The Importance of Nutritional Education in Preventing Obesity and Malnutrition

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Abstract

Japan once was a country suffering from undernourishment due to the shortage of food supply during and right after World War. Within a half century, however, Japan became one of the most developed industrial counties and, during the process of the economic development, adopted Western life style and eating habit: the Japanese have, with sufficient food supply, the intake of far more animal protein and lipid today than before the War. It is true that the increased intake of animal food has contributed to the nutritional improvement and physical development of Japanese people; but its excessive intake has also led to obesity and life style-related diseases such as diabetes mellitus. Excess energy is deposited and saved as subcutaneous and visceral fat, and prepares the body for starvation; but fat deposit in the well-nourished body becomes prevalence of obesity. This is one serious problem which the world faces today. Another seriously nutritional problem is that more than13 % of the world population is suffering from under-nutrition. Under-nutrition beyond nutritional adaptation is a risk factor leading to death. We have to deal with two contrasting issues: the control of food intake which meets the needs of the body in developed countries and the challenges to malnutrition resulting from inadequate food supply in developing countries. Nutritional education in individual countries should be regarded as imperative.

Introduction

There are two contrasting nutritional concerns in the world.

One is undernourishment, which is caused chiefly by insufficient food supply common in countries in Africa and in Southeast Asia[1], and could result in high mortality rate caused by infection. The other concern is what we may call "overnourishment" or excessive intake of food which causes obesity and other life style-related diseases like diabetes mellitus, hyperlipidemia and hypertension[2,3,4].

Both malnutrition and "overnourishment" are observed in every country regardless of its national wealth. In India and China, for example, "overnourishment" has become a serious

[1] United Nations Development Program, Human development report, 1993.

[2] Lichtenstein A.H., Kennedy E., Barrier P., Danford D, Ernst N.D., Grundy S.M., Leveille G. A., Van Horn L., Williams C.L., and Booth S.L.: Dietary fat consumption and health. Nutr. Rev., S3-19, 1998.

[3] Tziomalos K., Weerasinghe C.N., Mikhailidis D.P., and Seifalian A.M.: Vascular risk factors in South Asia. Int. J. Cardiol., 1,128(1), 5-16 2008.

[4] Choi C.U., and Park C.G.: Estimating the probability of stroke in Korean hypertensive patients visiting tertiary hospitals using a risk profile from the Framingham study. BMC Neurol., 22, 9-16, 2009.

problem in proportion to their economic growths. Thirteen percent of the world population is suffering from starvation and malnutrition due to insufficient food supply[5]. Twenty-seven per cent of the world population is overweight and 7% of the population is obese[6]. The obesity problem has reached to a level that WHO declared it was serious health threat facing the world. These means that nearly 50% of the world population are reported to be unhealthy because either of lack of food or overeating.

I would like to overview these two contrasting problems in the modern history of Japan. Modern Japan experienced the conditions of undernourishment and "overnourishment" within a half century. Japan overcame the problem of malnutrition after the Second World War; but today the Japanese face the problem of obesity and the danger of getting chronic diseases resulting from overweight. Japan's experience may offer a hint for the solution to the world's nutritional problems.

Malnutrition and growth retardation in Japan

Japan suffered from severe undernourishment due to food shortage, during and right after the Second World War. Malnutrition and resulting growth retardation were, then, Japan's major concerns.

The Nutritional Improvement Law was enacted in 1952 and was enforced. The national nutrition survey was carried out to monitor the conditions of health and dietary intake. According to the 1946 survey, energy intake was 1900kcal/day and protein intake was 59g. The energy value was not very low, but the protein intake was low. Protein deficiency is still the world's nutritional problem and is prone to occur in countries where people's energy source is from starch of cereals such as potatoes or rice.[7,8] Protein deficiency was the government's nutritional concern, for low protein deficiency was then understood as the very cause of the nation's malnutrition.

Japan in the 60s and the 70s overcame the problem of undernourishment through stable food supply as it achieved industrial growth, and its stability was maintained by food import. A notable fact was that the Japanese then adopted western life style and eating habit: the government then encouraged the intake of animal-protein foods to improve nutritional conditions and overcome growth retardation.

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[5] World Food Programme; http//www.wfp.org/hunger. Accessed February 2009

[6] World Health Organization, Obesity: Preventing and managing the Global epidemic Report 894. World Health Organization, Geneva, Switzerland. http://www.dm-net.co.jp/calender. Accessed January 2009.

