Predicted Value Equations

Predicted Study Summary Table

Reference	Abbreviation	Gender	Age Range [yrs]	Height Range	Caucasian	Black	Mexican - American	Asian	FVC	FEV1	FEV1/FVC	FEV6	FEV1/FEV6	FEF25–75%	PEFR	FEF25%	FEF50%	FEF75%	MVV	SVC	FEV0.5	FEV3	FEV3/FVC	FET	FIVC
NHANES III (1999)	Nh	M	8–19	48–75.6 in (122–192 cm)	X				X	X	X	X	X	X	X										
		M	8–19	48–76.4 in (122–194 cm)		X			X	X	X	X	X	X	X										
		M	8–19	47.2–70.9 in (120–180 cm)			X		X	X	X	X	X	X	X										
		M	20–80	62.2–76.4 in (158–194 cm)	X				X	X	X	X	X	X	X										
		M	20–80	62.2–77.2 in (158–196 cm)		X			X	X	X	X	X	X	X										
		M	20–80	61.4–75.6 in (156–192 cm)			X		X	X	X	X	X	X	X										
		F	8–17	46.5–70.1 in (118–178 cm)	X				X	X	X	X	X	X	X										
		F	8–17	46.5–72.4 in (118–184 cm)		X			X	X	X	X	X	X	X										
		F	8–17	44.9–67.7 in (114–172 cm)			X		X	X	X	X	X	X	X										
		F	18–80	57.1–70.9 in (145–180 cm)	X				X	X	X	X	X	X	X										
		F	18–80	53.5–70.9 in (136–180 cm)		X			X	X	X	X	X	X	X										
		F	18–80	53.5–67.7 in (136–172 cm)			X		X	X	X	X	X	X	X										
ECCS/ERS (Quanjer 1993)	EC	M	18–70	61– 76.8 in (155–195 cm)	X				X	X	X			X	X	X	X	X							X
		F	18–70	57.1–70.9 in (145–180 cm)	X				X	X	X			X	X	X	X	X							X
Wang (1993)	Wg	M	6–18	43.3–74.8 in (110–190 cm)	X				X	X	X			X											
		M	6–18	47.2–74.8 in (120–190 cm)		X			X	X	X			X											
		F	6–18	43.3–70.9 in (110–180 cm)	X				X	X	X			X											
		F	6–18	47.2–70.9 in (120–180 cm)		X			X	X	X			X											
Quanjer (1995)	Qu	M	6–18	43.3–80.7 in (110–205 cm)	X				X	X	X														
		F	6–18	43.3–72.8 in (110–185 cm)	X				X	X	X														
Zapletal (1987)	Za	M	6–18	42.1–71.7 in (107–182 cm)	X				X	X	X			X	X	X	X	X	X	X					
		F	6–18	42.1–71.7 in (107–182 cm)	X				X	X	X			X	X	X	X	X	X	X					
Morris (1971/73)	Mo	M	20–90	58–80 in (147.3–203.2 cm)	X				X	X				X											
		M	20–79	58–80 in (147.3–203.2 cm)	X						X														
		F	20–90	56–72 in (142.2–182.9 cm)	X				X	X				X											
		F	20–79	56–72 in (142.2–182.9 cm)	X						X														
Cherniack (1972)	Ch	M	15–79	35–85 in (88.9–215.9 cm)	X				X	X				X	X	X	X	X	X						
		F	15–79	35–85 in (88.9–215.9 cm)	X				X	X				X	X	X	X	X	X						
Roberts (1991)	Ro	M	18–86	63.4–77.2 in (161–196 cm)	X				X	X	X				X		X								
		F	18–86	57.5–69.7 in (146–177 cm)	X				X	X	X				X		X								
Knudson (1983)	Kn	M	6–11	44–61 in (111.8–154.9 cm)	X				X	X	X			X			X	X							
		M	12–24	55–76 in (139.7–193 cm)	X				X	X	X			X			X	X							
		M	25 +	62–77 in (157.5–195.6 cm)	X				X	X				X			X	X							
		M	25–85	62–77 in (157.5–195.6 cm)	X						X														
		F	6–10	42–58 in (106.7–147.3 cm)	X				X	X	X			X			X	X							
		F	11–19	52–72 in (132.1–182.9 cm)	X				X	X	X			X			X	X							
		F	20–69	58–71 in (147.3–180.3 cm)	X				X	X				X			X	X							
		F	20–88	58–71 in (147.3–180.3 cm)	X						X														
		F	70 +	58–66 in (147.3–167.6 cm)	X				X	X				X			X	X							
Hsu (1979)	Hs	M	7–20	43.7–74.8 in (111–190 cm)	X				X	X	X			X	X										
		M	7–20	43.7–74.8 in (111–190 cm)		X			X	X	X			X	X										
		M	7–20	43.7–74.8 in (111–190 cm)			X		X	X	X			X	X										
		F	7–18	43.7–74.8 in (111–190 cm)	X				X	X	X			X	X										
		F	7–18	43.7–74.8 in (111–190 cm)		X			X	X	X			X	X										
		F	7–18	43.7–74.8 in (111–190 cm)			X		X	X	X			X	X										

Crapo (1981)	Cr	M	15–91	61.8–76.4 in (157–194 cm)	X			X	X	X		X						X	X					
		F	17–84	57.5–70.1 in (146–178 cm)	X			X	X	X		X						X	X					
Warwick (1977)	Wa	M	< 18	35.4–74 in (90–188 cm)	X			X	X	X			X		X	X							X	
		F	< 18	35.4–70.1 in (90–178 cm)	X			X	X	X			X		X	X							X	
Polgar (1971)	Po	M	4–17	43.3–67 in (110–170 cm)	X			X	X	X		X	X				X							
		F	4–17	43.3–67 in (110–170 cm)	X			X	X	X		X	X				X							

Shaded = LLN available

MORRIS (1971/1973)

Morris, James F., et. Al.: Spirometric Standards for Healthy Non-smoking Adults. American Review of Respiratory Disease 1971; vol 103(1): 57–67.

