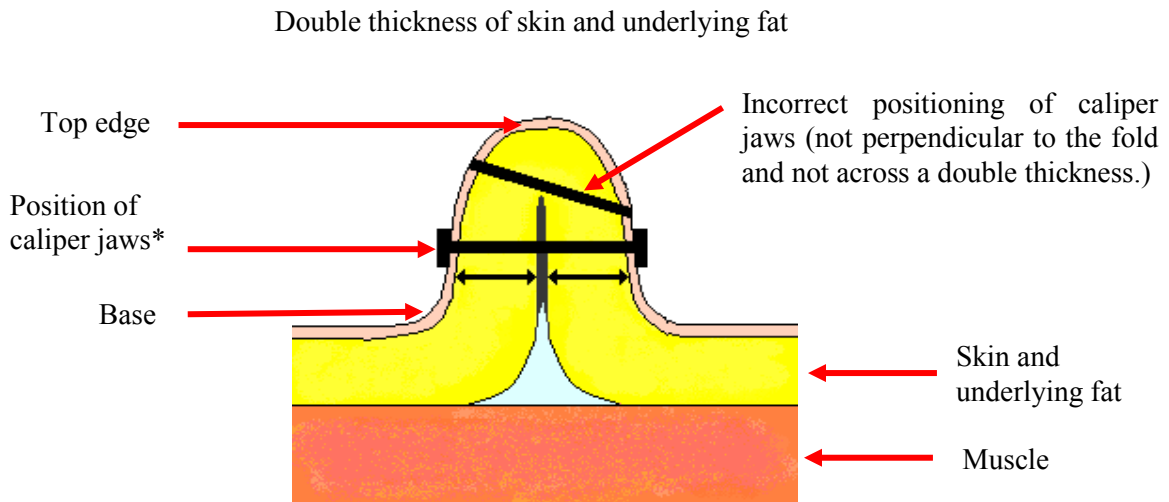


3.4.7 Skinfolds

The current NYFS anthropometry protocol includes calf, triceps, and subscapular skinfold measures for participants aged 3 years and older. All skinfolds are measured in millimeters using the Holtain skinfold caliper.

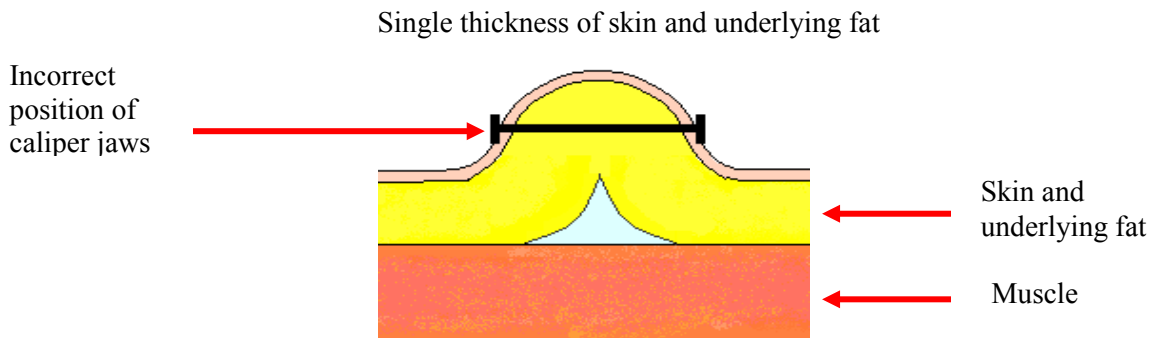
The protocol stipulates that each skinfold consist of a double thickness of skin and underlying adipose (fat) tissue as illustrated in Exhibit 3-13. The ease with which a double thickness can be separated from the underlying muscle tissue varies depending on the individual. This makes skinfolds prone to measurement error. Proper skinfold measurement technique is taught during examiner training. Examiners are cautioned **to not take a skinfold measurement reading if they cannot construct a fold that has two thicknesses of skin and underlying fat.** Exhibits 3-13 and 3-14 depict examples of a correct and incorrect skinfold, respectively. If you are physically unable to produce a correct skinfold with confidence, record “Could Not Obtain” (CNO) in the application system. In such cases, at the end of the exam select Physical Limitation as the reason for the Partial exam status.

Exhibit 3-13. **CORRECT** skinfold measurement



* Correct positioning of caliper jaws – perpendicular to the skinfold and across two thicknesses of skin and underlying fat

Exhibit 3-14. **INCORRECT** skinfold measurement



General procedures for taking skinfold measurement are provided next. Tailored instructions for the triceps, subscapular, and calf skinfold measure will follow.

1. Prior to measuring the skinfold, carefully mark the appropriate site with a cosmetic pencil. Use the black color unless the SP's skin is dark enough to make the black mark indistinguishable. In these cases use the white pencil. Make all marks on the right side of the body.
2. The sight of the caliper may make some children frightened and anxious. In order to make them feel more relaxed, explain the procedure and demonstrate the use of the caliper on the palm of the child and/or the parent.

3. Grasp the skinfold between your thumb and index finger approximately 2.0 cm above the measurement mark. The amount grasped will vary depending on the thickness of the adipose tissue beneath the skin. Pull the skinfold away from the SP's body to separate the fat from the underlying muscle. The sides of the fold should be roughly parallel.
4. With your free hand, place the caliper jaws perpendicular to the length of the fold. Exhibits 3-13 and 3-14 contrast the correct and incorrect positioning of the caliper jaws on the fold.
5. Continue to hold the skinfold with your thumb and forefinger. Release the handle of the calipers to apply full tension on the fold and hold this position for approximately 3 seconds. **It is critical to wait roughly 3 seconds before attempting to read the skinfold measurement.** During this time the needle on the caliper dial will settle into a final position that represents the true thickness of the fold.
6. As indicated in Section 3.3, read the caliper dial at eye level to prevent measurement error due to parallax. In other words, take the reading with your line of sight directly in front of the measurement value instead of at an angle. Measure the thickness to the nearest tenth of a millimeter (0.1 mm). Note that the caliper dial shows 0.2 mm increments. The caliper needle will commonly fall onto one of these increments. However, do not ignore the odd tenths. If after 3 seconds you observe that the needle truly lies between two lines on the dial, e.g., between 10.6 mm and 10.8 mm, take the odd number in between the two, e.g., 10.7, as the measurement.
7. The Holtain calipers, used in NYFS, are designed to provide accurate measurements up to a maximum of 45.0 mm. Since the face of the caliper dial shows between 0.0 mm and 40.0 mm, in order to measure above 40.0 mm the needle will need to run a full circle and past the 0.0. However, since measurements over 45.0 will be considered invalid, ISIS will not accept entries above this number for quality control purposes. Therefore, **record skinfold measurement results greater than 45.0 mm as EC (Exceeds Capacity)** beside the appropriate ISIS field.
8. Finally, remove the caliper jaws; then let go of the fold. Perform all skinfold measures according to the above procedures.

3.4.7.1 Calf Skinfold

The calf skinfold is measured on the inside of the right leg at the level of maximal calf girth. The procedures for making this mark are explained in Section 3.4.7, Maximal Calf Circumference. Instructions for performing the calf skinfold measure are provided below:

1. **Position the SP:** Ask the SP to sit on the bench or chair, hang his or her right leg loosely with the knee flexed at a 90o angle. Flexing or tightening the leg muscles will yield an inaccurate measurement.

2. **Grasp the skinfold:** Using your thumb and index finger, grasp a fold of skin and subcutaneous adipose tissue approximately 2.0 cm above the maximal calf girth mark. If you have difficulty separating the skinfold from the muscle, start at the knee where the tissue tends to be looser and work your way down to the mark. Ensure that the skinfold consists of a double thickness and sits **perpendicular** to the floor.
3. **Position the caliper:** Holding the skinfold 2.0 cm above the maximal girth mark, place the tips of the caliper jaws over the complete skinfold. Ensure that the **mark remains centered between the tips** and that the jaws sit **perpendicular** to the length of the skinfold. Exhibit 3-15 demonstrates the correct placement of the caliper for this measurement.
4. **Take the measurement:** Continue to hold the skinfold in place and release the caliper handle to exert full tension on the skinfold. Wait 3 seconds for the needle on the caliper dial to settle on an accurate measurement. Read the thickness to the nearest 0.1 mm.
5. **Record the result:**
 - **One examiner:** Read the measurement to the nearest millimeter, remove the caliper jaws that let go of the skinfold. Record the calf skinfold measurement and proceed to the next measure, the triceps skinfold.
 - **One examiner and one recorder:** Call this result to the recorder, who will enter this number on the ISIS screen. Remove the caliper jaws, then let go of the skinfold. Proceed to the next measure, the triceps skinfold.

