〈Original Article〉

# Foresight of physical development indicated by the National Health and Nutrition Survey in Japan: An approach in terms of biomedical sciences

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**Summary** Human beings go through three stages of life during the span of each person's existence. After the defeat in World War II the Japanese people reconstructed their country as an economic power, supported by the betterment of their physical health, and eventually came to tackle the problem of lifestyle-related diseases (1996). With this as a turning point, the growth of the national strength of Japan led to the expansion of welfare capabilities (relief to the people deprived of the means of living and access to healthcare services), and the country came to have the longest life expectancy in the world. There is now an urgent need to develop health sciences for the Japanese people and to promote the practice of proper nutrition.

The present review of the data from The National Health and Nutrition Survey in Japan indicated the need for actions to ensure proper physical development. The first of the three stages of life (up to the age of 29 years old) was characterized as the key period for sound physical development. The review made us aware of many problems, such as the health state of economically disadvantaged

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schoolchildren and students and the deteriorated physical condition of young, new mothers eating less than 1,600 kcal. This study highlighted the health of the people up to the age of 29 years old as an important theme of discussion.

**Key words:** Nutrient intake, Activities of daily living (ADL), Quality of life, Lifestyle-related disease, Dietary deficiency

## 1. Introduction

A source of realistic information on the health level of the Japanese people is The National Health and Nutrition Survey in Japan, which reports the results of the survey conducted annually by the Ministry of Health, Labour and Welfare[1].

Intrigued by this publication, we examined the relationship between the health level of Japanese people and the level of nutrition. The focal point in our analysis was how the changes in dietary life affected the health level. In particular, considering the importance of lifestyle-related diseases, we paid special attention to the impacts of these diseases in the analysis of dietary practice using the data for the years from 1995 (when the collection of relevant data began) onwards, and recognized the importance of the period of kinetic growth under the age of 30 years old.

We first grasped an overview of the soundness of dietary life and the health level by stratifying the frequency of consumption of the three major nutrients of energy (kcal), protein (g), and lipid (g) into levels. Considering the variance of the population, we used the data expressed as mean values in this analysis on the assumption that mean and standard deviation values had low accuracy.

## 2. Subjects and methods

1. Subjects

The Health Promotion Act aims to correct socioeconomic and regional disparities, primarily focusing on 1) body composition, 2) nutrient intake, and 3) the check for lifestyle-related disease conditions. While the check for nutrition levels in this context mainly looks at the basic nutrients of energy, protein, lipid, and carbohydrate, we opted to grasp the nutrition levels making use of the changes in population means.

The survey that provided the data for this study was a uniform survey conducted in 2011 examining the activities of daily living among 8,000 people in 3,400 households. Considering the nature of this survey, we decided to perform our population analysis without using standard deviation (SD) representing variance.

Ultimately, we considered it appropriate to perform systematic analysis of sample groups in a condition without involving random errors, and looked for trends in such groups on the direction level[1].

2. Methods

To clarify the trend characteristics of the sampled population data, we compared the survey results from three time points (1995, 2003, and 2011) representing the period for which analysis was possible. To grasp age-specific characteristics associated with the aging process, data were compared among the age ranges of subject samples at each time point. For this purpose, we looked at the subject samples in the following five age ranges:

1) 1-6 years old (infancy)
2) 7-14 years old (childhood)
3) 15-19 years old (adolescence)
4) 20-29 years old (adulthood)
5) over 70 years old (old age)

Among these ranges, we particularly examined the age ranges of 1) 1-6 years old, 2) 7-14 years old, 4) 20-29 years old, and 5) over 70 years old. Here, we clarified the problems arising from lifestyle and considered that these should be distinguished because of their large influence on the reference values.

## 3. Results

We characterized the trends by comparing the measurement results in 1995, when lifestyle-related diseases were first officially recognized in Japan, with those in 2011, the newest measurements in this study.

1. Inter-annual variations in total intake of three major nutrients and energy (Table 1)

These data summarize the changes in the dietary life of the people in post-war Japan. We directed our attention to basic nutrient intake parameters (energy, protein, lipid, and carbohydrate) from 1995 to 2011, comparing the values in 2011 with the baseline values in 1995.

