



**GROWTH-AND-OBESITY PROFILES OF CHILDREN OF
KARACHI USING BOX-INTERPOLATION METHOD:
CALCULATIONS OF M. FAMILY**

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Additional File 2



Table 1. Parents' ages, heights and masses (weights)

	<i>Father</i> (valid if A > 21 years)	<i>Mother</i> (valid if A > 19 years)
Date of Birth (YYYY-MM-DD)	1970-01-13	1973-11-04
Date of Birth (decimal years)	1970.03561643835	1973.84383561643
Date of Checkup (YYYY-MM-DD)	2009-02-05	2009-02-05
Date of Checkup (decimal years)	2009.09863013698	2009.09863013698
Age (YY-MM-DD)	39-00-22	35-03-01
Age, A (decimal years)	39.06301369863	35.25479178082
Height, <i>h</i> (cm)	169.3	154.9
Height (ft-in) [§]	5 ft 6.65354330708 in	5 ft 0.9842519685 in
Gross Mass (kg)	71.4	50.7
Dress Code [¶]	2/2 [#]	3/3 [@]
Clothing Correction (kg)	0.4	0.5
Net Mass, μ (kg)	71.0	50.2
Net Weight, W (lb-oz) = 2.205μ [‡]	156 lb 8.88 oz	110 lb 11.056 oz
Body-Mass Index, BMI (kg/m ²)	24.77105094	20.92188842

[§] h (in) = $\frac{h(cm)}{2.54}$; 1 ft = 12 in; ft stands for feet and in for inch(es); 1 kg = 2.205 lb; 1 lb = 16 oz

[¶]For explanation of dress code (undressing), see *Manual for Obtaining Anthropometric Measurements*, available at: http://www.ngds-ku.org/ngds_folder/M02.pdf

[#]Full-sleeved shirt, trousers

[@]Abaya (an outer garment worn by Muslim women)

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Table 2. Parents' height percentiles, optimal masses and mass percentiles²

	<i>Father</i> (valid if A > 21 year)	<i>Mother</i> (valid if A > 19 year)
$h_{<} (cm)$	167.50	154.75
$h (cm)$	169.3	154.9
$h_{>} (cm)$	172.00	159.00
$P(h)_{<}$	10	10
$P(h)$	16.0000000000	10.5294117646
$P(h)_{>}$	25	25
$\mu_{opt<} (kg)$	58.25	48.25
$\mu_{opt} (kg)$	60.2500000000	48.39117647056
$W_{opt} (lb-oz)$	132 lb 13.62 oz	106 lb 11.2407058812 oz
$\mu_{opt>} (kg)$	63.25	52.25
$\mu_{<} (kg)$	70.50	48.25
$\mu (kg)$	71.0	50.2
$\mu_{>} (kg)$	79.00	52.25
$P(\mu)_{<}$	50	10
$P(\mu)$	51.47058823525	17.3125
$P(\mu)_{>}$	75	25

²Growth parameters (height, mass, percentiles) in this calculation have been taken from CDC Growth Tables generated from Growth Charts. These tables appear in: Kamal SA, Jamil SS, A Method to Generate Growth-and-Obesity Profiles of Still-Growing Parents, *International Journal of Biology and Biotechnology* **9**: 233-255, 2012, full text: <http://www.ngds-ku.org/Papers/J30.pdf> (pp.246-3249). Since October 2014, Extended Growth Tables (5 decimal places) containing percentiles from 0.01th to 99.99th are used, which appear in:

http://www.ngds-ku.org/Papers/J34/Additional_File_3.pdf

Table 3. Parents' Obesity Profiles

	<i>Father</i> (valid if A > 21 year)	<i>Mother</i> (valid if A > 19 year)
$\Delta\mu$ (kg)* = $\mu - \mu_{opt}$	+10.75	+1.80882352944
ΔW (lb-oz)* = 2.205 $\Delta\mu$	+23 lb 11.26 oz	+3 lb 15.8152941185 oz
$100 \frac{ \Delta\mu }{\mu_{opt}} \%^{\circ}$	17.8423236514%	3.7379201362%*
<i>STATUS</i> (μ) [©]	OBESE	OBESE

Table 4. Adult-mid-parental (Target) heights and percentiles

<i>Adult-MP-Height Formula</i>	<i>Boy</i> = $\frac{M + F + 13}{2}$	<i>Girl</i> = $\frac{M + F - 13}{2}$
$h_{adult-MP<} (cm)$	167.50	154.75
$h_{adult-MP} (cm)$	168.60	155.60
$h_{adult-MP} (ft-in)$	5 ft 6.3779527559 in	5 ft 1.25984251968 in
$h_{adult-MP>} (cm)$	172.00	159.00
$P_{MP<}$	10	10
P_{MP}	13.6666666666	13.0000000000
$P_{MP>}$	25	25

COLOR CODES FOR STATUSES		<1%	Hue 085, Sat 255, Lum 064	Red 000, Green 128, Blue 000
		1-10%	Hue 042, Sat 255, Lum 128	Red 255, Green 255, Blue 000
		>10%	Hue 000, Sat 255, Lum 092	Red 184, Green 000, Blue 000

*Valid if the mother is **NOT PREGNANT**. In case of pregnancy, add estimated weight of fetus and re-determine difference of mass (weight)-for-height and status.

