

Critical periods during childhood and adolescence: a study of adult height among immigrant siblings, Gerald J. van den Berg et al., 2011 [1]

Hiroshi Mori*

Professor Emeritus, Senshu University, Japan

***Corresponding author:** Hiroshi Mori, Professor Emeritus, Senshu University, Japan

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Introduction

Sweden has been known for high-income and open-society in the northern Europe. When people in the poorer nations migrate to Sweden, children accompanying them are expected to grow under the wealthier and healthier circumstances. If the siblings start their lives in the new environments before the age of maturity, it is expected for them to grow taller in height, and more productive in future work place, than otherwise.

As noted in the human biology, the earlier years of life are critical for the future adult height [2,3]. Cole and Mori stated only a few years ago, on the basis of statistical observations, using SITAR, of child height development in Japan and South Korea in the North East Asia, “most of the height increment seen in adults had already accrued by age of 1.5 years,” [4] although they don’t overlook the importance of proper diet in the later years of childhood [5].

The report, by Gerald J. et al. [1], identifies what “critical periods during childhood” would be like, by examining nearly 19,000 male individuals who became Swedish citizens and enlisted in 1984-1997 and who lived in Sweden in 1999. The basic assumption is that people who have migrated from the poorer countries to Sweden, the better socio-economic environments should grow taller in height than otherwise. If born in Sweden, they would be as tall as ordinary Swedes. If migrated to Sweden at age 5, for instance, they would be somewhat shorter in mean height than those born in Sweden, because they have undergone less favorable socio-economic environments for 5 years before they landed in Sweden. If they were over 18 years of age, they should not have been benefited at all in respect of adult height/statue from migrating to Sweden.

By applying econometric models, the report provides estimates of probable gains in mean height from migrating to Sweden from the Middle-East, for example, as reproduced in Table 1. When migrated at age two, the probable handicap from spending two years in Middle-East should have been -2.59***, migrated at age nine, the handicap should have been -5.00***, and at seventeen, -7.40***, respectively (***p<0.01).

In case the families migrate from Finland, neighboring country to Sweden, probable gains in mean height should be minimal, because of the similarities in the socio-economic conditions

and presumably gene potentials between the two nations, whatever the age at migration. On the other hand, when the families migrate from Asia, probable gains in height should be much larger. Table 2 provides descriptive statistics: variables adopted in the econometric analyses, such as adult height, age at immigration, age at military test, etc., by areas of origin, Sweden, Nordic, (other) Europe, Middle East, Asia, and Latin America. Understandably, “adult height” measured at military tests varies by the area of origin, with Nordic very close to Sweden, and Asia the lowest, and Middle East half way between. These estimates, polished by the sensitivity analyses, look quite reasonable to the reviewer. The reviewer, however, would like to raise a naïve question, as a food economist, whether children born and raised in foreign lands for some years have fully adjusted to Swedish way of diets, immediately after they started their new lives, accompanying their parents to Sweden.

Table 1 Fixed-effect analysis of adult height in cm as a function of age at migration, from the MiddleEast (cm)

age of migration	estimate element of θ	St errors
Zero	-0.17	1.41
One	-1.42	0.79
Two	-2.59	0.74
Three	-2.01	0.65
Four	-1.76	0.66
Five	-3.16	0.66
Six	-4.14	0.68
Seven	-3.64	0.67
Eight	-3.08	0.69
Nine	-5	0.7
Ten	-3.9	0.73
Eleven	-4.94	0.72
Twelve	-4.68	0.76
Thirteen	-6.14	0.81
Fourteen	-4.74	0.87
Fifteen	-6.22	0.96
Sixteen	-5.75	1.09
Seventeen	-7.4	1.18

Sources: Table 3, Gerald J. van den Berg.

Table 2 Descriptive Statistics.

	Sweden	Nordic	Europe	M. East	Asia	Latin Am
Adult height in cm	177.7	177.6	177.2	173.5	169.6	173.3
SD	6.5	6.3	6.7	6.1	6.2	6.2
age at immigration	-3.1	3.75	6.05	9.27	8.88	7.71
SD	2.8	301	4.5	4.4	4.3	4.3

Source: Table 1, Gerald J. p. 31.

Table 3 Per capita supply of cereals, meat and milk, 1990 and 2000, by area of selected countries

