



## GROWTH-AND-OBESITY CALCULATIONS OF U. FAMILY

SGPP-KHI-20110614-01



**Table 1. Parents' Fractional Ages, Heights and Weights**

<i>Date Format</i> <i>Year-Month-Day</i>	<i>Father</i> <i>(valid if A &gt; 21 years)</i>	<i>Mother</i> <i>(valid if A &gt; 19 years)</i>
Date of Birth (YYYY-MM-DD)	1974-08-08	1980-02-15
Fractional Date of Birth	1974.60273972602	1980.1256830601
Date of Checkup	2012-07-15	2012-07-15
Fractional Date of Checkup	2012.53825136612	2012.53825136612
Age (YY-MM-DD)	37-11-07	32-05-00
Fractional Age, <i>A</i> (years)	37.9355116401	32.41256830602
Height, <i>h</i> (cm)	172.01	162.94
Height (ft-in) <sup>§</sup>	5 ft 7.7204724409 in	5 ft 4.1496062992 in
Gross Mass (kg)	76.38	61.63
Dress Code (Undressing) <sup>¶</sup>	2/2 (2/2) <sup>#</sup>	3/3 (2/2) <sup>@</sup>
Clothing Correction (kg)	0.30	0.30
Net Mass, $\mu$ (kg)	76.08	61.33
Net Weight, <i>W</i> (lb-oz) = $2.205\mu$ <sup>∃</sup>	167 lb 12.1024 oz	135 lb 3.7224 oz
Body-Mass Index, <i>BMI</i> (kg/m <sup>2</sup> )	25.7136135275	23.1002957817

$$^{\S}h \text{ (in)} = \frac{h \text{ (cm)}}{2.54}; 1 \text{ ft} = 12 \text{ in}; \text{ ft stands for feet and in for inch(es)}$$

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

<sup>#</sup>T-shirt, trousers

<sup>@</sup>For the purpose of height measurement and weighing *abaya* (an outer garment worn by Muslim women), *headscarf* and *veil* were removed and she was checked in *dress code 2/2*.

<sup>∃</sup>1 kg = 2.205 lb; 1 lb = 16 oz

**Table 2. Height Percentiles, Optimal Masses and Mass Percentiles (Parents)<sup>2</sup>**

	<i>Father</i> (valid if A > 21 years)	<i>Mother</i> (valid if A > 19 years)
$h < (cm)$	172.00	159.00
$h (cm)$	172.01	162.94
$h > (cm)$	176.50	163.50
$P(h) <$	25	25
$P(h)$	25.0555555555	46.8888888887
$P(h) >$	50	50
$\mu_{opt} < (kg)$	63.25	52.25
$\mu_{opt} (kg)$	63.266111111	57.5033333333
$W_{opt} (lb-oz)$	139 lb 8.028399984 oz	126 lb 12.717599984 oz
$\mu_{opt} > (kg)$	70.50	58.25
$\mu < (kg)$	70.50	58.25
$\mu (kg)$	76.08	61.33
$\mu > (kg)$	79.00	66.00
$P(\mu) <$	50	50
$P(\mu)$	66.4117647057	59.9354838707
$P(\mu) >$	75	75

<sup>2</sup>Growth parameters (height, mass, percentiles) have been taken from Growth Tables generated from Growth Charts. These tables appear in: Kamal SA and Jamil SS, A Method to Generate Growth-and-Obesity Profiles of Still-Growing Parents, *International Journal of Biology and Biotechnology* 9: 233-255, 2012, available at: <http://www.ngds-ku.org/Papers/J30.pdf>

**Table 3. Obesity Profiles (Parents)**

	<i>Father</i> (valid if A > 21 years)	<i>Mother</i> (valid if A > 19 years)
$\Delta\mu$ (kg) = $\mu - \mu_{opt}$	+12.813888889	+3.8266666667
$\Delta W$ (lb-oz) = 2.205 $\Delta\mu$	+28 lb 4.0740000032 oz	+8 lb 7.00480000112 oz
$100 \frac{ \Delta\mu }{\mu_{opt}} \% \text{ } ^{\circ}$	<b>20.253953758%</b>	<b>6.65468668489%*</b>
<b>STATUS</b> $^{\circ}$	<b>OBESE</b>	<b>OBESE</b>




**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> = $\frac{M + F - 13}{2}$
$h_{adult-MP} < (cm)$	172.00	159.00
$h_{adult-MP} (cm)$	173.975	160.975
$h_{adult-MP} (ft-in)$	5 ft 8.4940944881 in	5 ft 3.3759842519 in
$h_{adult-MP} > (cm)$	176.50	163.50
$P_{MP} <$	25	25
$P_{MP}$	35.972222222	35.972222222
$P_{MP} >$	50	50

\* 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.

