Human growth study for boys and girls in Songkohn District

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1. Introduction

Human growth study is basic and very important to know the health status of children for the purpose of efficient and effective health care to growing children. We measure not only basic body dimensions but also skinfold thickness and bone density, from which we can estimate the nutritional status of children. We have very successfully finished the following survey for the children from 6 to 20 years old, owing to cordial corporation to our study by the villagers and NIOPH s sta s. We have obtained the data of 842 subjects in total, from 29 August to 1 of September, 2005.

Survey leader: Toshio Kawabe

Subjects: about 30 boys and 30 girls for each age from 6 to 20 years old of the village children

Measurements: Stature (body height), weight, chest circumference (only for boy), upper arm and calf circumferences, two skinfold thicknesses, and bone density

Information: exact birth data for all the subject children according to the list of our study on village population

The specialty of the survey leader (Dr. Toshio KAWABE), professor of Takasaki City University of Economics, is human ecology, especially physical growth of children and adult body physique. Similar surveys have ever conducted in Papua New Guinea, in Malaysia and in Tonga. Thus, this Laos survey is very important for the comparative growth study on ecologically di erent conditions.

The measurement was conducted by the members with enough trained for the growth study. The subjects of school children might be easily measured because the measurement was done with clothes and with no pain. It has taken about a few minutes for each of the village boys and girls.

2. Subjects and Method

1) Survey schedule and measured subject numbers

    29 Aug.   Bengkhamlay (temple), 210 boys and girls

    30 Aug.   Bengkhamlay (temple), 92 boys and girls

                 Dongbang (temple) 70 boys and girls

    31 Aug.   Thakhamlian (project house), 168 boys and girls

1 Sep.   Lahanam thong (temple), 302 boys and girls

2) Collected data: Subjects consisted of 842 children who were borne between 30 Feb. 1987 and 30 Feb. 2000 living at the 4 villages (Bengkhamlay, Thakhamlian, Dongbang, and Lahanam thong) in Songkhon district in Savannaket Province, Lao PDR. Birth date (or age information) for all the subject children were collected.

3) Anthropometric measurement method: Anthropometric measurements were conducted in the subject children at the villages of Bengkhamlay, Thakhamlian, Dongbang, and Lahanam thong. Measurement items are stature, weight, three circumferences (chest, upper arm, and calf), and three skinfold thicknesses (triceps, subscapular, and calf), according to IBP (international biology plan) method. Inter-observer error was avoided because the author measured almost all the items by himself, especially the skinfold thicknesses and circumferences.

The measurement of stature was taken with an anthropometer, to the nearest 0.1 cm. Body weight was measured using a bath room type scale. The measurement was made to the nearest 0.5 kilogram and the value of weight is subtracted 0.5 kg (or 1.0 kg for heavier weight garment) from the measurement value. Circumferences were measured on the left side of the body, to the nearest 1 mm with a plastic coating tape. Chest circumference was measured only for males, at the end of a normal expiration. Upper arm circumference was taken horizontally at the mid-point between the acromion and olecranon with the arm resting by the side. Calf circumference was measured at the maximum circumference, with the subjects in a standing position. Skinfold thicknesses were made on left side, to nearest 0.1 mm, by using Holtain caliper which is generally accepted as the most reliable caliper. Triceps and calf skinfold were measured on the back of arm and calf at the same level as the circumference measurements. Subscapular skinfold was taken under the angle of scapula.

For the index of body build and/or fatness, the body mass index (BMI) was adopted, which is defined as the weight (kg) divided by stature (m) squared. Judged by the criteria of independence to stature and high correlation with body fatness, BMI may be the best index for the north American people and for the Japanese.

Another measurement is the bone volume using the ultrasound bone densitometer (SENSA-MARK8800). This measurement is conducted in the heel bone of a subject using the ultrasound. Thus, this system is harmless to a subject and available in the field conditions than conventional X-ray systems. The result of measurements is the ultrasound velocity (1500-2300 m/s), which is reflected the bone volume.

The survey was carried out mainly at the temple in each village. The flow of survey was as follows. First, we registered the household and birth date for the identification of each child. After the registration, we carried out the measurements for each child (See Appendix Photo 1-4). The subjects of school children might be easily measured because the measurement was done with clothes and with no pain. It had taken about a few minutes for each subject. So, the survey was done for 4days (from 29 August to 1 of September, 2005).

