

表2C. 平成17年国民健康・栄養調査地域ブロック別集計データの誤差率—【食塩摂取量(g/日)の平均値】

	北海道		東北		関東Ⅰ		関東Ⅱ		北陸		東海		近畿Ⅰ		近畿Ⅱ		中国		四国		北九州		南九州																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
男																										20-29歳	12	20.3%	28	9.7%	95	4.6%	33	11.5%	19	6.8%	50	6.7%	49	5.3%	18	6.8%	22	7.6%	13	4.3%	39	5.2%	21	10.3%			30-39歳	18	9.9%	29	7.2%	148	2.8%	40	5.7%	25	8.2%	65	6.2%	53	5.1%	15	10.6%	34	8.7%	15	7.2%	44	11.4%	22	11.5%			40-49歳	21	8.3%	36	7.9%	123	4.2%	47	2.6%	28	8.6%	62	3.6%	55	5.9%	12	11.3%	30	8.7%	16	6.1%	45	6.4%	25	7.5%			50-59歳	28	9.7%	42	5.6%	149	2.7%	61	4.8%	28	6.9%	79	5.0%	66	6.7%	25	6.1%	43	7.4%	29	7.7%	49	5.8%	24	12.3%			60-69歳	25	6.8%	48	6.0%	177	2.8%	43	4.4%	33	6.5%	100	4.1%	80	5.6%	25	13.5%	35	5.4%	22	9.9%	39	6.1%	41	5.9%			70歳以上	32	5.1%	53	4.3%	130	3.9%	72	7.4%	29	10.4%	82	4.7%	65	6.3%	18	12.6%	46	4.8%	38	3.6%	55	5.6%	55	8.0%			40-74歳(再掲)	87	5.3%	146	2.6%	513	1.8%	186	3.0%	105	3.7%	288	2.4%	210	3.9%	86	3.1%	131	4.0%	89	2.1%	158	4.2%	110	4.5%			計	136	3.3%	236	3.1%	822	1.4%	296	3.0%	162	4.2%	438	2.2%	348	3.0%	111	2.7%	210	3.4%	133	1.8%	271	3.9%	188	4.6%			女																										20-29歳	12	13.3%	20	7.6%	91	3.8%	37	8.6%	17	7.5%	61	6.9%	53	5.5%	23	9.4%	27	7.6%	11	15.7%	36	5.2%	16	10.7%			30-39歳	20	6.5%	35	4.9%	164	2.4%	47	5.4%	27	6.0%	65	4.2%	57	4.8%	16	5.4%	31	6.2%	16	8.3%	44	3.5%	23	3.0%			40-49歳	25	7.4%	45	7.5%	151	3.3%	56	4.5%	35	6.3%	56	3.3%	71	4.2%	16	5.2%	34	10.7%	21	8.2%	55	4.3%	25	9.3%			50-59歳	33	7.9%	50	3.9%	165	2.8%	59	5.1%	32	8.0%	103	5.7%	70	4.0%	30	4.9%	53	4.4%	30	8.3%	54	5.5%	44	6.9%			60-69歳	24	8.6%	52	5.2%	205	2.8%	65	6.9%	42	9.4%	119	3.2%	76	5.6%	24	10.5%	54	8.9%	29	3.6%	39	5.3%	49	8.0%			70歳以上	39	7.1%	80	3.9%	163	3.1%	79	3.8%	37	7.0%	132	4.2%	84	5.3%	14	11.8%	58	5.0%	38	6.0%	77	3.8%	70	7.1%			40-74歳(再掲)	98	5.1%	171	3.1%	585	1.7%	204	3.0%	124	5.5%	324	2.1%	250	3.1%	74	4.7%	160	5.6%	95	3.5%	179	2.3%	143	6.1%			計	153	4.9%	282	2.9%	939	1.5%	343	3.1%	190	4.4%	536	2.4%	411	2.7%	123	5.2%	257	4.1%	145	4.4%	305	1.7%	227	4.9%			男女計																										20-29歳	24	11.0%	48	5.7%	186	3.6%	70	7.6%	36	6.8%	111	4.2%	102	3.8%	41	7.4%	49	5.4%	24	7.2%	75	3.5%	37	8.5%			30-39歳	38	5.8%	64	5.4%	312	1.8%	87	4.1%	52	5.3%	130	4.5%	110	3.4%	31	5.9%	65	6.1%	31	6.3%	88	6.7%	45	9.5%			40-49歳	46	6.5%	81	7.0%	274	2.8%	103	2.3%	63	6.5%	118	2.5%	126	4.4%	28	6.7%	84	7.6%	37	6.7%	100	3.5%	50	7.1%			50-59歳	61	7.9%	92	3.8%	314	2.5%	120	4.0%	60	7.2%	182	4.7%	136	3.9%	55	4.3%	96	3.5%	59	5.6%	103	4.2%	68	8.4%			60-69歳	49	6.2%	100	5.1%	382	2.6%	108	5.1%	75	7.5%	219	3.2%	136	4.6%	49	12.2%	89	7.1%	51	6.4%	78	4.5%	90	5.9%			70歳以上	71	5.7%	133	3.4%	293	2.9%	151	5.3%	68	6.8%	214	3.1%	149	5.3%	30	6.0%	104	3.8%	76	2.7%	132	3.0%	125	7.2%			40-74歳(再掲)	185	4.8%	317	2.4%	1098	1.5%	390	2.7%	229	4.4%	612	1.9%	460	3.1%	140	3.8%	291	4.0%	184	2.1%	337	2.6%	253	5.1%			計	289	3.7%	518	2.6%	1761	1.3%	639	2.7%	352	4.2%	974	1.9%	759	2.5%	234	3.8%	467	3.0%	278	2.5%	576	2.2%	415	4.5%		
20-29歳	12	20.3%	28	9.7%	95	4.6%	33	11.5%	19	6.8%	50	6.7%	49	5.3%	18	6.8%	22	7.6%	13	4.3%	39	5.2%	21	10.3%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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40-49歳	21	8.3%	36	7.9%	123	4.2%	47	2.6%	28	8.6%	62	3.6%	55	5.9%	12	11.3%	30	8.7%	16	6.1%	45	6.4%	25	7.5%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
50-59歳	28	9.7%	42	5.6%	149	2.7%	61	4.8%	28	6.9%	79	5.0%	66	6.7%	25	6.1%	43	7.4%	29	7.7%	49	5.8%	24	12.3%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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70歳以上	32	5.1%	53	4.3%	130	3.9%	72	7.4%	29	10.4%	82	4.7%	65	6.3%	18	12.6%	46	4.8%	38	3.6%	55	5.6%	55	8.0%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
40-74歳(再掲)	87	5.3%	146	2.6%	513	1.8%	186	3.0%	105	3.7%	288	2.4%	210	3.9%	86	3.1%	131	4.0%	89	2.1%	158	4.2%	110	4.5%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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40-74歳(再掲)	98	5.1%	171	3.1%	585	1.7%	204	3.0%	124	5.5%	324	2.1%	250	3.1%	74	4.7%	160	5.6%	95	3.5%	179	2.3%	143	6.1%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
計	153	4.9%	282	2.9%	939	1.5%	343	3.1%	190	4.4%	536	2.4%	411	2.7%	123	5.2%	257	4.1%	145	4.4%	305	1.7%	227	4.9%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
男女計																										20-29歳	24	11.0%	48	5.7%	186	3.6%	70	7.6%	36	6.8%	111	4.2%	102	3.8%	41	7.4%	49	5.4%	24	7.2%	75	3.5%	37	8.5%			30-39歳	38	5.8%	64	5.4%	312	1.8%	87	4.1%	52	5.3%	130	4.5%	110	3.4%	31	5.9%	65	6.1%	31	6.3%	88	6.7%	45	9.5%			40-49歳	46	6.5%	81	7.0%	274	2.8%	103	2.3%	63	6.5%	118	2.5%	126	4.4%	28	6.7%	84	7.6%	37	6.7%	100	3.5%	50	7.1%			50-59歳	61	7.9%	92	3.8%	314	2.5%	120	4.0%	60	7.2%	182	4.7%	136	3.9%	55	4.3%	96	3.5%	59	5.6%	103	4.2%	68	8.4%			60-69歳	49	6.2%	100	5.1%	382	2.6%	108	5.1%	75	7.5%	219	3.2%	136	4.6%	49	12.2%	89	7.1%	51	6.4%	78	4.5%	90	5.9%			70歳以上	71	5.7%	133	3.4%	293	2.9%	151	5.3%	68	6.8%	214	3.1%	149	5.3%	30	6.0%	104	3.8%	76	2.7%	132	3.0%	125	7.2%			40-74歳(再掲)	185	4.8%	317	2.4%	1098	1.5%	390	2.7%	229	4.4%	612	1.9%	460	3.1%	140	3.8%	291	4.0%	184	2.1%	337	2.6%	253	5.1%			計	289	3.7%	518	2.6%	1761	1.3%	639	2.7%	352	4.2%	974	1.9%	759	2.5%	234	3.8%	467	3.0%	278	2.5%	576	2.2%	415	4.5%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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計	289	3.7%	518	2.6%	1761	1.3%	639	2.7%	352	4.2%	974	1.9%	759	2.5%	234	3.8%	467	3.0%	278	2.5%	576	2.2%	415	4.5%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