$^{\circ}$  Pertaining-to-mass (weight)

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

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

**Table 5. Pakistan Army-Cutoff-Adult Heights and Percentiles**

<i>Army-Cutoff-Adult Height</i>	<i>Males = 5 ft 4 in</i>	<i>Females = 5 ft 2 in</i>
$h_{\text{cutoff, adult}} < (cm)$	—	154.75
$h_{\text{cutoff, adult}} (cm)$	162.56	157.48
$h_{\text{cutoff, adult}} > (cm)$	163.00	159.00
$P_{\text{cutoff}} <$	—	10
$P_{\text{cutoff}}$	<3**	19.6352941175
$P_{\text{cutoff}} >$	3	25

\*\*Extrapolating, using heights corresponding to 3<sup>rd</sup> (163.00 cm) and 5<sup>th</sup> (165.00 cm) percentiles, the percentile for males' army-cut-off height comes out to **2.56**

**Table 6. Fractional Ages, Heights and Weights (Children)**

<i>Date Format</i> <i>Year-Month-Day</i>	<i>Jt. U.</i>	<i>Jm. U.</i>
Gender	Female	Female
Date of Birth	2005-04-10	2006-03-23
Fractional Date of Birth	2005.27397260273	2006.22465753424
Date of Checkup	2012-07-15	2012-07-15
Fractional Date of Checkup	2012.53825136612	2012.53825136612
Age	07-03-05	06-03-22
Fractional Age, <i>A (years)</i>	7.26427876339	6.31359383188
Height, <i>h (cm)</i>	119.36	119.15
Height ( <i>ft-in</i> )	3 ft 10.9921259842 in	3 ft 10.9094488188 in
Gross Mass ( <i>kg</i> )	19.19	19.14
Dress Code (Undressing) <sup>¶</sup>	1.5/1.5 (0/0.5) <sup>§</sup>	2.5/2 (0/2) <sup>®</sup>
Clothing Correction ( <i>kg</i> )	0	0.10
Net Mass, $\mu$ ( <i>kg</i> )	19.19	19.04
Net Weight, $W$ ( <i>lb-oz</i> ) = $2.205\mu$ <sup>⊘</sup>	42 lb 5.0232 oz	41 lb 15.7312 oz
Body-Mass Index, <i>BMI (kg/m<sup>2</sup>)</i>	13.4696823631	13.411546213

<sup>¶</sup> See relevant note on page 1

<sup>§</sup> Sleeveless dress (*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)

<sup>®</sup> *Shalwar/kameez* with *dupatta* (*Undressing*: to waist, barefoot, wearing trousers)

<sup>⊘</sup> See relevant note on page 1

**Table 7. Height and Mass Percentiles (Jt. U.: Female)**

$$h = 119.36 \text{ cm}$$

<i>Percentile</i>	25	50	
<i>Age (years)</i>			
$A < = 7.0$	117.50	121.50	
$A = 7.26427876339$	119.349951343	119.36	123.08567258
$A > = 7.5$	121.00	124.50	

$$P(h) = 25.0672471012$$

$$\mu = 19.19 \text{ kg}$$

<i>Percentile</i>	05	10	
<i>Age (years)</i>			
$A < = 7.0$	18.25	19.00	
$A = 7.26427876339$	18.646418145	19.19	19.5285575267
$A > = 7.5$	19.00	20.00	

$$P(\mu) = 8.08104289565$$

**Table 8. Optimal Mass and Estimated-Adult Height (Jt. U.: Female)**

<i>Height Percentile</i>	25	25.0672471012	50
$\mu_{\text{opt}} < (kg)$ [ $A < = 9.0$ years]	20.50	20.505379768	22.50
$\mu_{\text{opt}} (kg)$ [ $A = 9.1698630137$ years]	21.0285575267 <sup>¥</sup>	21.034648174 <sup>¥</sup> 21.034648174 <sup>¥</sup>	23.2928362901 <sup>¥</sup>
$W_{\text{opt}} (lb-oz)$	21.50	21.5067247101	24.00
$\mu_{\text{opt}} > (kg)$ [ $A > = 9.5$ years]		46 lb 6.1023875776 oz.	
$h_{\text{est-adult}} (cm)$	159.00	159.012104478	163.50
$h_{\text{est-adult}} (ft-in)$		5 ft 2.6031907393 in	
$\Delta\mu (kg) = \mu - \mu_{\text{opt}}$		-1.844648174	
$\Delta W (lb-oz) = 2.205\Delta\mu$		-4 lb 1.07918757872 oz.	
$100 \frac{ \Delta\mu }{\mu_{\text{opt}}} \% \text{ } ^{\text{©}}$		<b>8.76956989601%</b>	
<i>STATUS</i> <sup>©</sup>		<b>WASTED</b>	

