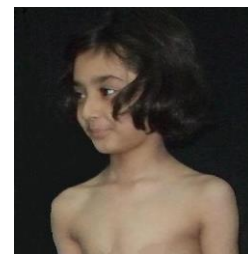




SPORTS AND ANTHROMATHEMATICS
A SEMINAR GIVEN ON THE OCCASION OF
FIFTY-FIFTH ANNUAL PRIZE DISTRIBUTION FUNCTION
OF GOVERNMENT COLLEGE, HYDERABAD
SATURDAY, MAY 17, 2014
Prof. Dr. Syed Arif Kamal[#]
PhD, MA, Johns Hopkins, Baltimore, MD, United States



Additional File
Basic and Innovative Concepts in Anthromathematics and Sport Mathematics

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Quantitative Estimates of Wasting

One word obese/wasted was used abandoning overweight, underweight, fat and lean

First mention: <http://www.ngds-ku.org/Papers/I29.pdf>

Growth-and-Obesity Profiles of Children of Karachi using Box-Interpolation Method
Kamal SA, Jamil N, Khan SA, *International Journal of Biology and Biotechnology*, **8 (1)**: 87-96, 2011

NGDS-BLA-2010-4721/F

Table 1. Growth-and-Obesity Profiles of G. Z.

Gender: Female • Date of Birth: 2005-10-24

| Checkup | 1 st | 2 nd | 3 rd |
|---|----------------------|----------------------|----------------------|
| Date of Checkup | 2011-04-21 | 2012-04-11 | 2013-05-16 |
| Age (years) | 5.49 | 6.46 | 7.56 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 2.50 | 7.00 | 13.50 |
| Height (cm) | 113.60 | 118.68 | 125.34 |
| Height (ft-in) | 3 ft 8.72 in | 3 ft 10.72 in | 3 ft 1.35 in |
| Percentile-for-Height | 72.63 | 58.76 | 53.04 |
| Estimated-Adult Height (cm) | 167.12 | 164.90 | 163.99 |
| Estimated-Adult Height (ft-in) | 5 ft 5.80 in | 5 ft 4.92 in | 5 ft 4.56 in |
| Gross Mass (kg) | 17.30 | 19.31 | 21.76 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 17.30 | 19.31 | 21.76 |
| Net Weight (lb-oz) | 38 lb 2.34 oz | 42 lb 9.26 oz | 47 lb 15.69 oz |
| Percentile-for-Net-Mass | 28.94 | 23.58 | 33.23 |
| Estimated-Adult Mass (kg) | 52.72 | 51.87 | 53.24 |
| Estimated-Adult Weight (lb-oz) | 116 lb 4.06 oz | 114 lb 6.02 oz | 117 lb 6.22 oz |
| BMI: Body-Mass Index (kg/m ²) | 13.41 | 13.71 | 13.85 |
| Estimated-Adult BMI (kg/m ²) | 18.88 | 19.08 | 19.80 |
| Optimal Mass (kg) | 20.79 | 22.27 | 24.58 |
| Optimal Weight (lb-oz) | 45 lb 13.36 oz | 49 lb 1.74 oz | 54 lb 3.03 oz |
| Δ Mass-for-Height (kg) | -3.49 | -2.96 | -2.82 |
| Δ Weight-for-Height (lb-oz) | -7 lb 11.01 oz | -6 lb 8.48 oz | -6 lb 3.34 oz |
| Status (pertaining-to-mass) | 16.77% WASTED | 13.30% WASTED | 11.46% WASTED |

| COLOR CODES FOR STAUSES | | <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 |
| | | ND | Hue 170, Sat 255, Lum 064 | Red 000, Green 000, Blue 128 |

cm: centimeter in: inch g: gram oz: ounce MP: mid-parental NC: non-computable
m: meter ft: feet kg: kilogram lb: pound w. r. t.: with respect to ND: non-determinable

$$1 \text{ kg} = 1000\text{g} = 2.205 \text{ lb} \bullet 1 \text{ lb} = 16 \text{ oz} \bullet 1 \text{ m} = 100 \text{ cm} \bullet 1 \text{ ft} = 12 \text{ in} \bullet 1 \text{ in} = 2.54 \text{ cm}$$

Dress Code is explained in the following references:

The NGDS Pilot Project: A Software to Analyze Growth of a Child (A Telemedicine Perspective)

<http://www.ngds-ku.org/Papers/C52.pdf>

Manual for Obtaining Anthropometric Measurements

http://www.ngds-ku.org/ngds_folder/M02.pdf

Cumulative-Scoliosis-Risk Weightage (CSRW) is elaborated in the following documents:

Cumulative-Scoliosis-Risk Weightage (CSRW) – Designing Preventive Strategies

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

Formulae for Assigning Cumulative-Scoliosis-Risk Weightage (CSRW)

http://www.ngds-ku.org/BLA/Scoliosis_Risk.pdf

Quantitative Estimates of Obesity

One word obese/wasted was used abandoning overweight, underweight, fat and lean

First mention: <http://www.ngds-ku.org/Papers/J29.pdf>

Growth-and-Obesity Profiles of Children of Karachi using Box-Interpolation Method
Kamal SA, Jamil N, Khan SA, *International Journal of Biology and Biotechnology*, **8 (1)**: 87-96, 2011

NGDS-BLA-2010-4443/H

Table 2. Growth-and-Obesity Profiles of Z. J.

Gender: Male • Date of Birth: 2005-06-12

| Checkup | 1 st | 2 nd | 3 rd |
|---|---------------------|--------------------|---------------------|
| Date of Checkup | 2011-04-25 | 2012-04-19 | 2013-11-21 |
| Age (years) | 5.87 | 6.85 | 8.44 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 1.50 | 7.00 | 11.00 |
| Height (cm) | 117.00 | 123.76 | 133.12 |
| Height (ft-in) | 3 ft 10.06 in | 4 ft 0.72 in | 4 ft 4.41 in |
| Percentile-for-Height | 66.74 | 72.66 | 66.68 |
| Estimated-Adult Height (cm) | 180.18 | 181.48 | 180.06 |
| Estimated-Adult Height (ft-in) | 5 ft 10.94 in | 5 ft 11.45 in | 5 ft 10.89 in |
| Gross Mass (kg) | 24.20 | 26.81 | 35.39 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 24.20 | 26.81 | 35.39 |
| Net Weight (lb-oz) | 53 lb 5.78 oz | 59 lb 1.86 oz | 78 lb 0.56 oz |
| Percentile-for-Net-Mass | 84.57 | 86.44 | 91.97 |
| Estimated-Adult Mass (kg) | 85.38 | 86.63 | 91.53 |
| Estimated-Adult Weight (lb-oz) | 188 lb 4.14 oz | 191 lb 0.19 oz | 201 lb 13.23 oz |
| BMI: Body-Mass Index (kg/m ²) | 17.68 | 17.50 | 19.97 |
| Estimated-Adult BMI (kg/m ²) | 26.30 | 26.30 | 28.23 |
| Optimal Mass (kg) | 21.82 | 24.86 | 29.10 |
| Optimal Weight (lb-oz) | 48 lb 1.91 oz | 54 lb 12.89 oz | 64 lb 2.64 oz |
| Δ Mass-for-Height (kg) | +2.38 | +1.95 | +6.29 |
| Δ Weight-for-Height (lb-oz) | +5 lb 3.97 oz | +4 lb 4.97 oz | +13 lb 13.92 oz |
| Status (pertaining-to-mass) | 10.89% OBESE | 7.87% OBESE | 21.62% OBESE |

Quantitative Estimates of Stunting

One word stunted/tall was used with a percentage representing severity

First mention: <http://www.ngds-ku.org/Papers/J29.pdf>

Growth-and-Obesity Profiles of Children of Karachi using Box-Interpolation Method
 Kamal SA, Jamil N, Khan SA, *International Journal of Biology and Biotechnology*, **8** (1): 87-96, 2011

SGPP-KHI-20100421-03/02

Table 3. Adult-Mid-Parental (Target) Heights

Father's Height: 166.80 cm • Mother's Height: 171.00 cm

| $BOY/GIRL=(FATHER+MOTHER \pm 13)/2$ | Boy | Girl |
|--|--------------|--------------|
| Adult-MP (Target) Height (cm) | 175.40 | 162.40 |
| Adult-MP Height (ft-in) | 5 ft 9.06 in | 5 ft 3.94 in |
| Percentile of Adult-MP (Target) Height | 43.89 | 43.89 |

Table 4. Growth-and-Obesity Profile of A. E.