Morris, James F, et al.: Normal values for the ratio of one-second forced expiratory volume to forced vital capacity. American Review of Respiratory Disease 1973 Vol 108: 1000–1003.

MALE

20–90 years,
58–80 in. (147.3–203.2 cm)

FVC (L) = 0.148 * H[in] - 0.025 * A[yrs] - 4.241
FEV1 (L) = 0.092 * H[in] - 0.032 * A[yrs] - 1.26
FEF25–75% (L/sec) = 0.047 * H[in] - 0.045 * A[yrs] + 2.513

MALE, 20–79 years

FEV1/FVC (L/sec) = (-0.3118 * H[in] - 0.2422 * A[yrs] + 107.12)/100

FEMALE

20–90 years,
56–72 in. (142.2–182.9 cm)

FVC = 0.115 * H[in] - 0.024 * A[yrs] - 2.852
FEV1 = 0.089 * H[in] - 0.025 * A[yrs] - 1.932
FEF25–75% = 0.06 * H[in] - 0.03 * A[yrs] + 0.551

FEMALE, 20–79 years

FEV1/FVC (L/sec) = (-0.0679 * H[in] - 0.1815 * A[yrs] + 88.7)/100

CHERNIACK (1972)

Cherniack, RM and Raber, MB: Normal Standards for Ventilatory Function Using an Automatic Wedge Spirometer American Review of Respiratory Disease 1972; Vol 106(1), p38–46.

MALE

15–79 years,
35–85 in. (88.9–215.9 cm)

FVC (L) = 0.12102 * H[in] - 0.01357 * A[yrs] - 3.18373
FEV1 (L) = 0.09107 * H[in] - 0.0232 * A[yrs] - 1.50723
FEF25% (L/sec) = 0.0903 * H[in] - 0.01987 * A[yrs] + 2.72554
FEF50% (L/sec) = 0.06526 * H[in] - 0.03049 * A[yrs] + 2.40337
FEF75% (L/sec) = 0.03583 * H[in] - 0.04142 * A[yrs] + 1.98361
FEF25–75% (L/sec) = 0.05948 * H[in] - 0.037 * A[yrs] + 2.61187
PEFR = 0.14393 * H[in] - 0.02403 * A[yrs] + 0.22544
MVV = 3.02915 * H[in] - 0.81621 * A[yrs] - 37.94893

FEMALE

15–79 years,
35–85 in. (88.9–215.9 cm)

FVC (L) = 0.07833 * H[in] - 0.01539 * A[yrs] - 1.04912
FEV1 (L) = 0.06029 * H[in] - 0.01936 * A[yrs] - 0.18693
FEF25% (L/sec) = 0.06876 * H[in] - 0.01926 * A[yrs] + 2.14653
FEF50% (L/sec) = 0.0622 * H[in] - 0.02344 * A[yrs] + 1.4264
FEF75% (L/sec) = 0.02334 * H[in] - 0.0345 * A[yrs] + 2.21596
FEF25–75% (L/sec) = 0.04931 * H[in] - 0.0312 * A[yrs] + 2.2561
PEFR = 0.0913 * H[in] - 0.01776 * A[yrs] + 1.1316
MVV = 2.13844 * H[in] - 0.68503 * A[yrs] - 4.86957

ROBERTS (1991)

Roberts, Michael C. et. al: Reference values and prediction equations for normal lung function in non-smoking white

