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Japanese school lunch has prevented obesity

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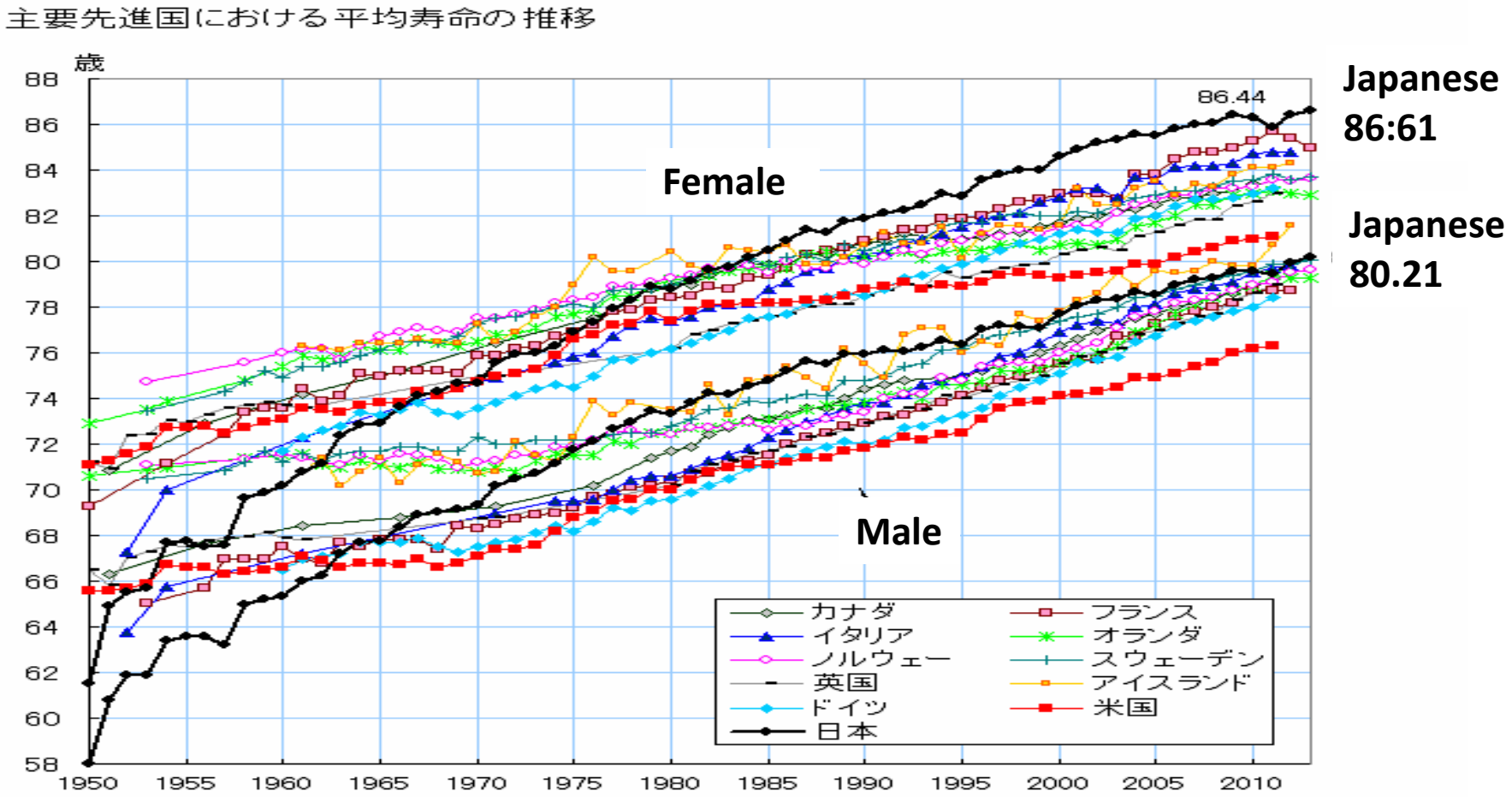


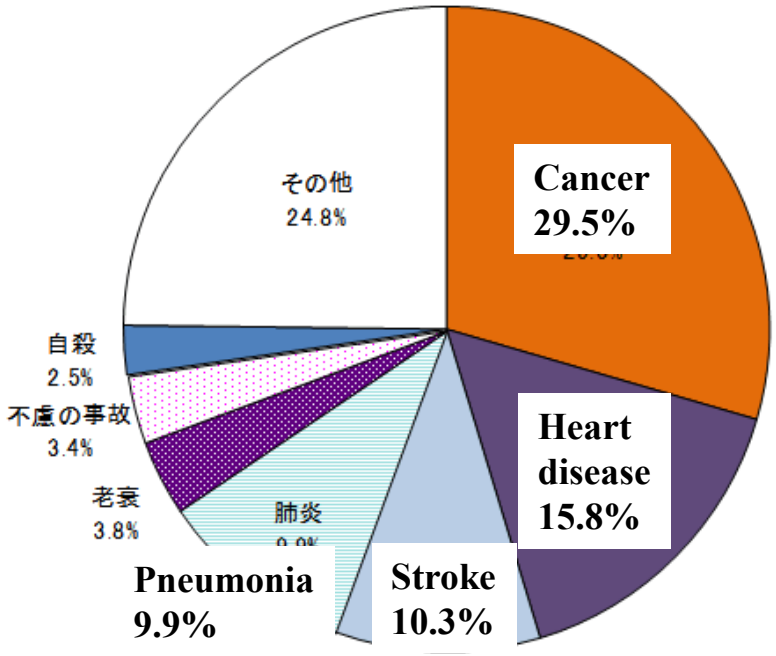
Japanese 86:61

Japanese 80.21

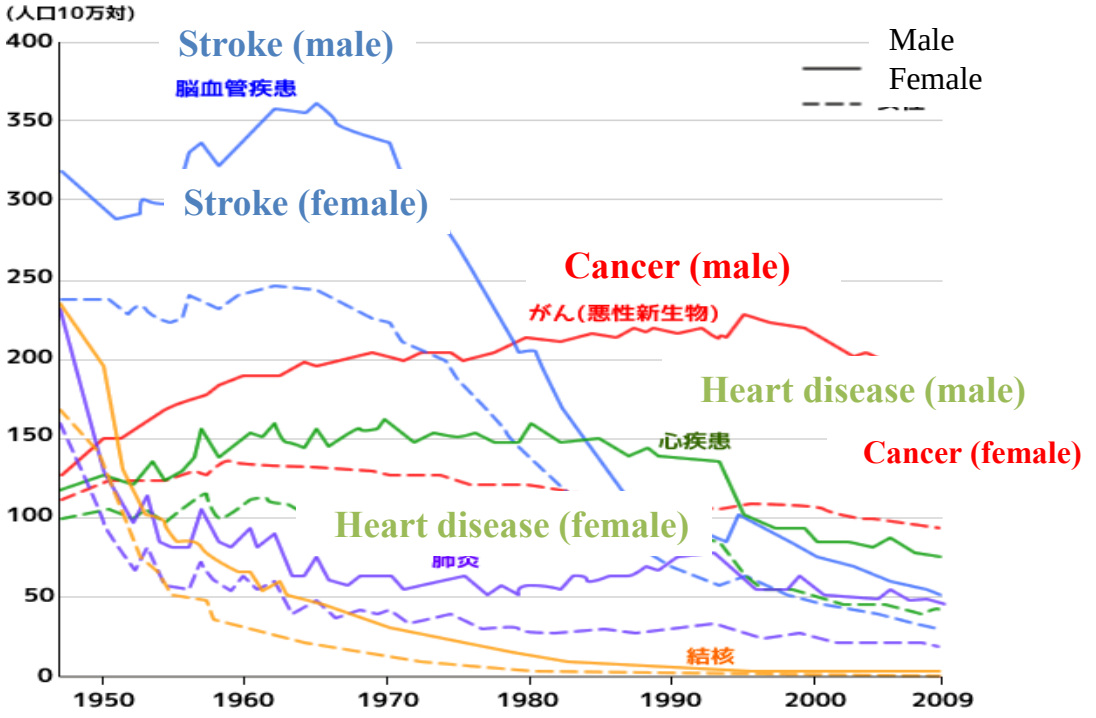
Life-expectancy for Japanese at birth is long; the mean for women is 87 and for men 80 . It has been increasing and Japanese women have the longest life-expectancy in the world and Japanese men are one of the top groups.