Gender: Male • Date of Birth: 2005-02-19

| Checkout | 1 st |
|---|----------------------|
| Date of Checkout | 2011-05-22 |
| Age (years) | 6.25 |
| Dress Code | 0/0.5 |
| Height (cm) | 106.20 |
| Height (ft-in) | 3 ft 5.81 in |
| Percentile-for-Height | <3 |
| Estimated-Adult Height (cm) | <163.00 |
| Estimated-Adult Height (ft-in) | <5 ft 4.17 in |
| Mid-Parental-Height Percentile | 43.89 |
| Current-Age-MP Height (cm) | 116.53 |
| Δ Height-for-Age (cm) | -10.33 |
| Δ Height-for-Age (in) | -4.07 |
| Status (pertaining-to-height) | 8.87% STUNTED |
| Gross Mass (kg) | 16.30 |
| Clothing Correction (kg) | 0 |
| Net Mass (kg) | 16.30 |
| Net Weight (lb-oz) | 35 lb 15.06 oz |
| Percentile-for-Net-Mass | <3 |
| Estimated-Adult Mass (kg) | <54.5 |
| Estimated-Adult Weight (lb-oz) | <120 lb 2.76 oz |
| BMI: Body-Mass Index (kg/m ²) | 14.45 |
| Estimated-Adult BMI (kg/m ²) | ND |
| Optimal Mass (kg) | <16.75 |
| Optimal Weight (lb-oz) | <36 lb 15.01 oz |
| Δ Mass-for-Height (kg) | NC |
| Δ Weight-for-Height (lb-oz) | NC |
| Status (pertaining-to-mass) | ND |

Quantitative Estimates of Tallness

One word stunted/tall was used with a percentage representing severity

First mention: <http://www.ngds-ku.org/Papers/J29.pdf>

Growth-and-Obesity Profiles of Children of Karachi using Box-Interpolation Method
Kamal SA, Jamil N, Khan SA, *International Journal of Biology and Biotechnology*, **8 (1)**: 87-96, 2011

SGPP-KHI-20080910-01/02

Table 5. Adult-Mid-Parental (Target) Heights

Father's Height: 168.90 cm • Mother's Height: 157.80 cm

| $BOY/GIRL=(FATHER+MOTHER \pm 13)/2$ | Boy | Girl |
|--|--------------|--------------|
| Adult-MP (Target) Height (cm) | 169.85 | 156.85 |
| Adult-MP Height (ft-in) | 5 ft 6.87 in | 5 ft 1.75 in |
| Percentile of Adult-MP (Target) Height | 17.83 | 17.41 |

Table 6. Growth-and-Obesity Profile of R. Z. A.

Gender: Female • Date of Birth: 2006-05-30

| Checkup | 1 st |
|---|--------------------|
| Date of Checkup | 2009-10-11 |
| Age (years) | 3.37 |
| Dress Code | 0/0.5 |
| Height (cm) | 102.80 |
| Height (ft-in) | 3 ft 4.47 in |
| Percentile-for-Height | 93.24 |
| Estimated-Adult Height (cm) | 173.47 |
| Estimated-Adult Height (ft-in) | 5 ft 8.30 in |
| Mid-Parental-Height Percentile | 17.41 |
| Current-Age-MP Height (cm) | 92.44 |
| Δ Height-for-Age (cm) | +10.36 |
| Δ Height-for-Age (in) | +4.08 |
| Status (pertaining-to-height) | 11.20% TALL |
| Gross Mass (kg) | 15.50 |
| Clothing Correction (kg) | 0 |
| Net Mass (kg) | 15.50 |
| Net Weight (lb-oz) | 34 lb 2.84 oz |
| Percentile-for-Net-Mass | 70.62 |
| Estimated-Adult Mass (kg) | 76.78 |
| Estimated-Adult Weight (lb-oz) | 169 lb 4.84 oz |
| BMI: Body-Mass Index (kg/m ²) | 14.67 |
| Estimated-Adult BMI (kg/m ²) | 25.52 |
| Optimal Mass (kg) | 17.71 |
| Optimal Weight (lb-oz) | 39 lb 0.96 oz |
| Δ Mass-for-Height (kg) | -2.21 |
| Δ Weight-for-Height (lb-oz) | -4 lb 14.12 oz |
| Status (pertaining-to-mass) | 12.50% WASTED |

Optimal Mass

A new criterion was introduced to maintain proper weight-for-height, the percentile of optimal mass is, numerically, matched with the percentile of height, expressed, mathematically, as, $P(\mu_{opt}) = P(h)$

First mention: <http://www.ngds-ku.org/Papers/J26.pdf>

An Investigation of the Growth Profiles of Pakistani Children
Kamal SA, Firdous S, Alam S, *International Journal of Biology and Biotechnology*, 1 (4): 709-717, 2004

Formal definition: <http://www.ngds-ku.org/Papers/J29.pdf>

Growth-and-Obesity Profiles of Children of Karachi using Box-Interpolation Method
Kamal SA, Jamil N, Khan SA, *International Journal of Biology and Biotechnology*, 8 (1): 87-96, 2011

NGDS-BLA-2010-4667/F

Table 7. Growth-and-Obesity Profiles of Z. G.

Gender: Female • Date of Birth: 2005-12-02

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|---|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2011-04-21 | 2012-04-11 | 2013-05-16 |
| Age (years) | 5.19 | 6.16 | 7.25 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.50 | 6.00 | 9.75 |
| Height (cm) | 106.60 | 113.29 | 121.84 |
| Height (ft-in) | 3 ft 5.97 in | 3 ft 8.60 in | 3 ft 11.97 in |
| Percentile-for-Height | 36.25 | 35.08 | 42.18 |
| Estimated-Adult Height (cm) | 161.02 | 160.81 | 162.09 |
| Estimated-Adult Height (ft-in) | 5 ft 3.40 in | 5 ft 3.31 in | 5 ft 3.82 in |
| Gross Mass (kg) | 16.30 | 20.96 | 26.74 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 16.30 | 20.96 | 26.74 |
| Net Weight (lb-oz) | 35 lb 15.06 oz | 46 lb 3.47 oz | 58 lb 15.39 oz |
| Percentile-for-Net-Mass | 21.13 | 54.69 | 54.69 |
| Estimated-Adult Mass (kg) | 51.22 | 57.27 | 66.98 |
| Estimated-Adult Weight (lb-oz) | 112 lb 14.98 oz | 126 lb 4.39 oz | 147 lb 11.05 oz |
| BMI: Body-Mass Index (kg/m ²) | 14.34 | 16.33 | 18.01 |
| Estimated-Adult BMI (kg/m ²) | 19.75 | 22.14 | 25.49 |
| Optimal Mass (kg) | 17.36 | 19.50 | 22.35 |
| Optimal Weight (lb-oz) | 38 lb 4.58 oz | 42 lb 15.89 oz | 49 lb 4.67 oz |
| Δ Mass-for-Height (kg) | -1.06 | +1.46 | +4.39 |
| Δ Weight-for-Height (lb-oz) | -2 lb 5.51 oz | +3 lb 3.58 oz | +9 lb 10.72 oz |
| Status (pertaining-to-mass) | 6.12% WASTED | 7.50% OBESE | 19.62% OBESE |

BMI (Body-Mass Index)

Estimates status of obesity, through BMI scale in adults and use of BMI tables for children

First mention: 1832 as the *Quetelet Index*, after **Adolphe Quetelet** (1796-1874)
 Belgian mathematician, astronomer and statistician
 Renamed as *Body-Mass Index* by
Ansel Keys (1904-2004)
 and Associates

Indices of Relative Weight and Adiposity

Keys A, Fidanza F, Karvonen MJ, Kimura MJ, Kimura N, Taylor HL, *Journal of Chronic Diseases*, **25 (6&7):** 329-343, 1972

NGDS-BLA-2010-4573/F

Table 8. Growth-and-Obesity Profiles of Z. Z.