urban population. Thorax 1991; 46: 643–650	
MALE 18–86 years, 63.4–77.2 in. (161–196 cm)	FVC (L) = 0.06628 * H[cm] - 0.028 * A[yrs] - 5.377 FEV1 (L) = 0.03961 * H[cm] - 0.033 * A[yrs] - 1.558 FEV1/FVC = (-0.21476 * H[cm] - 0.242 * A[yrs] + 126.252)/100 PEFR = 0.05317 * H[cm] - 0.062 * A[yrs] + 3.884 FEF50% (L/sec) = -0.044 * A[yrs] + 6.456
FEMALE 18–86 years, 57.5–69.7 in. (146–177 cm)	FVC (L) = 0.04321 * H[cm] - 0.023 * A[yrs] - 2.379 FEV1 (L) = 0.03321 * H[cm] - 0.025 * A[yrs] - 1.394 FEV1/FVC = (-0.172 * A[yrs] + 88.134)/100 PEFR = 0.04087 * H[cm] - 0.05 * A[yrs] + 2.945 FEF50% (L/sec) = -0.038 * A[yrs] + 5.556
KNUDSON (1983) Knudson, Ronald J., et. al: Change in the Normal Maximum Expiratory Flow-Volume Curve with Growth and Aging. American Review of Respiratory Disease 1983; 127(5–6): 725–734.	
MALE 6–11 years, 44–61 in. (111.8–154.9 cm)	FVC (L) = 0.0409 * H[cm] - 3.3756 FEV1 (L) = 0.0348 * H[cm] - 2.8142 FEF50% (L/sec) = 0.0378 * H[cm] - 2.5454 FEF75% (L/sec) = 0.0171 * H[cm] - 1.0149 FEF25–75% (L/sec) = 0.0338 * H[cm] - 2.3197 FEV1/FVC = 100.4389 – 0.0813 * H[cm]
MALE 12–24 years, 55–76 in. (139.7–193.0 cm)	FVC (L) = 0.059 * H[cm] + 0.0739 * A[yrs] - 6.8865 FEV1 (L) = 0.0519 * H[cm] + 0.0636 * A[yrs] - 6.1181 FEF50% (L/sec) = 0.0543 * H[cm] + 0.115 * A[yrs]-6.3851 FEF75% (L/sec) = 0.0397 * H[cm] - 0.0057 * A[yrs] - 4.2421 FEF25–75% L/sec) = 0.0539 * H[cm] + 0.0749 * A[yrs] - 6.199 FEV1/FVC = 100.4389 – 0.0813 * H[cm]
MALE 25+ years, 62–77 in. (157.5–195.6 cm)	FVC (L) = 0.0844 * H[cm] - 0.0298 * A[yrs] - 8.7818 FEV1 (L) = 0.0665 * H[cm] - 0.0292 * A[yrs] - 6.5147 FEF50% (L/sec) = 0.0684 * H[cm] - 0.0366 * A[yrs] - 5.5409 FEF75% (L/sec) = 0.031 * H[cm] - 0.023 * A[yrs] - 2.4827 FEF25–75% (L/sec) = 0.0579 * H[cm] - 0.0363 * A[yrs] - 4.5175 **MALE ≥ 25 and < 85 years** FEV1/FVC = 86.6862 – 0.105 * A[yrs]
FEMALE 6–10 years, 42–58 in. (106.7–147.3 cm)	FVC (L) = 0.043 * H[cm] - 3.7486 FEV1 (L) = 0.0336 * H[cm] - 2.7578 FEF50% (L/sec) = 0.1846 * A[yrs] + 0.7362 FEF75% (L/sec) = 0.0109 * H[cm] - 0.1657 FEF25–75% (L/sec) = 0.022 * H[cm] - 0.8119 FEV1/FVC = 109.9739 – 0.1909 * H[cm] + 0.6655 * A[yrs]
FEMALE 11–19 years, 52–72 in. (132.1–182.9 cm)	FVC (L) = 0.0416 * H[cm] + 0.0699 * A[yrs] - 4.447 FEV1 (L) = 0.0351 * H[cm] + 0.0694 * A[yrs] - 3.7622 FEF50% (L/sec) = 0.0288 * H[cm] + 0.1111 * A[yrs] - 2.304 FEF75% (L/sec) = 0.0243 * H[cm] + 0.2923 * A[yrs] - 4.4009 - 0.0075 * A[yrs]^2 FEF25–75% (L/sec) = 0.0279 * H[cm] + 0.1275 * A[yrs] - 2.8007 FEV1/FVC = 109.9739 – 0.1909 * H[cm] + 0.6655 * A[yrs]
FEMALE 20–69 years, 58–71 in. (147.3–180.3 cm)	FVC (L) = 0.0444 * H[cm] - 0.0169 * A[yrs] - 3.1947 FEV1 (L) = 0.0332 * H[cm] - 0.019 * A[yrs] - 1.821 FEF50% (L/sec) = 0.0321 * H[cm] - 0.024 * A[yrs] - 0.4371

	FEF75% (L/sec) = 0.0174 * H[cm] - 0.0254 * A[yrs] - 0.1822 FEF25–75% (L/sec) = 0.03 * H[cm] - 0.0309 * A[yrs] - 0.4057 **FEMALE ≥ 20 and < 88 years** FEV1/FVC = 121.6777 – 0.1852 * H[cm] – 0.1896 * A[yrs]
FEMALE 70+ years, 58–66 in. (147.3–167.6 cm)	FVC (L) = 0.0313 * H[cm] - 0.0296 * A[yrs] - 0.1889 FEV1 (L) = 0.0143 * H[cm] - 0.0397 * A[yrs] + 2.6539 FEF50% (L/sec) = 0.0118 * H[cm] - 0.0755 * A[yrs] + 6.2402 FEF75% (L/sec) = -0.0172 * A[yrs] + 1.8894 FEF25–75% (L/sec) = -0.0615 * A[yrs] + 6.3706

HSU (1979)

Hsu, Katharine, et. al.: Ventilatory Functions of Normal Children and Young Adults – Mexican American, White and Black. J Pediatr 1979; 95: 14–23.

