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The Chinese the Asia Tallest: How and When?

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1. Abstract

Japan was a forerunner in rapid economic development in NE Asia after WWII, followed by South Korea with two decades behind due to Korean War (1950-53). Children in Japan started to increase in height radically in 1960, as the inputs to health, food consumption increased in quantity and quality and then quit increasing in height in the mid-1990s. They were overtaken by Korean peers by 3.0 cm in the mid-2000s, that plateaued in height afterwards. The Great Chinese Famine, caused by the Great Leap Forward led to severe malnutrition in China nationwide in 1975-1985. China's economy has made fast development since then. Very little is known about the trend in stature, "net measure that captures the supply of inputs to health" (Steckel) in China since then. Based on nationwide surveys, CNSSCH, this note explores trends in children's height in China over the period of 1985 to 2020.

2. Introduction

In an impressive report in EHB, 21(2016) [1], a group of medical scientists in Beijing showed that senior male students in Beijing attained 175.4 cm and female students 162.6 cm, respectively in mean height in 2010. Thus, these students were taller than their peers in European countries lying along the same latitude as Beijing—France and Italy—and significantly taller than those in Japan. The authors of the report are seriously concerned about obesity, as the economy of the nation develops further. Mainland China is very large in area from South to North and West to East and disparities in living standards between urban and rural and coastal big and inland smaller cities still remain to be solved.

In this note, we use nationwide Han school children's height by

age from 1985 to 2019, by 5 years intervals, CNSSCH [2], Ministry of Education as a main body. China has developed remarka- bly fast and steadily in the last half-century and "inputs to health" (Steckel, 1955) [3], per capita food consumption, in particular, have increased both in quantity and quality as well (Tables 2-3, subsequent section). Growth in school children's height in Chi- na will be analyzed, based on consistent nationwide statistics, CNSSCH and FAOSTAT [4], since the mid-1970s.

3. Growth in Height

Table 1 demonstrates secular trends of mean height of male children by age from 7 to 18 years old, from 1985 to 2019, based on CNSSCH. Across all ages from 7 to 18, male students in China have grown taller in height. The children in the younger ages, 9to 14, in particular, increased by 10 cm in mean height over the survey period, 1985 to 2019, whereas those in the older ages increased much less, approximately by 4 cm.

Children 8 years old in 1995 were born in 1987, grew to 1 year old in 1988, ---,7 years old in 1994, and are called 1987 birth cohort. Likewise, children 18 years old in 1995 were born in 1976, grew to 1 year old in 1977, and in turn to 18 years old in 1995, are called 1976 birth cohort. To determine one's growth, comparing one's mean height by age, say 7 years old and 18 years old in the same year, using cross-sectional data is not appropriate. Mean height of 18 years old in 1995 should be compared to height of 7 years old in 1984, the same birth cohort, using longitudinal data, if available(Mori, ACMCR, 2022 [5]). A 7 years old in 1995 has not grown instantly to 18 years old in 1995. Neither 18 or 7 years olds in 1995, for example, share "the inputs to health" while growing up.

Figure 1 illustrates secular changes in height growth from age 6 (1st graders in primary school) to age 17(3rd graders in high school) in Japan and South Korea, every year from 1985 and 2017 and height growth from age 7 to age 18 in China, over the period from 1985 to 2019.

In respect of growth from the youngest grades in primary school to the oldest grades in high school, school children in China, representing the entire nation, have been slightly declining in growth from 50 cm from the mid-1990s to 47 cm in the end of the 2010s, whereas their peers in Japan have been almost constant at 54 cm for the entire period, presumably because disparities between urban and rural and the bigger cities and the smaller cities had not existed in Japan in recent years. And technically, China classifies school children from 7 to 18, excluding 6 in age, when height increases significantly in one year, regardless the country of origin. Nevertheless, school children in China have not been increasing in growth velocities in the latest decades, as compared to Japan and South Korea.

Although the velocity of growth among China's youth differs from that of Japan, it remains the case that the final height achieved in China is apparently greater in Japan.