Exhibit 3-15. Calf skinfold measurement



3.4.7.2 Triceps Skinfold

The triceps skinfold is measured at the upper arm midpoint mark on the posterior surface of the right upper arm. The procedures for making this mark are explained in Section 3.4.3, Upper Arm Length. Follow the procedures below to perform the triceps skinfold measure:

1. **Position the SP:** Ask the SP to turn so that you stand **behind** his or her right side. Have the participant stand upright with the weight evenly distributed on both feet, the shoulders relaxed, and the arms hanging loosely at the sides. Flexing or tightening the arm muscles will yield an inaccurate measurement.
2. **Grasp the skinfold:** Using your thumb and index finger, grasp a fold of skin and subcutaneous adipose tissue approximately 2.0 cm above the mid-arm circumference mark. If you have difficulty separating the skinfold from the triceps muscle, start at the elbow where the tissue tends to be looser and work your way up to the mark. Make sure that the skinfold consists of a double thickness and sits **parallel** to the long axis of the arm.
3. **Position the caliper:** Holding the skinfold 2.0 cm above the circumference mark, place the tips of the caliper jaws over the complete skinfold. Ensure that the **mark remains centered between the tips** and that the jaws sit **perpendicular** to the length of the skinfold. Exhibit 3-16 demonstrates the correct placement of the caliper for this measurement.
4. **Take the measurement:** Continue to hold the skinfold in place and release the caliper handle to exert full tension on the skinfold. Wait 3 seconds for the needle on the caliper dial to settle on an accurate measurement. Read the thickness to the nearest 0.1 mm.
5. **Record the result:**
 - **One examiner:** Read the measurement to the nearest millimeter, remove the caliper jaws that let go of the skinfold. Record the calf skinfold measurement and proceed to the next measure, the subscapular skinfold.
 - **One examiner and one recorder:** Call this result to the recorder, who will enter this number on the ISIS screen. Remove the caliper jaws, then let go of the skinfold. Proceed to the next measure, the subscapular skinfold.

Exhibit 3-16. Triceps skinfold measurement



Caliper jaws
CENTERED
over the mark

3.4.7.3 Subscapular Skinfold

The subscapular skinfold is measured at the inferior angle of the right scapula. The subscapular skinfold measurement is taken on all participants. Ask the SP to take his or her arm out of his or her shirt and adjust the shirt so that you can see the SP's right shoulder blade. Instructions for performing the subscapular skinfold measure are provided below:

1. **Position the SP:** Similar to the triceps skinfold measure, turn the SP so that you stand **behind** his or her right side. Have the participant stand upright with the weight evenly distributed on both feet, the shoulders relaxed, and the arms hanging loosely at the sides.
2. **Mark the measurement site:** Tell the SP that you are going to mark the measurement site with a cosmetic pencil. Palpate for the inferior angle, or triangle portion, of the right scapula (Exhibit 3-17). Using the cosmetic pencil, mark a cross (+) **on** the inferior angle (Exhibit 3-18). Make the first line at 45 degrees to the spine and cross this with a line that bisects the inferior angle of the scapula.

NOTE: If you encounter difficulty locating the inferior angle of the scapula, it may help to gently bring the arm behind the back, causing the scapula to protrude. Then, after locating the site have the SP relax the arm, re-examine the site, and make the mark taking care not to mark the site when the skin is stretched.

3. **Grasp the skinfold:** Using your thumb and index finger, grasp a fold so that the index finger remains situated roughly 2.0 cm above and medial to the inferior angle of the

scapula. Due to tightness in this area of the back on many SPs, obtaining this skinfold measure can be a challenge. In cases where you experience difficulty separating the subscapular skinfold from the underlying tissue, begin grasping the fold with the thumb and index finger spread wide.

4. **Position the caliper:** Continue to hold the skinfold in place. With the other hand, set the **top jaw of the caliper on the “+” mark**. This differs from the triceps skinfold procedure in which the mark is centered between the caliper tips. Position the tips of the caliper jaws over the complete skinfold **perpendicular** to the length of the fold and roughly 2.0 cm lateral to the fingers (Exhibit 3-19).
5. **Take the measurement:** Continue to hold the skinfold in place and release the caliper handle to exert full tension on the skinfold. Wait 3 seconds for the needle on the caliper dial to settle on an accurate measurement. Read the thickness to the nearest 0.1 mm.
6. **Record the result:**
 - i. **One examiner:** Read the measurement to the nearest millimeter, remove the caliper jaws then let go of the skinfold. Record the calf skinfold measurement.
 - ii. **One examiner and one recorder:** Call this result to the recorder, who will enter this number on the ISIS screen. Remove the caliper jaws, then let go of the skinfold.

The subscapular skinfold measurement constitutes the final body measure for the NYFS.

Exhibit 3-17. Location of subscapular skinfold

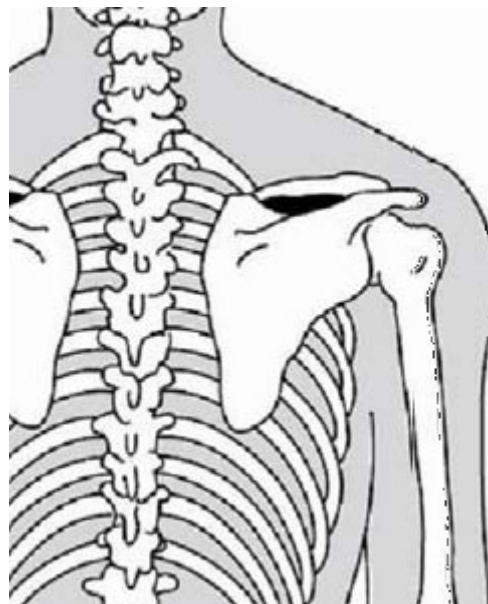


Exhibit 3-18. Subscapular skinfold mark

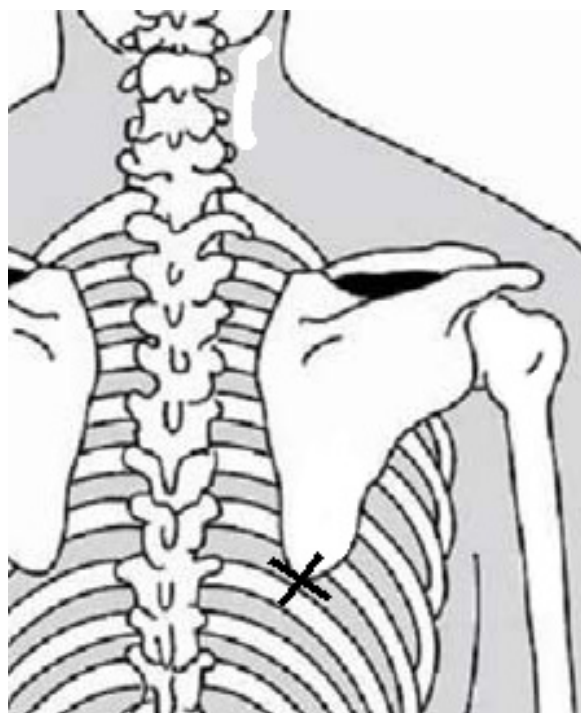
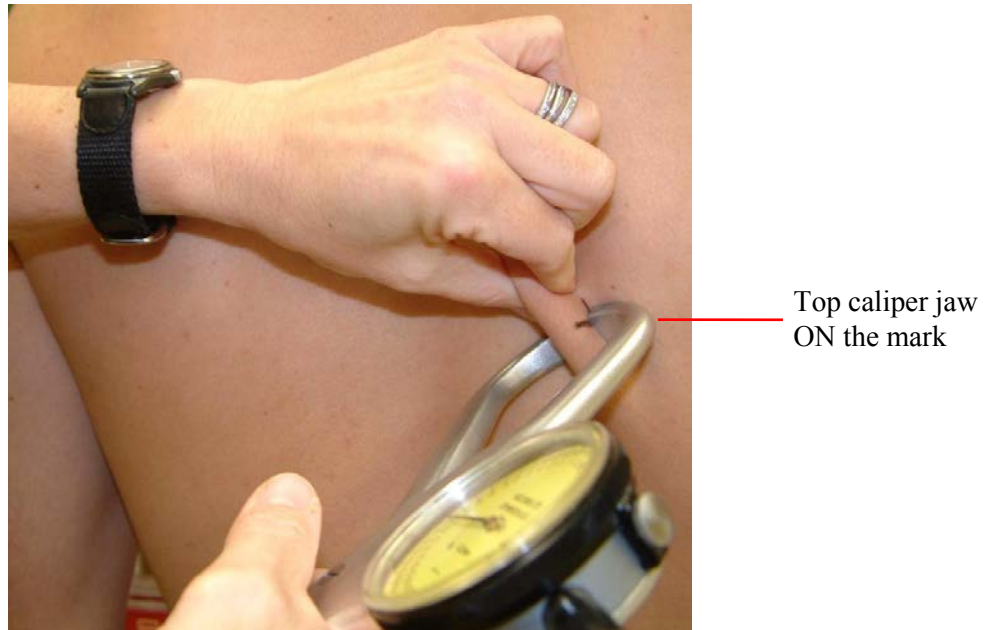


Exhibit 3-19. Subscapular skinfold measurement



3.5 Special Considerations

Obtaining complete and accurate body measurement data can be more challenging under some circumstances. The following situations may require certain modifications to the procedures that would be followed under routine conditions.