To determine the Predicted FEV1/FVC value for this predicted set QRS software uses:
Pred FEV1/Pred FVC

MALE, White 7–20 years, 43.7–74.8 in. (111–190 cm)	FVC [L] = (0.000358 * H[cm]$^{3.18}$)/1000 FEV1 [L] = (0.000774 * H[cm]^{3})/1000 PEFR [L/min] = 0.000335 * H[cm]$^{2.79}$ FEF25–75% [L/min] = 0.000798 * H[cm]$^{2.46}$
MALE, Black 7–20 years, 43.7–74.8 in. (111–190 cm)	FVC [L] = (0.00107 * H[cm]$^{2.93}$)/1000 FEV1 [L] = (0.00103 * H[cm]$^{2.92}$)/1000 PEFR [L/min] = 0.000174 * H[cm]$^{2.92}$ FEF25–75% [L/min] = 0.000361 * H[cm]$^{2.60}$
MALE, Mexican-American 7–20 years, 43.7–74.8 in. (111–190 cm)	FVC [L] = (0.00106 * H[cm]$^{2.97}$)/1000 FEV1 [L] = (0.00173 * H[cm]$^{2.85}$)/1000 PEFR [L/min] = 0.000769 * H[cm]$^{2.63}$ FEF25–75% [L/min] = 0.000913 * H[cm]$^{2.45}$
FEMALE, White 7–18 years, 43.7–74.8 in. (111–190 cm)	FVC [L] = (0.00257 * H[cm]$^{2.78}$)/1000 FEV1 [L] = (0.00379 * H[cm]$^{2.68}$)/1000 PEFR [L/min] = 0.00258 * H[cm]$^{2.37}$ FEF25–75% [L/min] = 0.00379 * H[cm]$^{2.16}$
FEMALE, Black 7–18 years, 43.7–74.8 in. (111–190 cm)	FVC [L] = (0.000834 * H[cm]$^{2.98}$)/1000 FEV1 [L] = (0.00114 * H[cm]$^{2.89}$)/1000 PEFR [L/min] = 0.000551 * H[cm]$^{2.68}$ FEF25–75% [L/min] = 0.00145 * H[cm]$^{2.34}$
FEMALE, Mexican-American 7–18 years, 43.7–74.8 in. (111–190 cm)	FVC [L] = (0.00125 * H[cm]$^{2.92}$)/1000 FEV1 [L] = (0.00161 * H[cm]$^{2.85}$)/1000 PEFR [L/min] = 0.000697 * H[cm]$^{2.64}$ FEF25–75% [L/min] = 0.00120 * H[cm]$^{2.40}$

CRAPO (1981)

Crapo, et. al: Reference Spirometric Values using Techniques and Equipment that Meet ATS Recommendations. American Review of Respiratory Disease 1981; 123: 659–664.

MALE 15–91 years, 61.8–76.4 in. (157–194 cm)	FVC (L) = 0.06 * H[cm] - 0.0214 * A[yrs] - 4.65 FEV05 (L) = 0.0327 * H[cm] - 0.0152 * A[yrs] - 1.914 FEV1 (L) = 0.0414 * H[cm] - 0.0244 * A[yrs] - 2.19 FEV3 (L) = 0.0535 * H[cm] - 0.0271 * A[yrs] - 3.512 FEF25–75% (L/sec) = 0.0204 * H[cm] - 0.038 * A[yrs] + 2.133

	FEV1/FVC = (-0.13 * H[cm] - 0.152 * A[yrs] + 110.49)/100 FEV3/FVC = (-0.0627 * H[cm] - 0.145 * A[yrs] + 112.09)/100
FEMALE 17–84 years, 57.5–70.1 in. (146–178 cm)	FVC (L) = 0.0491 * H[cm] - 0.0216 * A[yrs] - 3.59 FEV05 (L) = 0.0238 * H[cm] - 0.0185 * A[yrs] - 0.809 FEV1 (L) = 0.0342 * H[cm] - 0.0255 * A[yrs] - 1.578 FEV3 (L) = 0.0442 * H[cm] - 0.0257 * A[yrs] - 2.745 FEF25–75% = 0.0154 * H[cm] - 0.046 * A[yrs] + 2.683 FEV1/FVC = (-0.202 * H[cm] - 0.252 * A[yrs] + 126.58)/100 FEV3/FVC = (-0.0937 * H[cm] - 0.163 * A[yrs] + 118.16)/100

WARWICK (1977/80)

Warwick, WJ: Pulmonary Function in Healthy Minnesota Children. Minnesota Medicine 1977; Supplement 60: 435–440.
Warwick, WJ: Pulmonary Function in Healthy Minnesota Children. Minnesota Medicine March 1980; 191–195.

MALE < 18 YEARS, 35.4–74 in. (90–188 cm)	LnFVC (L) = 3.0131 * ln(H[cm]) - 14.0535 LnFEV1 (L) = 2.7572 * ln(H[cm]) - 12.9007 LnFEV1/FVC = -0.2679 * ln(H[cm]) + 1.2137 LnFEF50% (L/sec) = 2.1326 * ln(H[cm]) - 9.3589 LnFEF75% (L/sec) = 2.1534 * ln(H[cm]) - 10.2213 LnPEFR (L/sec)= 2.4991 * ln(H[cm]) - 10.7785 LnFET (s) = 1.6208 * ln(H[cm]) – 7.2327
FEMALE < 18 YEARS, 35.4–70.1 in. (90–178 cm)	LnFVC (L) = 2.9446 * ln(H[cm]) - 13.8007 LnFEV1 (L) = 2.7522 * ln(H[cm]) - 12.921 LnFEV1/FVC = -0.2126 * ln(H[cm]) + 0.9719 LnFEF50% (L/sec) = 2.1958 * ln(H[cm]) - 9.6458 LnFEF75% (L/sec) = 2.2961 * ln(H[cm]) - 10.8666 LnPEFR (L/sec) = 2.4369 * ln(H[cm]) - 10.535 LnFET (s) = 1.2423 * ln(H[cm] – 5.3288

POLGAR (1971)

Polgar and Promadhat: Pulmonary Function Testing in Children: Techniques and Standards 1971.

