Introduction

The period of adolescence witnesses rapid growth, indicating a need to understand this process with explicit attention. Growth monitoring during adolescence is done by measuring anthropometric parameters that include height, weight, body circumference, and skinfold thickness. Height in younger years is a critical parameter for the overall development of an individual, and these measurements are important as these aid in diagnosing stunting and overweight amounting to the double burden of malnutrition. A high amount of body fat can lead to weight-related diseases, and being underweight can also place one at risk for multiple health problems. The former is known to cause childhood obesity, which is a precursor of adulthood obesity and plays a central role in the metabolic syndrome that leads to diseases such as hypertension, type II diabetes, and cardiovascular disease, whereas the latter in adolescence is linked with cognitive deficits and reduced scholastic achievements, economic outputs, and reproductive health, especially in females. In India, the prevalence of stunting, thinness, and overweight or obese is reported to be 15%, 16%, and 11%, respectively.

ABSTRACT

Purpose: The aim of the study was to estimate centiles by using improved statistical smoothing procedure, the Box-Cox power-exponential (BCPE) method, in urban northern Indian adolescents aged 11–17 years. Materials and Methods: Data were collected cross-sectionally by measuring specific anthropometric features such as height, weight, and mid-upper arm circumference in school-based adolescents aged 11–17 years including both boys (n = 838) and girls (n = 788) enrolled in government educational institutions in urban Delhi. We used a state-of-the-art statistical methodology (BCPE method) to establish centile curves. Results: The model fitted before smoothing revealed that weight, height, and BMI did not follow a normal distribution; both skewness and kurtosis were observed in all three variables. After correcting both skewness and kurtosis, estimated empirical percentile values showed a gradual increase in weight, height, and BMI in both boys and girls. Girls had higher weight and height than boys in initial ages and observed a steep increase in boys in both weight and height in later ages. BMI was higher in girls than boys and visibly higher during 14–16 years of age. The 50th percentile value of BMI was smaller in all the ages in our study than that in other studies. Conclusions: Smoothened percentile values derived for BMI by using the state-of-the-art statistical methodology may help policymakers to promote better growth in urban adolescents.

Keywords: Adolescents, BMI, Box-Cox power exponential method
India is reported to have the second-highest population of obese children (14.4 million) in the world and is expected to have approximately 17 million by 2025.[10] With this increasing overweight-obesity burden, it is also important to identify the stunting and thinning among adolescents so that the associated burden, squeal, and the related economic consequences are reduced. Primary care and family physicians regularly screen and manage adolescent health and nutritional problems.

As body mass index (BMI) for age is a well-recognized measure to identify overweight and obesity in children and adolescents aged 2–19 years,[11] two BMI charts have been recommended for Indian children by the national task force of the Indian Academy of Pediatrics (IAP). These have been formulated based on the US Center for Disease Control (CDC) charts that utilize 85th and 95th centiles age- and sex-wise as cut-offs.[12] Internationally, cut-offs have been recommended for children based on centiles akin to adult BMIs of 25 and 30 kg/m² by the International Obesity Task Force (IOTF).[13] The CDC growth charts were revised in 2000 for two reasons: (i) to use more comprehensive survey data and (ii) to use improved statistical smoothing procedures. These improved procedures take appropriate transformation and remove both skewness and kurtosis present in the data, if necessary. Not accounting for skewness and kurtosis will lead to distortion of fitted centiles, which may subsequently result in inaccurate clinical decisions concerning children and adolescents.[14]

In India, some studies reported percentiles for weight, height, and BMI in children and adolescents[15–20] in affluent school children, and no study estimated the smoothened percentiles among underprivileged urban adolescents. In addition, secular trends and continuous shifts in the distribution of anthropometry measurements due to changes in diet and behavior have contributed to the increase in the prevalence of overweight/obesity,[21] which urges the need for generating time-specific estimates of anthropometric measures. Thus, a population-specific, BMI-for-age estimation for adolescent boys and girls with appropriate statistical smoothing methods is crucial to improve clinical assessment and public health surveillance of the dual burden of malnutrition. Thus, in this paper, we attempted to provide smoothened empirical percentiles of weight-for-age, height-for-age, and BMI-for-age, correcting for both skewness and kurtosis, for adolescent boys and girls selected from government schools in a northern part of India, representing the lower socioeconomic stratum.

