



کراچی یونیورسٹی

University of Karachi  
THE NGDS PILOT PROJECT  
The Sibling Growth Pilot Project



SF-GROWTH-AND-IMAGING LABORATORY

**ADDITIONAL FILE 1**

**GROWTH-AND-OBESITY VECTOR-ROADMAPS GENERATED USING ENHANCED ANTHROPOMETRIC INSTRUMENTS: THE FOURTH-GENERATION SOLUTION OF CHILDHOOD OBESITY**

*Syed Arif Kamal\*, Ashfaq Ali Naz, Saba Musafar and Shakeel Ahmed Ansari*

<http://www.ngds-ku.org/Presentations/Vector.pdf>

Text in BLUE is not part of report handed out to parents of L. G. (header and footer on this page as well as page 5)

**GROWTH-AND-OBESITY SCALAR-ROADMAPS OF G. FAMILY**

*SGPP Case Number: SGPP-KHI-20131021-02 • Date of Report (year-month-day): 2015-08-29*

*Father's Name: W/H • Mother's Name: W/H • e-mail: W/H • Paper Mail: W/H*

*Telephone: W/H • Best time to Call: 11 am on Saturday*

**Table 1. Adult-mid-parental (Target) and army-cutoff heights**

Father's Height: † 167.16 cm • Mother's Height: † 160.16 cm

Adult-Mid-Parental (Target) and Army-Cutoff Heights	Boy †		Girl †	
	Target	Army-Cutoff	Target	Army-Cutoff
Height (cm)	170.16	162.56	157.16	157.48
Height (ft-in)	5 ft 6.99 in	5 ft 4.00 in	5 ft 1.87 in	5 ft 2.00 in
Percentile	18.95	2.72	18.14	19.36

cm: centimeter(s) • ft: foot (feet) • in: inch(es) • kg: kilogram(s) • lb: pound(s) • oz: ounce(s)

MP: Mid-Parental • NA: Not Available • NM: Not Measured • W/H: Withheld to protect privacy

EC I: Energy-Channelization I (Tallness + Wasting) • EC II: Energy-Channelization II (Stunting + Obesity)

EC III: Energy-Channelization III (Puberty-Induced Energy-Channelization) • AM: Acute Malnutrition

ON: Over-Nutrition (Tallness + Obesity) • UN: Under-Nutrition (Stunting + Wasting)

- a). The mother, accompanied by father, could come and discuss strategies for long-term-health protection of their child(ren), on:  
**Tuesday, September 1, 2015 at 1730h**
- b). For explanation of dress and behavior codes see *Manual for Anthropometric Measurements*:  
[http://www.ngds-ku.org/ngds\\_folder/M02.pdf](http://www.ngds-ku.org/ngds_folder/M02.pdf)
- c). Optimal mass (weight) is the recommended mass based on current height of the incumbent.
- d). WASTED (OBESE) means student has lesser (excess) weight-for-height (do not confuse with everyday meaning of wasted). Detailed guidelines to help maintain optimal weight-for-height are placed at:  
<http://www.ngds-ku.org/BLA/Weight.pdf>
- e). If the data are divided into 100 equal parts, each part represents percentile and gives ranking in the sample chosen to collect data.
- f). Estimated-adult height is based on percentile of current height. Adult-mid-parental (Target) height is obtained by adding 6.5 cm to (for boys)/subtracting 6.5 cm from (for girls) average of parents' heights (in cm).
- g). Some helpful suggestions to increase heights of girls, who are considered short-for-age, are available at the link:  
<http://www.ngds-ku.org/BLA/Height.pdf>
- h) All diet-based interventions to maintain appropriate weight-for-height and proper height-for-age would be nullified, if children were suffering from vitamin-D deficiency (VDD). The following link lists some indications as well as remedial measures to spot and overcome VDD:  
<http://www.ngds-ku.org/BLA/VDD.pdf>
- i) Cumulative-Scoliosis-Risk Weightage (CSRW) above 5.5, 6.5 or 7.5 after the first, the second or the third checkup, respectively, needs careful observation and follow up. CSRW is determined on the basis of the following criteria:  
[http://www.ngds-ku.org/BLA/Scoliosis\\_Risk.pdf](http://www.ngds-ku.org/BLA/Scoliosis_Risk.pdf)
- j) Guidelines to guard against curvatures of spinal column are placed at:  
<http://www.ngds-ku.org/Articles/A14.pdf>
- k) This 'Growth-and-Obesity Roadmap' is generated according to the procedures given in:  
<http://www.ngds-ku.org/Papers/J40.pdf>
- l) Next checkup of your family is scheduled on:  
**Saturday, March 26, 2016 at 0937h**
- m) Many thanks for your support and understanding of the work done by the NGDS Team.