3. Results and discussion

1)Subject numbers: Data from 5.5 to 18.5 years old subjects were selected for the following analysis. Results of anthropometric measurement for 4 villages are shown in Table 1. Numbers of subject for both sexes in

Table 1 Subjects of Songkohn boys and girls

Age in Years	6	7	8	9	10	11	12	13	14	15	16	17	18	All
Boy	30	31	17	26	22	35	25	34	31	28	26	26	17	348
Girl	35	31	34	44	45	32	32	38	35	26	34	30	23	439
All	65	62	51	70	67	67	57	72	66	54	60	56	40	787

most age groups are enough without the number of 8 years of boy, 17, which, however, is adequate for the calculation of mean value and standard deviation (SD).

2)Stature: Figure 1 shows the stature means and standard deviations of Songkohn boys with   comparison of 50, 25 and 5 percentiles of NCHS 2000. Songkohn boys clearly show very short statures. All the means of age groups from 6 to 18 years old are below 50 percentile values, and furthermore age groups over 8 years old are under 5 percentiles. Only the mean of 6 years old group overcome 25 percentile and 7 year old group is between 5 and 25 values.
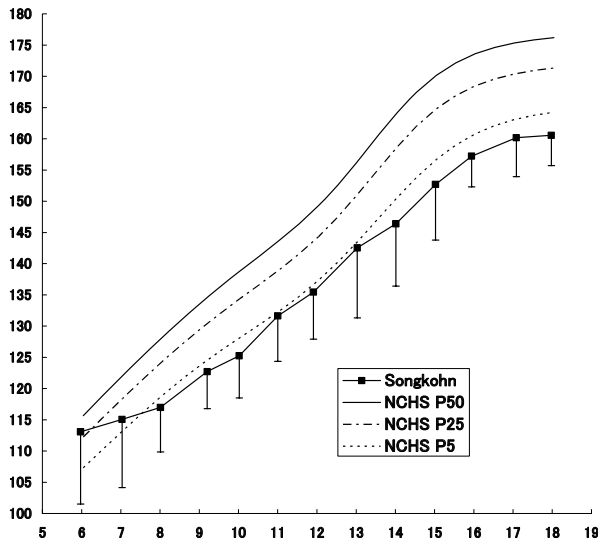
Figure 1. Stature means and standard deviations of Songkohn boys

Songkohn girls also show very low stature values, that is, age groups over 12 years old are under 5 percentiles, while means of age groups under 11 years old are between 5 and 25 percentile values (Figure 2).
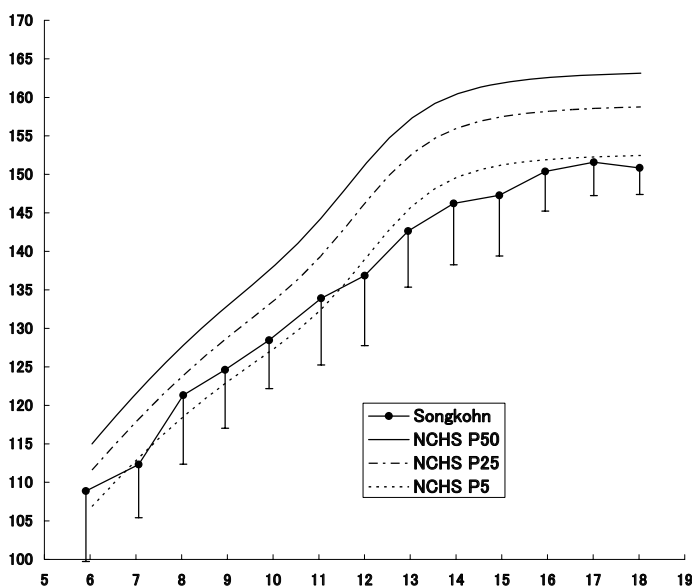
Figure 2. Stature means and standard deviations of Songkohn girls

