

Table 3. Associations between food group intake and total cholesterol level using multiple regression analysis

Survey year	Food group	Men				Women			
		model 1 ^a		model 2 ^b		model 1 ^a		model 2 ^b	
		β^c	<i>P</i>	β^c	<i>P</i>	β^c	<i>P</i>	β^c	<i>P</i>
1980	Rice	-0.155	<0.001	-0.096	0.004	-0.149	<0.001	-0.089	0.003
	Wheat	0.063	<0.001	-0.001	0.970	0.058	<0.001	-0.011	0.513
	Nuts and Seeds	0.000	0.978	-0.010	0.500	0.020	0.107	0.006	0.612
	Potatoes	-0.036	0.014	-0.033	0.033	-0.064	<0.001	-0.064	<0.001
	Sugar and Preserves	0.022	0.140	0.000	0.996	0.054	<0.001	0.037	0.006
	Sweets and Snacks	0.019	0.201	-0.008	0.654	0.019	0.147	-0.008	0.595
	Fat and Oil	0.087	<0.001	0.021	0.279	0.084	<0.001	0.016	0.348
	Legumes	-0.047	0.002	-0.036	0.023	-0.021	0.102	-0.012	0.379
	Fruit	0.017	0.273	-0.013	0.433	0.033	0.014	-0.001	0.962
	Green and Yellow Vegetables	0.027	0.068	0.016	0.289	0.035	0.006	0.018	0.173
	Other Vegetables	-0.040	0.009	-0.035	0.028	-0.028	0.036	-0.026	0.068
	Mushrooms	-0.011	0.438	-0.009	0.554	0.007	0.595	0.007	0.564
	Seaweed	-0.032	0.025	-0.022	0.125	-0.020	0.105	-0.012	0.358
	Fish and Shellfish	0.004	0.791	0.030	0.073	-0.026	0.044	-0.010	0.496
	Meat and Poultry	0.109	<0.001	0.071	<0.001	0.085	<0.001	0.044	0.009
	Eggs	0.071	<0.001	0.036	0.019	0.066	<0.001	0.032	0.015
Milk and Dairy Products	0.105	<0.001	0.068	<0.001	0.118	<0.001	0.083	<0.001	
1990	Rice	-0.093	<0.001	-0.036	0.255	-0.122	<0.001	-0.089	0.001
	Wheat	0.062	<0.001	0.030	0.177	0.042	0.004	0.001	0.941
	Nuts and Seeds	0.038	0.027	0.037	0.036	0.020	0.149	0.008	0.598
	Potatoes	-0.070	<0.001	-0.053	0.004	-0.006	0.684	-0.006	0.677
	Sugar and Preserves	0.021	0.235	0.017	0.353	0.029	0.051	0.021	0.165
	Sweets and Snacks	-0.050	0.005	-0.055	0.005	-0.018	0.226	-0.033	0.053
	Fat and Oil	0.034	0.079	0.006	0.783	0.028	0.083	-0.002	0.917
	Legumes	-0.041	0.024	-0.031	0.100	0.018	0.234	0.020	0.193
	Fruit	0.016	0.398	-0.001	0.980	0.053	0.001	0.029	0.081
	Green and Yellow Vegetables	0.028	0.108	0.023	0.212	0.031	0.033	0.005	0.761
	Other Vegetables	-0.068	<0.001	-0.061	0.001	-0.018	0.245	-0.029	0.071
	Mushrooms	0.005	0.769	0.000	0.979	0.015	0.278	0.005	0.754
	Seaweed	-0.014	0.402	-0.011	0.536	0.010	0.473	0.008	0.581
	Fish and Shellfish	0.026	0.158	0.043	0.031	0.009	0.541	0.017	0.304
	Meat and Poultry	0.062	0.002	0.062	0.005	0.056	<0.001	0.046	0.010
	Eggs	0.023	0.192	0.005	0.769	0.033	0.029	0.013	0.397
Milk and Dairy Products	0.089	<0.001	0.070	<0.001	0.079	<0.001	0.045	0.005	

^aAge, body mass index, total energy intake and intake of each food group were entered in the model.

^bAge, body mass index, total energy intake and intake of all food groups were entered in the model.

^cStandardized regression coefficient.

many of whom should have undergone menopause, we were not able to perform analysis in a population consisting only of postmenopausal women due to lack of information in the datasets about menopause.

When food group intake was separately entered into multiple linear regression analysis in the present study, the intake of rice decreased and that of wheat increased serum total cholesterol concentration in both sexes in both surveys. On the other hand, when food group intakes were collectively entered into the analysis, the intake of rice also decreased serum total cholesterol concentration in all groups except for men in the 1990 survey; however, no positive association was found between wheat and serum total cholesterol concentration. This suggests that the effect of food patterns, such as Japanese-type or Western-type meals, is greater than the direct effect of individual food groups, such as rice and wheat. Indeed, in a previous study examining the association

between food patterns and serum total cholesterol concentration in Japanese, in which food patterns were divided into meat-based, vegetable-based and Western-type meals, higher levels of serum total cholesterol were found to be associated with meat-based and Western-type meals than with vegetable-based meals.¹⁴

In the present study, a negative association was also observed between vegetable intake and serum total cholesterol concentration. This might have been due to an increase in the intake of dietary fiber from vegetables, although Brown et al have suggested that the direct effect of dietary fiber in decreasing serum total cholesterol concentration is not so significant and that a "healthy food choice pattern" as represented by choosing food containing a large amount of dietary fiber instead contributes to the maintenance of serum total cholesterol concentration at an appropriate level.¹⁵ Future studies need to be performed from multiple viewpoints to

promote disease prevention through improved dietary habits. Such studies should focus on nutrients, food groups or food pattern including food choice, which is more closely related to daily dietary habits.

Using the integrated datasets of the NIPPON DATA 80/90 and the National Nutrition Surveys in Japan conducted in 1980 and 1990, the present study has revealed positive and negative associations between serum total cholesterol concentration and food group intake in a representative sample of the Japanese population. Several limitations in estimating sex- and age-specific food intake using data based on the intake of whole family units and a cross-sectional design should be taken into consideration.⁷ Nevertheless, the results provide some insights into the improvements in dietary habits that can be made for disease prevention in Japan.

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NIPPON DATA80 における食品群摂取頻度質問結果と国民栄養調査食品群摂取量との一貫性の検討

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A. 目的

国民栄養調査（現在の国民健康・栄養調査）は 1945 年に開始され、近年では毎年 1 回の調査が行われている。また循環器疾患基礎調査は国民栄養調査客体の一部を対象として、わが国における心臓病、脳卒中等の成人の循環器疾患及びその危険因子に関してその現状を把握し、今後の予防対策の検討に資することを目的として 1960 年から 10 年ごとに実施されている。横断研究である循環器疾患基礎調査を長期追跡コホート研究に昇華させた NIPPON DATA80 のデータと国民栄養調査により個人別に推定された食品摂取量データを結合した。今回は NIPPON DATA80 おける食品群摂取頻度質問結果と国民栄養調査食品群摂取量との一貫性について検討した。

B. 方法

循環器疾患基礎調査ではベースライン調査時に主な食品について平均的な摂取頻度についての質問を個人毎に行った。鶏卵、魚、肉については毎日 2 回（個）以上、毎日 1 回（個）位、2 日に 1 回（個）位、週に 1・2 回（個）位、ほとんど食べない、の 1～5 の 5 段階のカテゴリーにわけて回答を求めた。国民栄養調査では世帯分の食品摂取量を得たが、世帯員の性・年齢を考慮して個人分に按分計算することにより按分推定量を求めた。個人毎の連続量である食品按分推定量を男女別に多い群から少ない群へと 5 段階にカテゴリー化した。各カテゴリーの人数は循環器疾患基礎調査時の 5 段階カテゴリーの人数に可能な限り一致させるようにした。2 評価法の一貫性を検討するため重み付け kappa 係数と Spearman 順位相関係数を求めた。

C. 結果

Table 1 に鶏卵、魚、肉の摂取頻度カテゴリー(FFQ)と国民栄養調査での按分摂取量のカテゴリー(NNS)の一致性を示した。Table 2 には男女別、食品別の重み付け kappa 係数と Spearman 順位相関係数を示した。鶏卵については男女とも最大摂取カテゴリー(1)と最少摂取カテゴリー(5)で完全一致が少なかったが、その他中間のカテゴリーでは対角線上に並ぶ完全一致が多く、外れる場合も隣に位置する場合が多かった。カテゴリー1と5は人数が少ないため2調査法は集団としての評価に耐える一致性が得られたと考える。重み付け kappa 係数は女性 0.239, 男性 0.224、Spearman 順位相関係数は女性 0.335, 男性 0.321 でいずれも有意確率 P は <0.0001 であった (Table 2)。魚、肉については鶏卵と比較して一致性がやや低下していたものの、魚では重み付け kappa 係数が女性 0.150, 男性 0.156、Spearman 順位相関係数が女性 0.226, 男性 0.236 でいずれも有意確率 P は <0.0001 であった。肉については重み付け kappa 係数が女性 0.188, 男性 0.167、Spearman 順位相関係数は女性 0.286, 男性 0.250 でいずれも有意確率 P は <0.0001 であった。やはり 2 調査法は魚、肉についても集団としての評価に耐える一致性が得られたと考える。

D. 考案

NIPPON DATA 研究は客体を全国から無作為抽出し、その参加率が高いことにより代表性に優れること、長期追跡が行えていることなどが大きな利点であるが、食品調査に関してはごく少数の食品の摂取頻度のみの調査に限定されたため栄養指標を用いての解析には限界があった。一方国民栄養調査は世帯毎に連続 3 日間秤量法による栄養調査が実施され、世帯単位 3 日分の詳細な栄養素等摂取量と食品群別摂取量が得られているが、1992 年以前に実施された調査では個人の摂取量は直接調査されていないのが欠点である。世帯員の性・年齢を考慮して個人別に按分計算することにより得られた按分推定量の妥当性を検討するためには循環器疾患基礎調査により得られた個人別の食品摂取頻度と比較することが可能な一つの方法である。鶏卵、魚、肉摂取について男女とも最大摂取カテゴリー(1)と最少摂取カテゴリー(5)で完全一致が少なかったが、その他中間のカテゴリーでは対角線上に並ぶ完全一致が多く、外れる場合も隣に位置する場合が多かった。カテゴリー1と5は人数が少なく、比較的良好な重み付け kappa 係数と Spearman 順位相関係数が得られた。従って 2 調査法は集団としての評価に十分耐える一致性が得られたと考える。今後循環器疾患基礎調査に無い食品群や栄養素について総摂取熱量を考慮に入れて予後との関連についての研究が可能となるであろう。また食事パターンについては近年注目されている分野である。食事パターンの世帯内ばらつきは食品群や栄養素摂取量の世帯内ばらつきより小さいであろうと想定できるため、この方面での研究進展も期待できる。

Comparison of the National Nutritional Survey in Japan Estimated Individual-Based Nutritional Data and NIPPON DATA80 Food Frequency Questionnaires

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ABSTRACT

Background: The National Nutritional Survey in Japan (NNSJ) was initiated in 1946. Using the majority of the participants for NNSJ, the National Survey on Circulatory Disorders has been conducted every 10 year since 1960. We performed a comparative study of the NNSJ80 estimated individual-based nutritional data by comparing those with NIPPON DATA80 food frequency questionnaires (FFQ) data.

Methods: A total of 10 546 community residents from 300 randomly selected districts participated in the both surveys in 1980. At baseline, history, physical, and blood biochemical measurement and a nutritional survey by FFQ were performed individually. From household-based NNSJ80 data, we estimated nutrient intakes of each household member by dividing household intake data proportionally using average intakes by sex and age groups calculated for NNSJ95. We re-categorized NNSJ80 estimated data to correspond to NIPPON DATA80 FFQ categories. Data were analyzed in men and women separately.

Results: Cross tables showed fairly good agreement of the two categories. The majorities of participants situated on the diagonally aligned cells or the next to them. Weighted kappa ranged from 0.152 to 0.241. Spearman's rank correlation coefficients between the two categories ranged from 0.224 to 0.338, and those between NNSJ80 continuous data and NIPPON DATA80 categorical data ranged from 0.237 to 0.354. All these values have $P < 0.001$.

Conclusions: These results may indicate that the present nutritional estimation method is applicable to, further studies.

Key words: food frequency questionnaires; weighed food records; egg; fish; meat

The National Nutritional Survey in Japan (NNSJ) was initiated in 1946 under the direction of the supreme commander of the General Headquarters with the main purposes of obtaining factual information on the nutritional health and actual food consumption and food requirements in Japan for emergency food supplies from other countries.¹ Household-based food consumption data had been collected in order to fulfill the above initial purpose. Recently, the survey has been conducted once every year. When the dietary survey method for the NNSJ was changes to obtain individual-based food intake data, the comparability of data that had been collected by the household-based food weighing method since 1946 was regarded as an issue of high priority.¹ We have accomplished estimating nutrient intakes of each

household member by dividing household intake data of NNSJ80 conducted in 1980 proportionally using average intakes by sex and age groups calculated for NNSJ95.² The average intakes in NNSJ95 were calculated by a combination method of household-based food weighing record and an approximation of proportions by which family members shared each dish or food in the household.

Using the majority of the participants for NNSJ, the National Survey on Circulatory Disorders has been conducted every 10 year in order to obtain cross-sectional data on cardiovascular disease prevalence and risk factors since 1960.³ At the survey, history, physical, and blood biochemical measurement and a nutritional survey using food frequency questionnaires (FFQ) were performed in individual

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participants. A cohort study based on the National Survey on Circulatory Disorders in 1980⁴ has been named as the National Integrated Project for Prospective Observation of Non-communicable Disease and Its Trends in the Aged (NIPPON DATA80).⁵

In the present study, we performed a comparative study of the NNSJ80 estimated individual-based nutritional data by comparing those with NIPPON DATA80 food frequency questionnaires (FFQ) data.

METHODS

Participants

The participants in this cohort were those in the 1980 National Survey on Circulatory Disorders.⁴ A total of 10 546 community-based participants aged 30 years and over in 300 randomly selected health districts throughout Japan participated in the survey, which consisted of history-taking, physical examinations, blood tests and self-administered questionnaires on lifestyle, including an essential nutritional survey by the FFQ method. The overall population aged 30 years and over in the 300 participating health districts was 13 771. Therefore, the participation rate of the survey was 76.6% before exclusion. Participants with missing data on FFQ were excluded.