Gender: Female • Date of Birth: 2006-08-15

| Checkup | 1 st | 2 nd | 3 rd |
|--|-----------------|-----------------|-----------------|
| Date of Checkup | 2011-04-21 | 2012-04-11 | 2013-05-16 |
| Age (years) | 4.68 | 5.66 | 6.75 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 2.50 | 8.50 | 12.00 |
| Height (cm) | 107.60 | 115.55 | 122.21 |
| Height (ft-in) | 3 ft 6.36 in | 4 ft 9.49 in | 4 ft 0.11 in |
| Percentile-for-Height | 72.07 | 76.58 | 68.03 |
| Estimated-Adult Height (cm) | 167.03 | 168.03 | 166.39 |
| Estimated-Adult Height (ft-in) | 5 ft 5.76 in | 5 ft 6.15 in | 5 ft 5.51 in |
| Gross Mass (kg) | 16.30 | 18.84 | 20.03 |
| Clothing Correction (kg) | 0 | 0.10 | 0 |
| Net Mass (kg) | 16.30 | 18.84 | 20.03 |
| Net Weight (lb-oz) | 35 lb 15.06 oz | 41 lb 8.68 oz | 44 lb 2.66 oz |
| Percentile-for-Net-Mass | 35.97 | 43.58 | 25.36 |
| Estimated-Adult Mass (kg) | 53.69 | 54.48 | 52.29 |
| Estimated-Adult Weight (lb-oz) | 118 lb 6.05 oz | 120 lb 2.03 oz | 115 lb 4.90 oz |
| BMI: Body-Mass Index (kg/m²) | 14.08 | 14.11 | 13.11 |
| Estimated-Adult BMI (kg/m ²) | 19.24 | 19.30 | 18.89 |
| Optimal Mass (kg) | 18.73 | 21.75 | 23.99 |
| Optimal Weight (lb-oz) | 41 lb 4.85 oz | 47 lb 15.33 oz | 52 lb 14.21 oz |
| Δ Mass-for-Height (kg) | -2.43 | -2.91 | -3.96 |
| Δ Weight-for-Height (lb-oz) | -5 lb 15.78 oz | -6 lb 6.65 oz | -8 lb 11.55 oz |
| Status (pertaining-to-mass) | 12.98% WASTED | 13.38% WASTED | 16.49% WASTED |

Estimated-Adult BMI

Estimates status of obesity, when the child reaches adulthood — BMI ratings may be applied

First mention: <http://pediatrics.aappublications.org/content/108/3/712.full.pdf>

Relationship of Childhood Obesity to Coronary

Heart Disease Risk Factors in Adulthood: The Bogalusa Heart Study

Freedman DS, Khan LK, Dietz WH, Srinivansan SR, Berenson GS, *Pediatrics*, **108 (3)**: 712-718, 2001

Formal definition: <http://www.ngds-ku.org/Papers/J30.pdf>

A Method to Generate Growth-and-Obesity Profiles of Children of Still-Growing Parents

Kamal SA, Jamil SS, *International Journal of Biology and Biotechnology*, **9 (3)**: 233-255, 2012

NGDS-BLA-2010-4979/D

Table 9. Growth-and-Obesity Profiles of U. S.

Gender: Female • Date of Birth: 2005-03-26

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|---|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2011-05-04 | 2012-04-02 | 2013-05-20 |
| Age (<i>years</i>) | 6.11 | 7.02 | 8.15 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 1.50 | 7.00 | 10.50 |
| Height (<i>cm</i>) | 118.60 | 123.62 | 130.33 |
| Height (<i>ft-in</i>) | 3 ft 10.69 in | 4 ft 0.67 in | 4 ft 3.31 in |
| Percentile-for-Height | 73.97 | 64.15 | 62.51 |
| Estimated-Adult Height (<i>cm</i>) | 167.34 | 165.76 | 165.5 |
| Estimated-Adult Height (<i>ft-in</i>) | 5 ft 5.88 in | 5 ft 5.26 in | 5 ft 5.16 in |
| Gross Mass (<i>kg</i>) | 21.30 | 23.39 | 24.95 |
| Clothing Correction (<i>kg</i>) | 0 | 0 | 0 |
| Net Mass (<i>kg</i>) | 21.30 | 23.39 | 24.95 |
| Net Weight (<i>lb-oz</i>) | 46 lb 15.46 oz | 51 lb 9.2 oz | 55 lb 0.24 oz |
| Percentile-for-Net-Mass | 59.79 | 56.86 | 40.55 |
| Estimated-Adult Mass (<i>kg</i>) | 59.46 | 58.2 | 54.12 |
| Estimated-Adult Weight (<i>lb-oz</i>) | 131 lb 1.81 oz | 128 lb 5.32 oz | 119 lb 5.21 oz |
| BMI: Body-Mass Index (kg/m^2) | 15.14 | 15.31 | 14.69 |
| Estimated-Adult BMI (kg/m^2) | 21.24 | 21.18 | 19.76 |
| Optimal Mass (<i>kg</i>) | 22.72 | 24.27 | 27.78 |
| Optimal Weight (<i>lb-oz</i>) | 50 lb 1.49 oz | 53 lb 8.15 oz | 61 lb 4.02 oz |
| Δ Mass-for-Height (<i>kg</i>) | -1.42 | -0.88 | -2.83 |
| Δ Weight-for-Height (<i>lb-oz</i>) | -3 lb 2.03 oz | 1 lb 14.95 oz | -6 lb 3.79 oz |
| Status (pertaining-to-mass) | 6.24% WASTED | 3.62% WASTED | 10.18% WASTED |

Physical Loss of Height

A very serious condition, which may be indication of trunk deformities or other bone disorders

Already exists in literature

NGDS-BLA-2010-5484/A

Table 10. Growth-and-Obesity Profiles of Z. H. Z.

Gender: Female • Date of Birth: 2005-06-16

| Checkup | 1 st | 2 nd | 3 rd |
|---|-----------------|-----------------|-----------------|
| Date of Checkup | 2011-05-04 | 2012-03-20 | 2013-06-02 |
| Age (years) | 5.88 | 6.76 | 7.96 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.50 | 1.00 | 5.75 |
| Height (cm) | 113.40 | 119.42 | 117.84 |
| Height (ft-in) | 3 ft 8.65 in | 3 ft 11.02 in | 3 ft 10.39 in |
| Percentile-for-Height | 48.99 | 48.80 | 4.55 |
| Estimated-Adult Height (cm) | 163.32 | 163.28 | 152.28 |
| Estimated-Adult Height (ft-in) | 5 ft 4.30 in | 5 ft 4.29 in | 4 ft 11.95 in |
| Gross Mass (kg) | 18.30 | 20.14 | 25.12 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 18.30 | 20.14 | 25.12 |
| Net Weight (lb-oz) | 40 lb 5.62 oz | 44 lb 6.54 oz | 55 lb 6.23 oz |
| Percentile-for-Net-Mass | 27.37 | 26.47 | 47.45 |
| Estimated-Adult Mass (kg) | 52.53 | 52.43 | 54.94 |
| Estimated-Adult Weight (lb-oz) | 115 lb 13.42 oz | 115 lb 9.62 oz | 121 lb 2.42 oz |
| BMI: Body-Mass Index (kg/m ²) | 14.23 | 14.12 | 18.09 |
| Estimated-Adult BMI (kg/m ²) | 19.69 | 19.66 | 23.69 |
| Optimal Mass (kg) | 19.70 | 21.93 | 19.81 |
| Optimal Weight (lb-oz) | 43 lb 6.97 oz | 48 lb 5.57 oz | 43 lb 10.95 oz |
| Δ Mass-for-Height (kg) | -1.40 | -1.79 | +5.31 |
| Δ Weight-for-Height (lb-oz) | -3 lb 1.35 oz | -3 lb 15.03 oz | +11 lb 11.28 oz |
| Status (pertaining-to-mass) | 7.10% WASTED | 8.15% WASTED | 26.79% OBESE |