To determine the Predicted FEV1/FVC value for this predicted set QRS software uses:
Pred FEV1/Pred FVC

MALE 4–17 years, 43.3–67 in. (110–170 cm)	FVC (L) = 0.0000044 * $H[cm]^{2.67}$ FEV1 (L) = 0.0000021 * $H[cm]^{2.8}$ FEF25–75% (L/min) = -207.70 + 2.621 * H[cm] PEFR (L/min)= -425.5714 + 5.2428 * H[cm] MVV = 1.276 * H[cm] - 99.507
FEMALE 4–17 years, 43.3–67 in. (110–170 cm)	FVC (L) = 0.0000033 * $H[cm]^{2.72}$ FEV1 (L) = 0.0000021 * $H[cm]^{2.8}$ FEF25–75% (L/min) = -207.70 + 2.621 * H[cm] PEFR (L/min)= -425.5714 + 5.2428 * H[cm] MVV = 1.276 * H[cm] - 99.507

ECCS/ERS (Quanjer 1993)

Quanjer, Ph.H, et. al: Lung Volumes and Ventilatory Flows: Official Statement of the European Respiratory Society. European Respiratory Journal 1992–1993; Supplement 15–16: 5–40.

MALE 18–70 years, 61–76.8 in. (155–195 cm)	FVC (L) = 0.0576 * H[cm] – 0.026*A[yrs] – 4.34 FEV1 (L) = 0.0430*H[cm] – 0.029*A[yrs] – 2.49 FEV1/FVC = (-0.180*A[yrs] + 87.21)/100 FEF25% (L/sec) = 0.0546 * H[cm] – 0.029 * A[yrs] – 0.47 FEF50% (L/sec) = 0.0379*H[cm] – 0.031 * A[yrs] – 0.35

For subjects aged 18–25 years the predicted mean is the same as for subjects 25 year.	FEF75% (L/sec) = 0.0261 * H[cm] – 0.026 * A[yrs] – 1.34 FEF25–75% (L/sec) = 0.0194 * H[cm] – 0.043 * A[yrs] + 2.7 PEFR (L/sec) = .0614 * H[cm] – 0.043 * A[yrs] + 0.15 FIVC = 0.0610 * H[cm] – 0.028 * A[yrs] – 4.65
FEMALE 18–70 years, 57.1–70.9 in. (145–180 cm) For subjects aged 18–25 years the predicted mean is the same as for subjects 25 year.	FVC (L) = 0.0443 * H[cm] – 0.026*A[yrs] – 2.89 FEV1 (L) = 0.0395*H[cm] – 0.025*A[yrs] – 2.6 FEV1/FVC = (-0.190*A[yrs] + 89.1)/100 FEF25% (L/sec) = 0.0322 * H[cm] – 0.025 * A[yrs] + 1.6 FEF50% (L/sec) = 0.0245 * H[cm] – 0.025 * A[yrs] +1.16 FEF75% (L/sec) = 0.0105 * H[cm] – 0.025 * A[yrs] +1.11 FEF25–75% (L/sec) = 0.0125 * H[cm] – 0.034 * A[yrs] + 2.92 PEFR (L/sec) = .0550 * H[cm] – 0.030 * A[yrs] -1.11 FIVC = 0.0466 * H[cm] – 0.026 * A[yrs] – 3.28
NHANES III (1999) Hankinson, John L., Odencrantz, John R., Fedan, Kathleen B.. Spirometric Reference Values from a Sample of the General U.S. Population. Am J Respir Crit Care Med 1999; Vol 159: 179–187.	
MALE Caucasian 8–19 years, 48.0–75.6 in. (122–192 cm)	FVC (L) = -0.2584 - 0.20415 * A[yrs] + 0.010133 * A[yrs]^2 + 0.00018642 * H[cm]^2 FEV1 (L) = -0.7453 - 0.04106 * A[yrs] + 0.004477 * A[yrs]^2 + 0.00014098 * H[cm]^2 FEV1/FVC = (88.066 - 0.2066 * A[yrs])/100 FEV6 (L) = -0.3119 - 0.18612 * A[yrs] + 0.009717 * A[yrs]^2 + 0.00018188 * H[cm]^2 FEV1/FEV6 = (87.34 - 0.1382 * A[yrs])/100 FEF25–75% (L/Sec) = - 1.0863 + 0.13939 * A[yrs] + 0.00010345 * H[cm]^2 PEF (L/Sec) = -0.5962 - 0.12357 * A[yrs] + 0.013135 * A[yrs]^2 + 0.00024962 * H[cm]^2
MALE Caucasian 20–80 years, 62.2–76.4 in. (158–194 cm)	FVC (L) = -0.1933 + 0.00064 * A[yrs] - 0.000269 * A[yrs]^2 + 0.00018642 * H[cm]^2 FEV1 (L) = 0.5536 - 0.01303 * A[yrs] - 0.000172 * A[yrs]^2 + 0.00014098 * H[cm]^2 FEV1/FVC = (88.066 - 0.2066 * A[yrs])/100 FEV6 (L) = 0.1102 - 0.00842 * A[yrs] - 0.000223 * A[yrs]^2 + 0.00018188 * H[cm]^2 FEV1/FEV6 = (87.34 - 0.1382 * A[yrs])/100 FEF25–75% (L/Sec) = 2.7006 – 0.04995 * A[yrs] + 0.00010345 * H[cm]^2 PEF (L/Sec) = 1.0523 + 0.08272 * A[yrs] - 0.001301 * A[yrs]^2 + 0.00024962 * H[cm]^2
FEMALE Caucasian 8–17 years, 46.5–70.1 in. (118–178 cm)	FVC (L) = -1.2082 + 0.05916 * A[yrs] + 0.00014815 * H[cm]^2 FEV1 (L) = -0.8710 + 0.06537 * A[yrs] + 0.00011496 * H[cm]^2 FEV1/FVC = (90.809 - 0.2125 * A[yrs])/100 FEV6 (L) = -1.1925 + 0.06544 * A[yrs] + 0.00014395 * H[cm]^2 FEV1/FEV6 = (90.107 - 0.1563 * A[yrs])/100 FEF25–75% (L/Sec) = -2.5284 + 0.5249 * A[yrs] - 0.015309 * A[yrs]^2 + 0.00006982 * H[cm]^2 PEF (L/Sec) = -3.6181 + 0.60644 * A[yrs] - 0.016846 * A[yrs]^2 + 0.00018623 * H[cm]^2
FEMALE Caucasian 18–80 years, 57.1–70.9 in. (145–180 cm)	FVC (L) = -0.356 + 0.0187 * A[yrs] - 0.000382 * A[yrs]^2 + 0.00014815 * H[cm]^2 FEV1 (L) = 0.4333 - 0.00361 * A[yrs] - 0.000194 * A[yrs]^2 + 0.00011496 * H[cm]^2 FEV1/FVC = (90.809 - 0.2125 * A[yrs])/100 FEV6 (L) = -0.1373 + 0.01317 * A[yrs] - 0.000352 * A[yrs]^2 + 0.00014395 * H[cm]^2 FEV1/FEV6 = (90.107 - 0.1563 * A[yrs])/100 FEF25–75% (L/Sec) = 2.367 - 0.01904 * A[yrs] - 0.0002 * A[yrs]^2 + 0.00006982 *