Mean energy intake in 1995 vs. 2011 was 2,042 vs. 1,840 kcal (90.1%), protein intake was 81.5 vs. 67.8 g (83.2%), lipid intake was 59.9 vs. 54.0 g (90.2%), and carbohydrate intake was 280 vs. 255 g (91.0%). These values decreased by slightly more

Table 1 The inter-annual variations of nutrient intake levels during 1955 to 2011: The comparison of total nutrient intake levels in 1995 with those in 2011

| Research year / Nutrient intake levels | 1955 | 1970 | 1980 | 1995 | 1996 | 2003 | 2009 | 2010 | 2011 | 2011/1995※ ratio (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | 2,104 | 2,210 | 2,119 | 2,042 | 2,002 | 1,920 | 1,861 | 1,849 | 1,840 | 90.1% | Mean 86.3% |
| Protein (g) | 69.7 | 77.6 | 78.7 | 81.5 | 80.1 | 71.5 | 67.8 | 67.3 | 67.0 | 83.2% | |
| Lipid (g) | 20.3 | 46.5 | 55.6 | 59.9 | 58.9 | 54.0 | 53.6 | 53.7 | 54.0 | 90.2% | |
| Carbohydrate (g) | 411 | 368 | 309 | 280 | 274 | 270 | 260 | 258 | 255 | 91.0% | |

※The percentage of intake level in 2011 compared to that in 1995

Table 2 The comparison of nutrient intake levels between populations of different age and gender, using published data from the National Health and Nutrition Survey in Japan, 2011

| Research member / Nutrient intake levels | Age group | | 1～6 | 7～14 | 15～19 | Charges from 15-19 years old to 20-29 years old | 20～29 | 30～39 | 40～49 | 50～59 | 60～69 | 70～ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | 3,839 | 209 | 352 | 193 | Male(%) | 259 | 479 | 480 | 521 | 630 | 746 |
| | Female | 4,408 | 185 | 368 | 187 | Female(%) | 328 | 525 | 558 | 553 | 749 | 953 |
| Energy (kcal) | Male | 2,047 | 1,316 | 2,018 | 2,439 | 87.6 | 2,136 | 2,117 | 2,090 | 2,118 | 2,141 | 1,936 |
| | Female | 1,660 | 1,242 | 1,853 | 1,820 | 86.5 | 1,575 | 1,651 | 1,668 | 1,726 | 1,692 | 1,595 |
| Protein (g) | Male | 73.2 | 46.1 | 71.8 | 82.9 | 92.5 | 76.7 | 72.7 | 72.6 | 76.2 | 78.9 | 71.8 |
| | Female | 61.6 | 43.5 | 67.0 | 65.8 | 87.5 | 57.6 | 59.0 | 60.5 | 64.7 | 66.4 | 60.2 |
| Lipid (g) | Male | 58.3 | 43.1 | 65.7 | 74.8 | 90.9 | 68.0 | 63.8 | 60.6 | 58.8 | 55.4 | 48.5 |
| | Female | 50.3 | 39.6 | 62.5 | 61.8 | 84.5 | 52.2 | 53.2 | 53.4 | 53.4 | 47.6 | 41.7 |
| Carbohydrate (g) | Male | 281.6 | 182.1 | 276.9 | 346.1 | 82.9 | 286.8 | 285.6 | 283.0 | 281.7 | 293.9 | 280.3 |
| | Female | 232.1 | 194.1 | 249.0 | 242.8 | 88.9 | 215.9 | 722.0 | 724.6 | 236.1 | 242.2 | 239.9 |

The percentage of intake level of populations from 20 to 29 years old compared to that from 15 to 19 years old

than 10% on average.

In particular, drastic deficiency in protein intake was remarkable.

2. Age-related changes among males and females in 2011 (Table 2)

The changes in nutrient intake associated with the transition of young men from the growth period at ages 15-19 to adulthood at ages 20-29 reflected their physiology. While carbohydrate intake energy linked to production showed a negative change exceeding 10%, protein and lipid intakes linked to metabolism showed negative changes less than 10%.