©Status (pertaining-to-mass)

$$STATUS(\mu) = 100 \frac{|\mu - \mu_{opt}|}{\mu_{opt}} = 100 \frac{|\Delta\mu|}{\mu_{opt}} = 100 \frac{|W - W_{opt}|}{W_{opt}}$$

Table 5. Children's ages, heights and weights

	<i>E. M.</i>	<i>L. M.</i>
Gender	Female	Female
Date of Birth (YYYY-MM-DD)	1999-12-05	2002-10-28
Date of Birth (<i>decimal years</i>)	1999.92876712328	2002.82465753424
Date of Checkup (YYYY-MM-DD)	2009-02-05	2009-02-05
Date of Checkup (<i>decimal years</i>)	2009.09863013698	2009.09863013698
Age (YY-MM-DD)	09-02-00	06-03-07
Age, <i>A</i> (<i>decimal years</i>)	9.1698630137	6.27397260274
Height, <i>h</i> (cm)	128.15	117.15
Height (<i>ft-in</i>)	4 ft 2.45275590551 in	3 ft 10.122047244 in
Gross Mass (kg)	18.9	17.2
Dress Code (Undressing) [¶]	1.5/2 (0/0.5) [§]	1.5/1.5 (0/0.5) [®]
Clothing Correction (kg)	0	0
Net Mass, μ (kg)	18.9	17.2
Net Weight, W (lb-oz) = 2.205μ [§]	41 lb 10.792 oz	37 lb 14.816 oz
Body-Mass Index, <i>BMI</i> (kg/m ²)	11.5086553156	12.5326774080

[¶]See relevant note on page 1

[§]T-shirt, long skirt (*Undressing*: to panties only, barefoot, all clothing above the waist removed; *Clothing Correction* was taken as zero as the child was weighed in near-nude state)

[®]T-shirt, skirt (*Undressing* and *Clothing Correction* as described above)

[§]See relevant note on page 1



Table 6. Height and mass percentiles (E. M.: Female)

$$h = 128.15 \text{ cm}$$

<i>Percentile</i>	10		25
<i>Age (years)</i>			
$A_{<} = 9.0$	125.50		129.00
$A = 9.1698630137$	126.1794520548	128.15	129.6794520548
$A_{>} = 9.5$	127.50		131.00

$$P(h) = 18.4452054793$$

$$\mu = 18.9 \text{ kg}$$

<i>Percentile</i>	—		3
<i>Age (years)</i>			
$A_{<} = 9.0$	—		21.50
$A = 9.1698630137$	—	18.9	21.8397260274
$A_{>} = 9.5$	—		22.50

$$P(\mu) < 3$$

Table 7. Optimal mass and estimated-adult height (E. M.: Female)

<i>Height Percentile</i>	10	18.4452054793	25
$\mu_{opt<}(kg)$ [$A_{<} = 9.0$ years]	23.50	24.62602739724	25.50
$\mu_{opt}(kg)$ [$A = 9.1698630137$ years]	23.8397260274	25.10920623004 25.10920623004	26.09452054795 [¥]
$W_{opt}(lb-oz)$		55 lb 5.85279579568 oz	
$\mu_{opt>}(kg)$ [$A_{>} = 9.5$ years]	24.50	26.0482876712	27.25
$h_{est-adult}(cm)$	154.75	157.14280821913	159.00
$h_{est-adult}(ft-in)$		5 ft 1.86724733036 in	
$\Delta\mu(kg) = \mu - \mu_{opt}$		-6.20920623004	
$\Delta W(lb-oz) = 2.205\Delta\mu$		-13 lb 11.0607957956 oz	
$100 \frac{ \Delta\mu }{\mu_{opt}} \%^{\textcircled{C}}$		24.7288033447%	
<i>STATUS</i> (μ) [Ⓒ]		WASTED	

Table 8. Estimated-adult mass/weight (E. M.: Female)

<i>Mass Percentile</i>	—	< 3	3
$\mu_{est-adult}(kg)$	—	< 45.25	45.25
$W_{est-adult}(lb-oz) =$ $2.205\mu_{est-adult}$		< 99 lb 12.42 oz	

[¥]The entries in blue font show alternate method of ‘constant-age route’, which could, also, be used to compute μ_{opt} as 25.10920623004 kg, with identical result 25.10920623004 kg as obtained from ‘constant-percentile route’.