3) Body weight: Means of body weight of Songkohn boys are shown in Figure 3, which indicate low values same as the values of statue, mostly under 5 percentiles. Only 3 age groups of 6, 7 and 16 are between 5 and 25 percentile values (Figure 3).
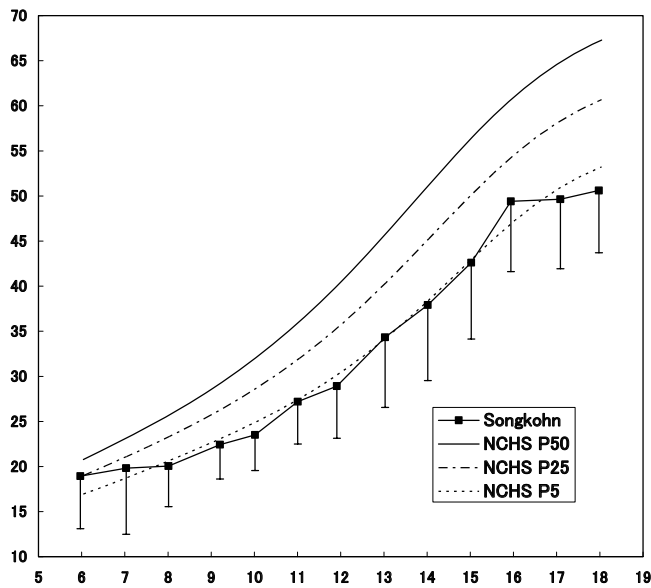
Figure 3. Weight means and standard deviations of Songkohn boys

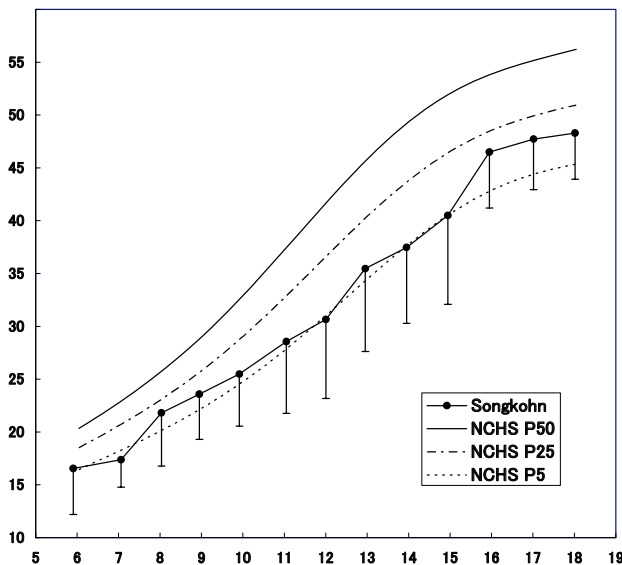Body weight of Songkohn girls exhibits higher mean values than boys. Means of body weight for most of all age groups are over 5 percentile, although those are under 25 percentiles (Figure 4).

Figure 4. Weight means and standard deviations of Songkohn girls

4) Body Mass Index] BMI means of Songkohn boys are higher than 5 percentile values in all age groups and 16 years age mean is over 25 percentiles although under 50 percentile (Figure 5).

Although means of BMI values for Songkohn girls indicate around 25 percentiles until the age of 15 years old, means of BMI for the ages over 16 years old amount to 50 percentile (Figure 6).