Year	Item	Area	supply/yr	Area	supply/yr	Area	supply/yr	Area	supply/yr
1990	Cereals	Denmark	92.75	Italy	157.41	Iran	195.66	Viet Nam	143.2
2000	Cereals	Denmark	107.25	Italy	161.61	Iran	204.53	Viet Nam	164.16
1990	Meat	Denmark	98.03	Italy	85.54	Iran	19.72	Viet Nam	15.39
2000	Meat	Denmark	69.83	Italy	88.66	Iran	23.88	Viet Nam	23.6
1990	Milk	Denmark	229.02	Italy	255.66	Iran	59.85	Viet Nam	1.32
2000	Milk	Denmark	234.01	Italy	268.45	Iran	59.68	Viet Nam	8.2
1990	Cereals	Finland	102.05	Romania	175.54	Turkey	253.09	Indonesia	169.37
2000	Cereals	Finland	107.08	Romania	187.56	Turkey	233.14	Indonesia	176.02
1990	Meat	Finland	62.98	Romania	73.24	Turkey	21.54	Indonesia	8.14
2000	Meat	Finland	65.49	Romania	47.42	Turkey	22.05	Indonesia	8.36
1990	Milk	Finland	347.91	Romania	144.76	Turkey	144.78	Indonesia	4.14
2000	Milk	Finland	351.65	Romania	196.97	Turkey	126.47	Indonesia	7.59
1990	Cereals	Sweden	81.42	Hungary	125.12	Pakistan	151.54	Myanmar	124.48
2000	Cereals	Sweden	101.36	Hungary	111.74	Pakistan	148.29	Myanmar	138.39
1990	Meat	Sweden	58.94	Hungary	107.3	Pakistan	11.93	Myanmar	4.8
2000	Meat	Sweden	69.04	Hungary	94.3	Pakistan	11.8	Myanmar	9.6
1990	Milk	Sweden	350.01	Hungary	175.82	Pakistan	113.01	Myanmar	12.08
2000	Milk	Sweden	352.12	Hungary	160.28	Pakistan	151.53	Myanmar	14.49

Sources, FAOSTAT, Food Balance Sheets, by country, 1990 and 2000.

Table 4: Changes in the consumption of Bread, Noodle, Fish and Rice before and after moving to the US (%).

	Bread	Noodle	Rice	Fish
Increased substantially	4.2	2.3	2.4	1.8
Increased slightly	17.1	15.5	6.7	11.7
No change	70.1	61.6	76.9	39.4
Decreased slightly	61	16.9	12.8	32.9
Decreased substantially	2.5	3.7	1.2	14.2
%Total	100	100	100	100

Source: Chadee et al. Table 2

Table 5: Changes in Meat Consumption before and after moving to the US (%).

	Pork	Beef	Chicken	All Meat
Increased substantially	1.4	26.9	5.2	15.5
Increased slightly	12	51.6	28.9	48.6
No change	40.2	16.8	50.1	30.3
Decreased slightly	31.6	3.6	13.2	4.9
Decreased substantially	14.8	1.1	2.6	0.8

Source: Chadee et al.

Source: Chadee et al. Table 3

Area cohort effects in food consumption

The reviewer spent a couple of years on post-doctoral fellowship in the mid-West, United States at the age of his early 30s. None of food markets in the small university town sold rice. Nearly twenty Japanese families would drive 200 miles in turn to purchase short-grain rice at a small Japanese food store in Chicago on weekends. None of Japanese expatriates could survive “no-rice” supper, or even bread sandwich for lunch. Some of the colleagues had their mothers in Japan ship rice grown in Japan with miso/shoyu and nori by air, supposedly quite expensive for their poor parents in Japan.

Table 3 provides per capita supply of cereals, meat and milk, in 1990 and 2000, by selected countries in Nordic, other Europe, Middle East, and Asia, Food Balance Sheets, FAOSTAT [6]. Countries vary to some extent in food consumption structure, cereals vs animal products, even in Europe. Countries in Asia, however, differ substantially from Sweden in respect of the basic structure of food consumption, i.e., Asians consume distinctly smaller amounts of animal products, milk in particular, than Europeans, much less than people in the Middle East. When Asians come to settle in Sweden, most of them find it nearly impossible to adjust to the European diets, heavily concentrated in animal protein. On the other hand, people who migrated from the Mid-East would find it much easier to adjust to the Swedish way of food consumption than most Asians come to settle in Sweden.

In the mid-1990s, large scale surveys of household food consumption, with emphases on beef and rice, for Japanese expatriate households in the LA area, US and the Sydney area, Australia [7]. Some of the key findings are summarized in Tables 4-5. The third-party observers in beef exporting countries had anticipated that Japanese consumers would immediately double or triple their beef consumption, should they face international prices under genuinely free trade. Most of the Japanese expatriates who answered the surveys, 1,200 households in LA and 800 households in Sydney, have not changed at-home consumption of rice and slightly increased meat consumption, partly to compensate decrease in fish consumption, presumably fresh tuna good for sashimi. Most of the respondents represent upper-middleclass Japanese families, with high educational backgrounds.

Summary Comments: Mother Country Cohort Effects

The report, *Critical periods*, analyzed by a group of noted scholars on the careful econometric analyses of huge number

of immigrant siblings, is successful in providing some evidence for determining a critical period during childhood and adolescence at age 9. In easier, common language, children accompanying immigrants to wealthier nations like Sweden would not grow in height comparable to native children, when migrated after age 9. The comments the reviewer has felt: the model is built on the tacit assumption: siblings start to adjust to the new environment, most importantly they start eating in the same way as the native population. Siblings accompanying immigrants from Europe, or even Middle East, would feel little difficulties to adjust to the Swedish diets, whereas those from Asia would not feel the same way, even before the age 9, due to mother country cohort effects in food consumption. Cohort effects in food consumption, staple foods, like rice and accompanying products, like shoyu, nori, and the like, are formed in the earlier period of life, younger than age 9 (Mori and Saegusa, 2012 [9]).

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