**Prof. Dr. Syed Arif Kamal**  
Professor and Project Director  
e-mail: [profdrakamal@gmail.com](mailto:profdrakamal@gmail.com)

\*Project Director, the NGDS Pilot Project and Director, SF-Growth-and-Imaging Laboratory

**Table 2a. Month-wise-height and -mass (-weight) management for L. G. (SGPP-KHI-20131021-02/01) based on the scalar model**

Gender: Female † • Date of Birth: August 15, 2007 • School: W/H • GR Number: W/H • Sport: Gymnastics

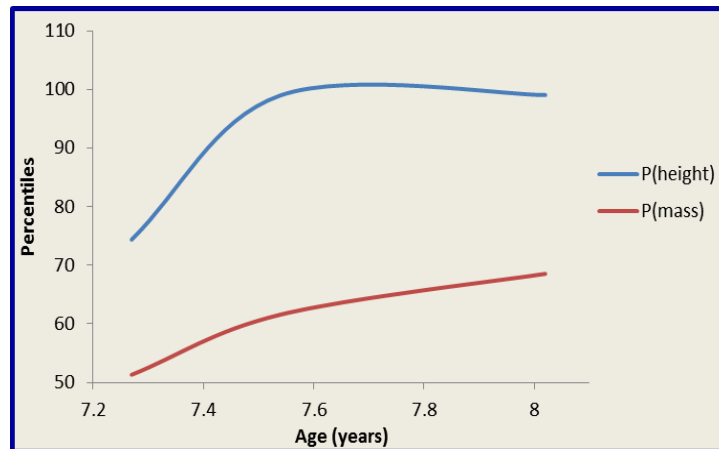
Target Date	Height Target		Mass (Weight) Target		
	cm	ft-in	kg	lb-oz	
August 22, 2015	144.04	4 ft 8.50 in	28.21	62 lb	3.25 oz
September 22, 2015	144.04	4 ft 8.71 in	31.33	69 lb	1.25 oz
October 22, 2015	144.58	4 ft 8.92 in	34.45	75 lb	15.25 oz
November 22, 2015	145.11	4 ft 9.13 in	37.56	82 lb	13.25 oz
December 22, 2015	145.65	4 ft 9.34 in	40.68	89 lb	11.25 oz
January 22, 2016	146.18	4 ft 9.55 in	43.80	96 lb	9.25 oz
February 22, 2016	146.72	4 ft 9.74 in	46.92	103 lb	7.25 oz

**Table 2b. Lifestyle adjustment, diet and exercise plans for L. G. to achieve month-wise targets**

	Height Management	Mass (Weight) Management
<b>Lifestyle Adjustment</b>	Recommended daily dose of vitamin D (600 IU) through 10-15 minute guarded-graduated sun-exposure (early morning or late afternoon) with the child minimally dressed, 8-hour night-time sound sleep	
<b>Diet Plans</b>	3 relaxed and balanced meals, 10-12 glasses of water daily — absolutely NO carbonated drinks To gain height, diet plan should include calcium-, protein- and fiber-rich diet (milk, fresh fruit, chicken and fish)	To put on mass (weight), diet plan should include milk, potato items (baked or boiled, but not fried) and protein-rich diet
<b>Exercise Plans</b>	Guarded-graduated exercises preceded by warm-up and followed by cool-down routines To pick up height, child should perform light-stretching exercises (bar hanging, mild-stretching, summersault, cartwheel)	To increase mass (weight), heavy exercises performed for shorter duration, consistently

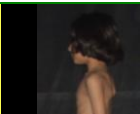


Need to take care of the checked items for L. G.:

- ⊗ 1. Optimal-weight management advised — note (d) on page-1 footer
- 2. Your child seems not to gain height, optimally — note (g) on page-1 footer
- ⊗ 3. Guard against your child acquiring scoliosis — notes (i, j) on page-1 footer
- 4. Signs of anemia observed; your child may have vitamin-D deficiency — note (h) on page-1 footer



**Figure 1. Time evolution of L. G.'s height and mass percentiles for her three checkups in the age range 7.27-8.02 years. Note that the gap between height and mass percentiles widened at the second checkup, also indicated by Growth-and-Obesity Roadmap**

