From the Poorest to the Tallest in East Asia:
The Secular Trend in Height of South Koreans

Daniel SCHWEKENDIEK and Seong-Ho JUN

Abstract

It is generally accepted that the Republic of Korea underwent an impressive economic transition in the past century. In a similar vein, human stature improved enormously over this same time period. This paper shows that the height of South Korean men increased drastically from 169 cm in cohorts born after the Korean War to 175 cm in cohorts born in 1983. South Koreans are now among the tallest of the entire Asian continent. Moreover, young South Koreans are also rapidly catching up to the heights of the most economically prosperous nations. This article also found that social differences based on height stratified by educational attainment were negligible in South Korea; interestingly and ironically, this is distinct from socialist North Korea, where highly educated people were about 1 to 2 cm taller. Rapid economic development combined with the introduction of nationwide high-protein feeding programs in primary schools are the likely causes for this remarkable and uniform growth spurt.

Keywords: health, nutrition, standard of living, stature, height, anthropometry

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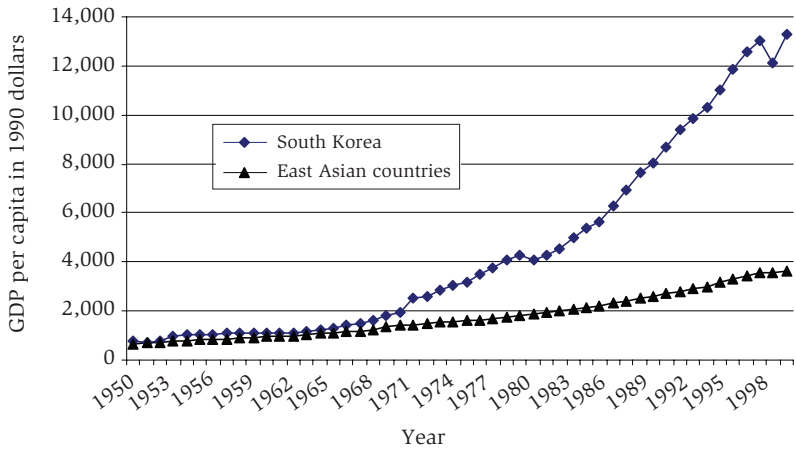
Introduction

In August 1948, the Republic of Korea was established after decades of colonization by Japan. At that time, Korea, as one of the poorest nations in the world, was not a significant player in the global economy and had very low potential for economic growth. Worst of all, the Korean War (1950-1953) had a devastating effect on the country as the infrastructure was almost completely destroyed. The resulting permanent division between North and South Korea had a negative impact on the two Koreas as the mountainous north was cut off from arable land and the flatter south could no longer access minerals and other natural resources previously available in abundance. In spite of these obstacles, South Korea now possesses one of the world's top economies. In December 1996, South Korea was granted membership to the Organization for Economic Corporation and Development (OECD), a highly economic, and most importantly symbolic, acknowledgment of the country's status.

The rise of the South Korean economy is reflected in its gross domestic product (GDP) per capita. Commonly, GDP per capita is understood as a proxy for average income and, more generally, as an indicator of living standards. The GDP per capita of South Korea constantly increased over the latter half of the past century (figure 1): from 1950 to 1999, the GDP increased by a factor of 17. This statistic is quite remarkable considering that South Korea was once one of the poorest countries in the world. In a comparison of 16 East Asian countries, South Korea was found to have the sixth lowest GDP per capita in 1950 as well as the second-lowest in Northeast Asia (Maddison 2001). However, the South Korean economy started to improve from the early 1960s to late 1980s, which is the period of concern in this study (figure 1). Therefore, it can be reasonably assumed that height as a socioeconomic welfare indicator likewise improved, since economic change generally goes hand in hand with biosocial development (Baten 2006; Brinkman et al. 1997). The Asian growth miracle is often explained by economic input factors and central planning, similar to the growth path of the Soviet Union from the 1950s to 1960s

Figure 1. Economic development in South Korea and East Asia, 1950-1999



Source: Maddison (2001, 304-305).

(Krugman 1994). However, it remains controversial as to whether living standards, as measured by biosocial human welfare indicators, actually improved in South Korea due to the fact that the government was very authoritarian. Though the South Korean government also opted for a centrally planned economy until the 1970s, similar to North Korea, it nevertheless introduced a number of social elements in order to raise the living standards of its citizens. The Saemaeul Movement of the 1970s, similar to North Korea's Thousand Horses movement, was initiated to improve the living standards of rural villagers and later expanded to government business, finance, and education (Moore 1984).