Tables 2 and 3 enumerate secular changes in per capita supply of protein from animal products and per capita supply of vegetables and fruit in Mainland China, as compared to Japan and South Korea and selected European countries from the 1970s to 2010s. The audience would be amazed to realize that per capita supply of vegetables in China, at 300 kg/year in the 2010s is more than three times greater than in Japan and developed nations in Europe at the same time. Mori, Cole and Kim suspect that a steady decline in growth velocities in children's height in South Korea in the past decades should have been caused by drastic decreases in Kimchi (i.e., vegetable) consumption by the younger generations, particularly children in growing ages since the mid-1990s (2021) [6].

Table 1: National Han Children's Height by Age, 1985~2019

	male		male		male		male		male		male		male	
age	1985 (cm)		1995 (cm)		2000 (cm)		2005 (cm)		2010 (cm)		2014 (cm)		2019 (cm)	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
7	119.51	5.53	122.23	5.87	122.58	6.23	124.15	6.14	125.52	5.99	126.62	5.79	126.87	5.74
8	123.96	5.78	126.74	6.24	128.12	6.22	129.52	6.44	130.74	6.17	131.97	6.07	132.4	5.91
9	128.86	6.10	131.84	6.44	132.93	6.59	134.44	6.54	135.81	6.57	137.18	6.46	137.76	6.43
10	133.51	6.23	136.85	6.95	137.98	6.85	139.33	6.86	140.88	6.95	142.09	6.90	143.09	6.87
11	138.27	6.71	142.31	7.60	143.05	7.47	144.74	7.67	146.25	7.87	148.08	7.89	149.66	7.96
12	142.92	7.55	148.23	8.53	149.13	8.77	150.56	8.65	152.39	8.86	154.54	8.79	156.34	8.94
13	151.02	8.55	156.26	8.84	157.05	9.25	157.92	9.05	159.88	8.66	161.40	8.62	163.48	8.36
14	157.25	8.46	161.94	8.17	162.69	8.41	163.74	8.28	165.27	7.81	166.48	7.64	168.57	7.16
15	162.29	7.46	165.66	6.88	166.82	7.07	167.73	7.08	168.75	6.96	169.79	6.79	171.28	6.55
16	165.76	6.29	167.95	6.35	169.23	6.41	169.75	6.50	170.53	6.43	171.35	6.32	172.58	6.28
17	167.54	6.02	168.94	6.08	170.20	6.24	170.78	6.39	171.39	6.29	172.05	6.29	173.03	6.31
18	168.21	5.90	169.31	6.01	170.25	6.34	171.00	6.29	171.42	6.32	172.00	6.27	172.75	6.28

Sources: Ministry of Education, Chinese National Survey on Student s' Constitution and Health (CNSSCH).

Table 2: Secular changes in per capita supply of protein from animal products, Mainland China, Japan, Rep. Korea, Italy, Netherlands and Norway, 1975 to 2010.

Year	1975	1980	1985	1990	1995	2000	2005	2010	2011	2015	2020
Cn_Mainland	5.8	6.8	9.4	13.3	21.1	26.8	31.3	36.9	36.9	39.4	41.5
Japan	41.6	46.9	50.9	55.2	56.1	55.0	51.3	48.6	48.3	48.2	49.6
Rep. Korea	14.6	18.5	23.0	26.6	33.8	36.8	39.0	44.0	43.7	48.6	53.7
Italy	46.2	53.0	56.5	59.9	58.6	62.1	59.8	60.4	60.7	55.4	58.0
Netherlands	62.3	65.3	67.7	64.8	72.7	75.4	72.9	73.1	71.7	72.7	68.5
Norway	58.3	65.3	63.9	59.7	63.7	64.5	63.3	65.0	67.6	65.8	64.6