**Table 9. Estimated-Adult Mass and Weight (Jt. U.: Female)**

<i>Mass Percentile</i>	05	8.08104289565	10
$\mu_{\text{est-adult}} (kg)$	46.50	47.5783650134	48.25
$W_{\text{est-adult}} (lb-oz) =$ $2.205\mu_{\text{est-adult}}$		104 lb 14.564717664 oz.	
Estimated-Adult BMI, $BMI_{\text{est-adult}} (kg/m^2)$		18.8169461942	

of constant-age route, which could, also, be used to compute  $\mu_{\text{opt}}$  as 25.10920623004 kg, with identical result 25.10920623004 kg as obtained from constant-percentile route (maroon font).

<sup>©</sup> See relevant note on page 3

**Table 10. Computations of Mid-Parental Height at the Current Age (Jt. U.: Female)**

<i>MP-Height Percentile</i>	25	35.972222222	50
$h_{MP}<(cm)$ [ $A \leq 7.0$ years]	117.50	119.255555555	121.50
$h_{MP}(cm)$ [ $A = 7.26427876339$ years]	119.349951343 <sup>¥</sup>	120.989517886 120.989517885 <sup>¥</sup>	123.08567258 <sup>¥</sup>
$h_{MP}>(cm)$ [ $A \geq 7.5$ years]	121.00	122.536111111	124.50
$\Delta h (cm) = h - h_{MP}$		-1.629517886	
$\Delta h (in) = \frac{\Delta h(cm)}{2.54}$		-0.6415424748	
$100 \frac{ \Delta h }{h_{MP}} \% ^{\text{³}}$		1.34682567091%	
<i>STATUS</i> <sup>³</sup>		<b>STUNTED</b>	

**Table 11. Computations of Army-Cutoff Height at the Current Age (Jt. U.: Female)**

<i>Cutoff-Height Percentile</i>	10	19.6352941175 <sup>£</sup>	25
$h_{cutoff}<(cm)$ [ $A \leq 7.0$ years]	114.50	116.42705882351	117.50
$h_{cutoff}(cm)$ [ $A = 7.26427876339$ years]	116.08567258034 <sup>¥</sup>	118.18249164479 118.18249164421 <sup>¥</sup>	119.34995134373 <sup>¥</sup>
$h_{cutoff}>(cm)$ [ $A \geq 7.5$ years]	117.50	119.74823529409	121.00
$\Delta h_{cutoff}(cm) = h - h_{cutoff}$		+1.177508356	
$h_{cutoff}(in) = \frac{\Delta h_{cutoff}(cm)}{2.54}$		+0.46358596692	

<sup>¥</sup> See relevant note on page 7

<sup>³</sup> Pertaining-to-height:  $STATUS = 100 \frac{|h - h_{MP}|}{h_{MP}} = 100 \frac{|\Delta h|}{h_{MP}}$

<sup>£</sup> The factor  $\frac{P_{cutoff} - P_{cutoff} <}}{P_{cutoff} > - P_{cutoff} <}}$ , which is, numerically, equal to 0.64235294117, is constant for all Pakistani females (for males, this factor comes out to -0.22), and need not be recomputed in future



**Table 12. Height and Mass Percentiles (Jm. U.: Female)**

$$h = 119.15 \text{ cm}$$

<i>Percentile</i>	50	75
<i>Age (years)</i>		
$A < = 6.0$	114.50	118.00
$A = 6.31359383188$	116.381562991	119.15
$A > = 6.5$	117.50	121.50

$$P(h) = 68.1484783837$$

$$\mu = 19.04 \text{ kg}$$

<i>Percentile</i>	10	25
<i>Age (years)</i>		
$A < = 6.0$	17.00	18.50
$A = 6.31359383188$	17.7839845797	19.04
$A > = 6.5$	18.25	19.50