NIPPON DATA80 baseline examination

At baseline, non-fasting blood samples were obtained. Body mass index (BMI) was calculated as weight (kg) divided by the square of height (m). Baseline blood pressures were measured by trained observers using a standard mercury sphygmomanometer on the right arm of seated participants.

A lifestyle survey was also carried out using self-administered questionnaires which asked about the typical daily consumption of 31 food items.⁶ Egg consumption was coded as ≥ 2 eggs/day, about 1 egg/day, about 1 egg/2 days, about 1 to 2 eggs/week, and less than once/week. Fish and meat intakes were coded separately as ≥ 2 times/day, about 1 time/day, about 1 time/2 days, about 1 to 2 times/week, and less than once/week. Participants were asked about their alcohol drinking habit (never, past, occasional, and daily drinkers). Reported information was confirmed by public health nurses through interviews with the study participants regarding food consumption, smoking, drinking habit, and present and past medical histories.

National Nutritional Survey

Food intake survey by weighed food records in three representative consecutive days were conducted by specially trained dietary interviewers. Dietary interviewers visited participants' houses at least one during the survey. Weekends and holidays were avoided.

We estimated nutrient intakes of each household member by dividing household intake data of NNSJ80 conducted

in 1980 proportionally using average intakes by sex and age groups calculated for NNSJ95.² The average intakes in NNSJ95 were calculated by a combination method of household-based food weighing record and an approximation of proportions by which family members shared each dish or food in the household. Detailed methods were described.⁷

For each person, means of the estimated individual food amount from the three days records were used in the analyses. Egg, fish and meat intakes were estimated in grams per person.

Data analyses

NIPPON DATA80 FFQ categorized food intakes into 5 groups, from the most frequent to the least frequent one. From NNSJ80, individual-based food intakes in grams were estimated. We re-categorized NNSJ80 data so that they corresponded to NIPPON DATA80 FFQ categories. For example, among total of 5228 women, there were 72, 1405, 1687, 1756 and 308 women in 5 egg intake categories in ≥ 2 eggs/day, about 1 egg/day, about 1 egg/2 days, about 1 to 2 eggs/week, and less than once/week, respectively. NNSJ80 egg intake data ranged from 250 to 0 g/day. We re-categorized NNSJ80 estimated data so that they corresponded to NIPPON DATA80 FFQ categories from the highest to the lowest egg intake participants. We obtained weighted kappa to evaluate agreement for the categorical data of the two systems for egg, fish and meat intakes. We also obtained Spearman's rank correlation coefficient between the two categories, and between NNSJ80 continuous data and NIPPON DATA80 categorical data. Data were analyzed in men and women separately.

RESULTS

Cross tables for comparing NIPPON DATA80 FFQ data on egg, fish, and meat intakes and re-categorized NNSJ80 data on these intakes to correspond to NIPPON DATA80 FFQ categories are shown in Tables 1–3. Upper datum in each cell is frequency and lower one in *italic* is percentage of total. For NNSJ80 data, categories and ranges in g/day for three food groups are shown. Egg data in Table 1 shows fairly good agreement of the two categories; except for the two extreme categories, ie, the most and the least intake categories where a relatively few percent of participants are found, the largest number of participants in each row situated on the diagonally aligned cells. The majority of participants situated on the diagonally aligned cells or the next to them. Comparisons of the two systems of fish and meat intakes in Tables 2 and 3 are not as good as those of Table 1, however, the agreements are relatively fair.

Weighted kappa and Spearman's rank correlation coefficients are shown in Table 4. Weighted kappa ranged from 0.152 to 0.241. Weighted kappa for egg is the best in men and women among three food items. Spearman's rank

Table 1. NIPPON DATA80 FFQ vs NNSJ80 estimates on egg intake in 5228 women and 4127 men

Women NNSJ_est range (g)	FFQ (egg)					Total	Men NNSJ_est range (g)	FFQ (egg)					Total
	1	2	3	4	5			1	2	3	4	5	
1 89.0–250.0	10 <i>0.19</i>	38 <i>0.73</i>	15 <i>0.29</i>	8 <i>0.15</i>	1 <i>0.02</i>	72 <i>1.38</i>	1 85.7–199.4	24 <i>0.58</i>	88 <i>2.13</i>	26 <i>0.63</i>	14 <i>0.34</i>	3 <i>0.07</i>	155 <i>3.76</i>
2 44.2–88.7	34 <i>0.7</i>	609 <i>11.7</i>	468 <i>9.0</i>	257 <i>4.9</i>	34 <i>0.7</i>	1402 <i>26.8</i>	2 45.4–85.6	82 <i>2.0</i>	605 <i>14.7</i>	431 <i>10.4</i>	228 <i>5.5</i>	27 <i>0.7</i>	1373 <i>33.3</i>
3 28.0–44.1	13 <i>0.3</i>	455 <i>8.7</i>	598 <i>11.4</i>	553 <i>10.6</i>	70 <i>1.3</i>	1689 <i>32.3</i>	3 29.2–45.3	31 <i>0.8</i>	391 <i>9.5</i>	397 <i>9.6</i>	378 <i>9.2</i>	39 <i>0.9</i>	1236 <i>30.0</i>
4 9.1–27.9	14 <i>0.3</i>	263 <i>5.0</i>	533 <i>10.2</i>	794 <i>15.2</i>	152 <i>2.9</i>	1756 <i>33.6</i>	4 7.5–29.1	17 <i>0.4</i>	268 <i>6.5</i>	356 <i>8.6</i>	520 <i>12.6</i>	58 <i>1.4</i>	1219 <i>29.5</i>
5 0–9.0	1 <i>0.0</i>	40 <i>0.8</i>	73 <i>1.4</i>	144 <i>2.8</i>	51 <i>1.0</i>	309 <i>5.9</i>	5 0–7.4	2 <i>0.1</i>	18 <i>0.4</i>	32 <i>0.8</i>	74 <i>1.8</i>	18 <i>0.4</i>	144 <i>3.5</i>
Total	72 <i>1.4</i>	1405 <i>26.9</i>	1687 <i>32.3</i>	1756 <i>33.6</i>	308 <i>5.9</i>	5228 <i>100.0</i>	Total	156 <i>3.8</i>	1370 <i>33.2</i>	1242 <i>30.1</i>	1214 <i>29.4</i>	145 <i>3.5</i>	4127 <i>100.0</i>

Cross table for comparing NIPPON DATA80 food frequency questionnaires (FFQ) data on egg intake and re-categorized NNSJ80 data on egg intake (categories and ranges in g/day) to correspond to NIPPON DATA80 FFQ categories. FFQ (egg) 1 to 5 correspond to egg consumption ≥ 2 eggs/day, about 1 egg/day, about 1 egg/2 days, about 1 to 2 eggs/week, and less than once/week, respectively. Upper datum in each cell is frequency and lower one in *italic* is percentage of total.

NNSJ_est = estimated data from the National Nutrition Survey.

Table 2. NIPPON DATA80 FFQ vs NNSJ80 estimates on fish intake in 5231 women and 4129 men

Women NNSJ_est range (g)	FFQ (fish)					Total	Men NNSJ_est range (g)	FFQ (fish)					Total
	1	2	3	4	5			1	2	3	4	5	
1 189.2–505.0	41 <i>0.78</i>	87 <i>1.66</i>	49 <i>0.94</i>	57 <i>1.09</i>	6 <i>0.11</i>	240 <i>4.6</i>	1 221.0–792.8	57 <i>1.38</i>	133 <i>3.22</i>	71 <i>1.72</i>	43 <i>1.04</i>	8 <i>0.19</i>	312 <i>7.6</i>
2 105.8–189.0	110 <i>2.1</i>	627 <i>12.0</i>	494 <i>9.4</i>	344 <i>6.6</i>	31 <i>0.6</i>	1606 <i>30.7</i>	2 124.6–220.8	149 <i>3.6</i>	596 <i>14.4</i>	398 <i>9.6</i>	255 <i>6.2</i>	29 <i>0.7</i>	1427 <i>34.6</i>
3 68.9–105.7	67 <i>1.3</i>	558 <i>10.7</i>	579 <i>11.1</i>	485 <i>9.3</i>	49 <i>0.9</i>	1738 <i>33.2</i>	3 81.8–124.5	83 <i>2.01</i>	422 <i>10.22</i>	451 <i>10.92</i>	322 <i>7.8</i>	30 <i>0.73</i>	1308 <i>31.7</i>
4 26.8–68.8	21 <i>0.4</i>	309 <i>5.9</i>	573 <i>11.0</i>	523 <i>10.0</i>	59 <i>1.1</i>	1485 <i>28.4</i>	4 33.6–81.7	23 <i>0.56</i>	256 <i>6.2</i>	363 <i>8.79</i>	281 <i>6.81</i>	39 <i>0.94</i>	962 <i>23.3</i>
5 0–26.7	1 <i>0.02</i>	28 <i>0.54</i>	39 <i>0.75</i>	76 <i>1.45</i>	18 <i>0.34</i>	162 <i>3.1</i>	5 0–33.3	2 <i>0.05</i>	18 <i>0.44</i>	23 <i>0.56</i>	63 <i>1.53</i>	14 <i>0.34</i>	120 <i>2.9</i>
Total	240 <i>4.6</i>	1609 <i>30.8</i>	1734 <i>33.2</i>	1485 <i>28.4</i>	163 <i>3.1</i>	5231 <i>100</i>	Total	314 <i>7.6</i>	1425 <i>34.5</i>	1306 <i>31.6</i>	964 <i>23.4</i>	120 <i>2.9</i>	4129 <i>100</i>

Cross table for comparing NIPPON DATA80 food frequency questionnaires (FFQ) data on fish intake and re-categorized NNSJ80 data on fish intake (categories and ranges in g/day) to correspond to NIPPON DATA80 FFQ categories. FFQ (fish) 1 to 5 correspond to fish consumption \geq twice/day, about once/day, about once/2 days, about 1 to 2 times/week, and less than once/week, respectively. Upper datum in each cell is frequency and lower one in *italic* is percentage of total.

NNSJ_est = estimated data from the National Nutrition Survey.

correlation coefficients between the two categories ranged from 0.224 to 0.338, and those between NNSJ80 continuous data and NIPPON DATA80 categorical data ranged from 0.237 to 0.354. All these values have $P < 0.001$.

DISCUSSION

Strength of NNSJ are, (1) it is the nation-wide, population based study and its sample is representative; (2) the survey

was started more than 60 years ago in 1946; (3) it is performed annually; and (4) it uses three days weighed recording method for dietary survey. Although household-based food consumption data had been collected in order to fulfill the initial purpose, food intake data for individual participants were not available until 1995. When the dietary survey method for the NNSJ was changed to obtain individual-based food intake data, the comparability of data that had been collected since 1946 was needed badly.¹ The

Table 3. NIPPON DATA80 FFQ vs NNSJ80 estimates on meat intake in 5231 women and 4127 men

Women NNSJ_est range (g)	FFQ (meat)					Total	Men NNSJ_est range (g)	FFQ (meat)					Total
	1	2	3	4	5			1	2	3	4	5	
1 131.8–628.7	9 <i>0.17</i>	47 <i>0.9</i>	42 <i>0.8</i>	22 <i>0.42</i>	3 <i>0.06</i>	123 2.35	1 158.8–298.5	12 <i>0.29</i>	50 <i>1.21</i>	41 <i>0.99</i>	26 <i>0.63</i>	4 <i>0.1</i>	133 3.22
2 73.1–131.7	46 <i>0.88</i>	374 <i>7.15</i>	413 <i>7.9</i>	271 <i>5.18</i>	54 <i>1.03</i>	1158 22.14	2 89.6–158.4	44 <i>1.07</i>	348 <i>8.43</i>	403 <i>9.76</i>	219 <i>5.31</i>	30 <i>0.73</i>	1044 25.3
3 43.1–73.0	46 <i>0.9</i>	451 <i>8.6</i>	633 <i>12.1</i>	526 <i>10.1</i>	122 <i>2.3</i>	1778 34.0	3 51.8–89.5	54 <i>1.3</i>	392 <i>9.5</i>	568 <i>13.8</i>	387 <i>9.4</i>	69 <i>1.7</i>	1470 35.6
4 15.9–43.0	23 <i>0.4</i>	244 <i>4.7</i>	585 <i>11.2</i>	652 <i>12.5</i>	185 <i>3.5</i>	1689 32.3	4 15.1–51.7	21 <i>0.5</i>	225 <i>5.5</i>	405 <i>9.8</i>	466 <i>11.3</i>	111 <i>2.7</i>	1228 29.76
5 0–15.8	0 <i>0</i>	44 <i>0.84</i>	103 <i>1.97</i>	218 <i>4.17</i>	118 <i>2.26</i>	483 9.23	5 0–14.9	2 <i>0.05</i>	29 <i>0.7</i>	54 <i>1.3</i>	128 <i>3.1</i>	39 <i>0.9</i>	252 6.1
Total	124 <i>2.4</i>	1160 <i>22.2</i>	1776 <i>34.0</i>	1689 <i>32.3</i>	482 <i>9.2</i>	5231 100	Total	133 <i>3.2</i>	1044 <i>25.3</i>	1471 <i>35.6</i>	1226 <i>29.7</i>	253 <i>6.1</i>	4127 100

Cross table for comparing NIPPON DATA80 food frequency questionnaires (FFQ) data on meat intake and re-categorized NNSJ80 data on meat intake (categories and ranges in g/day) to correspond to NIPPON DATA80 FFQ categories. FFQ (meat) 1 to 5 correspond to fish consumption \geq twice/day, about once/day, about once/2 days, about 1 to 2 times/week, and less than once/week, respectively. Upper datum in each cell is frequency and lower one in *italic* is percentage of total.

NNSJ_est = estimated data from the National Nutrition Survey.