欠損値の扱い方の違い等により、公表値とは少し異なることがある。

表2D. 平成17年国民健康・栄養調査地域ブロック別集計データの誤差率—【食塩摂取量<10g/日の者の割合】

	北海道		東北		関東Ⅰ		関東Ⅱ		北陸		東海		近畿Ⅰ		近畿Ⅱ		中国		四国		北九州		南九州																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率	人数	誤差率																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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20-29歳	12	50.7%	28	16.1%	95	14.5%	33	19.8%	19	50.2%	50	22.7%	49	13.1%	18	15.2%	22	16.6%	13	12.2%	39	13.7%	21	12.2%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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40-74歳(再掲)	87	15.4%	146	8.8%	513	6.2%	186	13.1%	105	11.8%	288	9.9%	210	10.6%	86	14.5%	131	16.7%	89	15.6%	158	13.6%	110	12.1%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
計	136	9.5%	236	8.4%	822	5.1%	296	10.2%	162	11.3%	438	8.2%	348	8.0%	111	9.4%	210	13.8%	133	9.9%	271	9.8%	188	10.8%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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60-69歳	24	24.4%	52	20.2%	205	9.1%	65	18.9%	42	14.7%	119	10.9%	76	16.0%	24	18.6%	54	17.1%	29	35.7%	39	16.6%	49	15.8%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
70歳以上	39	14.5%	80	16.3%	163	9.8%	79	11.8%	37	19.0%	132	10.4%	84	11.3%	14	20.6%	58	7.2%	38	13.4%	77	9.4%	70	13.8%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
40-74歳(再掲)	98	9.3%	171	10.6%	585	6.2%	204	8.4%	124	13.0%	324	6.0%	250	7.2%	74	8.2%	160	11.6%	95	13.8%	179	5.5%	143	8.8%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
計	153	8.5%	282	8.9%	939	4.7%	343	8.1%	190	9.9%	536	4.8%	411	5.5%	123	6.8%	257	8.0%	145	11.5%	305	3.7%	227	5.4%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
男女計																										20-29歳	24	17.2%	48	12.7%	186	8.5%	70	13.1%	36	27.2%	111	11.6%	102	9.2%	41	12.4%	49	17.0%	24	16.7%	75	9.3%	37	12.1%			30-39歳	38	16.5%	64	16.2%	312	5.5%	87	10.2%	52	19.4%	130	10.3%	110	8.5%	31	9.2%	65	13.7%	31	14.4%	88	12.2%	45	15.8%			40-49歳	46	10.2%	81	13.2%	274	8.3%	103	12.4%	63	20.4%	118	11.7%	126	9.5%	28	28.5%	84	15.0%	37	20.2%	100	7.5%	50	18.3%			50-59歳	61	20.7%	92	15.2%	314	7.5%	120	13.0%	60	36.7%	182	13.4%	136	9.9%	55	10.5%	96	12.5%	59	9.9%	103	16.7%	68	15.6%			60-69歳	49	23.3%	100	13.7%	382	8.8%	108	15.2%	75	13.1%	219	9.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
20-29歳	24	17.2%	48	12.7%	186	8.5%	70	13.1%	36	27.2%	111	11.6%	102	9.2%	41	12.4%	49	17.0%	24	16.7%	75	9.3%	37	12.1%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
30-39歳	38	16.5%	64	16.2%	312	5.5%	87	10.2%	52	19.4%	130	10.3%	110	8.5%	31	9.2%	65	13.7%	31	14.4%	88	12.2%	45	15.8%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
40-49歳	46	10.2%	81	13.2%	274	8.3%	103	12.4%	63	20.4%	118	11.7%	126	9.5%	28	28.5%	84	15.0%	37	20.2%	100	7.5%	50	18.3%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
50-59歳	61	20.7%	92	15.2%	314	7.5%	120	13.0%	60	36.7%	182	13.4%	136	9.9%	55	10.5%	96	12.5%	59	9.9%	103	16.7%	68	15.6%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
60-69歳	49	23.3%	100	13.7%	382	8.8%	108	15.2%	75	13.1%	219	9.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