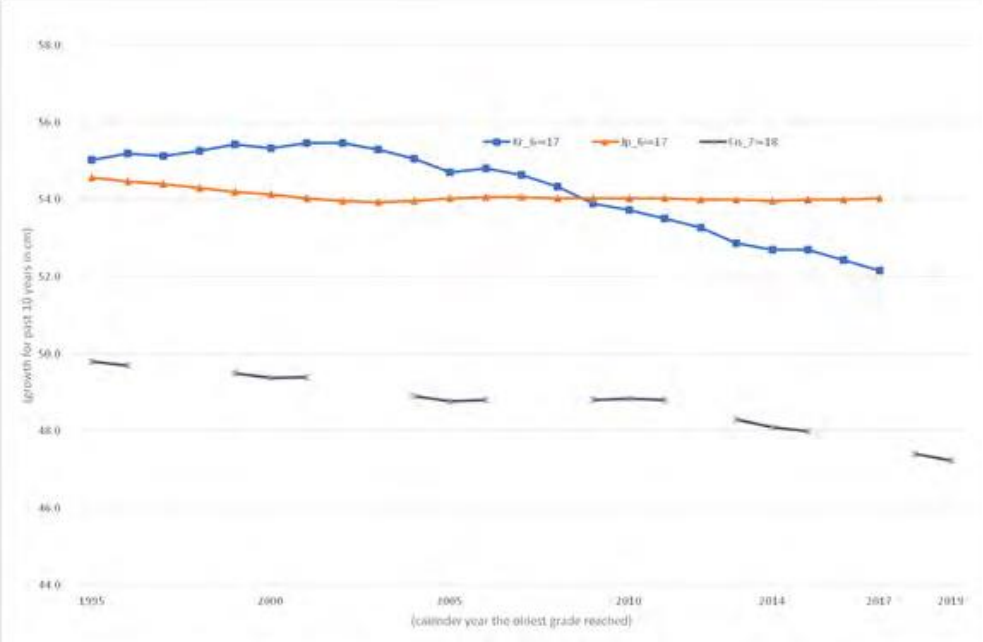
Sources: FAOSTAT, Food Balances, various issues on the internet.

Notes: year denotes 3-year moving averages, for 1975~2010 and 2-year averages for 2011-2020.

Table 3: Secular changes in per capita supply of Vegetables and Fruit, 1975 to 2010. (kg/year).

	Cn_mainld	Japan	Rp. Korea	Italy	Netherlan	Norway
Vegetables						
1975	46.3	121.7	146.1	161.8	74.1	46.8
1980	51.9	123.3	206.4	166.4	75.5	55.7
1985	81.0	121.4	188.8	172.4	77.4	55.4
1990	99.2	117.2	196.1	176.7	72.0	58.5
1995	151.6	115.5	212.8	176.8	76.2	62.0
2000	232.7	112.7	229.6	180.7	98.3	64.3
2005	283.8	106.5	223.8	180.3	92.0	74.9
2010	330.7	100.3	212.0	155.8	83.3	76.2
2011	326.0	101.5	204.5	145.2	59.4	68.4
2015	353.4	94.1	201.6	131.0	60.3	73.2
2020	378.8	95.6	193.7	96.5	83.2	76.2
Fruit, excluding wine						
1975	5.1	59.4	15.4	117.2	87.4	85.4
1980	6.3	56.8	24.6	110.0	105.9	87.9
1985	9.4	50.5	33.1	117.5	103.8	98.3
1990	14.8	49.8	52.8	127.3	131.9	98.4
1995	29.3	51.8	64.6	125.4	134.3	99.2
2000	43.3	52.7	68.8	139.1	121.6	107.9
2005	58.3	57.7	71.5	156.6	128.6	132.3
2010	78.1	50.9	69.2	157.0	127.6	131.4
2011	78.0	35.9	53.4	146.7	96.8	80.5
2015	92.5	34.2	55.8	122.4	109.0	80.5
2020	100.5	33.2	49.2	122.7	104.2	75.5

Sources and Notes: The same as Table 2.



Graph 1: Secular trends of height growth of male studensts from the youngest to the eldest grades, Urban China, in comparison with Japan and South Korea, 1985 to 2019

4. Conclusions

Based on food balance sheets, FAOSTAT, the old version, up to 2013 and the newer version, from 2010 to 2020, per capita supply of protein from animal products in Japan and South Korea stopped increasing in the mid-2010s, whereas China has not stopped increasing animal protein consumption yet, if not comparable to the northern countries in Europe. What is very impressive or strong in China's food consumption, however, is that China has attained a very high level of vegetables and fruit consumption and more importantly, the younger generations do not seem to have steered away from vegetables and fruit, unlike children in Japan and south Korea [6;7], which may require statistical verifications. As the economy/society develops rapidly, people tend to change in food consumption patterns appreciably by generation [8].

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