図録主要先進国の平均寿命の推移 http://www2.ttcn.ne.jp/honkawa/1610.html

Japanese Ministry of Health, Labor and Welfare

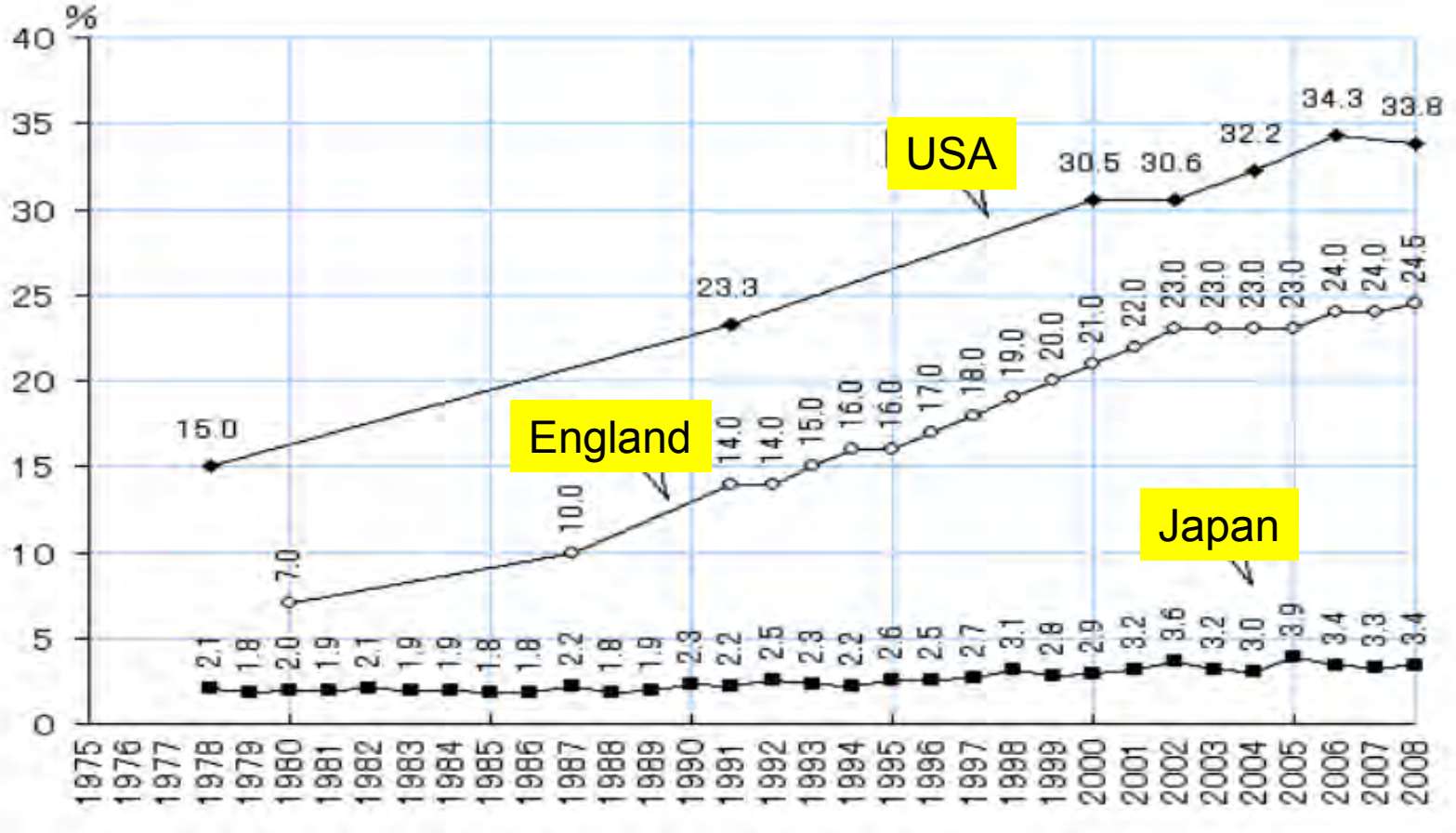


Japanese Cancer Research Center
「主要死因別年齢調整死亡率年次推移」



Leading causes of death in Japan (left) and Age-adjusted changes since 1950 (right)

Leading causes of death in Japan are cancer (30%), heart disease (16%) and stroke (10%). Death rate from stroke was the highest in Japan until 1980 but has dropped dramatically. Cancer and heart disease have been increasing in total number: however, the age-adjusted death rates for them have been quite constant, indicating the increase was due to the increase in the elderly population.

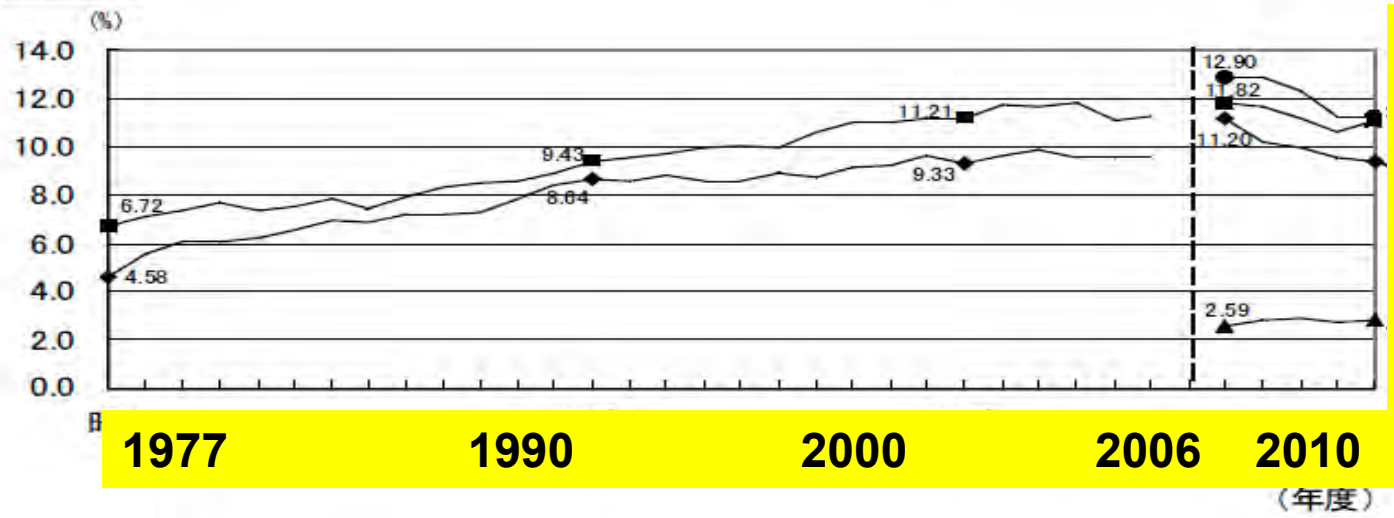


Secular changes in obesity in USA, England and Japan (BMI over 30)

Prevalence of obesity in the last 40 years has increased in USA from 15% to 33%, in England from 7% to 25%. In Japan it has also increased from 2% to 3.4%, but the increase has been small.

Obesity ratio is decreasing in Japanese children

Boy



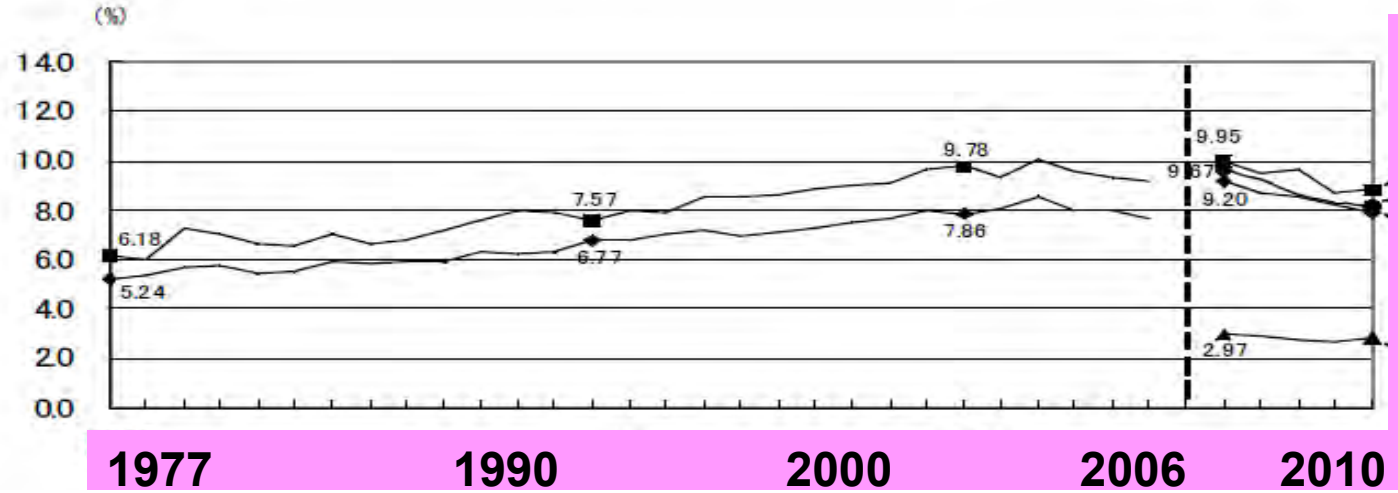
17 years

11 years

14 years

5 years

Girl



11 years

17 years

14 years

5 years

The prevalence of obesity in Japanese children has been decreasing in the last decade. At present it is about 10% if we define obesity as over 120% of standard body/height.

Washington Post : January 28, 2013

How Japan's revolutionary school lunches helped slow the rise of child obesity

By Max Fisher

http://www.washingtonpost.com/blogs/worldviews/wp/2013/01/28

…..But the world's children are increasingly overweight and obese, a problem with global health and thus economic implications. A National Institute of Health study characterized the global rise in child obesity over the last three decades as an "epidemic." According to the Centers for Disease Control and Prevention, the prevalence of childhood obesity in the United States has tripled over that period.

Japan hasn't solved childhood obesity, but it has achieved some of the developed world's greatest successes in keeping children healthy. …… Japanese school lunches tend to be planned by a nutritionist, include locally grown and fresh ingredients and tend to be dominated by rice, vegetables, soups and fish. The Japanese program is both impressively successful and surprisingly cheap at about $2 per meal.