In this paper, we analyzed the long-term trend in the height of South Koreans by considering average height measurements as an indicator of quality of life. Stature is a reliable and sensitive proxy for the biosocial welfare of a country and has been applied by researchers in various fields (Baten and Hira 2008; Fogel 1983; Komlos and Baten 1998; Steckel 2009; Strauss and Thomas 1998). It is also established by the United Nations when assessing the health status within popula-

tions (WHO 1994). Indeed, height has now become a common welfare indicator in the social sciences, similar to GDP per capita or infant mortality, as the amount of human stature-related articles published in international social sciences journals has recently quadrupled (Steckel 2009). Further, it should be noted that the 2009 Economic History Association Meeting, along with the fifteenth World Economic History Congress organized by the International Economic History Association, perhaps the most important gatherings of historians, were both largely dedicated to the topic of height and historical development. Based on this, we investigated the anthropometric trend in South Korea, a rather understudied area in the international social sciences.

One advantage offered by studying height is that it effectively reflects net nutritional status; for example, it captures the actual amount of food and medical provisions consumed by individuals. Being distinct from GDP per capita, average height gauges socioeconomic distributional effects within a society. For instance, if one person owns 99 percent of a country's income, then the average GDP per capita will not be affected. By comparison, if that same person owns 99 percent of all the food and medical resources in the country, then average height will be drastically affected. Therefore, human stature is actually a more precise and refined welfare indicator than conventional macroeconomic indicators.

It should be noted that terminal height is largely influenced during infancy (Bogin 1999; Tanner 1990). Specifically, relative height gains in the first two years of life have the largest effect. Hence, environmental circumstances during early life have a large impact on adult growth status. Currently, the anthropometric literature commonly makes use of adult height arranged by birth as a prevailing socioeconomic factor in early life with a drastic impact on later-life outcomes such as human stature.

Researchers unfamiliar with using anthropometric indicators might be reluctant, citing that genes more strongly determine human size. While genes do indeed affect physical characteristics, the genetic effect is clearly cancelled out when taking population averages into

consideration. As correctly pointed out by Eveleth and Tanner (1990), "Two genotypes which produce the same adult height under optimal environmental circumstances may produce different heights under circumstances of deprivation. Thus, children who would be taller in a well-off community could be smaller under poor economic conditions." Similarly, a study of separated monozygotic twins (thus controlling for genotype) raised under different circumstances found that the adult heights of the twins differed by more than 8 cm (Tanner 1990). In other terms, extreme differences between the phenotypes and genotypes of individuals do occur and are largely subject to living conditions.

Research on the Biological Standard of Living in Korea

Paradoxically, the international literature actually contains more comprehensive investigations into the biological standard of living in North Korea. Schwekendiek (2008a; 2008b; 2009c) and Pak (2003; 2004a) analyzed North Korean height data collected during and after the infamous "Great Famine" of the late 1990s. Conversely, only a few internationally published socioeconomic studies based on anthropometry have been conducted on South Korea. However, most of these studies focused on current times. Although Gill (1998) highlighted anthropometric developments in Korea in a long-term study, his focus was on Colonial Korea (1910-1945), specifically Korea's economy under Japanese rule. Therefore, the availability and consistency of statistical health data for that time period are completely different compared to modern South Korea. Further studies on height and the biological standard of living in Colonial Korea have been published by Kimura (1993) and more recently by Choi and Schwekendiek (2009). Beyond this, there is a comparative study on the stature of adults living in the two Koreas (Pak 2004a; Schwekendiek et al. 2009). The heights of North Korean defectors have been measured, though the comparison is based on a non-random sampling due to the self-selection of the escapees (Schwekendiek 2009b).

South Korean height data used by Pak (2004a) were obtained from a national anthropometric survey primarily carried out for the consumer industry. This source was also taken into account here.

In summation, although there is extensive research on adult height in Colonial Korea and North Korea, the biological standard of living in South Korea is still understudied. Compared to South Korea's impressive economic growth, there is a prominent lack of long-term evidence on the anthropometric development of the nation.

Height Data Sources

Researchers employing human height measurements must solve the problem of dealing with only a few observations when transforming an aggregated cross-sectional measurement of heights into a time series arranged by birth cohorts (which is also known as "backward projection of heights"). For example, in a single assessment of adult height, one could choose to observe twenty unbiased cases. On one hand, catch-up growth occurs until the age of 20 whereas on the other hand, shrinkage in stature starts at the age of 40. Yet, from the age of 20 to 40, the terminal height remains constant, providing biologically unbiased data. It should be noted that adjustments for shrinking in old age have recently been suggested (Choi and Schwekendiek 2009; Morgan 2008; Prince and Steckel 2003) along with adjustments for catch-up growth of individuals under 20 years of age (Fredriks et al. 2000).[1] However, we tried to refrain from adapting these critical heights to our study in order to prevent the methodology from biasing our findings; moreover, aging-effect adjustments were not necessary since the critical economic period from the 1950s to 1980s was taken into account by simply combining two anthropometric sources.