### Materials and Methods

#### Study subjects

The data were taken from the cross-sectional study that examined the Weekly Iron Folic Acid Supplementation Program (WIFS) for school-based adolescents aged 10–20 years. This study was carried out in 2017 in the National Capital Territory (NCT) Region of Delhi. The list of schools and sampling frames were obtained from the State Department of Health and Family Welfare, and 34 government schools were selected encompassing all administrative districts within the NCT region of Delhi in consultation with key school health officials of Delhi. The schools were considered as clusters and selected using probability proportionate to size (PPS)-based cluster sampling. All the students in a randomly selected section of a class from the selected schools were included in the study. The children studying in these schools belonged to low socioeconomic status as these schools were non-fee-paying schools. Written permission was sought from the Directorate of Education and State Department of Health and Family Welfare. For participation of schools, consent was obtained from the principals of the schools and representatives of parent-teacher associations. Assent was taken from students, and information was given to parents about the study. Ethical approval was obtained from the Institute Ethics Committee of All India Institute of Medical Sciences, New Delhi, India.

#### Anthropometric measurements

Anthropometric measurements of adolescents were done by trained health personnel. The kappa coefficient after training compared to the lead investigator was found to be 0.8. Weight was measured to the nearest 0.1 kg, with shoes removed and minimal school uniform, by using an electronic weighing machine (Equinox Model EQ-EB-6171L). Height was measured to the nearest 0.1 cm by using a portable wall-mounted stadiometer (Prestige Model SM) in a standing position with head straight in the Frankfurt horizontal line. Two readings of both weight and height were recorded and their average was considered. BMI was computed using weight in kg and height in m (BMI = weight in kg/height in m²). Daily calibration of measuring instruments with standard weight and height was done respectively.

#### Statistical methods

Lambda–Mu–Sigma (LMS) versus Box–Cox power-exponential (BCPE) centile curves plot various percentiles of target parameters over different ages and are used as a reference for evaluating the growth of the children. The challenge involved in constructing centile curves is the smoothness of percentiles over age. Smoothing is necessary as it tries to retain the short-term fluctuating trends of actual biological growth parameters in children. The fundamental aspect in centile estimation is z-score ($z = (y - \text{mean})/\text{standard deviation}$), and the interpretation of $z$-scores is straightforward in terms of percentiles when the $y$-values (anthropometric measures) follow an exact normal distribution. The properties of an exact normal distribution are as follows: the frequency curve of the target parameter ($y$-values) should be unimodal, symmetrical (skewness = 0), and with normal peakedness (kurtosis = 3). For attaining normal distribution and smoothness, the two most commonly used methods are LMS and BCPE. For obtaining smoothened centile curves, we need to rule out both skewness and kurtosis to the maximum extent possible.
LMS method

The LMS method\cite{22,23} corrects the skewness present in the data by differentiating the age-dependent distribution of a target parameter (e.g., BMI) based on a quantile regression fit. This method uses three different components: median (M = μ), coefficient of variation (S = σ\text{υ}), and skewness of the distribution. An exponential factor (L = λ) from a Box-Cox transformation is used to evaluate the skewness. After the regression, L, M, and S values are used to construct centile curves (C_α - centile of α quantile) by using the following equation:

\[ C_\alpha = \mu \ast (1 + \lambda \ast \sigma_\text{υ} \ast z_\alpha)^{1/\lambda} \]

where \( z_\alpha \) is the standard normal distribution for the α-quantile; for instance, \( z_{0.95} = 1.64 \). The z-score (standard deviation score) is calculated for the given anthropometric parameter (y) by using the following equation:

\[ Z\text{-score} = \frac{1}{\sigma\lambda} \left( \left( \frac{y}{\mu} \right)^{\lambda} - 1 \right) \text{for } y, \mu, \sigma, \text{ and } \lambda \neq 0 \]