Table 4. Comparison between NIPPON DATA80 FFQ data and NNSJ80 Estimates

	Egg		Fish		Meat	
	Women	Men	Women	Men	Women	Men
Weighted Kappa	0.241	0.225	0.152	0.163	0.183	0.168
P	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Spearman r for Category	0.338	0.322	0.226	0.224	0.281	0.254
P	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Spearman r for Gram Intake	0.354	0.338	0.237	0.251	0.291	0.270
P	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Weighted kappa to evaluated agreement for the categorical data of the two systems for egg, fish and meat intakes, and Spearman's rank correlation coefficient between the two categories, and between NNSJ80 continuous data and NIPPON DATA80 categorical data are shown.

estimation method we used in the present study to obtain nutrient intakes of each household member was done by dividing household intake data of NNSJ90⁸ proportionally using average intakes by sex and age groups calculated for NNSJ95.^{2,7,9}

FFQ are an attractive method in epidemiologic studies because of their low respondent burden and ease of administration.¹⁰ The use of FFQ in estimating food groups and nutrient intake is based on the frequency with which a fixed list of foods of predetermined portion sizes is consumed over an extended period of time. This method relies heavily on memory, and the questions posed to respondents are open to interpretation.¹⁰ Another approach commonly employed to determine nutrient intake is 24-hour food intake recall method (24HR). 24HR consists of obtaining information on food and fluid intake for the previous day or previous 24 hours. 24HR is based on the assumption that the intake described is typical of daily intake. Although 24HR is one of the easiest methods for collecting information regarding the participant's intake, it is prone to error: (1) participant may not be able to recall the

foods eaten; (2) participant may not be able to estimate the amounts of each food eaten; (3) information given may not be sufficiently specific; (4) participant may not be telling the truth; (5) intake during the previous 24 hours may not be representative of the usual individual intake.¹¹ The third method is the use of weighed food records. In contrast to FFQ, weighed food records allow more precise determination of portion sizes, do not rely on memory and are not limited to selection from a predetermined list of foods. Weighed food records are not very practical in large epidemiologic studies, however, because they require extensive participant training, have a high respondent burden and require lengthy data entry by trained personnel.¹⁰

The National Health and Nutrition Examination Survey (NHANES) is a survey research program conducted by the National Center for Health Statistics (NCHS) to assess the health and nutritional status of adults and children in the United States. In NHANES, 24HR was used mainly.¹² The uniqueness of NNSJ is its use of weighed food records method in a nation-wide large-scale survey.

The evaluation results of the present study showed fairly good agreement between the NIPPON DATA80 FFQ and NNSJ80 estimations. The present data of weighted kappa to evaluated agreement for the categorical data of the two systems for egg, fish and meat intakes showed fairly good agreement. Our Spearman's rank correlation coefficients between the NNSJ80 continuous data and NIPPON DATA80 FFQ data ranged within those of previously reported results. For instance, Sasaki et al. compared the FFQ data of the Japan Public Health Center-Based Prospective Study Cohort I with dietary records for food group.¹³ The crude Spearman's rank correlation coefficient for egg in men was 0.28, and 0.43 in women, and ours were 0.338 for men and 0.354 for women.

Limitations of the study

First, household-based food consumption data were collected in NNSJ80, and we estimated nutrient intakes of each household member by dividing household intake data of NNSJ80 conducted in 1980 proportionally using average intakes by sex and age groups calculated for NNSJ95. Thus, we do not have data to directly compare with FFQ of NIPPON DATA80. Second, we performed a comparative study between quantitative data of NNSJ80 and frequency data of FFQ of NIPPON DATA80, both categorized into 5 groups. Comparison between the two data of different quality is expected to result in not good agreement. Third, we surveyed a limited number of essential nutritional components, egg, fish and meat, by the food-frequency method.

Understanding that any FFQ contains its own inherent problems,¹⁰ and the presently obtained results were within the ranges of previously reported results, it may be concluded that the nutritional estimation method used in the present study is applicable to further studies.

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NIPPON DATA80/90 Nutrition Study: Appendix Tables

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Key words: nutrition; cross sectional survey; Japan

Table A1. Nutrient intakes per day estimated by proportional distribution, NIPPON DATA80 Nutrition Study, men

(n)	Men Ages 30–39 (1220)		Men Ages 40–49 (1196)		Men Ages 50–59 (1019)		Men Ages 60–69 (679)		Men ages 70– (471)		Total (4585)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total energy (kcal/day)	2475	(486)	2476	(450)	2488	(484)	2298	(541)	1981	(406)	2401	(502)
Total protein (g/day)	90.6	(20.3)	92.9	(19.7)	95.0	(21.2)	87.3	(21.2)	74.4	(17.7)	90.0	(21.1)
Animal protein (g/day)	53.6	(16.5)	53.9	(16.8)	54.3	(17.9)	48.5	(16.6)	40.4	(14.4)	51.7	(17.2)
Vegetable protein (g/day)	42.9	(9.5)	44.5	(9.1)	46.3	(9.9)	43.1	(10.3)	37.7	(8.7)	43.6	(9.8)
Total fat (g/day)	60.8	(18.7)	56.3	(17.5)	53.6	(17.8)	46.8	(18.3)	38.1	(15.5)	53.6	(19.1)
Carbohydrate (g/day)	358.3	(79.2)	362.6	(73.4)	371.3	(81.8)	356.1	(92.0)	318.7	(69.9)	357.9	(80.7)
Sucrose (g/day)	29.3	(15.9)	26.6	(14.6)	27.0	(16.4)	26.0	(15.3)	25.2	(16.2)	27.2	(15.7)
Starch (g/day)	240.6	(61.1)	248.1	(57.9)	258.1	(63.3)	244.4	(72.1)	217.2	(53.8)	244.6	(62.8)
Calcium (mg/day)	515.9	(163.7)	539.4	(158.8)	585.0	(181.0)	573.5	(176.6)	521.5	(170.1)	546.5	(171.2)
Magnesium (mg/day)	321.7	(78.4)	331.7	(73.6)	352.4	(80.8)	326.5	(78.3)	286.1	(68.1)	328.2	(78.8)
Iron (mg/day)	14.9	(3.9)	15.2	(3.8)	15.7	(4.0)	15.4	(4.0)	13.2	(3.6)	15.0	(3.9)
Sodium (mg/day)	5740	(2048)	5931	(2078)	6387	(2349)	6065	(2345)	5262	(1942)	5933	(2184)
Potassium (mg/day)	2930	(761)	3065	(743)	3238	(841)	3108	(806)	2760	(739)	3042	(792)
Phosphorus (mg/day)	1378	(302)	1418	(284)	1480	(314)	1365	(317)	1181	(255)	1389	(309)
Vitamin A (IU/day)	1738	(755)	1804	(783)	1794	(803)	1636	(801)	1511	(812)	1729	(791)
Vitamin B1 (mg/day)	1.10	(0.39)	1.18	(0.46)	1.20	(0.48)	1.17	(0.48)	1.06	(0.40)	1.15	(0.45)
Vitamin B2 (mg/day)	1.02	(0.28)	1.03	(0.29)	1.03	(0.29)	0.98	(0.28)	0.58	(0.20)	0.98	(0.31)
Vitamin C (mg/day)	99.7	(41.0)	109.6	(42.7)	118.2	(49.1)	119.8	(51.0)	109.4	(48.6)	110.4	(46.3)
Niacin (mg/day)	22.3	(7.0)	22.4	(6.8)	23.1	(7.4)	21.3	(9.2)	17.3	(6.0)	21.8	(7.5)
Vitamin E (mg/day)	10.7	(3.1)	10.6	(2.9)	10.8	(3.1)	9.8	(2.9)	8.1	(2.7)	10.3	(3.1)
Total dietary fiber (g/day)	16.9	(4.8)	18.1	(4.7)	19.5	(5.4)	19.4	(5.4)	17.6	(5.3)	18.2	(5.2)
Cholesterol (mg/day)	435	(145)	405	(139)	408	(147)	352	(132)	288	(118)	394	(146)
Saturated fatty acid (g/day)	17.4	(5.1)	16.0	(4.7)	14.7	(4.8)	13.0	(4.6)	11.0	(4.1)	15.1	(5.2)
Monounsaturated fatty acid (g/day)	22.6	(6.8)	21.0	(6.5)	20.1	(6.6)	17.1	(6.5)	14.2	(5.8)	19.9	(7.0)
Polyunsaturated fatty acid (g/day)	15.5	(5.1)	14.5	(4.6)	14.6	(4.8)	12.7	(5.0)	10.6	(4.5)	14.1	(5.0)
Total n-3 polyunsaturated fatty acid (g/day)	3.1	(1.1)	3.0	(1.1)	3.1	(1.1)	2.8	(1.2)	2.2	(1.0)	2.9	(1.1)
Total n-6 polyunsaturated fatty acid (g/day)	12.2	(4.1)	11.4	(3.8)	11.4	(3.8)	9.8	(4.0)	8.2	(3.8)	11.1	(4.1)
Total trans fatty acid (g/day)	1.1	(0.6)	0.9	(0.5)	0.7	(0.5)	0.7	(0.5)	0.6	(0.4)	0.8	(0.5)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A2. Nutrient intakes per day estimated by proportional distribution, NIPPON DATA80 Nutrition Study, women

(n)	Women Ages 30–39 (1583)		Women Ages 40–49 (1469)		Women Ages 50–59 (1319)		Women Ages 60–69 (900)		Women ages 70– (566)		Total (5837)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total energy (kcal/day)	1957	(338)	2025	(401)	1985	(420)	1825	(413)	1639	(342)	1929	(402)
Total protein (g/day)	73.8	(14.8)	77.4	(17.6)	77.6	(17.6)	71.5	(18.2)	63.9	(15.5)	74.2	(17.3)
Animal protein (g/day)	43.4	(13.0)	45.1	(14.6)	43.9	(14.9)	39.6	(14.1)	34.9	(13.5)	42.5	(14.4)
Vegetable protein (g/day)	34.5	(6.7)	37.1	(8.0)	38.0	(8.6)	35.6	(8.4)	32.1	(7.6)	35.9	(8.0)
Total fat (g/day)	52.1	(15.5)	51.3	(16.8)	46.8	(16.3)	38.5	(15.5)	33.8	(12.3)	46.8	(16.9)
Carbohydrate (g/day)	289.6	(57.3)	308.4	(68.0)	311.2	(72.8)	298.1	(71.0)	272.3	(63.1)	298.9	(67.5)
Sucrose (g/day)	24.1	(12.3)	23.0	(13.3)	23.4	(14.0)	21.6	(13.3)	19.8	(12.0)	22.9	(13.2)
Starch (g/day)	192.0	(44.3)	210.9	(52.8)	212.6	(57.1)	203.9	(54.4)	188.8	(49.7)	202.9	(52.5)
Calcium (mg/day)	494.3	(139.6)	534.1	(163.8)	576.8	(175.6)	541.3	(179.8)	481.1	(146.7)	528.9	(164.8)
Magnesium (mg/day)	263.3	(56.2)	288.8	(67.7)	301.4	(69.8)	282.5	(71.2)	254.1	(62.9)	280.4	(67.3)
Iron (mg/day)	12.8	(3.0)	14.0	(3.6)	14.5	(3.7)	13.2	(3.8)	12.1	(3.2)	13.5	(3.5)
Sodium (mg/day)	4817	(1544)	5170	(1859)	5419	(1960)	5225	(2040)	4773	(1908)	5100	(1853)
Potassium (mg/day)	2546	(592)	2852	(730)	3002	(773)	2830	(784)	2531	(719)	2768	(736)
Phosphorus (mg/day)	1128	(217)	1209	(258)	1224	(262)	1150	(276)	1030	(236)	1164	(256)
Vitamin A (IU/day)	1561	(618)	1725	(750)	1742	(834)	1611	(850)	1415	(740)	1637	(760)
Vitamin B1 (mg/day)	1.13	(0.40)	1.18	(0.47)	1.19	(0.48)	1.10	(0.43)	1.05	(0.41)	1.15	(0.44)
Vitamin B2 (mg/day)	1.05	(0.28)	1.09	(0.33)	1.10	(0.36)	1.10	(0.41)	1.07	(0.35)	1.08	(0.34)
Vitamin C (mg/day)	99.9	(37.8)	120.6	(48.3)	133.3	(55.2)	124.6	(54.2)	109.8	(48.3)	117.4	(49.9)
Niacin (mg/day)	16.3	(5.0)	17.8	(6.1)	18.0	(6.1)	16.6	(6.1)	14.5	(5.4)	16.9	(5.9)
Vitamin E (mg/day)	9.3	(2.5)	9.8	(2.8)	9.7	(2.8)	8.7	(2.8)	7.8	(2.5)	9.3	(2.7)
Total dietary fiber (g/day)	16.0	(4.1)	17.9	(4.9)	19.1	(5.4)	18.5	(5.4)	16.5	(4.8)	17.6	(5.0)
Cholesterol (mg/day)	368	(118)	373	(133)	349	(127)	302	(131)	251	(99)	343	(130)
Saturated fatty acid (g/day)	15.4	(4.3)	14.4	(4.6)	12.9	(4.3)	11.0	(4.2)	9.4	(3.2)	13.3	(4.7)
Monounsaturated fatty acid (g/day)	19.7	(5.8)	19.1	(6.2)	17.5	(6.0)	14.4	(5.8)	12.6	(4.6)	17.5	(6.3)
Polyunsaturated fatty acid (g/day)	13.3	(4.1)	13.3	(4.3)	12.8	(4.4)	10.6	(4.4)	9.5	(3.6)	12.4	(4.4)
Total n-3 polyunsaturated fatty acid (g/day)	2.7	(0.9)	2.7	(1.0)	2.7	(1.0)	2.3	(1.0)	2.1	(0.9)	2.6	(1.0)
Total n-6 polyunsaturated fatty acid (g/day)	10.5	(3.3)	10.4	(3.5)	10.0	(3.5)	8.2	(3.6)	7.3	(2.9)	9.7	(3.6)
Total trans fatty acid (g/day)	1.0	(0.5)	0.8	(0.5)	0.7	(0.5)	0.6	(0.5)	0.5	(0.4)	0.8	(0.5)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A3. Food group intakes per day estimated by proportional distribution, NIPPON DATA80 Nutrition Study, men