表2E. 平成17年国民健康・栄養調査地域ブロック別集計データの誤差率—【「メネリックス」が強く疑われる者の割合】

	北海道	東北	関東Ⅰ	関東Ⅱ	北陸	東海	近畿Ⅰ	近畿Ⅱ	中国	四国	北九州	南九州
	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率
男												
20-29歳	0 -	7 -	14 -	9 93.3%	8 -	15 -	9 -	8 -	10 -	10 -	15 -	11 -
30-39歳	3 97.6%	13 -	27 70.9%	13 96.5%	6 -	28 67.1%	12 98.2%	7 95.8%	12 -	7 -	19 58.8%	10 -
40-49歳	11 52.7%	18 57.1%	30 41.2%	11 -	11 -	23 54.6%	18 -	6 94.3%	8 -	5 89.4%	17 47.6%	15 -
50-59歳	10 99.3%	18 72.0%	35 23.3%	27 42.9%	17 90.5%	39 20.0%	16 48.0%	17 25.6%	20 35.2%	17 31.3%	25 36.5%	17 37.1%
60-69歳	17 63.7%	35 44.6%	91 13.4%	23 30.7%	18 29.3%	67 22.2%	38 26.4%	18 17.6%	26 45.6%	13 49.0%	22 41.7%	27 15.2%
70歳以上	22 36.1%	38 18.1%	79 15.3%	41 20.9%	16 31.0%	50 16.2%	42 28.7%	10 40.3%	33 16.3%	29 33.2%	47 35.6%	41 11.9%
40-74歳(再掲)	46 46.5%	86 30.9%	193 8.8%	80 21.3%	59 21.0%	163 14.0%	95 18.4%	43 11.7%	73 24.6%	52 24.7%	86 19.9%	73 13.0%
計	63 33.9%	129 17.8%	276 7.7%	124 18.2%	76 17.5%	222 11.9%	135 18.0%	66 15.1%	109 23.9%	81 28.6%	145 21.8%	121 12.0%
女												
20-29歳	3 -	9 -	26 -	14 -	6 -	24 -	15 -	11 -	14 -	6 -	15 -	9 -
30-39歳	7 -	26 -	62 66.4%	29 95.4%	13 -	39 98.0%	30 -	11 -	21 -	12 -	21 99.9%	15 86.6%
40-49歳	13 -	19 98.7%	70 53.5%	34 -	20 -	29 -	41 -	11 -	27 88.1%	12 59.5%	31 84.8%	21 -
50-59歳	23 96.3%	37 56.0%	84 37.5%	38 -	21 49.2%	67 69.9%	32 70.2%	25 58.0%	40 72.9%	16 94.6%	34 48.1%	34 -
60-69歳	15 60.0%	42 29.2%	118 33.4%	51 33.4%	32 31.6%	84 32.8%	47 37.3%	13 84.3%	39 48.1%	23 20.5%	29 31.1%	37 22.4%
70歳以上	26 43.3%	48 23.9%	88 22.7%	54 28.3%	22 23.8%	77 22.9%	44 46.0%	11 -	44 21.5%	27 60.0%	52 23.0%	52 22.8%
40-74歳(再掲)	61 37.3%	113 19.1%	313 17.2%	142 28.5%	84 38.9%	212 26.4%	140 37.9%	53 50.7%	125 30.2%	63 14.5%	116 20.5%	111 26.2%
計	87 35.3%	181 14.4%	448 13.9%	220 17.3%	114 32.2%	320 20.6%	209 32.8%	82 49.7%	185 27.7%	96 26.4%	182 19.8%	168 23.0%
男女計												
20-29歳	3 -	16 -	40 -	23 93.1%	14 -	39 -	24 -	19 -	24 -	16 -	30 -	20 -
30-39歳	10 -	39 94.7%	89 48.6%	42 68.2%	19 -	67 52.6%	42 97.3%	18 93.1%	33 -	19 -	40 54.6%	25 49.9%
40-49歳	24 48.0%	37 53.9%	100 36.5%	45 -	31 -	52 57.6%	59 -	17 66.8%	35 72.6%	17 58.4%	48 23.2%	36 -
50-59歳	33 70.6%	55 28.9%	119 24.6%	65 40.1%	38 52.4%	106 19.0%	48 42.7%	42 29.0%	60 45.6%	33 39.5%	59 29.3%	51 29.4%
60-69歳	32 52.4%	77 25.6%	209 11.8%	74 21.8%	50 19.9%	151 20.5%	85 19.8%	31 33.6%	65 30.8%	36 13.0%	51 26.8%	64 17.9%
70歳以上	48 23.6%	86 16.0%	167 12.4%	95 18.4%	38 12.9%	127 11.7%	86 30.4%	21 52.1%	77 16.7%	56 34.7%	99 20.3%	93 10.3%
40-74歳(再掲)	107 38.6%	199 21.5%	506 7.2%	222 18.8%	143 24.6%	375 13.3%	235 15.8%	96 19.6%	198 24.1%	115 14.6%	202 10.4%	184 12.7%
計	150 30.2%	310 13.5%	724 6.8%	344 16.7%	190 22.2%	542 11.4%	344 16.8%	148 22.9%	294 23.3%	177 22.9%	327 12.6%	289 11.7%