BCPE method

The BCPE method\cite{24,25} is used when the z-score obtained using the LMS method does not follow a standard normal distribution as it does not correct for kurtosis. This BCPE distribution has four parameters: median (M = μ), coefficient of variation (S = σ\text{υ}), Box-Cox transformation (L = λ), and a parameter related to kurtosis (P = τ) selected for constructing the curves. As this method involves an additional parameter “P” to correct for kurtosis, it is called the LMSP method, a generalization of the LMS method of centile estimation.\cite{26} The generalized additive model for location, scale, and shape (GAMLSS) model is used to model these four parameters as functions of many explanatory variables by using BCPE distribution.\cite{27} The centile estimation is a special case of the GAMLSS model as age is the single explanatory variable in the model. The GAMLSS model is a semi-parametric model with a probability density function conditional on four distribution parameters (μ, σ, v, and τ). The first two, μ (mean) and σ (coefficient of variation), are population distribution parameters that characterize location and scale parameters. The other two, v (skewness) and τ (kurtosis), are shape parameters. These four parameters were modeled as non-parametric smoothing cubic spline functions of age with effective degrees of freedom (EDF) with BCPE distribution by using the Rigby–Stasinopoulos (RS) algorithm.

Statistical analysis

Data were entered and managed using MS Access. First, the data were checked for outliers. To precisely represent the population of adolescents aged 11–17 years, outliers were checked using Tukey’s methodology.\cite{28} The interquartile range (IQR) was calculated, and outliers were identified as any value of anthropometric measures more than twice the interquartile range below the first quartile or above the third quartile were removed from the analysis. Height, weight, and BMI were summarized as mean and standard deviation. The normality of the data distribution was assessed by both graphical and computational methods. The histogram of the data was plotted to check the tails of the distribution for normality, and the GAMLSS model was fitted before and after smoothing. The coefficient of skewness and kurtosis of the residuals was calculated to assess for the normal distribution. The percentiles (3, 5, 10, 25, 50, 75, 85, 90, 95, and 97) estimated using the GAMLSS model were reported. The GAMLSS model was fitted using the GAMLSS package of R version 3.6.0 (The R Foundation for Statistical Computing, 2009), and other descriptive analyses were done using Stata 12.0 (StataCorp LP, College Station, TX 77845, USA).

Results

The cross-sectional survey included 838 boys and 788 girls. The age of school children ranged from 10 to 20 years. We excluded 37 children whose age was either below 11 years or above 17 years as the sample size in those ages were very small. There were 26 children whose age was 10 years and 11 children whose age was above 18 years. Tukey’s fences showed 20 records (1.3% of the observations) as outliers. Thus, the data used to establish the age-sex-specific percentiles pertained to 1569 children (800 boys and 769 girls).

The mean (±SD) of height (cm), weight (kg), and BMI (kg/m²) by age and sex is given in Table 1. The Scatter plot in Figure 1 shows the linear relationship of height, weight, and BMI by age and sex. The histogram given in Figure 2 depicts the skewness and peakedness of height, weight, and BMI by sex. The residuals of the fitted GAMLSS model without smoothing revealed [Table 2] that the weight, height, and BMI did not follow a normal distribution and that weight and BMI were positively skewed, whereas height was negatively skewed in both boys and girls. The coefficient of kurtosis for the residuals of height, weight, and BMI showed that the peak of the curve was departed from the normal peak in both boys and girls.