Resumption of School Lunch

- **1946 After the Second World War, the Ministries of Education, Health and Agriculture recommended a school lunch program. It was supported by LARA (Licensed Agency for Relief in Asia)**

Beginning of Full School Lunch

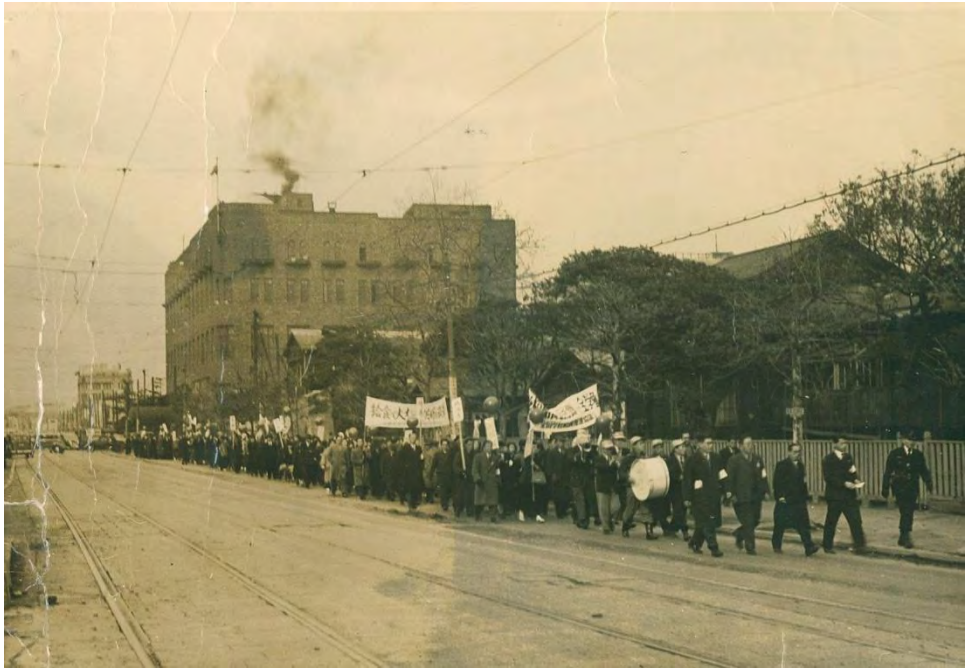
1950 Full school lunch was served when wheat flour from the USA was supplied.

School Meal Law was established in 1954

Government Appropriation for Relief in Occupied Area Fund (GARIOA) was ended on June 30, 1951 by the Peace Treaty between Japan and USA.

Due to the financial burden, many schools could not continue school lunch.

Teachers of schools and parents demanded the establishment of the School Meal Law.



People taking to the streets demanding the establishment of the School Meal Law

Present Japanese school lunch

Influences of school lunch for industries

- **Most of Japanese children have school lunch.**
- **Basically there is a dietitian at each school.**
- **About half of them are now nutrition teachers.**
- **They make different menus almost every day.**
- **They try to use locally available foods (promotion of local industries)**
- **They use only foods supplied by known food producers (safe food supply).**
- **They try to use natural foods but not supplements and nutrients.**

Establishment of NUTRITION TEACHER

The Central Education Council proposed implementing a system of nutrition teachers in schools.

This law was adopted on May 14, 2005.

Under the proposed system, school dietitians become the chief person responsible for nutrition education as well as food management.


きゅうしょく
ひるやすみ
そうじ
しょしゃ
学級の日

Basic Law on Shokuiku

It is a Japanese NEW BASIC LAW established in 2006 .

Shokuiku is defined as acquisition of knowledge about food and nutrition, as well as the ability to make appropriate food choices through various experiences related to food, in order to develop people's ability to follow a healthy diet.

In addition, the law calls for promotion of SHOKUIKU for a richer lifestyle based on life-long cultivation of a healthy mind in a healthy body.

www.maff.go.jp/english_p/shokuiku.pdf

School lunch influences agriculture and other food industries. Fresh local vegetables are used for school lunch. Farmers harvest vegetables very early in the morning and bring them to school. Of course it is tasty and children are happy and send massages of appreciation to food producers. Food producers are encouraged and try to supply better products. By these efforts, good relation is established between food producers and children.

Farmers are introduced in the “School Lunch Newsletter”

Strawberries from the Izumida family

Tomatoes from the Iitsuka family

Eggplants from Ms Aoki

Leeks from Mr. Yasuo

Children make fertilizer from their waste of school lunch. The fertilizer is given to the farmers free. Children see the growth and harvesting of foods.

http://www.city.kochi.kochi.jp/2005/kyushoku/index_1.html


Farmers use the fertilizer made by children.
Children: I don’t like potatoes, but I will eat this potato.

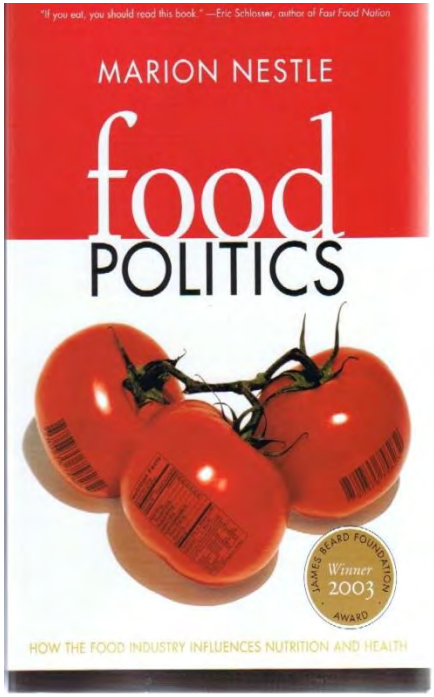
Sugar and obesity

Sugar rich beverages are abundant.

Sugar intakes in various countries

Country	Intake (g./day)
USA*1	124-142
UK *2	84
Holland *3	135
South Africa *4	42－59
Vietnamese, Japanese and Cambodians *5	25-30
Taiwan *5	**50**

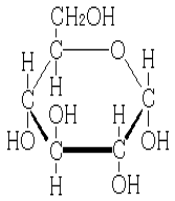
***2 Family Food 2007**
***3 Dutch National Food Consumption Survey-Young children2005/2006**
***4 The National Food Consumption Survey; children aged 1-9years1999**
***5** From our present study



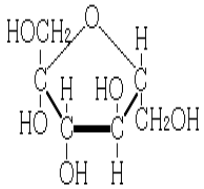
- **Amazon.com Review**
- **Marion Nestle, nutrition chair at New York University.**
- **The book argues that the food industry has intimidated and silenced critics of the food industry.**
- **Someone or some organization/group with power and money is able to gain the support or at least the silence of potential critics by supporting their 'Research', which of course will have favorable results.**
- **Similarly, powerful industries may use donations to politicians to make sure that government regulatory agencies won't be too hard on a given industry. --** ***Arthur Boehm***

Sugars: Mono- and Di-saccharides

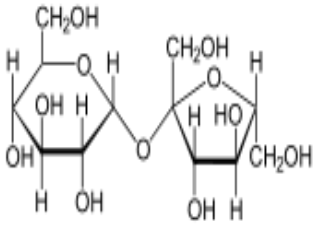
Mono- and Di-saccharides:



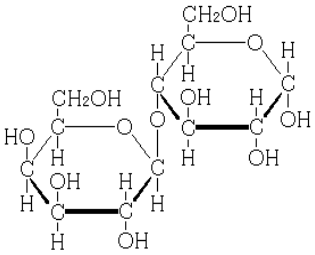
glucose



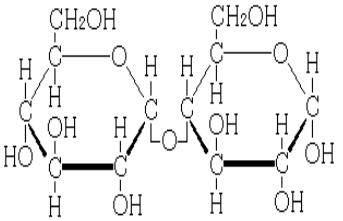
fructose



sucrose

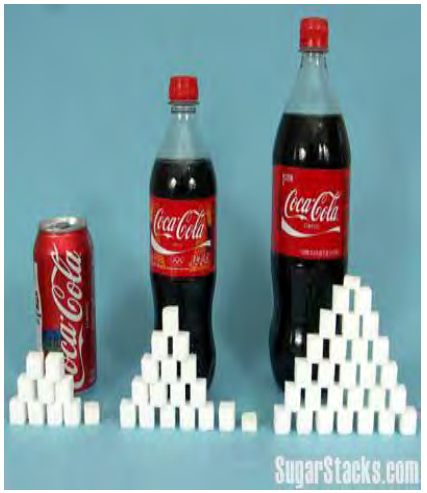


lactose



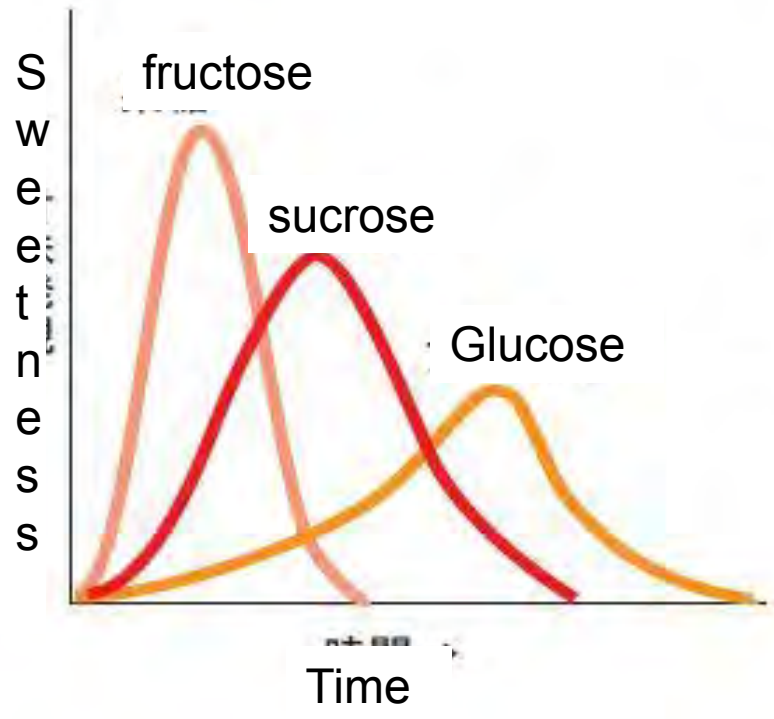
maltose

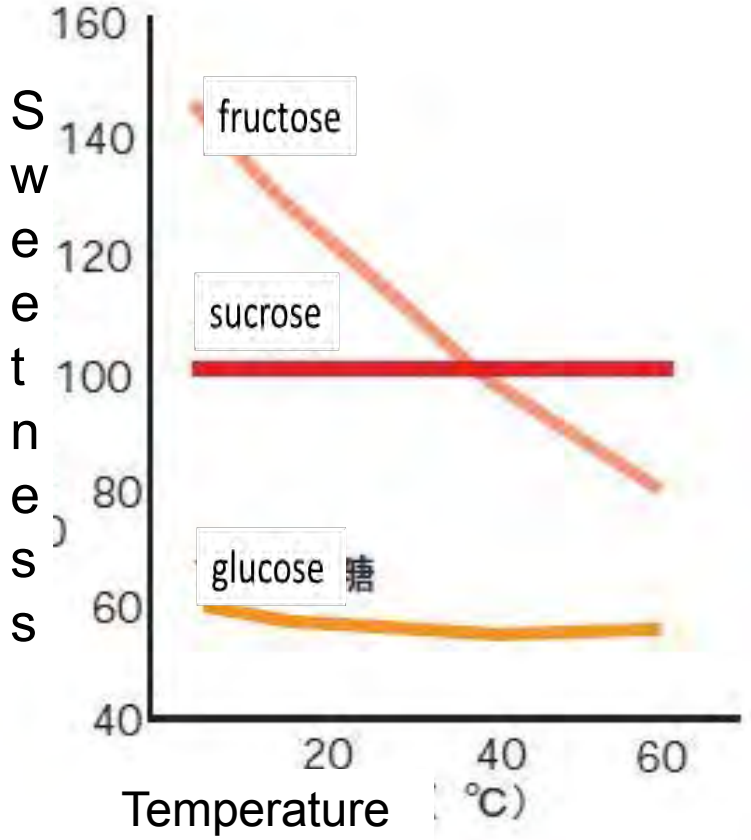
Isomerized sugar ; made from starch that has undergone enzymological procedures to convert to glucose and continuously some of it is converted into fructose. It is also called High Fructose Corn Syrup (HFCS). Isomerized sugar is almost 1:1 ratio of glucose and fructose in liquid form.



labaq.com/archives/51197015.html

Taste of fructose is sharp and sweetness is about 50% higher than sucrose in low temperature





Energy drinks in Vietnam

330mL about 260kcal

Glu (g)	Fru (g)	Suc (g)	Lac (g)	Mal (g)	Tổng số (g)
30	33	1.7	0	0	64.7

260 kcal,
21.5 sugar cubes

1bowl of rice 220kcal,
about l8 sugar cubes

Fructose, compared with sucrose 1;

- **Taste:** Fructose is sweeter about 1.5 times when it is cold, however, less sweeter than sucrose at higher temperature. Taste of glucose is sharp. We can feel sweetness very quickly and disappear quickly than sucrose.
- **Appetite:** Compared with consumption of high glucose beverages, drinking high-fructose beverages with meals results in lower circulating insulin and leptin levels, and higher ghrelin levels after the meal. Since leptin and insulin decrease appetite and ghrelin increases appetite, some researchers suspect that eating large amounts of fructose increases the likelihood of weight gain.

We have made a sugar composition table (mono- and di-saccharides) of Japanese snacks and beverages.

Concentrations of sugars (sucrose, glucose, fructose and lactose) in 135 sugar rich foods and beverages

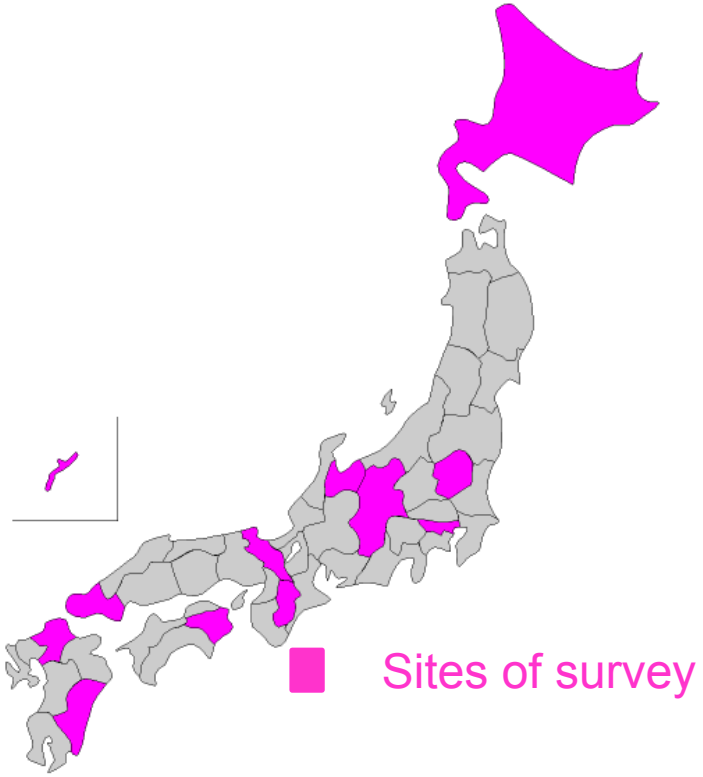
1. Yamamoto S, Taniguchi H, Sarukura N, Tseng AT, Wong UY, Takeichi H. 2009. Development of food composition database monosaccharide and disaccharides in sweet snacks and beverages J Jpn Diet Assoc 52: 22-25(in Japanese)
2. Takeichi H, Wakaikawa N,Taniguchi H,Sarukura N, Tseng AT, Wong UY, Yamamoto S. 2010 Concentration of monosaccharide and disaccharides in commercial sweet snacks. J JpnDiet Assoc 5 : 23-26 (in Japanese)

Concentrations of sugars (sucrose, glucose, fructose and lactose) in 135 sugar rich foods and beverages

No.	Food	Glucose	Sucrose	Fructose	Lactose	Total
1	Soy milk	—	1.45±0.91	—	0.01±0.01	1.46
2	Soy and milk coffee	0.06±0.02	6.05±1.39	0.03±0.03	—	6.14
3	Carrot juice	3.16±1.15	0.02±0.01	3.39±0.92	—	6.57
4	10% Acerola juice	2.09±1.52	—	1.73±1.21	—	3.82
5	20% Japanese apricot juice	1.43±1.09	—	2.00±1.22	—	3.43
6	Mandarin orange juice from concentrate	1.94±0.07	5.38±0.38	2.19±0.12	—	9.51
7	50% Mandarin orange juice	2.89±0.70	1.67±0.41	3.80±0.82	—	8.36
8	Reconstituted orange juice	2.24±0.09	3.58±0.23	2.46±0.08	—	8.28
9	30% Orange juice	3.82±2.70	0.69±0.21	5.20±0.21	—	9.71

Nutrition Survey in Japanese Children
-Food, energy and nutrient intakes-

About 1,000 school children aged 7, 10 and 13 y old
In areas throughout the country for a 3 non-consecutive day survey



We studied the intakes of energy and nutrient intakes by a 3-day nutrition survey in children and found that energy and lipid intakes were lower than the RDAs.