3.5.1 Children

The procedures for performing anthropometric measures on children must take into account their smaller size as well as extra safety precautions:

- **Weight.** When a child cannot stand unassisted on the digital weight scale, collect the weight following the Tare procedures described in Section 3.4.2, shown earlier.
- **Upper arm length.** For small children up to roughly 6 or 7 years of age, you may opt to stand the child on the step stool. In this position you can better control the child's movements and take measurements at eye level for data accuracy. Ensure that the step stool sits against the wall and ask the child to hold the safety bar for balance. If the child cannot stand alone on the step stool, take the measurements with the child sitting in the parent's lap.

- **Skinfolds.** You should also stand small children on the step stool for skinfold measurements; this allows measurements to be taken at eye level. Children who cannot stand on the set stool should sit on the parent's lap. Do not let the calipers become the object of the child's attention. Rather, hold them behind your body until you are **ready** to take the measure. Demonstrate the use of the caliper on the palm of the child and/or the parent. This often helps make the child and parent feel more comfortable with the skinfold measurement procedures.

3.5.2 SPs in Wheelchairs

If the SP is willing and able to participate, exam staff should attempt to collect the following subset of anthropometric measurements on SPs who are in wheelchairs:

- Upper arm length;
- Arm circumference;
- Maximal calf circumference
- Triceps skinfold; and
- Calf skinfold.

To prepare the SP for these measurements, direct him or her to the right side of the wheelchair so that the arm of the chair does not restrict the right arm. Ensure that the SP can extend the right arm without interference from the chair. **As with ambulatory participants, DO NOT try to lift the SP or bear his or her weight in order to facilitate the examination protocol.**

3.5.3 Amputees

For SPs who have any part of a limb on the right side amputated, collect the required measurement data on the SP's **left side**. For example, if the SP has part of his or her right arm missing, obtain the Upper Arm Length measurement and mark the midpoint on the left arm. Measure the Arm Circumference and Triceps Skinfold on the left arm as well. Enter Could Not Obtain (CNO) in the Comment box only if both arms are amputated or if for some other reason you cannot obtain these three measurements.

3.5.4 Comprehension or Language Difficulties

Some SPs may have difficulty understanding the examination instructions. Exam staff should use extreme caution when attempting to conduct the anthropometry component on these participants. If the SP cannot understand your instructions because of a developmental disability or other type of physical or mental impairment, ask if a family member or friend accompanied the SP to the MC who can help explain your directions to the SP. Regardless, if you believe the SP cannot comprehend well enough for you to safely and accurately carry out the examination protocol, then on the ISIS screen, code the appropriate measure(s) as Could Not Obtain (CNO) and select “Communication Problem” as the reason for the Partial or Not Done exam status.

For many SPs, language barriers are a common cause of difficulty in understanding examination instructions. For Spanish-speaking SPs, if the examiner is not English-Spanish bilingual, a Spanish interpreter will be assigned to interpret for the SP and the examiner during the exam. If the SP speaks a language other than English or Spanish, arrangements will be made ahead of the anthropometry exam to identify an appropriate interpreter. Regardless, as in the case of other forms of comprehension difficulties, if you cannot safely and accurately perform the exam on the SP, then code the affected measure(s) as Could Not Obtain (CNO) on the ISIS screen and select “Communication Problem” as the reason for the Partial or Not Done exam status. See the *NHANES Interpretation Guidelines* for procedures related to the interpretation of MC examination components and working with interpreters.

3.6 Post-examination Procedures

At the end of the examination remove any remaining cosmetic pencil marks from the SPs skin with a few drops of baby oil on a piece of gauze. Return the SP’s jewelry, wallet, purse, or other belongings that may have been set aside, and put away equipment and supplies in preparation for the next examination.

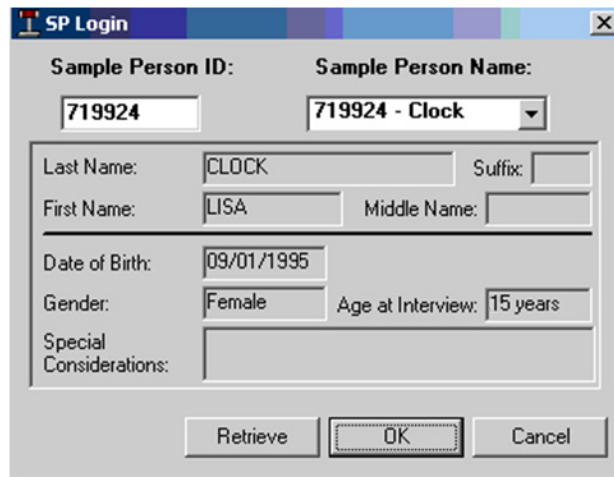
To end the component, the examiner/recorder will click the Finish button on the ISIS screen. **Do not click “Finish” until the SP is completely ready for the next component or ready to be escorted out of the room.** Thank the SP for participating, introduce the next component, or accompany him or her to the next exam room or to the reception area.

4. INTEGRATED SURVEY INFORMATION SYSTEM (ISIS) DATA ENTRY

4.1 General Screen Information

To begin the examination, click the “Logon SP” icon, the first icon on the left in the standard toolbar. ISIS will present a dialog box that asks for the name and password of the examiner and recorder. Wand the barcode on the SP’s information sheet or type the SP’s ID number to log the SP into the component. This will activate a dialog box (Exhibit 4-1) containing descriptive information about the SP (i.e., name, SP ID, age, etc.). Verify that the correct participant name appears on the screen. Click OK to initiate the examination.

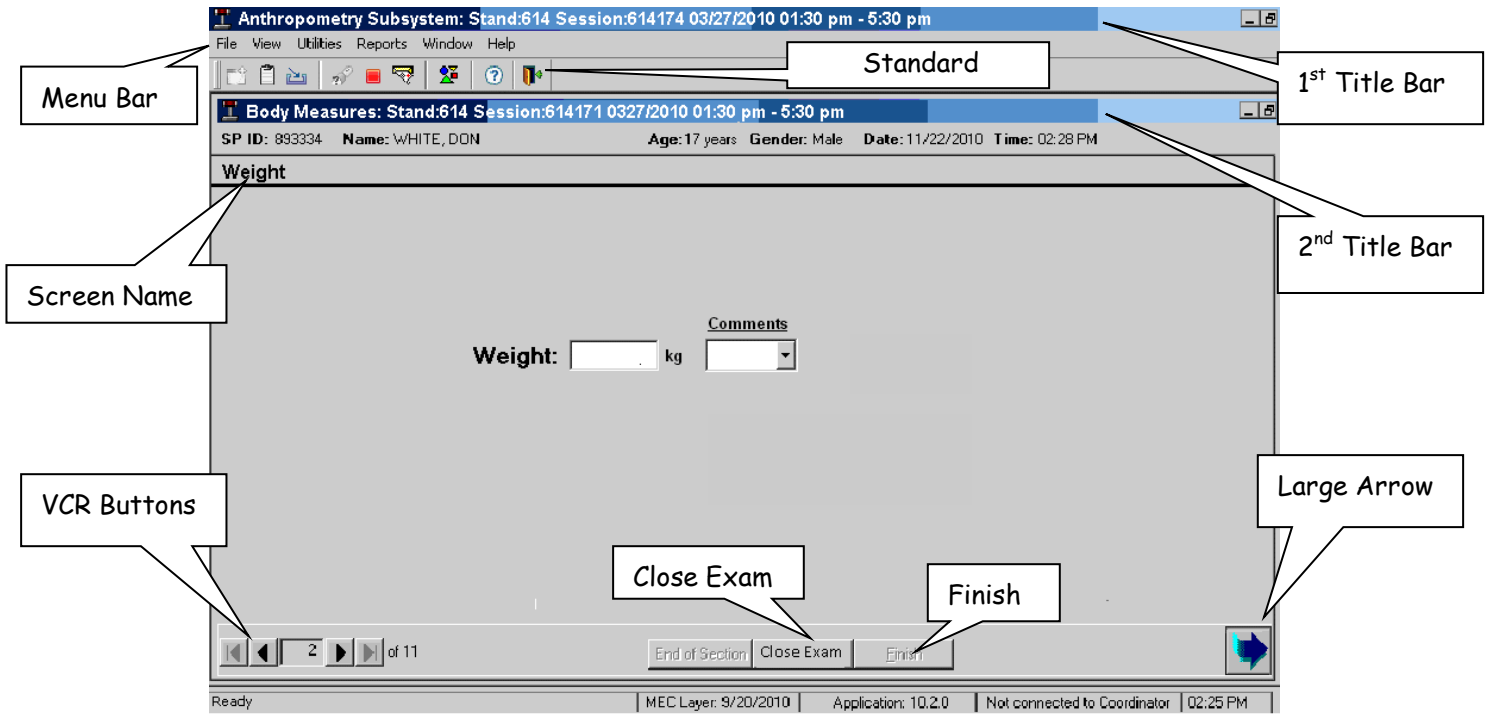
Exhibit 4-1. Logon SP screen



Sample Person ID:		Sample Person Name:	
719924		719924 - Clock	
Last Name:	CLOCK	Suffix:	
First Name:	LISA	Middle Name:	
Date of Birth:	09/01/1995		
Gender:	Female	Age at Interview:	15 years
Special Considerations:			
Retrieve		OK	Cancel

All ISIS screens have similar characteristics. As shown below in Exhibit 4-2, at the very top of the screen is a title bar containing the component name (Anthropometry Subsystem), Stand number, Session number, and Session date and time. Below this are the Menu Bar and Standard Toolbar icons which provide software application commands and shortcuts. Under the standard toolbar sits a second title bar that identifies the examination component (Body Measures), Stand number, Session number, and Session date and time. Below the second title bar is the SP ID, Name, Age, Gender, and current date and time. The component screen name lies in the upper left of the main window area.

