

# Distribution of Body Weight, Height and Body Mass Index in a National Sample of Malaysian Adults

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## Summary

We describe the distribution of body weight, height and body mass index (BMI) by age, sex and ethnicity in Malaysian adults. A national sample of 28737 individuals aged 20 or older had usable data. They were selected by stratified 2-stage cluster sampling. Percentile tables and curves by age, sex and ethnicity are presented. The body weight and BMI distributions were right skewed, while that of height was symmetrical. BMI distribution showed the expected increase with age, while that of height decrease with age. Differences in BMI between the 2 sexes and among the 4 ethnic groups were observed. Indian had the highest BMI, followed by Malay, Chinese and other indigenous ethnic group.

**Key Words:** Body weight, Height, Body mass index, Obesity, Population survey, Distribution

## Introduction

The distributions of body weight, height and body mass index (BMI) in a representative national sample of Malaysian adults have not previously been described. Such information is of epidemiological interest, and is also useful in public health practice.

The relationship between BMI and mortality is U shaped<sup>1-4</sup>. Both low and high BMI are associated with increase risk of all-cause mortality. High body mass index in particular is associated with increase risk of hypertension, diabetes and hyperlipidaemia<sup>5</sup>. Height is negatively associated with mortality, with shorter individuals having higher mortality risk<sup>1</sup>. This is not due to the biological effect of height per se but is a reflection of nutritional and health deficit earlier in life

with resulting failure to attain growth potential. Countries that have undergone rapid socio-economic development, for example Japan, have witnessed marked secular increase in height among younger cohorts as well as improvement in health status<sup>3</sup>. Thus, information on population distribution of anthropometric indicators are useful for predicting health burden in a population as well as for describing changes in physical status associated the rapid socio-economic development in the last 4 decades.

We present here the distribution of body weight, height and body mass index by age, sex and ethnicity using the data from the National Health and Morbidity survey (NHMS) completed in 1996.

## Materials and Methods

### Sampling design and sample

The NHMS was a multi-purpose health survey designed to describe the health status, health related behaviour and health services utilisation for a representative sample of the population of Malaysia. An up to date and representative sampling frame for this population was provided by the frame used by the annual Labour Force survey conducted by the Department of Statistics<sup>6</sup>. The sampling frame was stratified by state and urban/rural residence. A stratified two stage cluster sampling design with self-weighting sample was used to draw a sample of 17995 private dwellings. However, only 13025 (87%) of dwellings were contactable or responded. All residents of sampled dwellings were included yielding a sample size of 59903 individuals. For NHMS

component on body weight and height, 31594 individuals aged 20 or older were eligible. 28737 (91%) of them agreed to have their measurements taken or had evaluable responses. Table I and II show the composition of the sample.

### Body weight and height measurement

Body weight and height were measured by trained observer. Body weight was measured in light indoor clothing without shoes to the nearest tenth of a kilogram using a bathroom spring balance. Height was measured without shoes to the nearest tenth of a centimetre using a measuring tape attached to a rigid wall. Measurements were not taken on respondents who were bedridden, pregnant, or who had spinal deformities and other major physical impairment. All observers attended centralised training on standardised protocol

**Table I**  
**Characteristics of Respondents Compared with Total Population of Malaysia Aged 20 or Older in 1996**

	<b>% Respondents (unweighted) n=28737 No. (%)</b>	<b>% Malaysia Population Aged 20 or Older n=11.64 million %</b>
<b>Sex</b>		
Male	13603 (47%)	51%
Female	15134 (53%)	49%
<b>Age</b>		
20 - 24	3844 (13%)	17%
25 - 29	4000 (14%)	15%
30 - 34	4193 (15%)	14%
35 - 39	3928 (14%)	13%
40 - 44	3323 (12%)	10%
45 - 49	2643 (9%)	8%
50 - 54	1928 (7%)	6%
55 - 59	1635 (6%)	5%
60 - 64	1328 (5%)	4%
65 - 69	892 (3%)	3%
>=70	1023 (4%)	4%
<b>Ethnic</b>		
Malay	12737 (44%)	43%
Chinese	7619 (27%)	28%
Indian	1941 (7%)	7%
Other indigenous	4458 (16%)	9%
Others	1982 (7%)	12%

**Table II**  
**Sample Size by Age, Sex and Ethnicity in the Survey**

	Malay	Chinese	Indian	Other indigenous
Men, age in years				
20 - 24	749	407	113	257
25 - 34	810	425	118	309
30 - 34	834	463	133	322
35 - 39	819	429	158	280
40 - 44	709	420	116	233
45 - 49	594	411	84	146
50 - 54	422	307	47	152
55 - 59	398	243	40	89
60 - 64	286	197	34	98
65 - 69	205	141	29	49
>=70	214	149	32	92
Women, age in years				
20 - 24	893	453	140	380
25 - 34	903	447	140	421
30 - 34	939	527	159	417
35 - 39	942	535	168	333
40 - 44	842	528	126	204
45 - 49	602	419	100	193
50 - 54	454	317	43	119
55 - 59	391	264	56	110
60 - 64	306	212	52	100
65 - 69	204	153	23	66
>=70	221	172	30	88

for body weight and height measurement. During field survey, supervisors conducted weekly check on compliance with measurement protocol. The spring balance for weight measurement was calibrated daily.

### Definitions

Body mass index (BMI) is defined as ratio of weight in kilogram to square of height in metre. For purpose of analysis, BMI was categorised as grade 3 thinness (BMI < 16 Kg/M<sup>2</sup>), grade 2 thinness (BMI 16 - 16.99 Kg/M<sup>2</sup>), grade 1 thinness (BMI 17 - 18.49 Kg/M<sup>2</sup>), normal (BMI 18.5 - 24.99 Kg/M<sup>2</sup>), grade 1 overweight (BMI 25 - 29.99 Kg/M<sup>2</sup>), grade 2 overweight (BMI 30 - 39.99 Kg/M<sup>2</sup>), grade 3 overweight (BMI ≥ 40 Kg/M<sup>2</sup>) according to the classification system recommended by the WHO Expert Committee on Physical status<sup>5</sup>.

### Statistical methods

Probability weighted estimation was used to obtain all estimates as appropriate for the sampling design<sup>7-9</sup>. The sampling weights were adjusted for household non-response using adjustment cells formed by state and urban/rural residence<sup>10</sup>. Post stratification was used to adjust the weighted sample totals to known population totals for age, gender and ethnicity based on 1996 census population projection.

Anthropometric measures are expected to vary smoothly and continuously by age. We therefore used polynomial smoothing method of Healy<sup>11</sup> to construct centile curves. Overall, ethnic and sex specific means and percentages were standardised by the direct method to the age distribution of the 1996 adult Malaysian

population. S-Plus<sup>12</sup> and STATA<sup>13</sup> software packages were used for analysis.

## Results

### Percentiles distribution

The percentiles of body weight, height and BMI by age, gender and ethnicity are shown in Tables III to XXVI. In all ethnic-gender groups, BMI rose with increasing age till fifth or sixth decade, thereafter it declined. The rise in BMI with age was steeper for women than men. In contrast there was an obvious decrease in height with age in both sexes and all ethnic groups.

### Mean BMI

Tables XXVII and XXVIII show the mean height, weight and BMI by gender, ethnicity and age. Women have higher mean BMI than men except for Chinese. Among women, Indian had the highest BMI, followed by Malay, Other indigenous and then Chinese. Among men, Chinese had the highest BMI followed by Indian, Malay and other indigenous. Among Indian, Malay and other indigenous ethnic group, women had higher BMI than men in all age groups till the seventh decade onwards when the mean BMI of the two sexes converged. In contrast, young Chinese men had higher BMI than their female counterparts until the fifth decade. Thereafter, the reverse was true.

### Percentage distribution of BMI

Tables XXIX to XXXI show the percentage distribution of BMI according to WHO classification<sup>5</sup>. Overall, 26.5% of the adult population had BMI in the overweight range but only about 6% had grade 2 or higher overweight, 61% had normal BMI and 13% had grade 1 or higher thinness. Both overweight and thinness were more common among women than men. Indian had the highest prevalence of overweight, followed by Malay, Chinese and other indigenous group the lowest prevalence.

## Discussion

We advise caution in interpreting the results. The stability of the centile estimates is assured only if based on

large sample sizes. This was clearly the case for Malay, Chinese and other indigenous ethnic group's estimates. However sample sizes for Indian in the older age groups (age 65 - 70+) were small. The smoothing method employed to construct the centile curves had masked the underlying sampling variability. One should also be cautious in interpreting cross sectional data longitudinally. The rise in BMI with age may be interpreted as due to sedentary lifestyle associated with ageing. However, the tendency of the rise to flatten or even reverses beyond age 50 - 60 should not be interpreted as due to ageing effect. One alternative explanation is selective survival. People with lower BMI tend to survive with increasing age thus shifting the BMI distribution of survivors downwards. On the other hand, the decrease in height with age is more reasonably interpreted as due to cohort effect. Younger cohorts attain better growth potential because of better nutrition than older cohorts. Cross sectional data as presented here cannot differentiate the individual contribution of ageing, selective survival and cohort effect.

Characteristics of the BMI distribution of the Malaysian population, as shown here, largely resemble those observed in other substantial population surveys<sup>5,14-16</sup>. The right skewed distribution, the age trend in BMI, differences between the 2 sexes and variation among the ethnic groups are all well described characteristics of population BMI distribution. The most notable findings are the remarkably low BMI prevailing in all ethnic groups in our population. This is in sharp contrast to Western populations<sup>14-16</sup>, and is comparable to other non-western populations<sup>5</sup>.

The other notable finding is the marked secular increase in height among younger cohorts. Younger Malaysians from all ethnic groups had attained better growth potential as a result of better nutrition and health brought on by the socio-economic development this country has witnessed in the last 4 decades. Countries that have similarly undergone rapid socio-economic development, for example Japan, have experienced similar changes in population height<sup>5</sup>.