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Changes in food intake and nutrients intake according to the national survey

Table 1 Annual changes of food intake and of nutrients intake in national nutrition survey (per caput per day)

		1946	1950	1955	1965	1975	1985	1995	2005
Cereals	g	398.4	476.8	479.6(100)	418.5	340.0	308.9	264.0(55)	452.0(94)
rice	g	241.1	338.7	346.6(100)	349.8	248.3	216.1	167.9(48)	343.9(99)
Meats	g	5.7	8.4	12.0(100)	29.5	64.2	71.7	82.3	80.2(668)
Milk and Milk Products	g	3.1	6.8	14.2(100)	57.4	103.6	116.7	144.5	125.1(881)
Sugars	g	0.5	7.2	15.8	17.9	14.6	11.2	9.9	7.1
Energy	kcal	1903	2098	2104	2184	2188	2088	2042	1904
Protein total	g	59.2	68.1	69.7	71.3	80.0	79.0	81.5	71.1
animal	g	10.5	17.6	22.3	28.5	38.9	40.1	44.4	38.3
Fat total	g	14.7	18.3	20.3	36.0	52.0	56.9	59.9	53.9
animal	g	—	—	6.5	14.3	27.4	27.6	29.8	27.3
Carbohydrate	g	386	415	411	384	337	298	280	267
Energy	%								
from CHO		81.0	79.0	78.1	70.3	61.6	57.1	54.8	56.1
from Fat		7.0	7.9	8.7	14.8	22.3	24.5	26.4	25.5

CHO : carbohydrate

Number in parenthesis is shown as % of each food intake, with the intake of each food in 1955 regarded as 100

Source : The National Health and Nutrition Survey by Ministry of Health, Labour and Welfare of Japan

Table 1 shows changes in intakes of cereals, meats, milk and milk products observed between 1947 and 2005[9]. The intake of cereal decreased, whereas the intakes of meats and milk and milk products increased and recorded 5-10 times more intakes than those in 1955. The increased food intakes reflected Japan's rapid industrial and economic development which began in 1960s.

The table shows also changes in energy intake, and nutrient intakes of protein, fat, and carbohydrate. Energy intake increased since 1950, but its peak was marked in 1975 with 2188 kcal. Since then it decreased slowly and reached to 1904 kcal in 2005.

The amount of animal protein intake per caput per day was only 17.6g in the total protein intake of 68.1g in 1950. The animal protein intake was 38.9g in the total protein intake of 80g in 1975. The animal protein intake doubled, and this is believed to have

[9] Ministry of Health, Labour and Welfare of Japan, The national health and nutrition survey in Japan, 2005 Daiichishuppan

contributed to the improvement in the physical stature of the Japanese. The amount of animal fat intake per caput per day was 6.5g in the total fat intake of 20.3g in 1955. The amount of animal fat intake was 27.4g in the total fat intake of 52g in 1975. The animal fat intake quadrupled and this might be related with prevalence of diabetes mellitus in Japan.

It should be noted that Japan's energy intake had been maintained at the range of 1900-2200 kcal for a half century (that is, between 1955 and 2005). It should also be noted that the intakes of protein and fat, especially of animal protein and fat which the Japanese nation had seldom taken before the Second World War, show rapid increase since 1955 (under the postwar condition).

The energy source for Japanese people had been mainly from carbohydrate, with rice as the staple food, before the War. The energy percentage supplied by carbohydrate was 78.1% in 1955 and since then rapidly decreased and recorded 56.1% in 2005. The percentage of energy supplied by fat was only 8.7% in 1955 and increased with animal food intake (26.5% in 2005) in Japan. It is clear that in the Japanese diet, the energy source was shifted from carbohydrate to fat due to the Western eating habit.