Exhibit 4-2. ISIS screen characteristics



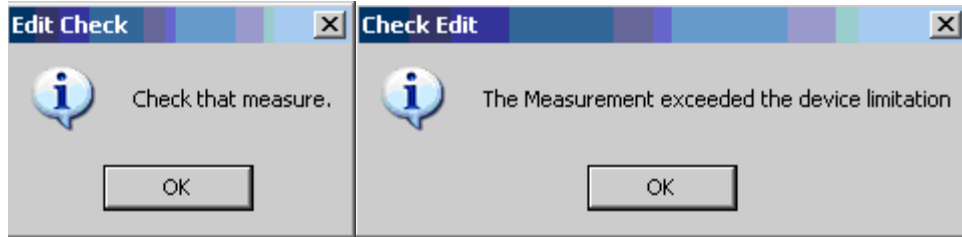
At the bottom left corner of the screen is the ISIS screen number and a set of arrow buttons for navigating the screens: The far left button moves to the first screen and the far right button moves to the last screen. Directly beside the screen number, the left button moves to the previous screen and the right button moves to the next screen. At the bottom right corner of the screen is a large arrow. **Always click on the large arrow to advance to the next screen.**

In the middle of the bottom of the screen are two buttons: Close Exam and Finish. Clicking Close Exam will delete any data captured on the current screen, terminate the exam, and code the exam status as Partial or Not Done. **NEVER click the Close Exam button unless the exam must be discontinued and there is no other appropriate means to exit the application.** Click the Finish button at the end of an exam.

As you proceed through the examination, certain ISIS entries will activate an Edit Check box (Exhibit 4-3). This window appears if the examiner/recorder enters a number that ISIS determines to be out of the acceptable range. Specifically, ISIS identifies numeric data entries as out of range as those that are less than the 1st percentile or greater than the 99th percentile for the SP's age and gender. In these cases, the Edit Check box will present the message, "Check that measure." ISIS will also identify numeric data entries that exceed the capacity of the equipment, and display an Edit Check box with the message

“The Measurement exceeded the device limitation.” **The examiner must review the measurement for accuracy and follow his or her instructions before proceeding with the exam.**

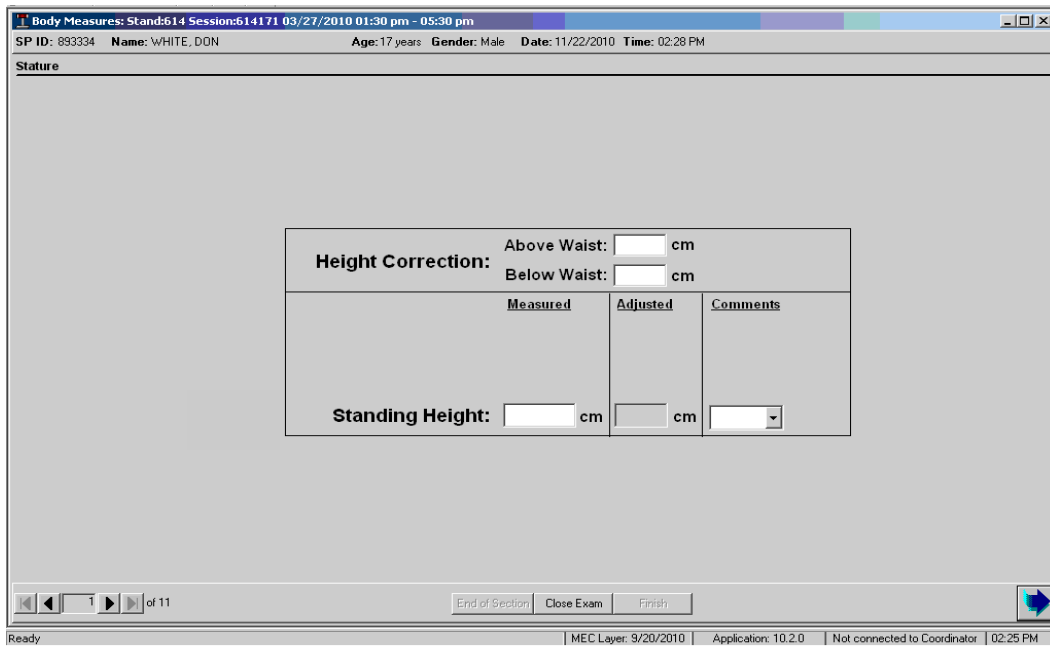
Exhibit 4-3. Edit Check box



4.2 Stature Screen

The first screen in the ISIS anthropometry application is the Stature screen (Exhibit 4-4). Enter the height measurement in centimeters to one decimal point. After the measure is successfully entered in ISIS, a computer-generated voice will repeat the number aloud. Always verify that this is the correct number.

Exhibit 4-4. Stature screen



4.2.1 Height Correction

The top portion of the Stature screen offers two fields for Height Correction: Above Waist and Below Waist (Exhibit 4-5). Using the designated height adjustment ruler, the exam staff will make corrections to the SP’s height in two cases:

- **Above Waist.** The SP refuses (or is unable) to remove a hairpiece such as a barrette, bun, or braids that would otherwise prevent an accurate stature measurement. The technologist measures the hairpiece with the ruler and enters this number in the Height Correction: Above Waist field.
- **Below Waist.** The SP refuses (or is unable) to remove his or her shoes for the stature measurement. The technologist measures the height of the shoe heel with the ruler and enters this number in the Height Correction: Below Waist field.

The Stature screen (Exhibit 4-5) also displays two columns associated with corrections to the standing height measurements:

- **Measured.** The uncorrected height measurement entered into ISIS from the stadiometer.
- **Adjusted.** The adjusted height measurement, taking into account the height correction. ISIS automatically calculates the adjusted height by subtracting the height correction number entered in the Above Waist and/or Below Waist field from the uncorrected height measurement value.

Exhibit 4-5. Stature screen – height correction

Height Correction:	Above Waist: <input type="text" value="1.0"/> cm						
	Below Waist: <input type="text" value=".0"/> cm						
	<table border="1"> <thead> <tr> <th><u>Measured</u></th> <th><u>Adjusted</u></th> <th><u>Comments</u></th> </tr> </thead> <tbody> <tr> <td>Standing Height: <input type="text" value="161.0"/> cm</td> <td><input type="text" value="160.0"/> cm</td> <td><input type="text"/></td> </tr> </tbody> </table>	<u>Measured</u>	<u>Adjusted</u>	<u>Comments</u>	Standing Height: <input type="text" value="161.0"/> cm	<input type="text" value="160.0"/> cm	<input type="text"/>
<u>Measured</u>	<u>Adjusted</u>	<u>Comments</u>					
Standing Height: <input type="text" value="161.0"/> cm	<input type="text" value="160.0"/> cm	<input type="text"/>					

4.2.2 Stature Comments

Beside the Measured and Adjusted columns is a Comments column for specific notes regarding recumbent length and standing height measurements. The Comment box provides the following codes in a drop-down list: EC, CNO, and NS.

- **EC = Exceeds Capacity:** Select EC if you cannot enter the height because the SP is too tall to be measured by the stadiometer.
- **CNO = Could Not Obtain:** Select CNO if you cannot obtain the stature measurement for a reason other than EC.
- **NS = Not Straight:** Select NS to code an inaccurate stature measurement if the SP's posture was not straight.

The drop-down list changes depending on whether or not a value is entered. Specifically, if the height value is zero, the drop-down list will provide the options CNO or EC (Exhibit 4-6). When a non-zero value is entered in the height and/or length, the drop-down list will consist of only NS (Exhibit 4-7).

Exhibit 4-6. Stature screen – standing height blank comments

The screenshot shows a software interface for recording stature measurements. At the top, a status bar displays: "Body Measures: Stand:614 Session:61417 03/27/2012 01:30 pm - 05:30 pm". Below this, patient information is shown: "SP ID: 893334 Name: WHITE, DDN Age: 14 years Gender: Male Date: 11/22/2012 Time: 02:28 PM". The main section is titled "Stature".

Under "Stature", there are two input fields for "Height Correction": "Above Waist: .0 cm" and "Below Waist: .0 cm". Below these is a table with three columns: "Measured", "Adjusted", and "Comments".