The distributions of anthropometric measurements of Malaysian adults described here are not merely of epidemiological interest. They are useful in their own

**Table III**  
**Percentiles of Body Mass Index for Malay Males, by Age**

Age Group n	20-24 749	25-29 810	30-34 834	35-39 819	40-44 709	45-49 594	50-54 422	55-59 398	60-64 286	65-69 205	>=70 214
Percentiles											
2.50th	15	16	17	17	17	17	17	16	16	15	14
5.00th	16	17	18	18	18	18	18	17	16	16	15
10.00th	17	18	18	19	19	19	19	18	17	17	16
15.00th	17	18	19	20	20	20	19	19	18	18	17
20.00th	18	19	20	20	20	20	20	19	19	18	18
25.00th	18	19	20	21	21	21	20	20	19	19	18
30.00th	19	20	21	21	21	21	21	21	20	19	19
35.00th	19	20	21	22	22	22	21	21	20	20	19
40.00th	20	21	22	22	22	22	22	22	21	20	20
45.00th	20	21	22	23	23	23	22	22	21	21	20
50.00th	21	22	23	23	23	23	23	23	22	21	21
55.00th	21	22	23	24	24	24	23	23	23	22	21
60.00th	22	23	24	24	24	24	24	24	23	22	22
65.00th	22	23	24	25	25	25	25	24	24	23	22
70.00th	23	24	25	25	25	25	25	25	24	24	23
75.00th	23	25	25	26	26	26	26	25	25	24	24
80.00th	24	25	26	27	27	27	27	26	26	25	25
85.00th	25	26	27	28	28	28	28	27	27	26	26
90.00th	26	28	28	29	29	29	29	29	28	27	27
95.00th	28	29	30	31	31	31	31	30	30	29	29
97.50th	30	31	32	33	33	33	33	32	32	31	31
mean	21.16	22.31	23.07	23.63	23.73	23.89	23.12	22.88	22.81	21.87	21.09
sd*	3.64	3.67	3.93	3.90	3.62	3.82	3.87	3.90	4.53	3.83	3.69
skew**	1.48	0.91	0.83	0.56	0.47	0.46	0.79	0.78	1.78	0.41	1.41

\*sd means standard deviation, \*\*skew means skewness

**Table IV**  
**Percentiles of Body Mass Index for Malay Females, by Age**

Age Group n	20-24 893	25-29 903	30-34 939	35-39 942	40-44 842	45-49 602	50-54 454	55-59 391	60-64 306	65-69 204	>=70 221
Percentiles											
2.50th	15	16	18	18	18	18	18	18	17	16	15
5.00th	16	17	18	19	19	19	19	18	18	17	15
10.00th	17	18	19	20	20	20	20	19	18	18	16
15.00th	17	19	20	21	21	21	21	20	19	18	17
20.00th	18	19	20	21	21	21	21	21	20	19	18
25.00th	18	20	21	22	22	22	22	21	20	19	18
30.00th	19	20	21	22	22	23	22	22	21	20	19
35.00th	19	21	22	23	23	23	23	22	21	21	19
40.00th	20	21	22	23	23	24	23	23	22	21	20
45.00th	20	22	23	24	24	24	24	23	22	22	20
50.00th	21	22	23	24	24	24	24	24	23	22	21
55.00th	21	23	24	25	25	25	25	24	24	23	22
60.00th	22	23	24	25	25	26	25	25	24	23	22
65.00th	22	24	25	26	26	26	26	25	25	24	23
70.00th	23	24	25	26	27	27	26	26	25	24	23
75.00th	23	25	26	27	27	27	27	27	26	25	24
80.00th	24	26	27	28	28	28	28	27	27	26	25
85.00th	25	27	28	29	29	29	29	28	28	27	26
90.00th	26	28	29	30	30	30	30	30	29	28	27
95.00th	28	30	31	32	32	32	32	32	31	30	29
97.50th	30	31	33	34	34	34	34	33	33	32	31
mean	21.16	22.64	23.52	24.68	24.99	25.03	24.65	24.23	23.56	22.33	21.54
sd*	4.09	4.91	4.54	5.06	4.52	4.95	5.03	4.85	4.93	5.08	4.15
skew**	1.37	1.33	0.72	0.82	0.85	0.49	0.19	0.40	0.83	1.76	0.43

\*sd means standard deviation, \*\*skew means skewness

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**Table V**  
Percentiles of Body Mass Index for Chinese Males, by Age

Age Group n Percentiles	20-24 407	25-29 425	30-34 463	35-39 429	40-44 420	45-49 411	50-54 307	55-59 243	60-64 197	65-69 141	>=70 149
2.50th	16	17	17	17	17	17	17	17	16	16	15
5.00th	17	17	18	18	18	18	18	17	17	17	16
10.00th	17	18	19	19	19	19	19	18	18	18	17
15.00th	18	19	19	20	20	20	20	19	19	18	18
20.00th	19	20	20	20	20	20	20	20	19	19	19
25.00th	19	20	21	21	21	21	21	20	20	20	19
30.00th	20	21	21	21	21	21	21	21	21	20	20
35.00th	20	21	22	22	22	22	22	21	21	21	20
40.00th	21	21	22	22	22	22	22	22	22	21	21
45.00th	21	22	23	23	23	23	23	22	22	22	21
50.00th	22	22	23	23	23	23	23	23	22	22	22
55.00th	22	23	23	24	24	24	24	23	23	23	22
60.00th	23	23	24	24	24	24	24	24	24	23	23
65.00th	23	24	25	25	25	25	25	25	24	24	23
70.00th	24	25	25	25	26	26	25	25	25	24	24
75.00th	24	25	26	26	26	26	26	26	26	25	25
80.00th	25	26	27	27	27	27	27	27	26	26	26
85.00th	26	27	27	28	28	28	28	28	27	27	27
90.00th	27	28	29	29	29	29	29	29	29	28	28
95.00th	29	30	31	31	31	31	31	31	31	30	30
97.50th	31	32	32	33	33	33	33	33	32	32	32
mean	22.07	22.74	23.68	23.79	23.67	24.11	23.48	23.29	23.17	22.90	22.00
sd*	3.75	3.59	3.83	3.99	3.56	3.65	3.51	3.41	3.79	3.57	3.55
skew**	0.97	1.19	0.44	1.13	0.45	0.57	0.51	0.20	0.12	0.16	-0.08

\*sd means standard deviation, \*\*skew means skewness

**Table VI**  
Percentiles of Body Mass Index for Chinese Females, by Age

Age Group n Percentiles	20-24 453	25-29 447	30-34 527	35-39 535	40-44 528	45-49 419	50-54 317	55-59 264	60-64 212	65-69 153	>=70 172
2.50th	14	15	16	17	17	17	18	17	17	17	16
5.00th	15	16	17	17	18	18	18	18	18	17	16
10.00th	16	17	18	18	19	19	19	19	19	18	17
15.00th	17	18	18	19	19	20	20	20	20	19	18
20.00th	17	18	19	20	20	20	21	21	20	20	19
25.00th	18	19	19	20	21	21	21	21	21	20	19
30.00th	18	19	20	21	21	21	22	22	21	21	20
35.00th	19	20	20	21	22	22	22	22	22	21	21
40.00th	19	20	21	22	22	22	23	23	22	22	21
45.00th	20	21	21	22	23	23	23	23	23	22	22
50.00th	20	21	22	23	23	23	24	24	23	23	22
55.00th	21	22	22	23	24	24	24	24	24	23	23
60.00th	21	22	23	24	24	24	25	25	24	24	23
65.00th	22	23	23	24	25	25	25	25	25	25	24
70.00th	22	23	24	25	25	26	26	26	26	25	24
75.00th	23	24	25	25	26	26	27	27	26	26	25
80.00th	24	25	25	26	27	27	27	27	27	27	26
85.00th	25	25	26	27	28	28	28	28	28	28	27
90.00th	26	27	28	28	29	29	30	30	29	29	28
95.00th	28	29	29	30	31	31	32	32	31	31	30
97.50th	29	30	31	32	33	33	33	33	33	33	32
mean	20.5	21.39	22.53	22.72	23.61	23.92	24.24	24.02	23.65	24.26	22.27
sd*	3.66	3.73	3.79	3.86	4.16	4.21	3.88	4.79	4.55	4.50	4.40
skew**	2.18	1.45	1.10	1.19	1.20	2.20	0.49	3.20	1.53	0.11	0.67

\*sd means standard deviation, \*\*skew means skewness

right. In public health practice, the planning of any prevention strategy must take into account the burden of illness due to any risk factor in the community. Population BMI distribution can help in estimating the burden of illness due to obesity related morbidity in the population. In the planning of screening programme to control overweight, information on BMI distribution in the population is required for resource planning. The available resources must match the number of individuals in the population targeted for intervention, the number in turn depends on the population BMI distribution.

To our knowledge, this is the first detailed description of BMI and height distributions in a representative national sample of Malaysian adults. The distributions can serve as baseline for comparison with future repeat survey to determine the effectiveness of intervention programme in shifting the population BMI distribution in a favourable direction as well in monitoring population nutritional status. The distributions described here can also serve as a yardstick for assessing

the representativeness of sample in small scale survey. The BMI and height distributions of a representative sample should closely match that described here.

In conclusion, we found the distribution of BMI of Malaysian adults was shifted downwards compared with those in Western populations. The height distribution was typical of that in countries that have undergone rapid socio-economic development. Detailed description of distributions of BMI and height in our population are useful for public health practice.

### Acknowledgement

We are grateful to the investigators of the Second National Health and Morbidity survey (NHMS2), and in particular its principal investigator, Dr. Maimunah A. Hamid for agreeing to release NHMS2 sample survey data for secondary analysis that made this research possible.

**Table VII**  
**Percentiles of Body Mass Index for Indian Males, by Age**

Age Group n	20-24 113	25-29 118	30-34 133	35-39 158	40-44 116	45-49 84	50-54 47	55-59 40	60-64 34	65-69 29	>=70 32
2.50th	15	16	17	18	18	18	18	17	17	16	16
5.00th	15	17	18	18	19	19	18	18	18	17	17
10.00th	16	18	19	19	20	20	19	19	19	18	18
15.00th	17	18	19	20	20	20	20	20	19	19	18
20.00th	18	19	20	21	21	21	21	20	20	19	19
25.00th	18	20	21	21	21	22	21	21	20	20	20
30.00th	19	20	21	22	22	22	22	21	21	21	20
35.00th	19	21	22	22	22	23	22	22	22	21	21
40.00th	19	21	22	23	23	23	23	22	22	22	21
45.00th	20	21	22	23	23	23	23	23	23	22	22
50.00th	20	22	23	24	24	24	24	23	23	23	22
55.00th	21	22	23	24	24	24	24	24	24	23	23
60.00th	21	23	24	25	25	25	25	25	24	24	23
65.00th	22	23	25	25	26	26	25	25	25	24	24
70.00th	23	24	25	26	26	26	26	26	25	25	24
75.00th	23	25	26	26	27	27	27	26	26	26	25
80.00th	24	25	27	27	28	28	28	27	27	26	26
85.00th	25	26	27	28	29	29	28	28	28	27	27
90.00th	26	28	29	29	30	30	30	29	29	29	28
95.00th	28	29	31	31	32	32	32	31	31	31	30
97.50th	30	31	32	33	33	34	33	33	33	32	32
mean	20.91	22.11	23.65	24.07	24.6	23.8	25.43	23.71	22.77	23.48	22.22
sd*	3.40	3.69	3.73	3.60	3.39	3.45	3.64	3.11	2.86	4.66	4.61
skew**	0.87	0.42	0.49	0.27	0.64	0.10	0.59	1.31	-0.15	0.19	1.74

\*sd means standard deviation, \*\*skew means skewness

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**Table VIII**  
Percentiles of Body Mass Index for Indian Females, by Age