1. Fredericks et al. (2000) found catch-up growth for 18 year-old males +1.4 cm, for 19 year-old males +1.1 cm, 20 year-old males +0.8 cm and 21 year-old males +0.5 cm in the Netherlands.

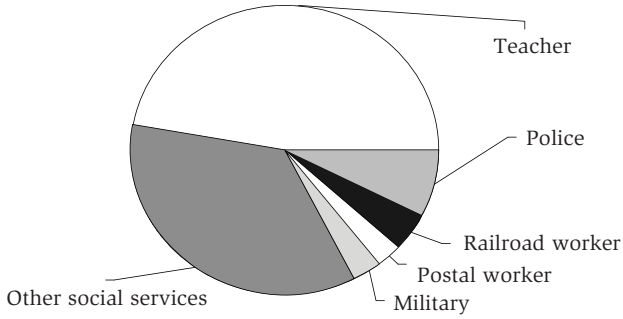
Two reliable primary sources are readily available for the large-scale assessment of anthropometric data on South Koreans. In 1979, 1986, 1992, 1997, and 2003, the Korean Research Institute of Standard and Science (KRISS) published anthropometric surveys that include standardized height information of persons roughly 0 to 50 or 0 to 70 years old (table 1). The Korean Medical Insurance Corporation (KMIC) also biennially collects anthropometric information of its insured people, who are comprised of state employed adults and their families. Both sources are often referenced in anthropometric research; anthropological as well as industrial studies are commonly based on the KRISS data (Kang et al. 2004; Pak 2004a) while economic historians or biosocial scholars prefer to make use of the KMIC data (Gill 1998; Song et al. 2003).

Table 1. National Anthropometric Surveys in South Korea

Year	1979	1986	1992	1997	2003
Institute	Korea Institute of Science and Technology (KIST)	Korean Research Institute of Standard and Science (KRISS)	Korean Research Institute of Standard and Science (KRISS)	Korean Research Institute of Standard and Science (KRISS)	Korean Research Institute of Standard and Science (KRISS)
Age Group (in Years)	0-50	0-51	6-50	0-70	0-70

The KMIC data is often referenced as it has been made accessible to (selected) public researchers. Launched in 1989, the national health insurance system of South Korea covers 94 percent of the population (Yang 1996). Among the 417 health insurance providers, the KMIC is one of the largest as it offers services to all state-employed workers across the country. In 1990 about 980,000 workers were insured by the company. Further, from 1940 to 1970, there were much more men than women employed by the state (Gill 1998), with almost half being teachers, office workers, or policemen (figure 2), who repre-

Figure 2. KMIC height sample by occupation in percent



Source: Data from the Korea Medical Insurance Corporation, as reported in Gill (1998).

Note: Based on 978,349 individuals measured in 1990. Note that the social statistics for the aforementioned 1994 height data were not reported. Data pertain to both males and females, as disaggregated information is not available.

sent the middle class (or arguably, the mid-upper class) of South Korean society.

Therefore, there could be selection bias when analyzing the mean stature of South Koreans. Even though terminal height is largely influenced by conditions prevailing during early childhood and not by job status per se, it can be assumed that wealthy parents can provide a better education and resources for their children, which allow advancement into higher-status positions. Moreover, compared to lower-class families, rich parents can take better care of their offspring both medically and nutritionally, a fact that must be considered when examining the heights of the insured workers' children. For these reasons, the KMIC data cannot be considered completely reliable. On the other hand, only the lowest and highest social strata of the population are missing, which does not distort average height too severely. Most importantly, annual height averages are based on several hundred to thousands of individuals, allowing us to measure anthropometric trends that are robust against individual outliers in the sample (table 2). Therefore, the KMIC height trend is smoother

Table 2. Sample Sizes by Number of Males Measured by KMIC and KRISS by Birth Year

Birth Year	KMIC in 1994	KRISS in 2004
1954		
1955	31,549	
1956		
1957		
1958		
1959		
1960	30,907	
1961		
1962		
1963		
1964		50
1965	22,988	57
1966		81
1967		90
1968		77
1969		77
1970	5,314	76
1971		71
1972		70
1973		60
1974		41
1975		39
1976		49
1977		75
1978		124
1979		101
1980		78
1981		51
1982		39
1983		41

Source: Gill (1998, 136).