However, females showed negative age-related changes exceeding 10% in all corresponding parameters in 2011. The values moved differently from those in males, and the potential effect of this difference reflected the attitude of young women dominated by aesthetic values. In particular, the systematic tendency toward reduced energy intake among the females at ages 20-29 was alarming, and considering the factors such as the predisposition to allergy, childbirth, and

Table 3 The time courses of mean nutrient intake level of populations from 1 to 6 years old during 1995 to 2011

| Nutrient intake levels \ Research year | | 1995 | 1996 | 2003 | 2009 | 2010 | 2011 | 2011/1995 ratio (%) |
|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | Male | 1,530 | 1,450 | 1,337 | 1,303 | 1,303 | 1,316 | 86.2% |
| | Female | 1,363 | 1,428 | 1,261 | 1,207 | 1,212 | 1,242 | 88.9% |
| Protein (g) | Male | 56.9 | 53.7 | 47.0 | 45.6 | 45.6 | 46.1 | 81.0% |
| | Female | 51.0 | 52.7 | 44.2 | 42.3 | 42.6 | 43.5 | 85.3% |
| Lipid (g) | Male | 49.5 | 47.5 | 43.6 | 40.6 | 42.9 | 43.1 | 87.1% |
| | Female | 44.7 | 47.3 | 40.2 | 38.6 | 38.8 | 39.6 | 88.6% |
| Carbohydrate (g) | Male | 213 | 200 | 186.2 | 185.1 | 181.7 | 182.1 | 85.3% |
| | Female | 188 | 196 | 177.8 | 169.9 | 170.1 | 174.1 | 92.6% |

Table 4 The time courses of mean nutrient intake level of populations from 7 to 14 years old during 1995 to 2011

| Nutrient intake levels \ Research year | | 1995 | 1996 | 2003 | 2009 | 2010 | 2011 | 2011/1995 ratio (%) |
|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | Male | 2,165 | 2,108 | 2,148 | 2,032 | 2,040 | 2,018 | 93.2% |
| | Female | 1,931 | 1,923 | 1,877 | 1,842 | 1,817 | 1,853 | 96.0% |
| Protein (g) | Male | 84.4 | 80.8 | 77.9 | 72.9 | 73.5 | 71.8 | 85.1% |
| | Female | 76.3 | 74.4 | 69.3 | 68.0 | 65.7 | 67.0 | 87.8% |
| Lipid (g) | Male | 72.5 | 70.2 | 68.2 | 66.5 | 66.4 | 65.7 | 90.6% |
| | Female | 65.0 | 65.8 | 61.4 | 60.8 | 59.1 | 62.5 | 96.2% |
| Carbohydrate (g) | Male | 289 | 284 | 298.6 | 278.0 | 279.1 | 276.9 | 95.9% |
| | Female | 257 | 255 | 256.5 | 249.9 | 249.2 | 249.0 | 96.9% |

infant nursing, the energy intake of less than 1,600 kcal is risking the health of these women.

3. Main features of the time courses from the baseline in 1995

The time courses of nutrient intake were analyzed according to the growth stages divided into 1-6 years old, 7-14 years old, 15-19 years old, 20-29 years old, and over 70 years old, setting the baseline in 1995 and assessing the changes in 1996, 2003, and 2011. The results are as follows.

1) Males and females aged 1-6 (Table 3)

A comparison of nutrition intake levels for males in 1995 vs. 2011 showed that energy intake was 1,530 vs. 1,316 kcal (86.2%), protein intake was 56.9 vs. 51.0 g (81.0%), lipid intake was 49.5 vs. 44.7 g (87.1%), and carbohydrate intake was 213 vs. 188 g (85.3%). All parameters showed negative changes.

The corresponding ratios in females were 88.9% for energy, 85.3% for protein, 88.6% for lipid, and 92.6% for carbohydrate.

The average of these values was 84.9% for males and 88.9% for females, indicating a decrease in nutrition in both genders.

2) Males and females aged 7-14 (Table 4)

The energy intake (kcal) of males in 1995 vs. 2011 was 2,165 vs. 2,018 (93.2%), protein intake (g) was 84.4 vs. 71.8 (85.1%), lipid intake (g) was 72.5 vs. 66.5 (90.6%), and carbohydrate intake (g) was 289 vs. 227 (95.9%).

