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## Epidemiological Measures of health and Disease

### Epidemiological Indicators of Adolescent Health

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Adapted from Medical Biostatistics, Fourth Edition ([MedicalBiostatistics.synthasite.com](https://www.synthasite.com/MedicalBiostatistics))

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Chapman & Hall/ CRC Press, 2018 US\$129.95 Available at <https://www.routledge.com/Medical-Biostatistics/Indrayan-Malhotra/p/book/9781498799539>

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Vital changes occur during adolescence that set the basics of adulthood. A spurt in gain in height and weight occurs and genitals take shape. Pubic hair grow. Menarche occurs and breasts develop in girls. Variation, as always, remains an integral part of all these developments. Relatively few physical sicknesses occur in this phase of life. Health is generally measured in terms of adequacy of physical growth and sexual maturation.

#### *Growth in Height and Weight in Adolescence*

Most countries have not developed standards for growth in height and weight during adolescence. The National Center for Health Statistics (NCHS) data, obtained for U.S. children and adolescents [1], are often used for comparison. Maximum growth in median height in one year occurs during the 13th year in U.S. boys (7.5 cm) and during the 11th year in girls (7.5 cm). This maximum in British children occurs around the 14th year and the 12th year, respectively [2]. Due mostly to genetic and nutritional factors, many children show slower or delayed growth. A child's measurement can be compared with the NCHS chart or the chart of his own country (where available) to assess the progress of growth. The assessment again is in terms of the percentile achieved.

Preece and Baines [3] have developed models that can be used to evaluate height parameters such as age at takeoff, height at takeoff, velocity at takeoff, age at peak height velocity, and peak height velocity. These parameters have special relevance to the adolescent group.

Short stature in adolescent girls that persists into adulthood is associated with increased risk of adverse reproductive outcomes. Risk of low birth weight babies, cephalopelvic disproportion, dystocia, and cesarean section increases in short mothers. No specific health risk is known for short-statured boys.

In U.S. boys, body mass index (BMI) is least (median 15.3 kg/m<sup>2</sup>) at age six years and in girls at age five years (median 15.2 kg/m<sup>2</sup>). This rises to 23.0 kg/m<sup>2</sup> at age 20 years in boys and to 21.7 kg/m<sup>2</sup> in girls at this age [4]. Thus BMI is not age independent in children. For internationally applicable cut-offs for well to do children, see Cole et al. [5].

### **Sexual Maturity Rating**

Breast development in females, appearance of pubic hair in both boys and girls, and the development of male genitalia are graded into stages from 1 to 5, where the first is the preadolescent stage and the last is the fully matured adult stage. One can think of these stages as scores and use them as measures of extent of pubertal development. This can be related to age to find whether or not the development is on course. Clear guidelines on this are not yet available and need to be developed separately for each population depending on the rate of sexual maturation generally seen in healthy adolescents in that population.

### **REFERENCES**

1. 2000 CDC Growth Charts: United States ([www.cdc.gov/growthcharts](http://www.cdc.gov/growthcharts)).
2. Cole TJ, Freeman JV, Preece MA. British 1990 growth reference centiles for weight, height, body mass index and head circumference fitted by maximum penalized likelihood. *Stat Med* 1998; 17:407-429.
3. Preece MA, Baines MJ. A new family of mathematical models describing the human growth curve. *Ann Hum Biol* 1978; 51:1-24.
4. Must A, Dallal GE, Dietz WH. Reference data for obesity: 85th and 95th percentiles of body mass index (wt/ht<sup>2</sup>) and triceps skinfold thickness. *Am J Clin Nutr* 1991; 53: 839-846.
5. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000; 320:1240-1243.