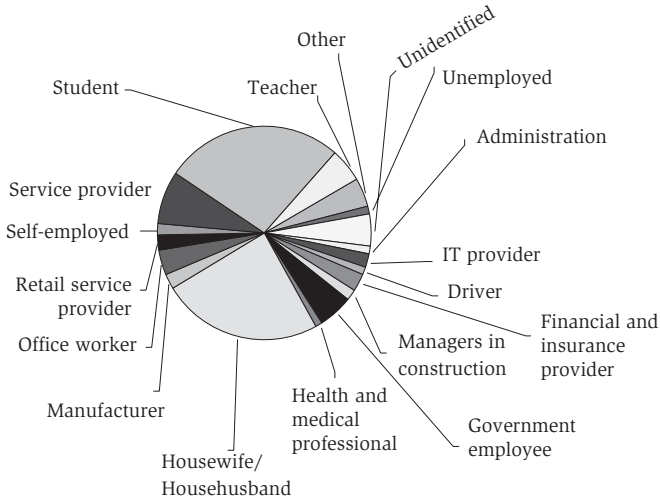
Note: Sample sizes for the KMIC were only reported for five-year birth cohorts.

compared to the KRISS height trend (see later figure 4). The KMIC height data were compiled from Gill (1998), who analyzed average height measurements of South Korean state-employed workers by gender in 1994. The terminal heights of cohorts born from 1954 to 1972 are represented in the sample as well; thus, the KMIC data represent the time period from the end of the Korean War to the early 1970s.[2]

Furthermore, the KRISS data was employed in our study. An advantage offered by using the KRISS data is that the surveys were primarily targeted at the consumer industry, which requires statistically representative samples. A drawback of the KRISS data is that detailed socioeconomic statistics are not included in the official survey report. According to the KRISS, only data released in these publications can be used for further analysis.[3] Therefore, these reports are sufficient for private industry but do not allow for a detailed analysis based on socioeconomic status. Fortunately, we were actually allowed to reanalyze the data from the 2004 survey (Korean Agency for Technology and Standards 2004). We were able to access the data while doing research on another topic, in which we only collected male height statistics (Choi and Schwekendiek 2009). Therefore, we can only report the height of South Korean men in this paper, which allows us to avoid the effects of gender dimorphism resulting from the high prevalence of female discrimination in East Asia and especially in Confucian Korea. Further, environmental stress is much more pronounced in males, due to the genetic resiliency of females during crisis periods (Baten and Guntupalli 2009). Therefore, male height is a better indicator for overall living standards than female height. As discussed, to avoid the effects of aging on terminal height, we limited ourselves to cohorts between 20 to 40 years of age. Sample sizes by

2. Note that there are two samples from 1990 and 1994 available, both ending in 1972 (Gill 1998). However, the 1990 sample was discarded here since we would have been forced to end our analysis in 1966, given the discussed distortions in terminal height caused by catch-up growth.
3. Note that the KRISS and KIST carried out these anthropometric surveys for the government, i.e. the South Korean Industrial Advancement Administration.

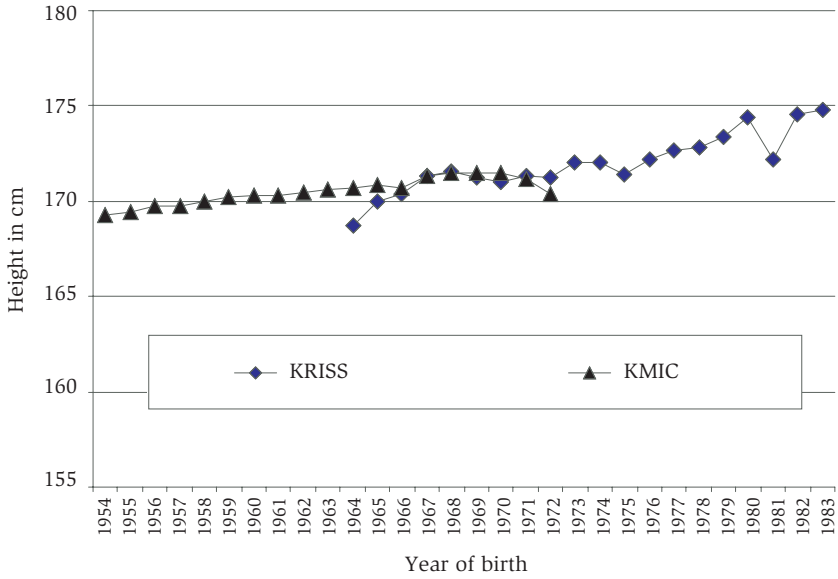
Figure 3. KRISS height sample by occupation in percent



Source: Calculated from raw data obtained from the KRISS (KATS 2004).
Note: Based on 2,727 individuals measured from 2003-2004. Data pertain to both males and females for broad comparison to figure 2.

gender and birth year are shown in table 2, and all cohorts contained twenty or more individuals, allowing us to broadly proxy the mean annual height for each birth year. Most importantly, distinct from the KMIC data representing only government workers, individuals measured by the KRISS represented all income strata, ranging from unemployed, blue-collar workers, and housewives (househusbands respectively) to highly skilled non-manual workers (figure 3). As indicated in figure 2, we unfortunately could not analyze socioeconomic characteristics by gender because such disaggregated information was not available. In any event, the KRISS and KMIC data seem to be sufficient for our analysis as both blue-collar and white-collar workers are represented in the analysis and the individuals measured by the KRISS are fully representative of the nation.