After smoothing, the coefficient of skewness and kurtosis of residuals for all the anthropometric measurements were near 0 and 3 respectively, as shown in Table 2; thus, the residuals were approximately normal as they were to be for an adequate model. The age- and sex-specific parameter values (μ, σ, v, and τ) and smoothed values of weight, height, and BMI at 5th, 10th, 25th, 50th, 75th, 85th, 90th, and 95th percentiles are presented in Table 3 (boys) and Table 4 (girls). Smoothed centile curves of height, weight, and BMI by sex are shown in Figure 3a–f.

The centile curves for boys and girls aged 11–17 years showed a gradual increase in height, weight, and BMI. Girls had a slightly higher weight than boys from age 11 to 13 years and a steep increase in boys at later ages. Girls were taller than boys at lower ages and vice-versa at later ages. Unlike weight and height, BMI was higher in girls than boys at each age and percentile and visibly high during pubertal age of 14–16 years [Figure 3f].
The median percentiles of BMI for boys and girls of the present study were compared with other Indian studies and WHO reference 2007 [Figure 4]. The median BMI in all ages was higher in all the studies than in our study except a recent study by Sarna et al., 2021. [27]

**Discussion**

Our study provides centile curves for height, weight, and BMI for Delhi urban school-going adolescents in India within the broad age group of 11–17 years. Ours is one of the first studies, to the
best of knowledge, to report percentiles after correcting for both skewness and kurtosis for height, weight, and BMI among North Indian underprivileged adolescents aged 11–17 years. Urban areas witness an obvious change in dietary and physical activity patterns due to a rise in income and growing affluence.[28] This necessitates the periodic updating of anthropometric measurements and estimation of smoothened percentiles; globally, several countries have been periodically updating the centile curves for their adolescent population.[29‑37]

The only study that included children in late adolescence aged 14–18 years from combined data of government and private schools of Delhi by Pandey et al.[18] had provided percentiles for BMI but not for height and weight. The 50th percentile of BMI at various age groups was higher by 0.9–1.2 kg/m² and 0.7–1.4 kg/m² in boys and girls, respectively, than that in our study. The 50th percentile of BMI estimated in our study was lower by 2.3–2.5 kg/m² in boys and 2.08–2.6 kg/m² in girls than those reported by Khadilkar et al.,[37] by 0.88–1.17 kg/m² in boys and 0.9–1.5 kg/m² in girls than those reported by Virani,[38] and by 1.8–2.1 kg/m² in boys and 1.3–1.7 kg/m² in girls than those reported by the Indian Academy of Pediatrics (revised IAP, 2015),[38] and higher by 0.88–1.17 kg/m² in boys and 0.9–1.5 kg/m² in girls than those reported by Sarna et al.,[27] at various age groups.

The present study established percentiles for height, weight, and BMI for children from lower socioeconomic strata by using the Delhi government school children aged 11–17 years. Pandey et al.[28] had established, more than ten years ago, percentiles only for BMI-for-age by using combined data of both government and private Delhi school children aged 14–18 years, which accounted for only skewness.

The median BMI is evidently lower in these children and adolescents who belong to lower and lower-middle socioeconomic status than their counterparts, which urges to improve and promote better child growth, especially in these areas.

The strength of our study is that we had corrected the data for both skewness and kurtosis by using the state-of-the-art statistical method, BCPE, to estimate smoothened percentiles for underprivileged urban adolescents. The limitation of our study is that we could not include data for the complete period of adolescence (10–19 years), only having for 11–17 years cross-sectional data with year-wise grouping and absence of pubertal assessment.