Sugar intakes from beverages and snacks

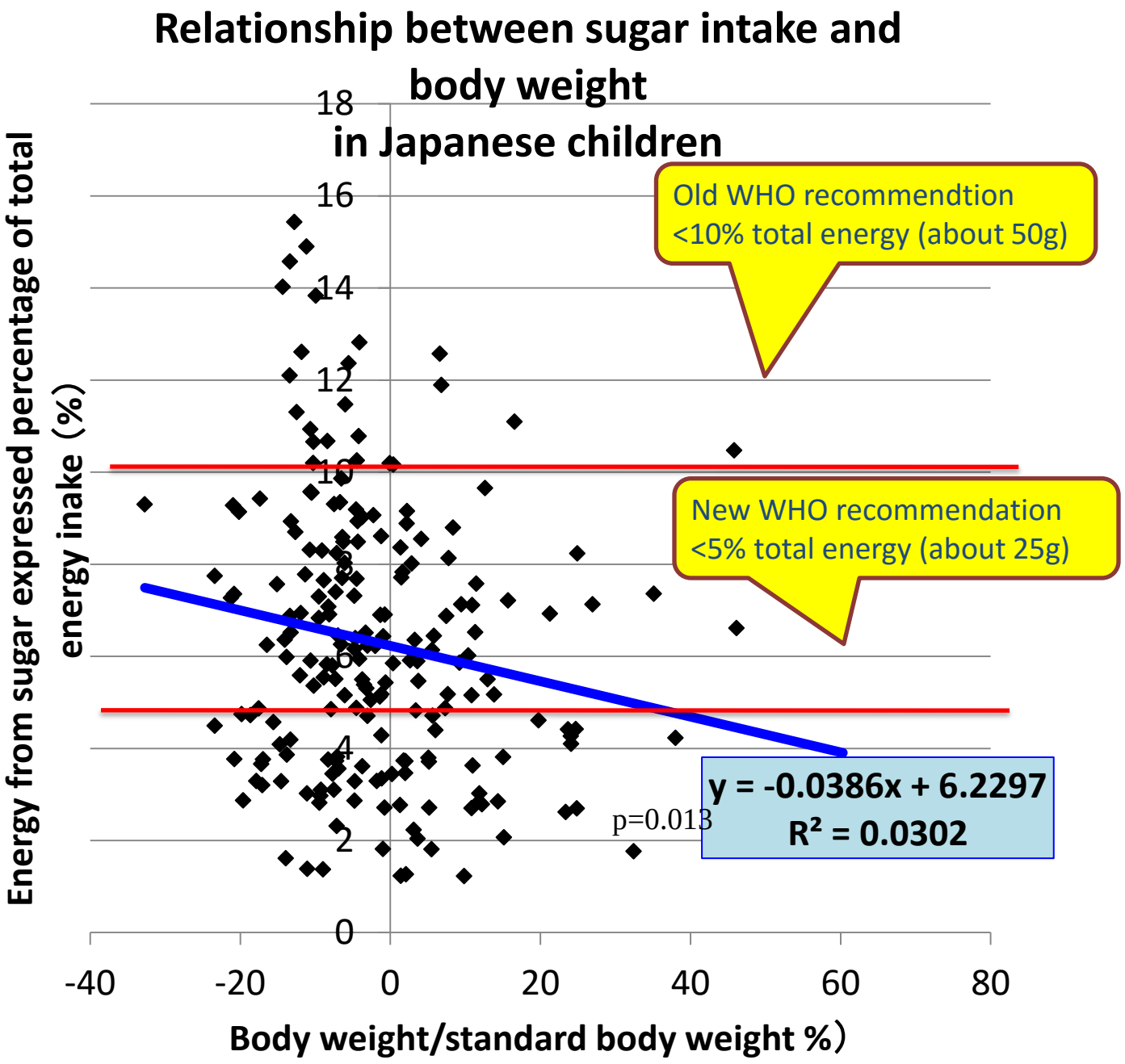
We studied the intakes by a 3 day nutrition survey in children and found that the total intake was only about 25g, which is much lower than that of children in Western countries (about 100g).

[g/day]

Age	gender	n	(A) sucrose	(B) glucose	(C) fructose	(D) lactose	(A)+(B)+(C)+(D) total
Years 7	boy	33	15.9 ± 9.4	3.1 ± 2.6 $^{a\,b\,c}$	3.5 ± 3.3 $^{a\,b\,c}$	2.5 ± 2.3	25.1 ± 14.6 $^{a\,b}$
	girl	42	17.7 ± 11.7	3.5 ± 3.0 $^{a\,b\,c}$	3.8 ± 3.6 $^{a\,b\,c}$	2.4 ± 1.6	27.4 ± 15.9 ^{a}
10	boy	64	16.8 ± 9.8	3.2 ± 3.4 $^{a\,b\,c}$	3.4 ± 3.7 $^{a\,b\,c}$	2.2 ± 1.9	25.7 ± 14.2 $^{a\,b}$
	girl	64	16.6 ± 9.5	3.4 ± 2.4 $^{a\,b\,c}$	3.6 ± 2.8 $^{a\,b\,c}$	2.4 ± 1.9	26.0 ± 12.7 $^{a\,b}$
13	boy	42	14.6 ± 12.7	4.0 ± 4.2 ^{b}	4.4 ± 4.6 ^{b}	2.1 ± 3.1	25.0 ± 20.7 $^{a\,b}$
	girl	38	12.0 ± 11.2	2.0 ± 2.4 ^{c}	2.1 ± 2.7 ^{c}	1.4 ± 1.7	17.5 ± 14.3 ^{b}
Mean			15.8 ± 10.7	3.2 ± 3.1	3.5 ± 3.5	2.2 ± 2.1	24.7 ± 15.5

Values are mean ±SD.

Figures with different superscript alphabet in the same column are significantly different assessed by one-way ANOVA and then Tukey's multiple comparison test ($p < 0.05$).


Relationship between sugar intake and body weight in Japanese children
Energy from sugar expressed percentage of total energy inake (%)
Body weight/standard body weight %)
Old WHO recommendtion
<10% total energy (about 50g)
New WHO recommendation
<5% total energy (about 25g)
y = -0.0386x + 6.2297
R² = 0.0302
p=0.013
18
16
14
12
10
8
6
4
2
0
-40
-20
0
20
40
60
80

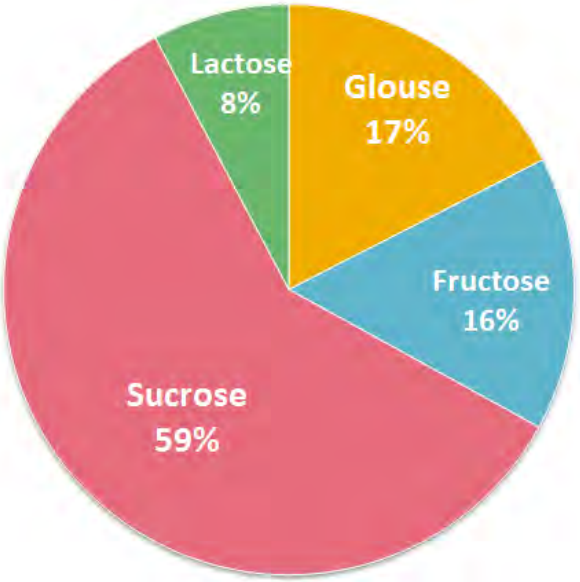
Tapioca milk tea (bubble tea) was born in Taiwan.
It is two times sweeter than cola drinks.
Size is jumbo (regular size is 700mL)

	Tapioca milk tea	Cola
	 700mL	 700mL
Energy	550(kcal)	296(kcal)
sugar cubes (3g)	46	25

Taiwanese children take about 2 times more sugar than Japanese children

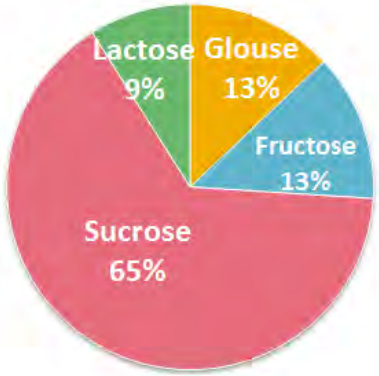
Taiwan

52.0g/day



Japan

24.7g/day



Former President Bill Clinton backs school soft-drink ban – says sugar adds up to fat kids

Source
http://www.nydailynews.com/news/politics/president-bill-clinton-backs-school-soft-drink-ban-sugar-adds-fat-kids-article-1.174157

Sugary soda has no place in schools, former President Bill Clinton said Monday.

"We wanted to stop and then reverse the epidemic of childhood obesity, which I believe is the No.1 public health problem in the United States today,“

Clinton said. As a result, the nation's 54 million students will have access to low energy beverages such as diet soda, low-calorie fruit drinks and bottled water instead.

Effect of Tapioca-milk ban on sugar intake in Taiwan

- **Following the strategy of Clinton, we studied In Taiwan whether tapioca-milk ban decreases sugar intake.**
- **Subjects:**