欠損値の扱い方の違い等により、公表値とは少し異なることがある。

表2F. 平成17年国民健康・栄養調査地域ブロック別集計データの誤差率—【「メネリックス」が強く疑われる者予備群の割合】

	北海道	東北	関東Ⅰ	関東Ⅱ	北陸	東海	近畿Ⅰ	近畿Ⅱ	中国	四国	北九州	南九州
	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率	人数 誤差率
男												
20-29歳	0 -	7 -	14 61.5%	9 64.4%	8 68.1%	15 51.1%	9 -	8 -	10 64.3%	10 51.0%	15 63.0%	11 -
30-39歳	3 97.6%	13 27.1%	27 34.9%	13 27.6%	6 -	28 34.1%	12 98.2%	7 58.9%	12 52.7%	7 -	19 59.6%	10 38.2%
40-49歳	11 44.2%	18 17.2%	30 21.8%	11 43.5%	11 40.4%	23 32.2%	18 46.4%	6 11.8%	8 48.8%	5 44.7%	17 23.1%	15 62.7%
50-59歳	10 29.3%	18 15.2%	35 11.3%	27 25.7%	17 25.1%	39 15.5%	16 17.5%	17 13.0%	20 26.7%	17 31.6%	25 18.4%	17 27.5%
60-69歳	17 23.4%	35 21.3%	91 8.1%	23 20.9%	18 19.9%	67 10.9%	38 17.0%	18 15.2%	26 14.3%	13 28.5%	22 24.0%	27 11.2%
70歳以上	22 18.8%	38 14.4%	79 9.3%	41 16.4%	16 13.1%	50 13.5%	42 16.5%	10 42.4%	33 10.8%	29 13.9%	47 19.5%	41 10.8%
40-74歳(再掲)	46 19.1%	86 13.0%	193 5.4%	80 10.2%	59 19.4%	163 10.3%	95 10.6%	43 8.4%	73 12.0%	52 18.8%	86 13.6%	73 9.0%
計	63 15.6%	129 11.0%	276 4.6%	124 8.9%	76 16.8%	222 10.0%	135 9.8%	66 14.4%	109 13.3%	81 19.6%	145 13.4%	121 7.7%
女												
20-29歳	3 -	9 -	26 -	14 -	6 -	24 65.4%	15 -	11 -	14 -	6 -	15 -	9 -
30-39歳	7 -	26 -	62 45.6%	29 54.4%	13 -	39 69.4%	30 69.2%	11 -	21 96.5%	12 86.6%	21 99.9%	15 60.5%
40-49歳	13 -	19 98.7%	70 41.9%	34 65.9%	20 65.3%	29 -	41 -	11 53.8%	27 62.1%	12 59.5%	31 23.0%	21 50.8%
50-59歳	23 57.3%	37 22.7%	84 25.2%	38 58.5%	21 31.9%	67 31.5%	32 54.5%	25 38.1%	40 27.6%	16 51.9%	34 28.5%	34 35.2%
60-69歳	15 40.4%	42 22.2%	118 17.0%	51 23.2%	32 25.1%	84 21.4%	47 25.7%	13 62.6%	39 38.5%	23 16.6%	29 22.3%	37 19.5%
70歳以上	26 20.2%	48 16.7%	88 16.8%	54 29.0%	22 27.8%	77 13.2%	44 24.7%	11 53.2%	44 15.5%	27 37.4%	52 15.9%	52 20.9%
40-74歳(再掲)	61 28.6%	113 12.0%	313 11.0%	142 19.6%	84 28.8%	212 18.1%	140 25.8%	53 27.8%	125 22.8%	63 19.4%	116 11.4%	111 16.3%
計	87 23.9%	181 7.2%	448 9.7%	220 15.2%	114 27.4%	320 12.7%	209 22.1%	82 22.2%	185 20.6%	96 23.9%	182 11.7%	168 14.6%
男女計												
20-29歳	3 -	16 -	40 69.0%	23 64.0%	14 71.8%	39 39.1%	24 -	19 -	24 89.8%	16 48.4%	30 62.6%	20 -
30-39歳	10 -	39 21.6%	89 29.2%	42 28.0%	19 74.6%	67 26.5%	42 54.8%	18 82.9%	33 45.4%	19 95.2%	40 60.3%	25 33.7%
40-49歳	24 39.5%	37 23.6%	100 24.9%	45 39.3%	31 42.7%	52 26.9%	59 50.0%	17 20.4%	35 46.4%	17 35.9%	48 20.5%	36 25.5%
50-59歳	33 27.5%	55 15.2%	119 14.6%	65 20.3%	38 23.3%	106 15.5%	48 24.1%	42 15.6%	60 27.5%	33 38.3%	59 18.3%	51 29.3%
60-69歳	32 24.8%	77 17.0%	209 8.6%	74 15.9%	50 18.4%	151 12.2%	85 16.8%	31 19.0%	65 17.6%	36 14.4%	51 19.1%	64 10.2%
70歳以上	48 14.5%	86 12.8%	167 9.1%	95 19.4%	38 12.6%	127 7.4%	86 13.0%	21 46.9%	77 8.1%	56 20.0%	99 13.7%	93 10.0%
40-74歳(再掲)	107 16.0%	199 10.3%	506 5.7%	222 10.1%	143 18.4%	375 9.9%	235 12.4%	96 10.1%	198 13.7%	115 16.0%	202 9.0%	184 9.8%
計	150 15.0%	310 7.4%	724 5.3%	344 9.7%	190 18.3%	542 8.0%	344 10.6%	148 14.0%	294 13.6%	177 18.7%	327 9.5%	289 7.9%