The corresponding ratios in females were 96.2% for energy, 87.8% for protein, 96.2% for lipid, and 96.9% for carbohydrate.

The average of these values was 91.2% for males and 94.2% for females, indicating a larger decrease in males than in females.

3) Males and females aged 15-19 (Table 5)

The energy intake (kcal) of males aged 15-19 in 1995 vs. 2011 was 2,589 vs. 2,439 (94.2%), protein intake (g) was 99.5 vs. 82.9 (83.3%), lipid intake was 83.3 vs. 74.8 (89.8%), and carbohydrate intake (g) was 352 vs. 346 (98.3%).

The corresponding ratios in females were 93.7% for energy, 83.4% for protein, 94.8% for lipid, and 94.6% for carbohydrate, showing generally smaller decreases. While males in this age group were in the growth stage showing body weight gain, females were in a state of arrested physical growth under the influence of their desire to be "slim". This foreshadowed the problems associated with the aesthetic expec-

Table 5 The time courses of mean nutrient intake level of populations from 15 to 19 years old during 1995 to 2011

| Nutrient intake levels \ Research year | | 1995 | 1996 | 2003 | 2009 | 2010 | 2011 | 2011/1995 ratio (%) |
|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | Male | 2,589 | 2,489 | 2,533 | 2,481 | 2,555 | 2,439 | 94.2% |
| | Female | 1,943 | 1,906 | 1,878 | 1,790 | 1,829 | 1,820 | 93.7% |
| Protein (g) | Male | 99.5 | 98.1 | 91.2 | 85.5 | 86.0 | 82.9 | 83.3% |
| | Female | 78.9 | 74.7 | 69.5 | 65.6 | 65.7 | 65.8 | 83.4% |
| Lipid (g) | Male | 83.3 | 80.6 | 81.8 | 79.1 | 80.1 | 74.8 | 89.8% |
| | Female | 65.2 | 62.9 | 63.9 | 60.5 | 63.0 | 61.8 | 94.8% |
| Carbohydrate (g) | Male | 352 | 335 | 345.3 | 344.5 | 358.8 | 346.1 | 98.3% |
| | Female | 257 | 257 | 249.0 | 238.0 | 241.4 | 242.8 | 94.6% |

tations of the women in their 20s.

4) Males and females aged 20-29 (Table 6)

The energy intake (kcal) of males aged 20-29 in 1995 vs. 2011 was 2,333 vs. 2,136 (91.6%), protein intake (g) was 93.4 vs. 76.7 (82.1%), lipid intake (g) was 70.6 vs. 68.6 (96.3%), and carbohydrate intake (g) was 320.0 vs. 286.8 (89.6%). The drop in protein intake was remarkably larger than that of other nutrients, and this was considered to be problematic. The average of the ratios in males was 89.9%.

Next we examined the nutrient intake levels of females in this age group. The energy intake (kcal) in 1995 vs. 2011 was 1,895 vs. 1,595 (84.2%), protein intake (g) was 74.7 vs. 57.6 (77.1%), lipid intake (g) was 60.5 vs. 52.2 (86.3%), and carbohydrate intake (g) was 249.0 vs. 215.9 (86.7%). The average of the ratios in females was 83.6%. The low energy diet less than 1,600 kcal observed in 2011 became a grave concern.

Table 6 The time courses of mean nutrient intake level of populations from 20 to 29 years old during 1995 to 2011.