$$P(\mu) = 24.0263460743$$

**Table 13. Optimal Mass and Estimated-Adult Height (Jm. U.: Female)**

<i>Height Percentile</i>	50	68.1484783837	75
$\mu_{\text{opt}} < (kg) [A < = 6.0 \text{ years}]$	20.00	21.8148478383	22.50
$\mu_{\text{opt}} (kg)$ [ $A = 6.31359383188 \text{ years}$ ]	20.9407814956 <sup>¥</sup>	22.75562933394 <sup>¥</sup> 22.75562933395 <sup>¥</sup>	23.4407814956 <sup>¥</sup>
$W_{\text{opt}} (lb-oz)$	21.50	23.3148478383	24.00
$\mu_{\text{opt}} > (kg) [A > = 6.5 \text{ years}]$		50 lb 2.8186028992 oz	
$h_{\text{est-adult}} (cm)$	163.50	166.40375654136	167.50
$h_{\text{est-adult}} (ft-in)$		5 ft 5.5132899767 in	
$\Delta\mu (kg) = \mu - \mu_{\text{opt}}$		-3.71562933394	
$\Delta W (lb-oz) = 2.205\Delta\mu$		-8 lb 3.08740290128 oz	
$100 \frac{ \Delta\mu }{\mu_{\text{opt}}} \% \text{ }^{\text{©}}$		<b>16.3283962812%</b>	
<b>STATUS</b> <sup>©</sup>		<b>WASTED</b>	

**Table 14. Estimated-Adult Mass and Weight (Jm. U.: Female)**

<i>Mass Percentile</i>	10	24.0263460743	25
$\mu_{\text{est-adult}} (kg)$	48.25	51.9903589531	52.25
$W_{\text{est-adult}} (lb-oz) =$ $2.205\mu_{\text{est-adult}}$		114 lb 10.219863856 oz	
Estimated-Adult BMI, $BMI_{\text{est-adult}} (kg/m^2)$		18.7757184198	

<sup>¥</sup> See relevant note on page 7

<sup>©</sup> See relevant note on page 3

**Table 15. Mid-Parental Height at the Current Age (Jm. U.: Female)**

<i>MP-Height Percentile</i>	25	35.972222222	50
$h_{MP}<(cm)$ [ $A \leq 6.0$ years]	110.50	112.25555555552	114.50
$h_{MP}(cm)$ [ $A = 6.31359383188$ years]	113.00875065504 <sup>¥</sup>	114.48904051369 <sup>¥</sup> 114.48904051369 <sup>¥</sup>	116.38156299128 <sup>¥</sup>
$h_{MP}>(cm)$ [ $A \geq 6.5$ years]	114.50	115.81666666664	117.50
$\Delta h (cm) = h - h_{MP}$		+4.66095948631	
$\Delta h (in) = \frac{\Delta h(cm)}{2.54}$		+1.8350234198	
$100 \frac{ \Delta h }{h_{MP}} \% \supset$		4.07109664417%	
<i>STATUS</i> <sup>3</sup>		TALL	

<sup>¥</sup> See relevant note on page 7

<sup>3</sup> See relevant note on page 8

**Table 16. Computations of Army-Cutoff Height at the Current Age (Jm. U.: Female)**

<i>Cutoff-Height Percentile</i>	10	19.6352941175 <sup>£</sup>	25
$h_{\text{cutoff}} < (cm)$ [A < = 6.0 years]	108.00	109.60588235292	110.50
$h_{\text{cutoff}} (cm)$ [A = 6.31359383188 years]	110.19515682316 <sup>¥</sup>	112.00247709632 112.00247709632 <sup>¥</sup>	113.00875065504 <sup>¥</sup>
$h_{\text{cutoff}} > (cm)$ [A > = 6.5 years]	111.50	113.42705882351	114.50
$\Delta h_{\text{cutoff}} (cm) = h - h_{\text{cutoff}}$		+7.14752290368	
$h_{\text{cutoff}} (in) = \frac{\Delta h_{\text{cutoff}} (cm)}{2.54}$		+2.81398539514	

<sup>£</sup> See relevant note on page 9

*Associated Report:* Growth-and-Obesity Profiles of U. Family  
[http://www.ngds-ku.org/Profiles/Growth\\_n\\_Obesity\\_Profile.pdf](http://www.ngds-ku.org/Profiles/Growth_n_Obesity_Profile.pdf)

*Web address of this document:* Growth-and-Obesity Calculations of U. Family  
[http://www.ngds-ku.org/Profiles/Growth\\_n\\_Obesity\\_Calculations.pdf](http://www.ngds-ku.org/Profiles/Growth_n_Obesity_Calculations.pdf)