Figure 4. Secular trend of South Korean male height, 1940s–1980s



Source: Calculated from raw data obtained from the KRISS (Korean Agency for Technology and Standards 2004) and the KMIC data reported by Gill (1998).

Note: Only subsample sizes over twenty observations were reported. Individuals were 20.0 to 39.9 years of age at the time of measurement.

Analysis of Human Height

The long-term trend in South Korean male height is plotted in figure 4. First, we compared the heights of non-randomly selected individuals measured by the KMIC to those of statistically representative individuals assessed by the KRISS. Fortunately, from 1964 to 1972, the height trends of both sources overlapped, thus allowing direct comparison. The trend in male height of the KRISS-sample corresponded to the male height trend of the KMIC-sample during this time period, indicating that the biological standards of living (and thus the socioeconomic living conditions in early life) of government employees and average South Koreans did not differ much. This is an intriguing

result that can be confirmed when stratifying the KRISS height data by a social status proxy (performed in a later section of this paper).

Second, there was a positive and secular growth spurt in the plotted time series. The average height of males improved from 169 cm just after the Korean War in 1953 to 175 cm in 1983, a difference of about 6 cm in less than three decades (corresponding to about 2 cm every ten years). This is a remarkable statistic, though secular trends in height were also found in other industrialized countries after World War II (Chamla 1983; Hauspie et al. 1996).

We can further verify the secular trend in the heights of South Koreans using a recent landmark study on worldwide heights. Baten (2006, 12) reported the global height trends of men arranged by birth year for all major world regions. Not surprisingly, at the beginning of the nineteenth century, height trends of males stagnated at around 165 cm throughout the world. With the advent of industrialization and modern economic growth, the heights of Western males improved from about 166 cm for cohorts born in 1810 to 177-178 cm for cohorts born in 1976. The average height of East Asian males born in 1976 was about 169 cm, whereas the height of Southeast or South Asian males was clearly below 164 cm. Thus, our finding that South Korean males born in 1976 were as tall as 172 cm clearly indicates that they were remarkably above average in height among their (East) Asian peers. Unfortunately, the heights of men born after 1976 were not reported.

To investigate recent trends, we used different sources that reported the average height of eighteen-year-old males from selected developed (i.e., OECD) countries during 1980 and 2000 (table 3). We were able to retrieve reliable data from South Korea, Japan, USA, the Netherlands, Belgium, and Norway. Actually, there are many other sources that include height data for OECD countries, e.g., the Eurobarometers or the European Community Household Panel. However, access to these data is often limited and expensive, and more importantly, heights were self-reported and not physically measured. There have been investigations that have shown that respondents considerably overestimate their heights (Danubio et al. 2008). Height aver-

Table 3. Height of 18 Year-Old Males in Selected OECD Nations around 1980 and 2000

Period	Selected OECD-nations	Measure-ment year	Age	Mean height in cm	Gap to South Korea in cm	Source
2000	South Korea	2002-2003	ca. 18	172.9	0.0	Korean Agency for Technology and Standards (2004)
	Japan	2006	18	171.1	-1.8	Ministry of Education, Culture, Sports, Science and Technology, under http://www.mext.go.jp/b-menu/houdou/19/10/07092511/007/002.xls
	USA	2003-2006	18	176.8	3.9	McDowell et al. (2008)
	Netherlands	1997	ca. 18	182.9	10.0	Komlos and Breitfelder (2007)
	Belgium	2005	18	179.5	6.6	DIN BELG, under http://www.dinbelg.be/18yearsboys.htm
	Norway	2002	ca. 18 (conscripts)	179.7	6.8	Statistics of Norway, under http://www.ssb.no/english/yearbook/tab/tab-106.html
1980	South Korea	1979	18	166.8	0.0	Agency for Technology and Standards, under http://www.ats.go.kr
	Japan	1980	17	169.7	2.9	Ministry of Education, Culture, Sports, Science and Technology, http://www.mext.go.jp/english/statist/index16.htm
	USA	1988-1994	18	177.3	10.5	McDowell et al. (2009)
	Netherlands	1978	ca. 18 (conscripts)	180.3	13.5	Chamla (1983)
	Belgium	1979	ca. 18 (conscripts)	175.3	8.5	Chamla (1983)
	Norway	1980	ca. 18 (conscripts)	179.5	12.7	Chamla (1983)

Note: All online sources accessed on July 8, 2010.

ages reported in table 3 were generated by direct measurement, either from relatively random samples or all male cohorts (as a number of studies are based on mandatory national conscription data).