Physical Loss of Mass

Associated with long-term disease, in this case cardiac problems since birth, both height and mass percentiles are falling below 3 — 1st checkup just after 2nd cardiac surgery, physical loss of mass between 2nd and 3rd checkup, the period when the patient underwent 3rd surgery

Already exists in literature

NGDS-BLA-2010-4660/F

Table 11. Growth-and-Obesity Profiles of G. R.

Gender: Female • Date of Birth: 2004-11-02

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|--|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2011-04-21 | 2012-04-11 | 2013-05-16 |
| Age (<i>years</i>) | 6.47 | 7.44 | 8.53 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.5 | 5.0 | 7.5 |
| Height (<i>cm</i>) | 107.60 | 113.48 | 117.46 |
| Height (<i>ft-in</i>) | 3 ft 6.36 in | 3 ft 8.68 in | 3 ft 10.24 in |
| Percentile-for-Height | <3 | <3 | <3 |
| Estimated-Adult Height (<i>cm</i>) | <151.50 | <151.5 | <151.5 |
| Estimated-Adult Height (<i>ft-in</i>) | <4 ft 11.65 in | <4 ft 11.65 in | <4 ft 11.65 in |
| Gross Mass (<i>kg</i>) | 13.30 | 17.65 | 15.57 |
| Clothing Correction (<i>kg</i>) | 0 | 0 | 0 |
| Net Mass (<i>kg</i>) | 13.30 | 17.65 | 15.57 |
| Net Weight (<i>lb-oz</i>) | 29 lb 5.22 oz | 38 lb 14.69 oz | 34 lb 5.31 oz |
| Percentile-for-Net-Mass | <3 | <3 | <3 |
| Estimated-Adult Mass (<i>kg</i>) | <45.25 | <45.25 | <45.25 |
| Estimated-Adult Weight (<i>lb-oz</i>) | <99 lb 12.42 oz | <99 lb 12.42 oz | <99 lb 12.42 oz |
| <i>BMI</i> : Body-Mass Index (<i>kg/m²</i>) | 11.49 | 13.71 | 11.29 |
| Estimated-Adult <i>BMI</i> (<i>kg/m²</i>) | NC | NC | NC |
| Optimal Mass (<i>kg</i>) | <16.47 | <18.38 | <20.57 |
| Optimal Weight (<i>lb-oz</i>) | <36 lb 4.90 oz | <40 lb 8.44 oz | <45 lb 5.63 oz |
| Δ Mass-for-Height (<i>kg</i>) | NC | NC | NC |
| Δ Weight-for-Height (<i>lb-oz</i>) | NC | NC | NC |
| Status (pertaining-to-mass) | ND | ND | ND |

Pseudo-Gain of Height

Physical gain of height accompanied by a drop in percentile

First mention: <http://www.ngds-ku.org/Papers/I32.pdf>

Stunting Induced by Wasting — Wasting Induced by Stunting: A Case Study
 Kamal SA, Jamil SS, Razzaq UA, *International Journal of Biology and Biotechnology*,
11 (1): 147-153, 2014

NGDS-BLA-2010-4951/D

Table 12. Growth-and-Obesity Profiles of Z. O.

Gender: Female • Date of Birth: 2005-12-02

| <i>Checkup</i> | 1 st | 2 nd | 3 rd |
|---|-----------------|-----------------|-----------------|
| Date of Checkup | 2011-05-14 | 2012-04-02 | 2013-05-20 |
| Age (years) | 5.42 | 6.33 | 7.46 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.50 | 1.00 | 6.00 |
| Height (cm) | 109.40 | 115.14 | 120.67 |
| Height (ft-in) | 3 ft 7.07 in | 3 ft 9.33 in | 3 ft 11.51 in |
| Percentile-for-Height | 46.52 | 39.79 | 26.49 |
| Estimated-Adult Height (cm) | 162.87 | 161.66 | 158.91 |
| Estimated-Adult Height (ft-in) | 5 ft 4.12 in | 5 ft 3.65 in | 5 ft 2.56 in |
| Gross Mass (kg) | 18.20 | 24.17 | 29.81 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 18.20 | 24.17 | 29.81 |
| Net Weight (lb-oz) | 40 lb 2.10 oz | 53 lb 4.72 oz | 65 lb 11.7 oz |
| Percentile-for-Net-Mass | 41.86 | 78.17 | 85.92 |
| Estimated-Adult Mass (kg) | 54.27 | 67.96 | 72.73 |
| Estimated-Adult Weight (lb-oz) | 119 lb 10.74 oz | 149 lb 13.46 oz | 160 lb 6.04 oz |
| BMI: Body-Mass Index (kg/m ²) | 15.21 | 18.23 | 20.47 |
| Estimated-Adult BMI (kg/m ²) | 20.46 | 26.00 | 28.80 |
| Optimal Mass (kg) | 18.57 | 20.25 | 20.26 |
| Optimal Weight (lb-oz) | 40 lb 14.99 oz | 44 lb 10.48 oz | 44 lb 10.82 oz |
| Δ Mass-for-Height (kg) | -0.37 | +3.92 | +9.55 |
| Δ Weight-for-Height (lb-oz) | -12.90 oz | +8 lb 10.24 oz | +21 lb 0.87 oz |
| Status (pertaining-to-mass) | 1.97% WASTED | 19.35% OBESE | 47.13% OBESE |

Pseudo-Gain of Mass

Physical gain of mass accompanied by a drop in percentile

First mention: <http://www.ngds-ku.org/Papers/I32.pdf>

Stunting Induced by Wasting — Wasting Induced by Stunting: A Case Study
 Kamal SA, Jamil SS, Razzaq UA, *International Journal of Biology and Biotechnology*,
11 (1): 147-153, 2014

NGDS-BLA-2010-4784/A

Table 13. Growth-and-Obesity Profiles of Z. Z.

Gender: Female • Date of Birth: 2006-02-05

| <i>Checkup</i> | 1 st | 2 nd | 3 rd |
|---|-----------------|-----------------|-----------------|
| Date of Checkup | 2011-05-04 | 2012-05-03 | 2013-06-02 |
| Age (years) | 5.24 | 6.24 | 7.32 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.50 | 4.00 | 8.50 |
| Height (cm) | 104.40 | 109.62 | 116.33 |
| Height (ft-in) | 3 ft 5.10 in | 3 ft 7.16 in | 3 ft 9.80 in |
| Percentile-for-Height | 17.90 | 9.79 | 9.74 |
| Estimated-Adult Height (cm) | 156.99 | 154.66 | 154.63 |
| Estimated-Adult Height (ft-in) | 5 ft 1.81 in | 5 ft 0.89 in | 5 ft 0.88 in |
| Gross Mass (kg) | 15.30 | 16.33 | 17.09 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 15.30 | 16.33 | 17.09 |
| Net Weight (lb-oz) | 33 lb 11.78 oz | 36 lb 0.02 oz | 37 lb 10.94 oz |
| Percentile-for-Net-Mass | 7.52 | 3.28 | <3 |
| Estimated-Adult Mass (kg) | 47.38 | 45.43 | <45.25 |
| Estimated-Adult Weight (lb-oz) | 104 lb 7.61 oz | 100 lb 2.6 oz | <99 lb 12.42 oz |
| <i>BMI</i> : Body-Mass Index (kg/m ²) | 14.04 | 13.59 | 12.63 |
| Estimated-Adult <i>BMI</i> (kg/m ²) | 19.22 | 18.99 | <18.92 |
| Optimal Mass (kg) | 16.20 | 17.57 | 19.59 |
| Optimal Weight (lb-oz) | 35 lb 11.38 oz | 38 lb 11.86 oz | 43 lb 3.29 oz |
| Δ Mass-for-Height (kg) | -0.90 | -1.24 | -2.5 |
| Δ Weight-for-Height (lb-oz) | -1 lb 15.95 oz | -2 lb 11.85 oz | -5 lb 8.36 oz |
| Status (pertaining-to-mass) | 5.53% WASTED | 7.07% WASTED | 12.78% WASTED |