	$H[cm]^2$ PEF (L/Sec) = 0.9267 + 0.06929 * A[yrs] - 0.001031 * $A[yrs]^2$ + 0.00018623 * $H[cm]^2$
MALE, Black (African-American) 8–19 years, 48.0–76.4 in. (122–194 cm)	FVC (L) = -0.4971 - 0.15497 * A[yrs] + 0.007701 * $A[yrs]^2$ + 0.00016643 * $H[cm]^2$ FEV1 (L) = -0.7048 - 0.05711 * A[yrs] + 0.004316 * $A[yrs]^2$ + 0.00013194 * $H[cm]^2$ FEV1/FVC = (89.239 - 0.1828 * A[yrs])/100 FEV6 (L) = -0.5525 - 0.14107 * A[yrs] + 0.007241 * $A[yrs]^2$ + 0.00016429 * $H[cm]^2$ FEV1/FEV6 = (88.841 - 0.1305 * A[yrs])/100 FEF25–75% (L/Sec) = -1.1627 + 0.12314 * A[yrs] + 0.00010461 * $H[cm]^2$ PEF (L/Sec) = -0.2684 - 0.28016 * A[yrs] + 0.018202 * $A[yrs]^2$ + 0.00027333 * $H[cm]^2$
MALE, Black (African-American) 20–80 years, 62.2–77.2 in. (158–196 cm)	FVC (L) = -0.1517 - 0.01821 * A[yrs] + 0.00016643 * $H[cm]^2$ FEV1 (L) = 0.3411 - 0.02309 * A[yrs] + 0.00013194 * $H[cm]^2$ FEV1/FVC = (89.239 - 0.1828 * A[yrs])/100 FEV6 (L) = -0.0547 - 0.02114 * A[yrs] + 0.00016429 * $H[cm]^2$ FEV1/FEV6 = (88.841 - 0.1305 * A[yrs])/100 FEF25–75% (L/Sec) = 2.1477 - 0.04238 * A[yrs] + 0.00010461 * $H[cm]^2$ PEF (L/Sec) = 2.2257 - 0.04082 * A[yrs] + 0.00027333 * $H[cm]^2$
FEMALE, Black (African-American) 8–17 years, 46.5–72.4 in. (118–184 cm)	FVC (L) = -0.6166 - 0.04687 * A[yrs] + 0.003602 * $A[yrs]^2$ + 0.00013606 * $H[cm]^2$ FEV1 (L) = -0.963 + 0.05799 * A[yrs] + 0.00010846 * $H[cm]^2$ FEV1/FVC = (91.655 - 0.2039 * A[yrs])/100 FEV6 (L) = -0.637 - 0.04243 * A[yrs] + 0.003508 * $A[yrs]^2$ + 0.00013497 * $H[cm]^2$ FEV1/FEV6 = (91.229 - 0.1558 * A[yrs])/100 FEF25–75% (L/Sec) = -2.5379 + 0.43755 * A[yrs] - 0.012154 * $A[yrs]^2$ + 0.00008572 * $H[cm]^2$ PEF (L/Sec) = -1.2398 + 0.16375 * A[yrs] + 0.00019746 * $H[cm]^2$
FEMALE, Black (African-American) 18–80 years, 53.5–70.9 in. (136–180 cm)	FVC (L) = -0.3039 + 0.00536 * A[yrs] - 0.000265 * $A[yrs]^2$ + 0.00013606 * $H[cm]^2$ FEV1 (L) = 0.3433 - 0.01283 * A[yrs] - 0.000097 * $A[yrs]^2$ + 0.00010846 * $H[cm]^2$ FEV1/FVC = (91.655 - 0.2039 * A[yrs])/100 FEV6 (L) = -0.1981 + 0.00047 * A[yrs] - 0.00023 * $A[yrs]^2$ + 0.00013497 * $H[cm]^2$ FEV1/FEV6 = (91.229 – 0.1558 * A[yrs])/100 FEF25–75% (L/Sec) = 2.0828 - 0.03793 * A[yrs] + 0.00008572 * $H[cm]^2$ PEF (L/Sec) = 1.3597 + 0.03458 * A[yrs] - 0.000847 * $A[yrs]^2$ + 0.00019746 * $H[cm]^2$
MALE, Hispanic (Mexican-American) 8–19 years, 47.2–70.9 in. (120–180 cm)	FVC (L) = -0.7571 - 0.0952 * A[yrs] + 0.006619 * $A[yrs]^2$ + 0.00017823 * $H[cm]^2$ FEV1 (L) = -0.8218 - 0.04248 * A[yrs] + 0.004291 * $A[yrs]^2$ + 0.00015104 * $H[cm]^2$ FEV1/FVC = (90.024 - 0.2186 * A[yrs])/100 FEV6 (L) = -0.6646 - 0.1127 * A[yrs] + 0.007306 * $A[yrs]^2$ + 0.0001784 * $H[cm]^2$ FEV1/FEV6 = (89.388 - 0.1534 * A[yrs])/100 FEF25–75% (L/Sec) = -1.3592 + 0.10529 * A[yrs] + 0.00014473 * $H[cm]^2$ PEF (L/Sec) = -0.9537 - 0.19602 * A[yrs] + 0.014497 * $A[yrs]^2$ + 0.00030243 * $H[cm]^2$
MALE, Hispanic (Mexican-American) 20–80 years, 61.4–75.6 in. (156–192 cm)	FVC (L) = 0.2376 - 0.00891 * A[yrs] - 0.000182 * $A[yrs]^2$ + 0.00017823 * $H[cm]^2$ FEV1 (L) = 0.6306 - 0.02928 * A[yrs] + 0.00015104 * $H[cm]^2$ FEV1/FVC = (90.024 - 0.2186 * A[yrs])/100 FEV6 (L) = 0.5757 - 0.0286 * A[yrs] + 0.0001784 * $H[cm]^2$ FEV1/FEV6 = (89.388 - 0.1534 * A[yrs])/100