Measured	Adjusted	Comments
Standing Height: <input type="text"/> cm	<input type="text"/> cm	<input type="text"/> EC CNO NS

At the bottom of the screen, there are navigation buttons: "End of Section", "Close Exam", and "Finish". A page indicator shows "1 of 11".

Exhibit 4-7. Stature screen – standing height value comments

Height Correction:	
Above Waist:	.0 cm
Below Waist:	.0 cm

Measured	Adjusted	Comments
Standing Height:	160.0 cm	NS

4.3 Weight Screen

The second data entry screen is the Weight screen (Exhibit 4-8). Weight in kilograms is collected on all SPs. When you open this screen the cursor will automatically appear in the Weight field. After the SP steps on the scale and the weight appears on the measurement device, enter the SP's weight in kilograms to one decimal point.

4.3.1 Weight Comments

Beside the Weight field, a Comments box provides the following codes in a drop-down list: EC, CNO, MA, and SH (Exhibit 4-8).

- **EC = Exceeds Capacity:** Select EC if you cannot enter the weight because: (1) the SP exceeds the capacity of the scale, **and** (2) the SP exceeds the capacity of two scales when standing with one foot on each scale.
- **CNO = Could Not Obtain:** Select CNO if you cannot obtain the weight for a reason other than EC.

- **MA = Medical Appliance:** Select MA if you successfully obtained the weight, but the SP wore a medical appliance that could not be removed, such as a cast or prosthesis.
- **SH = Shoes:** Select SH if you successfully obtained the weight, but the SP refused to remove his or her shoes in order to step on the scale.

4.3.2 Clothing Comments

Beside the Weight field, a Clothing Comments box provides the following codes in a drop-down list: CL and SCL (Exhibit 4-8).

- **CL = Clothing:** Select CL if you successfully obtained the weight, but the SP wore street clothes instead of the recommended NYFS clothing (shorts and T-shirt, or MC light clothing).

Exhibit 4-8. Weight screen with comments list

4.3.3 Tare

Use the Tare functions on the scale when a child cannot stand unassisted on the weight scale. In these cases an adult will assist in weighing the child. First, the child's parent or guardian will stand alone on the scale while the examiner/recorder clicks the Tare button. This sets the reading on the scale measurement device to zero. Next, the child is handed to the person on the scale. The scale will now read

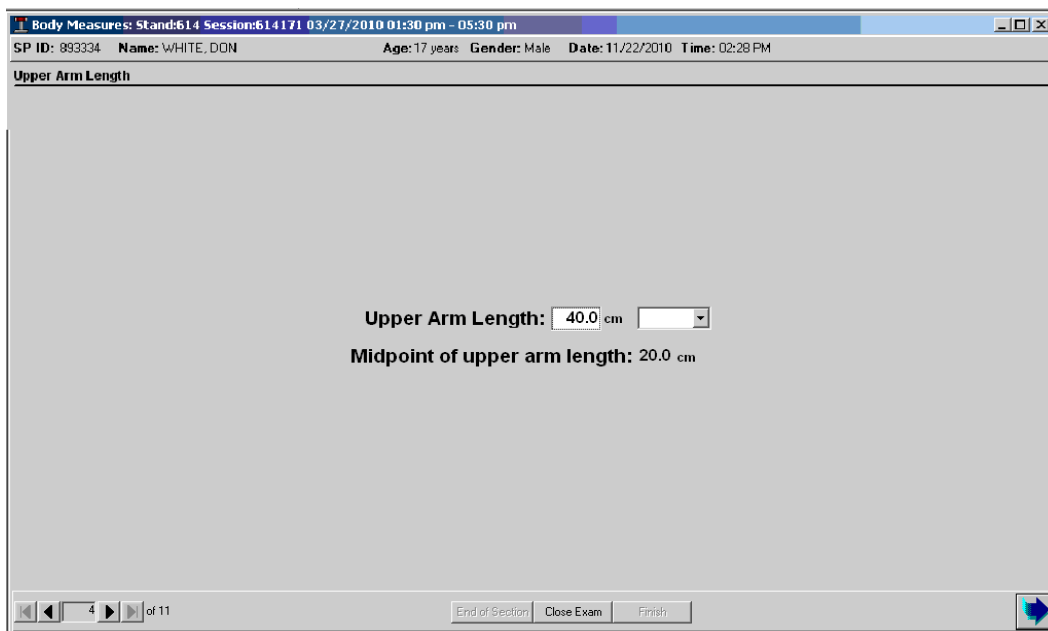
only the weight of the child. As soon as the scale measures this weight, enter the weight in kilograms to one decimal point.

4.4 Upper Arm Length Screen

Following weight measurement is the Upper Arm Length screen (Exhibit 4-9). This screen is displayed for all. After the examiner/recorder enters the upper arm length, ISIS will call out both the number entered and the midpoint of this measurement.

If you cannot obtain the measure for some reason, for example, SP refusal or physical limitation, select CNO (Could Not Obtain) from the corresponding Comment box.

Exhibit 4-9. Upper arm length screen



4.5 Circumference Measures Screen

The Circumference Measures screen (Exhibit 4-10) is also displayed for SPs aged 3 years and older. This screen contains two measures: Arm Circumference and Waist Circumference. After the examiner/recorder enters each measurement, ISIS will repeat the number aloud for confirmation.

If you cannot obtain the measure for some reason, for example, SP refusal or physical limitation, select CNO (Could Not Obtain) from the corresponding Comment box.

To move the screen cursor from one measurement field to the next, press “Enter” or “Tab” on the keyboard or click the cursor on the desired field.

Exhibit 4-10. Circumference Measures screen

Body Measures: Stand:614 Session:614171 03/27/2010 01:30 pm - 05:30 pm
SP ID: 893334 Name: WHITE, DON Age: 17 years Gender: Male Date: 11/22/2010 Time: 02:28 PM

Circumference Measures

Arm Circumference: 30.0 cm

Waist Circumference: 100.0 cm

End of Section Close Exam Finish

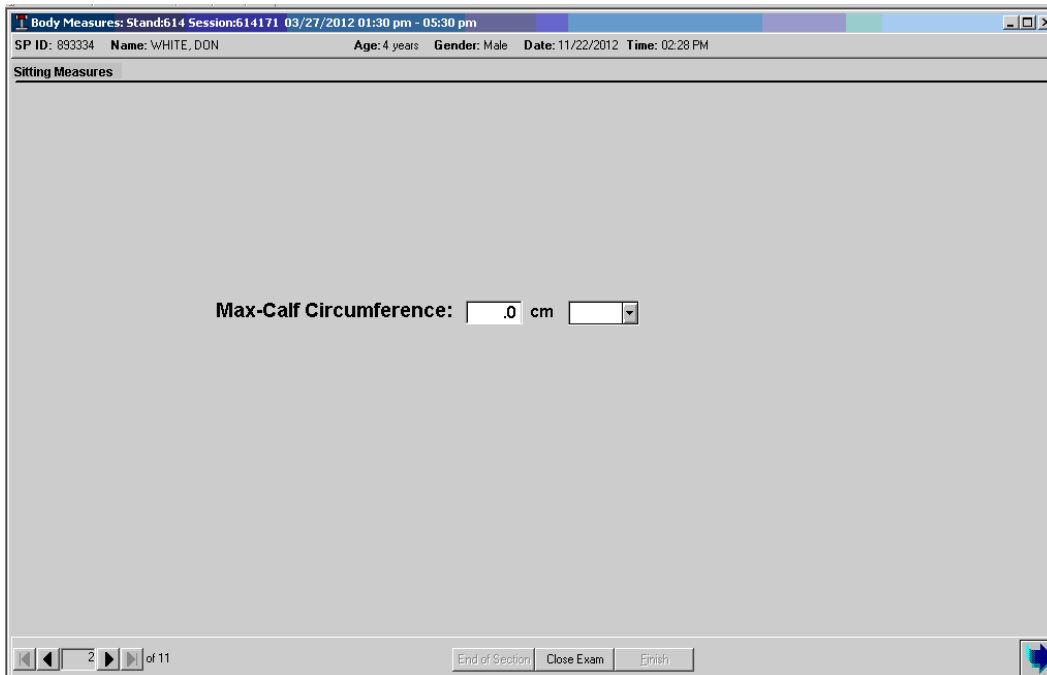
Ready | MEC Layer: 9/20/2010 | Application: 10.2.0 | Not connected to Coordinator | 02:25 PM

4.6 Sitting Measures Screen

The next screen is titled Sitting Measures (Exhibit 4-11). In accordance with the anthropometry protocol, this screen will be displayed for all SPs. After the examiner/recorder enters the applicable measurements, ISIS will repeat the number aloud for confirmation.

If you cannot obtain the measure for some reason, for example, SP refusal or physical limitation, select CNO (Could Not Obtain) from the Comments box located beside each measurement field.

Exhibit 4-11. Sitting Measures screen



4.7 Skinfold Measures Screen

Next, ISIS will display the Skinfold Measures screen (Exhibit 4-12) for SPs aged 3 years and older. This screen contains three skinfold measures: Calf Skinfold, Triceps Skinfold, and Subscapular Skinfold. ISIS will continue to repeat each measurement aloud after the examiner/recorder enters the number on the screen.