Age Group n	0-24 140	25-29 140	30-34 159	35-39 168	40-44 126	45-49 100	50-54 43	55-59 56	60-64 52	65-69 23	>=70 30
Percentiles											
2.50th	15	16	17	18	19	19	19	19	18	16	14
5.00th	16	17	18	19	19	20	20	19	18	17	15
10.00th	17	18	19	20	20	21	21	20	19	18	16
15.00th	17	19	20	20	21	21	21	21	20	19	17
20.00th	18	19	20	21	22	22	22	22	21	20	18
25.00th	19	20	21	22	22	23	23	22	21	20	18
30.00th	19	20	21	22	23	23	23	23	22	21	19
35.00th	19	21	22	23	23	24	24	23	22	21	19
40.00th	20	21	22	23	24	24	24	24	23	22	20
45.00th	20	22	23	24	24	25	25	24	23	22	20
50.00th	21	22	23	24	25	25	25	25	24	23	21
55.00th	21	23	24	24	25	26	26	25	24	23	21
60.00th	22	23	24	25	26	26	26	26	25	24	22
65.00th	22	24	25	26	26	27	27	26	26	24	23
70.00th	23	24	25	26	27	27	27	27	26	25	23
75.00th	24	25	26	27	28	28	28	28	27	26	24
80.00th	24	26	27	28	28	29	29	28	28	26	25
85.00th	25	27	28	29	29	30	30	29	29	27	26
90.00th	26	28	29	30	30	31	31	31	30	29	27
95.00th	28	30	31	32	32	33	33	33	32	31	29
97.50th	30	31	32	33	34	35	35	34	34	33	31
mean	21.21	22.33	24.00	24.53	24.88	25.35	26.13	24.57	25.05	24.47	20.49
sd*	4.20	4.38	4.42	5.07	5.41	4.78	4.54	4.91	5.62	3.78	3.45
skew**	1.03	0.91	0.68	1.07	2.13	0.42	0.61	0.59	1.74	-0.18	0.22

\* sd means standard deviation, \*\* skew means skewness

**Table IX**  
Percentiles of Body Mass Index for Other Indigenous Males, by Age

Age Group n	20-24 257	25-29 309	30-34 322	35-39 280	40-44 233	45-49 146	50-54 152	55-59 89	60-64 98	65-69 49	>=70 92
Percentiles											
2.50th	15	16	17	17	17	16	16	15	14	14	13
5.00th	16	17	17	18	17	17	17	16	15	15	14
10.00th	17	18	18	19	18	18	18	17	16	16	15
15.00th	17	18	19	19	19	19	18	18	17	16	16
20.00th	18	19	20	20	20	19	19	18	18	17	16
25.00th	18	19	20	20	20	20	19	19	18	18	17
30.00th	19	20	21	21	21	20	20	19	19	18	17
35.00th	19	20	21	21	21	21	21	20	19	19	18
40.00th	20	21	22	22	22	21	21	20	20	19	18
45.00th	20	21	22	22	22	22	21	21	20	20	19
50.00th	21	22	22	23	23	22	22	21	21	20	20
55.00th	21	22	23	23	23	23	22	22	21	21	20
60.00th	22	23	24	24	24	23	23	22	22	21	21
65.00th	22	23	24	24	24	24	24	23	22	22	21
70.00th	23	24	25	25	25	25	24	24	23	22	22
75.00th	24	25	25	26	26	25	25	24	24	23	23
80.00th	24	25	26	26	26	26	26	25	25	24	23
85.00th	25	26	27	27	27	27	27	26	25	25	24
90.00th	26	28	28	29	29	28	28	27	27	26	26
95.00th	28	29	30	30	30	30	30	29	29	28	28
97.50th	30	31	32	32	32	32	32	31	31	30	29
mean	21.35	22.02	22.99	23.21	23.59	22.78	22.10	21.56	21.32	21.21	19.81
sd*	2.81	3.12	3.35	3.43	4.07	3.56	3.22	3.40	3.56	3.01	3.39
skew**	1.40	0.82	0.46	0.55	0.53	0.39	0.33	0.42	1.04	0.40	0.35

\*sd means standard deviation, \*\*skew means skewness

**Table X**  
**Percentiles of Body Mass Index for Other Indigenous Females, by Age**

Age Group n	20-24 380	25-29 421	30-34 417	35-39 333	40-44 204	45-49 193	50-54 119	55-59 110	60-64 100	65-69 66	>=70 88
Percentiles											
2.50th	15	16	17	18	17	17	16	15	14	14	13
5.00th	16	17	18	18	18	18	17	16	15	14	13
10.00th	17	18	19	19	19	19	18	17	16	15	15
15.00th	17	19	20	20	20	19	19	18	17	16	15
20.00th	18	19	20	20	20	20	19	18	18	17	16
25.00th	18	20	21	21	21	20	20	19	18	17	17
30.00th	19	20	21	21	21	21	20	20	19	18	17
35.00th	19	21	22	22	22	21	21	20	19	18	18
40.00th	20	21	22	22	22	22	21	21	20	19	18
45.00th	20	22	23	23	23	22	22	21	20	19	19
50.00th	21	22	23	23	23	23	22	22	21	20	19
55.00th	21	23	24	24	24	23	23	22	21	20	20
60.00th	22	23	24	24	24	24	23	23	22	21	20
65.00th	22	24	25	25	25	25	24	23	22	22	21
70.00th	23	24	25	26	26	25	25	24	23	22	21
75.00th	24	25	26	26	26	26	25	25	24	23	22
80.00th	24	26	27	27	27	27	26	25	24	24	23
85.00th	25	27	28	28	28	28	27	26	25	25	24
90.00th	26	28	29	29	29	29	28	28	27	26	25
95.00th	28	30	31	31	31	31	30	29	29	28	27
97.50th	30	32	32	33	33	33	32	31	31	30	29
mean	21.47	22.30	23.38	24.09	24.40	23.08	22.82	22.14	20.52	20.57	19.72
sd*	3.93	4.20	3.95	4.52	4.740	4.54	4.54	4.42	4.15	4.23	4.30
skew**	1.47	0.95	0.94	0.82	0.45	0.46	0.27	0.31	0.32	0.20	0.58

\*sd means standard deviation, \*\*skew means skewness

**Table XI**  
**Percentiles of Body Weight for Malay Males, by Age**

Age Group n	20-24 749	25-29 810	30-34 834	35-39 819	40-44 709	45-49 594	50-54 422	55-59 398	60-64 286	65-69 205	>=70 214
Percentiles											
2.50th	42	45	47	47	47	46	45	43	41	38	36
5.00th	44	47	49	49	49	48	47	45	43	40	38
10.00th	46	49	51	52	52	51	49	48	45	43	41
15.00th	48	51	53	54	54	53	51	49	47	45	43
20.00th	49	53	55	55	55	54	53	51	49	47	44
25.00th	51	54	56	57	57	56	55	53	50	48	46
30.00th	52	55	57	58	58	57	56	54	52	50	47
35.00th	53	57	59	59	59	59	57	55	53	51	49
40.00th	55	58	60	61	61	60	59	57	55	52	50
45.00th	56	59	61	62	62	61	60	58	56	54	51
50.00th	57	60	62	63	63	63	61	59	57	55	53
55.00th	59	62	64	65	65	64	63	61	59	56	54
60.00th	60	63	65	66	66	65	64	62	60	58	55
65.00th	61	65	67	68	68	67	66	64	62	59	57
70.00th	63	66	68	69	69	68	67	65	63	61	59
75.00th	65	68	70	71	71	70	69	67	65	63	61
80.00th	67	70	72	73	73	72	71	69	67	65	63
85.00th	69	72	74	75	76	75	74	72	70	67	65
90.00th	72	76	78	79	79	78	77	75	73	71	69
95.00th	77	81	83	84	84	83	82	80	78	76	74
97.50th	82	85	87	88	89	88	87	85	83	81	79
mean	58.53	61.2	63.53	64.78	64.59	64.55	61.63	59.94	59.06	56.19	53.88
sd*	10.76	10.71	11.88	11.44	11.17	11.48	10.83	11.41	11.60	10.86	9.66
skew**	1.41	0.97	0.86	0.58	0.60	0.52	0.64	0.89	0.64	0.34	0.55

\*sd means standard deviation, \*\*skew means skewness

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**Table XII**  
Percentiles of Body Weight for Malay Females, by Age

Age Group n Percentiles	20-24 893	25-29 903	30-34 939	35-39 942	40-44 842	45-49 602	50-54 454	55-59 391	60-64 306	65-69 204	>=70 221
2.50th	33	37	40	41	41	41	39	37	35	32	29
5.00th	35	39	42	43	43	43	41	39	37	34	31
10.00th	38	42	44	46	46	45	44	42	40	37	34
15.00th	40	44	46	47	48	47	46	44	42	39	36
20.00th	41	45	48	49	49	49	48	46	43	40	37
25.00th	43	47	49	51	51	50	49	47	45	42	39
30.00th	44	48	50	52	52	52	51	49	46	43	40
35.00th	45	49	52	53	54	53	52	50	48	45	42
40.00th	47	50	53	54	55	54	53	51	49	46	43
45.00th	48	52	54	56	56	56	55	53	50	47	44
50.00th	49	53	56	57	57	57	56	54	52	49	46
55.00th	50	54	57	58	59	58	57	55	53	50	47
60.00th	52	56	58	60	60	60	59	57	54	52	49
65.00th	53	57	60	61	62	61	60	58	56	53	50
70.00th	55	59	61	63	63	63	62	60	58	55	52
75.00th	57	60	63	65	65	65	64	62	59	57	54
80.00th	59	62	65	67	67	67	66	64	62	59	56
85.00th	61	65	68	69	70	69	68	66	64	61	58
90.00th	64	68	71	72	73	73	71	70	67	65	62
95.00th	69	73	76	77	78	78	77	75	73	70	67
97.50th	74	78	81	82	83	82	81	80	77	75	72
mean	50.65	53.86	56.32	58.55	58.81	58.54	56.99	54.96	52.19	49.73	47.39
sd*	10.42	11.9	11.17	12.12	11.05	11.74	11.67	11.55	11.31	11.97	10.67
skew**	1.31	1.28	0.60	0.70	0.73	0.32	0.15	0.54	0.19	1.15	0.42