Positive effects of animal-protein food

Table 2 Annual changes of Japanese physical statue

			1910	1930	1950	1970	1975	1990	2005
Male	Height (cm)	6y	107.0	108.1	108.6	114.5	114.3	116.8	116.6
		12y	133.6	137.1	136.0	147.1	147.9	151.4	152.5
	Body weight (kg)	6y	—	—	18.8	19.9	20.6	21.2	20.7
		12y	—	—	31.5	38.5	40.3	43.3	44.0
Female	Height (cm)	6y	105.8	106.9	107.2	113.6	113.4	116.0	115.8
		12y	133.6	138.4	136.8	148.4	149.6	151.5	152.0
	Body weight (kg)	6y	—	—	16.1	19.7	19.9	20.9	20.9
		12y	—	—	32.2	40.3	40.6	43.9	42.3

Source : School Health Statistics, Ministry of Education, Culture, Sports, Science and Technology of Japan.

(1) *Contribution of animal-protein food to the improvement in the physical stature of the Japanese*

The changes in the Japanese physique represented by changes of Japanese children's height and body weight were observed between 1910 and 2005. As is shown, the stature continued to improve. The average growth of 12-year-old boys (who usually have the greatest physical growth in a year) was 12cm in height and 9kg in weight between 1950 and 1975. Their growth shows a remarkable improvement in 1975 when the animal-protein food intake was increased. Since 1975 the intake had been maintained and the average height of 12-year-old boys reached 152.5cm and their weight 44.0kg in 2005.

Thus Japanese physique was significantly improved with the increased intake of animal-protein food. Animal protein taken through such foods as meat, fish, egg and milk contain protein of good quality. It is "good" because it has a balanced essential amino acid pattern, with protein synthesis necessary for physical growth and biosynthesis of antibody against infectious diseases.

(2) *Contribution of animal-protein food to extension of life expectancy*

The animal-protein food improved the nutritional status of the Japanese. The nutritional improvement strengthens the body's defense mechanisms against infection and diseases, radically decreases mortality rate from infection with help of immunization and antibiotics. Thus, Japan has become one of the countries which enjoy longevity with 79.19 years old in male and 85.99 in female (2007). In the UK, 76.9 years old and 81.3 (2004-2006); in the US, 75.2 and 80.4, (2005), according to UN's Demographic Yearbook, 2005.

Negative effects of the intake of animal-protein food: Animal-protein food and obesity

Table 3 Prevalence of obesity (BMI ≧ 25) and of lean (BMI ＜ 18.5) in Japan

Obese			1980	1985	1990	1995	2005
Male	%	20s	10.6	13.6	16.4	17.7	19.8
		30s	19.3	18.3	23.1	24.4	26.7
		40s	23.3	21.4	27.5	28.5	34.1
Female	%	20s	11.1	8.2	8.3	6.6	5.6
		30s	14.7	13.1	13.5	11.7	14.3
		40s	24.6	22.8	20.9	21.3	19.3
Lean							
Male	%	20s	9.3	7.5	8.6	7.5	7.2
		30s	5.0	4.2	4.5	4.4	5.1
		40s	4.3	3.0	2.8	2.7	2.4
Female	%	20s	12.4	16.8	17.7	24.5	22.6
		30s	7.8	7.8	9.9	12.0	20.0
		40s	4.9	3.8	5.2	6.1	8.0

Source : The National Health and Nutrition Survey by Ministry of Health, Labour and Welfare of Japan (2005)

Japanese traditional dish is composed of rice as staple food, main dish and side dishes. This typically Japanese pattern of food intake has been regarded as nutritionally balanced and thus healthy. However, the Japanese eating habit has been changing considerably due to the changes in life style. It seems that many Japanese people today still regard the Western eating habit as better than the Japanese one.

It is true that rich fat contained in animal-protein foods is effective in the need for urgent energy supply. However, the constantly large intakes of animal-protein foods have caused the Japanese obesity and life style-related diseases like DM, circulatory and cardiovascular diseases.

People with BMI>25 are defined as obese in Japan according to the evaluation of The Japanese Congress of Obesity. The number of obese males (aged between 20 and 40) had

gradually increased since 1985 and measured 34% of the male population in Japan in 2005—the tendency is obvious among the males in their 40s. On the other hand, the number of the obese females had gradually decreased on all ages since 1980, measuriing only 6% of the population among the young females (in their 20s), and 14-19% among the females aged between 30 and 49.

Obesity is induced by accumulated fat in the body as store of excess energy when energy intake exceeds energy expenditure. Fat is energy store for preparing for starvation; when visceral fat is deposited in the well-nourished body and becomes large, the adipose tissue starts to secrete insulin-resistant substances such as TNF-α and thus type 2 DM is to be developed[10].

