Annex 1

Glossary of terms and abbreviations

This glossary provides brief definitions of terms and abbreviations used in the report. More detailed definitions may be found in specialized dictionaries, and many of the terms are more fully discussed in the relevant sections of this report.

abdominal circumference
Circumference of the trunk, which reflects intra-abdominal and subcutaneous fat. Preference has been given in this report to circumference of the abdomen rather than the waist (the narrowest part of the trunk). The recommended measurement protocol is described in Annex 2.

abdominal fatness
Fat deposition, primarily visceral, reflected in a large abdominal circumference, especially relative to hip or lower body circumferences.

abdomen:hip ratio
The ratio of abdominal circumference to hip circumference. See measurement protocols in Annex 2.

adolescence
The period extending from the earliest signs of pubescence to the achievement of adult status.

adolescent spurt
A transient period of rapid somatic growth during pubescence, occurring about 2 years earlier in girls than in boys. See section 6.

adiposity
A descriptive term (from adipose tissue or fat) referring to the relative contribution of fat to body composition.

adult voice
The attainment of adult voice, a maturational indicator for boys. See section 6 and Annex 2.

AGA
See *appropriate for gestational age.*

AMA
See *arm muscle area.*

AMC
See *arm muscle circumference.*

appropriate for gestational age (AGA)
Birth weight in the normal range, based on percentile definitions related to gestational age. See section 4.

arm muscle area (AMA)
The estimated cross-sectional area of the muscle in the upper arm, calculated from the triceps skinfold thickness and arm circumference. See Annex 2 for derivation.

arm muscle circumference (AMC)
The estimated circumference of the muscle in the upper arm, calculated from triceps skinfold thickness and arm circumference. See Annex 2 for derivation.

attributable risk
The proportion of a population outcome due to an exposure. For example, the proportion of deaths from diarrhoea that can be attributed to malnutrition. This measure is derived by subtracting the rate of the outcome (usually incidence or mortality) among the unexposed from the rate among the exposed individuals.

AV
See *adult voice.*

B2
Breast stage 2. A stage in the maturation of the breast in females. See Annex 2 for description, and section 6.

BMI
See *body mass index.*

body mass index (BMI)
A measure of body mass relative to height, calculated as weight (kg)/height^2 (m^2).

breast-milk substitute
Any food marketed or otherwise represented as a partial or total replacement for breast milk, whether or not suitable for that purpose.

catch-up growth
Rapid, compensatory growth during rehabilitation from prior nutritional deficits or illness.

complementary feeding
Provision of both breast milk and solid (or semi-solid) food to a child.

complementary food
Any food, whether manufactured or locally prepared, suitable as a complement to breast milk or to infant formula, when either becomes insufficient to satisfy the nutritional requirements of the infant. Such food is also commonly called "weaning food" or "breast milk supplement".

exclusive breast-feeding
The feeding of an infant only with breast milk from his/her mother or a wet nurse, or expressed breast milk, and *no other* liquids or solids except vitamins, mineral supplements, or medicines in drop or syrup form.

fatness
The relative amount of body fat.

GA
See *gestational age.*

G3
Genital stage 3. For boys, a stage in the maturation of the genitalia. See Annex 2 for description, and section 6.

gestational age (GA)
Duration of pregnancy, usually expressed in weeks. See section 3.

growth faltering
The negative departure of a child's growth path. Failure to gain, or actual loss of, weight; a weight gain less than a specified value over a given period.

growth velocity
The rate of growth over a specified period, e.g. 5 cm/year.

indicators
Relate to the use or application of indices and are often constructed from them. For example, the proportion of children below a certain level of weight-for-age is widely used as an indicator of nutritional status. See section 2.

indices
Indices are combinations of measurements necessary for their interpretation. For example, a value for weight alone has no meaning unless it is related to age or height. Thus, weight and height may be combined to produce the body mass index. See section 2.

intrauterine growth retardation (IUGR)
Birthweight below a given low percentile cut-off for gestational age. See section 4.

IUGR
See *intrauterine growth retardation.*

large for gestational age (LGA)
Birthweight above a given high percentile cut-off for gestational age. See section 4.

last menstrual period (LMP)
The recalled first day of the last normal menstrual period before the amenorrhea associated with pregnancy; used in dating the beginning of pregnancy. See section 3.

LBW
See *low birth weight.*

LGA
See *large for gestational age.*

LMP
See *last menstrual period.*

low birth weight (LBW)
Birth weight < 2500 g

low height-for-age
Height < -2 SD of the sex-specific reference data relative to age. See section 5.

low weight-for-age
Weight < -2 SD of the sex-specific reference data relative to age. See section 5.

low weight-for-height
Weight < -2 SD of the sex-specific reference data relative to height. See section 5.

maturation
The process of achievement of adult status in structure or function.

menarche
The onset of menses (menstruation) in adolescent girls. The age at which menarche occurs is an indicator of maturational timing. See section 6.

menopause
Natural menopause is considered to have occurred in a woman after 12 consecutive months with no menses.

mid-upper arm circumference (MUAC)
The circumference of the upper arm measured at the mid-point between the tip of the acromial process and the tip of the olecranon process.

MUAC
See *mid-upper arm circumference.*

NCHS
National Center for Health Statistics. A governmental agency in the USA charged with collection and distribution of national data related to health.

NCHS/WHO growth reference data
Reference data for height and weight of children in the USA, originally collected by the National Center for Health Statistics and recommended for international use by WHO.

net gestational weight gain
During pregnancy, the total maternal weight gain minus the infant's birth weight.

net gestational rate of gain
During pregnancy, the net gestational weight gain/gestational age.

nomogram
A graphical device to allow rapid determination of an index (such as BMI), avoiding the need for detailed calculations.

obesity
A state of excess body fat storage (There is no agreement about cut-off points for the percentage of body fat that constitutes obesity.) See sections 6 and 7.

overall rate of gestational weight gain
During pregnancy, the total maternal weight gain/gestational age.

overweight
Excess weight relative to height. For adults, this report recognizes the following three grades of overweight, as judged by BMI:

grade 1: BMI 25.00-29.99

grade 2: BMI 30.00-39.99

grade 3: BMI $\geq$ 40.00

peak height velocity
The maximum rate of growth in stature occurring during the adolescent spurt. See section 6.

point of flexion
The most acute bend in a curve, especially with regard to curves of rates of risk. (The term "inflection" has a very specific meaning in mathematics and was therefore considered inappropriate for most uses considered in this report.)

predominant breast-feeding
Breast milk as an infant's predominant source of nourishment, but with the possible addition of water and water-based drinks (sweetened and flavoured water, teas, infusions, etc.), fruit juice, oral rehydration salts (ORS) solution, drop and syrup forms of vitamins, minerals, and medicines, and ritual fluids (in limited quantities). With the exception of fruit juice and sugar-water, no food-based fluid is admitted by this definition.

prepregnancy weight
Maternal weight measured before conception.

preterm delivery
Birth at < 37 weeks of gestation.

prevalence
The proportion of a population with a disease or condition. See section 2.

pubescence
The period of development of secondary sex characteristics from childhood patterns to adult patterns.

rate of short-term gestational weight gain
During pregnancy, the maternal weight gain between two prenatal visits divided by the gestational age interval between visits.

relative risk
The ratio of the risk of disease or death in one group (exposed) to the risk in another group (unexposed). Groups are often defined by exposure to detrimental factors.

Rohrer's ponderal index
In newborns, an index characterizing body proportions. See Annex 2 for derivation, and section 4.

sexual maturation
The attainment of adult patterns of secondary sex characteristics and reproductive functions. See section 6.

sexual maturation ratings (SMR)
Ratings or stages of the development of secondary sex characteristics, based on quantitative and qualitative changes in pubic hair, breast development in females, and pubic hair, genitalia and voice in males.

SGA
See *small for gestational age.*

shortness
A descriptive term for low height-for-age, without implication of causes.

skeletal maturation
The maturation of the bones of the skeleton, primarily described by changes in shape of primary and secondary centres of ossification from radiographs, and terminating in the fusion of epiphyses of long bones and the cessation of longitudinal growth.

small for gestational age (SGA)
Birthweight below a given low percentile cut-off for gestational age. SGA and intrauterine growth retardation (IUGR) are not strictly synonymous: some SGA infants (e.g. those born to short mothers) may represent merely the lower extreme of the "normal" fetal growth distribution, while other infants who meet the criteria for AGA may have actually been exposed to one or more growth-inhibiting factors. In individual cases, however, it is usually very difficult to ascertain whether or not the observed birth weight is the result of restricted *in utero* growth; classification of an infant as IUGR is thus based, de facto, on the established cut-off for SGA. See section 4.

spermarche
The onset of production of sperm cells by adolescent males.

standard deviation score
See *Z-score.*

stunted
Term applied to individuals whose height-for-age is low as the result of the past process of stunting.

stunting
The process of failure to reach linear growth potential as a result of inadequate nutrition and/or poor health. See section 5.

supplementary feeding programme
A programme providing food or meals additional to the regular family diet, often for younger children who are at risk of inadequate nutrition.

therapeutic feeding programme
Intensive feeding in a supervised or clinical setting for children found to be significantly wasted because of starvation or diseases.

thinness
Insufficient body mass relative to height as indicated by low BMI. For adults, this report recognizes the following three grades of thinness:

grade 1: BMI 17.0–18.49 (mild)

grade 2: BMI 16.0–16.99 (moderate)

grade 3: BMI <16.0 (severe)

Thinness in adolescents is defined as BMI <5th percentile for age.

total gestational weight gain
The difference between final maternal weight, measured or recalled immediately before delivery, and measured or recalled prepregnancy weight.

underweight
See *low weight-for-age*, and section 5.

wasting
See *low weight-for-height.* Describes a recent or current severe process leading to significant weight loss, usually as a consequence of acute starvation and/or severe disease. See section 5.

weaning process
The progressive transfer from breast milk as the sole source of an infant's nourishment to the usual family diet.

weight cycling
Repeated weight gain and loss in an individual, which may be intentional or unintentional and may lead to net gain, net loss, or no overall change.

Z-score (standard deviation score).
The deviation of an individual's value from the median value of a reference population, divided by the standard deviation of the reference population. See sections 2 and 5.

Annex 2
Recommended measurement protocols and derivation of indices

1. Introduction

The manner in which anthropometric and related data are collected requires careful attention. Correct procedures for obtaining the basic measurements are central to the appropriate use and interpretation of anthropometry. The use of specified protocols accomplishes several objectives: it ensures that measurements are comparable with reference data, facilitates interpretation of results, provides a basis for training and standardization of data collectors, and maximizes the reliability of measurements.

This annex provides the basic information necessary for collecting measurements recommended for use in the various age and physical status groups. Specific techniques and details of applications and interpretation of the measurements are provided within the main sections of the report. More complete discussions of anthropometric protocols for many of the recommended measurements and for measurements that may be used for other purposes may be found elsewhere (*1, 2*). To be consistent with the recommended reference data, arm circumference and skinfolds should be measured on the right side of the body.

Training data collectors is important for the proper use of anthropometry, and various publications provide procedures for standardization – ensuring that all observers take measurements in the same way (*3, 4*). It is also important that training curricula cover issues of sensitivity to local customs, dress, and practices of modesty, especially where proper measurement will require the exposure of certain parts of the body. Many problems in this area may be avoided by using observers of the same sex as the subjects.

For almost all age groups, it is recommended that age, sex, height, and weight are recorded; other measurements may be restricted to a single group (e.g. fundal height in pregnancy, attainment of adult voice in adolescence). Table A2.1 may be used to identify all measurements recommended for a particular age or status group or to identify the group or groups in which a specific measurement is advocated.

2. Determination of age and sex

2.1 *Chronological age*

Since many of the recommended measurements and reference data are considered in terms of chronological age, accurate age determination is important, especially for very young children and during adolescence because of the rapid rates of growth. In many areas, birth date is formally registered, and chronological age can be obtained through interviews and

Table A 2.1
Measurements recommended for use in particular age and status groups

	Age or status group							
Measurement	Pregnancy	Newborn	Infancy	Childhood	Adolescence	Adult, overweight	Adult, thinness	Elderly
Age	X	X	X	X	X	X	X	X
Sex	X	X	X	X	X	X	X	X
Gestational age	X	X						
Symphysis-fundus height	X							
Height	X			X	X	X	X	X
Sitting height							X	X
Length		X	X	X				
Weight	X	X	X	X	X	X	X	X
Circumferences								
Head		X	X					
Arm	X			X			X	X
Chest		X						
Abdomen						X		X
Hip						X		X
Calf	X							X

Table A 2.1 (*continued*)

Measurement	Age or status group							
	Pregnancy	Newborn	Infancy	Childhood	Adolescence	Adult, overweight	Adult, thinness	Elderly
Skinfold thicknesses								
Triceps					X		X	X
Subscapular	X				X			X
Thigh	X							
Maturational indicators								
Menarcheal status					X			
Breast stage 2 (B2)					X			
Genital stage 3 (G3)					X			
Adult voice (AV)					X			
Derived indices								
Weight loss							X	X
Body mass index	X				X	X	X	X
Ponderal index		X						
Abdomen:hip ratio						X		X
Arm muscle circumference							X	
Arm muscle area							X	

verified from records, if necessary. Where birth dates are not commonly known or recorded, efforts should be made to approximate age as accurately as possible; some approaches based on local cultural designations or calendar-related events have been successful in this regard (*5*). Except in emergency situations, however, children's age should not be approximated according to height or weight: small children are likely to be considered younger than they are, and prevalence of undernutrition will therefore be underestimated.