Quantitative Recommendations for Gaining Mass — Wasted Child

First-generation solution of child's wasting problem; for other solution, see page 24

First mention: <http://www.ngds-ku.org/Papers/Roadmap.pdf> (September 4, 2013)

Growth-and-Obesity Roadmaps of Children (Time Series of Growth-and-Obesity Pattern)

Kamal SA, Jamil SS, Ansari SA, *the First Conference on Anthromathematics in the Memory of (Late) Syed Firdous (ANTHROMATHEMATICS 2013)*, University of Karachi, Karachi, Pakistan, and Government College, Hyderabad, Pakistan, September 4 & 5, 2013, abstract#Anthro13-02, p 8

NGDS-BLA-2011-5085/H (SGPP-KHI-20110614-01/01)

Table 14. Adult-Mid-Parental (Target) and Army-Cutoff Heights

Father's Height: 172.01 cm • Mother's Height: 162.94 cm

| <i>BOY/GIRL=(FATHER+MOTHER ± 13)/2</i> | <i>Target Boy</i> | <i>Army-Cutoff Boy</i> | <i>Target Girl</i> | <i>Army-Cutoff Girl</i> |
|--|-------------------|------------------------|--------------------|-------------------------|
| Height (cm) | 173.98 | 162.56 cm | 160.98 | 157.48 cm |
| Height (ft-in) | 5 ft 8.49 in | 5 ft 4.00 in | 5 ft 3.38 in | 5 ft 2.00 in |
| Percentile | 35.97 | 2.56 | 35.97 | 19.64 |

Army-cutoff values are based on selection standards for the Armed Forces of Pakistan.

(continued on the next page)

Quantitative Recommendations for Gaining Mass — Wasted Child

(continued from the previous page)

NGDS-BLA-2011-5085/H (SGPP-KHI-20110614-01/01)

Table 15. Growth-and-Obesity Roadmap of Hr. S.

Gender: Female • Date of Birth: 2005-04-10

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|---|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2012-07-15 | 2013-05-15 | 2013-11-21 |
| Age (years) | 7.26 | 8.10 | 8.61 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 9.50 | 10.25 | 15.25 |
| Height (cm) | 119.36 | 124.53 | 126.45 |
| Height (ft-in) | 3 ft 10.99 in | 4 ft 1.03 in | 4 ft 1.70in |
| Percentile-for-Height | 25.07 | 27.91 | 22.29 |
| Estimated-Adult Height (cm) | 159.01 | 159.52 | 158.23 |
| Estimated-Adult Height (ft-in) | 5 ft 2.60 in | 5 ft 2.80 in | 5 ft 2.30in |
| Current-Age-MP Height (cm) | 120.99 | 125.79 | 128.72 |
| Δ Height w. r. t. Current-Age-MP (cm) | -1.63 | -1.26 | -2.27 |
| Δ Height w. r. t. Current-Age-MP (in) | -0.64 | -0.50 | -0.89 |
| Status (pertaining-to-height) | 1.35% STUNTED | 1.00% STUNTED | 1.76% STUNTED |
| Current-Age- Army-Cutoff Height (cm) | 118.18 | 122.97 | 125.83 |
| Δ Height w. r. t. Army-Cutoff (cm) | +1.18 | +1.56 | +0.62 |
| Δ Height w. r. t. Army-Cutoff (in) | +0.46 | +0.61 | +0.24 |
| Reference Height (cm) | 120.99 | 125.79 | 128.72 |
| Percentile-for-Reference-Height | 35.97 | 35.97 | 35.97 |
| Age of Prediction, A+ (years) | 7.77 | 8.60 | 9.11 |
| Reference Height, at A+ (cm) | 123.99 | 128.62 | 131.42 |
| Height — to be gained (cm) | 4.63 | 4.09 | 4.97 |
| Height — to be gained (in) | 1.82 | 1.61 | 1.96 |
| Gross Mass (kg) | 19.19 | 21.90 | 22.53 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 19.19 | 21.90 | 22.53 |
| Net Weight (lb-oz) | 42 lb 5.02 oz | 48 lb 4.63 oz | 49 lb 10.86 oz |
| Percentile-for-Net-Mass | 8.08 | 15.31 | 11.36 |
| Estimated-Adult Mass (kg) | 47.58 | 49.67 | 48.61 |
| Estimated-Adult Weight (lb-oz) | 104 lb 14.56 oz | 109 lb 8.23 oz | 107 lb 3.01 oz |
| BMI: Body-Mass Index (kg/m ²) | 13.47 | 14.12 | 14.09 |
| Estimated-Adult BMI (kg/m ²) | 18.82 | 19.52 | 19.42 |
| Optimal Mass (kg) | 21.03 | 23.49 | 23.99 |
| Optimal Weight (lb-oz) | 46 lb 6.10 oz | 51 lb 12.87 oz | 52 lb 14.30 oz |
| Δ Mass-for-Height (kg) | -1.84 | -1.59 | -1.46 |
| Δ Weight-for-Height (lb-oz) | -4 lb 1.08 oz | -3 lb 8.24 oz | -3 lb 3.44 oz |
| Status (pertaining-to-mass) | 8.77% WASTED | 6.79% WASTED | 6.08% WASTED |
| Optimal Mass for Reference Height, at A+ (kg) | 23.40 | 25.70 | 27.60 |
| Mass — to be gained (kg) | 4.21 | 3.80 | 5.07 |
| Mass — to be gained (lb-oz) | 9 lb 4.53 oz | 8 lb 6.06 oz | 11 lb 2.87 oz |

Quantitative Recommendations for Reducing Mass — Obese Child

First-generation solution of child's obesity problem; for other solution, see page 24

First mention: <http://www.ngds-ku.org/Papers/Roadmap.pdf> (September 4, 2013)

Growth-and-Obesity Roadmaps of Children (Time Series of Growth-and-Obesity Pattern)

Kamal SA, Jamil SS, Ansari SA, *the First Conference on Anthromathematics in the Memory of (Late) Syed Firdous (ANTHROMATHEMATICS 2013)*, University of Karachi, Karachi, Pakistan, and Government College, Hyderabad, Pakistan, September 4 & 5, 2013, abstract#Anthro13-02, p 8

SGPP-KHI-20060412-01/01

Table 16. Adult-Mid-Parental (Target) and Army-Cutoff Heights

Father's Height: 165.70 cm • Mother's Height: 155.73 cm

| <i>BOY/GIRL=(FATHER+MOTHER ± 13)/2</i> | <i>Target Boy</i> | <i>Army-Cutoff Boy</i> | <i>Target Girl</i> | <i>Army-Cutoff Girl</i> |
|--|-------------------|------------------------|--------------------|-------------------------|
| Height (cm) | 167.22 | 162.56 cm | 154.22 | 157.48 cm |
| Height (ft-in) | 5 ft 5.83 in | 5 ft 4.00 in | 5 ft 0.72 in | 5 ft 2.00 in |
| Percentile | 9.43 | 2.56 | 8.81 | 19.64 |

Army-cutoff values are based on selection standards for the Armed Forces of Pakistan.