5) Comparison of stature among Asian populations: For the comparison among Asian populations, means of stature are graphically shown in Figures 7 and 8, where the mean values of the Japanese and the Malaysian and the Chinese in Malaysia also shown for the convenience of easy understanding the values. Means of Songkohn
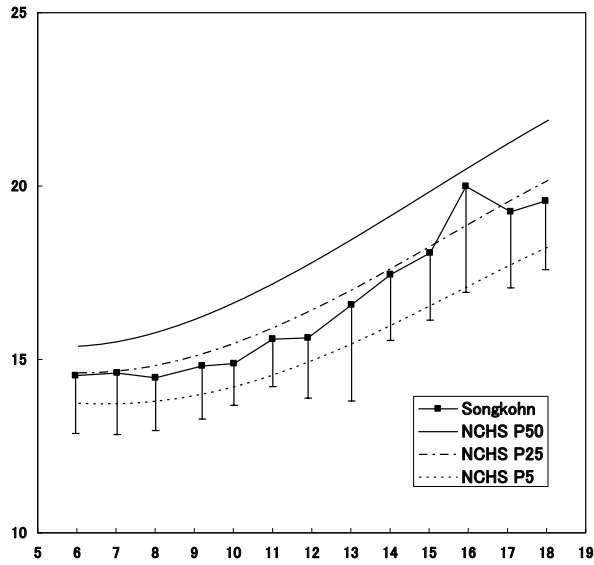
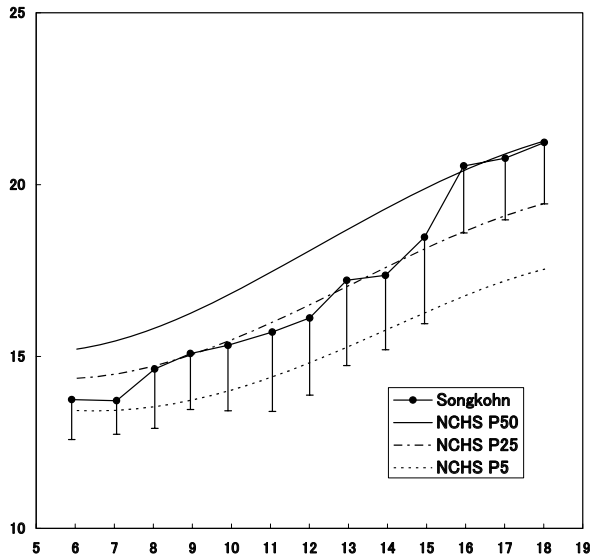Figure 5. BMI means and standard deviations of Songkohn boys

Figure 6. BMI means and standard deviations of Songkohn girls
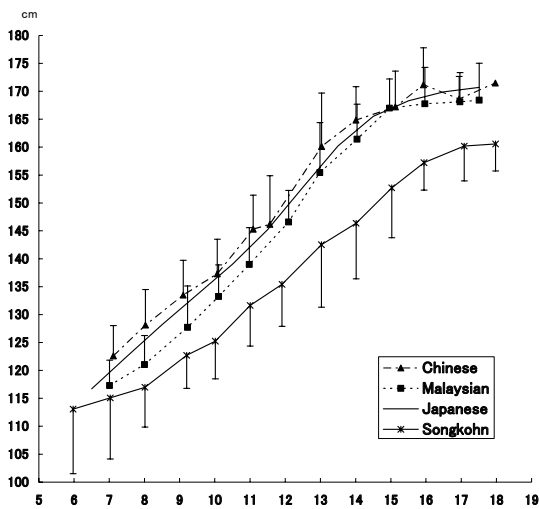

Figure 7. Stature means and standard deviations of Songkohn boys with the comparison of the Japanese and the Chinese and the Malaysians in Malaysia
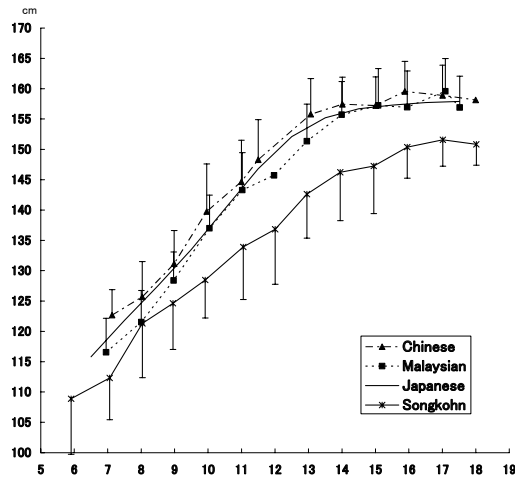
Figure 8. Stature means and standard deviations of Songkohn girls with the comparison of the Japanese and the Chinese and the Malaysians in Malaysia

boys and girls show clearly lower values than other Asian children.