欠損値の扱い方の違い等により、公表値とは少し異なることがある。

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**Association between Vegetable Intake and Dietary Quality in
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Association between Vegetable Intake and Dietary Quality in Japanese Adults: A Secondary Analysis from the National Health and Nutrition Survey, 2003

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Summary Objective: To investigate dietary quality among Japanese adults with a high vegetable diet, to consider dietary recommendation for vegetable intake. Design and setting: In the cross-sectional study of the National Health and Nutrition Survey 2003, we conducted the secondary analyses. The food-weighing method in one-day assessed the dietary intake. From 11,630 subjects, 2,305 men and 2,312 non-pregnant/lactating women, aged 20–69 y, and with an energy intake between 1,500 and 3,712 kcal were selected. Associations between vegetable, nutrient-density, and food intake were analyzed according to tertile cutoff: low vegetable diet (LVD), medium vegetable diet (MVD), or high vegetable diet (HVD). Differences across subgroups were tested after age adjustment. Results: Mean vegetable intakes were 309 g for men and 318 g for women. Only 35% of Japanese met the vegetable intake (VI) recommendation of ≥ 350 g/d. VI had a positive association with age. Men 20–29 y-old and women 30–39 y-old were the subjects with the lowest VI. HVD subjects had higher intake for most food groups, whereas wheat in men; and wheat, sweets, and alcohol in women were negatively associated with VI. Main sources of energy for men and women with HVD were rice, wheat, and meat. HVD also had higher micronutrient-density. Conclusion: These analyses demonstrated the beneficial effects of HVD on dietary quality in the population studied. We concluded recommendations for adequate vegetable intake are expected to improve diet quality among Japanese adults, especially for the group aged 20–39.

Key Words Japanese, vegetable, dietary quality, recommendations

Unbalanced diet has been known for many years to play a key role as a risk factor for chronic diseases. What is apparent at the global level is that great changes have extended in the world since the second half of the 20th century, inducing major modifications in diet, first in industrial regions and more recently in developing countries. Traditional, largely plant origin food has been swiftly replaced by a high energy-dense diet with a substantial content of animal-based foods, fat, and sugar. According to the World Health Report 2002 (1), low fruit and vegetable intakes were estimated to cause about 31% of ischemic heart disease and 11% of strokes worldwide. Overall, it is estimated that up to 2.7 million lives could potentially be saved each year if fruit and vegetable consumption, which are sources of minerals and vitamins (2), were sufficiently increased (3). Vegetable consumption was associated with higher bone mineral density in the elderly (4, 5), reduction of cardiovascular disease risks (6, 7), cancer prevention and a decrease in all mortality (1, 3).

According to WHO, life expectancy in Japan is the highest in the world (8). One of the most important factors for increasing longevity could be their proper food habits with plant origin foods and fish. Furthermore, the "Japanese diet" is characterized by a large intake of diverse fresh vegetables, fish, and soy, and a low intake of red meat, in addition to the wide variety of foods in each meal (9, 10); thus, it may be related with the low prevalence of cardiovascular diseases (CVD), and obesity compared to countries such as the US (11–16).

In the year 2000, the Ministry of Health and Welfare Japan started "Health Japan 21," an initiative to promote health status in the 21st century (17). Focus areas that the Ministry had considered were the following: nutrition, physical exercise, smoking, alcohol, cardiovascular diseases, and cancer. The Ministry of Health set the levels of target values for those items to be achieved to the year 2010. One of the nutritional goals for Japanese adults is to increase the average of vegetable and green-yellow vegetable intakes reaching 350 and 120 g a day, respectively. However, recent data showed that vegetable intakes were below the recommendations, especially in the group aged 20 to 39 y. To

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Table 1. Vegetable consumption in Japanese adults according to age groups.

	Total Japanese		20-39 y-old		40-59 y-old		60-69 y-old	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Male	n 2,305		731		1,002		572	
Total vegetables (g)	309.2	3.7	276.7	6.5	302.7	5.5	362.0	7.3
G-Y vegetables (g)	102.0	1.9	90.9	3.3	96.6	2.8	125.7	3.7
Other vegetables (g)	181.0	2.6	166.2	4.7	177.6	4.0	205.7	5.3
Vegetable juice (g)	5.0	0.8	5.8	1.4	5.3	1.2	3.2	1.5
Pickles (g)	21.2	0.7	13.7	1.3	23.2	1.1	27.3	1.4
Female	n 2,312		623		1,067		622	
Total vegetables (g)	317.7	3.6	267.0	6.8	322.0	5.2	361.1	6.8
G-Y vegetables (g)	109.9	2.0	90.0	3.8	106.3	2.9	136.0	3.8
Other vegetables (g)	182.1	2.6	159.7	4.9	187.8	3.8	194.8	4.9
Vegetable juice (g)	6.0	0.8	6.2	1.5	7.5	1.2	3.2	1.5
Pickles (g)	19.7	0.7	11.2	1.3	20.4	1.0	27.1	1.3

Means with SE.

G-Y vegetables: green and yellow vegetables.

Table 2. Vegetable consumption according to Japanese vegetable recommendation.