(n)	Men Ages 30–39 (1220)		Men Ages 40–49 (1196)		Men Ages 50–59 (1019)		Men Ages 60–69 (679)		Men ages 70– (471)		Total (4585)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/day)	313.4	(106.3)	308.0	(103.1)	313.6	(116.0)	284.5	(109.0)	243.4	(99.9)	300.6	(109.6)
Vegetable food (g/day)	1296.1	(340.9)	1315.9	(306.5)	1312.3	(327.9)	1237.9	(324.0)	1058.9	(277.4)	1271.9	(329.4)
Cereal (g/day)	393.5	(96.0)	392.5	(89.5)	390.2	(95.7)	372.2	(108.2)	321.0	(81.3)	381.9	(97.2)
Rice (g/day)	286.0	(97.5)	307.8	(99.3)	332.2	(104.3)	307.3	(118.4)	264.0	(88.7)	302.8	(104.0)
Flour (g/day)	110.6	(62.4)	90.8	(52.6)	68.3	(48.9)	73.3	(53.6)	63.2	(53.4)	85.6	(57.6)
Nuts (g/day)	1.2	(3.9)	1.4	(5.0)	1.7	(6.0)	1.1	(3.2)	1.6	(4.6)	1.4	(4.7)
Potatoes (g/day)	61.9	(43.4)	63.4	(40.8)	70.3	(49.8)	71.1	(54.8)	67.4	(50.6)	66.1	(47.0)
Sugar and sweetener (g/day)	13.5	(9.4)	12.9	(9.5)	15.2	(12.2)	13.9	(10.7)	13.0	(10.0)	13.7	(10.4)
Sweets and snacks (g/day)	15.3	(16.1)	14.0	(14.9)	11.7	(14.1)	18.7	(21.9)	23.9	(28.7)	15.5	(18.4)
Fats and oils (g/day)	22.1	(13.3)	18.5	(11.4)	16.9	(10.8)	13.1	(9.8)	9.3	(8.5)	17.3	(12.0)
Soybean and legumes (g/day)	70.7	(40.1)	77.7	(45.3)	93.1	(54.3)	94.4	(55.8)	82.6	(51.9)	82.2	(49.4)
Fruit (g/day)	107.1	(72.6)	142.4	(89.3)	150.7	(103.2)	168.4	(107.0)	169.0	(122.6)	141.4	(98.0)
Green and yellow vegetable (g/day)	52.0	(35.7)	57.6	(37.6)	62.0	(41.8)	58.2	(44.0)	52.1	(40.2)	56.6	(39.5)
Other vegetable (g/day)	217.8	(87.4)	229.7	(92.9)	245.5	(111.4)	247.9	(110.4)	202.6	(93.8)	230.0	(99.8)
Mushroom (g/day)	9.3	(11.8)	9.9	(13.6)	11.6	(14.5)	10.4	(13.8)	7.8	(11.5)	10.0	(13.2)
Sea algae (g/day)	5.5	(7.6)	6.5	(8.2)	7.3	(8.7)	6.8	(9.1)	6.1	(7.6)	6.4	(8.3)
Condiments and beverages (g/day)	252.7	(239.6)	223.3	(197.4)	186.3	(161.3)	156.8	(148.3)	107.3	(107.8)	201.1	(194.2)
Fish and shellfish (g/day)	114.0	(59.1)	128.3	(65.5)	142.4	(69.8)	125.9	(61.9)	101.1	(53.3)	124.5	(64.4)
Meat (g/day)	87.4	(43.2)	78.7	(41.0)	68.3	(38.9)	53.5	(37.8)	41.3	(29.7)	71.1	(42.4)
Egg (g/day)	44.5	(22.9)	42.2	(21.9)	42.3	(22.5)	35.2	(21.7)	31.5	(19.9)	40.7	(22.5)
Milk and dairy products (g/day)	74.8	(53.1)	68.1	(49.4)	69.5	(63.7)	76.5	(69.5)	73.6	(70.6)	72.0	(59.4)
Other foods (g/day)	8.0	(16.2)	8.0	(15.6)	6.0	(12.0)	4.5	(13.0)	3.4	(7.4)	6.6	(14.1)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A4. Food group intakes per day estimated by proportional distribution, NIPPON DATA80 Nutrition Study, women

(n)	Women Ages 30–39 (1583)		Women Ages 40–49 (1469)		Women Ages 50–59 (1319)		Women Ages 60–69 (900)		Women ages 70– (566)		Total (5837)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/day)	289.4	(92.0)	287.4	(103.5)	283.7	(104.7)	249.3	(101.3)	215.8	(83.0)	274.3	(101.3)
Vegetable food (g/day)	953.0	(218.5)	1039.7	(257.1)	1062.0	(270.9)	1011.2	(286.2)	883.2	(235.0)	1001.7	(259.4)
Cereal (g/day)	303.5	(67.8)	304.6	(74.9)	294.3	(80.5)	287.6	(74.2)	266.6	(70.0)	295.7	(74.7)
Rice (g/day)	185.1	(62.2)	212.9	(72.7)	217.1	(77.3)	225.9	(77.4)	223.4	(76.1)	209.3	(73.8)
Flour (g/day)	113.2	(52.9)	83.3	(51.9)	73.4	(52.1)	64.5	(45.2)	49.6	(37.9)	83.0	(54.2)
Nuts (g/day)	1.4	(5.1)	1.4	(4.7)	2.3	(7.2)	1.8	(5.7)	1.7	(4.8)	1.7	(5.6)
Potatoes (g/day)	57.6	(35.7)	62.8	(42.7)	67.1	(50.2)	71.5	(52.0)	67.5	(54.0)	64.1	(45.8)
Sugar and sweetener (g/day)	13.4	(8.9)	13.3	(10.1)	14.0	(10.9)	12.2	(9.8)	11.8	(9.1)	13.2	(9.9)
Sweets and snacks (g/day)	28.6	(27.0)	29.3	(32.1)	28.3	(32.7)	22.0	(26.7)	19.8	(24.6)	26.8	(29.6)
Fats and oils (g/day)	19.0	(11.0)	17.8	(10.7)	14.5	(9.7)	11.5	(8.9)	9.5	(7.1)	15.6	(10.5)
Soybean and legumes (g/day)	57.6	(32.4)	70.3	(40.2)	82.9	(48.2)	77.5	(47.4)	72.7	(43.7)	71.1	(42.8)
Fruit (g/day)	147.1	(88.2)	195.2	(122.4)	219.4	(143.2)	205.1	(140.9)	168.4	(120.7)	186.5	(125.5)
Green and yellow vegetable (g/day)	51.4	(32.3)	60.0	(39.8)	63.7	(45.4)	60.3	(45.0)	58.8	(46.1)	58.4	(41.1)
Other vegetable (g/day)	191.9	(76.7)	219.1	(94.8)	227.9	(99.4)	213.0	(95.4)	187.7	(91.4)	209.7	(92.4)
Mushroom (g/day)	7.9	(9.8)	9.6	(12.0)	10.3	(13.2)	9.0	(12.5)	7.5	(10.7)	9.0	(11.7)
Sea algae (g/day)	4.3	(6.0)	6.4	(7.9)	7.2	(9.4)	6.9	(8.8)	6.4	(7.0)	6.1	(8.0)
Condiments and beverages (g/day)	80.2	(78.0)	76.7	(84.0)	66.7	(65.9)	57.6	(103.7)	38.9	(35.0)	68.8	(79.6)
Fish and shellfish (g/day)	86.6	(42.1)	98.4	(51.8)	105.9	(50.7)	98.3	(50.3)	89.7	(47.1)	96.0	(48.9)
Meat (g/day)	64.1	(34.3)	64.0	(33.5)	51.5	(36.5)	39.2	(27.1)	32.3	(25.5)	54.3	(34.8)
Egg (g/day)	38.5	(19.2)	36.9	(19.1)	34.7	(19.9)	31.6	(21.1)	26.6	(16.4)	35.0	(19.7)
Milk and dairy products (g/day)	102.7	(61.9)	90.8	(72.1)	92.5	(83.4)	83.1	(73.6)	68.9	(62.0)	91.1	(72.2)
Other foods (g/day)	6.8	(13.9)	7.2	(13.5)	5.7	(13.1)	4.6	(12.1)	3.6	(8.7)	6.0	(13.0)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A5. Nutrient intakes expressed as percent energy intake or caloric densities estimated by proportional distribution NIPPON DATA80 Nutrition Study, men

(n)	Men Ages 30–39 (1220)		Men Ages 40–49 (1196)		Men Ages 50–59 (1019)		Men Ages 60–69 (679)		Men ages 70– (471)		Total (4585)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total protein (%kcal)	14.7	(2.1)	15.0	(2.0)	15.3	(2.2)	15.3	(2.1)	15.1	(2.2)	15.1	(2.1)
Animal protein (%kcal)	8.7	(2.5)	8.7	(2.4)	8.8	(2.6)	8.5	(2.4)	8.2	(2.5)	8.7	(2.5)
Vegetable protein (%kcal)	6.9	(0.9)	7.2	(0.9)	7.5	(0.9)	7.5	(1.0)	7.6	(1.1)	7.3	(1.0)
Total fat (%kcal)	22.1	(5.1)	20.4	(4.7)	19.4	(5.0)	18.3	(5.0)	17.2	(4.9)	20.0	(5.2)
Carbohydrate (%kcal)	57.8	(5.8)	58.6	(5.8)	59.7	(6.2)	62.0	(6.5)	64.5	(6.7)	59.7	(6.4)
Sucrose (g/1000 kcal)	4.7	(2.2)	4.2	(2.1)	4.2	(2.2)	4.5	(2.4)	5.0	(2.8)	4.5	(2.3)
Starch (g/1000 kcal)	38.9	(6.5)	40.2	(6.6)	41.6	(6.9)	42.6	(7.1)	44.1	(7.7)	40.9	(7.0)
Calcium (mg/1000 kcal)	208.7	(51.9)	218.1	(50.9)	236.0	(60.4)	252.6	(65.3)	263.7	(67.3)	229.3	(60.5)
Magnesium (mg/1000 kcal)	130.0	(18.2)	134.1	(18.2)	142.1	(20.5)	143.3	(21.2)	144.8	(20.0)	137.2	(20.2)
Iron (mg/1000 kcal)	6.0	(1.1)	6.1	(1.1)	6.3	(1.1)	6.8	(1.3)	6.7	(1.3)	6.3	(1.2)
Sodium (mg/kcal)	2324	(736)	2403	(749)	2582	(828)	2666	(907)	2692	(989)	2490	(827)
Potassium (mg/1000 kcal)	1185	(202)	1239	(205)	1306	(244)	1365	(254)	1397	(270)	1274	(240)
Phosphorus (mg/1000 kcal)	559	(69)	574	(63)	597	(70)	598	(71)	599	(70)	581	(70)
Vitamin A (IU/1000 kcal)	705	(275)	730	(286)	729	(313)	728	(367)	768	(402)	727	(316)
Vitamin B1 (mg/1000 kcal)	0.45	(0.14)	0.47	(0.16)	0.48	(0.16)	0.51	(0.18)	0.54	(0.18)	0.48	(0.16)
Vitamin B2 (mg/1000 kcal)	0.42	(0.09)	0.42	(0.09)	0.42	(0.09)	0.43	(0.10)	0.29	(0.08)	0.41	(0.10)
Vitamin C (mg/1000 kcal)	40.1	(14.3)	44.3	(15.2)	47.7	(18.1)	52.8	(21.6)	55.2	(22.3)	46.3	(18.3)
Niacin (mg/1000 kcal)	9.0	(2.2)	9.1	(2.2)	9.3	(2.3)	9.2	(2.6)	8.7	(2.3)	9.1	(2.3)
Vitamin E (mg/1000 kcal)	4.3	(0.9)	4.3	(0.9)	4.4	(0.9)	4.3	(0.9)	4.1	(0.9)	4.3	(0.9)
Total dietary fiber (g/1000 kcal)	6.8	(1.4)	7.3	(1.4)	7.8	(1.7)	8.5	(2.0)	8.9	(2.1)	7.6	(1.8)
Cholesterol (mg/1000 kcal)	178	(60)	164	(51)	165	(55)	156	(57)	146	(56)	165	(56)
Saturated fatty acid (%kcal)	6.3	(1.5)	5.8	(1.3)	5.3	(1.4)	5.1	(1.4)	5.0	(1.4)	5.7	(1.5)
Monounsaturated fatty acid (%kcal)	8.2	(1.9)	7.6	(1.8)	7.3	(1.9)	6.7	(1.8)	6.4	(1.9)	7.4	(2.0)
Polyunsaturated fatty acid (%kcal)	5.6	(1.4)	5.3	(1.3)	5.3	(1.4)	5.0	(1.5)	4.8	(1.4)	5.3	(1.4)
Total n-3 polyunsaturated fatty acid (%kcal)	1.1	(0.3)	1.1	(0.3)	1.1	(0.4)	1.1	(0.4)	1.0	(0.3)	1.1	(0.3)
Total n-6 polyunsaturated fatty acid (%kcal)	4.4	(1.1)	4.1	(1.1)	4.1	(1.1)	3.8	(1.2)	3.7	(1.2)	4.1	(1.2)
Total trans fatty acid (%kcal)	0.4	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A6. Nutrient intakes expressed as percent energy intake or caloric densities estimated by proportional distribution NIPPON DATA80 Nutrition Study, women