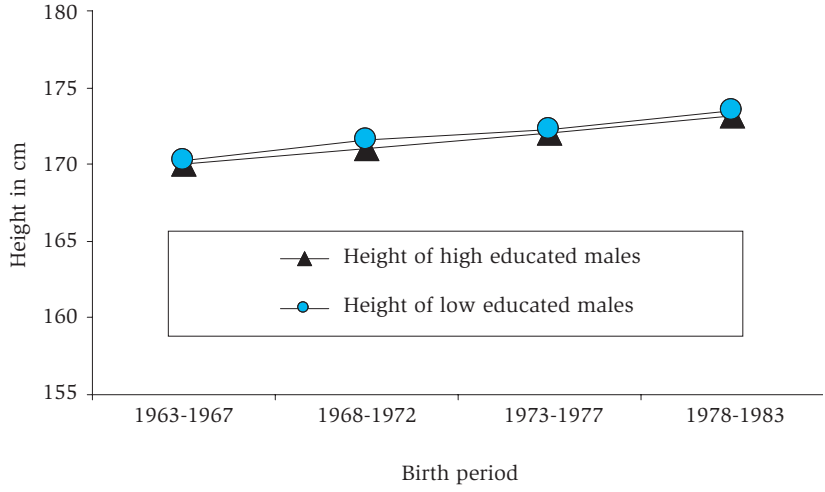
We found that the average height of eighteen-year-old males from the Netherlands was about 183 cm, and this served as a maximum reference as the Dutch are known to be the tallest people in the world. Furthermore, eighteen-year-old South Koreans are about 4 to 7 cm shorter than their American, Belgian, or Norwegian counterparts (table 2). This gap has drastically decreased compared to a few decades ago in which double-digit gaps in height were common between South Koreans and other developed nations (table 2). Now, South Korean young adults stand at about 172.9 cm, making them even taller than their Japanese peers (171.1 cm). This is an astonishing finding as young South Korean males were almost 3 cm shorter than their Japanese counterparts only two decades earlier (table 2). Hence, it seems that South Koreans are not only catching up rapidly to Western height standards but also even surpassing the heights of its geographical neighbour Japan, which started to industrialize much earlier and is still far more economically successful.

Another anthropological study comparing the adult heights of East Asian people corroborates our results (Lin et al. 2004). South Korean males were found to be 170.7 cm tall, considerably taller than the Taiwanese (169.9 cm), Chinese (167.8 cm), and Japanese (169.0 cm). Of note, that study also found that South Korean women were the tallest in East Asia. However, adult stature was simply pooled across all birth and age cohorts; in other words, the data were not adjusted for secular trends in height, age shrinking effects, or overall demographic composition. A nationwide survey in 2002 that measured that the stature of seventeen-year-old Chinese males reported an average height of 170.2 cm in urban areas and 166.3 cm in rural districts (Yang et al. 2005). These values are clearly below those of seventeen-year-old males (172.5 cm) living in South Korea (Korean Agency for Technology and Standards 2004). In addition, recent research has found that eighteen-year-old males measured in Hong Kong are on average 171.8 cm tall (So et al. 2008). Hence, even Hong

Kong natives, in other words, those residing in one of China's most urbanized and economically prosperous regions, are more than 1 cm shorter than their South Korean peers who stood at 172.9 cm at that time (table 2).

Moreover, the finding that South Koreans born near the end of the Korean War are 6 cm shorter than those born in the early 1980s (figure 4) represents a very remarkable improvement compared to North Korea. In the late 1990s, the height difference between a twenty-year-old male living in South Korea and his genetic counterpart living in North Korea, a country characterized by extreme famines and lack of economic growth, was about 6 cm (Pak 2004a). These 6 cm gained by South Koreans in just three decades clearly indicate the health and wealth of the South Korean population. Of note, considerable height differences between the two Koreas have been particularly notable among North and South Korean children (Pak 2003; Schwekendiek 2009a; Schwekendiek and Pak 2009), reconfirming the biosocial rule that deteriorating environmental living conditions sig-

Figure 5. Height by educational status



Source: Calculated from raw data obtained from the KRISS (Korean Agency for Technology and Standards 2004).

nificantly inhibit human growth.