	<350 g		≥350 g		p value
	Mean	SE	Mean	SE	
Male	n=1,490		n=815		
Age	46.0	0.4	50.2	0.5	0.00
Total vegetables (g)	205.5	2.8	498.7	3.8	0.00
G-Y vegetables (g)	67.1	2.0	165.8	2.7	0.00
Other vegetables (g)	120.4	2.5	291.7	3.4	0.00
Vegetable juices (g)	1.1	0.9	11.9	1.3	0.00
Pickles (g)	16.8	0.9	29.3	1.2	0.00
Female	n=1,493		n=819		
Age	46.9	0.3	52.5	0.5	0.00
Total vegetables (g)	218.2	2.8	499.1	3.8	0.00
G-Y vegetables (g)	74.9	2.1	173.8	2.9	0.00
Other vegetables (g)	126.8	2.6	283.0	3.5	0.00
Vegetable juices (g)	0.8	1.0	15.4	1.3	0.00
Pickles (g)	15.8	0.8	26.9	1.2	0.00

Means with SE. Mean adjusted for age by general linear model (GLM).

algae (19.0 vs. 12.1 g), 25% of meat (60.5 vs. 45.6 g), 32% of poultry (24.1 vs. 17.1 g), and 10% of beverages (647.4 vs. 585.6 g). HVD had 41, 27 and 60% lower intake of wheat (87.4 vs. 123.1 g), sweets (31.4 vs. 40.0 g) and alcoholic beverages (42.8 vs. 68.4 g), respectively. The principle sources of energy in LVD were rice (28%), wheat (14%), sweets (7%), meat (6%), condiments (5%), dairy products (5%), fish and shellfish (4%), soy beans (4%), fruit (4%), and eggs (3%), while for HVD they were rice (27%), wheat (9%), meat (7%), condiments (6%), sweets (5%), dairy products (5%), soy beans (4%), fruit (4%), fish and shellfish (4%), and processed fish (3%) (Table 4).

Micronutrients

In men and women, the intake of energy and selected nutrients also differed by vegetable intakes category. Men with HVD had higher intakes of energy, protein density, fat density, and polyunsaturated fat density than LVD ($p < 0.05$). Energy density was 23% lower (1.2 vs. 1.5 g/kcal) (Table 5). Cholesterol density, unsaturated fat density, and monounsaturated fat density were not associated with vegetable intake ($p > 0.05$). Fiber was 63% higher in this group of men than in LVD (7.8 vs. 5.6 g/1,000 kcal). For micronutrients, HVD had 36, 30, 19, 87, 53, and 81% higher intake of potassium density (1,323.7 vs. 972.7 mg/1,000 kcal), calcium density (273.7 vs. 209.4 mg/1,000 kcal), magnesium density (141.2 vs. 117.8 mg/1,000 kcal), vitamin A density (558.5 vs. 298.9 $\mu\text{gRE}/1,000$ kcal), folic acid density (184.3 vs. 120.6 $\mu\text{g}/1,000$ kcal), and vitamin C density (57.0 vs. 31.5 mg/1,000 kcal), respectively than the LVD.

In women, those with HVD had significantly higher consumptions of energy, protein density, fiber density, and polyunsaturated fat density (Table 6). However, energy density and cholesterol density had a negative association with vegetable intake ($p < 0.05$). Micronutrient intakes were also higher in HVD than in LVD. Those nutrient were potassium density (1,584.9 vs. 1,122.4 g/1,000 kcal), calcium density (330.9 vs. 263.5 mg/1,000 kcal), magnesium density (160.3 vs. 128.1 mg/1,000 kcal), vitamin A density (699.8 $\mu\text{gRE}/1,000$ kcal), folic acid density (225.3 vs. 141.6 $\mu\text{g}/1,000$ kcal), and vitamin C density (79.2 vs. 47.3 mg/1,000 kcal). HVD had 41, 29, 25, 89, 59, 67, and 58% higher intake of the micronutrients mentioned above. Density of carbohydrates, fats, saturated fats and monounsaturated fats were not associated with vegetable intake.

DISCUSSION

In order to develop practical measures to increase

improve such undesirable dietary conditions in Japanese, the Food Guide Study Group (a tentative name) developed the Food Guide Spinning Top to eat a balanced diet by choosing large enough servings of vegetable dishes, among other measures (18).

Because people eat a mix of foods, this study focuses on the dietary patterns of Japanese who had a high vegetable diet using the National Health and Nutrition Survey 2003 data (19). We therefore described and analyzed dietary patterns in detail to explain the complex relationships between diet and health and to design educational programs in the future for promoting vegetable consumption among Japanese adults with considerations of dietary recommendation for vegetable intake.

METHODS

NHNS data. The National Health and Nutrition Survey 2003 (NHNS 2003) is a cross-sectional survey on a nationally representative sample of the non-institutionalized population of Japan (19). It includes (a) physical examination (anthropometry measurements, blood pressure, blood test, a questionnaire on medication, smoking status, alcohol intake, exercise, and number of steps measured by a pedometer), (b) dietary survey that involves weighing the amount of food consumed over one day by a household and individual household members, and (c) questionnaire on health-related behaviors, habits, and knowledge factors (20).

Subjects. We performed a secondary analysis of the dataset from NHNS 2003 with the permission of the Japanese government authority. From 11,630 subjects, 2,305 men and 2,312 non-pregnant/lactating women were selected with the following inclusion criteria: age between 20 and 69 y, and energy intakes between 1,500 and 3,712 kcal. The criteria for energy were determined between those values to exclude confounding data for the analyses.

Food classifications data. All food recorded in the survey was grouped into 32 food groups: rice, wheat, other cereals, potatoes, other starches, sugar, soy beans, other beans, nuts and seeds, green-yellow vegetables, other vegetables, pickles made from vegetables, vegetable juice, fruit, fruit juice, mushrooms, seaweed (algae), fish and shellfish, processed fish, meat, poultry, organs, eggs, dairy products, oil, sweets, alcoholic beverages, beverages, condiments, spices, and dietary supplements. Macronutrients, micronutrients and fiber were calculated per 1,000 kcal of energy consumed (21). Energy density values were calculated based on food intake, excluding all beverages such as milk, juice, and tea.

Statistical analysis. All analyses were performed using the Statistical Package for Social Science (version 11; SPSS Inc, Chicago, IL) (22). All data were expressed as mean and standard error (SE). The participants were categorized as having a low vegetable diet (LVD), medium vegetable diet (MVD), or high vegetable diet (HVD) using sex-specific tertile cutoff points. We determined age-adjusted means for dietary variables across

tertile of vegetable intake using a general linear model (GLM). Age, energy intake (kcal/d), energy density excluding beverages such as milk and juice (kcal/g), nutrient density (per 1,000 kcal) and groups of food were included as covariance for continuous variables. *p* values <0.05 were considered significant.