**Table 2: The fitted values for the normal distribution of height (cm), weight (kg), and BMI (kg/m²) before and after smoothing**

|                  | Before smoothing | After smoothing |
|------------------|------------------|-----------------|
|                  | Mu (Sigma⁰)     | Residuals       | Mu (Sigma⁰) | Residuals |
|                  | Skewness | Kurtosis | AIC   | Skewness | Kurtosis | AIC |
| Weight (kg)      |          |          |       |          |          |      |
| Boys (n=800)     | 42.5 (10.4)   | 0.405    | 2.949 | 41.4 (0.154) | 0.020    | 2.928 | 5425.9 |
| Girls (n=769)    | 40.6 (7.3)    | 0.435    | 3.299 | 39.7 (0.157) | 0.011    | 2.893 | 5009.9 |
| Height (cm)      |          |          |       |          |          |      |
| Boys (n=800)     | 156.3 (11.5)  | -0.268   | 2.438 | 155.7 (0.047) | 0.004    | 2.964 | 5474.3 |
| Girls (n=769)    | 150.0 (6.6)   | -0.230   | 3.607 | 149.8 (0.039) | 0.007    | 3.029 | 4917.3 |
| Body Mass Index (kg/m²) | |       |       |          |          |      |
| Boys (n=800)     | 17.2 (2.6)    | 0.846    | 3.748 | 16.8 (0.125) | 0.017    | 2.857 | 3535.1 |
| Girls (n=769)    | 18.0 (2.7)    | 0.570    | 3.112 | 17.6 (0.134) | 0.008    | 2.905 | 3534.9 |

![Image](image.png)

**Figure 2: Skewness and peakedness of weight (kg), height (cm), and BMI (kg/m²) by histogram for boys (a, c, and e) and girls (b, d, and f) aged 11–17 years**
estimates of anthropometric measures might be helpful to compare with that of their counterparts and thus to help policy decisions to promote better child growth in these areas. Urban disadvantaged adolescents are often seen first by primary care and family physicians. These updated curves would be of utmost value to them, keeping in mind the heterogeneity and diversity of the adolescent age group. Regular screening of adolescents with these updated BMI charts will help in the provision of preventive services by primary care physicians. Multicentric study with a heterogeneous population at regular time intervals utilizing robust statistical techniques as outlined in the current study should be the way forward for future research in these areas.

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Table 3: Parameter values (mu, sigma, nu, tau) and percentiles of weight (kg), height (cm), and BMI (kg/m²) by age in boys aged 11-17 years