Counting the number of deciduous teeth in young children may be appropriate for assigning them to age groups, but is an unsatisfactory method for individuals because of the wide variation in the timing of deciduous eruption (*6*). Eruption of permanent teeth in adolescents is more sensitive to environmental influences than that of deciduous teeth in younger children; counting the number of permanent teeth in adolescents will result in underestimation of chronological age in populations whose overall somatic maturation has been delayed by environmental factors (*7*). Moreover, variation in the timing of permanent tooth eruption makes this an inappropriate method of estimating chronological age of the individual. Assessment of the recommended maturational indicators will allow grouping of adolescents into general categories that may be useful for interpreting anthropometric data, but is not appropriate for estimating chronological age in individuals.

2.2 *Gestational age*

For newborns, gestational age should be assessed, and may be considered as the number of completed weeks since the first day of the last normal menstrual period (LMP). The LMP date is obtained by interviewing the mother carefully. Alternatively, when ultrasound equipment is available, early (<20 weeks) ultrasonic measurements of fetal dimensions can improve the estimate of gestational age (*8*).

2.3 *Sex*

Because of the systematic differences in anthropometric dimensions at most ages, recommended reference data are reported separately for males and females. The collected data should therefore include the sex of individuals concerned. Distinctions between sexes will usually be obvious, although parents or other family members may need to be consulted in the case of small children.

3. Measurement protocols

3.1 *Height, sitting height, length, and weight*

Height (adapted from reference 2)

The measurement of height requires a vertical board with an attached metric rule and a horizontal headboard that can be brought into contact with the uppermost point on the head. The individual to be measured

should be barefoot or in thin socks and wearing little clothing so that the positioning of the body can be seen. He or she should stand on a flat surface, with weight distributed evenly on both feet, heels together, and the head positioned so that the line of vision is perpendicular to the body. The arms hang freely by the sides, and the head, back, buttocks, and heels are in contact with the vertical board. Anyone who cannot stand straight in this position should be positioned vertically so that only the buttocks and the heels or the head are in contact with the vertical board. The individual is asked to inhale deeply and maintain a fully erect position. The movable headboard is brought onto the topmost point on the head with sufficient pressure to compress the hair. For consistency with methods used to collect the recommended reference data, no additional upward pressure is exerted on the mastoid processes. The height is recorded to the nearest 0.1 cm.

Two measurers are needed to determine the height of children aged 2–3 years. One measurer places a hand on the child's feet to prevent lifting of the heels and to keep the heels against the vertical board, and makes sure the knees are extended with the other hand. The second lowers the headboard and observes the height reading.

Note: See section 9.4.2 for height measurements in the elderly.

Sitting height (adapted from reference 2)

The measurement of sitting height requires a table and an anthropometer or measuring stick with a horizontal headboard. The individual sits on the table with the legs hanging unsupported over the edge and with the hands resting on the thighs. The posture is as erect as possible, and the line of vision parallel to the ground. It is useful for the measurer to apply gentle pressure with the right hand over the lumbar area and the left hand, simultaneously, on the superior part of the sternum; this reinforces the erect position. Gentle upward pressure on the mastoid processes ensures the fully erect seated posture.

The anthropometer is positioned vertically in the midline behind the subject so that it nearly touches the back. The measurer's left hand is placed under the subject's chin to assist in holding the proper position, and the right hand moves the blade of the anthropometer onto the vertex (the topmost point of the head). The subject is instructed to take a deep breath, and the measurement is made just before he or she exhales and recorded to the nearest 0.1 cm.

Length (adapted from reference 2)

Two observers are required to measure recumbent length. The subject lies in a supine position on a recumbent length table or measuring board. The crown of the head touches the stationary, vertical headboard. The subject's head is held with the line of vision aligned perpendicular to the plane of the measuring surface. The shoulders and buttocks are flat against the table top, with the shoulders and hips aligned at right angles

to the long axis of the body. The legs are extended at the hips and knees and lie flat against the table top, and the arms rest against the sides of the trunk. The measurer ensures that the legs remain flat on the table and shifts the movable board against the heels. In infants, care is taken to extend the legs gently. The length is recorded to the nearest 0.1 cm.

Weight (adapted from reference 2)
During infancy, a levelled pan scale with a beam and movable weights is preferred. Other types of scales may be used where pan scales are unavailable; all types should be regularly calibrated. Birth weight should be determined within 12 hours of birth. The infant, with or without a diaper, is placed on the scales so that the weight is distributed equally about the centre of the pan. When the infant is lying or suspended quietly (which may require patience), weight is recorded to the nearest 10 g. When an infant is restless, it is possible to weigh the mother while she is holding the infant and again without the infant, but this procedure is unreliable, partly because the mother's weight will usually be recorded to the nearest 100 g. If a diaper is worn, its weight is subtracted from the observed weight: reference data for infants are based on nude weights.

An individual who is able to stand without support is weighed using a levelled platform scale with a beam and movable weights. He or she stands still in centre of the platform, with the body weight evenly distributed between both feet. Light indoor clothing can be worn, but shoes, long trousers, and sweaters should be removed. The weight of the remaining clothing is not subtracted from the observed weight when the recommended reference data are used; however, if heavy clothing must be worn during weighing because of cultural constraints, adjustments should be made before weight measurements are interpreted. Weight is recorded to the nearest 100 g.

Individuals, other than infants, who cannot stand unsupported by reason of disability can be weighed using a beam chair scale or bed scale. If an adult weighs more than the upper limit on the beam, a compensating weight can be suspended from the left-hand end of the beam and the measurer must then determine how much weight must be placed on the platform for the scale to record zero. When the subject is reweighed, this compensatory weight is added to his or her measured weight.

Note: See section 9.4.1 for weight measurements in the elderly.

3.2 *Circumferences*

Measurements of body circumferences require a flexible but inelastic (non-stretchable) graduated tape measure.

Head circumference (adapted from reference 2)
Head circumference is measured with the infant held or seated on the lap of the mother or care-taker. Objects such as hairpins are removed from

the hair. The tape is positioned just above the eyebrows and placed posteriorly to give the maximum circumference. It is pulled sufficiently tight to compress hair and yield a measure that "approximates" cranial circumference. The measurement is recorded to the nearest 0.1 cm.

Mid-upper arm circumference (adapted from reference 2)
For measurement of MUAC the subject stands erect, with the arms hanging freely at the sides of the trunk, the palms towards the thighs. Loose clothing without sleeves is worn to allow total exposure of the arm and shoulder area. The circumference is measured at the midpoint of the arm. To locate the midpoint, the subject's elbow is flexed to 90° with the palm facing upward. The measurer locates the lateral tip of the acromion at the shoulder, and a small mark is made at the identified point. The most distal point on the olecranon process of the ulna (at the point of the elbow) is located and marked. A measuring tape placed over these two marks is used to find the midpoint between them, which is marked.

With the subject's arm relaxed, the elbow extended and hanging just away from the side of the trunk, and the palm towards the thigh, the tape is placed around the arm and positioned perpendicular to the long axis of the arm at the marked midpoint. With the tape snug to the skin but not compressing soft tissues, the circumference is recorded to the nearest 0.1 cm.

Note: See section 9.4.5 for measurements in the elderly.

Chest circumference (adapted from reference 2)
An infant is measured when held or seated on the lap of the mother or care-taker; the chest should be bare. The arms are abducted slightly to permit passage of the tape around the chest. When the tape is snugly in place, the arms are lowered to their natural position at the sides of the trunk. Chest circumference is measured at the level of the fourth costosternal (rib) joints, counting the number of ribs from above. The measurement is made in a horizontal plane to the nearest 0.1 cm at the end of a normal expiration.

Abdominal circumference (adapted from references 2 and 9)
The subject stands comfortably with his or her weight evenly distributed on both feet, and the feet about 25-30 cm apart. The measurement is taken midway between the inferior margin of the last rib and the crest of the ilium, in a horizontal plane. Each landmark should be palpated and marked, and the midpoint determined with a tape measure and marked. The observer sits by the side of the subject and fits the tape snugly but not so tightly as to compress underlying soft tissues. The circumference is measured to the nearest 0.1 cm at the end of normal expiration.

Hip (buttocks) circumference (adapted from reference 2)
Wearing only nonrestrictive briefs or underwear, or a light smock over underwear, the subject stands erect with arms at the sides and feet

together. The measurer sits at the side of the subject so that the level of maximum extension of the buttocks can be seen, and places the tape measure around the buttocks in a horizontal plane. An assistant may be needed to help position the tape on the opposite side of the subject's body. The tape is snug against the skin but does not compress the soft tissues. The measurement is recorded to the nearest 0.1 cm.

Calf circumference (adapted from reference 2)
The subject sits on a table so that the leg to be measured hangs freely; alternatively, he or she stands with the feet about 20 cm apart and weight distributed equally on both feet. The tape measure is positioned horizontally around the calf and moved up and down to locate the maximum circumference in a plane perpendicular to the long axis of the calf. The tape is in contact with the skin over the whole circumference but does not indent the skin. The measurement is recorded to the nearest 0.1 cm. During infancy and in the elderly, calf circumference can be measured with the subject supine and the knee flexed to 90°.

Note: See section 9.4.3 for further details of measurements in the elderly.

3.3 *Skinfold thicknesses*

Skinfolds should be measured using skinfold callipers, such as Lange or Holtain callipers, that provide standardized pressure at all jaw openings. Some plastic models are available and may be preferred for non-research purposes. General guidelines for measuring skinfolds should be consulted for those inexperienced in these methods (*1, 2*).

Triceps skinfold (adapted from reference 2)
The triceps skinfold is measured in the midline of the posterior aspect of the arm, over the triceps muscle, at a level midway between the lateral projection of the acromion process at the shoulder and the olecranon process of the ulna (at the point of the elbow). With the elbow flexed to 90°, the midpoint is determined by measuring the distance between the two landmarks using a tape measure; it is marked on the lateral side of the arm. Except for infants and the handicapped, the subject should be measured standing, with the arm hanging loosely and comfortably at the side. The calliper is held in the measurer's right hand. A vertical fold of skin and subcutaneous tissue is picked up gently with the left thumb and index finger, approximately 1 cm proximal to the marked level, and the tips of the callipers are applied perpendicular to the skinfold at the marked level. Measurements are recorded to the nearest 0.5 mm (Lange callipers), 0.2 mm (Holtain callipers), or smallest unit of graduation.

Note: See section 9.4.6 for measurements in the elderly.

Subscapular skinfold (adapted from reference 2)
The subscapular skinfold is picked up gently on a diagonal, inclined infero-laterally at approximately 45° to the horizontal plane in the natural

cleavage lines of the skin. The site is just inferior to the inferior angle of the scapula. The subject stands comfortably erect, with the arms relaxed at the sides of the body. To locate the site, the measurer palpates the scapula, running the fingers inferiorly and laterally along its vertebral border until the inferior angle is identified. For some subjects, especially the obese, gently placing the arm behind the back will help identify the site. The calliper jaws are applied 1 cm infero-lateral to the thumb and finger raising the fold, and the thickness is recorded to the nearest 0.5 mm (Lange callipers), 0.2 mm (Holtain callipers), or smallest unit of graduation.

Note: See section 9.4.4 for measurements in the elderly.

Thigh skinfold (anterior) (adapted from reference 2)
The thigh skinfold site is located in the midline of the anterior aspect of the thigh, midway between the inguinal crease and the proximal border of the knee cap (patella). The subject flexes the hip to assist location of the inguinal crease. The thickness of the vertical fold is measured while the subject stands. The body weight is shifted to the other foot while the leg on the measurement side is relaxed with the knee slightly flexed and the foot flat on the floor. The calliper jaws are applied about 1 cm distal to the fingers holding the fold, and the thickness of the fold is recorded to the nearest 0.5 mm (Lange callipers), 0.2 mm (Holtain callipers), or the smallest unit of graduation.

3.4 *Maturational indicators in adolescence*

More complete descriptions and discussions of stages of secondary sexual characteristics used as maturational indicators may be found elsewhere (*10, 11*).

Menarcheal status (girls) (adapted from reference 12)
Menarcheal status is determined by interview. At the time of questioning each subject is asked her age (or her date of birth) and whether she has begun to menstruate. A knowledge of local language and terminology for referring to menstruation is necessary so that the information obtained is correct.

B2 – Breast development (girls) (adapted from references 10 and 11)
Breast stage 2 (B2) is an arbitrary stage in the process of areolar and breast development in adolescence. It is the breast bud stage, characterized by elevation of the breast and papilla as a small mound, in contrast to the lack of palpable breast tissue in childhood; areolar diameter is enlarged and areolar tissue is elevated.

G3 – Genital development (boys) (adapted from references 10 and 11)
Genital stage 3 (G3) is an arbitrary stage in the process of development in size and shape of penis and scrotum in adolescence. It is characterized

by enlargement of the penis, especially in length, compared with the childhood form; enlargement of testes and descent of the scrotum are also evident.

Voice change (boys) (adapted from reference 13)
The recommended maturational indicator is the attainment of the adult voice (sometimes designated AV). It is important to specify that for the recommended uses, the voice change noted is not the so-called "breaking" or husky adolescent voice, but the attainment of the adult voice. The pitch and resonance of the voice has adult characteristics. It may be helpful for assessment to have boys read or recite a chosen text.

