TABLE 1: Summary of methods to measure body composition from infancy through adolescence

METHOD	AGE/WEIGHT LIMITS	INDICATORS OF WEIGHT STATUS AND EXCESS ADIPOSITY/ESTIMATE(S) OF BODY FAT	NATIONAL REFERENCE DATA FOR U.S. POPULATION OF CHILDREN	ADVANTAGES	DISADVANTAGES
Anthropometry: **Stature/ Recumbent Length and Weight**	All ages	Weight for length Body Mass Index	YES (birth and older)	• Simple and quick measurements • Noninvasive and safe measurements • Highly acceptable to participants • Inexpensive and portable equipment • Minimal staff training	• Does not measure body fat • Provides only an indicator of weight and obesity status
Anthropometry: **Skinfold Thicknesses**	All ages	Site specific and sum of skinfold thicknesses Total body fat predicted by regression equations	YES (ages 2 months and older)	• Relatively simple and quick measurements • Noninvasive and safe measurements • Acceptable to participants • Inexpensive and portable equipment	• Greater staff training and skill required • Greater privacy needed to conduct measurements • Requires greater child compliance; movement may cause inaccuracies particularly in younger children • Measures only subcutaneous fat at various body locations • Requires age- and sex-specific predictive equations that may not always be available for the study population of interest
Anthropometry: **Waist Circumference**	Recommended for ages 8 years and older	Abdominal girth Surrogate for abdominal visceral fat /central fat distribution	YES (ages 8 years and older)	• Relatively simple and quick measurements • Noninvasive and safe measurements • Moderately acceptable to participants • Inexpensive and portable equipment	• Greater staff training and skill required • Greater privacy needed to conduct measurements • Greater source of embarrassment for children during measurement • Includes both abdominal visceral and subcutaneous adipose tissue • Difficult to find and measure anatomic location of waist consistently over time and and on participants with obesity
Bioelectrical Impedance Analysis (BIA)	All ages	Measures the impedance or resistance to the flow of an electrical current through the body to estimate TBW Total FM and total FFM predicted by regression equations	NO	• Relatively simple and quick measurements • Noninvasive and safe measurements • Moderate to high acceptability to participants • Relatively inexpensive and portable equipment	• Requires participant preparation such as fasting and no exercise in advance that may make it less feasible to conduct with children • Requires greater compliance; movement may cause inaccuracies particularly in younger children • Effects of growth and development on the limb and trunk in children violates key assumptions in using BIA to estimate fat mass unless age-, sex- and race/ethnicity-specific predictive equations are incorporated into the device being used.
Air Displacement Plethysmography (ADP)	Birth to 6 months (up to 8 kg) using PEA POD 6 years and older (35 kg to 200 kg) using BOD POD 2-5 years old using adapter insert made for BOD POD	Measures body volume used to estimate body density Total FM and Total FFM predicted by regression equations	NO	• Relatively short duration to conduct test • Noninvasive and safe measurements • Moderate to high acceptability to participants	• Greater staff training and skill required • Greater privacy needed to conduct measurements • Greater source of embarrassment for children during measurement due to need for tight-fitting clothing • Equipment is expensive and not portable; only one manufacturer of equipment; generally found in specialized research centers or hospitals • Requires participant preparation such as fasting in advance that may make is less feasible to conduct with children • Requires greater compliance; movement may cause inaccuracies particularly in younger children
Dual Energy X-Ray Absorptiometry (DXA)	All ages (some instruments have an upper weight limit)	Instrument-specific software algorithms are used to calculate the various values for bone mineral content, "bone-free" lean mass or FFM, and FM	YES (ages 8 years and older)	• Relatively short duration to conduct test • Noninvasive and safe measurements • Moderate acceptability to participants	• Requires skilled and certified technicians to conduct test or physicians • Greater privacy needed to conduct measurements • Equipment is most expensive and not portable; generally found in specialized research centers or hospitals • Requires greater compliance and movement may cause inaccuracies particularly in younger children; young children must be restrained • Low dose ionizing radiation exposure (less than single day's exposure from natural sources at sea level) • Requires manufacturer/instrument specific algorithms that may not be available for the population of interest