The major cause of obesity in Japan is the combination of fat eating and lack of physical activity. The Japanese started to eat animal-protein foods after the World War, and adopted the Western eating habit. It could be concluded that obesity in Japan resulted from their adoption of the Western eating habit

Obesity problem in Japan

Table 4 Trends in prevalence of obesity and in prevalence of lean in Japan

Obese			1980	1985	1990	1995	2000	2005
Male	%	6y	2.64	2.91	3.98	4.33	5.04	4.54
		12y	7.48	7.92	9.64	10.23	11.28	11.23
Female	%	6y	2.73	3.33	4.32	4.58	4.57	4.83
		12y	7.30	7.43	8.34	9.19	10.05	9.56
Lean								
Male	%	6y	0.50	0.42	0.53	0.66	1.01	0.58
		12y	1.35	1.27	2.50	2.50	3.53	3.34
Female	%	6y	0.56	0.44	0.64	0.71	0.91	0.89
		12y	2.38	2.44	3.16	3.36	4.15	4.67

Assessment of obesity : [(Measured B.W. － standard B.W.) / standard B.W.] × 100 ≧ 120

Assessment of lean : [(Measured B.W. － standard B.W.) / standard B.W.] × 100 ≦ 80

Standard B.W.: average body weight in each height

Source : School health statistics, The Ministry of Education and Science and Technology

Table 4 shows the prevalence of obesity and overweight in OCED countries[11]. The most

[10] Femandez R.J.M., Gutierrez C., Ricart W., Casamitjana R., Femandez Castaner M., Vendrell J., Richart C., and Soler J.: The TNF-alpha gene Nco / polymorphism influences the relationship among insulin resistance, percent body fat, and increased serum leptin levels. Diabetes, 46, 1468-1472, 1997.

[11] OECD Health Data, 2005

common estimation method of obesity is BMI index which is calculated by dividing body weight in kg by the height in meters (BMI=Body weight kg/height m^2). People with obesity here refer to those with over 30 BMI index, and people with overweight refer to those with 25 to 30 BMI index. The obesity rates in the US and in the UK are over 30%, which involves a high risk of getting degenerative diseases such as DM, hypertension and cardiovascular disease. The obesity rate in Japan is only 3% and the overweight rate 25%. (In Japan, obesity is defined as with BMI > (less than 25%).

Although obesity in Japan is less serious than in the US and the UK, Japan faces the serious problem of dealing with a large number of patients and potential patients with diabetes mellitus. According to the 2007 national nutrition survey, the total number of patients with DM(Hemoglobin A 1c: HbA1c $\geqq$ 6.1) and the potential patients (5.6 $\leqq$ HbA1c < less than 6.1%) amounts to 22 million in Japan, which corresponds to 18 % of the entire population[12]. It should be noted that the total number of people with physician-diagnosed DM and the people with undiagnosed DM (fasting glucose at least 126mg/dl, lasting for 8-24 hours) is 10% of the population in the US[13]. In spite of its moderate prevalence of obesity, Japanese people are prone to develop diabetes mellitus partly due to their poor secretion of insulin from cell in pancreas.

Undernourished women in Japan

There is another nutritional concern in Japan: young Japanese females have lower BMI, and this is a phenomenon never observed in Japanese males. The prevalence of lean woman with BMI<18.5 was observed among the females in their 20s and 30s in 1980 and on and shared 20-23% of the population in 2005. This leanness among the Japanese females is not caused by food shortage but by their consciousness of the body[14].

There is a gap between the actual condition of overweight and the consciousness of being overweighed. Some women with normal BMI think themselves “fat” and go on a diet to become thinner and, in their consciousness, more beautiful. Japanese young females may acquire the fixed idea that being slim is beautiful through the media (TV, magazine, and etc). Undernourished young females are most likely to deliver low-weight babies who could later develop coronary heart disease. According to the fetal hypothesis by Barker DJP (1995), fetal malnutrition prepares coronary heart disease[15]. With the increase of young Japanese female with low BMI observed since 1985, the birthrate of babies with low weight (less than 2500g)

[12] The National Health and Nutrition Survey in Japan, 2008 http://www.dm-net.co.jp Accessed December 2008.

[13] Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey 2007, http://www.cdc.gov/diabetes Accessed January 2009.

[14] The National Health and Nutrition Survey in Japan, 2006.