| Nutrient intake levels \ Research year | | 1995 | 1996 | 2003 | 2009 | 2010 | 2011 | 2011/1995 ratio (%) |
|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | Male | 2,333 | 2,295 | 2,200 | 2,138 | 2,119 | 2,136 | 91.6% |
| | Female | 1,895 | 1,826 | 1,683 | 1,659 | 1,612 | 1,595 | 84.2% |
| Protein (g) | Male | 93.4 | 90.2 | 77.1 | 73.0 | 73.6 | 76.7 | 82.1% |
| | Female | 74.7 | 71.7 | 63.8 | 60.2 | 58.2 | 57.6 | 77.1% |
| Lipid (g) | Male | 70.6 | 70.1 | 65.6 | 66.3 | 65.5 | 68.0 | 96.3% |
| | Female | 60.5 | 59.4 | 55.1 | 54.8 | 52.3 | 52.2 | 87.9% |
| Carbohydrate (g) | Male | 320.0 | 307 | 304.6 | 297.2 | 290.9 | 286.8 | 89.7% |
| | Female | 249.0 | 244 | 223.9 | 223.1 | 218.8 | 215.9 | 86.7% |

Table 7 The time courses of mean nutrient intake level of populations over 70 years old during 1995 to 2011

| Nutrient intake levels \ Research year | | 1995 | 1996 | 2003 | 2009 | 2010 | 2011 | 2011/1995 ratio (%) |
|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | Male | 1,975 | 1,998 | 1,975 | 1,894 | 1,898 | 1,936 | 98.0% |
| | Female | 1,625 | 1,632 | 1,602 | 1,585 | 1,585 | 1,595 | 98.2% |
| Protein (g) | Male | 79.2 | 81.0 | 74.3 | 69.9 | 69.8 | 71.8 | 90.7% |
| | Female | 67.5 | 67.9 | 62.4 | 60.1 | 60.2 | 60.2 | 96.5% |
| Lipid (g) | Male | 47.3 | 49.3 | 44.7 | 44.6 | 46.5 | 48.5 | 102.5% |
| | Female | 41.9 | 41.6 | 39.1 | 39.7 | 41.5 | 41.7 | 99.5% |
| Carbohydrate (g) | Male | 287..0 | 289 | 296.2 | 278.2 | 274.9 | 280.3 | 97.7% |
| | Female | 242.0 | 244 | 244.9 | 241.8 | 237.9 | 239.9 | 99.1% |

5) Males and females aged over 70 (Table 7)

While this category covers the people aged 65-74 (early old age) and those aged 75 or more (late old age), these people represent 26% of the national population in 2015.

The energy intake (kcal) of men leading a normal daily life in 1995 vs. 2011 was 1,975 vs. 1,936 (98.0%), protein intake (g) was 79.2 vs. 71.8 (90.7%), lipid intake (g) was 47.3 vs. 48.5 (108.5%), and carbohydrate intake was 287.0 vs. 280.3 (97.7%). The 2.5% positive increase in lipid intake suggested a tendency of diet imbalance.

The corresponding ratios in females were 98.2% for energy, 96.5% for protein, 99.5% for lipid, and 99.1% for carbohydrate. The average of these values, 97.2% for males and 98.3% for females, was comparable between genders.

As the people in this age group become older and undergo the process of aging, they are threatened with the possibility of developing various conditions mentioned below (Figure 1) in contrary to healthy longevity. These conditions can be categorized into:

1) physical frailty
2) decline of activities of daily living (ADL)
3) geriatric syndrome
4) dementia
5) multiple organ dysfunction, etc.[2]

Special difficulty surrounds these conditions, because it is hard to detect populations with statistical significance, considering the trend characteristics of the subject group, in particular the sampling group.

## 3. Discussion

Assuming a typical human life span of 90 years, we divide it into three stages in terms of the functions of a person (Fig. 1).

These are the kinetic growth period up to the age of 29 years, the plateau period from the ages 30 to 59 where the person continues to live while maintaining physical strength, and the downhill preparation for death starting from the age of 60[3].

In particular, the key is the person's power at the beginning of life, i.e., the health condition in the kinetic stage.

1. Consequences of the modern dietary situations

Japan is an elongated chain of islands in the temperate climate zone. It is blessed with the rich gifts of Mother Nature, and has distinct seasons offering many opportunities for us to appreciate natural beauty.