(continued on the next page)

Quantitative Recommendations for Reducing Mass — Obese Child

(continued from the previous page)

SGPP-KHI-20060412-01/01

Table 17. Growth-and-Obesity Roadmap of Z. J.

Gender: Female • Date of Birth: 1996-09-23

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|---|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2007-05-13 | 2007-10-07 | 2008-06-15 |
| Age (years) | 10.63 | 11.04 | 11.73 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.50 | 1.00 | 6.00 |
| Height (cm) | 136.41 | 139.70 | 146.53 |
| Height (ft-in) | 4 ft 5.71 in | 4 ft 7.00 in | 4 ft 9.69 in |
| Percentile-for-Height | 23.50 | 27.37 | 37.45 |
| Estimated-Adult Height (cm) | 158.58 | 159.43 | 161.24 |
| Estimated-Adult Height (ft-in) | 5 ft 2.43 in | 5 ft 2.77 in | 5 ft 3.48 in |
| Current-Age-MP Height (cm) | 132.18 | 134.55 | 138.97 |
| Δ Height w. r. t. Current-Age-MP (cm) | +4.23 | +5.15 | +7.56 |
| Δ Height w. r. t. Current-Age-MP (in) | +1.66 | +2.03 | +2.97 |
| Status (pertaining-to-height) | 3.20% TALL | 3.83% TALL | 5.44% TALL |
| Current-Age- Army-Cutoff Height (cm) | 135.38 | 137.81 | 142.32 |
| Δ Height w. r. t. Army-Cutoff (cm) | +1.03 | +1.89 | +4.21 |
| Δ Height w. r. t. Army-Cutoff (in) | +0.41 | +0.74 | +1.66 |
| Reference Height (cm) | 136.41 | 139.70 | 146.53 |
| Percentile-for-Reference-Height | 23.50 | 27.37 | 37.45 |
| Age of Prediction, A+ (years) | 11.14 | 11.54 | 12.23 |
| Reference Height, at A+ (cm) | 139.45 | 142.79 | 150.35 |
| Height — to be gained (cm) | 3.04 | 3.09 | 3.82 |
| Height — to be gained (in) | 1.20 | 1.22 | 1.50 |
| Gross Mass (kg) | 42.50 | 46.50 | 49.60 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 42.50 | 46.50 | 49.60 |
| Net Weight (lb-oz) | 93 lb 11.40 oz | 102 lb 8.52 oz | 109 lb 5.89 oz |
| Percentile-for-Net-Mass | 79.24 | 83.08 | 81.21 |
| Estimated-Adult Mass (kg) | 68.62 | 70.99 | 69.83 |
| Estimated-Adult Weight (lb-oz) | 151 lb 4.81 oz | 156 lb 8.37 oz | 153 lb 15.49 oz |
| BMI: Body-Mass Index (kg/m ²) | 22.84 | 23.83 | 23.10 |
| Estimated-Adult BMI (kg/m ²) | 27.29 | 27.93 | 26.86 |
| Optimal Mass (kg) | 30.95 | 33.31 | 37.90 |
| Optimal Weight (lb-oz) | 68 lb 3.81 oz | 73 lb 7.25 oz | 83 lb 8.99 oz |
| Δ Mass-for-Height (kg) | +11.55 | +13.19 | +11.70 |
| Δ Weight-for-Height (lb-oz) | +25 lb 7.59 oz | +29 lb 1.27 oz | +25 lb 12.90 oz |
| Status (pertaining-to-mass) | 37.33% OBESE | 39.59% OBESE | 30.88% OBESE |
| Optimal Mass for Reference Height, at A+ (kg) | 32.91 | 35.11 | 39.84 |
| Mass — to be lost (kg) | 9.59 | 11.39 | 9.76 |
| Mass — to be lost (lb-oz) | 21 lb 2.34 oz | 25 lb 1.84 oz | 21 lb 8.33z |

Classification of Nutritional Statuses

Under-nutrition, over-nutrition and malnutrition and energy-channelization

First mention: <http://www.ngds-ku.org/Papers/J32.pdf>

Stunting Induced by Wasting — Wasting Induced by Stunting: A Case Study
Kamal SA, Jamil SS, Razzaq UA, *International Journal of Biology and Biotechnology*,
11 (1): 147-153, 2014



Figure is reprinted from the above-mentioned reference

Under-Nutrition: Coexistence of Wasting and Stunting

The example below lists growth-and-obesity data of a child, whose height percentile is falling below 25 (NCHS 50th percentile is mapped to Pakistani 100th percentile) and $P(\mu) < P(h)$

Already exists in literature

NGDS-BLA-2010-4663/A

Table 18. Growth-and-Obesity Profiles of Y. L.

Gender: Female • Date of Birth: 2005-01-14

| Checkup | 1 st | 2 nd | 3 rd |
|---|-----------------|-----------------|-----------------|
| Date of Checkup | 2011-05-04 | 2012-03-19 | 2013-06-02 |
| Age (years) | 6.30 | 7.18 | 8.38 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 1.50 | 3.50 | 9.25 |
| Height (cm) | 111.20 | 115.44 | 124.56 |
| Height (ft-in) | 3 ft 7.78 in | 3 ft 9.45 in | 4 ft 1.04 in |
| Percentile-for-Height | 15.84 | 9.63 | 19.57 |
| Estimated-Adult Height (cm) | 156.40 | 154.58 | 157.46 |
| Estimated-Adult Height (ft-in) | 5 ft 1.58 in | 5 ft 0.86 in | 5 ft 1.99 in |
| Gross Mass (kg) | 16.30 | 16.99 | 18.59 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 16.30 | 16.99 | 18.59 |
| Net Weight (lb-oz) | 35 lb 15.06 oz | 37 lb 7.30 oz | 40 lb 15.86 oz |
| Percentile-for-Net-Mass | <3 | <3 | <3 |
| Estimated-Adult Mass (kg) | <45.25 | <45.25 | <45.25 |
| Estimated-Adult Weight (lb-oz) | <99 lb 12.42 oz | <99 lb 12.42 oz | <99 lb 12.42 oz |
| BMI: Body-Mass Index (kg/m ²) | 13.18 | 12.75 | 11.98 |
| Estimated-Adult BMI (kg/m ²) | <18.50 | <18.94 | <18.25 |
| Optimal Mass (kg) | 18.28 | 19.29 | 23.04 |
| Optimal Weight (lb-oz) | 40 lb 4.87 oz | 42 lb 8.64 oz | 50 lb 12.75 oz |
| Δ Mass-for-Height (kg) | -1.98 | -2.31 | -4.45 |
| Δ Weight-for-Height (lb-oz) | -4 lb 5.81 oz | -5 lb 1.34 oz | -9 lb 12.89 oz |
| Status (pertaining-to-mass) | 10.82% WASTED | 11.95% WASTED | 19.3% WASTED |

Over-Nutrition: Coexistence of Obesity and Tallness

The example below lists growth-and-obesity data of a child, whose height and mass percentiles both are shooting up above 97

Already exists in literature

NGDS-BLA-2011-5822/G

Table 19. Growth-and-Obesity Profiles of L. Z.