RESULTS

Food intake

From a total of 11,630 Japanese, we selected 4,617 subjects for the analyses (2,305 men and 2,312 women). Mean vegetable intake was 309.2 g for men and 317.7 g for women. For men, proportions of green-yellow vegetables (G-YV), other vegetables (OV), vegetable juice, and pickles were 33% (102.0 g), 59% (181.0 g), 2% (5.0 g), and 7% (21.2 g), respectively. For women, G-YV, OV, vegetable juice, and pickles contributed 35% (109.9 g), 57% (182.1 g), 2% (6.0 g) and 6% (19.7 g), respectively (Table 1). Only 35% of Japanese met the vegetable intake recommendation of ≥ 350 g per day on the selected survey day. Total vegetable intakes were associated with age, and subjects above the recommendation were significantly older than those below the recommendation (50.2 vs. 46.0 y-old for men and 52.5 vs. 46.9 y-old for women) (Table 2). Men and women between 20 and 39 y old were the subjects with the lowest vegetable intake (Table 1).

Based on the tertile cutoff points, the low vegetable diet (LVD), medium vegetable diet (MVD), and high vegetable diet (HVD) were defined as follows: for men, vegetable intake less than 209.7 g, from 209.7 to 361.1 g and more than 361.1 g, respectively, and for women, less than 224.0 g, from 224.0 to 360.2 g, and more than 360.2 g, of vegetable, respectively.

Table 3 shows the average intake of each food group. Comparing men with HVD and those with LVD, the former ate a larger amount of rice (486.1 vs. 436.1 g), potatoes (72.6 vs. 47.4 g), soy beans (80.5 vs. 59.8 g), fruit (105.0 vs. 64.7 g), mushrooms (24.1 vs. 12.3 g), algae (24.1 vs. 12.9 g), processed fish (42.6 vs. 33.1 g), meat (83.1 vs. 58.7 g), and dairy products (98.0 vs. 79.0 g). In contrast, wheat was 30% lower in HVD than in LVD (97.9 vs. 127.9 g). Alcohol intake did not show a statistically significant trend among the three groups, but when the mean intakes were compared between HVD and LVD, the association with vegetables was negative ($p < 0.05$) (224.5 vs. 257.7 g). Main sources of energy for the LVD diet were rice (34%), wheat (12%), alcoholic beverages (7%), meat (7%), condiments (5%), fish and shellfish (4%), soy beans (3%), sweets (3%), dairy products (3%), and eggs (3%). For HVD, major sources were rice (33%), wheat (8%), meat (8%), condiments (6%), alcoholic beverages (5%), fish and shellfish (4%), soy beans (4%), dairy products (3%), processed fish (3%), and eggs (3%).

Comparing women with HVD and those with LVD, those with HVD had a 32% higher intake of potatoes (74.6 vs. 50.9 g), 18% of sugar (9.6 vs. 7.9 g), 19% of soy beans (71.9 vs. 58.4 g), 26% of fruit (151.5 vs. 112.8 g), 45% of mushrooms (22.2 vs. 12.3 g), 37% of

Table 3. Percentage of subjects and mean of food intake according to vegetables in men.

	LVD (n=768)			MVD (n=769)			HVD (n=768)			P value			
	% of consumers	Mean intake (g)	SE	% of energy source	% of consumers	Mean intake (g)	SE	% of energy source	% of consumers		Mean intake (g)	SE	% of energy source
Rice	97.9	436.1	7.2	33.9	99.6	461.8	7.1	33.5	99.6	486.1	7.2	33.4	0.00
Wheat	85.8	127.9	4.4	12.2	84.7	102.7	4.4	9.5	84.7	97.9	4.4	8.0	0.00
Other cereals	6.3	12.6	2.1	0.9	6.6	11.6	2.0	0.7	6.6	14.8	2.1	0.8	0.53
Potatoes	58.4	47.4	2.7	1.4	68.8	63.4	2.7	1.6	68.8	72.5	2.7	1.7	0.00
Other starches	21.9	1.8	0.4	0.2	22.0	1.8	0.4	0.2	22.0	2.4	0.4	0.2	0.53
Sugar	76.4	7.7	0.3	1.3	81.7	7.9	0.3	1.3	81.7	8.3	0.3	1.3	0.42
Soy beans	70.5	59.8	2.9	3.2	79.1	59.6	2.9	3.1	79.1	80.5	2.9	3.8	0.00
Other beans	3.2	1.5	0.3	0.1	3.7	0.8	0.3	0.1	3.7	1.6	0.3	0.2	0.19
Nuts and seeds	18.5	1.9	0.4	0.4	24.9	2.4	0.4	0.6	24.9	2.9	0.4	0.6	0.18
G-Y vegetables	89.0	44.3	2.7	0.6	96.3	93.6	2.7	1.2	96.3	168.3	2.7	1.9	0.00
Other vegetables	96.8	78.0	3.2	0.8	99.9	166.9	3.2	1.6	99.9	298.1	3.2	2.5	0.00
Vegetable juice	0.4	-0.1	1.3	0.0	2.0	2.4	1.3	0.0	2.0	12.6	1.3	0.1	0.00
Pickles	55.6	13.6	1.2	0.2	63.9	20.3	1.2	0.3	63.9	29.7	1.2	0.4	0.00
Fruit	39.0	64.7	4.2	1.8	53.7	85.2	4.2	2.2	53.7	105.0	4.2	2.5	0.00
Jam	5.7	1.0	0.2	0.1	7.2	1.0	0.2	0.1	7.2	0.8	0.2	0.1	0.80
Fruit juice	8.0	11.9	1.8	0.2	11.7	11.2	1.8	0.2	11.7	8.2	1.8	0.1	0.34
Mushrooms	46.2	12.3	1.1	0.1	55.8	17.2	1.1	0.1	55.8	24.1	1.1	0.2	0.00
Algae	63.6	12.9	1.1	0.2	62.3	14.3	1.1	0.1	62.3	17.8	1.1	0.2	0.00
Fish	67.2	68.4	2.9	4.3	68.8	71.9	2.9	4.4	68.8	69.6	2.9	3.9	0.68
Processed fish	64.4	33.1	1.9	2.5	68.7	35.8	1.8	2.7	68.7	42.6	1.9	3.0	0.00
Meat	79.5	58.8	2.3	6.6	84.0	70.5	2.3	7.1	84.0	83.1	2.3	7.8	0.00
Poultry	34.7	22.8	1.7	1.6	35.5	24.0	1.6	1.6	35.5	25.3	1.7	1.6	0.57
Organs	4.8	2.6	0.5	0.1	2.6	1.7	0.5	0.1	2.6	2.6	0.5	0.1	0.38
Eggs	83.0	39.9	1.4	2.8	83.1	42.4	1.4	2.8	83.1	43.1	1.4	2.7	0.25
Dairy products	55.7	79.0	4.9	2.8	58.7	98.5	4.8	3.2	58.7	98.0	4.9	3.0	0.01
Oil	88.5	12.0	0.4	4.9	91.9	12.6	0.4	4.8	91.9	12.8	0.4	4.7	0.26
Sweets	28.5	20.2	1.6	3.0	30.1	20.4	1.6	2.8	30.1	19.8	1.6	2.6	0.96
Alcoholic drinks	60.6	257.7	14.5	6.7	65.3	268.6	14.4	6.8	65.3	224.5	14.5	5.2	0.08
Beverages	88.0	566.9	15.4	1.8	92.4	590.0	15.3	1.5	92.4	595.3	15.4	1.3	0.39
Condiments	100.0	121.6	4.0	4.6	100.0	120.5	4.0	5.5	100.0	123.4	4.0	5.8	0.88
Spices	28.4	0.3	0.1	0.0	29.6	0.4	0.1	0.0	29.6	0.3	0.1	0.0	0.57
Dietary supplements	11.5	8.9	1.6	0.3	15.6	13.3	1.6	0.5	15.6	10.7	1.6	0.4	0.14