[15] Barker, D.J.P.: Fetal origin of coronary heart disease, BMJ, 311, 171-174, 1995.

had increased since 1990 and recorded 10 % of the babies at birth in 2005[16].

There is a negative correlation between growth domestic product (GDP) and the prevalence of overly light-weighed females with index of BMI<18.5. Generally, the prevalence of overly light-weighed females is higher in countries with low GDP[17]. For instance, in Pakistan and Bangladesh, the prevalence of under-weight woman is notable and is also associated with short life expectancy. Japan is, in this sense, very specific with many overly light-weight females despite its high GDP. As the data suggest, Japan has its unique nutritional concerns: overweight among males in their 30s and 40s and undernourishment among females in their 20s and 30s. These tendencies need to be corrected by proper nutritional education.

Nutritional concerns for children: obesity and undernourishment

Table 5 Percentages of overweight and obesity in countries (2002-2003)

	Overweight	Obesity
Japan	21.6	3.2
Switzerland	29.4	7.7
France	28.1	9.4
Italy	33.5	8.5
Norway	34.4	8.3
Sweden	33.1	9.7
Turkey	31.6	12.0
Holland	35.0	10.0
Finland	32.2	12.8
Canada	32.1	14.3
Ireland	34.0	13.0
Spain	35.3	13.1
Iceland	35.9	12.4
Germany	36.3	12.9
Czech Republic	36.2	14.8
Luxembourg	34.4	18.4
Hungary	34.0	18.8
New Zealand	35.2	20.9
Greece	35.2	21.9
Slovakia	35.2	22.4
UK	39.0	23.0
USA	35.1	30.6

Overweight : 25 ≦ BMI ＜ 30; Obesity : BMI ≧ 30

Source : OECD Health Data 2005

BMI is not valid in assessing the body fat of children. The numbers of obese children have increased since 1985 and measured nearly 12% in 2005[18]. Obese children are epidemiologically likely to become obese adults. Obesity among children in Japan could be

[16] Demographics statistics 2007, Minister of Minister's Secretariat, Statistics Section, 2007.

[17] WHO Core Health Indicators 2006; WHO Global Database on Body Mass Index 2006.

[18] School Health Data, Ministry of Education, Culture, Sports, Science, and Technology, Japan, 2005.

found in lack of physical activities: they prefer TV watching or playing computer games. Their preference of junk foods and cakes rich in fat and/or in sugar could be another cause. The excessive intake of sugar and fat should be avoided because they are easily changed to be synthesized for body fat and to be accumulated in the body. As sugar is rapidly absorbed into capillary blood from the intestine, it elevates rapidly blood glucose level and stimulates insulin secretion to blood stream, promoting fat synthesis.

On the other hand, lean children had also increased since 1990 and measured 4.5% of 12-year-old girls and 3.4% of 12-year-old boys in 2005. The prevalence of lean children could be a problem because undernourishment in childhood could be understood as a predisposing factor for obesity in adult life. Undernourishment in developing countries is associated with poverty, but in Japan it could be associated with the desire for being thin. In either case, undernourishment is a risk factor of obesity in adult life if sufficient nutrition is supplied later and should be avoided for their future healthy life.

Introduction of L-Arabinose for prevention and improvement of obesity

Sugar that we consume is broken down to glucose and fructose by sucrose (digestive enzyme) in the small intestine and absorbed to become energy. This action is faster than the absorption of starch, and produces a more rapid elevation of blood glucose than that of starch. The rapid elevation of blood glucose acts on pancreas and induces a rapid secretion of insulin which is anabolic for synthesis of fat, easily may lead to obesity[19]. However, if a small amount of L-Arabinose is added to sucrose, the breakdown of sucrose is inhibited and rapid elevation of blood glucose is suppressed[20,21].

L-Arabinose is expected to contribute to the prevention, management and improvement of obesity and associated life style-related diseases like DM. I would like to summarize L-arabinose studies and let you to know of the pentose's safe and useful effectiveness for energy cut from sugar (sucrose).

(1) L-arabinose is a natural pentose with sweet taste. It is contained in all fermented foods and in natural plant in a small amount. It has 60 % sweetness of sugar.

(2) It selectively and strongly inhibits the sucrase activity. Therefore, it strongly inhibits digestion and absorption of sugar in intestines (Seri, 1996).