3.5 *Other measurements*

Fundal height (symphysis–fundus height) (adapted from reference 14)
A measuring tape of nonelastic material is required. The distance between the upper border of the symphysis pubis to the superior fundus uteri is recorded to the nearest 0.1 cm.

4. Derived indices

The following seven recommended indices are derived from the basic measurements:

- *Percentage weight loss*, or weight change, is calculated as:

$$\frac{\text{previous weight - current weight}}{\text{previous weight}} \times 100$$

Weight must be measured in the same units on all occasions.

- *Sitting height: height ratio* is expressed as a decimal fraction:

$$\frac{\text{sitting height (cm)}}{\text{height (cm)}}$$

- *Body mass index (BMI)* is calculated as:

$$\frac{\text{weight (kg)}}{\text{height}^2\ (\text{m}^2)}$$

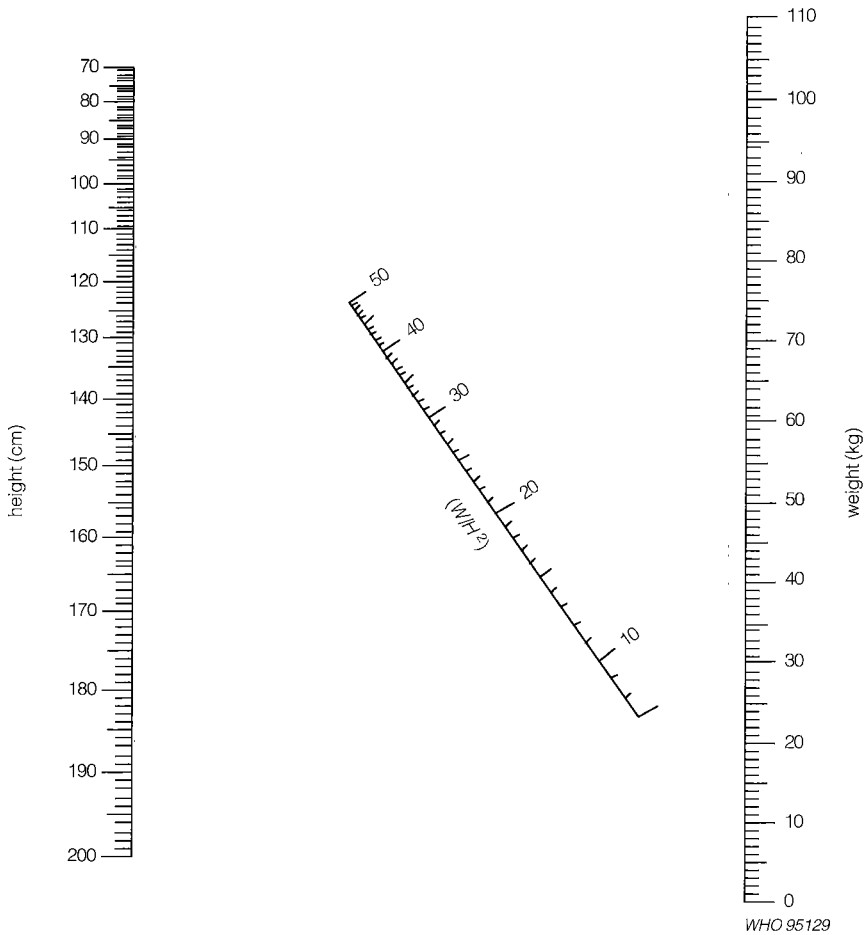
Body mass index may be calculated directly from observed measurements of weight and height, determined from a nomogram (Fig. A2.1), or derived from Table A2.2.

- *Ponderal index (Rohrer's) (PI)* for newborn is calculated as:

$$\frac{\text{birth weight (g)}}{\text{birth length}^3\ (\text{cm}^3)} \times 100$$

Figure A 2.1

Nomogram for obtaining body mass index from height, *H* (cm), and weight, *W* (kg)[a]



Directions

1. Locate the person's height on the left column. Numbers in this column *increase* going down the scale.
2. Locate the person's weight on the right column. Numbers in this column *decrease* going down the scale.
3. Lay a ruler or straightedge so that it touches these two points – height and weight.
4. Note where the straightedge crosses the slanted line between these two columns. This is the body mass index value.
5. Enter the body mass index value in the person's record.

[a] Adapted from reference *16* with the permission of the American Society for Clinical Nutrition.

Table A 2.2

Body mass index for selected heights and weights

Weight (kg)	Height (cm) 140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
31	15.8	15.6	15.4	15.2	14.9	14.7	14.5	14.3	14.2	14.0	13.8	13.6	13.4	13.2	13.1	12.9	12.7	12.6	12.4	12.3	12.1	12.0	11.8	11.7	11.5	11.4
32	16.3	16.1	15.9	15.6	15.4	15.2	15.0	14.8	14.6	14.4	14.2	14.0	13.9	13.7	13.5	13.3	13.1	13.0	12.8	12.7	12.5	12.3	12.2	12.0	11.9	11.8
33	16.8	16.6	16.4	16.1	15.9	15.7	15.5	15.3	15.1	14.9	14.7	14.5	14.3	14.1	13.9	13.7	13.6	13.4	13.2	13.1	12.9	12.7	12.6	12.4	12.3	12.1
34	17.3	17.1	16.9	16.6	16.4	16.2	16.0	15.7	15.5	15.3	15.1	14.9	14.7	14.5	14.3	14.2	14.0	13.8	13.6	13.4	13.3	13.1	13.0	12.8	12.6	12.5
35	17.9	17.6	17.4	17.1	16.9	16.6	16.4	16.2	16.0	15.8	15.6	15.4	15.1	15.0	14.8	14.6	14.4	14.2	14.0	13.8	13.7	13.5	13.3	13.2	13.0	12.9
36	18.4	18.1	17.9	17.6	17.4	17.1	16.9	16.7	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.8	14.6	14.4	14.2	14.1	13.9	13.7	13.5	13.4	13.2
37	18.9	18.6	18.3	18.1	17.8	17.6	17.4	17.1	16.9	16.7	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.8	14.6	14.5	14.3	14.1	13.9	13.8	13.6
38	19.4	19.1	18.8	18.6	18.3	18.1	17.8	17.6	17.3	17.1	16.9	16.7	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.8	14.7	14.5	14.3	14.1	14.0
39	19.9	19.6	19.3	19.1	18.8	18.5	18.3	18.0	17.8	17.6	17.3	17.1	16.9	16.7	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.9	14.7	14.5	14.3
40	20.4	20.1	19.8	19.6	19.3	19.0	18.8	18.5	18.3	18.0	17.8	17.5	17.3	17.1	16.9	16.6	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.1	14.9	14.7
41	20.9	20.6	20.3	20.0	19.8	19.5	19.2	19.0	18.7	18.5	18.2	18.0	17.7	17.5	17.3	17.1	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.1
42	21.4	21.1	20.8	20.5	20.3	20.0	19.7	19.4	19.2	18.9	18.7	18.4	18.2	17.9	17.7	17.5	17.3	17.0	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.4
43	21.9	21.6	21.3	21.0	20.7	20.5	20.2	19.9	19.6	19.4	19.1	18.9	18.6	18.4	18.1	17.9	17.7	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.8
44	22.4	22.1	21.8	21.5	21.2	20.9	20.6	20.4	20.1	19.8	19.6	19.3	19.0	18.8	18.6	18.3	18.1	17.9	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2
45	23.0	22.6	22.3	22.0	21.7	21.4	21.1	20.8	20.5	20.3	20.0	19.7	19.5	19.2	19.0	18.7	18.5	18.3	18.0	17.8	17.6	17.4	17.1	16.9	16.7	16.5
46	23.5	23.1	22.8	22.5	22.2	21.9	21.6	21.3	21.0	20.7	20.4	20.2	19.9	19.7	19.4	19.1	18.9	18.7	18.4	18.2	18.0	17.7	17.5	17.3	17.1	16.9
47	24.0	23.6	23.3	23.0	22.7	22.4	22.0	21.8	21.5	21.2	20.9	20.6	20.3	20.1	19.8	19.6	19.3	19.1	18.8	18.6	18.4	18.1	17.9	17.7	17.5	17.3
48	24.5	24.1	23.8	23.5	23.1	22.8	22.5	22.2	21.9	21.6	21.3	21.1	20.8	20.5	20.2	20.0	19.7	19.5	19.2	19.0	18.8	18.5	18.3	18.1	17.8	17.6
49	25.0	24.6	24.3	24.0	23.6	23.3	23.0	22.7	22.4	22.1	21.8	21.5	21.2	20.9	20.7	20.4	20.1	19.9	19.6	19.4	19.1	18.9	18.7	18.4	18.2	18.0
50	25.5	25.1	24.8	24.5	24.1	23.8	23.5	23.1	22.8	22.5	22.2	21.9	21.6	21.4	21.1	20.8	20.5	20.3	20.0	19.8	19.5	19.3	19.1	18.8	18.6	18.4
51	26.0	25.7	25.3	24.9	24.6	24.3	23.9	23.6	23.3	23.0	22.7	22.4	22.1	21.8	21.5	21.2	21.0	20.7	20.4	20.2	19.9	19.7	19.4	19.2	19.0	18.7
52	26.5	26.2	25.8	25.4	25.1	24.7	24.4	24.1	23.7	23.4	23.1	22.8	22.5	22.2	21.9	21.6	21.4	21.1	20.8	20.6	20.3	20.1	19.8	19.6	19.3	19.1
53	27.0	26.7	26.3	25.9	25.6	25.2	24.9	24.5	24.2	23.9	23.6	23.2	22.9	22.6	22.3	22.1	21.8	21.5	21.2	21.0	20.7	20.4	20.2	19.9	19.7	19.5
54	27.6	27.2	26.8	26.4	26.0	25.7	25.3	25.0	24.7	24.3	24.0	23.7	23.4	23.1	22.8	22.5	22.2	21.9	21.6	21.4	21.1	20.8	20.6	20.3	20.1	19.8
55	28.1	27.7	27.3	26.9	26.5	26.2	25.8	25.5	25.1	24.8	24.4	24.1	23.8	23.5	23.2	22.9	22.6	22.3	22.0	21.8	21.5	21.2	21.0	20.7	20.4	20.2
56	28.6	28.2	27.8	27.4	27.0	26.6	26.3	25.9	25.6	25.2	24.9	24.6	24.2	23.9	23.6	23.3	23.0	22.7	22.4	22.2	21.9	21.6	21.3	21.1	20.8	20.6
57	29.1	28.7	28.3	27.9	27.5	27.1	26.7	26.4	26.0	25.7	25.3	25.0	24.7	24.3	24.0	23.7	23.4	23.1	22.8	22.5	22.3	22.0	21.7	21.5	21.2	20.9
58	29.6	29.2	28.8	28.4	28.0	27.6	27.2	26.8	26.5	26.1	25.8	25.4	25.1	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1	21.8	21.6	21.3
59	30.1	29.7	29.3	28.9	28.5	28.1	27.7	27.3	26.9	26.6	26.2	25.9	25.5	25.2	24.9	24.6	24.2	23.9	23.6	23.3	23.0	22.8	22.5	22.2	21.9	21.7
60	30.6	30.2	29.8	29.3	28.9	28.5	28.1	27.8	27.4	27.0	26.7	26.3	26.0	25.6	25.3	25.0	24.7	24.3	24.0	23.7	23.4	23.1	22.9	22.6	22.3	22.0
61	31.1	30.7	30.3	29.8	29.4	29.0	28.6	28.2	27.8	27.5	27.1	26.8	26.4	26.1	25.7	25.4	25.1	24.7	24.4	24.1	23.8	23.5	23.2	23.0	22.7	22.4
62	31.6	31.2	30.7	30.3	29.9	29.5	29.1	28.7	28.3	27.9	27.6	27.2	26.8	26.5	26.1	25.8	25.5	25.2	24.8	24.5	24.2	23.9	23.6	23.3	23.1	22.8
63	32.1	31.7	31.2	30.8	30.4	30.0	29.6	29.2	28.8	28.4	28.0	27.6	27.3	26.9	26.6	26.2	25.9	25.6	25.2	24.9	24.6	24.3	24.0	23.7	23.4	23.1
64	32.7	32.2	31.7	31.3	30.9	30.4	30.0	29.6	29.2	28.8	28.4	28.1	27.7	27.3	27.0	26.6	26.3	26.0	25.6	25.3	25.0	24.7	24.4	24.1	23.8	23.5
65	33.2	32.7	32.2	31.8	31.3	30.9	30.5	30.1	29.7	29.3	28.9	28.5	28.1	27.8	27.4	27.1	26.7	26.4	26.0	25.7	25.4	25.1	24.8	24.5	24.2	23.9
66	33.7	33.2	32.7	32.3	31.8	31.4	31.0	30.5	30.1	29.7	29.3	28.9	28.6	28.2	27.8	27.5	27.1	26.8	26.4	26.1	25.8	25.5	25.1	24.8	24.5	24.2
67	34.2	33.7	33.2	32.8	32.3	31.9	31.4	31.0	30.6	30.2	29.8	29.4	29.0	28.6	28.3	27.9	27.5	27.2	26.8	26.5	26.2	25.8	25.5	25.2	24.9	24.6
68	34.7	34.2	33.7	33.3	32.8	32.3	31.9	31.5	31.0	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.2	26.9	26.6	26.2	25.9	25.6	25.3	25.0
69	35.2	34.7	34.2	33.7	33.3	32.8	32.4	31.9	31.5	31.1	30.7	30.3	29.9	29.5	29.1	28.7	28.4	28.0	27.6	27.3	27.0	26.6	26.3	26.0	25.7	25.3
70	35.7	35.2	34.7	34.2	33.8	33.3	32.8	32.4	32.0	31.5	31.1	30.7	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.7	27.3	27.0	26.7	26.3	26.0	25.7
71	36.2	35.7	35.2	34.7	34.2	33.8	33.3	32.9	32.4	32.0	31.6	31.1	30.7	30.3	29.9	29.6	29.2	28.8	28.4	28.1	27.7	27.4	27.1	26.7	26.4	26.1
72	36.7	36.2	35.7	35.2	34.7	34.2	33.8	33.3	32.9	32.4	32.0	31.6	31.2	30.8	30.4	30.0	29.6	29.2	28.8	28.5	28.1	27.8	27.4	27.1	26.8	26.4
73	37.2	36.7	36.2	35.7	35.2	34.7	34.2	33.8	33.3	32.9	32.4	32.0	31.6	31.2	30.8	30.4	30.0	29.6	29.2	28.9	28.5	28.2	27.8	27.5	27.1	26.8
74	37.8	37.2	36.7	36.2	35.7	35.2	34.7	34.2	33.8	33.3	32.9	32.5	32.0	31.6	31.2	30.8	30.4	30.0	29.6	29.3	28.9	28.5	28.2	27.9	27.5	27.2
75	38.3	37.7	37.2	36.7	36.2	35.7	35.2	34.7	34.2	33.8	33.3	32.9	32.5	32.0	31.6	31.2	30.8	30.4	30.0	29.7	29.3	28.9	28.6	28.2	27.9	27.5
76	38.8	38.2	37.7	37.2	36.7	36.1	35.7	35.2	34.7	34.2	33.8	33.3	32.9	32.5	32.0	31.6	31.2	30.8	30.4	30.1	29.7	29.3	29.0	28.6	28.3	27.9
77	39.3	38.7	38.2	37.7	37.1	36.6	36.1	35.6	35.2	34.7	34.2	33.8	33.3	32.9	32.5	32.0	31.6	31.2	30.8	30.5	30.1	29.7	29.3	29.0	28.6	28.3
78	39.8	39.2	38.7	38.1	37.6	37.1	36.6	36.1	35.6	35.1	34.7	34.2	33.8	33.3	32.9	32.5	32.1	31.6	31.2	30.9	30.5	30.1	29.7	29.4	29.0	28.7
79	40.3	39.7	39.2	38.6	38.1	37.6	37.1	36.6	36.1	35.6	35.1	34.6	34.2	33.7	33.3	32.9	32.5	32.0	31.6	31.2	30.9	30.5	30.1	29.7	29.4	29.0
80	40.8	40.2	39.7	39.1	38.6	38.0	37.5	37.0	36.5	36.0	35.6	35.1	34.6	34.2	33.7	33.3	32.9	32.5	32.0	31.6	31.3	30.9	30.5	30.1	29.7	29.4
81	41.3	40.7	40.2	39.6	39.1	38.5	38.0	37.5	37.0	36.5	36.0	35.5	35.1	34.6	34.2	33.7	33.3	32.9	32.4	32.0	31.6	31.2	30.9	30.5	30.1	29.8
82	41.8	41.2	40.7	40.1	39.5	39.0	38.5	37.9	37.4	36.9	36.4	36.0	35.5	35.0	34.6	34.1	33.7	33.3	32.8	32.4	32.0	31.6	31.2	30.9	30.5	30.1
83	42.3	41.7	41.2	40.6	40.0	39.5	38.9	38.4	37.9	37.4	36.9	36.4	35.9	35.5	35.0	34.5	34.1	33.7	33.2	32.8	32.4	32.0	31.6	31.2	30.9	30.5
84	42.9	42.3	41.7	41.1	40.5	40.0	39.4	38.9	38.3	37.8	37.3	36.8	36.4	35.9	35.4	35.0	34.5	34.1	33.6	33.2	32.8	32.4	32.0	31.6	31.2	30.9
85	43.4	42.8	42.2	41.6	41.0	40.4	39.9	39.3	38.8	38.3	37.8	37.3	36.8	36.3	35.8	35.4	34.9	34.5	34.0	33.6	33.2	32.8	32.4	32.0	31.6	31.2
86	43.9	43.3	42.7	42.1	41.5	40.9	40.3	39.8	39.3	38.7	38.2	37.7	37.2	36.7	36.3	35.8	35.3	34.9	34.4	34.0	33.6	33.2	32.8	32.4	32.0	31.6
87	44.4	43.8	43.1	42.5	42.0	41.4	40.8	40.3	39.7	39.2	38.7	38.2	37.7	37.2	36.7	36.2	35.7	35.3	34.9	34.4	34.0	33.6	33.2	32.7	32.3	32.0
88	44.9	44.3	43.6	43.0	42.4	41.9	41.3	40.7	40.2	39.6	39.1	38.6	38.1	37.6	37.1	36.6	36.2	35.7	35.3	34.8	34.4	33.9	33.5	33.1	32.7	32.3