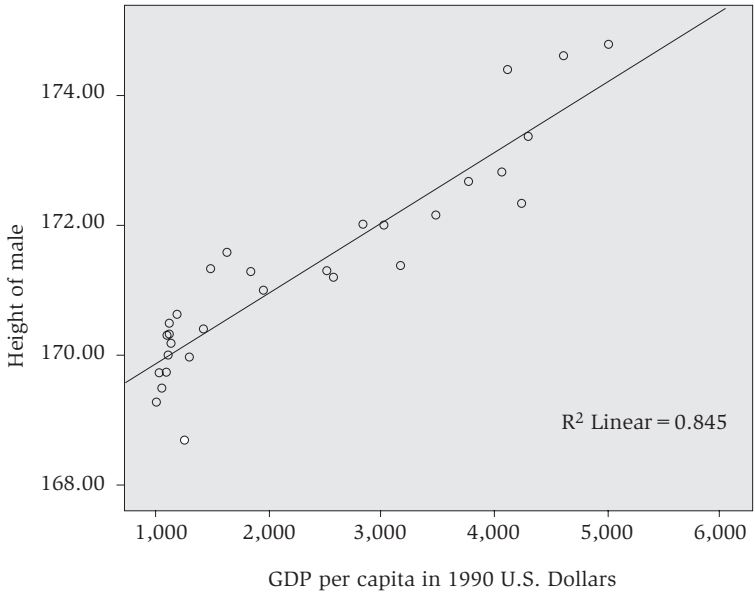
In summation, it may be concluded that South Korean men are the tallest in East Asia, clearly topping its direct economic rivals, China and Japan, in anthropometric performance. We here also provided evidence that South Koreans are taller than Taiwanese, Hong Kongers, and, not much surpassingly, North Koreans. Beyond this, South Koreans are now probably the tallest in all of Asia.

Furthermore, concerning the KRISS dataset, we analyzed height stratified by educational attainment in order to detect if there are considerable socioeconomic differences in the biological standard of living. Due to the small sample sizes, we opted to aggregate the data by five-year birth cohorts (figure 5). We classified South Koreans holding a university degree as "highly educated" versus those lacking a college education. As a result, we only detected small differences in the stature of men stratified by educational attainment (3 mm on average). Interestingly, in North Korea, the average height of adult males holding a university degree was reported to be 166 cm, whereas those having no or just a primary or secondary education ranged between 164 to 165 cm (Pak 2004b). Ironically enough, this indicates that socioeconomic differences in self-proclaimed classless North Korea are larger than in free market-oriented South Korea, where height gaps within social classes hardly exist. Underlying reasons for the secular upward trend in South Korean stature as well as explanations for the nonexistent height gap between highly educated and lower educated South Koreans will be discussed in the following.

Discussion

It should not be noted that even small gains in average height are quite remarkable. For example, consider that a country's birth cohort of 100,000 individuals gains 1 cm in average height. Yet, one might not realize this change as a 1 cm difference in stature is hard to perceive by visual inspection. However, if the height gains of that birth cohort are summed together, one will find that the whole nation has

Figure 6. The relationship between average height and income per capita in South Korea, 1954-1983

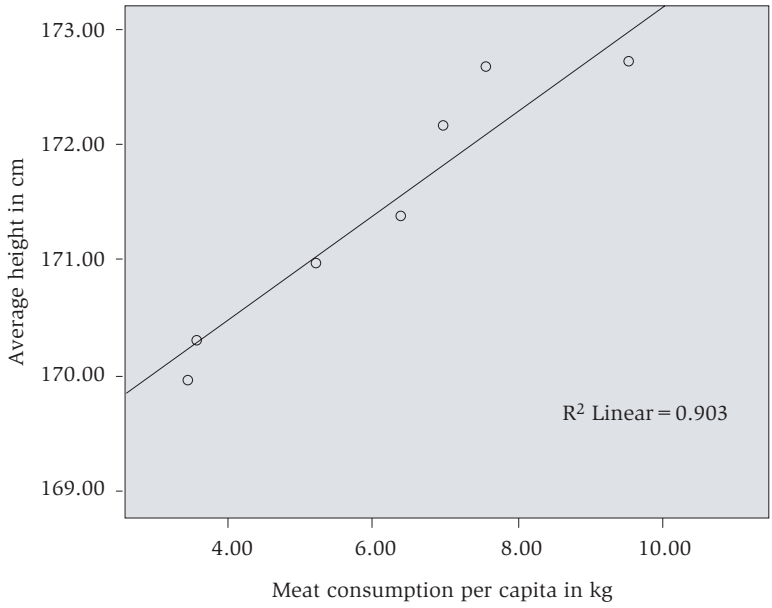


Note: KMIC reported heights from 1954 to 1963; KRISS reported heights from 1964 to 1983.

gained an impressive 1 km in height. Such a change, therefore, is not coincidental and demands underlying causes such as gross nutritional improvements.