If you cannot obtain the measure for some reason, for example, SP refusal or physical limitation, select CNO (Could Not Obtain) from the corresponding Comments box.

If the skinfold measurement exceeds 45.0 mm, select EC (Exceeds Capacity) from the Comment box. Using the existing skinfold calipers, measurements greater than 45.0 mm will not be considered accurate. ISIS has been programmed accordingly to accept only entries that are less than or equal to 45.0.

To move the screen cursor from one measurement field to the next, press “Enter” or “Tab” on the keyboard or click the cursor on the desired field.

Exhibit 4-12. Skinfold measures screen

Body Measures: Stand614 Session:614171 03/27/2012 01:30 pm - 05:30 pm

SP ID: 893334 Name: WHITE, DON Age: 14 years Gender: Male Date: 11/22/2012 Time: 02:28 PM

Skinfold Measures

Calf Skinfold: 0.0 mm

Triceps Skinfold: 0.0 mm

Subscapular Skinfold: 0.0 mm

EC
CNO

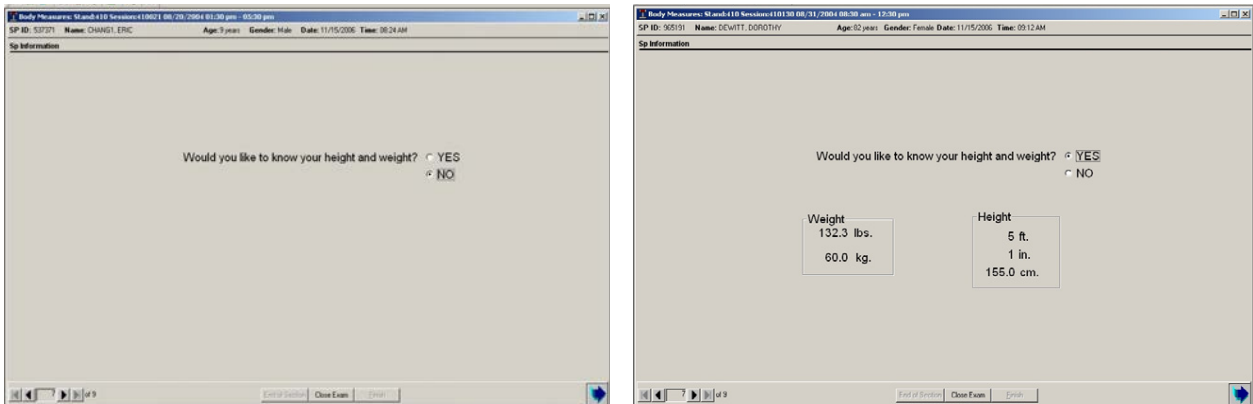
1 of 11 End of Section Close Exam Finish

4.8 SP Information Screen

Following the measurement screens, ISIS will present the SP Information screen (Exhibit 4-13), which offers the question, “Do you want to know your height and weight?” The examiner/recorder will read the question to the SP and click the “Yes” or “No” radio button. This will trigger the following responses:

- **YES** – ISIS will show two boxes: Weight in both pounds and kilograms, and height in both English and metric equivalents.
- **NO** – ISIS will be ready to advance to the next screen.

Exhibit 4-13. SP Information screen



4.9 Anthropometry Component Status Screen

The Anthropometry Component Status (Exhibits 4-14 and 4-15) marks the final ISIS screen. The purpose of this screen is to document the overall status of the anthropometry examination: Complete, Partial, and Not Done. As with all other NYFS exam components, ISIS will automatically default to one of these codes.

- **Complete:** All required measures were captured in ISIS.
- **Partial:** One or more required measures were NOT captured in ISIS.
- **Not Done:** No required measures were captured in ISIS.

Exhibit 4-14. Anthropometry component status screen—Complete

Body Measures: Stand:614 Session:614171 03/27/2010 01:30 pm - 05:30 pm

SP ID: 893334 Name: WHITE, DON Age: 17 years Gender: Male Date: 11/22/2010 Time: 02:28 PM

Body Measurement component Status

Status

Complete

Partial

Not Done

Comments

Other text

11 of 11

End of Section Close Exam Finish

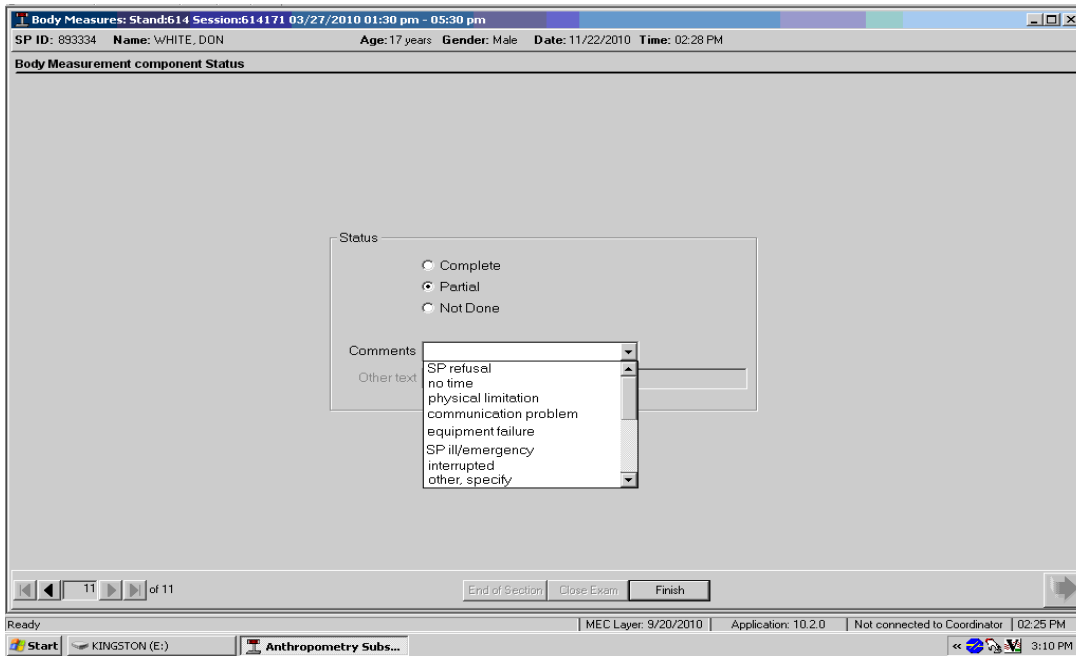
Ready MEC Layer: 9/20/2010 Application: 10.2.0 Not connected to Coordinator 02:25 PM

For Partial and Not Done exams, use the drop-down menu beside the Comments box to select from a list of reasons that include safety exclusion, SP refusal, no time, physical limitation, communication problem, equipment failure, SP ill/emergency, interrupted, medical appliance, unable to lie flat, and Other, specify. If you choose the “Other, specify” comment, you must enter a description. Be as **brief** as possible. Select “Other, specify” only if the comment does not fit into one of the defined choices.

The following are some common scenarios regarding reasons for Partial status exams:

- **Partial status example #1:** If CNO or EC was entered for one of the measures because it was physically impossible for the examiner to obtain the measurement, then ISIS will code the exam status as Partial, and the examiner/recorder should code the reason as “physical limitation.”
- **Partial status example #2:** If CNO was entered for one of the measures because the SP refused to allow the examiner to obtain the measurement, then ISIS will code the exam status as Partial, and the examiner/recorder should code the reason as “SP refusal.”

Exhibit 4-15. Anthropometry component status screen–Partial



Finally, click “Finish” to end the examination. Thank the SP for participating.

5. QUALITY CONTROL

5.1 Introduction to Quality Control for Body Measures

Quality control procedures ensure the collection and documentation of accurate, reliable data. The NYFS body measures data are among the most important data collected in the study. Your role as an examiner is crucial to the success of this component. The body measures protocol requires the examiner to work independently for all measurements (see Chapter 3, Examination Protocol).

In anthropometrics, the most common errors involve body positioning, locating and marking body landmarks, reading measurement results, and recording examination results in the Integrated Survey Information System (ISIS). The methods used in the NYFS were developed to minimize inter-examiner variability, reduce error, and ensure data quality. In addition to the standardized examination protocol, the body measures component incorporates specific quality control (QC) procedures.