6) Chest circumference: Results of chest circumference for boys are shown in Figure 9, where the mean values of Malaysian and Chinese in Malaysia also shown for the convenience of comparison. Means of Songkohn boys show clearly lower values than Malaysian boys.
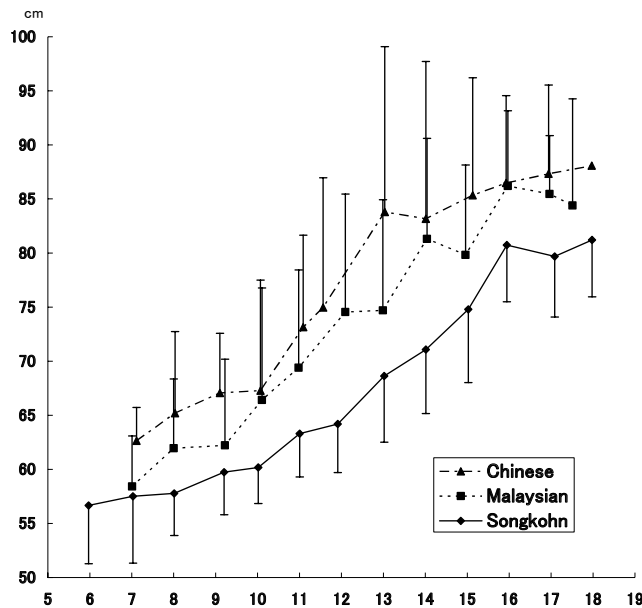
Figure 9. Chest circumference means and standard deviations of Songkohn boys with the comparison of Chinese and Malaysians in Malaysia

7) Upper arm circumference: Means of upper arm circumference for boys and girls are shown in Figure 10 and 11, where the mean values of Malaysian and Chinese in Malaysia also shown for the convenience of comparison. Means of Songkohn boys show clearly lower values than Malaysian boys. Although Songkohn girls also show lower mean values for upper arm circumferences under the age of 15 years old, they reach same values in the ages of late adolescent periods over 16 years.

8) Skinfold thickness: Means of triceps skinfold thickness for boys and girls are shown in Figure 12 and 13, where the mean and standard deviation values of Malaysian and Chinese in Malaysia also shown. Means of
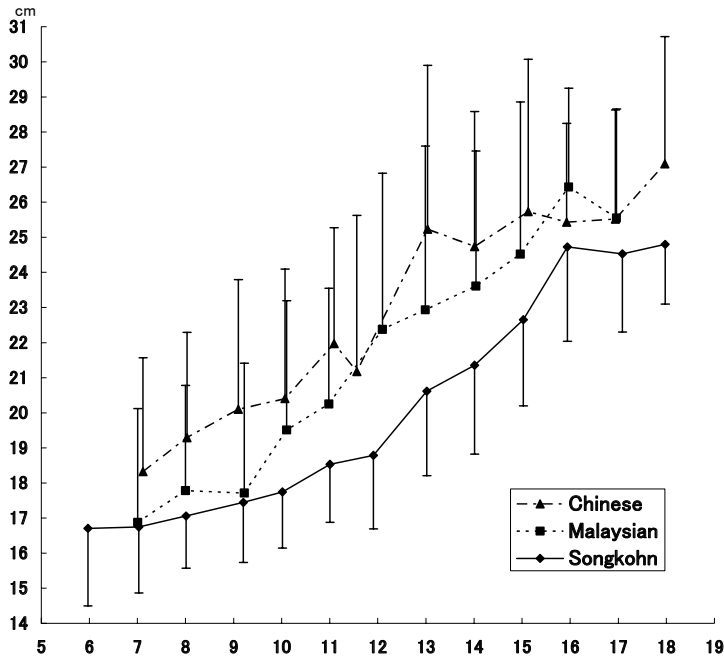
Figure 10. Upper arm circumference means and standard deviations of Songkohn boys with the comparison of Chinese and Malaysians in Malaysia
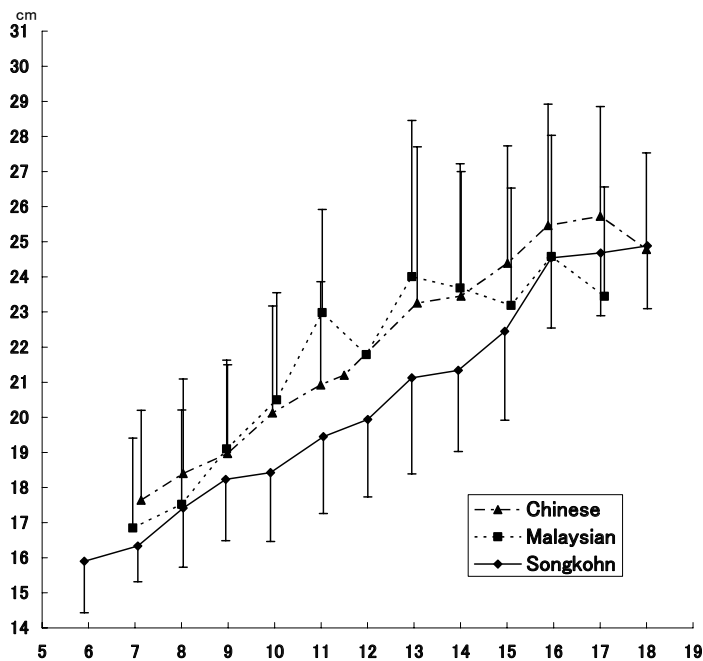
Figure 11. Upper arm circumference means and standard deviations of Songkohn girls with the comparison of Chinese and Malaysians in Malaysia