(3) It reduces the rapid increase of blood glucose after sucrose loading at a small

[19] Hallfrisch, J., Lazar, F., Jorgensen, C., and Reiser, S.: Insulin and glucose responses in rats fed sucrose or starch: Am. J. Nutr., 32, 787-793, 1979.

[20] Seri K., Sanai K., Matsuo N., Kwakubo K., Xue X., and Inoue S.,: L-arabinose selectively inhibits intestinal sucrose in an uncompetitive manner and suppressers glycemic response after sucrose ingestion in animals. Metabolism, 45, 1368-1374, 1996.

[21] Fujii, M., Hatozoe M., Hou De-King, Sanada H., Osaki S., and Hizukuri S. : J. Appl. Glycosci., 47, 355-361, 2000.

addition(2-3 %) of L-arabinose in sugar (Seri, 1996)(Fujii, 2000).
(4) It reduces significantly sucrose utilization in a small amount and consequently led to decrease of lipogenesis(lipid synthesis)[22].
(5) It changes improves the enteric environment. Short-chain fatty acids are produced from non-digested sucrose and L-arabinose by intestinal microbes.
(6) It could change muscle fiber type to oxidative to burn fat. The skeletal muscle, which is comprised of 40-50 % of the body weight, utilizes fat for the energy. Even a slight increase of oxidative muscle fiber accelerates fat burning in body[23].

Thus L-Arabinose is effective in management of obesity and obesity-related DM as well as maintenance of good health.

The importance of proper nutritional education

In Japan, traditional eating habit seems to have been abandoned in the process of industrial and economic growth; and today the "Western" eating habit is dominant with increased intakes of animal-protein foods such meat, eggs, milk, and milk products. While the intake of animal-protein foods was effective in coping with malnutrition, and bettering the physical stature and longevity of the Japanese, it has, as a negative by-product, led to the prevalence of obesity and life style-related diseases like Diabetes Mellitus. Japan now faces the problem that one fifth of the Japanese population is patients and pre-patients with DM. In order to cope with this situation, the government introduced nutritional education and metabolic syndrome checking programmes for people aged between 40 and 74 years old in 2008. These programmes are organized and carried out by registered dietitians (the Ministry of Health, Labour and Welfare of Japan).

Sugar and animal-protein foods, preferred by people, are both excellent in taste and in high nutritional values. However, those foods are prone to overeaten and damage health. That is why proper nutritional education and diet management by registered dietitians are necessary.

Today nutritional problems—such as skipping breakfast, undernourishment, unbalanced diet, overeating and lack of physical activities—are observed in Japanese children. Nutritional education for children has become imperative. In 2005, the nine principles of "*Shokuiku*" or Healthy Diet Education were specified to promote dietary and nutritional education for children at schools by the Ministry of Education, Culture, Sports, Science and Technology. Dietitians and registered dietitians at schools as nutrition teachers play a very important role in nutritional education at schools. Such nutritional education would prepare a better adult life for children, for it will help to prevent obesity and lifestyle-related diseases

[22] Osaki S., Kimura T., Sugimoto T., Hizukuri S., and Iritani N. : L-Arabinose feeding prevents increases due to dietary sucrose in lipogenic enzymes and triacylglycerol levels in rats. J. Nutr., 131, 796-799, 2001.

[23] Kikuzawa A., Tanaka N., Ichikawa M., and Miyasaka K., Effects of L-arabinose on skeletal muscle fiber composition. J. Jpn. Soc. Nutr. Food Sci., 58, 51-57, 2005.

such as DM.

Both developed and developing countries have a sense of common nutritional concerns. To improve the quality of nutritional education and materialize it is our common goal for our better future.

Conclusion

The animal protein food is effective in coping with malnutrition in developing countries, as shown in bettering the physical growth and longevity of Japanese. As a negative side it leads to the prevalence of obesity and life style-related disease such as Diabetes Mellitus. Obesity and DM may especially easily occur in the people who have seldom eaten animals as food, and traditionally don't partake of it, as is now happening in Japan. If this is so, the obesity problem will become a more serious global one than it is today with the increase of over-nourished people in developing countries. It is not easy to control food intake which meets the needs of the body in countries with sufficient food supplies. Nutritional education in countries would be required for a solution to the problems.

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Published by the Forum on Public Policy