\*sd means standard deviation, \*\*skew means skewness

**Table XIII**  
Percentiles of Body Weight for Chinese Males, by Age

Age Group n Percentiles	20-24 407	25-29 425	30-34 463	35-39 429	40-44 420	45-49 411	50-54 307	55-59 243	60-64 197	65-69 141	>=70 149
2.50th	46	48	49	50	49	48	47	45	44	42	40
5.00th	48	50	51	51	51	50	49	47	46	44	42
10.00th	50	53	54	54	54	53	52	50	48	47	45
15.00th	52	54	56	56	56	55	54	52	50	49	47
20.00th	54	56	57	58	57	56	55	54	52	50	49
25.00th	55	57	59	59	59	58	57	55	54	52	50
30.00th	57	59	60	60	60	59	58	57	55	53	52
35.00th	58	60	61	62	61	61	59	58	56	55	53
40.00th	59	61	62	63	63	62	61	59	58	56	54
45.00th	60	63	64	64	64	63	62	61	59	57	56
50.00th	62	64	65	66	65	65	63	62	60	59	57
55.00th	63	65	66	67	67	66	65	63	62	60	58
60.00th	64	67	68	68	68	67	66	65	63	61	60
65.00th	66	68	69	70	70	69	68	66	65	63	61
70.00th	67	70	71	71	71	70	69	68	66	65	63
75.00th	69	71	73	73	73	72	71	70	68	67	65
80.00th	71	73	75	75	75	74	73	72	70	69	67
85.00th	74	76	77	78	78	77	76	74	73	71	70
90.00th	77	79	80	81	81	80	79	78	76	75	73
95.00th	82	84	85	86	86	85	84	83	81	80	78
97.50th	86	89	90	91	91	90	89	88	86	85	83
mean	62.67	64.92	67.11	66.28	65.68	66.61	64.31	63.33	61.67	60.43	57.98
sd*	11.47	11.32	11.53	11.57	11.37	10.51	10.37	9.78	10.79	9.93	10.48
skew**	0.97	0.94	0.67	0.73	0.76	0.38	0.44	0.10	0.11	0.70	0.00

\*sd means standard deviation, \*\*skew means skewness

**Table XIV**  
**Percentiles of Body Weight for Chinese Females, by Age**

Age Group n Percentiles	20-24 453	25-29 447	30-34 527	35-39 535	40-44 528	45-49 419	50-54 317	55-59 264	60-64 212	65-69 153	>=70 172
2.50th	34	36	38	39	40	41	40	40	38	36	34
5.00th	36	38	40	41	42	43	42	42	40	39	36
10.00th	39	41	43	44	45	45	45	44	43	41	39
15.00th	41	43	44	46	47	47	47	46	45	43	41
20.00th	42	44	46	47	48	49	49	48	47	45	42
25.00th	44	46	47	49	50	50	50	50	48	46	44
30.00th	45	47	49	50	51	52	52	51	50	48	45
35.00th	46	48	50	51	52	53	53	52	51	49	47
40.00th	47	50	51	53	54	54	54	54	52	51	48
45.00th	49	51	53	54	55	56	55	55	54	52	49
50.00th	50	52	54	55	56	57	57	56	55	53	51
55.00th	51	53	55	57	58	58	58	58	56	55	52
60.00th	53	55	57	58	59	60	60	59	58	56	54
65.00th	54	56	58	60	61	61	61	61	59	58	55
70.00th	56	58	60	61	62	63	63	62	61	59	57
75.00th	57	60	61	63	64	65	65	64	63	61	59
80.00th	59	62	64	65	66	67	67	66	65	63	61
85.00th	62	64	66	67	69	69	69	69	68	66	63
90.00th	65	67	69	71	72	72	72	72	71	69	67
95.00th	70	72	74	76	77	77	78	77	76	74	72
97.50th	75	77	79	80	82	82	82	82	81	79	77
mean	51.12	52.9	55.91	56.06	57.37	58.11	58.26	57.1	55.59	56.02	51.21
sd*	8.79	9.37	9.44	9.31	9.99	9.62	9.70	9.10	10.74	11.01	10.45
skew**	1.47	1.32	1.09	0.63	0.79	0.61	0.39	0.42	1.02	0.35	0.60

\*sd means standard deviation, \*\*skew means skewness

**Table XV**  
**Percentiles of Body Weight for Indian Males, by Age**

Age Group n Percentiles	20-24 113	25-29 118	30-34 133	35-39 158	40-44 116	45-49 84	50-54 47	55-59 40	60-64 34	65-69 29	>=70 32
2.50th	43	47	49	51	51	51	50	49	47	44	41
5.00th	45	49	51	53	53	53	52	51	49	46	43
10.00th	47	51	54	55	56	56	55	53	51	49	46
15.00th	49	53	55	57	58	58	57	55	53	51	48
20.00th	51	54	57	59	59	59	58	57	55	52	49
25.00th	52	56	59	60	61	61	60	58	56	54	51
30.00th	54	57	60	62	62	62	61	60	58	55	52
35.00th	55	59	61	63	64	63	63	61	59	57	54
40.00th	56	60	62	64	65	65	64	63	61	58	55
45.00th	57	61	64	65	66	66	65	64	62	59	57
50.00th	59	62	65	67	67	67	67	65	63	61	58
55.00th	60	64	66	68	69	69	68	67	65	62	59
60.00th	61	65	68	69	70	70	69	68	66	64	61
65.00th	63	67	69	71	72	72	71	70	68	65	62
70.00th	64	68	71	73	73	73	73	71	69	67	64
75.00th	66	70	73	74	75	75	74	73	71	69	66
80.00th	68	72	75	76	77	77	76	75	73	71	68
85.00th	71	74	77	79	80	80	79	78	76	73	71
90.00th	74	78	80	82	83	83	82	81	79	77	74
95.00th	79	83	85	87	88	88	87	86	84	82	79
97.50th	83	87	90	92	93	93	92	91	89	87	84
mean	59.76	62.56	67.38	67.28	69.02	67.54	69.98	66.89	62.4	63.03	57.78
sd*	9.98	10.93	10.81	10.76	10.13	10.81	11.44	11.03	8.65	14.47	14.2
skew**	0.99	0.17	0.08	0.21	0.27	0.30	-0.09	1.07	-0.23	0.03	1.28

\*sd means standard deviation, \*\*skew means skewness

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**Table XVI**  
**Percentiles of Body Weight for Indian Females, by Age**

Age Group n	20-24 140	25-29 140	30-34 159	35-39 168	40-44 126	45-49 100	50-54 43	55-59 56	60-64 52	65-69 23	>=70 30
Percentiles											
2.50th	35	38	40	42	43	43	42	41	38	34	29
5.00th	37	40	42	44	45	45	44	43	40	36	31
10.00th	39	42	45	47	48	48	47	45	43	39	34
15.00th	41	44	47	48	50	50	49	47	45	41	36
20.00th	43	46	48	50	51	51	51	49	46	43	38
25.00th	44	47	50	52	53	53	52	51	48	44	39
30.00th	45	48	51	53	54	54	54	52	49	46	41
35.00th	47	50	52	54	55	56	55	53	51	47	42
40.00th	48	51	54	55	57	57	56	55	52	48	43
45.00th	49	52	55	57	58	58	58	56	53	50	45
50.00th	50	54	56	58	59	59	59	57	55	51	46
55.00th	52	55	57	59	61	61	60	59	56	52	48
60.00th	53	56	59	61	62	62	62	60	57	54	49
65.00th	54	58	60	62	63	64	63	62	59	55	51
70.00th	56	59	62	64	65	65	65	63	61	57	52
75.00th	58	61	64	66	67	67	67	65	63	59	54
80.00th	60	63	66	68	69	69	69	67	65	61	56
85.00th	62	66	68	70	71	72	71	70	67	64	59
90.00th	65	69	71	73	75	75	74	73	70	67	62
95.00th	70	74	76	78	80	80	80	78	76	72	67
97.50th	75	78	81	83	84	85	84	83	80	77	72
mean	51.28	54.7	58.56	58.77	59.81	60.85	60.84	57.13	56.81	54.82	46.1
sd*	10.72	11.34	11.52	12.01	12.13	11.59	12.20	12.15	10.08	9.41	6.04
skew**	1.04	0.81	0.52	0.61	0.77	0.19	0.57	0.49	-0.08	0.25	0.27

\*sd means standard deviation, \*\*skew means skewness

**Table XVII**  
**Percentiles of Body Weight for Other Indigenous Males, by Age**

Age Group n	20-24 257	25-29 309	30-34 322	35-39 280	40-44 233	45-49 146	50-54 152	55-59 89	60-64 98	65-69 49	>=70 92
Percentiles											
2.50th	40	42	44	44	43	42	40	38	35	33	31
5.00th	42	44	46	46	45	44	42	40	38	35	33
10.00th	44	47	48	49	48	47	45	43	40	38	36
15.00th	46	49	50	50	50	49	47	45	42	40	38
20.00th	48	50	52	52	52	50	48	46	44	42	40
25.00th	49	52	53	54	53	52	50	48	45	43	41
30.00th	50	53	55	55	54	53	51	49	47	45	43
35.00th	52	54	56	56	56	54	53	50	48	46	44
40.00th	53	56	57	57	57	56	54	52	49	47	45
45.00th	54	57	58	59	58	57	55	53	51	49	47
50.00th	55	58	60	60	60	58	57	54	52	50	48
55.00th	57	59	61	61	61	60	58	56	54	51	49
60.00th	58	61	62	63	62	61	59	57	55	53	51
65.00th	59	62	64	64	64	63	61	59	56	54	52
70.00th	61	64	65	66	65	64	62	60	58	56	54
75.00th	63	66	67	68	67	66	64	62	60	58	56
80.00th	65	68	69	70	69	68	66	64	62	60	58
85.00th	67	70	72	72	72	71	69	67	65	62	61
90.00th	70	73	75	75	75	74	72	70	68	66	64
95.00th	75	78	80	81	80	79	77	75	73	71	69
97.50th	80	83	85	85	85	84	82	80	78	76	74
mean	57.00	58.53	60.66	61.18	62.41	58.87	56.07	54.82	54.39	53.14	48.55
sd*	8.37	9.06	10.53	9.96	12.09	10.42	9.61	10.54	10.88	10.00	9.20
skew**	0.97	1.09	0.74	0.57	0.43	0.26	0.70	0.40	1.22	0.59	0.11