5.2 Equipment Calibrations

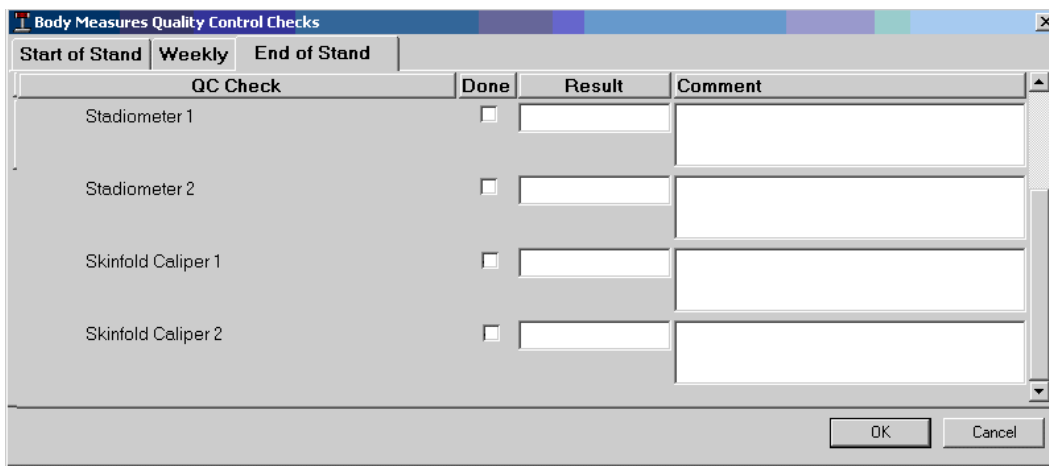
Routine calibrations of the body measures equipment ensure that the equipment produces accurate measures. The following pieces of equipment require calibration at specific points during a stand: portable scale, portable stadiometer, and skinfold calipers. Table 5-1 summarizes the calibration schedule and requirements for these equipment pieces.

Sections 5.2.1–5.2.3 detail the required calibration procedures for the equipment listed in Table 5-1. The examiner will record the results of all calibrations on the ISIS screen titled, “Body Measures Quality Control Checks.” To access this screen, select the Quality Control option from the main Utilities menu. The Body Measures Quality Control Checks dialog box (Exhibit 5-1) contains individual tabs designated for the Start of Stand, Weekly, End of Stand, and Equipment Swap calibration procedures.

Table 5-1. Body measures equipment calibrations

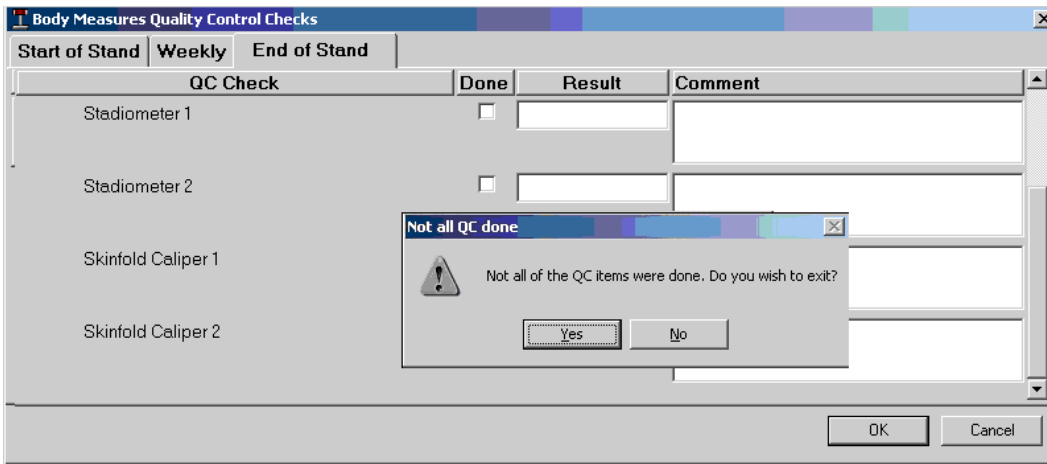
Calibration schedule	Equipment	Calibration requirements
Start of Stand	Scales	11 10-kg weights, acceptable range: 109.50 – 110.50 kg
	Stadiometers	100 cm rod
	Skinfold calipers	Step 1: 9.8-10.5; Step 2: 19.8-20.5; Step 3: 29.9-30.5; Step 4: 39.8-40.4
Weekly	Scales	11 10-kg weights, acceptable range: 109.50 – 110.50 kg
	Stadiometer	100 cm rod
	Skinfold calipers	Step 1: 9.8-10.5; Step 2: 19.8-20.5; Step 3: 29.9-30.5; Step 4: 39.8-40.4
End of Stand	Scales	11 10-kg weights, acceptable range: 109.50 – 110.50 kg
	Stadiometers	100 cm rod

Exhibit 5-1. Body Measures Quality Control Checks dialog box



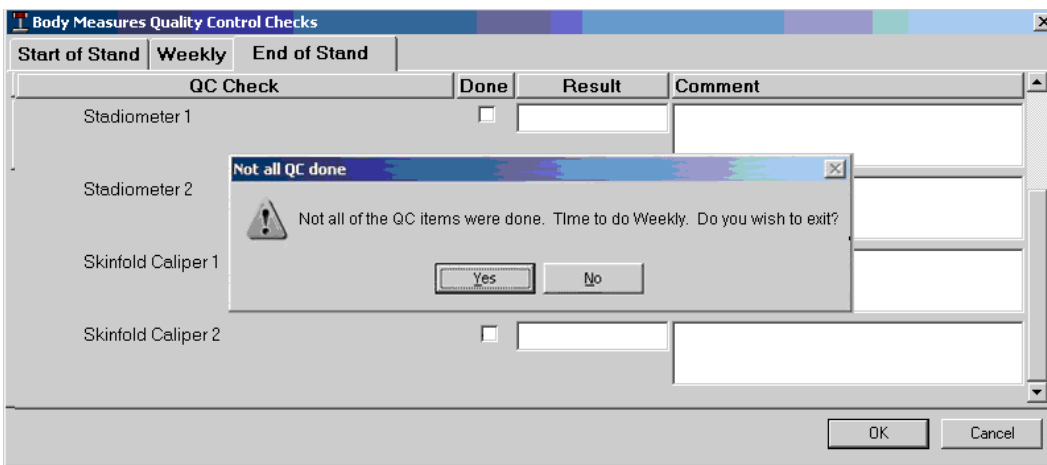
To exit the Body Measures Quality Control Checks dialog box, click “OK.” If any required procedures are not checked as “Done,” ISIS will present a pop-up reminder window to indicate that not all of the QC items were done (Exhibit 5-2).

Exhibit 5-2. Not all QC done message box



To return to the QC dialog box, click “No,” perform the required procedure(s), and check the corresponding “Done” box. If it is time to perform Weekly QC, when you attempt to exit the QC dialog box, ISIS will present a similar pop-up window that includes a reminder to perform the weekly QC procedure (Exhibit 5-3).

Exhibit 5-3. Time to do Weekly QC message box



Finally, if you need to exit the Body Measures QC utility without completing all of the required procedures listed in the QC dialog box, click OK to close the dialog box and click “Yes” to close the pop-up reminder window. ISIS will then return you to the main component screen.

5.2.1 Portable Scales

Calibration: Start of Stand, Weekly, End of Stand

- Take both portable scales to the Body Measures room of the NHANES mobile examination center (MEC).
- Place one portable scale on the floor and activate it by lightly touching the surface with your foot.
- Verify that it is set to measure weight in kilograms.
- Wait for the display to read 0.0.
- Start, Weekly and End of Stand - Carefully place 11 of the 10-kilogram weights on the scale.
- Record the weight.
- The acceptable calibration weight range for 11 10-kilogram calibration weights is 109.50 – 110.50 kg.
- Follow the above calibration procedures for the second portable scale, under “Portable Scale 1.”
- Back in the NYFS mobile center (MC) click on the “Start of Stand,” “Weekly,” or “End of Stand” tab in the QC Checks dialog box (Exhibit 5-4).

Exhibit 5-4. QC Checks: Portable scales calibration

QC Check	Done	Result	Comment
Portable Scale 1	<input checked="" type="checkbox"/>	110.00	
Portable Scale 2	<input checked="" type="checkbox"/>	110.00	
Stadiometer 1	<input type="checkbox"/>		
Stadiometer 2	<input type="checkbox"/>		

- Click the “Done” box beside “Portable Scale 1.”
- When the scale display has stabilized, record the value in the Result field.
- Record the manufacturer serial number in the Comment field.
- If the result falls outside the acceptable range, ask the home office component specialist to have the scale replaced. Document the issue in the UFO system.
- If either scale is replaced at a later date, record the calibration results under the Equipment Swap tab of the QC Checks dialog box.

5.2.2 **Stadiometer**

Calibration: Start, Weekly, End of Stand

- Place one end of the 100 cm calibration rod on the base of the stadiometer column next to the measuring rod.
- Lower the stadiometer headpiece to rest firmly against the top end of the calibration rod. Ensure that the rod stands perpendicular to the base.
- Click on the appropriate tab (i.e., “Start of Stand” or “Weekly”) in the QC Checks dialog box (Exhibit 5-5).
- Click the “Done” box beside “Stadiometer 1.”
- Record the height. The acceptable calibration height range for the 80.0 calibration rod is 99.8 – 100.2 cm.
- Record the manufacturer serial number in the Comment field.
- If the result falls outside the acceptable range, ask the home office component specialist to have the scale replaced. Document the issue in the UFO system.
- If either scale is replaced at a later date, record the calibration results under the Equipment Swap tab of the QC Checks dialog box.