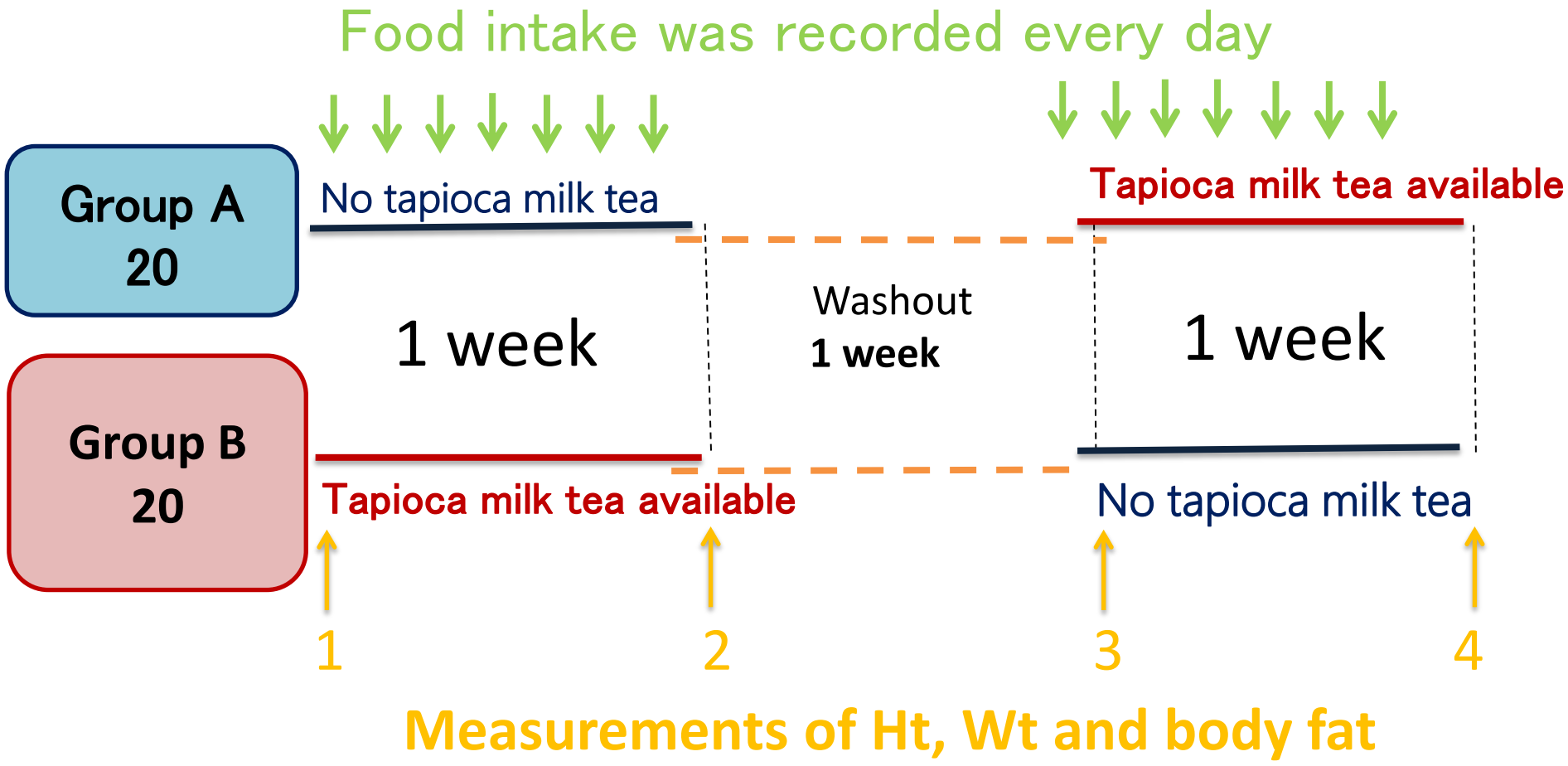
From 341

1. Sugary beverage more than 4 times/week
2. Sweet cake etc more than 2 times/week
3. Like Tapioca milk tea
4. Age (20－24 years old)
5. Willing to join the study

↓

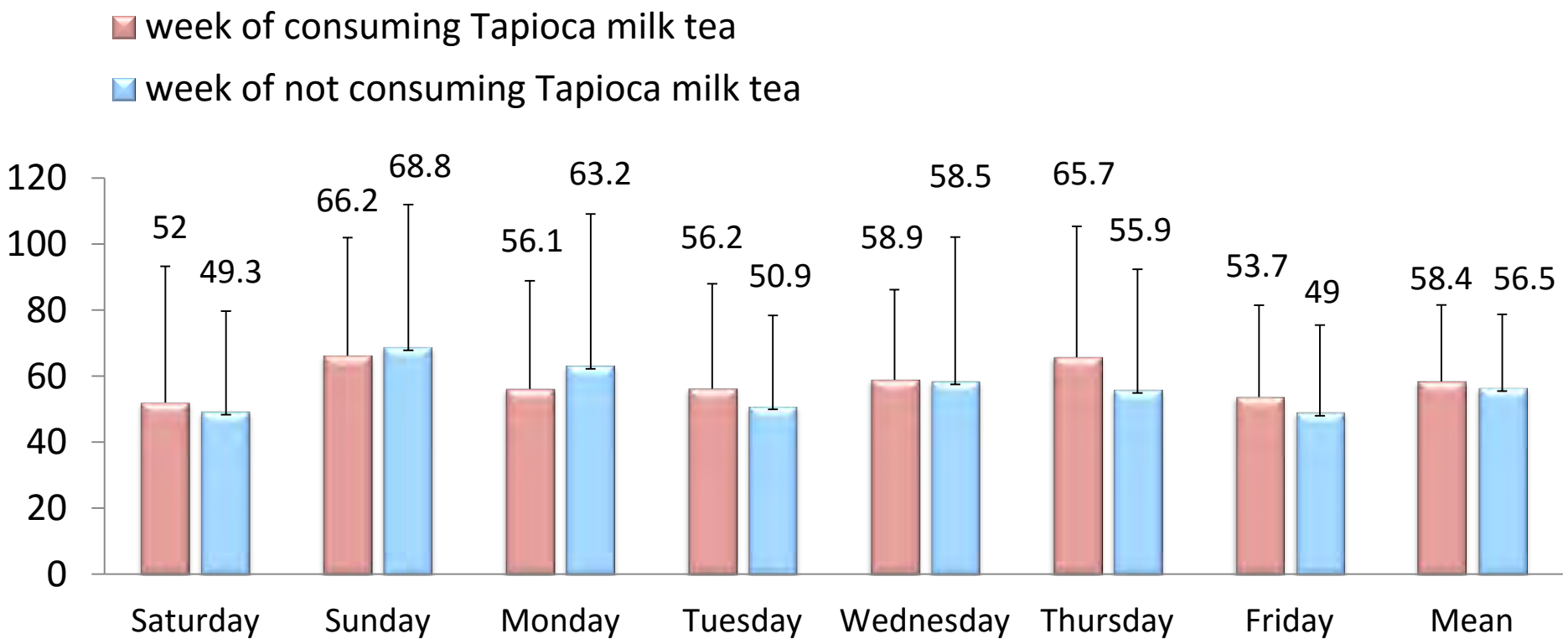
Final number 40

Crossover-design study



Subjects were allowed to take foods freely except tapioca milk tea

Sugar intake with and without tapioca milk tea



- No effects were observed without tapioca milk.
- Maybe the sugar intake level has become habitual.
- To reduce sugar intake, we have to find the time before it becomes a habit.

Without proper school lunch, what happens to children? They get hungry and may eat cheap but tasty food with sugar rich beverages.

Sugar-free beverage is a big business

Bottled green tea is popular in Japan (left). Many companies sell it but all brands are sugar-free. Picture in center is the label of green tea sold in Thailand. Sugar-free is written on it because most of the tea sold is sugar-added. Sugar-free coffee is also popular in Japan.

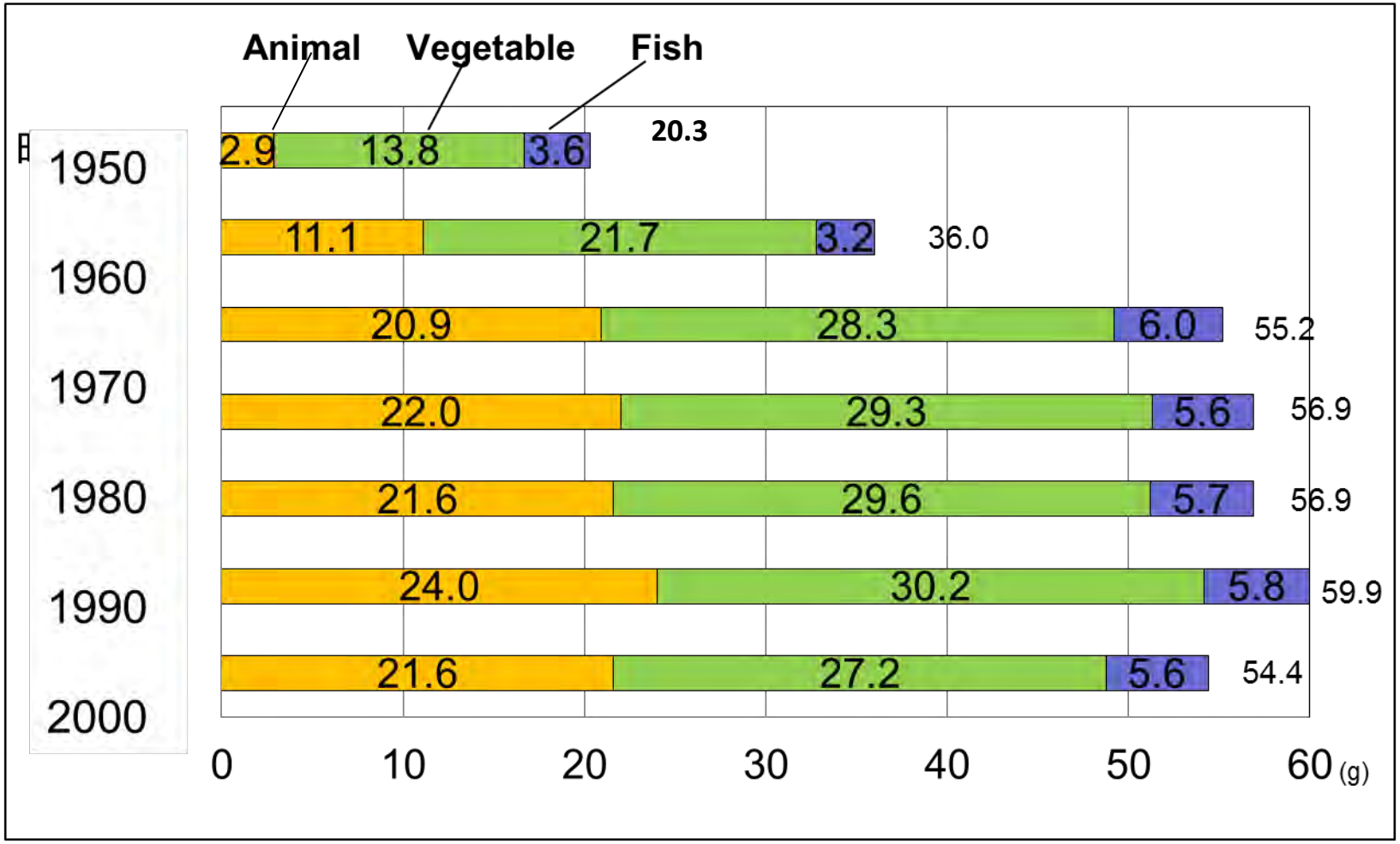
Japanese children do not bring money to school