Gender: Male • Date of Birth: 2005-11-02

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> |
|--|-----------------------|-----------------------|
| Date of Checkup | 2012-05-02 | 2013- 11- 26 |
| Age (<i>years</i>) | 6.50 | 8.07 |
| Dress Code | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 6.00 | 7.25 |
| Height (<i>cm</i>) | 120.03 | 129.02 |
| Height (<i>ft-in</i>) | 3 ft 11.26 in | 4 ft 2.80 in |
| Percentile-for-Height | 59.48 | 54.84 |
| Estimated-Adult Height (<i>cm</i>) | 178.59 | 177.78 |
| Estimated-Adult Height (<i>ft-in</i>) | 5 ft 10.31 in | 5 ft 9.99 in |
| Gross Mass (<i>kg</i>) | 23.87 | 31.68 |
| Clothing Correction (<i>kg</i>) | 0 | 0 |
| Net Mass (<i>kg</i>) | 23.87 | 31.68 |
| Net Weight (<i>lb-oz</i>) | 52 lb 10.13 oz | 69 lb 13.67 oz |
| Percentile-for-Net-Mass | 72.92 | 86.18 |
| Estimated-Adult Mass (<i>kg</i>) | 78.29 | 86.36 |
| Estimated-Adult Weight (<i>lb-oz</i>) | 172 lb 10.12 oz | 190 lb 6.67 oz |
| <i>BMI</i> : Body-Mass Index (<i>kg/m²</i>) | 16.57 | 19.03 |
| Estimated-Adult <i>BMI</i> (<i>kg/m²</i>) | 24.55 | 27.32 |
| Optimal Mass (<i>kg</i>) | 23.06 | 26.43 |
| Optimal Weight (<i>lb-oz</i>) | 50 lb 13.62 oz | 58 lb 4.32 oz |
| Δ Mass-for-Height (<i>kg</i>) | +0.81 | +5.25 |
| Δ Weight-for-Height (<i>lb-oz</i>) | +1 lb 12.52 oz | +11 lb 9.35 oz |
| Status (pertaining-to-mass) | 3.51% OBESE | 19.88% OBESE |

Acute Malnutrition: Severe Wasting and Stunting

Both height and mass percentiles are falling below 3 — may be caused due to mal-absorption of diet or due to long-term disease (see also page 7)

Already exists in literature

NGDS-BLA-2011-5748/E

Table 20. Growth-and-Obesity Profiles of Z. L.

Gender: Male • Date of Birth: 2005-04-08

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> |
|--|-----------------------|-----------------------|
| Date of Checkup | 2012-04-26 | 2013- 11- 28 |
| Age (<i>years</i>) | 7.05 | 8.64 |
| Dress Code | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 6.0 | 7.0 |
| Height (<i>cm</i>) | 110.15 | 117.05 |
| Height (<i>ft-in</i>) | 3 ft 7.37 in | 3 ft 10.08 in |
| Percentile-for-Height | <3 | <3 |
| Estimated-Adult Height (<i>cm</i>) | <163.00 | <163.00 |
| Estimated-Adult Height (<i>ft-in</i>) | <5 ft 4.17 in | <5 ft 4.17 in |
| Gross Mass (<i>kg</i>) | 16.77 | 19.09 |
| Clothing Correction (<i>kg</i>) | 0 | 0 |
| Net Mass (<i>kg</i>) | 16.77 | 19.09 |
| Net Weight (<i>lb-oz</i>) | 36 lb 15.65 oz | 42 lb 1.5 oz |
| Percentile-for-Net-Mass | <3 | <3 |
| Estimated-Adult Mass (<i>kg</i>) | <54.50 | <54.50 |
| Estimated-Adult Weight (<i>lb-oz</i>) | <120 lb 2.76 oz | <120 lb 2.76 oz |
| <i>BMI</i> : Body-Mass Index (<i>kg/m²</i>) | 13.82 | 13.93 |
| Estimated-Adult <i>BMI</i> (<i>kg/m²</i>) | NC | NC |
| Optimal Mass (<i>kg</i>) | <18.10 | <21.28 |
| Optimal Weight (<i>lb-oz</i>) | <39 lb 14.51 oz | <46 lb 14.77 oz |
| Δ Mass-for-Height (<i>kg</i>) | NC | NC |
| Δ Weight-for-Height (<i>lb-oz</i>) | NC | NC |
| Status (pertaining-to-mass) | ND | ND |

Energy-Channelization I: Coexistence of Wasting and Tallness

Tallness with wasting, might be the result of micronutrients, predominantly, involved in tissue synthesis, all of them flow through a single absorption-channel

First mention: <http://www.ngds-ku.org/Papers/J32.pdf>

Stunting Induced by Wasting — Wasting Induced by Stunting: A Case Study
Kamal SA, Jamil SS, Razzaq UA, *International Journal of Biology and Biotechnology*, **11 (1): 147-153, 2014**

NGDS-BLA-2010-4795/F

Table 21. Growth-and-Obesity Profiles of H. A.

Gender: Female • Date of Birth: 2006-04-05

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|---|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2011-04-21 | 2012-04-11 | 2013-05-17 |
| Age (years) | 5.04 | 6.02 | 7.12 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 3.5 | 7.0 | 11.5 |
| Height (cm) | 111.50 | 117.55 | 124.56 |
| Height (ft-in) | 3 ft 7.90 in | 3 ft 10.28 in | 4 ft 1.04 in |
| Percentile-for-Height | 78.52 | 70.89 | 66.39 |
| Estimated-Adult Height (cm) | 168.67 | 166.84 | 166.12 |
| Estimated-Adult Height (ft-in) | 5 ft 6.41 in | 5 ft 5.69 in | 5 ft 5.40 in |
| Gross Mass (kg) | 15.30 | 18.76 | 22.09 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 15.30 | 18.76 | 22.09 |
| Net Weight (lb-oz) | 33 lb 11.78 oz | 41 lb 5.85 oz | 48 lb 11.34 oz |
| Percentile-for-Net-Mass | 9.76 | 28.67 | 42.14 |
| Estimated-Adult Mass (kg) | 48.16 | 52.69 | 54.31 |
| Estimated-Adult Weight (lb-oz) | 106 lb 3.25 oz | 116 lb 2.94 oz | 119 lb 11.95 oz |
| <i>BMI</i> : Body-Mass Index (kg/m ²) | 12.31 | 13.58 | 14.24 |
| Estimated-Adult <i>BMI</i> (kg/m ²) | 16.93 | 18.93 | 19.68 |
| Optimal Mass (kg) | 20.39 | 22.14 | 24.85 |
| Optimal Weight (lb-oz) | 44 lb 15.44 oz | 48 lb 13.24 oz | 54 lb 12.68 oz |
| Δ Mass-for-Height (kg) | -5.09 | -3.38 | -2.76 |
| Δ Weight-for-Height (lb-oz) | -11 lb 3.66 oz | -7 lb 7.38 oz | -6 lb 1.35 oz |
| Status (pertaining-to-mass) | 24.97% WASTED | 15.28% WASTED | 11.10% WASTED |

Energy-Channelization II: Coexistence of Obesity and Stunting

Stunting with obesity may be caused by storage of most micronutrients, all of them flowing through one channel of absorption

First mention: <http://www.ngds-ku.org/Papers/J32.pdf>

Stunting Induced by Wasting — Wasting Induced by Stunting: A Case Study
Kamal SA, Jamil SS, Razzaq UA, *International Journal of Biology and Biotechnology*, **11 (1):** 147-153, 2014

NGDS-BLA-2010-5280/F

Table 22. Growth-and-Obesity Profiles of R. Z.