(n)	Women Ages 30–39 (1583)		Women Ages 40–49 (1469)		Women Ages 50–59 (1319)		Women Ages 60–69 (900)		Women ages 70– (566)		Total (5837)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total protein (%kcal)	15.1	(1.9)	15.3	(2.1)	15.7	(2.3)	15.7	(2.2)	15.7	(2.3)	15.5	(2.1)
Animal protein (%kcal)	8.9	(2.2)	8.9	(2.5)	8.9	(2.7)	8.7	(2.6)	8.5	(2.7)	8.9	(2.5)
Vegetable protein (%kcal)	7.1	(0.8)	7.4	(1.0)	7.7	(1.0)	7.8	(1.0)	7.9	(1.1)	7.5	(1.0)
Total fat (%kcal)	23.9	(5.4)	22.8	(5.6)	21.2	(5.4)	18.8	(5.4)	18.5	(5.2)	21.7	(5.8)
Carbohydrate (%kcal)	59.2	(5.8)	60.9	(6.2)	62.6	(6.5)	65.5	(6.8)	66.4	(7.0)	62.1	(6.8)
Sucrose (g/1000 kcal)	4.9	(2.2)	4.5	(2.3)	4.6	(2.5)	4.7	(2.5)	4.8	(2.6)	4.7	(2.4)
Starch (g/1000 kcal)	39.3	(6.5)	41.8	(7.1)	42.9	(7.4)	44.9	(7.9)	46.1	(8.0)	42.3	(7.6)
Calcium (mg/1000 kcal)	252.8	(56.5)	264.5	(64.1)	293.2	(76.7)	297.7	(74.2)	295.0	(73.5)	275.9	(70.4)
Magnesium (mg/1000 kcal)	134.7	(17.3)	143.0	(20.2)	152.8	(22.9)	155.5	(22.5)	155.3	(23.0)	146.1	(22.4)
Iron (mg/1000 kcal)	6.5	(1.1)	6.9	(1.2)	7.4	(1.4)	7.3	(1.4)	7.4	(1.4)	7.0	(1.3)
Sodium (mg/kcal)	2467	(682)	2566	(809)	2752	(884)	2886	(978)	2915	(1014)	2664	(862)
Potassium (mg/1000 kcal)	1303	(204)	1412	(249)	1521	(280)	1559	(293)	1548	(314)	1443	(278)
Phosphorus (mg/1000 kcal)	578	(62)	599	(67)	621	(74)	633	(74)	630	(79)	606	(73)
Vitamin A (IU/1000 kcal)	803	(299)	857	(346)	891	(419)	890	(441)	875	(451)	857	(381)
Vitamin B1 (mg/1000 kcal)	0.58	(0.18)	0.59	(0.20)	0.60	(0.20)	0.61	(0.20)	0.64	(0.22)	0.60	(0.20)
Vitamin B2 (mg/1000 kcal)	0.54	(0.12)	0.54	(0.13)	0.56	(0.15)	0.61	(0.18)	0.66	(0.18)	0.57	(0.15)
Vitamin C (mg/1000 kcal)	51.1	(17.2)	59.8	(21.5)	67.6	(25.8)	68.6	(26.9)	67.5	(27.7)	61.3	(24.1)
Niacin (mg/1000 kcal)	8.4	(2.0)	8.8	(2.2)	9.1	(2.3)	9.1	(2.4)	8.8	(2.4)	8.8	(2.3)
Vitamin E (mg/1000 kcal)	4.7	(0.9)	4.8	(0.9)	4.9	(1.1)	4.8	(1.0)	4.8	(1.1)	4.8	(1.0)
Total dietary fiber (g/1000 kcal)	8.2	(1.5)	8.9	(1.8)	9.7	(2.1)	10.2	(2.3)	10.1	(2.2)	9.2	(2.1)
Cholesterol (mg/1000 kcal)	189	(54)	185	(59)	179	(64)	167	(63)	155	(59)	179	(61)
Saturated fatty acid (%kcal)	7.1	(1.5)	6.4	(1.6)	5.9	(1.5)	5.4	(1.5)	5.2	(1.4)	6.2	(1.7)
Monounsaturated fatty acid (%kcal)	9.0	(2.0)	8.5	(2.1)	7.9	(2.1)	7.0	(2.0)	6.9	(2.0)	8.1	(2.2)
Polyunsaturated fatty acid (%kcal)	6.1	(1.4)	5.9	(1.4)	5.8	(1.5)	5.2	(1.5)	5.2	(1.6)	5.8	(1.5)
Total n-3 polyunsaturated fatty acid (%kcal)	1.2	(0.3)	1.2	(0.4)	1.2	(0.4)	1.1	(0.4)	1.1	(0.4)	1.2	(0.4)
Total n-6 polyunsaturated fatty acid (%kcal)	4.8	(1.2)	4.6	(1.2)	4.5	(1.3)	4.0	(1.3)	4.0	(1.3)	4.5	(1.3)
Total trans fatty acid (%kcal)	0.5	(0.2)	0.4	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)	0.4	(0.2)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A7. Food group intakes estimated by proportional distribution, expressed as caloric densities, NIPPON DATA80 Nutrition Study, men

(n)	Men Ages 30–39 (1220)		Men Ages 40–49 (1196)		Men Ages 50–59 (1019)		Men Ages 60–69 (679)		Men ages 70– (471)		Total (4585)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/1000 kcal)	127.9	(41.2)	124.9	(37.2)	126.9	(43.1)	125.4	(44.4)	123.3	(45.2)	126.1	(41.6)
Vegetable food (g/1000 kcal)	522.4	(90.3)	531.5	(79.0)	528.1	(87.0)	541.2	(89.5)	535.1	(91.2)	530.1	(86.9)
Cereal (g/1000 kcal)	160.0	(31.0)	159.7	(28.9)	157.8	(30.0)	162.6	(31.8)	163.5	(33.0)	160.2	(30.6)
Rice (g/1000 kcal)	115.5	(31.7)	124.5	(33.4)	133.6	(33.6)	132.9	(35.5)	134.1	(38.1)	126.4	(34.6)
Flour (g/1000 kcal)	45.6	(27.1)	37.5	(22.3)	28.2	(20.8)	33.1	(25.6)	32.4	(26.6)	36.4	(25.2)
Nuts (g/1000 kcal)	0.4	(1.3)	0.5	(1.8)	0.7	(2.1)	0.5	(1.3)	0.7	(2.0)	0.5	(1.7)
Potatoes (g/1000 kcal)	24.8	(16.1)	25.6	(15.6)	28.3	(19.8)	31.1	(22.4)	34.5	(25.7)	27.7	(19.3)
Sugar and sweetener (g/1000 kcal)	5.4	(3.6)	5.2	(3.7)	6.0	(4.4)	6.1	(4.6)	6.5	(4.8)	5.7	(4.1)
Sweets and snacks (g/1000 kcal)	5.9	(5.6)	5.4	(5.5)	4.5	(5.1)	7.9	(8.1)	11.3	(12.5)	6.3	(7.2)
Fats and oils (g/1000 kcal)	8.8	(4.7)	7.4	(4.1)	6.8	(3.9)	5.6	(3.7)	4.6	(3.4)	7.1	(4.4)
Soybean and legumes (g/1000 kcal)	28.6	(15.8)	31.5	(18.3)	37.8	(21.9)	41.8	(25.6)	41.9	(24.5)	34.7	(21.1)
Fruit (g/1000 kcal)	42.7	(27.0)	57.0	(33.4)	60.0	(38.5)	73.2	(44.5)	84.2	(55.3)	59.1	(39.8)
Green and yellow vegetable (g/1000 kcal)	21.0	(13.8)	23.3	(14.4)	25.3	(17.2)	25.8	(19.6)	26.5	(20.5)	23.8	(16.6)
Other vegetable (g/1000 kcal)	88.3	(32.5)	93.3	(34.5)	99.3	(41.7)	109.2	(45.3)	103.2	(45.7)	96.7	(39.3)
Mushroom (g/1000 kcal)	3.8	(4.8)	4.0	(5.5)	4.6	(5.7)	4.6	(6.0)	3.9	(5.9)	4.2	(5.5)
Sea algae (g/1000 kcal)	2.2	(2.9)	2.6	(3.3)	3.0	(3.6)	3.0	(4.0)	3.1	(3.9)	2.7	(3.5)
Condiments and beverages (g/1000 kcal)	101.1	(92.6)	89.5	(76.8)	74.3	(61.9)	67.6	(59.7)	53.6	(48.1)	82.3	(75.3)
Fish and shellfish (g/1000 kcal)	46.4	(22.3)	52.2	(25.2)	57.7	(26.9)	55.6	(25.8)	51.6	(27.1)	52.3	(25.5)
Meat (g/1000 kcal)	35.8	(18.1)	31.8	(15.4)	27.6	(15.2)	23.2	(13.3)	20.6	(13.6)	29.5	(16.5)
Egg (g/1000 kcal)	18.3	(9.8)	17.2	(8.7)	17.3	(9.3)	15.7	(10.2)	16.2	(10.7)	17.2	(9.6)
Milk and dairy products (g/1000 kcal)	30.4	(21.4)	27.6	(19.6)	28.0	(25.4)	33.7	(30.3)	37.2	(33.6)	30.3	(25.0)
Other foods (g/1000 kcal)	3.4	(9.1)	3.3	(6.8)	2.4	(4.8)	2.1	(7.0)	1.7	(3.7)	2.8	(7.0)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A8. Food group intakes estimated by proportional distribution, expressed as caloric densities, NIPPON DATA80 Nutrition Study, women

(n)	Women Ages 30–39 (1583)		Women Ages 40–49 (1469)		Women Ages 50–59 (1319)		Women Ages 60–69 (900)		Women ages 70– (566)		Total (5837)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/day)	148.7	(42.3)	142.6	(44.8)	144.6	(50.2)	137.4	(48.6)	132.8	(47.3)	143.0	(46.5)
Vegetable food (g/day)	487.1	(75.3)	514.0	(84.5)	536.1	(90.5)	554.8	(95.6)	539.3	(90.7)	520.4	(89.3)
Cereal (g/day)	156.2	(28.6)	151.3	(27.8)	148.9	(29.7)	159.0	(30.7)	163.6	(32.7)	154.5	(29.7)
Rice (g/day)	94.7	(26.9)	105.2	(28.6)	109.1	(29.5)	124.3	(35.2)	136.0	(35.9)	109.2	(32.9)
Flour (g/day)	59.0	(28.6)	42.0	(26.6)	38.1	(27.6)	36.1	(26.5)	31.5	(26.0)	43.8	(29.0)
Nuts (g/day)	0.7	(2.3)	0.7	(2.0)	1.1	(3.2)	1.0	(2.7)	1.0	(2.5)	0.8	(2.6)
Potatoes (g/day)	29.4	(17.6)	31.1	(20.4)	33.8	(24.2)	39.6	(27.7)	41.2	(31.3)	33.5	(23.5)
Sugar and sweetener (g/day)	6.8	(4.3)	6.5	(4.7)	7.0	(5.0)	6.7	(5.1)	7.1	(5.2)	6.8	(4.8)
Sweets and snacks (g/day)	14.2	(12.5)	13.9	(14.4)	13.7	(15.0)	11.5	(12.3)	11.6	(13.5)	13.3	(13.7)
Fats and oils (g/day)	9.7	(5.0)	8.7	(4.6)	7.3	(4.4)	6.2	(4.2)	5.8	(3.9)	8.0	(4.8)
Soybean and legumes (g/day)	29.5	(16.3)	35.0	(19.9)	42.4	(25.1)	42.9	(24.9)	44.7	(26.5)	37.3	(22.6)
Fruit (g/day)	74.4	(41.5)	95.7	(55.3)	109.7	(67.1)	111.4	(69.1)	101.8	(67.4)	96.1	(60.3)
Green and yellow vegetable (g/day)	26.4	(16.2)	29.8	(19.3)	32.6	(23.3)	33.3	(24.3)	36.3	(27.1)	30.7	(21.4)
Other vegetable (g/day)	98.3	(35.2)	108.9	(42.7)	115.6	(46.5)	117.7	(48.5)	115.3	(52.5)	109.5	(44.4)
Mushroom (g/day)	4.1	(5.0)	4.8	(6.0)	5.2	(6.5)	4.9	(6.8)	4.6	(6.6)	4.7	(6.1)
Sea algae (g/day)	2.2	(3.0)	3.2	(3.9)	3.7	(4.9)	3.8	(5.0)	3.9	(4.4)	3.2	(4.2)
Condiments and beverages (g/day)	40.9	(40.8)	37.7	(48.9)	33.4	(31.5)	30.7	(43.5)	23.4	(19.3)	35.1	(40.4)
Fish and shellfish (g/day)	44.5	(20.5)	48.8	(23.9)	54.2	(25.6)	54.5	(26.7)	55.2	(27.0)	50.4	(24.6)
Meat (g/day)	32.8	(15.6)	31.7	(15.8)	26.0	(15.9)	21.3	(13.4)	19.6	(13.0)	27.9	(15.9)
Egg (g/day)	19.8	(9.6)	18.5	(9.7)	17.9	(10.9)	17.5	(11.0)	16.7	(10.7)	18.4	(10.3)
Milk and dairy products (g/day)	52.8	(31.0)	45.0	(34.5)	47.0	(42.1)	45.8	(39.3)	42.5	(38.5)	47.4	(36.8)
Other foods (g/day)	3.5	(7.2)	3.7	(7.0)	3.0	(7.0)	2.6	(7.6)	2.2	(5.3)	3.2	(7.0)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1980 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table A9. Nutrient intakes estimated by simple density calculation, NIPPON DATA80 Nutrition Study, 10 422 men and women

	Mean	(SD)
Total energy (kcal/day)	2107	(445)
Total protein (%kcal)	15.1	(2.1)
Animal protein (%kcal)	8.6	(2.3)
Vegetable protein (%kcal)	7.2	(1.0)
Total fat (%kcal)	21.9	(5.6)
Carbohydrate (%kcal)	60.5	(6.3)
Sucrose (g/1000 kcal)	4.7	(2.4)
Starch (g/1000 kcal)	42.6	(7.2)
Calcium (mg/1000 kcal)	261.3	(65.3)
Magnesium (mg/1000 kcal)	135.6	(19.2)
Iron (mg/1000 kcal)	6.4	(1.2)
Sodium (mg/kcal)	2452	(813)
Potassium (mg/1000 kcal)	1327	(238)
Phosphorus (mg/1000 kcal)	586	(62)
Vitamin A (IU/1000 kcal)	773	(345)
Vitamin B1 (mg/1000 kcal)	0.56	(0.18)
Vitamin B2 (mg/1000 kcal)	0.49	(0.10)
Vitamin C (mg/1000 kcal)	53.1	(20.4)
Niacin (mg/1000 kcal)	8.7	(2.3)
Vitamin E (mg/1000 kcal)	4.5	(0.9)
Total dietary fiber (g/1000 kcal)	8.0	(1.7)
Cholesterol (mg/1000 kcal)	178	(58)
Saturated fatty acid (%kcal)	6.8	(1.8)
Monounsaturated fatty acid (%kcal)	9.0	(2.3)
Polyunsaturated fatty acid (%kcal)	6.3	(1.6)
Total n-3 polyunsaturated fatty acid (%kcal)	1.2	(0.3)
Total n-6 polyunsaturated fatty acid (%kcal)	4.5	(1.2)
Total trans fatty acid (%kcal)	0.3	(0.2)

Total energy per person per day was calculated by dividing total energy per household with number of household member, and other nutrient intakes expressed in percent energy intake or caloric densities were calculated using total energy and nutrient intakes of the household.

Table A10. Nutrient intakes estimated by simple density calculation, NIPPON DATA80 Nutrition Study, 10 422 men and women

	Mean	(SD)
Animal food (g/1000 kcal)	147.5	(49.0)
Vegetable food (g/1000 kcal)	501.6	(85.8)
Cereal (g/1000 kcal)	153.8	(29.4)
Rice (g/1000 kcal)	111.1	(32.0)
Flour (g/1000 kcal)	42.0	(27.6)
Nuts (g/1000 kcal)	0.6	(1.9)
Potatoes (g/1000 kcal)	31.5	(21.5)
Sugar and sweetener (g/1000 kcal)	5.9	(4.2)
Sweets and snacks (g/1000 kcal)	11.5	(11.8)
Fats and oils (g/1000 kcal)	7.7	(4.5)
Soybean and legumes (g/1000 kcal)	33.5	(20.1)
Fruit (g/1000 kcal)	76.2	(47.0)
Green and yellow vegetable (g/1000 kcal)	25.7	(18.1)
Other vegetable (g/1000 kcal)	95.9	(39.3)
Mushroom (g/1000 kcal)	4.0	(5.4)
Sea algae (g/1000 kcal)	2.6	(3.4)
Condiments and beverages (g/1000 kcal)	52.5	(53.4)
Fish and shellfish (g/1000 kcal)	46.3	(22.8)
Meat (g/1000 kcal)	30.8	(17.0)
Egg (g/1000 kcal)	18.1	(10.1)
Milk and dairy products (g/1000 kcal)	52.3	(39.9)
Other foods (g/1000 kcal)	3.3	(7.5)

Food group intakes were calculated using total energy intake and food group intakes of the household.