- **It is surprising for me, too, that Japanese school children basically do not bring money with them to school.**

- **It means that they can not buy soda drinks or other beverages and foods.**

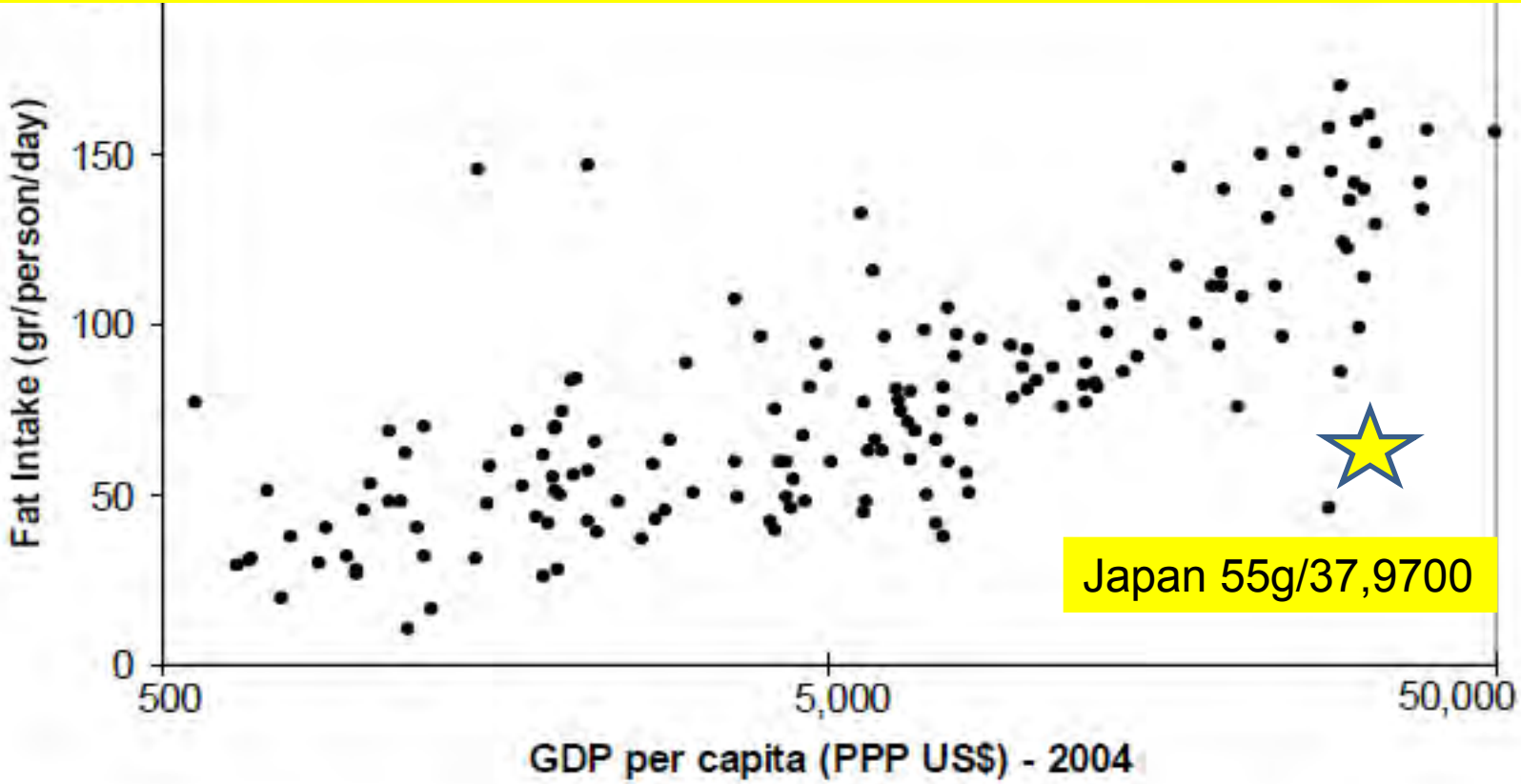
- **For this to work, there must be a proper school lunch and proper breakfast at home.**

Japanese have maintained their lipid intake at about 55g/day for more than 40 years



From Japanese National Nutrition Survey

Lipid intake (g/person/day) and GDP per Capita in 162 countries (2000-2003). The higher the income, the higher the fat intake. However, Japan was exceptional. We do not know the reason.

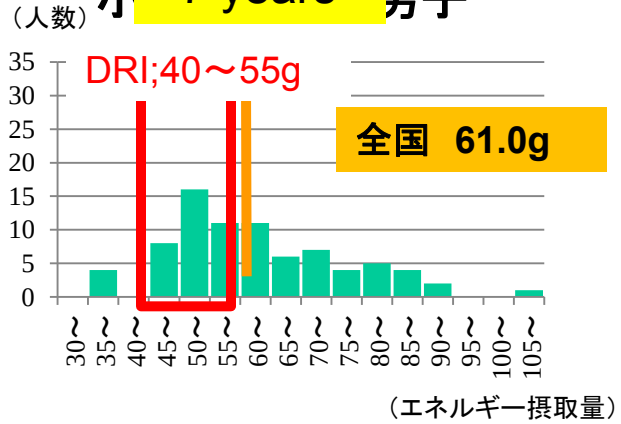


Source: FAO (2004) for fat intake, and UNDP (2006) for 2004 GDP per capita.

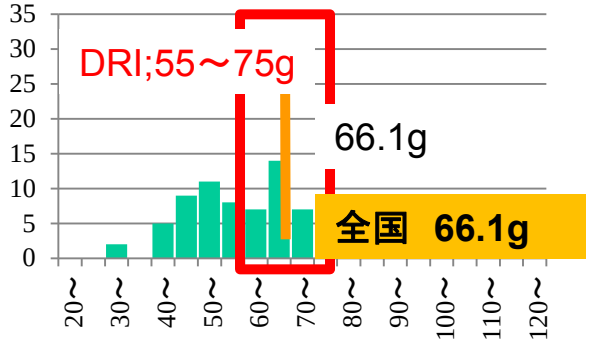
- Modern Economic Growth and Quality of Life: Cross Sectional and Time Series Evidence by Richard A. Easterlin and Laura Angelescu, University of Southern California Discussion Paper No. 2755 April 2007