\*sd means standard deviation, \*\*skew means skewness

**Table XVIII**  
**Percentiles of Body Weight for Other Indigenous Females, by Age**

Age Group n	20-24 380	25-29 421	30-34 417	35-39 333	40-44 204	45-49 193	50-54 119	55-59 110	60-64 100	65-69 66	>=70 88
Percentiles											
2.50th	32	35	37	38	37	35	33	31	28	26	23
5.00th	34	37	39	40	39	37	35	33	30	28	26
10.00th	37	40	42	42	41	40	38	36	33	31	28
15.00th	38	42	44	44	43	42	40	38	35	33	30
20.00th	40	43	45	46	45	44	42	39	37	34	32
25.00th	41	45	47	47	46	45	43	41	38	36	34
30.00th	43	46	48	48	48	46	44	42	40	37	35
35.00th	44	47	49	50	49	48	46	43	41	39	36
40.00th	45	49	50	51	50	49	47	45	42	40	38
45.00th	47	50	52	52	52	50	48	46	44	41	39
50.00th	48	51	53	54	53	52	50	47	45	43	40
55.00th	49	52	54	55	54	53	51	49	46	44	42
60.00th	50	54	56	56	56	54	53	50	48	45	43
65.00th	52	55	57	58	57	56	54	52	49	47	45
70.00th	54	57	59	59	59	58	56	53	51	49	47
75.00th	55	59	61	61	61	59	58	55	53	50	48
80.00th	57	61	63	63	63	61	60	57	55	53	51
85.00th	60	63	65	66	65	64	62	60	57	55	53
90.00th	63	66	68	69	69	67	65	63	61	58	56
95.00th	68	71	73	74	74	72	71	68	66	64	62
97.50th	72	76	78	79	78	77	75	73	71	68	66
mean	49.59	51.55	53.86	55.75	55.65	51.85	51.40	49.10	44.34	44.37	42.00
sd*	9.91	9.98	10.38	11.11	11.49	11.03	10.69	10.27	9.21	9.70	10.41
skew**	1.76	0.99	1.01	0.79	0.56	0.27	0.23	0.23	0.33	0.14	0.64

\*sd means standard deviation, \*\*skew means skewness

**Table XIX**  
**Percentiles of Height for Malay males, by age**

Age Group n	20-24 749	25-29 810	30-34 834	35-39 819	40-44 709	45-49 594	50-54 422	55-59 398	60-64 286	65-69 205	>=70 214
Percentiles											
2.50th	155	154	154	153	153	152	151	150	149	148	147
5.00th	156	156	156	155	155	154	153	152	151	150	149
10.00th	159	158	158	157	157	156	155	154	153	152	151
15.00th	160	160	159	159	158	158	157	156	155	154	153
20.00th	161	161	161	160	160	159	158	157	156	155	154
25.00th	162	162	162	161	161	160	159	158	157	156	155
30.00th	163	163	162	162	161	161	160	159	158	157	156
35.00th	164	164	163	163	162	162	161	160	159	158	157
40.00th	165	164	164	164	163	162	162	161	160	159	158
45.00th	165	165	165	164	164	163	163	162	161	160	158
50.00th	166	166	166	165	165	164	163	162	161	160	159
55.00th	167	167	166	166	165	165	164	163	162	161	160
60.00th	168	168	167	167	166	166	165	164	163	162	161
65.00th	169	168	168	168	167	166	166	165	164	163	162
70.00th	169	169	169	168	168	167	167	166	165	164	163
75.00th	170	170	170	169	169	168	168	167	166	165	164
80.00th	171	171	171	170	170	169	169	168	167	166	165
85.00th	172	172	172	172	171	171	170	169	168	167	166
90.00th	174	174	174	173	173	172	171	171	170	169	168
95.00th	176	176	176	175	175	174	174	173	172	171	170
97.50th	178	178	178	177	177	176	176	175	174	173	172
mean	166.3	165.65	165.83	165.55	164.83	164.27	163.27	161.72	161.06	160.16	159.94
sd*	6.46	6.81	6.37	6.45	6.18	6.53	6.29	6.17	7.83	6.37	8.83
skew**	-0.20	-0.46	0.01	0.03	-0.20	-0.11	-1.02	-0.03	-1.91	-0.29	-1.92

\*sd means standard deviation, \*\*skew means skewness

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**Table XX**  
**Percentiles of Height for Malay Females, by Age**

Age Group n Percentiles	20-24 893	25-29 903	30-34 939	35-39 942	40-44 842	45-49 602	50-54 454	55-59 391	60-64 306	65-69 204	>=70 221
2.50th	143	143	143	142	141	141	140	139	138	136	135
5.00th	145	145	144	144	143	143	142	141	140	138	137
10.00th	147	147	147	146	146	145	144	143	142	141	139
15.00th	148	148	148	148	147	146	146	145	143	142	141
20.00th	150	150	149	149	148	148	147	146	145	143	142
25.00th	151	151	150	150	149	149	148	147	146	144	143
30.00th	152	151	151	151	150	150	149	148	147	145	144
35.00th	152	152	152	152	151	150	150	149	147	146	145
40.00th	153	153	153	152	152	151	150	149	148	147	146
45.00th	154	154	154	153	153	152	151	150	149	148	146
50.00th	155	155	154	154	153	153	152	151	150	149	147
55.00th	155	155	155	155	154	154	153	152	151	149	148
60.00th	156	156	156	156	155	154	154	153	152	150	149
65.00th	157	157	157	156	156	155	154	153	152	151	150
70.00th	158	158	158	157	157	156	155	154	153	152	151
75.00th	159	159	158	158	158	157	156	155	154	153	152
80.00th	160	160	160	159	159	158	157	156	155	154	153
85.00th	161	161	161	160	160	159	158	158	157	155	154
90.00th	162	162	162	162	161	161	160	159	158	157	156
95.00th	165	165	165	164	164	163	162	161	160	159	158
97.50th	167	167	166	166	166	165	164	164	163	161	160
mean	154.65	154.30	154.77	154.09	153.45	152.96	152.22	150.58	148.88	149.08	148.01
sd*	6.04	6.13	5.95	6.01	6.21	6.09	6.91	5.94	7.74	6.52	7.70
skew**	0.22	-0.46	0.06	0.24	0.80	0.47	0.19	0.47	-1.66	-0.03	0.52

\*sd means standard deviation, \*\*skew means skewness

**Table XXI**  
**Percentiles of Height for Chinese Males, by Age**

Age Group n Percentiles	20-24 407	25-29 425	30-34 463	35-39 429	40-44 420	45-49 411	50-54 307	55-59 243	60-64 197	65-69 141	>=70 149
2.50th	157	157	156	155	155	154	153	152	151	150	149
5.00th	159	158	158	157	157	156	155	154	153	152	151
10.00th	161	161	160	160	159	158	157	156	156	155	154
15.00th	163	162	162	161	160	160	159	158	157	156	155
20.00th	164	163	163	162	162	161	160	159	158	157	156
25.00th	165	164	164	163	163	162	161	160	159	158	157
30.00th	166	165	165	164	163	163	162	161	160	159	158
35.00th	166	166	166	165	164	164	163	162	161	160	159
40.00th	167	167	166	166	165	164	164	163	162	161	160
45.00th	168	168	167	167	166	165	164	164	163	162	161
50.00th	169	168	168	167	167	166	165	164	164	163	162
55.00th	170	169	169	168	167	167	166	165	164	163	162
60.00th	170	170	169	169	168	168	167	166	165	164	163
65.00th	171	171	170	170	169	168	168	167	166	165	164
70.00th	172	172	171	171	170	169	169	168	167	166	165
75.00th	173	172	172	171	171	170	170	169	168	167	166
80.00th	174	173	173	173	172	171	171	170	169	168	167
85.00th	175	175	174	174	173	173	172	171	170	169	168
90.00th	177	176	176	175	175	174	173	173	172	171	170
95.00th	179	178	178	178	177	176	176	175	174	173	172
97.50th	181	180	180	180	179	178	178	177	176	175	174
mean	168.45	168.84	168.35	166.89	166.42	166.26	165.46	164.92	163.13	162.51	162.22
sd*	6.98	6.09	6.44	6.33	6.40	6.87	6.62	6.65	7.01	6.64	7.19
skew**	-0.38	0.05	-0.51	-0.19	0.06	0.46	-0.73	-0.03	0.10	-0.04	-0.19

\* sd means standard deviation, \*\* skew means skewness

**Table XXII**  
**Percentiles of Height for Chinese Females, by Age**

Age Group n Percentiles	20-24 453	25-29 447	30-34 527	35-39 535	40-44 528	45-49 419	50-54 317	55-59 264	60-64 212	65-69 153	>=70 172
2.50th	146	146	146	145	144	144	143	142	141	140	139
5.00th	148	148	147	147	146	146	145	144	143	142	141
10.00th	150	150	150	149	149	148	147	146	145	144	143
15.00th	152	151	151	151	150	149	149	148	147	146	145
20.00th	153	153	152	152	151	151	150	149	148	147	146
25.00th	154	154	153	153	152	152	151	150	149	148	147
30.00th	155	155	154	154	153	153	152	151	150	149	148
35.00th	156	155	155	155	154	153	153	152	151	150	149
40.00th	156	156	156	155	155	154	154	153	152	151	150
45.00th	157	157	157	156	156	155	154	154	153	152	151
50.00th	158	158	157	157	156	156	155	154	154	153	152
55.00th	159	159	158	158	157	157	156	155	154	153	152
60.00th	160	159	159	159	158	157	157	156	155	154	153
65.00th	160	160	160	159	159	158	158	157	156	155	154
70.00th	161	161	161	160	160	159	158	158	157	156	155
75.00th	162	162	162	161	161	160	159	159	158	157	156
80.00th	163	163	163	162	162	161	160	160	159	158	157
85.00th	164	164	164	163	163	162	162	161	160	159	158
90.00th	166	166	165	165	164	164	163	163	162	161	160
95.00th	168	168	168	167	167	166	166	165	164	163	162
97.50th	170	170	170	169	169	168	168	167	166	165	164
mean	158.10	157.34	157.65	157.21	156.00	156.01	155.03	154.66	153.41	151.94	151.67
sd*	6.72	5.88	6.13	6.28	6.13	6.51	5.35	7.28	6.75	6.38	6.22
skew**	-1.81	0.25	-0.51	-0.66	-0.49	-1.39	0.11	-2.46	-2.22	0.10	-0.93

\*sd means standard deviation, \*\*skew means skewness

**Table XXIII**  
**Percentiles of Height for Indian Males, by Age**

Age Group n Percentiles	20-24 113	25-29 118	30-34 133	35-39 158	40-44 116	45-49 84	50-54 47	55-59 40	60-64 34	65-69 29	>=70 32
2.50th	157	157	157	156	156	155	154	153	152	151	150
5.00th	159	159	158	158	158	157	156	155	154	153	152
10.00th	161	161	161	160	160	159	159	158	157	155	154
15.00th	162	162	162	162	161	161	160	159	158	157	156
20.00th	163	163	163	163	163	162	161	160	159	158	157
25.00th	164	164	164	164	164	163	162	161	160	159	158
30.00th	165	165	165	165	165	164	163	162	161	160	159
35.00th	166	166	166	166	165	165	164	163	162	161	160
40.00th	167	167	167	167	166	166	165	164	163	162	161
45.00th	168	168	168	167	167	166	166	165	164	163	161
50.00th	168	168	168	168	168	167	167	166	165	164	162
55.00th	169	169	169	169	169	168	167	166	165	164	163
60.00th	170	170	170	170	169	169	168	167	166	165	164
65.00th	171	171	171	171	170	170	169	168	167	166	165
70.00th	172	172	172	171	171	170	170	169	168	167	166
75.00th	173	173	173	172	172	171	171	170	169	168	167
80.00th	174	174	174	173	173	172	172	171	170	169	168
85.00th	175	175	175	175	174	174	173	172	171	170	169
90.00th	176	176	176	176	176	175	175	174	173	172	171
95.00th	178	179	179	178	178	178	177	176	175	174	173
97.50th	180	181	181	180	180	180	179	178	177	176	175
mean	169.11	168.16	168.9	167.18	167.49	168.37	165.75	167.71	165.57	163.43	160.73
sd*	5.84	6.46	8.11	6.76	6.38	6.27	8.09	6.74	7.54	8.32	6.65
skew**	0.21	-0.02	-0.33	-0.03	-0.12	0.07	0.19	0.51	-0.07	0.16	-0.05