Weight (kg)	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
31	11.2	11.1	11.0	10.9	10.7	10.6	10.5	10.4	10.2	10.1	10.0														
32	11.6	11.5	11.3	11.2	11.1	10.9	10.8	10.7	10.6	10.4	10.3	10.2	10.1												
33	12.0	11.8	11.7	11.6	11.4	11.3	11.2	11.0	10.9	10.8	10.7	10.5	10.4	10.3	10.2	10.1									
34	12.3	12.2	12.0	11.9	11.8	11.6	11.5	11.4	11.2	11.1	11.0	10.9	10.7	10.6	10.5	10.4	10.3	10.2	10.0						
35	12.7	12.5	12.4	12.3	12.1	12.0	11.8	11.7	11.6	11.4	11.3	11.2	11.0	10.9	10.8	10.7	10.6	10.5	10.3	10.2	10.1	10.0			
36	13.1	12.9	12.8	12.6	12.5	12.3	12.2	12.0	11.9	11.8	11.6	11.5	11.4	11.2	11.1	11.0	10.9	10.7	10.6	10.5	10.4	10.3	10.2	10.1	
37	13.4	13.3	13.1	13.0	12.8	12.7	12.5	12.4	12.2	12.1	11.9	11.8	11.7	11.5	11.4	11.3	11.2	11.0	10.9	10.8	10.7	10.6	10.5	10.4	10.2
38	13.8	13.6	13.5	13.3	13.1	13.0	12.8	12.7	12.6	12.4	12.3	12.1	12.0	11.9	11.7	11.6	11.5	11.3	11.2	11.1	11.0	10.9	10.8	10.6	10.5
39	14.2	14.0	13.8	13.7	13.5	13.3	13.2	13.0	12.9	12.7	12.6	12.4	12.3	12.2	12.0	11.9	11.8	11.6	11.5	11.4	11.3	11.2	11.0	10.9	10.8
40	14.5	14.3	14.2	14.0	13.8	13.7	13.5	13.4	13.2	13.1	12.9	12.8	12.6	12.5	12.3	12.2	12.1	11.9	11.8	11.7	11.6	11.4	11.3	11.2	11.1
41	14.9	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.5	13.4	13.2	13.1	12.9	12.8	12.7	12.5	12.4	12.2	12.1	12.0	11.9	11.7	11.6	11.5	11.4
42	15.2	15.1	14.9	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.1	13.0	12.8	12.7	12.5	12.4	12.3	12.1	12.0	11.9	11.8	11.6
43	15.6	15.4	15.2	15.1	14.9	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.1	13.0	12.8	12.7	12.6	12.4	12.3	12.2	12.0	11.9
44	16.0	15.8	15.6	15.4	15.2	15.0	14.9	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.1	13.0	12.9	12.7	12.6	12.4	12.3	12.2
45	16.3	16.1	15.9	15.8	15.6	15.4	15.2	15.0	14.9	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.1	13.0	12.9	12.7	12.6	12.5
46	16.7	16.5	16.3	16.1	15.9	15.7	15.5	15.4	15.2	15.0	14.9	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.2	13.0	12.9	12.7
47	17.1	16.9	16.7	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.2	15.0	14.8	14.7	14.5	14.3	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.2	13.0
48	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.9	15.7	15.5	15.3	15.1	15.0	14.8	14.7	14.5	14.3	14.2	14.0	13.9	13.7	13.6	13.4	13.3
49	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.5	15.3	15.1	15.0	14.8	14.6	14.5	14.3	14.2	14.0	13.9	13.7	13.6
50	18.1	17.9	17.7	17.5	17.3	17.1	16.9	16.7	16.5	16.3	16.1	16.0	15.8	15.6	15.4	15.3	15.1	14.9	14.8	14.6	14.5	14.3	14.1	14.0	13.9
51	18.5	18.3	18.1	17.9	17.6	17.4	17.2	17.0	16.8	16.7	16.5	16.3	16.1	15.9	15.7	15.6	15.4	15.2	15.1	14.9	14.7	14.6	14.4	14.3	14.1
52	18.9	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.9	15.7	15.5	15.4	15.2	15.0	14.9	14.7	14.6	14.4
53	19.2	19.0	18.8	18.6	18.3	18.1	17.9	17.7	17.5	17.3	17.1	16.9	16.7	16.5	16.4	16.2	16.0	15.8	15.7	15.5	15.3	15.2	15.0	14.8	14.7
54	19.6	19.4	19.1	18.9	18.7	18.5	18.3	18.0	17.8	17.6	17.4	17.2	17.0	16.9	16.7	16.5	16.3	16.1	15.9	15.8	15.6	15.4	15.3	15.1	15.0
55	20.0	19.7	19.5	19.3	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.1	15.9	15.7	15.6	15.4	15.2
56	20.3	20.1	19.8	19.6	19.4	19.2	18.9	18.7	18.5	18.3	18.1	17.9	17.7	17.5	17.3	17.1	16.9	16.7	16.5	16.4	16.2	16.0	15.8	15.7	15.5
57	20.7	20.4	20.2	20.0	19.7	19.5	19.3	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.7	16.5	16.3	16.1	16.0	15.8
58	21.0	20.8	20.5	20.3	20.1	19.8	19.6	19.4	19.2	18.9	18.7	18.5	18.3	18.1	17.9	17.7	17.5	17.3	17.1	16.9	16.8	16.6	16.4	16.2	16.1
59	21.4	21.2	20.9	20.7	20.4	20.2	19.9	19.7	19.5	19.3	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	17.1	16.9	16.7	16.5	16.3
60	21.8	21.5	21.3	21.0	20.8	20.5	20.3	20.0	19.8	19.6	19.4	19.2	18.9	18.7	18.5	18.3	18.1	17.9	17.7	17.5	17.3	17.2	17.0	16.8	16.6
61	22.1	21.9	21.6	21.4	21.1	20.9	20.6	20.4	20.1	19.9	19.7	19.5	19.3	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.3	17.1	16.9
62	22.5	22.2	22.0	21.7	21.5	21.2	21.0	20.7	20.5	20.2	20.0	19.8	19.6	19.4	19.1	18.9	18.7	18.5	18.3	18.1	17.9	17.7	17.5	17.4	17.2
63	22.9	22.6	22.3	22.1	21.8	21.5	21.3	21.0	20.8	20.6	20.3	20.1	19.9	19.7	19.4	19.2	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.5
64	23.2	22.9	22.7	22.4	22.1	21.9	21.6	21.4	21.1	20.9	20.7	20.4	20.2	20.0	19.8	19.5	19.3	19.1	18.9	18.7	18.5	18.3	18.1	17.9	17.7
65	23.6	23.3	23.0	22.8	22.5	22.2	22.0	21.7	21.5	21.2	21.0	20.7	20.5	20.3	20.1	19.8	19.6	19.4	19.2	19.0	18.8	18.6	18.4	18.2	18.0
66	24.0	23.7	23.4	23.1	22.8	22.6	22.3	22.1	21.8	21.6	21.3	21.1	20.8	20.6	20.4	20.1	19.9	19.7	19.5	19.3	19.1	18.9	18.7	18.5	18.3
67	24.3	24.0	23.7	23.5	23.2	22.9	22.6	22.4	22.1	21.9	21.6	21.4	21.1	20.9	20.7	20.5	20.2	20.0	19.8	19.6	19.4	19.2	19.0	18.8	18.6
68	24.7	24.4	24.1	23.8	23.5	23.3	23.0	22.7	22.5	22.2	22.0	21.7	21.5	21.2	21.0	20.8	20.5	20.3	20.1	19.9	19.7	19.4	19.2	19.0	18.8
69	25.0	24.7	24.4	24.2	23.9	23.6	23.3	23.1	22.8	22.5	22.3	22.0	21.8	21.5	21.3	21.1	20.8	20.6	20.4	20.2	19.9	19.7	19.5	19.3	19.1
70	25.4	25.1	24.8	24.5	24.2	23.9	23.7	23.4	23.1	22.9	22.6	22.3	22.1	21.8	21.6	21.4	21.1	20.9	20.7	20.5	20.2	20.0	19.8	19.6	19.4
71	25.8	25.5	25.2	24.9	24.6	24.3	24.0	23.7	23.5	23.2	22.9	22.7	22.4	22.2	21.9	21.7	21.4	21.2	21.0	20.7	20.5	20.3	20.1	19.9	19.7
72	26.1	25.8	25.5	25.2	24.9	24.6	24.3	24.1	23.8	23.5	23.2	23.0	22.7	22.5	22.2	22.0	21.7	21.5	21.3	21.0	20.8	20.6	20.4	20.2	19.9
73	26.5	26.2	25.9	25.6	25.3	25.0	24.7	24.4	24.1	23.8	23.6	23.3	23.0	22.8	22.5	22.3	22.0	21.8	21.6	21.3	21.1	20.9	20.7	20.4	20.2
74	26.9	26.5	26.2	25.9	25.6	25.3	25.0	24.7	24.4	24.2	23.9	23.6	23.4	23.1	22.8	22.6	22.3	22.1	21.9	21.6	21.4	21.2	20.9	20.7	20.5
75	27.2	26.9	26.6	26.3	26.0	25.6	25.4	25.1	24.8	24.5	24.2	23.9	23.7	23.4	23.1	22.9	22.6	22.4	22.2	21.9	21.7	21.4	21.2	21.0	20.8
76	27.6	27.3	26.9	26.6	26.3	26.0	25.7	25.4	25.1	24.8	24.5	24.3	24.0	23.7	23.5	23.2	22.9	22.7	22.4	22.2	22.0	21.7	21.5	21.3	21.1
77	27.9	27.6	27.3	27.0	26.6	26.3	26.0	25.7	25.4	25.1	24.9	24.6	24.3	24.0	23.8	23.5	23.2	23.0	22.7	22.5	22.3	22.0	21.8	21.6	21.3
78	28.3	28.0	27.6	27.3	27.0	26.7	26.4	26.1	25.8	25.5	25.2	24.9	24.6	24.3	24.1	23.8	23.5	23.3	23.0	22.8	22.5	22.3	22.1	21.8	21.6
79	28.7	28.3	28.0	27.7	27.3	27.0	26.7	26.4	26.1	25.8	25.5	25.2	24.9	24.7	24.4	24.1	23.8	23.6	23.3	23.1	22.8	22.6	22.4	22.1	21.9
80	29.0	28.7	28.3	28.0	27.7	27.4	27.0	26.7	26.4	26.1	25.8	25.5	25.2	25.0	24.7	24.4	24.2	23.9	23.6	23.4	23.1	22.9	22.6	22.4	22.2
81	29.4	29.0	28.7	28.4	28.0	27.7	27.4	27.1	26.8	26.4	26.1	25.9	25.6	25.3	25.0	24.7	24.5	24.2	23.9	23.7	23.4	23.2	22.9	22.7	22.4
82	29.8	29.4	29.1	28.7	28.4	28.0	27.7	27.4	27.1	26.8	26.5	26.2	25.9	25.6	25.3	25.0	24.8	24.5	24.2	24.0	23.7	23.4	23.2	23.0	22.7
83	30.1	29.8	29.4	29.1	28.7	28.4	28.1	27.7	27.4	27.1	26.8	26.5	26.2	25.9	25.6	25.3	25.1	24.8	24.5	24.3	24.0	23.7	23.5	23.2	23.0
84	30.5	30.1	29.8	29.4	29.1	28.7	28.4	28.1	27.7	27.4	27.1	26.8	26.5	26.2	25.9	25.6	25.4	25.1	24.8	24.5	24.3	24.0	23.8	23.5	23.3
85	30.8	30.5	30.1	29.8	29.4	29.1	28.7	28.4	28.1	27.8	27.4	27.1	26.8	26.5	26.2	25.9	25.7	25.4	25.1	24.8	24.6	24.3	24.0	23.8	23.5
86	31.2	30.8	30.5	30.1	29.8	29.4	29.1	28.7	28.4	28.1	27.8	27.5	27.1	26.8	26.5	26.3	26.0	25.7	25.4	25.1	24.9	24.6	24.3	24.1	23.8
87	31.6	31.2	30.8	30.5	30.1	29.8	29.4	29.1	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.7	25.4	25.1	24.9	24.6	24.4	24.1
88	31.9	31.6	31.2	30.8	30.4	30.1	29.7	29.4	29.1	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.7	25.4	25.2	24.9	24.6	24.4

