ANTHROPOMETRY

1 Background and Rationale

The purpose of the anthropometric measurements is to provide information about body build and body fat distribution in the CHS participants. Standing height is needed for the adjustment of body weight for height; for those people who cannot stand straight, a measure of heel-to-knee (knee height) length will be used to calculate height. Waist and hip circumferences will be used to calculate body fat distribution. Sitting height is needed for adjustment of pulmonary function test results.

2 Definitions

- Standing height Distance from the sole of the feet to the top of the head with the participant standing erect and looking straight ahead.
- Sitting height Distance from the top of the stool to the top of the head with the participant sitting erect and looking straight ahead.
- Weight Weight with participant wearing underwear and examination suit, but no shoes, minus the weight of the suit.
- Hip circumference Circumference at the level of maximal protrusion of the gluteal muscles (hips) with the participant standing erect.
- Waist circumference Circumference at the level of the umbilicus with the participant standing erect.

2.1 Equipment/Supplies

- Detecto balance beam scale (model # 437) calibrated in kilograms
- Stadiometer calibrated in centimeters (200 cm), fastened to the wall
- Ruler to use for people over 200 centimeters
- Steel/fiberglass tape calibrated in centimeters
- Stool (flat-seated) approximately 32" high
- Tape to fasten the stadiometer to the wall
- Carpenter square
- Foot stool
- Weight (50 lbs.)

3 Methods

Anthropometric measurements are made with the participants wearing the sweat suit but no shoes (the weight of the CHS examination suit will be subtracted from this weight by the computer).

3.1 Standing Height Measurement

- Height measurement is taken using the following procedure:
  - Participant stands erect with his/her back to vertical mounted metal centimeter ruler (stadiometer).
  - Heels should be together and against the vertical ruler.
  - Participant stands erect with weight distributed evenly across both feet; both feet are flat on floor.
  - Participant faces straight ahead with his/her head in the Frankfort horizontal plane (the horizontal plane which includes the lower margin of the bony orbit, (the socket containing the eye), and the most forward point in the supratragal notch (the notch just above the anterior cartilaginous projections of the external ear). See Figure 1.
  - Bring the carpenter square down snugly but not tightly on the top of the head.

    Note: Examiner should use a stool to adjust the bar and read the measurement when a participant is taller than examiner. Examiner's eyes should be level with the point of measurement.
  - Record the measurement to the nearest half centimeter, rounding down.
- Periodically, a check is made to be sure the floor is level, the wall is at a 90 degree angle to the floor, the wall is straight and the metal ruler is mounted perpendicular to the floor.
- A chart converting centimeters to inches is on the wall or available for use in informing the participant of his/her height in inches (Figure 2).

3.2 Unadjusted Sitting Height

- Sitting height measurement is taken using the following procedure:
  - Place a sturdy, flat-seated stool approximately 32" high, in front of the height ruler. Two of its legs are placed against the wall and the seat is centered against the ruler.
  - Seat participant on stool.
  - Place the participant's sacrum, thoracic spine and back of the head against

the ruler.

- Participant's legs should hang unsupported.
- The muscles of the thighs and buttocks should be relaxed.
- Encourage participant to sit up as straight as possible to achieve maximum sitting height.
- Participant faces straight ahead with his/her head in the Frankfort position. See Figure 1.
- Bring the carpenter square down snugly but not tightly on the top of the head.
- Record the height from the floor to the top of the participant's head to the nearest half centimeter, rounding down.
- The computer will calculate the sitting height by subtracting the stool seat height from the unadjusted sitting height.

3.3 Weight Measurement

■ Storage:

When not in use, the counter poise should rest in a position toward the far right, in vicinity of 200 lbs. The top poise should rest in the zero position.

■ Weight measurement is done using the following procedure:

- Prior to asking participant to step onto scale, lift the counter poise and position it at zero.
- Ask participant to step onto the scale, facing the measurement beam.
- Instruct participant to stand in the middle of the platform on the scale with head erect and eyes looking straight ahead.
- Weight should be equally distributed on both feet.
- Instruct participant not to touch or support him/herself.
- With participant standing quietly in the proper position, examiner lifts the counterweight (larger weight), and slides it to the right until the beam approaches balance.

- Adjust the top poise until the beam is evenly balanced.
- Reader reads the scale with eyes level to the point of measurement.
- Record the weight to the nearest 0.5 pound, rounding down.
- Ask the participant to step off the scale.
- Return the counter poise to the 200-pound mark, and the top poise to zero.

■ Maintenance of Balance Scale

With normal use, the scale should last for many years. In order to ensure long life, the following maintenance practices are recommended:

- The scale equipment should remain in a stationary position; it should not be moved from room to room, nor moved within the same room.
- While the upper poise slides easily across the column, the counter poise must always be lifted carefully before it is moved across the column; this prevents any wear on the notches which could result in erroneous readings.
- The counter poise should rest on the 200-pound mark when the scale is not in use; if the weight is left at zero, the gear mechanisms are subjected to unnecessary wear.
- The scale should not be tipped; the platform should be kept free of objects and no one should ever jump on it; all staff should be instructed in the correct use of the scale.
- The scale should always remain standing on a flat, hard, level surface.

3.4 Hip Circumference

■ Hip circumference is measured using the following procedure:

- Hip circumference is measured while participant is standing erect, with arms hanging loosely at the sides, weight equally distributed on both feet, and with head facing straight ahead.
- Apply anthropometric tape at the level of the maximal protrusion of the gluteal muscles (Figure 4), underneath the sweat suit, but over the underwear.
- Apply tape snugly but not tight,

- Assure that tape is horizontal. Check the position of the tape to assure its correct position from both the front and back.

- Record the measurement to the nearest half centimeter, rounding down.

3.5 Waist Circumference

- Waist circumference is measured using the following procedure:

  - Waist circumference is measured while participant is standing erect, with arms hanging loosely at the sides, weight equally distributed on both feet, and with head facing straight ahead.

  - Apply anthropometric tape at the level of the umbilicus (navel) (Figure 3), underneath the sweat shirt.

  - Apply tape snugly but not tight.

  - Assure that tape is horizontal.

  - Read measurement at mid-respiration with the participant breathing quietly.

  - Record the measurement to the nearest half centimeter, rounding down.

3.6 Important points for accurate waist and hip circumferences are:

- Careful location of the correct site to be measured.

- Pulling the measuring tape snug (but not indenting the skin) so it does not slide.

- Assuring the tape is horizontal all of the way around the body part during measurement.