\*sd means standard deviation, \*\*skew means skewness

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**Table XXIV**  
**Percentiles of Height for Indian Females, by Age**

Age Group n Percentiles	20-24 140	25-29 140	30-34 159	35-39 168	40-44 126	45-49 100	50-54 43	55-59 56	60-64 52	65-69 23	>=70 30
2.50th	144	144	144	143	143	142	142	141	140	138	137
5.00th	146	146	146	145	145	144	143	143	142	140	139
10.00th	148	148	148	148	147	146	146	145	144	143	141
15.00th	150	150	149	149	149	148	147	146	145	144	143
20.00th	151	151	151	150	150	149	148	148	147	145	144
25.00th	152	152	152	151	151	150	149	149	148	147	145
30.00th	153	153	153	152	152	151	150	150	149	147	146
35.00th	154	154	153	153	153	152	151	150	149	148	147
40.00th	154	154	154	154	153	153	152	151	150	149	148
45.00th	155	155	155	155	154	154	153	152	151	150	149
50.00th	156	156	156	155	155	154	154	153	152	151	150
55.00th	157	157	156	156	156	155	154	154	153	152	150
60.00th	157	157	157	157	156	156	155	154	154	152	151
65.00th	158	158	158	158	157	157	156	155	154	153	152
70.00th	159	159	159	159	158	158	157	156	155	154	153
75.00th	160	160	160	160	159	159	158	157	156	155	154
80.00th	161	161	161	161	160	160	159	158	157	156	155
85.00th	162	162	162	162	161	161	160	159	159	157	156
90.00th	164	164	164	163	163	162	162	161	160	159	158
95.00th	166	166	166	166	165	165	164	163	162	161	160
97.50th	168	168	168	168	167	167	166	165	164	163	162
mean	155.44	156.47	156.10	154.84	155.25	154.97	152.36	152.39	151.30	149.62	150.66
sd*	6.18	6.59	6.11	6.11	7.54	6.12	6.71	6.40	8.21	6.04	8.83
skew**	-0.06	0.18	0.39	0.02	-1.66	-0.38	0.84	-0.16	-2.51	0.06	0.71

\*sd means standard deviation, \*\*skew means skewness

**Table XXV**  
**Percentiles of Height for Other Indigenous Males, by Age**

Age Group n Percentiles	20-24 257	25-29 309	30-34 322	35-39 280	40-44 233	45-49 146	50-54 152	55-59 89	60-64 98	65-69 49	>=70 92
2.50th	152	151	151	150	149	149	148	147	146	145	144
5.00th	153	153	153	152	151	151	150	149	148	147	146
10.00th	156	155	155	154	154	153	152	151	150	149	148
15.00th	157	157	156	156	155	154	154	153	152	151	150
20.00th	158	158	157	157	156	156	155	154	153	152	151
25.00th	159	159	158	158	157	157	156	155	154	153	152
30.00th	160	160	159	159	158	158	157	156	155	154	153
35.00th	161	161	160	160	159	158	158	157	156	155	154
40.00th	162	161	161	160	160	159	159	158	157	156	155
45.00th	163	162	162	161	161	160	159	159	158	157	156
50.00th	163	163	163	162	161	161	160	159	158	158	157
55.00th	164	164	163	163	162	162	161	160	159	158	157
60.00th	165	164	164	164	163	162	162	161	160	159	158
65.00th	166	165	165	164	164	163	163	162	161	160	159
70.00th	166	166	166	165	165	164	163	163	162	161	160
75.00th	167	167	167	166	166	165	164	164	163	162	161
80.00th	168	168	168	167	167	166	165	165	164	163	162
85.00th	170	169	169	168	168	167	167	166	165	164	163
90.00th	171	171	170	170	169	169	168	167	167	166	165
95.00th	173	173	173	172	172	171	171	170	169	168	167
97.50th	175	175	175	174	174	173	173	172	171	170	169
mean	163.33	163.04	162.23	162.28	162.45	160.62	159.14	159.12	159.44	157.86	156.39
sd*	6.26	6.78	6.15	6.29	6.87	6.86	6.78	6.77	7.15	6.39	6.72
skew**	0.07	0.34	-0.16	0.38	0.28	-0.28	-0.13	0.10	1.12	-0.67	0.01

\* sd means standard deviation, \*\* skew means skewness

**Table XXVI**  
**Percentiles of Height for Other Indigenous Females, by Age**

Age Group n Percentiles	20-24 380	25-29 421	30-34 417	35-39 333	40-44 204	45-49 193	50-54 119	55-59 110	60-64 100	65-69 66	>=70 88
2.50th	140	140	140	140	139	138	138	137	135	134	133
5.00th	142	142	142	141	141	140	139	138	137	136	135
10.00th	144	144	144	144	143	142	142	141	140	138	137
15.00th	146	146	145	145	145	144	143	142	141	140	139
20.00th	147	147	147	146	146	145	144	143	142	141	140
25.00th	148	148	148	147	147	146	145	145	143	142	141
30.00th	149	149	149	148	148	147	146	145	144	143	142
35.00th	150	150	149	149	149	148	147	146	145	144	143
40.00th	150	150	150	150	149	149	148	147	146	145	144
45.00th	151	151	151	151	150	150	149	148	147	146	144
50.00th	152	152	152	151	151	150	150	149	148	147	145
55.00th	153	153	153	152	152	151	150	150	148	147	146
60.00th	154	153	153	153	153	152	151	150	149	148	147
65.00th	154	154	154	154	153	153	152	151	150	149	148
70.00th	155	155	155	155	154	154	153	152	151	150	149
75.00th	156	156	156	156	155	155	154	153	152	151	150
80.00th	157	157	157	157	156	156	155	154	153	152	151
85.00th	158	158	158	158	157	157	156	155	154	153	152
90.00th	160	160	160	159	159	158	158	157	156	155	153
95.00th	162	162	162	162	161	161	160	159	158	157	156
97.50th	164	164	164	164	163	163	162	161	160	159	158
mean	151.91	152.08	151.63	152.06	151.00	149.75	150.04	148.93	147.01	146.74	145.58
sd*	5.95	5.80	6.92	5.67	6.74	6.59	5.74	7.25	5.77	6.01	6.33
skew**	-0.05	-0.20	0.99	0.16	-1.57	-1.65	0.28	2.30	-0.05	-0.18	-0.33

\*sd means standard deviation, \*\*skew means skewness

**Table XXVII**  
**Crude and Age-adjusted Mean Height, Body Weight and BMI**

		Height, cm		Weight, Kg		BMI, Kg/m <sup>2</sup>	
		Crude (SE)	Age-adjusted (SE)	Crude (SE)	Age-adjusted (SE)	Crude (SE)	Age-adjusted (SE)
All		159.6 (0.1)	159.6 (<0.1)	58.3 (0.1)	58.3 (<0.1)	22.9 (<0.1)	22.9 (<0.1)
	men	165.0 (0.3)	165.0 (0.1)	61.9 (0.4)	61.8 (0.1)	22.7 (<0.1)	22.7 (<0.1)
	women	154.0 (0.3)	154.0 (0.1)	54.6 (0.3)	54.7 (0.1)	23.1 (0.3)	23.1 (<0.1)
Malay		158.9 (0.3)	158.9 (0.1)	58.2 (0.4)	58.2 (0.1)	23.1 (0.3)	23.1 (<0.1)
	men	164.7 (0.3)	164.7 (0.1)	61.7 (0.4)	61.6 (0.2)	22.7 (0.3)	22.7 (0.1)
	women	153.3 (0.3)	153.3 (0.1)	55.0 (0.4)	55.0 (0.2)	23.4 (0.3)	23.4 (0.1)
Chinese		161.4 (0.3)	161.7 (0.1)	59.9 (0.4)	59.8 (0.2)	22.9 (0.3)	22.8 (0.1)
	men	166.7 (0.4)	166.9 (0.1)	64.6 (0.4)	64.6 (0.2)	23.2 (0.3)	23.2 (0.1)
	women	156.2 (0.3)	156.5 (0.1)	55.2 (0.4)	55.0 (0.2)	22.7 (0.3)	22.5 (0.1)
Indian		161.1 (0.5)	161.1 (0.2)	60.9 (0.5)	60.7 (0.3)	23.4 (0.3)	23.4 (0.1)
	men	167.6 (0.5)	167.6 (0.3)	65.1 (0.6)	64.9 (0.4)	23.2 (0.3)	23.1 (0.1)
	women	154.7 (0.5)	154.7 (0.2)	56.7 (0.6)	56.5 (0.4)	23.7 (0.4)	23.6 (0.2)
Other indigenous		156.4 (0.4)	156.3 (0.1)	54.9 (0.5)	54.9 (0.2)	22.4 (0.3)	22.4 (0.1)
	men	161.8 (0.4)	161.6 (0.2)	58.3 (0.5)	58.3 (0.2)	22.2 (0.3)	22.3 (0.1)
	Women	150.9 (0.4)	150.8 (0.1)	51.4 (0.5)	51.5 (0.2)	22.6 (0.3)	22.6 (0.1)

\*Age-adjusted to the 1996 Malaysian population

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**Table XXVIII**  
**Age Specific Mean Height, Weight and BMI**