[Ⓒ]See relevant note on page 3

Table 9. Computations of mid-parental height at current age (E. M.: Female)

MP-Height Percentile	10	13.0000000000	25
$h_{CA-MP} (cm) [A_{<} = 9.0 \text{ years}]$	125.50	126.2000000000	129.00
$h_{MP} (cm)$ [$A = 9.1698630137 \text{ years}$]	126.1794520548	126.8794520548 126.8794520548	129.6794520548 [¥]
$h_{CA-MP} (cm) [A_{>} = 9.5 \text{ years}]$	127.50	128.2000000000	131.00
$\Delta h (cm) = h - h_{CA-MP}$		+1.2705479452	
$\Delta h (in) = \frac{\Delta h (cm)}{2.54}$		+0.50021572645	
$100 \frac{ \Delta h }{h_{CA-MP}} \% ^{\text{³}}$		1.00138196108%	
$STATUS (h)^{\text{³}}$		(+)	

[¥]See relevant note on page 6

^³Status (pertaining-to-height)

$$STATUS(h) = 100 \frac{|h - h_{CA-MP}|}{h_{CA-MP}} = 100 \frac{|\Delta h|}{h_{CA-MP}}$$



Table 10. Height and mass percentiles (L. M.: Female)

$$h = 117.15 \text{ cm}$$

<i>Percentile</i>			
<i>Age (years)</i>	50		75
$A_{<} = 6.0$	114.50		118.00
$A = 6.27397260274$	116.14383561644	117.15	119.91780821918
$A_{>} = 6.5$	117.50		121.50

$$P(h) = 56.66515426475$$

$$\mu = 17.2 \text{ kg}$$

<i>Percentile</i>			
<i>Age (years)</i>	05		10
$A_{<} = 6.0$	16.50		17.00
$A = 6.27397260274$	16.91095890411	17.2	17.68493150685
$A_{>} = 6.5$	17.25		18.25

$$P(\mu) = 6.86725663715$$

Table 11. Optimal mass and estimated-adult height (L. M.: Female)

<i>Height Percentile</i>	50	56.66515426475	75
$\mu_{opt<}(kg)$ [$A_{<} = 6.0$ years]	20.00	20.66651542647	22.50
$\mu_{opt}(kg)$ [$A = 6.27397260274$ years]	20.82191780822	21.48843323469 21.48843323469	23.32191780822 [¥]
$W_{opt}(lb-oz)$		47 lb 6.11192451984 oz	
$\mu_{opt>}(kg)$ [$A_{>} = 6.5$ years]	21.50	22.16651542647	24.00
$h_{est-adult}(cm)$	163.50	164.56642468236	167.50
$h_{est-adult}(ft-in)$		5 ft 4.78993097729 in	
$\Delta\mu(kg) = \mu - \mu_{opt}$		-4.28843323469	
$\Delta W(lb-oz) = 2.205\Delta\mu$		-9 lb 7.29592451984 oz	
$100 \frac{ \Delta\mu }{\mu_{opt}} \%^{\circ}$		19.9569377062%	
STATUS (μ)[©]		WASTED	

Table 12. Estimated-adult mass/weight (L. M.: Female)

<i>Mass Percentile</i>	5	6.86725663715	10
$\mu_{est-adult}(kg)$	46.50	47.153539823	48.25
$W_{est-adult}(lb-oz) =$ $2.205\mu_{est-adult}$		103 lb 15.5768849553 oz	

[¥] See relevant note on page 6

[©] See relevant note on page 3

Table 13. Mid-parental height at current age (L. M.: Female)

<i>MP-Height Percentile</i>	10	13.0000000000	25
$h_{CA-MP<} (cm) [A_{<} = 6.0 \text{ years}]$	108.00	108.5000000000	110.50
$h_{CA-MP} (cm)$ $[A = 6.27397260274 \text{ years}]$	109.91780821918	110.47260273972 110.47260273972	112.69178082192 [¥]
$h_{CA-MP>} (cm) [A_{>} = 6.5 \text{ years}]$	111.50	112.1000000000	114.50
$\Delta h (cm) = h - h_{CA-MP}$		+6.67739726028	
$\Delta h (in) = \frac{\Delta h (cm)}{2.54}$		+2.62889655916	
$100 \frac{ \Delta h }{h_{CA-MP}} \% ^{\text{³}}$		6.04439208877%	
<i>STATUS (h)^³</i>		TALL	

[¥]See relevant note on page 6

^³See relevant note on page 7

Web address of the main document:

GROWTH-AND-OBESITY PROFILES OF CHILDREN OF KARACHI USING BOX-INTERPOLATION METHOD

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Additional File 3: PRACTICE DATA SET

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Additional File 4: ICP MODEL ILLUSTRATED

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