Weight	Height (cm)																																																	
(kg)	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
89	45.4	44.8	44.1	43.5	42.9	42.3	41.8	41.2	40.6	40.1	39.6	39.0	38.5	38.0	37.5	37.0	36.6	36.1	35.7	35.2	34.8	34.3	33.9	33.5	33.1	32.7	32.3	31.9	31.5	31.2	30.8	30.4	30.1	29.7	29.4	29.1	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.7	25.5	25.2	24.9	24.7
90	45.9	45.3	44.6	44.0	43.4	42.8	42.2	41.6	41.1	40.5	40.0	39.5	39.0	38.4	37.9	37.5	37.0	36.5	36.1	35.6	35.2	34.7	34.3	33.9	33.5	33.1	32.7	32.3	31.9	31.5	31.1	30.8	30.4	30.1	29.7	29.4	29.1	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.7	25.5	25.2	24.9
91	46.4	45.8	45.1	44.5	43.9	43.3	42.7	42.1	41.5	41.0	40.4	39.9	39.4	38.9	38.4	37.9	37.4	36.9	36.5	36.0	35.5	35.1	34.7	34.3	33.8	33.4	33.0	32.6	32.2	31.9	31.5	31.1	30.8	30.4	30.1	29.7	29.4	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.7	25.5	25.2
92	46.9	46.3	45.6	45.0	44.4	43.8	43.2	42.6	42.0	41.4	40.9	40.3	39.8	39.3	38.8	38.3	37.8	37.3	36.9	36.4	35.9	35.5	35.1	34.6	34.2	33.8	33.4	33.0	32.6	32.2	31.8	31.5	31.1	30.7	30.4	30.0	29.7	29.4	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.8	25.5
93	47.4	46.8	46.1	45.5	44.8	44.2	43.6	43.0	42.5	41.9	41.3	40.8	40.3	39.7	39.2	38.7	38.2	37.7	37.3	36.8	36.3	35.9	35.4	35.0	34.6	34.2	33.7	33.3	33.0	32.6	32.2	31.8	31.4	31.1	30.7	30.4	30.0	29.7	29.4	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0	25.8
94	48.0	47.3	46.6	46.0	45.3	44.7	44.1	43.5	42.9	42.3	41.8	41.2	40.7	40.2	39.6	39.1	38.6	38.1	37.7	37.2	36.7	36.3	35.8	35.4	34.9	34.5	34.1	33.7	33.3	32.9	32.5	32.1	31.8	31.4	31.0	30.7	30.3	30.0	29.7	29.3	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3	26.0
95	48.5	47.8	47.1	46.5	45.8	45.2	44.6	44.0	43.4	42.8	42.2	41.7	41.1	40.6	40.1	39.5	39.0	38.5	38.1	37.6	37.1	36.6	36.2	35.8	35.3	34.9	34.5	34.1	33.7	33.3	32.9	32.5	32.1	31.7	31.4	31.0	30.7	30.3	30.0	29.6	29.3	29.0	28.7	28.4	28.1	27.8	27.5	27.2	26.9	26.6	26.3
96	49.0	48.3	47.6	46.9	46.3	45.7	45.0	44.4	43.8	43.2	42.7	42.1	41.6	41.0	40.5	40.0	39.4	38.9	38.5	38.0	37.5	37.0	36.6	36.1	35.7	35.3	34.8	34.4	34.0	33.6	33.2	32.8	32.4	32.1	31.7	31.3	31.0	30.6	30.3	30.0	29.6	29.3	29.0	28.7	28.4	28.0	27.7	27.5	27.2	26.9	26.6
97	49.5	48.8	48.1	47.4	46.8	46.1	45.5	44.9	44.3	43.7	43.1	42.5	42.0	41.4	40.9	40.4	39.9	39.4	38.9	38.4	37.9	37.4	37.0	36.5	36.1	35.6	35.2	34.8	34.4	34.0	33.6	33.2	32.8	32.4	32.0	31.7	31.3	31.0	30.6	30.3	29.9	29.6	29.3	29.0	28.7	28.3	28.0	27.7	27.4	27.2	26.9
98	50.0	49.3	48.6	47.9	47.3	46.6	46.0	45.4	44.7	44.1	43.6	43.0	42.4	41.9	41.3	40.8	40.3	39.8	39.3	38.8	38.3	37.8	37.3	36.9	36.4	36.0	35.6	35.1	34.7	34.3	33.9	33.5	33.1	32.7	32.4	32.0	31.6	31.3	30.9	30.6	30.2	29.9	29.6	29.3	28.9	28.6	28.3	28.0	27.7	27.4	27.1
99		49.8	49.1	48.4	47.7	47.1	46.4	45.8	45.2	44.6	44.0	43.4	42.8	42.3	41.7	41.2	40.7	40.2	39.7	39.2	38.7	38.2	37.7	37.3	36.8	36.4	35.9	35.5	35.1	34.7	34.3	33.9	33.5	33.1	32.7	32.3	32.0	31.6	31.2	30.9	30.6	30.2	29.9	29.6	29.2	28.9	28.6	28.3	28.0	27.7	27.4
100			49.6	48.9	48.2	47.6	46.9	46.3	45.7	45.0	44.4	43.9	43.3	42.7	42.2	41.6	41.1	40.6	40.1	39.6	39.1	38.6	38.1	37.6	37.2	36.7	36.3	35.9	35.4	35.0	34.6	34.2	33.8	33.4	33.0	32.7	32.3	31.9	31.6	31.2	30.9	30.5	30.2	29.9	29.5	29.2	28.9	28.6	28.3	28.0	27.7
101				49.4	48.7	48.0	47.4	46.7	46.1	45.5	44.9	44.3	43.7	43.1	42.6	42.0	41.5	41.0	40.5	40.0	39.5	39.0	38.5	38.0	37.6	37.1	36.7	36.2	35.8	35.4	34.9	34.5	34.1	33.7	33.4	33.0	32.6	32.2	31.9	31.5	31.2	30.8	30.5	30.2	29.8	29.5	29.2	28.9	28.6	28.3	28.0
102				49.9	49.2	48.5	47.9	47.2	46.6	45.9	45.3	44.7	44.1	43.6	43.0	42.5	41.9	41.4	40.9	40.3	39.8	39.4	38.9	38.4	37.9	37.5	37.0	36.6	36.1	35.7	35.3	34.9	34.5	34.1	33.7	33.3	32.9	32.6	32.2	31.8	31.5	31.1	30.8	30.5	30.1	29.8	29.5	29.2	28.9	28.6	28.3
103					49.7	49.0	48.3	47.7	47.0	46.4	45.8	45.2	44.6	44.0	43.4	42.9	42.3	41.8	41.3	40.7	40.2	39.7	39.2	38.8	38.3	37.8	37.4	36.9	36.5	36.1	35.6	35.2	34.8	34.4	34.0	33.6	33.3	32.9	32.5	32.1	31.8	31.4	31.1	30.8	30.4	30.1	29.8	29.5	29.1	28.8	28.5
104						49.5	48.8	48.1	47.5	46.8	46.2	45.6	45.0	44.4	43.9	43.3	42.7	42.2	41.7	41.1	40.6	40.1	39.6	39.1	38.7	38.2	37.7	37.3	36.8	36.4	36.0	35.6	35.2	34.7	34.4	34.0	33.6	33.2	32.8	32.5	32.1	31.7	31.4	31.1	30.7	30.4	30.1	29.7	29.4	29.1	28.8
105						49.9	49.3	48.6	47.9	47.3	46.7	46.1	45.4	44.9	44.3	43.7	43.1	42.6	42.1	41.5	41.0	40.5	40.0	39.5	39.0	38.6	38.1	37.6	37.2	36.8	36.3	35.9	35.5	35.1	34.7	34.3	33.9	33.5	33.1	32.8	32.4	32.1	31.7	31.4	31.0	30.7	30.4	30.0	29.7	29.4	29.1
106							49.7	49.1	48.4	47.7	47.1	46.5	45.9	45.3	44.7	44.1	43.6	43.0	42.5	41.9	41.4	40.9	40.4	39.9	39.4	38.9	38.5	38.0	37.6	37.1	36.7	36.3	35.8	35.4	35.0	34.6	34.2	33.8	33.5	33.1	32.7	32.4	32.0	31.7	31.3	31.0	30.6	30.3	30.0	29.7	29.4
107								49.5	48.8	48.2	47.6	46.9	46.3	45.7	45.1	44.5	44.0	43.4	42.9	42.3	41.8	41.3	40.8	40.3	39.8	39.3	38.8	38.4	37.9	37.5	37.0	36.6	36.2	35.8	35.3	34.9	34.5	34.2	33.8	33.4	33.0	32.7	32.3	32.0	31.6	31.3	30.9	30.6	30.3	30.0	29.6
108								50.0	49.3	48.6	48.0	47.4	46.7	46.1	45.5	45.0	44.4	43.8	43.3	42.7	42.2	41.7	41.2	40.6	40.2	39.7	39.2	38.7	38.3	37.8	37.4	36.9	36.5	36.1	35.7	35.3	34.9	34.5	34.1	33.7	33.3	33.0	32.6	32.2	31.9	31.6	31.2	30.9	30.6	30.2	29.9
109									49.8	49.1	48.4	47.8	47.2	46.6	46.0	45.4	44.8	44.2	43.7	43.1	42.6	42.1	41.5	41.0	40.5	40.0	39.6	39.1	38.6	38.2	37.7	37.3	36.8	36.4	36.0	35.6	35.2	34.8	34.4	34.0	33.6	33.3	32.9	32.5	32.2	31.8	31.5	31.2	30.8	30.5	30.2
110										49.5	48.9	48.2	47.6	47.0	46.4	45.8	45.2	44.6	44.1	43.5	43.0	42.4	41.9	41.4	40.9	40.4	39.9	39.4	39.0	38.5	38.1	37.6	37.2	36.8	36.3	35.9	35.5	35.1	34.7	34.3	34.0	33.6	33.2	32.8	32.5	32.1	31.8	31.5	31.1	30.8	30.5
111										50.0	49.3	48.7	48.0	47.4	46.8	46.2	45.6	45.0	44.5	43.9	43.4	42.8	42.3	41.8	41.3	40.8	40.3	39.8	39.3	38.9	38.4	38.0	37.5	37.1	36.7	36.2	35.8	35.4	35.0	34.6	34.3	33.9	33.5	33.1	32.8	32.4	32.1	31.7	31.4	31.1	30.7
112											49.8	49.1	48.5	47.8	47.2	46.6	46.0	45.4	44.9	44.3	43.8	43.2	42.7	42.2	41.6	41.1	40.6	40.2	39.7	39.2	38.8	38.3	37.9	37.4	37.0	36.6	36.2	35.7	35.3	35.0	34.6	34.2	33.8	33.4	33.1	32.7	32.4	32.0	31.7	31.4	31.0
113												49.6	48.9	48.3	47.6	47.0	46.4	45.8	45.3	44.7	44.1	43.6	43.1	42.5	42.0	41.5	41.0	40.5	40.0	39.6	39.1	38.6	38.2	37.8	37.3	36.9	36.5	36.1	35.7	35.3	34.9	34.5	34.1	33.7	33.4	33.0	32.7	32.3	32.0	31.6	31.3
114												50.0	49.3	48.7	48.1	47.5	46.8	46.2	45.7	45.1	44.5	44.0	43.4	42.9	42.4	41.9	41.4	40.9	40.4	39.9	39.4	39.0	38.5	38.1	37.7	37.2	36.8	36.4	36.0	35.6	35.2	34.8	34.4	34.0	33.7	33.3	33.0	32.6	32.3	31.9	31.6
115													49.8	49.1	48.5	47.9	47.3	46.7	46.1	45.5	44.9	44.4	43.8	43.3	42.8	42.2	41.7	41.2	40.7	40.3	39.8	39.3	38.9	38.4	38.0	37.6	37.1	36.7	36.3	35.9	35.5	35.1	34.7	34.3	34.0	33.6	33.2	32.9	32.5	32.2	31.9
116														49.6	48.9	48.3	47.7	47.1	46.5	45.9	45.3	44.8	44.2	43.7	43.1	42.6	42.1	41.6	41.1	40.6	40.1	39.7	39.2	38.8	38.3	37.9	37.4	37.0	36.6	36.2	35.8	35.4	35.0	34.6	34.3	33.9	33.5	33.2	32.8	32.5	32.1
117														50.0	49.3	48.7	48.1	47.5	46.9	46.3	45.7	45.1	44.6	44.0	43.5	43.0	42.5	42.0	41.5	41.0	40.5	40.0	39.5	39.1	38.6	38.2	37.8	37.3	36.9	36.5	36.1	35.7	35.3	34.9	34.6	34.2	33.8	33.5	33.1	32.8	32.4
118															49.8	49.1	48.5	47.9	47.3	46.7	46.1	45.5	45.0	44.4	43.9	43.3	42.8	42.3	41.8	41.3	40.8	40.4	39.9	39.4	39.0	38.5	38.1	37.7	37.2	36.8	36.4	36.0	35.6	35.2	34.9	34.5	34.1	33.7	33.4	33.0	32.7
119																49.5	48.9	48.3	47.7	47.1	46.5	45.9	45.3	44.8	44.2	43.7	43.2	42.7	42.2	41.7	41.2	40.7	40.2	39.8	39.3	38.9	38.4	38.0	37.6	37.1	36.7	36.3	35.9	35.5	35.1	34.8	34.4	34.0	33.7	33.3	33.0
120																49.9	49.3	48.7	48.1	47.5	46.9	46.3	45.7	45.2	44.6	44.1	43.5	43.0	42.5	42.0	41.5	41.0	40.6	40.1	39.6	39.2	38.7	38.3	37.9	37.5	37.0	36.6	36.2	35.8	35.4	35.1	34.7	34.3	34.0	33.6	33.2
121																	49.7	49.1	48.5	47.9	47.3	46.7	46.1	45.5	45.0	44.4	43.9	43.4	42.9	42.4	41.9	41.4	40.9	40.4	40.0	39.5	39.1	38.6	38.2	37.8	37.3	36.9	36.5	36.1	35.7	35.4	35.0	34.6	34.2	33.9	33.5
122																		49.5	48.9	48.3	47.7	47.1	46.5	45.9	45.4	44.8	44.3	43.7	43.2	42.7	42.2	41.7	41.2	40.8	40.3	39.8	39.4	38.9	38.5	38.1	37.7	37.2	36.8	36.4	36.0	35.6	35.3	34.9	34.5	34.2	33.8
123																		49.9	49.3	48.7	48.0	47.5	46.9	46.3	45.7	45.2	44.6	44.1	43.6	43.1	42.6	42.1	41.6	41.1	40.6	40.2	39.7	39.3	38.8	38.4	38.0	37.5	37.1	36.7	36.3	35.9	35.6	35.2	34.8	34.4	34.1
124																			49.7	49.0	48.4	47.8	47.2	46.7	46.1	45.5	45.0	44.5	43.9	43.4	42.9	42.4	41.9	41.4	41.0	40.5	40.0	39.6	39.1	38.7	38.3	37.8	37.4	37.0	36.6	36.2	35.8	35.5	35.1	34.7	34.3
125																				49.4	48.8	48.2	47.6	47.0	46.5	45.9	45.4	44.8	44.3	43.8	43.3	42.7	42.3	41.8	41.3	40.8	40.4	39.9	39.5	39.0	38.6	38.2	37.7	37.3	36.9	36.5	36.1	35.7	35.4	35.0	34.6
126																				49.8	49.2	48.6	48.0	47.4	46.8	46.3	45.7	45.2	44.6	44.1	43.6	43.1	42.6	42.1	41.6	41.1	40.7	40.2	39.8	39.3	38.9	38.5	38.0	37.6	37.2	36.8	36.4	36.0	35.6	35.3	34.9
127																					49.6	49.0	48.4	47.8	47.2	46.6	46.1	45.5	45.0	44.5	43.9	43.4	42.9	42.4	41.9	41.5	41.0	40.5	40.1	39.6	39.2	38.8	38.3	37.9	37.5	37.1	36.7	36.3	35.9	35.6	35.2
128																					50.0	49.4	48.8	48.2	47.6	47.0	46.5	45.9	45.4	44.8	44.3	43.8	43.3	42.8	42.3	41.8	41.3	40.9	40.4	39.9	39.5	39.1	38.6	38.2	37.8	37.4	37.0	36.6	36.2	35.8	35.5
129																						49.8	49.2	48.6	48.0	47.4	46.8	46.3	45.7	45.2	44.6	44.1	43.6	43.1	42.6	42.1	41.6	41.2	40.7	40.3	39.8	39.4	38.9	38.5	38.1	37.7	37.3	36.9	36.5	36.1	35.7
130																							49.5	48.9	48.3	47.8	47.2	46.6	46.1	45.5	45.0	44.5	43.9	43.4	42.9	42.4	42.0	41.5	41.0	40.6	40.1	39.7	39.2	38.8	38.4	38.0	37.6	37.2	36.8	36.4	36.0
131																							49.9	49.3	48.7	48.1	47.5	47.0	46.4	45.9	45.3	44.8	44.3	43.8	43.3	42.8	42.3	41.8	41.3	40.9	40.4	40.0	39.5	39.1	38.7	38.3	37.9	37.5	37.1	36.7	36.3
132																								49.7	49.1	48.5	47.9	47.3	46.8	46.2	45.7	45.1	44.6	44.1	43.6	43.1	42.6	42.1	41.7	41.2	40.7	40.3	39.9	39.4	39.0	38.6	38.2	37.7	37.3	37.0	36.6
133																									49.4	48.9	48.3	47.7	47.1	46.6	46.0	45.5	45.0	44.4	43.9	43.4	42.9	42.5	42.0	41.5	41.0	40.6	40.2	39.7	39.3	38.9	38.4	38.0	37.6	37.2	36.8
134																									49.8	49.2	48.6	48.0	47.5	46.9	46.4	45.8	45.3	44.8	44.3	43.8	43.3	42.8	42.3	41.8	41.4	40.9	40.5	40.0	39.6	39.2	38.7	38.3	37.9	37.5	37.1
135																										49.6	49.0	48.4	47.8	47.3	46.7	46.2	45.6	45.1	44.6	44.1	43.6	43.1	42.6	42.1	41.7	41.2	40.8	40.3	39.9	39.4	39.0	38.6	38.2	37.8	37.4
136																										50.0	49.4	48.8	48.2	47.6	47.1	46.5	46.0	45.4	44.9	44.4	43.9	43.4	42.9	42.4	42.0	41.5	41.1	40.6	40.2	39.7	39.3	38.9	38.5	38.1	37.7
137																											49.7	49.1	48.5	48.0	47.4	46.9	46.3	45.8	45.3	44.7	44.2	43.7	43.2	42.8	42.3	41.8	41.4	40.9	40.5	40.0	39.6	39.2	38.8	38.4	38.0
138																												49.5	48.9	48.3	47.8	47.2	46.6	46.1	45.6	45.1	44.6	44.0	43.6	43.1	42.6	42.1	41.7	41.2	40.8	40.3	39.9	39.5	39.0	38.6	38.2
139																												49.8	49.2	48.7	48.1	47.5	47.0	46.4	45.9	45.4	44.9	44.4	43.9	43.4	42.9	42.4	42.0	41.5	41.1	40.6	40.2	39.7	39.3	38.9	38.5
140																													49.6	49.0	48.4	47.9	47.3	46.8	46.2	45.7	45.2	44.7	44.2	43.7	43.2	42.7	42.3	41.8	41.4	40.9	40.5	40.0	39.6	39.2	38.8
141																													50.0	49.4	48.8	48.2	47.7	47.1	46.6	46.0	45.5	45.0	44.5	44.0	43.5	43.0	42.6	42.1	41.6	41.2	40.8	40.3	39.9	39.5	39.1
142																														49.7	49.1	48.6	48.0	47.4	46.9	46.4	45.8	45.3	44.8	44.3	43.8	43.3	42.9	42.4	41.9	41.5	41.0	40.6	40.2	39.8	39.3
143																															49.5	48.9	48.3	47.8	47.2	46.7	46.2	45.6	45.1	44.6	44.1	43.6	43.2	42.7	42.2	41.8	41.3	40.9	40.5	40.0	39.6