Exhibit 5-5. QC Checks: Stadiometer calibration

QC Check	Done	Result	Comment
Portable Scale 1	<input type="checkbox"/>		
Portable Scale 2	<input type="checkbox"/>		
Stadiometer 1	<input checked="" type="checkbox"/>	100.0	
Stadiometer 2	<input checked="" type="checkbox"/>	100.0	

5.2.3 Skinfold Calipers

Calibration: Start of Stand, Weekly

- Click on the appropriate tab (i.e., “Start of Stand” or “Weekly”) in the ISIS QC Checks dialog box (Exhibit 5-6).
- Click the “Done” box beside “Skinfold Caliper 1.”
- Record the caliper serial number in the Result field, for example, “60709.”
- “Zero” the calipers:
 - Check that the pointer falls exactly on 0 mm.
 - If the pointer is off, loosen the screw knob on top of the dial, turn the dial slowly until the pointer reads zero, and retighten the screw.
- Place the step wedge standard between the caliper jaws at each of the four steps.

Check that the reading falls within the following acceptable ranges:

- Step 1: 9.8 – 10.5 mm
- Step 2: 19.8 – 20.5 mm
- Step 3: 29.9 – 30.5 mm
- Step 4: 39.8 – 40.4 mm

- Record the measurement taken at all four steps in the Comment field, for example: “10.2, 20.4, 30.3, 39.9.”

NOTE: The caliper results are entered under Comments and the caliper serial number under Results because the Result field has a standard character length of 15 characters which does not accommodate the caliper results.

Exhibit 5-6. QC Checks: Skinfold caliper calibration

QC Check	Done	Result	Comment
Stadiometer 1	<input type="checkbox"/>		
Stadiometer 2	<input type="checkbox"/>		
Skinfold Caliper 1	<input checked="" type="checkbox"/>	60709	10.2, 20.4, 30.3, 39.9
Skinfold Caliper 2	<input checked="" type="checkbox"/>	60708	10.0, 20.2, 30.0, 40.0

- If any readings fall outside the acceptable range, ask the home office component specialist to have the calipers replaced. Document the issue in the UFO system.
- Follow the above calibration procedures for the second set of skinfold calipers, under “Skinfold Caliper 2.”
- If the calipers are replaced at a later date, record the calibration results under the Equipment Swap tab of the QC Checks dialog box.

5.3 ISIS Examination Screens

The ISIS Body Measures Examination screens are designed to be user friendly and, at the same time to ensure the collection of accurate data. Quality control features of the ISIS anthropometry application include the following:

- The application will not permit advancement to the next screen unless a number or a comment is entered in every field.
- When the application advances to the next screen, the cursor will automatically appear in the appropriate field awaiting data entry.
- Each measurement number entered is verified using a computer-generated voice that repeats the measure aloud immediately following data capture.
- The risk of measurement and recording errors is reduced through the use of pre-programmed edit ranges. For example, if data captured in ISIS do not fall within the 1st or 99th percentile based on the NHANES dataset, an “out of range” message will appear on the screen. Although some data collected, i.e., from very small or very large SPs, may truly fall outside of the “normal” ranges, the examiner must verify the measurement if prompted by ISIS.
- Data entry errors are also minimized by limits set on the placement of decimal points and the number of digits entered. For instance, if the number entered for a measurement exceeds the allowable digits, ISIS will not permit the number to be entered.

5.4 Observations, Replication, and Review

A consulting anthropometry expert will visit each MC team twice per year at minimum. These visits will serve to verify that the anthropometry protocol is being implemented properly and consistently. While at the MC, the expert will meet with the examiners to review any problems or variations in the standard procedures. Following the site visit, the consultant will summarize all of the issues encountered during the visit in a final report to Westat. The Westat component specialist will forward a copy of the consultant’s Site Visit report to the appropriate NCHS project officer.

Besides the observation of anthropometry examinations, a critical function of the body measures consultant is to serve as the “gold standard” anthropometry examiner. In this role, the consultant will conduct a repeat anthropometry examination on each SP immediately following the examination

performed by the technologist. These gold standard replicate exams will be used to compare measurements between the expert consultant and the individual technologists. Gold standard examinations thus serve as an essential aspect of quality control for the anthropometry component. Appendix B explains the procedures for conducting anthropometry gold standard replicate examinations.

In addition to observations and gold standard exams completed by the anthropometry consultant, NCHS personnel and Westat component staff will visit the MC teams at regular intervals to observe anthropometry examinations. To further monitor the quality of data collection, Westat component staff will generate reports from the ISIS intraweb. The number of anthropometry examinations and examination times: cumulative and sorted by session, by age group, and by technologist, as well as the reason for not done and partial examinations, will be analyzed for each stand.

Finally, retraining sessions will be arranged by the Westat component specialist in coordination with the NCHS project officer and the anthropometry consultant when major protocol changes are introduced, or when a lack of standardization is observed among the examiners.

Appendix A

Body Measures Recording Form

Appendix A. Body Measures Recording Form

Body Measures Recording Form

SP ID: _____ **Stand #:** _____ **Session/Date:** _____
Examiner: _____

MEASURES		3YR+	8YR+
(BMXHT)	Height		
(BMXHTCRA)	Ht Correction: Above Waist		
(BMXHTCRB)	Ht Correction: Below Waist		
(BMXWT)	Weight		
Weight Comment: <input type="checkbox"/> MA <input type="checkbox"/> SH	Clothing Comments: <input type="checkbox"/> CL		
(BMXARML)	Upper Arm Length		
<i>Mid-point of Upper Arm Length (BMXARML/2)</i>			
(BMXARMC)	Arm Circumference		
(BMXWAIST)	Waist Circumference		
(BMXCALF)	Max-calf Circumference		
(BMXCALFF)	Calf Skinfold		
(BMXTRI)	Triceps Skinfold		
(BMXSUB)	Subscapular Skinfold		
Comment: CNO = Could Not Obtain EC = Exceeds Capacity MA = Medical Appliance		CL = Heavy (Street) Clothing SH = Shoes	

Appendix B

Procedures for Conducting Anthropometry Gold Standard Replicate Examinations

PROCEDURES FOR CONDUCTING ANTHROPOMETRY GOLD STANDARD REPLICATE EXAMINATIONS

Gold standard examinations are an essential quality control measure for the anthropometry component. These replicate exams are used to compare differences in measurement results obtained by the expert consultant to those obtained by the individual technologists. Below are instructions for conducting gold standard replicate examinations at the MC.

At the start of the session during which gold standard replicate exams will be conducted, activate the Gold Standard software application:

- In the ISIS Anthropometry application, under the Utilities menu, go to “Gold Standard.”
- Click on “Gold Standard” so that a check mark appears beside it, indicating the application is on.
- If rebooting the computer becomes necessary during a session, the Gold Standard application must be reactivated.

To use the Gold Standard application, the examiner should conduct exams as usual. Following the primary examination, the Gold Standard recruitment screen will appear with two questions:

1. Do you want to conduct a gold standard examination on this SP?
2. Does the SP consent to a gold standard examination?

If a gold standard examination will not be conducted at this time, answer “No” to the first question; the second question will remain deactivated. If “Yes” is answered to the first question, ISIS will activate the second question. In order to repeat the examination, verbal consent must then be obtained from the SP:

“In order to assure the high quality of our data we sometimes repeat the exam. Would you mind if we repeat the exam?”

If the SP does not give consent, or if for some other reason a gold standard exam will not be conducted at this time, simply advance to the next screen, the status screen, and end the gold standard

exam. If the SP gives consent, enter “Yes” to the second recruitment question and select the appropriate name under the Gold Standard Examiner and Gold Standard Recorder drop-downs.

For the gold standard exam, the anthropometry consultant will serve as the examiner. In preparation for the gold standard exam, the cosmetic pencil marks should be erased completely prior to the gold standard exam.

In ISIS the gold standard application screens are identical to the primary exam screens, except that the SP information screen will not appear. Also, the status of gold standard exams will always default to “Complete” regardless of whether the actual status of this section was partial or not done. This is designed to prevent the status of the gold standard section from affecting the overall status of the component.

The ISIS anthropometry application for NYFS is also designed with the capability to provide the results of gold standard examinations as compared to the results obtained in the primary examination. This allows the gold standard examiner and the MC staff to review and discuss on the spot any relevant measurement errors or discrepancies. Gold standard comparison reports can be generated from ISIS in two ways:

1. ISIS anthropometry application: In the main menu bar, under the tab entitled “Reports” select “Gold Standard.” Then choose the desired results by Stand, Session, and/or SP(s).
2. ISIS IntraWeb: Select MC Operations, Operations Reports, Anthropometry Gold Standard Report. Then choose the desired results by Stand, Session, and/or SP(s).

The gold standard reports include the results obtained for individual SPs as well as a display of the absolute and percent difference between the values obtained by the gold standard examiner compared to the technologist. The major difference between generating the report from the application vs. the IntraWeb is that the IntraWeb report additionally offers a cumulative summary of the number of gold standard examinations performed for each examiner.

Finally, ensuring that SPs complete their primary exams at the MC remains a top priority. If conducting gold standard replicate exams will impede the flow of SPs through the MC, the anthropometry consultant can instead observe the primary exams.