Our focus is to determine what has caused this remarkable growth spurt in South Koreans. As illustrated in figure 6, economic growth is usually associated with height gains. This positive and linear correlation can also be observed for many other countries (Baten 2006; Brinkman et al. 1997). Yet, there are also a few exceptions to this rule in which average stature actually decreased when GDP increased. For example, countries that rapidly started transforming to a modern economy during industrialization such as the USA or Europe constitute the so-called “early industrial growth puzzle” or “antebellum puzzle” (Komlos 1996; 1998; Margo and Steckel 1983).

Figure 7. The relationship between average height and meat consumption per capita in South Korea, 1960-1978



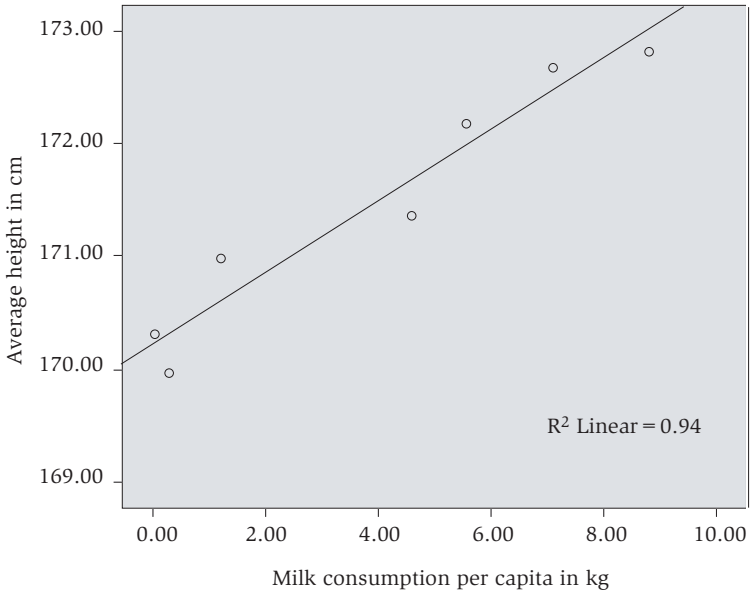
Source: Kim et al. (1979, 34).

Note: KRISS reported heights for 1960 only; KMIC reported heights for all other years. Meat consumption reported for 1960, 1970, 1975-1979.

Possible explanations for this phenomenon are shifts in income distribution, relative prices for food, variability in income, low food security, market disintegration, disruptions in the agricultural sector, and epidemics due to urbanization. South Koreans, however, continuously and remarkably grew in stature despite undergoing an enormous socioeconomic transition in just a few decades that is almost unparalleled in modern history.

A likely reason for this steady and enormous growth spurt in the heights of South Koreans could be that the government started school feeding programs in primary schools directly after the Korean War (Ju 2000). These programs were supported by UNICEF, CARE, and

Figure 8: The relationship between average height and milk consumption per capita, 1960-1978



Source: Kim et al. (1979, 34).

Note: KRISS reported heights for 1960 only; KMIC reported heights for all other years. Milk consumption reported for 1960, 1970, 1975-1979.

USAID. Though these schemes started as relief projects after the Korean War, they became self-supporting in 1973 and have continued even until now. More importantly, these programs have added Western-quality protein sources such as cow milk (or soy milk) to the diets of South Korean children. Milk and meat consumption per capita has linearly increased over the past few decades as well (figures 7 and 8). It should be mentioned that the tallest people in the world live in economically prosperous and high protein-consuming countries such as the Netherlands, Germany, Switzerland, Scandinavia, and the USA. Though some Koreans (and other Asians) are at somewhat of a genetic disadvantage, as they suffer more often from lactose intolerance, the continuous consumption of milk via school

feeding programs introduced by the government could eventually overcome this genetic deficiency (Swallow 2003). Additionally, the government introduced special nutritional projects targeting rural areas (Ju 2000) and poor families (Bae et al. 2010), which might have contributed to levelling the biological standard of living.

For all of the above reasons, we did not find the extreme height differences between highly educated people and lower educated people that are present in North Korea, where social background and thus entitlement to food and other daily amenities clearly affects the heights of children. On the contrary, we detected an impressive upward trend in height in South Korea comprising all social strata, despite a rapid transformation of the society and economy in just a few decades.

Last but not least, considering the current economic and anthropometric trend in South Korea, one may speculate that South Koreans are the most likely among all Asians to attain Western height levels, a conclusion which, from a macrohistorical point of view, does make perfect sense as descendants of the Mongolian race were once the tallest in the world, reaching the height levels of many of today's developed Western countries already a long time ago (Steckel and Prince 2001).

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