Songkohn boys do not change according to ageing, showing same means in all age groups, and the means of all ages exhibit clearly lower values than Malaysian boys.

For means of triceps skinfold thickness of Songkohn girls, the means show higher values in elder age, showing lower mean values of Malaysian and Chinese in Malaysia. The girls, however, reach nearly same value over the age of 16 years old for triceps skinfold thickness in late of adolescence.

Means of subscapular skinfold thickness of Songkohn boys show same changing patterns as the triceps
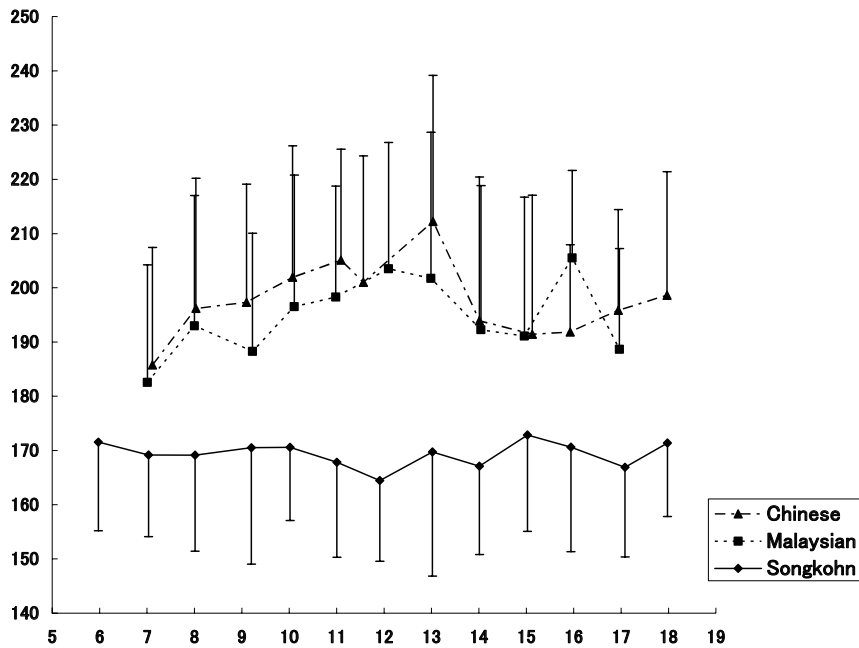
Figure 12. Triceps skinfold thickness means and standard deviations of Songkohn
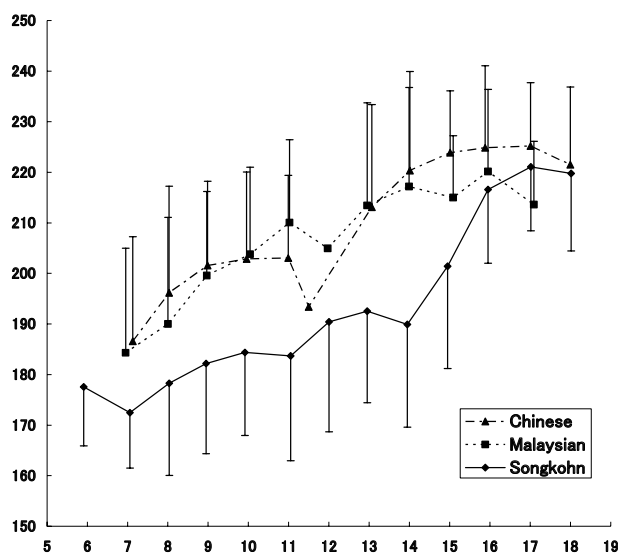boys with the comparison of Chinese and Malaysians in Malaysia