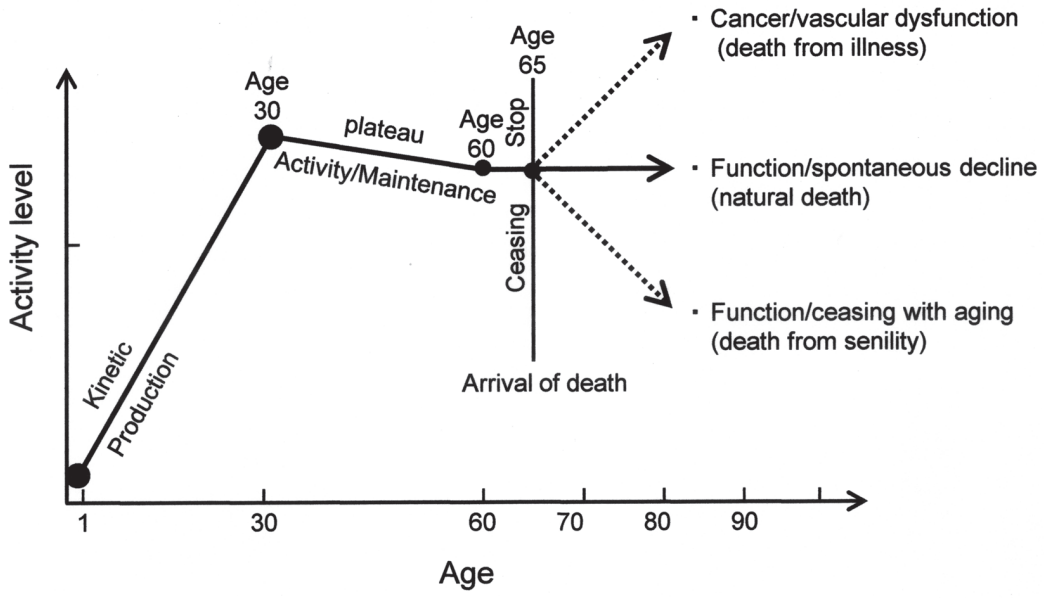


Fig 1 Human growth and predestined illness.

After the precious experience of the defeat in the war and the subsequent miraculous recovery, the country now enjoys the status as an economic power. In particular, the country's strengths in technology and economy have enabled us to promote the physical development of people as a national policy. The Japanese people have long been eating traditional foods centered on rice and supplemented with vegetables, seaweed, fish, soybeans, tubers, etc. This diet helped us recover from starvation and provided the motive power for post-war development. Stimulated by the Korean War, the extremely rapid development of the country culminated in the unprecedented high economic growth in the 1960s, the like of which had never been seen before in the world. Concurrently, healthcare also made dramatic progress. The unique system for the universal coverage of national health insurance began in 1961, and Japan started to establish its status as a country of longevity. The energy intake of a Japanese person peaked at 2,200 kcal in the period from 1970 to 1975. The dietary life of the Japanese in this era was characterized by the coexistence of Westernization and traditional Japanese foods, informing the modern style of the Japanese dietary life.

Collapse of the bubble economy hit Japan in 1990. At that point, Japan started to aim at a high level of welfare. The steps taken by the country included the adoption of the term "lifestyle-related diseases" in 1996, the Healthy Japan 21 program in 2000, the standards for the diagnosis of metabolic syndrome in 2005, and the beginning of health checkups for metabolic syndrome in 2008. These set into motion the new efforts to promote the physical development of Japanese people.

2. Combination of food efficacies and its direction

Japanese people now and in the future need to promote physical development to prevent a fall into poor nutritional conditions.

Fortunately, Japan is an archipelago in the temperate climate zone, and the diversified terrains with four seasons offer us opportunities to feel the traditional rhythms of living, which reside in the seas, in the mountains, and in the earth. The Japanese people have long been growing in harmony with nature and accepting its blessings. However, the physiology of Japanese people has several constitutional features that can be problematic in modern life.

For example, the intestines are long and the pancreas is weak in its main function of insulin secretion. In addition, many of them have trouble in digesting dairy products due to lactose intolerance[4].

However, a new dietary habit incorporating Western foods on top of traditional Japanese foods took root in the period from 1970 to about 1975, when the high economic growth reached a peak, and a new way of physical development for the Japanese people began. The consumption of rice at the center of the traditional Japanese diet decreased, making way for the increase in milk, dairy products, and meat.