Table B1. Nutrient intakes per day estimated by proportional distribution, NIPPON DATA90 Nutrition Study, men

(n)	Men Ages 30–39 (660)		Men Ages 40–49 (836)		Men Ages 50–59 (793)		Men Ages 60–69 (708)		Men ages 70– (491)		Total (3488)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total energy (kcal/day)	2377	(436)	2405	(427)	2446	(475)	2238	(414)	1985	(413)	2316	(461)
Total protein (g/day)	88.6	(17.9)	93.1	(18.0)	97.0	(20.6)	87.2	(18.1)	77.7	(17.8)	89.8	(19.5)
Animal protein (g/day)	45.8	(13.2)	49.2	(13.7)	50.6	(15.5)	43.5	(13.4)	38.3	(12.9)	46.2	(14.5)
Vegetable protein (g/day)	42.9	(8.7)	43.8	(8.5)	46.3	(9.6)	43.7	(9.0)	39.6	(9.0)	43.6	(9.2)
Total fat (g/day)	65.0	(17.2)	61.9	(15.5)	59.7	(17.0)	52.8	(15.9)	45.0	(14.6)	57.8	(17.4)
Carbohydrate (g/day)	327.4	(65.4)	329.9	(65.8)	343.4	(73.4)	325.4	(67.2)	299.8	(66.8)	327.4	(69.1)
Sucrose (g/day)	27.1	(16.2)	26.5	(14.8)	25.1	(16.1)	24.6	(14.3)	24.3	(14.5)	25.6	(15.3)
Starch (g/day)	215.9	(47.4)	218.0	(47.9)	228.8	(54.6)	215.5	(51.5)	195.8	(48.4)	216.4	(51.2)
Calcium (mg/day)	500.5	(145.6)	528.5	(172.0)	597.5	(212.5)	578.8	(209.6)	565.4	(204.3)	554.3	(193.4)
Magnesium (mg/day)	295.2	(79.3)	309.7	(78.0)	342.2	(92.1)	315.6	(87.1)	284.4	(84.0)	312.0	(86.4)
Iron (mg/day)	12.1	(2.8)	12.8	(3.3)	13.9	(3.7)	12.7	(3.6)	11.6	(3.3)	12.7	(3.4)
Sodium (mg/day)	5631	(1615)	5854	(1832)	6217	(1917)	5681	(1716)	5099	(1720)	5753	(1806)
Potassium (mg/day)	2828	(693)	2988	(715)	3270	(877)	3118	(841)	2885	(800)	3034	(804)
Phosphorus (mg/day)	1294	(255)	1354	(269)	1446	(309)	1318	(281)	1204	(277)	1335	(289)
Vitamin A (IU/day)	2905	(2579)	2825	(2437)	3077	(2821)	2895	(2711)	2601	(3070)	2880	(2706)
Vitamin B1 (mg/day)	1.36	(0.43)	1.40	(0.54)	1.41	(0.51)	1.31	(0.47)	1.19	(0.44)	1.35	(0.49)
Vitamin B2 (mg/day)	1.45	(0.40)	1.46	(0.46)	1.53	(0.45)	1.39	(0.42)	1.28	(0.47)	1.43	(0.45)
Vitamin C (mg/day)	110.3	(59.4)	117.7	(51.4)	137.2	(70.5)	141.9	(68.2)	131.5	(61.5)	127.6	(63.6)
Niacin (mg/day)	19.7	(5.0)	20.7	(5.5)	21.5	(5.9)	18.3	(4.9)	16.5	(5.5)	19.6	(5.6)
Vitamin E (mg/day)	10.2	(2.8)	10.1	(2.6)	10.6	(3.1)	9.8	(2.9)	8.3	(2.6)	9.9	(2.9)
Total dietary fiber (g/day)	14.2	(4.1)	15.2	(4.4)	17.5	(5.4)	17.5	(5.5)	16.5	(5.3)	16.2	(5.1)
Cholesterol (mg/day)	451	(149)	441	(133)	452	(149)	402	(142)	349	(137)	425	(147)
Saturated fatty acid (g/day)	17.0	(4.5)	16.4	(4.4)	15.2	(4.6)	13.7	(4.4)	12.1	(4.2)	15.1	(4.7)
Monounsaturated fatty acid (g/day)	22.7	(6.2)	21.8	(5.8)	21.0	(6.2)	18.4	(6.0)	15.6	(5.4)	20.2	(6.4)
Polyunsaturated fatty acid (g/day)	15.5	(4.6)	14.7	(4.2)	15.2	(4.7)	13.5	(4.6)	11.4	(4.0)	14.3	(4.6)
Total n-3 polyunsaturated fatty acid (g/day)	3.2	(1.1)	3.0	(1.0)	3.3	(1.2)	3.0	(1.2)	2.5	(1.0)	3.0	(1.1)
Total n-6 polyunsaturated fatty acid (g/day)	12.1	(3.7)	11.5	(3.4)	11.8	(3.8)	10.4	(3.7)	8.8	(3.2)	11.1	(3.7)
Total trans fatty acid (g/day)	1.0	(0.5)	1.0	(0.5)	0.8	(0.5)	0.7	(0.4)	0.6	(0.4)	0.8	(0.5)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B2. Nutrient intakes per day estimated by proportional distribution, NIPPON DATA90 Nutrition Study, women

(n)	Women Ages 30–39 (1031)		Women Ages 40–49 (1171)		Women Ages 50–59 (1035)		Women Ages 60–69 (915)		Women ages 70– (702)		Total (4854)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total energy (kcal/day)	1880	(314)	1965	(350)	1927	(371)	1809	(375)	1616	(326)	1859	(367)
Total protein (g/day)	71.7	(13.1)	78.2	(15.3)	78.2	(16.6)	72.6	(16.2)	64.4	(14.2)	73.8	(15.9)
Animal protein (g/day)	36.9	(9.9)	41.2	(11.5)	39.8	(12.2)	35.6	(11.4)	31.3	(10.3)	37.5	(11.6)
Vegetable protein (g/day)	34.9	(6.4)	37.1	(7.1)	38.5	(8.1)	37.1	(8.3)	33.3	(7.2)	36.4	(7.7)
Total fat (g/day)	57.2	(14.0)	56.3	(14.3)	51.3	(14.7)	45.1	(14.1)	38.3	(12.0)	50.7	(15.5)
Carbohydrate (g/day)	262.1	(48.5)	279.6	(55.5)	285.9	(61.4)	277.1	(64.3)	253.1	(55.9)	272.9	(58.4)
Sucrose (g/day)	21.6	(11.0)	22.6	(13.1)	21.1	(13.0)	22.0	(14.2)	20.1	(12.2)	21.6	(12.8)
Starch (g/day)	170.7	(35.7)	184.7	(39.4)	189.4	(45.9)	180.5	(46.1)	167.4	(40.7)	179.4	(42.4)
Calcium (mg/day)	473.7	(137.1)	527.6	(175.7)	573.8	(202.0)	567.8	(204.1)	493.6	(181.8)	528.7	(185.2)
Magnesium (mg/day)	241.7	(58.2)	272.8	(70.1)	287.4	(77.8)	275.9	(79.3)	245.7	(70.7)	266.0	(73.6)
Iron (mg/day)	10.2	(2.3)	11.5	(2.9)	12.2	(3.5)	11.5	(3.1)	10.1	(2.7)	11.2	(3.0)
Sodium (mg/day)	4863	(1434)	5134	(1557)	5320	(1722)	5024	(1565)	4587	(1559)	5016	(1587)
Potassium (mg/day)	2446	(551)	2800	(695)	3014	(825)	2896	(796)	2544	(716)	2752	(751)
Phosphorus (mg/day)	1060	(192)	1161	(234)	1186	(255)	1132	(259)	1008	(221)	1117	(242)
Vitamin A (IU/day)	2452	(1827)	2709	(2383)	2936	(2878)	2730	(2726)	2336	(2633)	2653	(2507)
Vitamin B1 (mg/day)	1.12	(0.35)	1.25	(0.48)	1.22	(0.43)	1.15	(0.42)	0.98	(0.35)	1.16	(0.42)
Vitamin B2 (mg/day)	1.21	(0.32)	1.32	(0.40)	1.35	(0.41)	1.26	(0.39)	1.08	(0.34)	1.26	(0.39)
Vitamin C (mg/day)	106.5	(48.0)	130.7	(57.1)	154.0	(78.3)	148.5	(68.3)	121.5	(55.0)	132.6	(64.9)
Niacin (mg/day)	14.7	(3.5)	16.4	(4.1)	16.4	(4.5)	15.0	(4.2)	13.1	(3.7)	15.3	(4.2)
Vitamin E (mg/day)	8.9	(2.4)	9.4	(2.5)	9.6	(2.9)	8.7	(2.6)	7.6	(2.4)	8.9	(2.7)
Total dietary fiber (g/day)	13.1	(3.5)	15.3	(4.5)	17.2	(5.6)	17.0	(5.3)	14.7	(4.7)	15.5	(5.0)
Cholesterol (mg/day)	391	(116)	408	(126)	391	(131)	338	(125)	296	(114)	371	(129)
Saturated fatty acid (g/day)	15.2	(3.8)	14.9	(4.1)	13.1	(4.0)	11.8	(3.8)	10.1	(3.4)	13.3	(4.3)
Monounsaturated fatty acid (g/day)	19.9	(5.1)	20.0	(5.4)	18.1	(5.5)	15.7	(5.2)	13.3	(4.4)	17.8	(5.7)
Polyunsaturated fatty acid (g/day)	13.3	(3.6)	13.5	(3.8)	13.1	(4.1)	11.5	(4.1)	9.7	(3.3)	12.5	(4.0)
Total n-3 polyunsaturated fatty acid (g/day)	2.7	(0.9)	2.8	(0.9)	2.9	(1.0)	2.5	(1.0)	2.1	(0.8)	2.6	(1.0)
Total n-6 polyunsaturated fatty acid (g/day)	10.5	(2.8)	10.6	(3.1)	10.1	(3.3)	8.9	(3.3)	7.5	(2.6)	9.7	(3.3)
Total trans fatty acid (g/day)	0.9	(0.4)	0.9	(0.4)	0.7	(0.4)	0.6	(0.3)	0.5	(0.4)	0.8	(0.4)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B3. Food group intakes per day estimated by proportional distribution, NIPPON DATA90 Nutrition Study, men

(n)	Men Ages 30–39 (660)		Men Ages 40–49 (836)		Men Ages 50–59 (793)		Men Ages 60–69 (708)		Men ages 70– (491)		Total (3488)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/day)	330.3	(105.8)	338.9	(111.4)	355.8	(126.6)	324.0	(122.2)	301.1	(119.2)	332.8	(118.5)
Vegetable food (g/day)	1223.0	(312.8)	1263.4	(312.2)	1305.8	(336.6)	1196.2	(297.3)	1063.3	(281.3)	1223.6	(319.8)
Cereal (g/day)	350.8	(73.9)	345.5	(76.3)	350.1	(82.6)	328.3	(79.1)	291.6	(73.6)	336.5	(80.0)
Rice (g/day)	250.5	(74.3)	261.8	(79.2)	282.6	(88.6)	255.9	(85.6)	224.7	(76.0)	258.0	(83.3)
Flour (g/day)	100.4	(53.9)	86.3	(49.9)	72.1	(51.9)	76.2	(55.0)	68.8	(50.6)	81.2	(53.4)
Nuts (g/day)	1.1	(3.3)	1.3	(3.7)	2.0	(5.6)	1.8	(4.5)	1.8	(4.6)	1.6	(4.4)
Potatoes (g/day)	62.5	(40.7)	62.3	(36.7)	72.8	(48.2)	72.7	(47.3)	71.2	(47.8)	68.1	(44.3)
Sugar and sweetener (g/day)	11.2	(9.5)	12.2	(8.9)	13.0	(10.8)	12.6	(9.0)	12.2	(10.0)	12.2	(9.7)
Sweets and snacks (g/day)	13.0	(14.8)	12.7	(14.3)	9.9	(14.2)	15.9	(22.1)	19.3	(24.1)	13.7	(18.0)
Fats and oils (g/day)	22.9	(11.1)	19.5	(10.3)	17.8	(9.8)	15.1	(9.6)	10.6	(7.6)	17.6	(10.6)
Soybean and legumes (g/day)	71.2	(42.6)	78.5	(46.1)	96.7	(53.3)	95.5	(53.4)	88.1	(53.7)	86.1	(50.8)
Fruit (g/day)	76.7	(58.4)	107.6	(75.8)	131.0	(93.2)	146.1	(103.7)	161.9	(110.6)	122.5	(93.2)
Green and yellow vegetable (g/day)	76.6	(42.1)	79.2	(44.1)	95.7	(56.4)	95.5	(60.7)	84.2	(52.0)	86.5	(52.1)
Other vegetable (g/day)	180.9	(80.2)	189.2	(78.2)	204.8	(88.8)	201.4	(87.3)	172.8	(83.5)	191.3	(84.4)
Mushroom (g/day)	10.1	(12.0)	12.1	(12.8)	15.6	(18.9)	12.9	(15.5)	10.8	(13.6)	12.5	(15.0)
Sea algae (g/day)	6.0	(6.7)	7.2	(8.2)	8.8	(10.3)	8.3	(12.3)	7.2	(8.8)	7.6	(9.5)
Condiments and beverages (g/day)	313.7	(267.2)	310.0	(276.0)	263.4	(234.2)	182.7	(159.5)	129.1	(112.5)	248.8	(236.2)
Fish and shellfish (g/day)	107.7	(50.7)	127.7	(56.0)	148.9	(69.1)	128.3	(56.6)	109.4	(53.4)	126.3	(59.9)
Meat (g/day)	88.5	(41.7)	86.1	(37.8)	70.5	(39.1)	55.8	(32.5)	43.5	(28.4)	70.9	(40.1)
Egg (g/day)	47.4	(24.0)	47.1	(22.1)	47.8	(23.9)	42.4	(22.8)	39.7	(23.5)	45.3	(23.4)
Milk and dairy products (g/day)	85.7	(58.7)	79.5	(61.7)	90.9	(79.0)	99.0	(83.9)	109.9	(90.8)	91.5	(75.3)
Other foods (g/day)	6.7	(8.9)	5.9	(9.1)	3.7	(6.7)	2.3	(4.8)	2.3	(4.4)	4.3	(7.5)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B4. Food group intakes per day estimated by proportional distribution, NIPPON DATA90 Nutrition Study, women