Figure 13. Triceps skinfold thickness means and standard deviations of Songkohn
girls with the comparison of Chinese and Malaysians in Malaysia

skinfold for girls, that is, the means showing higher values in elder age with lower mean values than Malaysian and Chinese in Malaysia (Figure 14). In the late adolescent ages, they reach nearly same value of the Malaysians.

For means of subscapular skinfold thickness of girls, no clear difference are found between Songkohn subjects and the Chinese and the Malaysians in Malaysia (Figure 15),
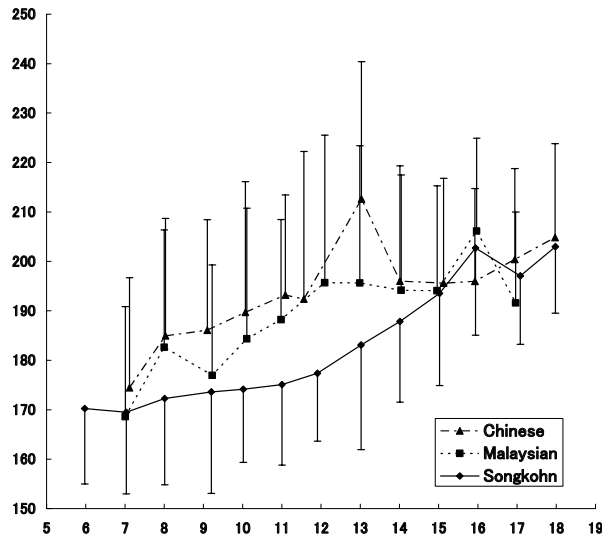
Figure 14. Subscapular skinfold thickness means and standard deviations of Songkohn boys with the comparison of Chinese and Malaysians in Malaysia
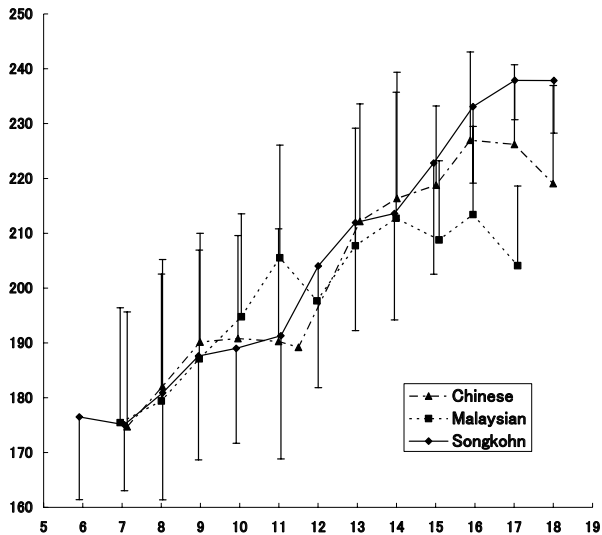

Figure 15. Subscapular skinfold thickness means and standard deviations of Songkohn girls with the comparison of Chinese and Malaysians in Malaysia

2005　8 9　　6

18

4　　(Bengkhamlay　Thakhamlian　Dongbang　Lahanam)

842

5.5　18.5　　　　　　　　　　　　　　　　　BMI

6　18

NCHS2000　5　　　　　　　　　　1　　　　　　　　5　　　　　　　　　25

2　　　　　　　　　　　　　NCHS2000　5

25　　　　　　　　　　　　　　3　4)　BMI　　　　　　　　　　25

5)　　　　16　　　50　　　　　　　　　15　　　25

5　6)

Appendix

Photo 1

Photo2

Photo3

Photo4