- *Abdomen:hip ratio (AHR)* is expressed as a decimal fraction:

$$\frac{\text{abdominal circumference (cm)}}{\text{hip circumference (cm)}}$$

- *Arm muscle circumference (AMC)* is estimated from arm circumference (AC) and triceps skinfold thickness (TSF), assuming a circular and concentric model (*15*):

$$\text{AMC (cm)} = \text{AC (cm)} - [\pi \times \text{TSF (cm)}]$$

- *Arm muscle area (AMA).* Cross-sectional arm muscle area is estimated from arm circumference (AC) and triceps skinfold thickness (TSF), assuming a circular and concentric model (*15*)

$$\text{AMA (cm}^2) = \frac{[\text{AC} - (\pi \times \text{TSF})]^2}{4\pi}$$

Corrections of AMA for estimated bone areas in each sex are recommended for some purposes:

$$\text{Bone-free AMA (cm}^2\text{) for men} = \frac{[\text{AC} - (\pi \times \text{TSF})]^2}{4\pi} - 10$$

$$\text{Bone-free AMA (cm}^2\text{) for women} = \frac{[\text{AC} - (\pi \times \text{TSF})]^2}{4\pi} - 6.5$$

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Annex 3
Recommended reference data

This annex contains tables of reference data, recommended by the Expert Committee, that have not been widely distributed by WHO previously. The NCHS/WHO reference data for the weight and height of children have been previously published by WHO (1), and have also been distributed separately as the annex to that publication. Individual sections of the report concerning age and physical status groups should be consulted for rationales, recommended cut-offs, and interpretation of the reference data.