The influence of this change became apparent in the types of diseases people had at the time of death. The leading cause of death changed from cerebrovascular disorders to cancer, and this contributed to a reduction of the death rate. At that time, the Japanese way of eating was associated with the intake of less energy. The trends described above can be summarized in the transition through the following four phases.

A. Advantages as seen from the passage of time

i) About 1970: Cancer became established as the most important type of disease at the peak of economic growth.

ii) About 1980: Beginning of the low nutrition era (the era of eclectic Japanese and Western foods). Top cause of death: cancer, followed by heart disease.

iii) About 1995: Recognition of lifestyle-related diseases, standards for the new pathologic condition called metabolic syndrome[5].

iv) About 2010: Complete entry to the low nutrition era, the era of longevity (80 years), improvement of new pathologic conditions in aged people (frailty, decline of activities of daily living [ADL], geriatric syndrome, dementia, multiple-organ dysfunction).

Furthermore, the following summarizes the problems related to pathologic conditions demanding special attention in each age group.

B. Major lifestyle problems in each age group

i) Children aged 1-6: Low nutrition: Lowering of the ability of mothers in providing nutrition: breast feeding immunity.
ii) Children aged 7-14: Mothers reducing or stopping their commitment to home eating: Limitation of school lunch in supporting food energy intake and physical strength, appearance of undernourished children.
iii) Women aged 20-29: Appearance of women lacking energy required for motherhood: Risks to mothers eating less than 1,600 kcal, advanced maternal age, risks associated with childbirth.
iv) People aged 60 or more (old age) and 70 or more (advanced age): Disease risks associated with solitary living[6]: New forms of aging, sociality in group living, constitutional changes; Changes in dietary life, imbalance in choosing high- and low-nutrition foods.

C. Problems recognized in the dietary life in the kinetic period

One of the background factors that pushed the life expectancy of the Japanese people to the top of the world was the advancement of medicine that prevented the increase in atherosclerotic heart disease. Now, the energy balance of the body has fallen into a decline, and this situation has become a problem.

After the turning point in 1980, the intake of the three major nutrients has been decreasing, encouraging physical development based on low nutrition. In particular, a review of nutritional efficacies began in 1995.

We discussed the energy in a person divided into three stages (ages 1-29: kinetic, ages 30-59: plateau, and ages 60 and over: end), and schematically showed the course of its changes (Fig. 1).

In this study, we focused on the kinetic action condition at the ages of 1-29 years. Although the calorie intake in this age range should be proportionate to the activated state, it showed a decreasing tendency. In particular, the eating behavior of young mothers was affecting infants and elementary school and junior high school students. As many as one-sixth of children were in a poor condition with energy deficiency, demonstrating a lack of adequate nutritional management.

Here, we should pay special attention to the roles of the intestinal flora in protecting our health. The intestinal flora work to help maintain homeostasis in the body, and its deterioration is involved in the onset of lifestyle-related diseases. The first system affected by this deterioration is believed to be the immune mechanism[7].

## 4. Conclusion

In order to examine the health level of people through a literature review, we analyzed the data in The National Health and Nutrition Survey in Japan from the perspective of biomedical science, and discussed how the health of people has been and should be addressed. We divided the aging process into three stages (ages 1-29 vs. ages 30-59 vs. ages 60 and over), summarized the roles of each stage, and focused on the growth stage under the age of 30.

Because the available material contained the data starting from 1995, we set the baseline in that year and compared the values in 2011 against the baseline. In this comparison, we noted the following four problems:
i) Children aged 1-6: Undernourishment of mothers. Frequent occurrence of food allergy.
ii) Elementary school and junior high school students: One-sixth of children are in poor eating situations at home.
iii) Women in their 20s: Low nutrition at 1,595 kcal on average. Problems with the health of mothers.
iv) People in old age and advanced age: Pathologic condition cannot be grasped through the present survey sampling. It is possible to grasp the levels in healthy groups.

We concentrated our analysis on the people aged 30 or less in the kinetic stage of life. Children aged 1-6, elementary school and junior high school students, and women in their 20s respectively had problems with different background factors, and these were considered to require solutions.

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