(n)	Women Ages 30–39 (1031)		Women Ages 40–49 (1171)		Women Ages 50–59 (1035)		Women Ages 60–69 (915)		Women ages 70– (702)		Total (4854)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/day)	306.8	(97.2)	321.3	(106.8)	316.6	(113.2)	288.0	(108.9)	256.3	(104.7)	301.5	(108.5)
Vegetable food (g/day)	889.0	(203.5)	995.8	(242.8)	1028.2	(265.2)	1001.6	(260.1)	871.9	(232.9)	963.2	(249.8)
Cereal (g/day)	265.7	(54.4)	268.2	(57.3)	262.3	(63.1)	254.3	(63.2)	240.8	(61.1)	259.8	(60.4)
Rice (g/day)	163.1	(48.9)	178.9	(52.5)	185.8	(60.6)	188.6	(66.4)	187.2	(62.4)	180.0	(58.6)
Flour (g/day)	96.0	(46.6)	82.7	(45.2)	72.5	(49.2)	66.0	(46.6)	55.3	(42.8)	76.2	(48.2)
Nuts (g/day)	1.2	(3.0)	1.6	(4.5)	1.9	(5.4)	1.8	(4.2)	1.6	(4.5)	1.6	(4.4)
Potatoes (g/day)	58.1	(33.3)	63.0	(41.1)	68.1	(44.9)	75.2	(50.0)	67.0	(45.6)	65.9	(43.3)
Sugar and sweetener (g/day)	10.9	(7.2)	12.3	(9.7)	11.9	(9.0)	11.8	(10.5)	11.5	(9.2)	11.7	(9.2)
Sweets and snacks (g/day)	23.7	(23.2)	26.2	(30.2)	23.3	(32.3)	20.1	(26.3)	18.5	(24.2)	22.8	(27.9)
Fats and oils (g/day)	20.0	(9.5)	18.9	(9.6)	15.2	(8.9)	13.1	(8.6)	10.1	(6.7)	16.0	(9.5)
Soybean and legumes (g/day)	58.0	(30.8)	69.5	(40.7)	82.1	(45.0)	82.9	(48.9)	73.2	(42.3)	72.8	(42.8)
Fruit (g/day)	105.8	(76.6)	152.3	(104.1)	187.4	(130.5)	184.3	(120.3)	149.4	(114.5)	155.5	(114.0)
Green and yellow vegetable (g/day)	73.0	(40.3)	84.8	(50.5)	98.5	(60.8)	95.2	(58.7)	83.4	(53.6)	87.0	(53.8)
Other vegetable (g/day)	159.3	(61.6)	180.2	(74.4)	189.9	(86.0)	179.0	(84.5)	154.7	(73.3)	173.9	(77.5)
Mushroom (g/day)	9.5	(10.5)	12.6	(13.5)	14.1	(16.5)	11.6	(14.1)	8.6	(10.9)	11.5	(13.6)
Sea algae (g/day)	4.9	(5.4)	7.2	(8.3)	8.5	(10.4)	8.1	(10.8)	7.5	(9.4)	7.2	(9.1)
Condiments and beverages (g/day)	98.5	(80.7)	102.3	(96.1)	81.8	(78.5)	73.3	(76.6)	55.7	(47.3)	84.9	(81.3)
Fish and shellfish (g/day)	82.6	(36.8)	102.4	(43.2)	110.6	(49.5)	98.0	(44.1)	90.3	(43.1)	97.4	(44.6)
Meat (g/day)	66.0	(31.0)	68.0	(30.9)	52.9	(30.1)	43.1	(26.1)	34.6	(23.8)	54.8	(31.5)
Egg (g/day)	42.8	(20.0)	41.1	(19.5)	39.8	(20.2)	35.5	(20.2)	33.1	(19.1)	39.0	(20.1)
Milk and dairy products (g/day)	114.4	(71.8)	110.2	(84.7)	113.8	(96.8)	111.9	(90.3)	99.1	(89.2)	110.6	(86.8)
Other foods (g/day)	6.4	(9.1)	4.9	(7.9)	3.1	(5.9)	3.0	(5.4)	2.1	(3.8)	4.1	(7.1)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B5. Nutrient intakes expressed as percent energy intake or caloric densities estimated by proportional distribution NIPPON DATA90 Nutrition Study, men

(n)	Men Ages 30–39 (660)		Men Ages 40–49 (836)		Men Ages 50–59 (793)		Men Ages 60–69 (708)		Men ages 70– (491)		Total (3488)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total protein (%kcal)	15.0	(1.7)	15.6	(1.9)	15.9	(2.0)	15.6	(1.9)	15.7	(2.1)	15.6	(1.9)
Animal protein (%kcal)	9.2	(2.0)	9.7	(2.0)	9.6	(2.3)	9.3	(2.3)	9.2	(2.5)	9.4	(2.2)
Vegetable protein (%kcal)	6.8	(0.8)	6.9	(0.8)	7.3	(0.9)	7.3	(1.0)	7.4	(1.1)	7.1	(0.9)
Total fat (%kcal)	24.6	(4.2)	23.2	(3.9)	21.9	(4.2)	21.1	(4.6)	20.3	(4.5)	22.3	(4.5)
Carbohydrate (%kcal)	55.2	(5.1)	54.9	(4.9)	56.2	(5.5)	58.3	(5.8)	60.5	(6.2)	56.7	(5.8)
Sucrose (g/1000 kcal)	4.6	(2.3)	4.4	(2.1)	4.1	(2.3)	4.4	(2.3)	4.8	(2.6)	4.4	(2.3)
Starch (g/1000 kcal)	37.2	(5.6)	36.9	(5.5)	38.0	(6.4)	39.0	(6.8)	39.9	(7.1)	38.0	(6.3)
Calcium (mg/1000 kcal)	210.9	(51.3)	219.8	(58.6)	245.1	(75.2)	258.0	(77.6)	284.7	(82.5)	240.8	(73.4)
Magnesium (mg/1000 kcal)	124.3	(24.9)	129.3	(25.6)	140.5	(29.7)	141.4	(31.2)	143.6	(32.1)	135.4	(29.5)
Iron (mg/1000 kcal)	5.1	(0.9)	5.4	(1.0)	5.7	(1.2)	5.7	(1.2)	5.9	(1.3)	5.5	(1.1)
Sodium (mg/kcal)	2384	(629)	2448	(669)	2567	(697)	2565	(721)	2587	(750)	2506	(695)
Potassium (mg/1000 kcal)	1190	(197)	1246	(217)	1341	(260)	1394	(282)	1456	(281)	1316	(263)
Phosphorus (mg/1000 kcal)	546	(58)	565	(63)	593	(69)	590	(71)	608	(74)	579	(70)
Vitamin A (IU/1000 kcal)	1235	(1131)	1181	(997)	1259	(1104)	1308	(1319)	1323	(1594)	1255	(1212)
Vitamin B1 (mg/1000 kcal)	0.6	(0.2)	0.6	(0.2)	0.6	(0.2)	0.6	(0.2)	0.6	(0.2)	0.6	(0.2)
Vitamin B2 (mg/1000 kcal)	0.6	(0.1)	0.6	(0.1)	0.6	(0.1)	0.6	(0.1)	0.6	(0.2)	0.6	(0.2)
Vitamin C (mg/1000 kcal)	46.1	(21.9)	48.9	(19.6)	56.2	(30.2)	63.0	(27.0)	65.8	(26.4)	55.3	(26.3)
Niacin (mg/1000 kcal)	8.3	(1.5)	8.6	(1.7)	8.8	(1.8)	8.2	(1.7)	8.3	(2.0)	8.5	(1.7)
Vitamin E (mg/1000 kcal)	4.3	(0.8)	4.2	(0.8)	4.3	(0.9)	4.4	(1.0)	4.2	(0.9)	4.3	(0.9)
Total dietary fiber (g/1000 kcal)	5.9	(1.3)	6.3	(1.5)	7.2	(1.8)	7.8	(2.0)	8.3	(2.2)	7.0	(1.9)
Cholesterol (mg/1000 kcal)	190	(53)	185	(48)	186	(53)	180	(56)	176	(58)	184	(53)
Saturated fatty acid (%kcal)	6.6	(1.2)	6.3	(1.3)	5.6	(1.3)	5.5	(1.3)	5.5	(1.4)	5.9	(1.4)
Monounsaturated fatty acid (%kcal)	8.7	(1.7)	8.3	(1.5)	7.8	(1.6)	7.4	(1.8)	7.1	(1.8)	7.9	(1.8)
Polyunsaturated fatty acid (%kcal)	6.0	(1.3)	5.6	(1.1)	5.7	(1.3)	5.4	(1.4)	5.2	(1.3)	5.6	(1.3)
Total n-3 polyunsaturated fatty acid (%kcal)	1.2	(0.3)	1.2	(0.3)	1.2	(0.4)	1.2	(0.4)	1.2	(0.4)	1.2	(0.3)
Total n-6 polyunsaturated fatty acid (%kcal)	4.7	(1.1)	4.4	(0.9)	4.4	(1.0)	4.2	(1.1)	4.0	(1.1)	4.3	(1.1)
Total trans fatty acid (%kcal)	0.4	(0.2)	0.4	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B6. Nutrient intakes expressed as percent energy intake or caloric densities estimated by proportional distribution NIPPON DATA90 Nutrition Study, women

(n)	Women Ages 30–39 (1031)		Women Ages 40–49 (1171)		Women Ages 50–59 (1035)		Women Ages 60–69 (915)		Women ages 70– (702)		Total (4854)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total protein (%kcal)	15.3	(1.7)	16.0	(1.9)	16.3	(2.0)	16.1	(2.1)	16.0	(2.1)	15.9	(2.0)
Animal protein (%kcal)	9.5	(2.0)	10.0	(2.2)	9.8	(2.4)	9.4	(2.4)	9.3	(2.5)	9.6	(2.3)
Vegetable protein (%kcal)	6.8	(0.8)	7.0	(0.9)	7.5	(0.9)	7.6	(1.0)	7.6	(1.0)	7.3	(1.0)
Total fat (%kcal)	27.3	(4.4)	25.8	(4.2)	23.9	(4.7)	22.4	(4.8)	21.2	(4.7)	24.4	(5.0)
Carbohydrate (%kcal)	55.8	(4.9)	56.9	(5.1)	59.4	(5.8)	61.3	(6.3)	62.7	(6.0)	58.9	(6.1)
Sucrose (g/1000 kcal)	4.6	(2.1)	4.6	(2.3)	4.4	(2.3)	4.8	(2.6)	4.9	(2.5)	4.6	(2.4)
Starch (g/1000 kcal)	37.2	(5.5)	38.2	(5.7)	39.8	(6.8)	40.4	(7.1)	41.9	(7.2)	39.3	(6.6)
Calcium (mg/1000 kcal)	252.3	(61.8)	268.4	(73.3)	298.0	(86.9)	314.0	(93.4)	306.3	(94.8)	285.4	(84.9)
Magnesium (mg/1000 kcal)	129.0	(24.4)	139.5	(29.5)	149.6	(31.2)	153.2	(34.4)	152.7	(34.7)	143.9	(32.0)
Iron (mg/1000 kcal)	5.5	(0.9)	5.9	(1.1)	6.3	(1.4)	6.4	(1.3)	6.3	(1.3)	6.0	(1.2)
Sodium (mg/kcal)	2602	(706)	2626	(697)	2780	(775)	2818	(846)	2859	(851)	2724	(775)
Potassium (mg/1000 kcal)	1304	(211)	1429	(259)	1566	(307)	1604	(311)	1578	(319)	1486	(303)
Phosphorus (mg/1000 kcal)	566	(59)	592	(68)	617	(71)	628	(80)	626	(75)	603	(74)
Vitamin A (IU/1000 kcal)	1310	(960)	1381	(1158)	1524	(1465)	1525	(1498)	1458	(1809)	1435	(1371)
Vitamin B1 (mg/1000 kcal)	0.60	(0.16)	0.64	(0.21)	0.63	(0.18)	0.64	(0.20)	0.61	(0.17)	0.62	(0.19)
Vitamin B2 (mg/1000 kcal)	0.64	(0.13)	0.67	(0.15)	0.70	(0.17)	0.70	(0.17)	0.67	(0.17)	0.68	(0.16)
Vitamin C (mg/1000 kcal)	56.4	(22.8)	66.4	(26.3)	79.7	(41.0)	81.8	(32.2)	75.0	(29.7)	71.3	(32.4)
Niacin (mg/1000 kcal)	7.8	(1.4)	8.4	(1.6)	8.5	(1.7)	8.3	(1.8)	8.1	(1.7)	8.2	(1.7)
Vitamin E (mg/1000 kcal)	4.7	(0.9)	4.8	(1.0)	5.0	(1.1)	4.8	(1.2)	4.7	(1.2)	4.8	(1.1)
Total dietary fiber (g/1000 kcal)	7.0	(1.5)	7.8	(1.9)	8.9	(2.3)	9.4	(2.3)	9.1	(2.4)	8.4	(2.3)
Cholesterol (mg/1000 kcal)	209	(56)	208	(55)	204	(60)	188	(61)	184	(61)	200	(59)
Saturated fatty acid (%kcal)	7.4	(1.4)	6.9	(1.4)	6.2	(1.4)	5.9	(1.4)	5.6	(1.5)	6.5	(1.5)
Monounsaturated fatty acid (%kcal)	9.7	(1.7)	9.3	(1.7)	8.5	(1.9)	7.9	(1.9)	7.4	(1.8)	8.7	(2.0)
Polyunsaturated fatty acid (%kcal)	6.5	(1.3)	6.3	(1.3)	6.1	(1.4)	5.7	(1.5)	5.4	(1.4)	6.1	(1.4)
Total n-3 polyunsaturated fatty acid (%kcal)	1.3	(0.3)	1.3	(0.3)	1.3	(0.4)	1.3	(0.4)	1.2	(0.4)	1.3	(0.4)
Total n-6 polyunsaturated fatty acid (%kcal)	5.1	(1.0)	4.9	(1.1)	4.7	(1.2)	4.4	(1.2)	4.2	(1.1)	4.7	(1.2)
Total trans fatty acid (%kcal)	0.5	(0.2)	0.4	(0.2)	0.3	(0.2)	0.3	(0.2)	0.3	(0.2)	0.4	(0.2)

Nutrient intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B7. Food group intakes estimated by proportional distribution, expressed as caloric densities, NIPPON DATA90 Nutrition Study, men