Lipid intake

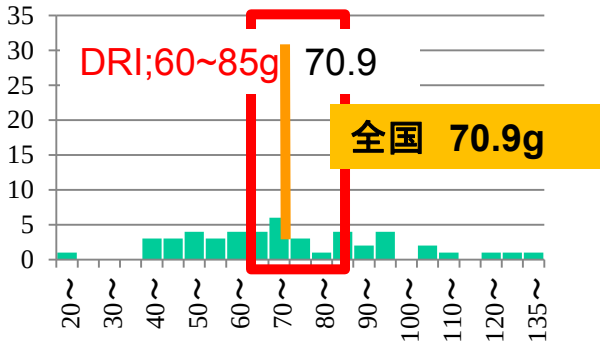
7 years



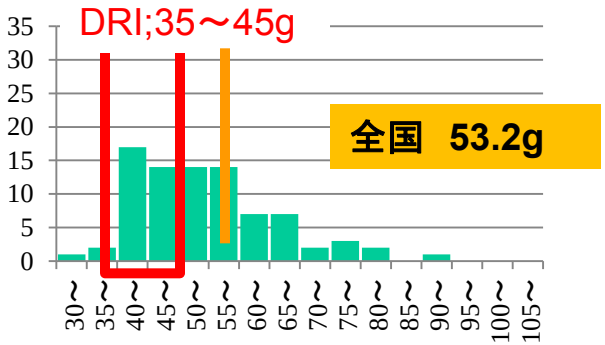
10 years



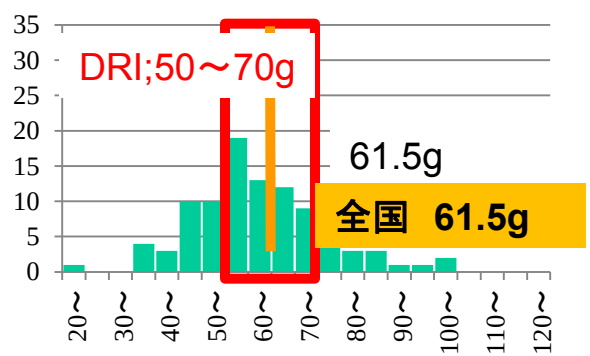
13 years



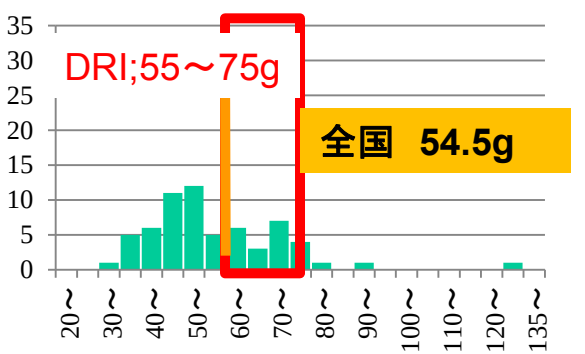
小学校2年生 女子



小学校5年生 女子

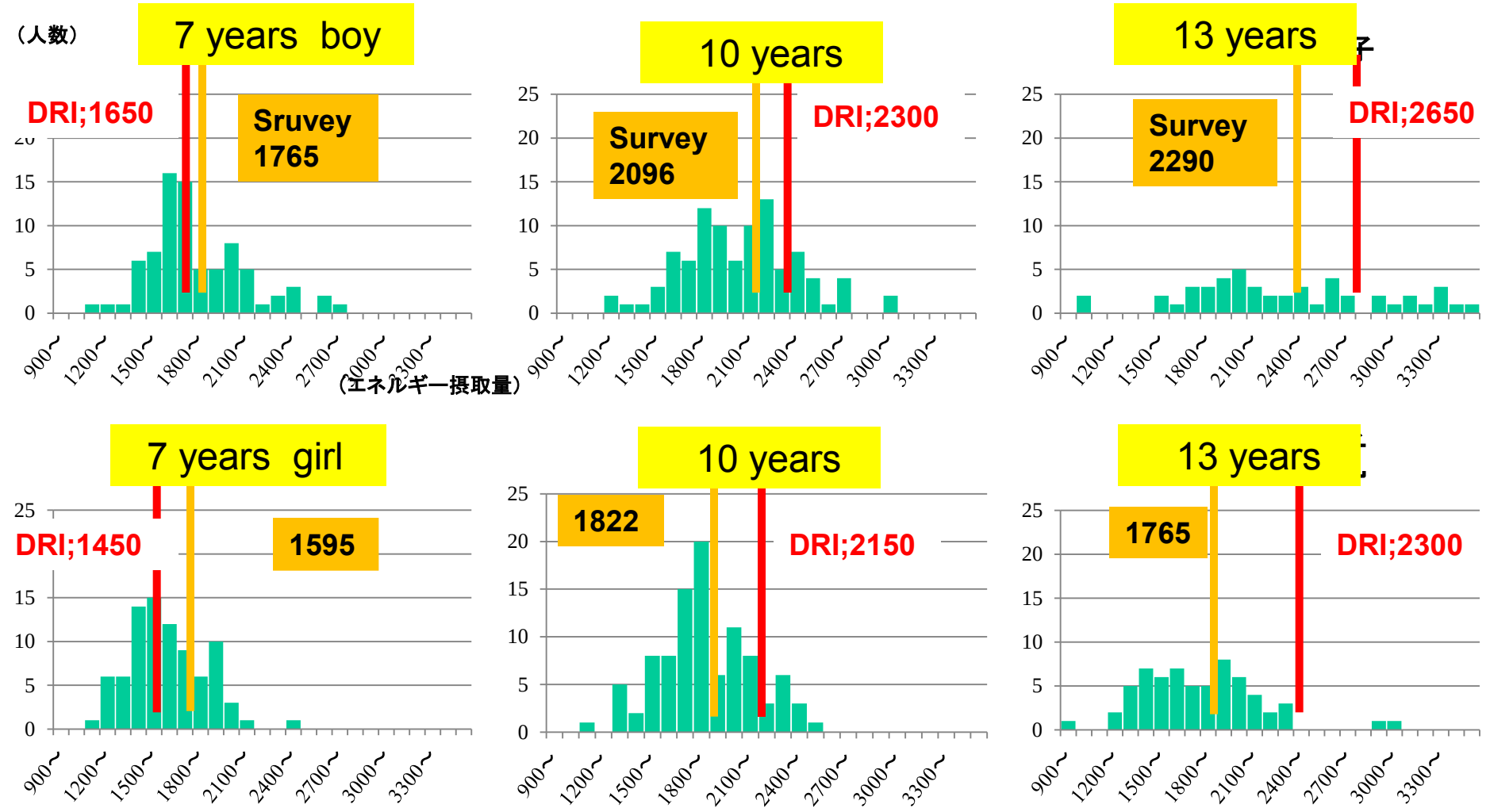


中学校2年生 女子



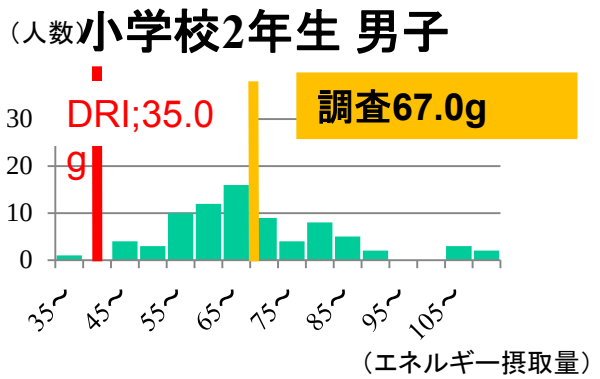
This graphs show the distribution of lipid intake. Red color square is DRI. Orange vertical line is the average intake. Lipid intake was normal in 10 and 13 y children.

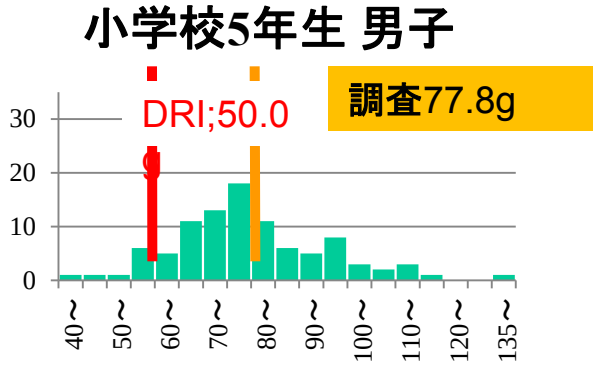
Energy intake（kcal）

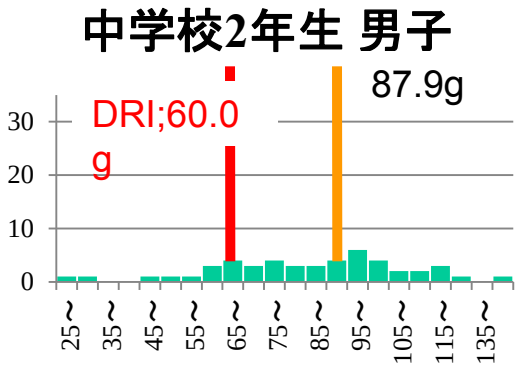


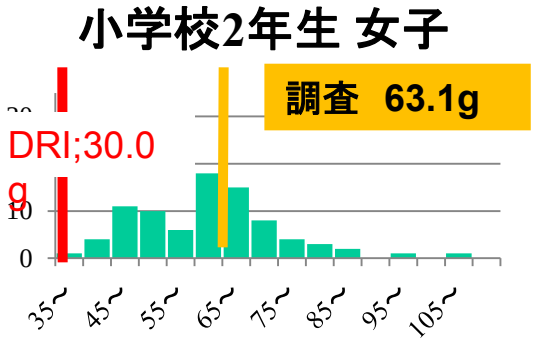
This graphs show the distribution of energy intake in 7, 10 and 13 y old.
Vertical lines show DRI (red line) and mean intake (orange line).
Energy intake was lower than DRI in older children, especially girls.

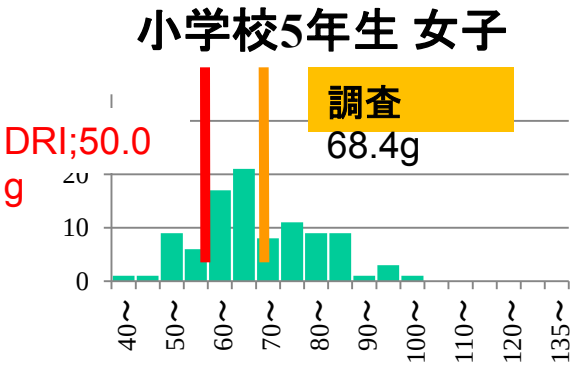
Protein intake (g)

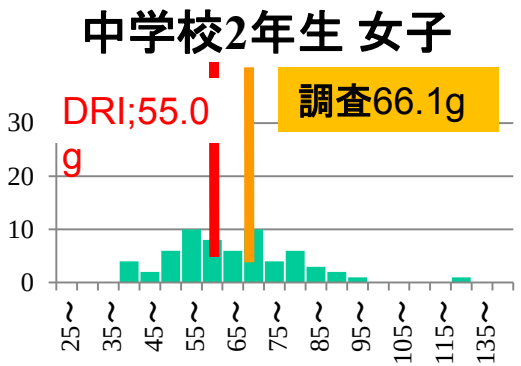












DRI

Survey

Protein intake was sufficient for most of the children.

Small portion foods are popular in Japan

(source: Nikkei Women on Line)

- **Are large portions good? The portion size of foods also influences energy intake and body weight. At stores, cooked side dishes are sold usually in small portions. This is good in the present society, with an increased elderly population that tends to eat small portions of food. Small portion size is also good for saving food and money.**

Conclusion

Good school lunch may prevent consuming fast foods with sweet beverages, and obesity.

This encourages new industries such as reliable foods, no- or low-sugar beverages and snacks.

Small portion of foods may be good for saving food and money and for preventing obesity in children and the elderly in various countries.