	FEF25–75% (L/Sec) = 1.7503 - 0.05018 * A[yrs] + 0.00014473 * $H[cm]^2$ PEF (L/Sec) = 0.087 + 0.0658 * A[yrs] - 0.001195 * $A[yrs]^2$ + 0.00030243 * $H[cm]^2$
FEMALE, Hispanic (Mexican-American) 8–17 years, 44.9–67.7 in. (114–172 cm)	FVC (L) = -1.2507 + 0.07501 * A[yrs] + 0.00014246 * $H[cm]^2$ FEV1 (L) = -0.9641 + 0.0649 * A[yrs] + 0.00012154 * $H[cm]^2$ FEV1/FVC = (92.360 - 0.2248 * A[yrs])/100 FEV6 (L) = -1.241 + 0.07625 * A[yrs] + 0.00014106 * $H[cm]^2$ FEV1/FEV6 = (91.644 - 0.1670 * A[yrs])/100 FEF25–75% (L/Sec) = -2.1825 + 0.42451 * A[yrs] - 0.012415 * $A[yrs]^2$ + 0.0000961 * $H[cm]^2$ PEF (L/Sec) = -3.2549 + 0.47495 * A[yrs] - 0.013193 * $A[yrs]^2$ + 0.00022203 * $H[cm]^2$
FEMALE, Hispanic (Mexican-American) 18–80 years, 53.5–67.7 in. (136–172 cm)	FVC (L) = 0.121 + 0.00307 * A[yrs] - 0.000237 * $A[yrs]^2$ + 0.00014246 * $H[cm]^2$ FEV1 (L) = 0.4529 - 0.01178 * A[yrs] - 0.000113 * $A[yrs]^2$ + 0.00012154 * $H[cm]^2$ FEV1/FVC = (92.36 - 0.2248 * A[yrs])/100 FEV6 (L) = 0.2033 + 0.0002 * A[yrs] - 0.000232 * $A[yrs]^2$ + 0.00014106 * $H[cm]^2$ FEV1/FEV6 = (91.664 - 0.167 * A[yrs])/100 FEF25–75% (L/Sec) = 1.7456 - 0.01195 * A[yrs] - 0.000291 * $A[yrs]^2$ + 0.0000961 * $H[cm]^2$ PEF (L/Sec) = 0.2401 + 0.06174 * A[yrs] - 0.001023 * $A[yrs]^2$ + 0.00022203 * $H[cm]^2$
ZAPLETAL (1987) Zapletal, A.: Lung Function in Children and Adolescents. Methods, Reference Values. Progress in Respiration Research Vol 22 (1987)	
MALE 6–18 years, 42.1–71.7 in. (107–182 cm)	FVC (L) = $10^{(-2.9236 + 2.936 * \log(H[cm]))}$ / 1000 FEV1 (L) = $10^{(-2.8652 + 2.8729 * \log(H[cm]))}$ / 1000 FEV1/FVC = (90.6043 - 0.04104 * H[cm])/100 FEF25% (L/Sec) = $10^{(-4.0164 + 2.1541 * \log(H[cm]))}$ FEF50% (L/Sec) = $10^{(-4.2168 + 2.1771 * \log(H[cm]))}$ FEF75% (L/Sec) = $10^{(-4.5808 + 2.2116 * \log(H[cm]))}$ FEF25–75% (L/Sec) = $10^{(-4.6651 + 2.3588 * \log(H[cm]))}$ PEFR (L/Sec) = $10^{(-4.3722 + 2.3422 * \log(H[cm]))}$ SVC (L) = $10^{(-2.5768 + 2.7799 * \log(H[cm]))}$ / 1000 MVV (L/Min) = $10^{(-1.9178 + 3.0388 * \log(H[cm]))}$ / 1000
FEMALE 6–18 years, 42.1–71.7 in. (107–182 cm)	FVC (L) = $10^{(-2.704 + 2.8181 * \log(H[cm]))}$ / 1000 FEV1 (L) = $10^{(-2.6056 + 2.7413 * \log(H[cm]))}$ / 1000 FEV1/FVC = (90.6043 - 0.04104 * H[cm])/100 FEF25% (L/Sec) = $10^{(-4.0164 + 2.1541 * \log(H[cm]))}$ FEF50% (L/Sec) = $10^{(-4.2168 + 2.1771 * \log(H[cm]))}$ FEF75% (L/Sec) = $10^{(-4.5808 + 2.2116 * \log(H[cm]))}$ FEF25–75% (L/Sec) = $10^{(-4.6651 + 2.3588 * \log(H[cm]))}$ PEFR (L/Sec) = $10^{(-4.3722 + 2.3422 * \log(H[cm]))}$ SVC (L) = $10^{(-2.297 + 2.6361 * \log(H[cm]))}$ / 1000 MVV (L/Min) = $10^{(-1.9178 + 3.0388 * \log(H[cm]))}$ / 1000
QUANJER (1995) Quanjer, PhH, et. al.: Spirometric Values for White European Children and Adolescents: Polgar Revisited, Pediatric Pulmonology 1995, 19: 135–142.	
MALE 6–18 years,	LnFVC [l] = -1.2782 + [1.3731 + 0.0164 * A[yrs]] * H[m] LnFEV1 [l] = -1.2933 + [1.2669 + 0.0174 * A[yrs]] * H[m]