	Age group	Height (SE) cm	Weight (SE) Kg	BMI (SE) Kg/m <sup>2</sup>
Malay men	20 - 29	166.0 (0.2)	59.8 (0.3)	21.7 (0.1)
	30 - 39	165.7 (0.2)	64.1 (0.3)	23.3 (0.1)
	40 - 49	164.6 (0.2)	64.6 (0.4)	23.8 (0.1)
	50 - 59	162.6 (0.2)	60.9 (0.4)	23.0 (0.2)
	60 - 69	160.7 (0.4)	57.9 (0.6)	22.4 (0.2)
	>=70	159.9 (0.7)	53.9 (0.7)	21.1 (0.3)
Malay women	20 - 29	154.5 (0.2)	52.2 (0.3)	21.9 (0.1)
	30 - 39	154.5 (0.2)	57.4 (0.3)	24.1 (0.1)
	40 - 49	153.2 (0.2)	58.7 (0.3)	25.0 (0.1)
	50 - 59	151.5 (0.3)	56.1 (0.5)	24.5 (0.2)
	60 - 69	149.0 (0.4)	51.1 (0.6)	23.0 (0.3)
	>=70	148.0 (0.6)	47.4 (0.8)	21.5 (0.3)
Chinese men	20 - 29	168.6 (0.3)	63.7 (0.5)	22.4 (0.2)
	30 - 39	167.6 (0.3)	66.7 (0.4)	23.7 (0.1)
	40 - 49	166.3 (0.3)	66.1 (0.5)	23.9 (0.1)
	50 - 59	165.2 (0.3)	63.9 (0.5)	23.4 (0.2)
	60 - 69	162.9 (0.4)	61.2 (0.6)	23.1 (0.2)
	>=70	162.2 (0.6)	58.0 (1.0)	22.0 (0.3)
Chinese women	20 - 29	157.7 (0.3)	51.9 (0.3)	20.9 (0.1)
	30 - 39	157.4 (0.2)	56.0 (0.3)	22.6 (0.1)
	40 - 49	156.0 (0.2)	57.7 (0.3)	23.8 (0.2)
	50 - 59	154.9 (0.3)	57.7 (0.4)	24.1 (0.2)
	60 - 69	152.8 (0.4)	55.8 (0.7)	23.9 (0.3)
	>=70	151.7 (0.5)	51.2 (0.8)	22.3 (0.4)
Indian men	20 - 29	168.7 (0.4)	61.1 (0.7)	21.5 (0.2)
	30 - 39	168.1 (0.5)	67.3 (0.7)	23.9 (0.2)
	40 - 49	167.9 (0.5)	68.4 (0.8)	24.3 (0.3)
	50 - 59	166.6 (0.9)	68.6 (1.4)	24.7 (0.5)
	60 - 69	164.6 (1.0)	62.7 (1.6)	23.1 (0.5)
	>=70	160.7 (1.1)	57.8 (2.4)	22.2 (0.8)
Indian women	20 - 29	155.9 (0.5)	52.9 (0.8)	21.7 (0.3)
	30 - 39	155.5 (0.4)	58.7 (0.7)	24.3 (0.3)
	40 - 49	155.1 (0.5)	60.3 (0.8)	25.1 (0.3)
	50 - 59	152.4 (0.9)	59.1 (1.7)	25.4 (0.6)
	60 - 69	150.6 (0.9)	56.0 (1.3)	24.8 (0.6)
	>=70	150.7 (2.0)	46.1 (1.2)	20.5 (0.7)
Other indigenous men	20 - 29	163.2 (0.3)	57.7 (0.4)	21.7 (0.1)
	30 - 39	162.3 (0.3)	60.9 (0.5)	23.1 (0.2)
	40 - 49	161.7 (0.4)	60.9 (0.7)	23.2 (0.2)
	50 - 59	159.1 (0.5)	55.5 (0.7)	21.9 (0.2)
	60 - 69	158.8 (0.6)	53.9 (0.8)	21.3 (0.2)
	>=70	156.4 (0.8)	48.5 (1.0)	19.8 (0.4)
Other indigenous women	20 - 29	152.0 (0.3)	50.5 (0.4)	21.9 (0.2)
	30 - 39	151.8 (0.3)	54.7 (0.4)	23.7 (0.2)
	40 - 49	150.4 (0.3)	54.0 (0.6)	23.8 (0.3)
	50 - 59	149.5 (0.4)	50.4 (0.7)	22.5 (0.3)
	60 - 69	146.9 (0.5)	44.4 (0.8)	20.5 (0.3)
	>=70	145.6 (0.7)	42.0 (1.2)	19.7 (0.5)

**Table XXIX**  
**Crude Percentage Distribution of BMI According to WHO\* Classification**

BMI	Thinness		Grade 1 (SE) 17-18.49	Normal (SE) 18.5-24.99	Grade 1 (SE) 25-29.99	Overweight	
	Grade 3 (SE) <16	Grade 2 (SE) 16-16.99				Grade 2 (SE) 30-39.99	Grade 3 (SE) ≥40
All	2.0 (0.1)	2.5 (0.1)	8.2 (0.2)	60.8 (0.4)	20.7 (0.3)	5.5 (0.2)	0.3 (0.0)
men	1.5 (0.1)	2.1 (0.1)	7.9 (0.3)	64.5 (0.5)	20.1 (0.4)	3.8 (0.2)	0.2 (0.0)
women	2.6 (0.2)	3.0 (0.2)	8.5 (0.3)	56.8 (0.5)	21.4 (0.4)	7.2 (0.3)	0.4 (0.1)
Malay	2.3 (0.2)	2.7 (0.2)	8.4 (0.3)	57.5 (0.5)	22.0 (0.4)	6.6 (0.3)	0.4 (0.1)
men	1.5 (0.2)	2.4 (0.2)	8.3 (0.4)	63.3 (0.7)	20.0 (0.6)	4.3 (0.3)	0.2 (0.1)
women	3.1 (0.2)	3.0 (0.2)	8.6 (0.4)	51.9 (0.7)	23.9 (0.6)	8.9 (0.4)	0.6 (0.1)
Chinese	1.4 (0.2)	2.2 (0.2)	7.5 (0.4)	62.3 (0.7)	21.6 (0.6)	4.8 (0.3)	0.2 (0.1)
men	1.0 (0.2)	1.7 (0.2)	6.3 (0.5)	61.8 (0.9)	24.5 (0.8)	4.6 (0.4)	0.1 (0.1)
women	1.8 (0.2)	2.7 (0.3)	8.8 (0.6)	62.7 (1.0)	18.7 (0.7)	4.9 (0.4)	0.4 (0.1)
Indian	2.2 (0.4)	2.7 (0.4)	6.5 (0.6)	56.8 (1.3)	24.9 (1.1)	6.6 (0.7)	0.2 (0.1)
men	1.9 (0.5)	2.0 (0.5)	6.5 (0.9)	61.6 (1.9)	24.2 (1.6)	3.7 (0.7)	0.1 (0.1)
women	2.5 (0.5)	3.5 (0.6)	6.5 (0.9)	52.2 (1.8)	25.6 (1.5)	9.4 (0.9)	0.4 (0.2)
Other indigenous	2.4 (0.3)	3.0 (0.3)	8.6 (0.5)	63.5 (0.9)	17.9 (0.7)	4.4 (0.4)	0.1 (0.0)
men	1.1 (0.3)	2.0 (0.3)	8.2 (0.7)	69.3 (1.2)	16.7 (1.0)	2.7 (0.4)	0.0 (0.0)
women	3.7 (0.4)	4.0 (0.5)	9.1 (0.7)	57.7 (1.2)	19.1 (0.9)	6.2 (0.6)	0.1 (0.1)

\*WHO Expert Committee on Physical Status<sup>5</sup>

**Table XXX**  
**Age-adjusted\* Percentage Distribution of BMI According to WHO Classification\*\***

BMI	Thinness		Grade 1 (SE) 17-18.49	Normal (SE) 18.5-24.99	Grade 1 (SE) 25-29.99	Overweight	
	Grade 3 (SE) <16	Grade 2 (SE) 16-16.99				Grade 2 (SE) 30-39.99	Grade 3 (SE) ≥40
All	2.0 (0.1)	2.5 (0.1)	8.2 (0.2)	60.8 (0.4)	20.7 (0.3)	5.5 (0.2)	0.3 (0.0)
men	1.5 (0.1)	2.1 (0.1)	7.9 (0.3)	64.5 (0.5)	20.1 (0.4)	3.8 (0.2)	0.2 (0.0)
women	2.6 (0.2)	3.0 (0.2)	8.5 (0.3)	56.8 (0.5)	21.4 (0.4)	7.2 (0.2)	0.4 (0.1)
Malay	2.3 (0.2)	2.7 (0.2)	8.5 (0.3)	57.5 (0.5)	22.0 (0.4)	6.6 (0.2)	0.4 (0.1)
men	1.5 (0.2)	2.5 (0.2)	8.3 (0.4)	63.3 (0.7)	19.9 (0.5)	4.2 (0.3)	0.2 (0.1)
women	3.1 (0.2)	3.0 (0.2)	8.6 (0.4)	51.9 (0.7)	23.9 (0.6)	9.0 (0.4)	0.6 (0.1)
Chinese	1.4 (0.1)	2.3 (0.2)	8.0 (0.4)	62.6 (0.7)	20.9 (0.5)	4.7 (0.3)	0.2 (0.1)
men	1.0 (0.2)	1.7 (0.2)	6.5 (0.5)	62.1 (0.9)	23.9 (0.8)	4.7 (0.4)	0.1 (0.1)
women	1.7 (0.2)	2.9 (0.3)	9.5 (0.6)	63.2 (0.9)	17.7 (0.7)	4.6 (0.4)	0.4 (0.1)
Indian	2.3 (0.4)	2.9 (0.4)	6.7 (0.6)	57.0 (1.3)	24.4 (1.0)	6.5 (0.6)	0.2 (0.1)
men	2.0 (0.5)	2.0 (0.5)	6.7 (0.9)	61.7 (1.9)	23.7 (1.5)	3.7 (0.6)	0.1 (0.1)
women	2.5 (0.6)	3.7 (0.7)	6.7 (0.9)	52.4 (1.7)	25.1 (1.4)	9.2 (0.9)	0.3 (0.2)
Other indigenous	2.5 (0.2)	3.0 (0.3)	8.6 (0.5)	62.9 (0.8)	18.3 (0.6)	4.5 (0.3)	0.1 (0.0)
men	1.2 (0.2)	2.1 (0.3)	8.3 (0.7)	68.5 (1.1)	17.1 (0.9)	2.8 (0.4)	0.0 (0.0)
women	3.8 (0.4)	3.9 (0.5)	8.9 (0.6)	57.3 (1.1)	19.6 (0.8)	6.3 (0.5)	0.1 (0.1)