Table A3.1
Mid-upper arm circumference (cm): combined sexes, 6–60 months[a]

Age (months)	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
6	10.9	12.0	13.2	14.3	15.5	16.7	17.8
7	11.0	12.2	13.4	14.6	15.7	16.9	18.1
8	11.2	12.4	13.6	14.8	16.0	17.2	18.3
9	11.3	12.5	13.7	14.9	16.2	17.4	18.6
10	11.5	12.7	13.9	15.1	16.3	17.5	18.8
11	11.6	12.8	14.0	15.2	16.5	17.7	18.9
12	11.7	12.9	14.1	15.4	16.6	17.9	19.1
13	11.7	13.0	14.2	15.5	16.7	18.0	19.2
14	11.8	13.1	14.3	15.6	16.8	18.1	19.4
15	11.9	13.1	14.4	15.7	16.9	18.2	19.5
16	11.9	13.2	14.5	15.8	17.0	18.3	19.6
17	12.0	13.2	14.5	15.8	17.1	18.4	19.7
18	12.0	13.3	14.6	15.9	17.2	18.5	19.8
19	12.0	13.3	14.6	15.9	17.2	18.5	19.8
20	12.1	13.4	14.7	16.0	17.3	18.6	19.9
21	12.1	13.4	14.7	16.0	17.3	18.7	20.0
22	12.1	13.4	14.7	16.1	17.4	18.7	20.0
23	12.1	13.4	14.8	16.1	17.4	18.8	20.1
24	12.1	13.5	14.8	16.1	17.5	18.8	20.1
25	12.2	13.5	14.8	16.2	17.5	18.8	20.2
26	12.2	13.5	14.9	16.2	17.5	18.9	20.2
27	12.2	13.5	14.9	16.2	17.6	18.9	20.3
28	12.2	13.5	14.9	16.3	17.6	19.0	20.3
29	12.2	13.6	14.9	16.3	17.6	19.0	20.4

Table A3.1 *(continued)*

Age (months)	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
30	12.2	13.6	14.9	16.3	17.7	19.0	20.4
31	12.2	13.6	15.0	16.3	17.7	19.1	20.4
32	12.2	13.6	15.0	16.4	17.7	19.1	20.5
33	12.3	13.6	15.0	16.4	17.8	19.1	20.5
34	12.3	13.7	15.0	16.4	17.8	19.2	20.6
35	12.3	13.7	15.1	16.4	17.8	19.2	20.6
36	12.3	13.7	15.1	16.5	17.9	19.3	20.6
37	12.3	13.7	15.1	16.5	17.9	19.3	20.7
38	12.3	13.7	15.1	16.5	17.9	19.3	20.7
39	12.4	13.8	15.2	16.6	18.0	19.4	20.8
40	12.4	13.8	15.2	16.6	18.0	19.4	20.8
41	12.4	13.8	15.2	16.6	18.1	19.5	20.9
42	12.4	13.8	15.3	16.7	18.1	19.5	20.9
43	12.4	13.9	15.3	16.7	18.1	19.6	21.0
44	12.5	13.9	15.3	16.8	18.2	19.6	21.1
45	12.5	13.9	15.4	16.8	18.2	19.7	21.1
46	12.5	13.9	15.4	16.8	18.3	19.7	21.2
47	12.5	14.0	15.4	16.9	18.3	19.8	21.2
48	12.5	14.0	15.5	16.9	18.4	19.8	21.3
49	12.5	14.0	15.5	17.0	18.4	19.9	21.4
50	12.6	14.0	15.5	17.0	18.5	20.0	21.4
51	12.6	14.1	15.5	17.0	18.5	20.0	21.5
52	12.6	14.1	15.6	17.1	18.6	20.1	21.6
53	12.6	14.1	15.6	17.1	18.6	20.1	21.6
54	12.6	14.1	15.6	17.2	18.7	20.2	21.7
55	12.6	14.1	15.7	17.2	18.7	20.3	21.8
56	12.6	14.1	15.7	17.2	18.8	20.3	21.9
57	12.6	14.1	15.7	17.3	18.8	20.4	21.9
58	12.6	14.2	15.7	17.3	18.9	20.5	22.0
59	12.6	14.2	15.8	17.3	18.9	20.5	22.1
60	12.6	14.2	15.8	17.4	19.0	20.6	22.2

[a] Median and standard deviations (cm). Reference data are based on the first and second National Health and Nutrition Examination Surveys (NHANES I and II) in the United States of America.

Table A3.2
Mid-upper arm circumference (cm): boys, 6–60 months[a]

Age (months)	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
6	11.5	12.6	13.8	14.9	16.1	17.3	18.4
7	11.6	12.7	13.9	15.1	16.3	17.5	18.6
8	11.7	12.8	14.0	15.2	16.4	17.6	18.8
9	11.7	12.9	14.2	15.4	16.6	17.8	19.0
10	11.8	13.0	14.2	15.5	16.7	17.9	19.1
11	11.9	13.1	14.3	15.6	16.8	18.0	19.3
12	11.9	13.2	14.4	15.7	16.9	18.1	19.4
13	12.0	12.2	14.5	15.7	17.0	18.2	19.5
14	12.0	13.3	14.5	15.8	17.1	18.3	19.6
15	12.1	13.3	14.6	15.9	17.1	18.4	19.7
16	12.1	13.4	14.6	15.9	17.2	18.5	19.8
17	12.1	13.4	14.7	16.0	17.3	18.6	19.8
18	12.1	13.4	14.7	16.0	17.3	18.6	19.9
19	12.2	13.5	14.8	16.1	17.4	18.7	20.0
20	12.2	13.5	14.8	16.1	17.4	18.7	20.0
21	12.2	13.5	14.8	16.1	17.5	18.8	20.1
22	12.2	13.5	14.9	16.2	17.5	18.8	20.1
23	12.2	13.5	14.9	16.2	17.5	18.9	20.2
24	12.2	13.6	14.9	16.2	17.6	18.9	20.2
25	12.2	13.6	14.9	16.3	17.6	18.9	20.3
26	12.3	13.6	14.9	16.3	17.6	19.0	20.3
27	12.3	13.6	15.0	16.3	17.7	19.0	20.4
28	12.3	13.6	15.0	16.3	17.7	19.1	20.4
29	12.3	13.7	15.0	16.4	17.7	19.1	20.4
30	12.3	13.7	15.0	16.4	17.8	19.1	20.5
31	12.3	13.7	15.1	16.4	17.8	19.2	20.5
32	12.3	13.7	15.1	16.5	17.8	19.2	20.6
33	12.4	13.7	15.1	16.5	17.9	19.2	20.6
34	12.4	13.8	15.1	16.5	17.9	19.3	20.6
35	12.4	13.8	15.2	16.5	17.9	19.3	20.7
36	12.4	13.8	15.2	16.6	18.0	19.3	20.7

Table A3.2 *(continued)*

Age (months)	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
37	12.4	13.8	15.2	16.6	18.0	19.4	20.8
38	12.4	13.8	15.2	16.6	18.0	19.4	20.8
39	12.5	13.9	15.3	16.7	18.1	19.5	20.9
40	12.5	13.9	15.3	16.7	18.1	19.5	20.9
41	12.5	13.9	15.3	16.7	18.1	19.6	21.0
42	12.5	13.9	15.4	16.8	18.2	19.6	21.0
43	12.5	14.0	15.4	16.8	18.2	19.7	21.1
44	12.5	14.0	15.4	16.8	18.3	19.7	21.1
45	12.6	14.0	15.4	16.9	18.3	19.8	21.2
46	12.6	14.0	15.5	16.9	18.4	19.8	21.3
47	12.6	14.0	15.5	17.0	18.4	19.9	21.3
48	12.6	14.1	15.5	17.0	18.4	19.9	21.4
49	12.6	14.1	15.6	17.0	18.5	20.0	21.4
50	12.6	14.1	15.6	17.1	18.5	20.0	21.5
51	12.6	14.1	15.6	17.1	18.6	20.1	21.6
52	12.6	14.1	15.6	17.1	18.6	20.1	21.6
53	12.6	14.1	15.7	17.2	18.7	20.2	21.7
54	12.6	14.2	15.7	17.2	18.7	20.2	21.8
55	12.6	14.2	15.7	17.2	18.8	20.3	21.8
56	12.6	14.2	15.7	17.3	18.8	20.4	21.9
57	12.6	14.2	15.8	17.3	18.9	20.4	22.0
58	12.6	14.2	15.8	17.3	18.9	20.5	22.1
59	12.6	14.2	15.8	17.4	19.0	20.6	22.2
60	12.6	14.2	15.8	17.4	19.0	20.6	22.2

[a] Median and standard deviations (cm). Reference data are based on the first and second National Health and Nutrition Examination Surveys (NHANES I and II) in the United States of America.

Table A3.3
Mid-upper arm circumference (cm): girls, 6–60 months[a]

Age (months)	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
6	10.4	11.5	12.7	13.9	15.0	16.2	17.4
7	10.6	11.8	13.0	14.1	15.3	16.5	17.7
8	10.8	12.0	13.2	14.4	15.6	16.8	18.0
9	11.0	12.2	13.4	14.6	15.8	17.0	18.2
10	11.1	12.3	13.6	14.8	16.0	17.2	18.4
11	11.3	12.5	13.7	15.0	16.2	17.4	18.6
12	11.4	12.6	13.9	15.1	16.4	17.6	18.8
13	11.5	12.7	14.0	15.2	16.5	17.7	19.0
14	11.6	12.8	14.1	15.4	16.6	17.9	19.2
15	11.7	12.9	14.2	15.5	16.7	18.0	19.3
16	11.7	13.0	14.3	15.6	16.8	18.1	19.4
17	11.8	13.1	14.4	15.7	16.9	18.2	19.5
18	11.8	13.1	14.4	15.7	17.0	18.3	19.6
19	11.9	13.2	14.5	15.8	17.1	18.4	19.7
20	11.9	13.2	14.5	15.8	17.2	18.5	19.8
21	11.9	13.3	14.6	15.9	17.2	18.5	19.8
22	12.0	13.3	14.6	15.9	17.3	18.6	19.9
23	12.0	13.3	14.7	16.0	17.3	18.6	20.0
24	12.0	13.4	14.7	16.0	17.4	18.7	20.0
25	12.0	13.4	14.7	16.1	17.4	18.7	20.1
26	12.1	13.4	14.7	16.1	17.4	18.8	20.1
27	12.1	13.4	14.8	16.1	17.5	18.8	20.2
28	12.1	13.4	14.8	16.1	17.5	18.9	20.2
29	12.1	13.5	14.8	16.2	17.5	18.9	20.3
30	12.1	13.5	14.8	16.2	17.6	18.9	20.3
31	12.1	13.5	14.9	16.2	17.6	19.0	20.3
32	12.1	13.5	14.9	16.3	17.6	19.0	20.4
33	12.2	13.5	14.9	16.3	17.7	19.0	20.4
34	12.2	13.6	14.9	16.3	17.7	19.1	20.5
35	12.2	13.6	15.0	16.3	17.7	19.1	20.5
36	12.2	13.6	15.0	16.4	17.8	19.2	20.5

Table A3.3 *(continued)*

Age (months)	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
37	12.2	13.6	15.0	16.4	17.8	19.2	20.6
38	12.2	13.6	15.0	16.4	17.8	19.2	20.6
39	12.3	13.7	15.1	16.5	17.9	19.3	20.7
40	12.3	13.7	15.1	16.5	17.9	19.3	20.7
41	12.3	13.7	15.1	16.6	18.0	19.4	20.8
42	12.3	13.8	15.2	16.6	18.0	19.4	20.8
43	12.4	13.8	15.2	16.6	18.1	19.5	20.9
44	12.4	13.8	15.2	16.7	18.1	19.5	21.0
45	12.4	13.8	15.3	16.7	18.1	19.6	21.0
46	12.4	13.9	15.3	16.7	18.2	19.6	21.1
47	12.4	13.9	15.3	16.8	18.2	19.7	21.2
48	12.4	13.9	15.4	16.8	18.3	19.8	21.2
49	12.5	13.9	15.4	16.9	18.3	19.8	21.3
50	12.5	14.0	15.4	16.9	18.4	19.9	21.4
51	12.5	14.0	15.5	17.0	18.4	19.9	21.4
52	12.5	14.0	15.5	17.0	18.5	20.0	21.5
53	12.5	14.0	15.5	17.0	18.6	20.1	21.6
54	12.5	14.0	15.6	17.1	18.6	20.1	21.7
55	12.5	14.1	15.6	17.1	18.7	20.2	21.7
56	12.5	14.1	15.6	17.2	18.7	20.3	21.8
57	12.5	14.1	15.7	17.2	18.8	20.3	21.9
58	12.5	14.1	15.7	17.3	18.8	20.4	22.0
59	12.5	14.1	15.7	17.3	18.9	20.5	22.1
60	12.5	14.1	15.7	17.3	18.9	20.5	22.2

[a] Median and standard deviations (cm). Reference data are based on the first and second National Health and Nutrition Examination Surveys (NHANES I and II) in the United States of America.

Table A3.4
Percentiles of BMI-for-age: male adolescents, 9–24 years[a]

	Percentiles				
Age (years)	5th	15th	50th	85th	95th
9	14.03	14.71	16.17	18.85	21.47
10	14.42	15.15	16.72	19.60	22.60
11	14.83	15.59	17.28	20.35	23.73
12	15.24	16.06	17.87	21.12	24.89
13	15.73	16.62	18.53	21.93	25.93
14	16.18	17.20	19.22	22.77	26.93
15	16.59	17.76	19.92	23.63	27.76
16	17.01	18.32	20.63	24.45	28.53
17	17.31	18.68	21.12	25.28	29.32
18	17.54	18.89	21.45	25.92	30.02
19	17.80	19.20	21.86	26.36	30.66
20–24	18.66	20.21	23.07	26.87	31.26

[a] Reference data are based on the first National Health and Nutrition Examination Survey (NHANES I) in the United States of America (*2, 3*).

Table A3.5
Percentiles of BMI-for-age: female adolescents, 9–24 years[a]

	Percentiles				
Age (years)	5th	15th	50th	85th	95th
9	13.87	14.66	16.33	19.19	21.78
10	14.23	15.09	17.00	20.19	23.20
11	14.60	15.53	17.67	21.18	24.59
12	14.98	15.98	18.35	22.17	25.95
13	15.36	16.43	18.95	23.08	27.07
14	15.67	16.79	19.32	23.88	27.97
15	16.01	17.16	19.69	24.29	28.51
16	16.37	17.54	20.09	24.74	29.10
17	16.59	17.81	20.36	25.23	29.72
18	16.71	17.99	20.57	25.56	30.22
19	16.87	18.20	20.80	25.85	30.72
20–24	17.38	18.64	21.46	26.14	31.20

[a] Reference data are based on the first National Health and Nutrition Examination Survey (NHANES I) in the United States of America (*2, 3*).