43.3–80.7 in. (110–205 cm)	FEV1/FVC = 86.2
FEMALE 6–18 years, 43.3–72.8 in. (110–185 cm)	LnFVC [l] = -1.4507 + [1.4800 + 0.0127 * A[yrs]] * H[m] LnFEV1 [l] = -1.5974 + [1.5016 + 0.0119 * A[yrs]] * H[m] FEV1/FVC = 88.9
WANG (1993) Wang, Xiaobin, et.al,: Pulmonary Function Between 6 and 18 Years of Age. Pediatric Pulmonology 1993; 15: 75–88.	
MALE, White 6–18 years, 43.3–74.8 in. (110–190 cm)	LnFVC(L) = α + β*lnHt[m] LnFEV1(L) = α + β*lnHt[m] LnFEV1/FVC(L) = α + β*lnHt[m] LnFEF25–75%(L/s) = α + β*lnHt[m]
MALE, Black 6–18 years, 47.2–74.8 in. (120–190 cm)	Refer to the Wang look-up tables for α and β.
FEMALE, White 6–18 years, 43.3–70.9 in. (110–180 cm)	
FEMALE, Black 6–18 years, 47.2–70.9 in. (120–180 cm)	

Wang look-up tables:

MALE, White, 6–18 years

Age [years]	FVC		FEV1		FEV1/FVC		FEF25–75%	
	α	β	α	β	α	β	α	β
6	-0.024	2.470	-0.109	2.252	-0.078	-0.248	-	-
7	-0.018	2.489	-0.104	2.270	-0.086	-0.220	-	-
8	0.005	2.443	-0.089	2.257	-0.091	-0.199	0.264	1.505
9	0.017	2.426	-0.063	2.197	-0.086	-0.206	0.308	1.443
10	0.030	2.407	-0.057	2.212	-0.081	-0.209	0.290	1.557
11	0.009	2.468	-0.093	2.324	-0.101	-0.147	0.242	1.738
12	-0.061	2.649	-0.161	2.512	-0.101	-0.133	0.165	1.982
13	-0.175	2.924	-0.292	2.843	-0.116	-0.085	0.007	2.396
14	-0.219	3.060	-0.329	2.983	-0.106	-0.087	0.014	2.483
15	-0.079	2.859	-0.141	2.709	-0.060	-0.155	0.241	2.163
16	0.104	2.591	0.062	2.409	-0.045	-0.178	0.503	1.764
17	0.253	2.374	0.262	2.099	0.008	-0.272	0.762	1.368
18	0.296	2.316	0.251	2.129	-0.054	-0.170	0.678	1.528