Gender: Female • Date of Birth: 2005-08-17

| <i>Checkup</i> | 1 st | 2 nd | 3 rd |
|--|-----------------|-----------------|-----------------|
| Date of Checkup | 2011-04-21 | 2012-04-16 | 2013-05-17 |
| Age (<i>years</i>) | 5.68 | 6.66 | 7.75 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 0.5 | 5.0 | 8.5 |
| Height (<i>cm</i>) | 107.40 | 112.83 | 118.24 |
| Height (<i>ft-in</i>) | 3 ft 6.28 in | 3 ft 8.42 in | 3 ft 10.55 in |
| Percentile-for-Height | 19.98 | 11.70 | 8.13 |
| Estimated-Adult Height (<i>cm</i>) | 157.58 | 155.23 | 153.91 |
| Estimated-Adult Height (<i>ft-in</i>) | 5 ft 2.04 in | 5 ft 1.11 in | 5 ft 0.59 in |
| Gross Mass (<i>kg</i>) | 17.80 | 19.40 | 22.20 |
| Clothing Correction (<i>kg</i>) | 0 | 0 | 0 |
| Net Mass (<i>kg</i>) | 17.80 | 19.40 | 22.20 |
| Net Weight (<i>lb-oz</i>) | 39 lb 3.98 oz | 42 lb 12.43 oz | 48 lb 15.22 oz |
| Percentile-for-Net-Mass | 28.70 | 20.16 | 29.68 |
| Estimated-Adult Mass (<i>kg</i>) | 52.69 | 50.96 | 52.81 |
| Estimated-Adult Weight (<i>lb-oz</i>) | 116 lb 3.05 oz | 42 lb 12.43 oz | 116 lb 7.2 oz |
| <i>BMI</i> : Body-Mass Index (<i>kg/m²</i>) | 15.43 | 15.24 | 15.88 |
| Estimated-Adult <i>BMI</i> (<i>kg/m²</i>) | 21.22 | 21.15 | 22.29 |
| Optimal Mass (<i>kg</i>) | 17.19 | 18.65 | 20.12 |
| Optimal Weight (<i>lb-oz</i>) | 37 lb 14.47 oz | 41 lb 1.92 oz | 44 lb 5.91 oz |
| Δ Mass-for-Height (<i>kg</i>) | +0.61 | +0.75 | +2.08 |
| Δ Weight-for-Height (<i>lb-oz</i>) | +1 lb 5.51 oz | +1 lb 10.51 oz | +4 lb 9.31 oz |
| Status (pertaining-to-mass) | 3.55% OBESE | 4.03% OBESE | 10.33% OBESE |

Energy-Channelization III: Puberty-Induced Energy-Channelization

The example below lists growth-and-obesity data of a child, who was entering puberty and exhibited the phenomenon of energy channelization, associated with drops in both height and mass percentiles at the time of the second checkup (April 16, 2012) and then a pickup, when she presented herself for the third checkup (May 17, 2013)

First mention: http://www.ngds-ku.org/Presentation/Sport_Mathematics.pdf (May 17, 2014)

Sports and Anthromathematics — This Seminar

NGDS-BLA-2010-5331/F

Table 23. Growth-and-Obesity Profiles of G. M. T.

Gender: Female • Date of Birth: 2005-09-15

| <i>Checkup</i> | <i>1st</i> | <i>2nd</i> | <i>3rd</i> |
|---|-----------------------|-----------------------|-----------------------|
| Date of Checkup | 2011-04-21 | 2012-04-16 | 2013-05-17 |
| Age (years) | 5.60 | 6.59 | 7.67 |
| Dress Code | 0/0.5 | 0/0.5 | 0/0.5 |
| Cumulative-Scoliosis-Risk Weightage | 2.00 | 4.50 | 8.00 |
| Height (cm) | 120.40 | 126.34 | 132.33 |
| Height (ft-in) | 3 ft 11.40 in | 4 ft 1.74 in | 4 ft 4.1 in |
| Percentile-for-Height | 95.58 | 93.24 | 97.08 |
| Estimated-Adult Height (cm) | 174.36 | 173.47 | 171.53 |
| Estimated-Adult Height (ft-in) | 5 ft 8.65 in | 5 ft 8.30 in | 5 ft 7.53 in |
| Gross Mass (kg) | 28.80 | 22.92 | 36.99 |
| Clothing Correction (kg) | 0 | 0 | 0 |
| Net Mass (kg) | 28.80 | 22.92 | 36.99 |
| Net Weight (lb-oz) | 63 lb 8.06 oz | 50 lb 8.62 oz | 81 lb 9.01 oz |
| Percentile-for-Net-Mass | >97 | 61.88 | >97 |
| Estimated-Adult Mass (kg) | > 88.75 | 60.36 | > 88.75 |
| Estimated-Adult Weight (lb-oz) | > 195 lb 11.10 oz | 133 lb 1.5 oz | > 195 lb 11.1 oz |
| BMI: Body-Mass Index (kg/m ²) | 19.87 | 14.35 | 21.12 |
| Estimated-Adult BMI (kg/m ²) | > 29.19 | 20.06 | > 31.16 |
| Optimal Mass (kg) | 26.15 | 28.68 | 30.93 |
| Optimal Weight (lb-oz) | 57 lb 10.40 oz | 63 lb 3.93 oz | 68 lb 3.14 oz |
| Δ Mass-for-Height (kg) | +2.65 | -5.78 | +6.06 |
| Δ Weight-for-Height (lb-oz) | +5 lb 13.66 oz | -12 lb 12.01 oz | +13 lb 5.89 oz |
| Status (pertaining-to-mass) | 10.15% OBESE | 20.16% WASTED | 19.60% OBESE |

*The Second-Generation Solution of
Childhood-Obesity Problem*

to be launched on **Thursday, September 4, 2014** during

**The Second Conference on
Athromathematics and Sport Mathematics**

<http://www.ngds-ku.org/Anthromathematics/2014/Athromathematics2014.pdf>

GROWTH-AND-OBESITY ENHANCED-ROADMAPS OF CHILDREN

Theoretical Background: <http://www.ngds-ku.org/Presentations/Enhanced.pdf>

Examples: http://www.ngds-ku.org/Presentations/Enhanced/Additional_File.pdf (pp. 2-5)

The First-Generation Solution of Childhood-Obesity Problem

proposed on **Wednesday, September 4, 2013** during

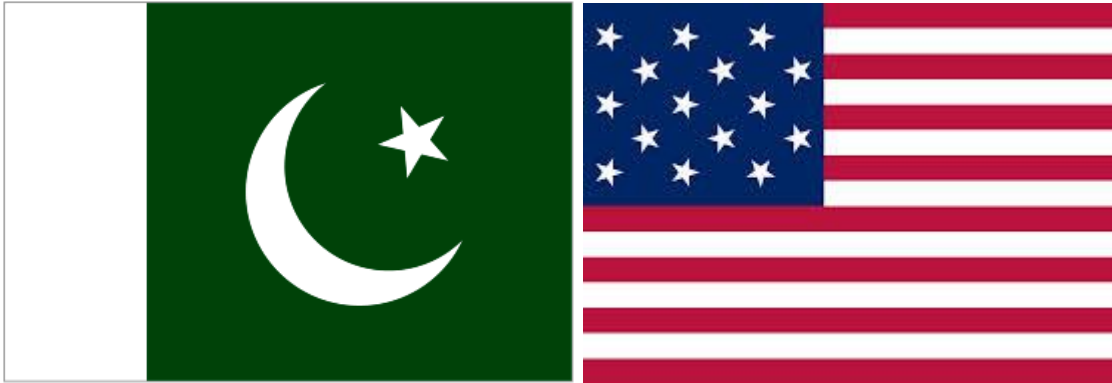
The First Conference on Anthromathematics

<http://www.ngds-ku.org/Anthromathematics/2013/Athromathematics2013.pdf>

GROWTH-AND-OBESITY ROADMAPS OF CHILDREN

Theoretical Background: <http://www.ngds-ku.org/Presentations/Roadmap.pdf>

Examples: This document (pp. 13-16) inspired by declaration of obesity as a national epidemic for the American children by the First Lady of US, **Her Excellency Michelle Obama**



Web address of the main document:

Seminar Notes

SPORTS AND ANTHROMATHEMATICS

http://www.ngds-ku.org/Presentations/Sport_Mathematics.pdf

Web address of this document:

Additional File

BASIC AND INNOVATIVE CONCEPTS IN ANTHROMATHEMATICS AND SPORT MATHEMATICS

http://www.ngds-ku.org/Presentations/Sport_Mathematics/Additional_File.pdf