**Table 2c. Growth-and-Obesity Scalar-Roadmap of L. G.**

Checkup	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Photograph			
Scanned Signatures	<i>L.G</i>	<i>L.G</i>	<i>L.G</i>
Class and Section	II-B	II-B	III-B
Date of Checkup (year-month-day)	2014-11-22	2015-02-28	2015-08-22
Age (year-month-day)	07-03-07	07-05-23	08-00-07
Age (decimal years)	7.27	7.54	8.02
Dress Code	0/0.5	0/0.5	0/0.5
Behavior Code	0	0	0
Height, $h$ (cm) $\Leftarrow$	126.96	139.92	143.51
Height (ft-in)	4 ft 1.98 in	4 ft 7.09 in	4 ft 8.50 in
Percentile-of-Height, $P(h)$ $\Leftrightarrow$	74.37	99.01	99.06
CA-MP (Current-Age-Mid-Parental) Height (cm) $\Leftarrow$	118.00	119.59	122.25
$\Delta$ Height w. r. t. CA-MP Height (cm)	+8.96	+20.33	+21.26
CA-AC (Current-Age-Army-Cutoff) Height (cm) $\Leftarrow$	118.26	119.86	122.53
$\Delta$ Height w. r. t. CA-AC Height (cm)	+8.70	+20.06	+20.98
Reference Height (cm) $\Leftarrow$	126.96	139.92	143.51
Percentile-of-Reference-Height $\Leftrightarrow$	74.37	99.01	99.06
Estimated-Adult Height (cm)	167.59	180.04	180.44
<b>Estimated-Adult Height (ft-in)</b>	<b>5 ft 5.98 in</b>	<b>5 ft 10.88 in</b>	<b>5 ft 11.04 in</b>
Algebraic Status (pertaining-to-height), $STATUS_{\pm}(h)$	+7.59%	+17.00%	+17.39%
<b>Qualitative Status (pertaining-to-height)</b>	<b>1<sup>st</sup>-Deg Tall</b>	<b>2<sup>nd</sup>-Deg Tall</b>	<b>2<sup>nd</sup>-Deg Tall</b>
Age of Prediction, $A+$ (years)	7.77	8.04	8.52
Reference Height, at $A+$ (cm)	130.09	143.24	146.67
6-Month-Height Management (cm)	+3.13	+3.32	+3.21
<b>Month-Wise-Height Management (cm/month)</b>	<b>+0.52</b>	<b>+0.55</b>	<b>+0.53</b>
Month-Wise-Height Management (in/month)	+0.21	+0.22	+0.21
Gross Mass (kg)	23.66	25.69	28.21
Clothing Correction (kg)	0	0	0
Net Mass, $\mu$ (kg) $\Rightarrow$	23.66	25.69	28.21
Net Weight (lb-oz)	52 lb 2.72 oz	56 lb 10.34 oz	62 lb 3.25 oz
Percentile-of-Net-Mass, $P(\mu)$ $\Leftrightarrow$	51.31	61.58	68.54
Optimal Mass (kg) $\Rightarrow$	26.37	39.28	42.61
$\Delta$ Mass-for-Height (kg)	-2.71	-13.59	-14.40
Estimated-Adult Mass (kg)	58.62	61.76	63.88
Estimated-Adult Weight (lb-oz)	129 lb 4.04 oz	136 lb 2.73 oz	140 lb 13.64 oz
Algebraic Status (pertaining-to-mass), $STATUS_{\pm}(\mu)$	-10.28%	-34.60%	-33.80%
<b>Qualitative Status (pertaining-to-mass)</b>	<b>2<sup>nd</sup>-Deg Wasted</b>	<b>4<sup>th</sup>-Deg Wasted</b>	<b>4<sup>th</sup>-Deg Wasted</b>
Optimal Mass for Reference Height, at $A+$ (kg)	28.09	42.21	46.92
6-Month-Mass Management (kg)	+4.43	+16.52	+18.71
<b>Month-Wise-Mass Management (kg/month)</b>	<b>+0.74</b>	<b>+2.75</b>	<b>+3.12</b>
Month-Wise-Weight Management (lb-oz/month)	+1 lb 10.05 oz	+6 lb 10.05 oz	+6 lb 14.01 oz
Cumulative-Scoliosis-Risk Weightage (CSRW)	8.50	9.00	9.00
Body-Mass Index, BMI ( $kg/m^2$ )	14.68	13.12	13.70
Estimated-Adult BMI ( $kg/m^2$ )	20.87	19.05	19.62
<b>Nutritional Status</b>	<b>EC I</b>	<b>EC I</b>	<b>EC I</b>
$P(h) + P(\mu)$	125.68	160.60	167.59
<b>Build</b>	<b>Medium</b>	<b>Big</b>	<b>Big</b>

**Table 3a. Month-wise-mass (-weight) management for parents**

Father's Date of Birth: † July15, 1971 • Mother's Date of Birth: † January 2, 1979