| Boys | Age (y) | Mu (μ) | Sigma (σ) | Nu (ν) | Tau (τ) | 5th | 10th | 25th | 50th | 75th | 85th | 90th | 95th |
|------|---------|--------|-----------|--------|---------|-----|------|------|------|------|------|------|------|
| Weight (kg) | | | | | | | | | | | | | |
| 11  | 30.2    | 0.206  | -1.11     | 4.48   | 22.8    | 23.7| 25.9 | 30.2 | 36.2 | 39.6 | 42.0 | 45.4 |
| 12  | 33.9    | 0.195  | -0.15     | 2.96   | 24.9    | 26.4| 29.4 | 33.9 | 39.3 | 42.2 | 44.1 | 46.9 |
| 13  | 37.7    | 0.184  | -0.11     | 2.21   | 28.0    | 29.8| 33.2 | 37.7 | 42.9 | 45.9 | 47.0 | 51.2 |
| 14  | 41.4    | 0.174  | -0.46     | 1.91   | 31.6    | 33.5| 37.0 | 41.4 | 46.7 | 50.0 | 52.4 | 56.4 |
| 15  | 45.2    | 0.165  | -0.65     | 1.93   | 35.2    | 37.1| 40.6 | 45.2 | 50.6 | 54.1 | 56.7 | 60.9 |
| 16  | 48.9    | 0.156  | -0.82     | 2.40   | 38.8    | 40.5| 44.0 | 48.9 | 55.0 | 58.5 | 61.1 | 65.2 |
| 17  | 52.7    | 0.148  | -1.28     | 3.50   | 42.8    | 44.2| 47.4 | 52.7 | 59.6 | 63.4 | 66.0 | 69.9 |
| Height (cm) | | | | | | | | | | | | | |
| 11  | 139.9   | 0.052  | 0.40      | 2.43   | 128.4   | 130.7| 134.8 | 139.9 | 145.1 | 147.7 | 149.5 | 152.0 |
| 12  | 145.7   | 0.054  | 0.36      | 2.37   | 133.2   | 135.7| 140.2 | 145.7 | 151.4 | 154.3 | 156.2 | 159.0 |
| 13  | 151.9   | 0.054  | 0.31      | 2.32   | 139.9   | 141.6| 146.3 | 151.9 | 157.8 | 160.8 | 162.8 | 165.7 |
| 14  | 157.8   | 0.050  | 0.27      | 2.27   | 145.3   | 147.9| 152.4 | 157.8 | 163.4 | 166.3 | 168.3 | 171.1 |
| 15  | 162.1   | 0.045  | 0.22      | 2.23   | 150.6   | 152.9| 157.2 | 162.1 | 167.2 | 169.9 | 171.7 | 174.3 |
| 16  | 165.1   | 0.040  | 0.18      | 2.18   | 154.6   | 156.8| 160.6 | 165.1 | 169.8 | 172.2 | 173.9 | 176.3 |
| 17  | 167.7   | 0.036  | 0.14      | 2.13   | 158.1   | 160.1| 163.6 | 167.7 | 171.8 | 174.0 | 175.5 | 177.7 |
| Body Mass Index (kg/m²) | | | | | | | | | | | | | |
| 11  | 15.2    | 0.123  | -1.37     | 1.87   | 12.7    | 13.1| 14.0 | 15.2 | 16.5 | 17.4 | 18.1 | 19.2 |
| 12  | 15.7    | 0.127  | -1.44     | 1.89   | 13.1    | 13.6| 14.5 | 15.7 | 17.1 | 18.1 | 18.9 | 20.1 |
| 13  | 16.2    | 0.129  | -1.51     | 1.92   | 13.5    | 14.0| 15.0 | 16.2 | 17.8 | 18.8 | 19.6 | 21.0 |
| 14  | 16.8    | 0.130  | -1.57     | 1.97   | 13.9    | 14.4| 15.4 | 16.8 | 18.4 | 19.5 | 20.3 | 21.8 |
| 15  | 17.3    | 0.128  | -1.64     | 2.05   | 14.4    | 14.9| 15.9 | 17.3 | 19.0 | 20.1 | 20.9 | 22.4 |
| 16  | 17.8    | 0.123  | -1.71     | 2.17   | 15.0    | 15.5| 16.5 | 17.8 | 19.5 | 20.6 | 21.5 | 22.8 |
| 17  | 18.4    | 0.118  | -1.77     | 2.32   | 15.6    | 16.0| 17.0 | 18.4 | 20.1 | 21.1 | 21.9 | 23.2 |

Figure 4: Comparison of median BMI (kg/m²) percentiles in boys and girls: present study versus other studies

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Conflicts of interest
There are no conflicts of interest.

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Table 4: Parameter values (mu, sigma, nu, tau) and percentiles of weight (kg), height (cm), and BMI (kg/m²) by age in girls aged 11-17 years