(n)	Men Ages 30–39 (660)		Men Ages 40–49 (836)		Men Ages 50–59 (793)		Men Ages 60–69 (708)		Men ages 70– (491)		Total (3488)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/1000 kcal)	139.6	(39.4)	141.7	(41.3)	146.0	(47.1)	144.5	(45.7)	152.3	(54.2)	144.3	(45.4)
Vegetable food (g/1000 kcal)	512.9	(83.7)	524.4	(87.0)	534.2	(91.6)	534.7	(91.5)	534.7	(83.9)	528.0	(88.3)
Cereal (g/1000 kcal)	149.0	(25.5)	145.0	(27.1)	144.4	(28.0)	148.5	(31.4)	148.4	(29.8)	146.8	(28.4)
Rice (g/1000 kcal)	106.2	(27.2)	109.3	(28.2)	115.8	(30.6)	115.0	(33.6)	114.3	(34.8)	112.0	(30.9)
Flour (g/1000 kcal)	42.9	(23.5)	36.7	(22.5)	30.4	(23.5)	35.2	(27.7)	35.1	(25.7)	35.9	(24.8)
Nuts (g/1000 kcal)	0.5	(1.3)	0.5	(1.5)	0.8	(2.1)	0.8	(1.8)	0.9	(2.1)	0.7	(1.8)
Potatoes (g/1000 kcal)	26.1	(14.5)	25.9	(14.2)	29.8	(18.8)	32.6	(20.9)	35.9	(23.0)	29.6	(18.6)
Sugar and sweetener (g/1000 kcal)	4.6	(3.2)	5.0	(3.4)	5.3	(3.9)	5.6	(3.9)	6.0	(4.5)	5.3	(3.8)
Sweets and snacks (g/1000 kcal)	5.3	(5.7)	5.0	(5.6)	3.9	(5.5)	6.7	(8.7)	9.3	(11.2)	5.8	(7.5)
Fats and oils (g/1000 kcal)	9.6	(4.1)	8.1	(3.8)	7.2	(3.5)	6.7	(3.8)	5.3	(3.4)	7.5	(4.0)
Soybean and legumes (g/1000 kcal)	29.8	(16.8)	32.8	(18.6)	39.9	(21.9)	42.9	(22.9)	44.7	(26.1)	37.6	(21.9)
Fruit (g/1000 kcal)	31.9	(23.4)	44.3	(30.9)	52.7	(35.6)	64.4	(45.0)	80.3	(52.6)	53.0	(40.7)
Green and yellow vegetable (g/1000 kcal)	32.5	(17.7)	33.2	(18.1)	39.8	(26.4)	42.8	(26.8)	42.6	(25.1)	37.9	(23.4)
Other vegetable (g/1000 kcal)	75.8	(29.9)	79.1	(30.4)	84.3	(34.0)	90.2	(36.8)	87.5	(40.0)	83.1	(34.3)
Mushroom (g/1000 kcal)	4.2	(4.9)	5.1	(5.5)	6.4	(7.5)	5.7	(6.8)	5.4	(6.8)	5.4	(6.4)
Sea algae (g/1000 kcal)	2.6	(2.9)	3.0	(3.3)	3.7	(4.3)	3.7	(5.5)	3.7	(4.7)	3.3	(4.2)
Condiments and beverages (g/1000 kcal)	129.9	(104.4)	126.1	(107.4)	106.1	(90.5)	81.0	(67.6)	63.5	(51.1)	104.3	(92.5)
Fish and shellfish (g/1000 kcal)	45.5	(19.6)	53.7	(23.0)	61.3	(26.4)	57.7	(23.9)	55.9	(27.8)	55.0	(24.7)
Meat (g/1000 kcal)	37.5	(16.7)	36.0	(15.1)	28.9	(15.3)	24.9	(13.8)	21.8	(13.8)	30.4	(16.1)
Egg (g/1000 kcal)	20.0	(9.4)	19.8	(9.1)	19.7	(9.4)	19.1	(9.9)	20.0	(11.1)	19.7	(9.7)
Milk and dairy products (g/1000 kcal)	36.3	(25.2)	33.1	(25.1)	37.3	(37.0)	43.6	(34.9)	55.4	(45.8)	39.9	(34.3)
Other foods (g/1000 kcal)	2.8	(3.8)	2.5	(3.7)	1.5	(2.6)	1.0	(2.4)	1.1	(2.1)	1.8	(3.2)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B8. Food group intakes estimated by proportional distribution, expressed as caloric densities, NIPPON DATA90 Nutrition Study, women

(n)	Women Ages 30–39 (1031)		Women Ages 40–49 (1171)		Women Ages 50–59 (1035)		Women Ages 60–69 (915)		Women ages 70– (702)		Total (4854)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Animal food (g/1000 kcal)	163.7	(45.4)	163.7	(46.0)	165.0	(52.2)	159.9	(53.2)	159.1	(58.3)	162.6	(50.5)
Vegetable food (g/1000 kcal)	472.7	(72.9)	506.3	(81.7)	533.6	(91.2)	553.6	(88.1)	539.2	(91.4)	518.7	(89.5)
Cereal (g/1000 kcal)	142.5	(24.5)	137.7	(24.2)	137.8	(30.9)	142.5	(30.1)	150.7	(32.4)	141.5	(28.5)
Rice (g/1000 kcal)	87.1	(22.8)	91.5	(23.2)	97.1	(29.6)	104.9	(32.0)	116.8	(34.4)	98.0	(29.8)
Flour (g/1000 kcal)	52.0	(26.1)	42.8	(23.8)	38.9	(27.7)	37.7	(28.0)	35.0	(27.2)	41.8	(27.1)
Nuts (g/1000 kcal)	0.6	(1.6)	0.8	(2.2)	0.9	(2.5)	1.0	(2.2)	0.9	(2.5)	0.8	(2.2)
Potatoes (g/1000 kcal)	30.8	(16.0)	32.1	(19.3)	35.4	(22.1)	41.4	(26.4)	41.5	(27.5)	35.6	(22.5)
Sugar and sweetener (g/1000 kcal)	5.8	(3.5)	6.2	(4.5)	6.2	(4.2)	6.5	(5.2)	7.0	(5.1)	6.3	(4.5)
Sweets and snacks (g/1000 kcal)	12.2	(11.7)	12.7	(13.9)	11.5	(15.0)	10.5	(13.1)	10.8	(13.4)	11.7	(13.5)
Fats and oils (g/1000 kcal)	10.6	(4.3)	9.6	(4.3)	7.8	(4.0)	7.2	(4.2)	6.2	(3.7)	8.5	(4.4)
Soybean and legumes (g/1000 kcal)	31.0	(15.9)	35.8	(21.6)	42.8	(22.7)	45.9	(25.3)	45.9	(26.2)	39.6	(23.0)
Fruit (g/1000 kcal)	55.3	(37.4)	76.1	(48.9)	95.5	(62.9)	100.9	(61.7)	89.9	(63.3)	82.5	(57.3)
Green and yellow vegetable (g/1000 kcal)	39.0	(20.8)	43.5	(25.1)	51.3	(30.1)	53.3	(32.7)	52.0	(32.3)	47.3	(28.6)
Other vegetable (g/1000 kcal)	85.5	(32.4)	92.2	(35.5)	98.7	(39.9)	99.1	(41.8)	96.9	(44.9)	94.2	(38.9)
Mushroom (g/1000 kcal)	5.1	(5.9)	6.4	(7.1)	7.3	(8.3)	6.4	(7.8)	5.3	(6.8)	6.2	(7.3)
Sea algae (g/1000 kcal)	2.6	(3.0)	3.7	(4.2)	4.5	(5.3)	4.6	(6.1)	4.7	(6.0)	3.9	(5.0)
Condiments and beverages (g/1000 kcal)	51.7	(42.2)	51.2	(46.1)	42.2	(39.5)	39.6	(36.6)	34.1	(28.5)	44.8	(40.4)
Fish and shellfish (g/1000 kcal)	44.3	(18.8)	52.8	(21.9)	57.8	(24.3)	54.8	(23.5)	56.3	(26.1)	52.9	(23.3)
Meat (g/1000 kcal)	35.1	(15.7)	34.7	(14.8)	27.6	(15.1)	23.9	(13.7)	21.4	(13.9)	29.3	(15.7)
Egg (g/1000 kcal)	23.0	(10.6)	21.0	(9.6)	20.8	(10.2)	19.8	(10.7)	20.6	(11.3)	21.1	(10.5)
Milk and dairy products (g/1000 kcal)	60.8	(36.3)	55.5	(40.5)	59.1	(49.9)	61.9	(49.1)	61.4	(54.9)	59.5	(45.8)
Other foods (g/1000 kcal)	3.4	(4.7)	2.5	(4.0)	1.6	(3.0)	1.7	(3.0)	1.3	(2.4)	2.2	(3.7)

Food group intakes of each family member were estimated by dividing the household intake data of National Nutrition Survey in 1990 using average intakes by age and sex groups calculated for National Nutrition Survey in 1995.

Table B9. Nutrient intakes estimated by simple density calculation, NIPPON DATA90 Nutrition Study, 8342 men and women

	Mean	(SD)
Total energy (kcal/day)	2042	(413)
Total protein (%kcal)	15.6	(1.9)
Animal protein (%kcal)	9.4	(2.2)
Vegetable protein (%kcal)	7.1	(1.0)
Total fat (%kcal)	24.4	(4.9)
Carbohydrate (%kcal)	57.4	(5.7)
Sucrose (g/1000 kcal)	4.5	(2.3)
Starch (g/1000 kcal)	38.4	(6.3)
Calcium (mg/1000 kcal)	268.5	(78.3)
Magnesium (mg/1000 kcal)	135.5	(30.1)
Iron (mg/1000 kcal)	5.6	(1.2)
Sodium (mg/kcal)	2506	(715)
Potassium (mg/1000 kcal)	1380	(274)
Phosphorus (mg/1000 kcal)	589	(70)
Vitamin A (IU/1000 kcal)	1315	(1278)
Vitamin B1 (mg/1000 kcal)	0.61	(0.18)
Vitamin B2 (mg/1000 kcal)	0.66	(0.16)
Vitamin C (mg/1000 kcal)	62.1	(28.2)
Niacin (mg/1000 kcal)	8.2	(1.7)
Vitamin E (mg/1000 kcal)	4.5	(1.0)
Total dietary fiber (g/1000 kcal)	7.4	(2.0)
Cholesterol (mg/1000 kcal)	202	(57)
Saturated fatty acid (%kcal)	6.5	(1.5)
Monounsaturated fatty acid (%kcal)	8.7	(1.9)
Polyunsaturated fatty acid (%kcal)	6.1	(1.4)
Total n-3 polyunsaturated fatty acid (%kcal)	1.3	(0.4)
Total n-6 polyunsaturated fatty acid (%kcal)	4.7	(1.1)
Total trans fatty acid (%kcal)	0.4	(0.2)

Total energy per person per day was calculated by dividing total energy per household with number of household member, and other nutrient intakes expressed in percent energy intake or caloric densities were calculated using total energy and nutrient intakes of the household.

Table B10. Nutrient intakes estimated by simple density calculation, NIPPON DATA90 Nutrition Study, 8342 men and women

	Mean	(SD)
Animal food (g/1000 kcal)	165.3	(52.5)
Vegetable food (g/1000 kcal)	502.8	(88.3)
Cereal (g/1000 kcal)	141.7	(28.2)
Rice (g/1000 kcal)	99.9	(28.8)
Flour (g/1000 kcal)	40.6	(26.1)
Nuts (g/1000 kcal)	0.7	(2.0)
Potatoes (g/1000 kcal)	33.2	(20.5)
Sugar and sweetener (g/1000 kcal)	5.5	(4.0)
Sweets and snacks (g/1000 kcal)	9.9	(11.6)
Fats and oils (g/1000 kcal)	8.2	(4.1)
Soybean and legumes (g/1000 kcal)	36.0	(21.0)
Fruit (g/1000 kcal)	65.7	(46.2)
Green and yellow vegetable (g/1000 kcal)	40.4	(25.3)
Other vegetable (g/1000 kcal)	83.2	(34.8)
Mushroom (g/1000 kcal)	5.4	(6.4)
Sea algae (g/1000 kcal)	3.3	(4.2)
Condiments and beverages (g/1000 kcal)	67.9	(61.5)
Fish and shellfish (g/1000 kcal)	49.4	(22.4)
Meat (g/1000 kcal)	32.2	(16.8)
Egg (g/1000 kcal)	20.8	(10.2)
Milk and dairy products (g/1000 kcal)	62.5	(47.8)
Other foods (g/1000 kcal)	2.2	(3.6)

Food group intakes were calculated using total energy intake and food group intakes of the household.

中年期の食習慣と将来の日常活動度(ADL)の変化について

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目的

先進諸国では高齢者人口割合が増加の一途を示す。わが国での65歳以上の人口割合は2005年に世界一となり、現在では約21%に達している。わが国の平均寿命と健康寿命ともに世界最長であるが、その差は約7年ある。すなわち日本人は死亡前に平均7年間の日常活動度(ADL)が低下した要介護状態にあることになる。高齢者のADL低下を予防する環境因子の中で食習慣が重要な一要素である。本研究の目的は中年期の食習慣と高齢期のADL低下と総死亡の関連について検討することにある。

方法

1980年に実施された国民栄養調査をもとに19年間の死因追跡を行ったNIPPON DATA80のデータセットを用いた。1980年に無作為抽出した全国300ヵ所において30才以上の男女を対象として検診を行い、食事栄養調査、生活習慣調査と血液生化学検査を行った。今回の解析対象は1999年にADL調査を行った当時65歳以上の男女1,889人と1980年から1990年までに死亡した427人を対象とした。1980年の追跡開始時に冠動脈疾患、脳卒中既往がある者は除外した。

食品摂取頻度のうち、卵、魚、肉の摂取頻度について中央値近傍で2群に分けた。卵と魚は1日1回摂取を境界とし、肉は2日1回摂取を境界とした。ADL低下は食事、着衣、入浴、排泄、移動のいずれかに介助が必要な場合と定義した(Katz et al. 1970)。多変量ロジスティック解析を用いてADL低下発生とADL低下発生または死亡の2評価項目に及ぼす食品摂取の影響を検討した。調整因子は年齢、性調整；モデル1ではさらにBMI、喫煙、飲酒、高血圧、糖尿病；モデル2ではさらに血清アルブミンおよび総コレステロール濃度；モデル3ではさらに職種(専門職か否か)、都市在住か否かに関して調整した。