Target Date	Father †			Mother †		
	kg	lb-oz		kg	lb-oz	
<b>November 22, 2014</b>	<b>62.66</b>	<b>138 lb</b>	<b>2.64 oz</b>	<b>71.16</b>	<b>156 lb</b>	<b>3.36 oz</b>
December 22, 2014	63.39	139 lb	12.40 oz	70.39	155 lb	3.36 oz
January 22, 2015	64.12	141 lb	6.15 oz	69.62	153 lb	8.19 oz
February 22, 2015	64.85	142 lb	15.91 oz	68.85	151 lb	13.03 oz
March 22, 2015	65.58	144 lb	9.66 oz	68.08	150 lb	1.86 oz
April 22, 2015	66.32	146 lb	3.77 oz	67.32	148 lb	7.05 oz
May 22, 2015	67.06	147 lb	13.88 oz	66.56	146 lb	12.24 oz

**Table 3b. Lifestyle adjustment, diet and exercise plans for parents to achieve month-wise targets**

	Father †	Mother †
<b>Lifestyle Adjustment</b>	Active and carefree lifestyle, lesser screen time, outdoor activities combined with light reading and social interactions, 6-hour night-time sound sleep	
<b>Diet Plans</b>	3 relaxed and balanced meals, 10-12 glasses of water daily — absolutely NO carbonated drinks To put on mass (weight), diet plan should include milk, potato items (baked or boiled, but not fried) and protein-rich diet	To shed off mass (weight), diet plan should include salad, yogurt and skimmed milk
<b>Exercise Plans</b>	Guarded-graduated exercises preceded by warm-up and followed by cool-down routines To put on mass (weight), father should perform heavy exercises for shorter duration, consistently	To shed off mass (weight), mother should perform light exercises for longer duration, consistently

**Table 3c. Obesity Roadmaps of parents**

	Father †	Mother †
Date of Checkup (year-month-day)	2014-11-22	2014-11-22
Age (year-month-day)	43-04-07	35-10-20
Age (decimal year)	43.36	35.89
Dress Code	1.5/2	2/2
Height, $h$ (cm)	167.16	160.16
Height (ft-in)	5 ft 5.81 in	5 ft 3.06 in
Gross Mass (kg)	62.96	71.46
Clothing Correction (kg)	0.30	0.30
Net Mass, $\mu$ (kg)	62.66	71.16
Net Weight (lb-oz)	138 lb 2.64 oz	156 lb 14.52 oz
Optimal Mass (kg)	67.06	66.56
$\Delta$ Mass-for-Height (kg)	-4.40	+4.60
Algebraic Status (pertaining-to-mass), $STATUS_{\pm}(\mu)$	-6.56%	+6.91%
<b>Qualitative Status (pertaining-to-mass)</b>	<b>1<sup>st</sup>-Deg Wasted</b>	<b>1<sup>st</sup>-Deg Obese</b>
Body-Mass Index, $BMI$ ( $kg/m^2$ )	22.42	27.74
$P(h) + P(\mu)$	31.45	118.16
<b>Build</b>	<b>Small</b>	<b>Medium</b>



Figures 2a-d. From left to right, (a) signing ‘The SGPP Participation Form’, (b) mouth inspection for signs of anemia as well as measurement of height (c) and mass (d)

### PROTECTING CONFIDENTIALITY OF G FAMILY

G Family was invited to come to SF-Growth-and-Imaging Laboratory after the Project Director of the NGDS Pilot Project received completed and duly signed (by both parents and the participating child) ‘The SGPP Participation Form’ (Informed Consent Form) — [http://www.ngds-ku.org/SGPP/SGPP\\_Form.pdf](http://www.ngds-ku.org/SGPP/SGPP_Form.pdf) (Figure 2a). To safeguard G. Family’s privacy, the photographs, included in L. G.’s Growth-and-Obesity Roadmap and on this page, do not show the actual child, whose profile is presented. These photographs are selected from the set of children, enrolled in Growth-and-Obesity-Monitoring Program conducted at SF Growth-and-Imaging Laboratory. In addition, family label (G.) and initials of child (L. G.) are different from first letters in actual names (according to our group’s confidentiality standards). Same holds for the case number appearing in this report and the main document. Further, in place of scanned signatures, initials are given, again, to protect privacy.

**Dress Code** 1.5/2 (father) meant he was measured wearing T-shirt and trousers, barefoot, 2/2 (mother) meant she was barefoot and wearing *shalwar/kameez* (*shalwar* is a garment worn on the lower portion of body, resembling athletic trousers and *kameez* is a garment worn on the upper portion of body, resembling a long shirt, generally, in the Indian subcontinent, the Middle East and the Far East.) without *dupatta* (a garment put on shoulders on top of *kameez*, at times worn over head) at the time of measurement. Female child’s dress code 0/0.5 meant she was barefooted and examined completely undressed wearing only panties (Figures 2b-d and 3a-c). **Behavior Code** 0 meant she was relaxed and cooperative.



Figures 3a-c. From left to right, common errors in measurement of mass — (a) hair-band not removed; (b) feet not positioned correctly and (c) the student holding on to beam scale

Web address of the main document:

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