Table A3.6

Percentiles of triceps skinfold thickness: male adolescents, 9–18 years[a]

Age years	Percentiles						
	5th	10th	25th	50th	75th	90th	95th
9.0	4.8	5.5	6.7	8.4	11.1	14.6	17.8
9.5	4.8	5.5	6.7	8.6	11.5	15.5	18.7
10.0	4.9	5.6	6.8	8.8	11.9	16.4	19.8
10.5	4.9	5.6	6.9	9.0	12.4	17.4	20.8
11.0	4.9	5.6	7.0	9.3	12.8	18.3	21.8
11.5	5.0	5.7	7.0	9.4	13.2	19.1	22.7
12.0	4.9	5.7	7.1	9.6	13.4	19.8	23.4
12.5	4.9	5.6	7.1	9.6	13.6	20.2	23.9
13.0	4.8	5.6	7.0	9.6	13.5	20.3	24.1
13.5	4.6	5.4	6.8	9.4	13.3	20.1	24.0
14.0	4.5	5.3	6.6	9.1	13.0	19.6	23.7
14.5	4.3	5.1	6.4	8.7	12.5	19.0	23.2
15.0	4.1	4.9	6.2	8.4	12.0	18.2	22.7
15.5	3.9	4.7	5.9	8.0	11.5	17.4	22.1
16.0	3.8	4.6	5.8	7.7	11.2	16.8	21.6
16.5	3.8	4.5	5.6	7.4	10.9	16.2	21.3
17.0	3.8	4.5	5.6	7.3	10.9	16.0	21.3
17.5	3.9	4.5	5.7	7.3	11.1	16.1	21.6
18.0	4.2	4.6	5.9	7.5	11.7	16.6	22.3

[a] Reference data are based on the Health Examination Survey, and the first National Health and Nutrition Examination Survey (NHANES I) in the United States of America (*4*).

Table A3.7

Percentiles of triceps skinfold thickness: female adolescents, 9–18 years[a]

Age years	Percentiles						
	5th	10th	25th	50th	75th	90th	95th
9.0	6.0	6.8	8.4	11.0	14.1	18.5	21.2
9.5	6.0	6.8	8.5	11.2	14.5	19.1	22.0
10.0	6.1	6.9	8.6	11.4	15.0	19.8	22.8
10.5	6.2	7.0	8.8	11.6	15.4	20.4	23.5
11.0	6.3	7.2	9.0	11.9	15.9	21.1	24.2
11.5	6.4	7.3	9.2	12.2	16.4	21.6	24.9
12.0	6.6	7.6	9.5	12.6	16.9	22.2	25.6
12.5	6.7	7.8	9.8	12.9	17.5	22.8	26.2
13.0	6.9	8.0	10.1	13.3	18.0	23.3	26.8
13.5	7.1	8.3	10.4	13.7	18.5	23.8	27.4
14.0	7.3	8.5	10.7	14.1	19.0	24.2	28.0
14.5	7.5	8.8	11.1	14.5	19.5	24.7	28.5
15.0	7.7	9.1	11.4	14.8	20.0	25.1	29.0
15.5	7.9	9.3	11.8	15.2	20.5	25.5	29.4
16.0	8.0	9.6	12.2	15.6	20.9	25.9	29.8
16.5	8.2	9.8	12.5	16.0	21.3	26.3	30.1
17.0	8.4	10.0	12.8	16.3	21.7	26.7	30.4
17.5	8.5	10.2	13.2	16.6	22.0	27.0	30.7
18.0	8.6	10.4	13.5	17.0	22.2	27.3	30.9

[a] Reference data are based on the Health Examination Survey, and the first National Health and Nutrition Examination Survey (NHANES I) in the United States of America (*4*).

Table A3.8

Percentiles of subscapular skinfold thickness: male adolescents, 9–18 years[a]

Age years	Percentiles						
	5th	10th	25th	50th	75th	90th	95th
9.0	3.2	3.7	4.0	4.9	6.4	10.4	13.6
9.5	3.2	3.7	4.0	5.0	6.6	10.9	14.4
10.0	3.3	3.8	4.1	5.0	6.8	11.4	15.2
10.5	3.4	3.8	4.2	5.2	7.0	11.8	15.9
11.0	3.4	3.9	4.3	5.3	7.2	12.2	16.6
11.5	3.5	3.9	4.4	5.4	7.4	12.6	17.2
12.0	3.6	4.0	4.5	5.6	7.6	13.0	17.9
12.5	3.6	4.1	4.6	5.7	7.9	13.4	18.5
13.0	3.7	4.2	4.8	5.9	8.1	13.8	19.1
13.5	3.8	4.3	5.0	6.1	8.4	14.2	19.7
14.0	3.9	4.4	5.1	6.3	8.6	14.6	20.3
14.5	4.0	4.6	5.3	6.5	8.9	15.1	20.9
15.0	4.2	4.7	5.5	6.7	9.2	15.5	21.5
15.5	4.3	4.8	5.7	7.0	9.5	16.1	22.1
16.0	4.4	5.0	5.9	7.2	9.9	16.6	22.7
16.5	4.6	5.2	6.1	7.5	10.2	17.3	23.3
17.0	4.8	5.4	6.4	7.8	10.6	18.0	24.0
17.5	4.9	5.5	6.6	8.2	11.0	18.7	24.6
18.0	5.1	5.7	6.8	8.5	11.4	19.5	25.3

[a] Reference data are based on the Health Examination Survey, and the first National Health and Nutrition Examination Survey (NHANES I) in the United States of America (*4*).

Table A3.9

Percentiles of subscapular skinfold thickness: female adolescents, 9–18 years[a]

Age years	Percentiles						
	5th	10th	25th	50th	75th	90th	95th
9.0	3.6	4.0	4.6	5.8	8.4	13.6	17.2
9.5	3.7	4.0	4.8	6.1	8.9	14.5	18.2
10.0	3.8	4.1	5.0	6.4	9.4	15.3	19.2
10.5	4.0	4.3	5.2	6.7	9.9	16.2	20.2
11.0	4.1	4.5	5.4	7.0	10.4	17.0	21.2
11.5	4.3	4.6	5.7	7.3	11.0	17.8	22.2
12.0	4.5	4.8	5.9	7.7	11.5	18.6	23.2
12.5	4.6	5.1	6.2	8.1	12.1	19.3	24.1
13.0	4.8	5.3	6.4	8.4	12.6	20.1	25.0
13.5	5.0	5.5	6.7	8.8	13.2	20.8	25.8
14.0	5.2	5.7	7.0	9.2	13.8	21.5	26.6
14.5	5.4	5.9	7.2	9.5	14.3	22.1	27.4
15.0	5.5	6.2	7.4	9.9	14.8	22.7	28.1
15.5	5.7	6.3	7.7	10.2	15.4	23.2	28.7
16.0	5.8	6.5	7.9	10.6	15.8	23.7	29.2
16.5	6.0	6.7	8.1	10.9	16.3	24.2	29.7
17.0	6.1	6.8	8.2	11.2	16.7	24.6	30.1
17.5	6.2	7.0	8.4	11.5	17.1	24.9	30.4
18.0	6.3	7.0	8.5	11.7	17.5	25.1	30.6

[a] Reference data are based on the Health Examination Survey, and the first National Health and Nutrition Examination Survey (NHANES I) in the United States of America (*4*).

Table A3.10

Adult weights and heights corresponding to recommended cut-off values for body mass index

	BMI								
	16.0	17.0	18.5	20.0	22.0	25.0	30.0	40.0	
Height (cm)	Thinness					Overweight			Height (cm)
	Body weight (kg)								
140	31.4	33.3	36.2	39.2	43.1	49.0	58.8	78.4	140
141	31.8	33.8	36.8	39.8	43.7	49.7	59.6	79.5	141
142	32.3	34.3	37.3	40.3	44.4	50.4	60.5	80.7	142
143	32.7	34.8	37.8	40.9	45.0	51.1	61.3	81.8	143
144	33.2	35.3	38.4	41.5	45.6	51.8	62.2	82.9	144
145	33.6	35.7	38.9	42.1	46.3	52.6	63.1	84.1	145
146	34.1	36.2	39.4	42.6	46.9	53.3	63.9	85.3	146
147	34.6	36.7	40.0	43.2	47.5	54.0	64.8	86.4	147
148	35.0	37.2	40.5	43.8	48.2	54.8	65.7	87.6	148
149	35.5	37.7	41.1	44.4	48.8	55.5	66.6	88.8	149
150	36.0	38.2	41.6	45.0	49.5	56.3	67.5	90.0	150
151	36.5	38.8	42.2	45.6	50.2	57.0	68.4	91.2	151
152	37.0	39.3	42.7	46.2	50.8	57.8	69.3	92.4	152
153	37.5	39.8	43.3	46.8	51.5	58.5	70.2	93.6	153
154	37.9	40.3	43.9	47.4	52.2	59.3	71.1	94.9	154
155	38.4	40.8	44.4	48.1	52.9	60.1	72.1	96.1	155
156	38.9	41.4	45.0	48.7	53.5	60.8	73.0	97.3	156
157	39.4	41.9	45.6	49.3	54.2	61.6	73.9	98.6	157
158	39.9	42.4	46.2	49.9	54.9	62.4	74.9	99.9	158
159	40.4	43.0	46.8	50.6	55.6	63.2	75.8	101.1	159
160	41.0	43.5	47.4	51.2	56.3	64.0	76.8	102.4	160
161	41.5	44.1	48.0	51.8	57.0	64.8	77.8	103.7	161
162	42.0	44.6	48.3	52.5	57.7	65.6	78.7	105.0	162

Table A3.10 *(continued)*

Height (cm)	BMI 16.0	17.0	18.5	20.0	22.0	25.0	30.0	40.0	Height (cm)
	Thinness					Overweight			
	Body weight (kg)								
163	42.5	45.2	49.2	53.1	58.5	66.4	79.7	106.3	163
164	43.0	45.7	49.8	53.8	59.2	67.2	80.7	107.6	164
165	43.6	46.3	50.4	54.5	59.9	68.1	81.7	108.9	165
166	44.1	46.8	51.0	55.1	60.6	68.9	82.7	110.2	166
167	44.6	47.4	51.6	55.8	61.4	69.7	83.7	111.6	167
168	45.2	48.0	52.2	56.4	62.1	70.6	84.7	112.9	168
169	45.7	48.6	52.8	57.1	62.8	71.4	85.7	114.2	169
170	46.2	49.1	53.5	57.8	63.6	72.3	86.7	115.6	170
171	46.8	49.7	54.1	58.5	64.3	73.1	87.8	117.0	171
172	47.3	50.3	54.7	59.2	65.1	74.0	88.8	118.3	172
173	47.9	50.9	55.4	59.9	65.8	74.8	89.8	119.7	173
174	48.4	51.5	56.0	60.6	66.6	75.7	90.8	121.1	174
175	49.0	52.1	56.7	61.3	67.4	76.6	91.9	122.5	175
176	49.6	52.7	57.3	62.0	68.1	77.4	92.9	123.9	176
177	50.1	53.3	58.0	62.7	68.9	78.3	94.0	125.3	177
178	50.7	53.9	58.6	63.4	69.7	79.2	95.0	126.7	178
179	51.3	54.5	59.3	64.1	70.5	80.1	96.1	128.2	179
180	51.9	55.1	59.9	64.8	71.3	81.0	97.2	129.6	180
181	52.4	55.7	60.6	65.5	72.1	81.9	98.3	131.0	181
182	53.0	56.3	61.3	66.2	72.9	82.8	99.4	132.5	182
183	53.6	57.0	62.0	67.0	73.7	83.7	100.5	134.0	183
184	54.2	57.6	62.6	67.7	74.5	84.6	101.6	135.4	184

Table A3.10 *(continued)*

	BMI								
	16.0	17.0	18.5	20.0	22.0	25.0	30.0	40.0	
Height (cm)	Thinness					Overweight			Height (cm)
	Body weight (kg)								
185	54.8	58.2	63.3	68.5	75.3	85.6	102.7	136.9	185
186	55.5	58.8	64.0	69.2	76.1	86.5	103.8	138.4	186
187	56.0	59.5	64.7	69.9	76.9	87.4	104.9	139.9	187
188	56.6	60.1	65.4	70.7	77.8	88.4	106.0	141.4	188
189	57.1	60.7	66.1	71.4	78.6	89.3	107.1	142.9	189
190	57.8	61.4	66.8	72.2	79.4	90.3	108.3	144.4	190

For easy reference and calculation of BMI values corresponding to recommended cut-offs, first find the height of the individual in the left- or right-hand column. The weights given in the row for that height correspond to various recommended cut-off values for adult BMI. Weights for two normal BMI values are also included.

Interpretation
BMI <16.00 indicates grade 3 thinness
BMI 16.0–16.99 indicates grade 2 thinness
BMI 17.0–18.49 indicates grade 1 thinness

BMI 18.5–24.99 is the normal range for an individual

BMI 25.0–29.99 indicates grade 1 overweight
BMI 30.0–39.99 indicates grade 2 overweight
BMI ≥ 40.00 indicates grade 3 overweight

References

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