| Girls | Age (y) | mu  | sigma | nu  | tau | 5th  | 10th | 25th | 50th | 75th | 85th | 90th | 95th |
|-------|--------|-----|-------|-----|-----|------|------|------|------|------|------|------|------|
| Weight (kg) | | | | | | | | | | | | | |
| 11 | 32.5 | 0.189 | -0.45 | 2.04 | 24.3 | 25.9 | 28.7 | 32.5 | 37.1 | 40.0 | 42.1 | 45.5 |
| 12 | 35.4 | 0.170 | -0.16 | 2.09 | 26.9 | 28.6 | 31.6 | 35.4 | 39.8 | 42.4 | 44.3 | 47.2 |
| 13 | 38.2 | 0.157 | -0.23 | 2.13 | 29.7 | 31.3 | 34.3 | 38.2 | 42.6 | 45.1 | 46.9 | 49.8 |
| 14 | 40.5 | 0.148 | -0.78 | 2.18 | 32.4 | 33.9 | 36.7 | 40.5 | 45.0 | 47.8 | 49.8 | 53.0 |
| 15 | 42.3 | 0.143 | -1.25 | 2.23 | 34.4 | 35.8 | 38.5 | 42.3 | 47.1 | 50.1 | 52.3 | 55.9 |
| 16 | 43.8 | 0.143 | -0.91 | 2.28 | 35.4 | 36.9 | 39.8 | 43.8 | 48.6 | 51.5 | 53.7 | 57.0 |
| 17 | 45.0 | 0.147 | 0.36 | 2.33 | 35.0 | 36.9 | 40.5 | 45.0 | 49.9 | 52.4 | 54.1 | 56.7 |
| Height (cm) | | | | | | | | | | | | | |
| 11 | 143.0 | 0.044 | 2.11 | 1.47 | 132.0 | 134.9 | 139.1 | 143.0 | 146.7 | 149.0 | 150.6 | 153.1 |
| 12 | 146.4 | 0.041 | 1.98 | 1.55 | 136.1 | 138.8 | 142.7 | 146.4 | 150.0 | 152.2 | 153.7 | 156.0 |
| 13 | 149.1 | 0.038 | 1.85 | 1.63 | 139.3 | 141.7 | 145.5 | 149.1 | 152.7 | 154.8 | 156.2 | 158.4 |
| 14 | 150.9 | 0.038 | 1.71 | 1.72 | 141.2 | 143.5 | 147.2 | 150.9 | 154.5 | 156.6 | 158.0 | 160.1 |
| 15 | 152.2 | 0.038 | 1.58 | 1.81 | 142.5 | 144.8 | 148.4 | 152.2 | 156.0 | 158.1 | 159.5 | 161.6 |
| 16 | 153.2 | 0.038 | 1.45 | 1.90 | 143.5 | 145.7 | 149.3 | 153.2 | 157.1 | 159.2 | 160.6 | 162.7 |
| 17 | 153.5 | 0.038 | 1.32 | 2.00 | 143.9 | 146.1 | 149.6 | 153.5 | 157.4 | 159.5 | 160.9 | 163.0 |
| Body Mass Index (kg/m²) | | | | | | | | | | | | | |
| 11 | 15.9 | 0.143 | -1.11 | 1.29 | 12.9 | 13.6 | 14.7 | 15.9 | 17.3 | 18.4 | 19.3 | 20.9 |
| 12 | 16.5 | 0.140 | -0.49 | 1.85 | 13.2 | 13.9 | 15.1 | 16.5 | 18.2 | 19.2 | 19.9 | 21.1 |
| 13 | 17.2 | 0.137 | -0.55 | 2.50 | 13.9 | 14.5 | 15.6 | 17.2 | 19.0 | 20.1 | 20.7 | 21.8 |
| 14 | 17.8 | 0.134 | -1.17 | 2.89 | 14.7 | 15.2 | 16.2 | 17.8 | 19.8 | 20.9 | 21.7 | 22.9 |
| 15 | 18.3 | 0.131 | -1.50 | 3.01 | 15.2 | 15.7 | 16.7 | 18.3 | 20.3 | 21.5 | 22.3 | 23.6 |
| 16 | 18.6 | 0.128 | -1.19 | 3.11 | 15.5 | 16.0 | 17.0 | 18.6 | 20.6 | 21.7 | 22.4 | 23.6 |
| 17 | 18.9 | 0.124 | -0.62 | 3.27 | 15.6 | 16.1 | 17.2 | 18.9 | 20.8 | 21.8 | 22.5 | 23.4 |
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