\*Age-adjusted to the 1996 Malaysian population

\*\*WHO Expert Committee on Physical Status<sup>5</sup>

DISTRIBUTION OF BODY WEIGHT, HEIGHT AND BODY MASS INDEX

**Table XXXI**  
**Age Specific Percentage Distribution of BMI According to WHO\* Expert Committee Classification**

		Thinness			Normal		Overweight		
		Grade3 (SE)	Grade2 (SE)	Grade1 (SE)	Normal (SE)	Grade1 (SE)	Grade2 (SE)	Grade3 (SE)	
Malay men	20 - 29	2.4 (0.5)	3.6 (0.6)	11.7 (0.9)	67.8 (1.3)	11.4 (0.9)	2.8 (0.5)	0.2 (0.2)	
	30 - 39	1.0 (0.3)	1.5 (0.3)	6.0 (0.6)	60.7 (1.2)	25.4 (1.1)	5.1 (0.5)	0.3 (0.2)	
	40 - 49	0.4 (0.2)	1.4 (0.4)	5.1 (0.7)	59.2 (1.6)	28.1 (1.4)	5.7 (0.7)	0.0 (0.0)	
	50 - 59	0.5 (0.3)	1.6 (0.5)	7.3 (1.0)	64.6 (1.9)	20.7 (1.5)	5.3 (0.9)	0.1 (0.1)	
	60 - 69	4.4 (1.1)	1.7 (0.6)	10.0 (1.5)	59.0 (2.4)	21.5 (1.9)	3.1 (0.9)	0.3 (0.3)	
	>=70	1.9 (0.9)	8.2 (2.0)	12.3 (2.3)	66.1 (3.6)	9.0 (2.1)	2.5 (1.2)	0.0 (0.0)	
Malay women	20 - 29	4.4 (0.5)	4.9 (0.5)	14.2 (0.9)	55.9 (1.3)	15.5 (0.9)	4.5 (0.5)	0.7 (0.2)	
	30 - 39	1.8 (0.3)	2.1 (0.4)	5.7 (0.6)	52.6 (1.3)	27.0 (1.1)	10.2 (0.8)	0.6 (0.2)	
	40 - 49	0.9 (0.3)	1.2 (0.3)	4.7 (0.6)	45.9 (1.5)	33.2 (1.4)	13.6 (1.0)	0.5 (0.2)	
	50 - 59	2.8 (0.6)	2.6 (0.6)	6.7 (1.0)	43.9 (1.9)	30.1 (1.8)	13.7 (1.3)	0.2 (0.2)	
	60 - 69	6.3 (1.3)	1.9 (0.6)	7.7 (1.3)	53.4 (2.4)	22.5 (2.1)	7.4 (1.4)	0.8 (0.5)	
	>=70	7.1 (2.0)	5.3 (1.7)	7.3 (1.8)	62.2 (3.7)	12.9 (2.5)	5.2 (1.5)	0.0 (0.0)	
Chinese men	20 - 29	0.9 (0.3)	2.0 (0.5)	9.2 (1.3)	68 (1.9)	15.6 (1.4)	4.3 (0.8)	0.0 (0.0)	
	30 - 39	0.6 (0.2)	1.2 (0.4)	5.2 (0.8)	57.9 (1.8)	29.0 (1.6)	5.8 (0.9)	0.4 (0.3)	
	40 - 49	0.6 (0.3)	1.3 (0.4)	4.0 (0.7)	58.6 (1.9)	30.2 (1.7)	5.5 (0.8)	0.0 (0.0)	
	50 - 59	0.9 (0.4)	1.1 (0.4)	5.8 (1.1)	61.2 (2.2)	27.3 (2.0)	3.8 (0.8)	0.0 (0.0)	
	60 - 69	2.1 (0.9)	3.7 (1.2)	4.4 (1.1)	61.0 (3.0)	25.0 (2.6)	3.9 (1.0)	0.0 (0.0)	
	>=70	4.4 (1.8)	3.7 (1.8)	10.2 (2.7)	63.5 (4.3)	18.2 (3.5)	0.0 (0.0)	0.0 (0.0)	
Chinese women	20 - 29	2.2 (0.5)	5.1 (0.8)	18.6 (1.5)	63.0 (1.9)	7.9 (1.0)	2.8 (0.6)	0.3 (0.2)	
	30 - 39	1.3 (0.4)	2.4 (0.5)	5.4 (0.8)	68.4 (1.8)	18.2 (1.4)	4.0 (0.7)	0.3 (0.2)	
	40 - 49	0.9 (0.3)	0.8 (0.3)	5.0 (0.8)	61.5 (1.8)	25.3 (1.6)	6.2 (0.8)	0.3 (0.2)	
	50 - 59	1.1 (0.5)	1.3 (0.6)	4.4 (1.0)	58.5 (2.1)	26.5 (1.9)	7.9 (1.2)	0.4 (0.4)	
	60 - 69	1.4 (0.6)	2.7 (0.9)	3.6 (1.1)	57.9 (2.8)	26.6 (2.6)	6.7 (1.6)	1.1 (0.6)	
	>=70	6.2 (2.0)	2.6 (1.5)	9.1 (2.3)	57.3 (4.1)	19.9 (3.4)	4.4 (1.5)	0.5 (0.5)	
Indian men	20 - 29	4.0 (1.3)	3.3 (1.2)	14.0 (2.4)	64.0 (3.8)	12.5 (2.3)	2.3 (0.9)	0.0 (0.0)	
	30 - 39	1.1 (0.6)	1.4 (0.7)	4.6 (1.4)	58.8 (3.1)	30.3 (3.0)	3.8 (1.2)	0.0 (0.0)	
	40 - 49	0.4 (0.4)	0.4 (0.4)	3.3 (1.3)	59.4 (3.5)	31.6 (3.3)	4.9 (1.5)	0.0 (0.0)	
	50 - 59	0.0 (0.0)	0.0 (0.0)	1.5 (1.1)	61.3 (6.4)	29.7 (5.4)	7.5 (3.0)	0.0 (0.0)	
	60 - 69	3.5 (2.6)	3.9 (2.7)	1.6 (1.5)	65.1 (6.5)	24.4 (6.5)	1.5 (1.5)	0.0 (0.0)	
	>=70	3.1 (3.1)	6.5 (4.6)	0.0 (0.0)	69.5 (8.9)	15.8 (7.8)	2.6 (2.6)	2.6 (2.6)	
Indian women	20 - 29	4.2 (1.2)	6.9 (1.6)	13.5 (2.4)	55.3 (3.4)	15.1 (2.4)	5.1 (1.3)	0.0 (0.0)	
	30 - 39	1.5 (0.7)	2.4 (0.9)	4.1 (1.2)	51.5 (2.8)	30.9 (2.7)	9.1 (1.6)	0.4 (0.3)	
	40 - 49	1.5 (0.9)	1.0 (0.7)	3.3 (1.3)	49.4 (3.5)	29.2 (3.2)	14.6 (2.5)	0.9 (0.7)	
	50 - 59	1.2 (0.9)	0.0 (0.0)	2.2 (1.3)	48.6 (5.9)	32.1 (5.5)	15.8 (4.0)	0.0 (0.0)	
	60 - 69	1.6 (1.2)	1.9 (1.9)	2.6 (1.6)	44.8 (7.0)	39.1 (6.9)	9.3 (3.6)	0.7 (0.7)	
	>=70	7.0 (6.7)	12.5 (8.2)	4.2 (4.2)	72.4 (10.2)	4.0 (3.0)	0.0 (0.0)	0.0 (0.0)	
Other indigenous men	20 - 290	0.5 (0.3)	1.3 (0.4)	8.4 (1.2)	78.3 (1.8)	9.2 (1.3)	2.3 (0.6)	0.0 (0.0)	
	30 - 39	0.1 (0.1)	1.8 (0.6)	4.7 (1.0)	65.9 (2.1)	24.6 (1.9)	2.8 (0.6)	0.0 (0.0)	
	40 - 49	0.6 (0.4)	1.2 (0.6)	7.0 (1.4)	61.4 (2.7)	23.8 (2.4)	5.9 (1.2)	0.0 (0.0)	
	50 - 59	2.2 (1.0)	3.5 (1.3)	11.4 (2.2)	65.1 (3.3)	16.8 (2.5)	1.0 (0.7)	0.0 (0.0)	
	60 - 69	1.9 (1.1)	4.7 (1.9)	14.0 (3.0)	66.0 (4.4)	12.4 (2.8)	1.0 (0.7)	0.0 (0.0)	
	>=70	13.9 (4.0)	5.9 (2.4)	19.7 (4.3)	53.1 (5.2)	7.3 (2.8)	0.0 (0.0)	0.0 (0.0)	
Other indigenous women	20 - 292	2.0 (0.6)	5.2 (1.0)	12.0 (1.2)	63.6 (1.8)	12.6 (1.2)	4.5 (0.8)	0.2 (0.2)	
	30 - 39	1.0 (0.4)	0.9 (0.4)	6.4 (1.0)	59.2 (2.0)	24.2 (1.6)	8.1 (1.1)	0.3 (0.2)	
	40 - 49	2.4 (0.8)	3.1 (1.0)	6.6 (1.3)	51.0 (2.6)	27.0 (2.4)	9.9 (1.5)	0.0 (0.0)	
	50 - 59	6.6 (1.7)	3.6 (1.3)	10.0 (2.0)	49.8 (3.3)	24.2 (3.0)	5.7 (1.5)	0.0 (0.0)	
	60 - 69	14.8 (2.9)	8.0 (2.3)	8.4 (2.1)	53.2 (3.7)	13.6 (2.7)	2.0 (1.0)	0.0 (0.0)	
	>=70	18.9 (4.4)	12.2 (3.7)	10.0 (3.2)	48.3 (5.5)	8.6 (3.6)	1.9 (1.4)	0.0 (0.0)	

\* WHO Expert Committee on Physical Status<sup>5</sup>

## References

1. Waaler HT. Height, weight and mortality. The Norwegian experience. *Acta Medica Scandinavica supplementum*, 1984,679: 1-56.
2. Waaler HT. Hazard of obesity The Norwegian experience. *Acta Medica Scandinavica supplementum*, 1988,723: 17-21.
3. Rissanen A et al. Weight and mortality in Finnish men. *J Clin epidemiol* 1989,42:781-9.
4. Rissanen A et al. Weight and mortality in Finnish women. *J Clin epidemiol* 1991,44:787-95.
5. WHO Expert Committee on Physical Status. Physical status : the Use and Interpretation of Anthropometry : report of a WHO expert committee. WHO technical report series; 854, 1995.
6. Labour Force Survey Report 1995, Department of Statistics. Kuala Lumpur.
7. Cochran WG. Sampling techniques. Third edition, Wiley 1977.
8. Lehtonen R, Pahkinen E. Practical methods for design and analysis of complex surveys. Wiley 1996.
9. Skinner CJ, Holt D, Smith TME. Analysis of complex surveys. Wiley 1989.
10. Kessler RC, Little RJA, Groves RM. Advances in strategies for minimizing and adjusting for survey nonresponse. *Epidemiologic Reviews* 1995;17: 192-204.
11. Healy MJR, Rasbash J, Yang M. Distribution free estimation of age related centiles. *Annals of Human Biology* 1988;15: 17-22.
12. Statistical Sciences, S-PLUS guide to statistical and mathematical analysis, Version 3.3, Seattle: StatSci, a division of MathSoft, Inc, 1995.
13. Statacorp 1997. Stata Statistical Software: Release 5.0 College Station, TX: Stata Corporation.
14. Kurzmarski RJ. Prevalence and weight gain in the United States. *Am J Clin Nutr* 1992; 55: 495S-502S.
15. Miller WJ. Population estimates of overweight and hypertension Canada 1985. *Can J Public Health* 1985; 76: 398-403.
16. Garrow JS. Obesity and related diseases. Churchill Livingstone 1988