Means with SE. Mean adjusted for age by GLM.

LVD: low vegetable diet, MVD: medium vegetable diet, HVD: high vegetable diet.

LVD: 133.8 g (<209.5 g), MVD: 283.3 g (209.5–361.1 g), HVD: 510.4 g (361.1–1,416.1 g).

vegetable consumption, the characteristics of vegetable intake among the general population should be considered. The dietary Guideline for Japanese recommended consuming an average of ≥ 350 g/d of vegetables (17) to ensure appropriate intake of such nutrients as vitamins, potassium, and dietary fiber. However, reports in detail on food patterns and vegetable intake among a representative Japanese population are scanty.

We found that the average intake of vegetables for Japanese was 313 g. Although it is lower than the Japanese minimum recommendation (≥ 350 g/d), it is approaching the recommended value. The mean intake of vegetables estimated in this study is relatively higher than the 277 g of vegetable intake reported by the NHNS 2003 (19), due to the inclusion criteria used to select Japanese for analysis.

The average of vegetable intake in men was 309 g, and in women, it was 318 g. We found that only 35% of

the population had ≥ 350 g of vegetable intake. Those subjects with the lowest intake of vegetables were in the same age group as reported by the NHNS 2003 (19).

We observed that vegetable intake was associated positively with age. Older Japanese were likely to eat more vegetables than the youths. This pattern could be a consequence of the food behaviors developed before the nutritional transition, such as the increased intake of animal-based food (19). However, this nutritional transition has a not entirely negative consequence due to animal-based food being a source of such nutrients as calcium and high-quality protein, and also, the finding that eggs, dairy products, and fish may protect against intracerebral haemorrhage (23).

To support the conclusion that HVD group had a better dietary quality than LVD, we examined some nutrients that are considered determinants of a healthy diet. We found that in men with HVD, rice, potatoes, soy

Table 4. Percentage of subjects and mean of food intake according to vegetables in women.

	LVD (n=774)				MVD (n=767)				HVD (n=771)				P value
	% of consumers	Mean intake (g)	SE	% of energy source	% of consumers	Mean intake (g)	SE	% of energy source	% of consumers	Mean intake (g)	SE	% of energy source	
Rice	97.8	319.2	5.5	28.0	97.9	330.9	5.5	28.7	98.6	327.4	7.2	26.8	0.31
Wheat	86.7	123.1	3.8	13.7	83.2	98.0	3.8	10.7	79.0	87.4	4.4	9.0	0.00
Other cereals	5.3	8.8	1.6	0.6	5.6	6.4	1.6	0.5	5.8	10.3	2.1	0.7	0.23
Potatoes	64.6	50.9	2.5	1.8	71.9	60.5	2.5	2.0	73.1	74.6	2.7	2.3	0.00
Other starches	18.7	1.6	0.4	0.2	21.1	1.9	0.4	0.2	19.9	2.4	0.4	0.2	0.27
Sugar	81.1	7.9	0.4	1.6	81.9	8.3	0.4	1.6	88.6	9.6	0.3	1.7	0.00
Soy beans	71.4	58.4	2.8	3.7	76.2	62.4	2.7	3.8	84.0	71.9	2.9	4.4	0.00
Other beans	4.0	2.1	0.4	0.2	4.9	1.4	0.4	0.2	7.8	2.8	0.3	0.3	0.10
Nuts and seeds	24.7	2.8	0.4	0.7	34.0	2.3	0.4	0.6	41.0	3.6	0.4	0.9	0.07
G-Y vegetables	90.1	50.9	2.9	0.8	96.5	101.8	2.8	1.5	99.1	177.2	2.7	2.5	0.00
Other vegetables	97.9	88.7	3.3	1.0	99.7	169.0	3.3	1.9	99.5	289.0	3.2	3.0	0.00
Vegetable juice	0.8	0.0	1.4	0.0	1.7	2.1	1.4	0.0	7.3	15.9	1.3	0.2	0.00
Pickles	45.3	12.8	1.2	0.2	56.4	19.2	1.2	0.4	58.7	27.3	1.2	0.5	0.00
Fruit	60.1	112.8	4.7	3.5	72.9	131.6	4.7	3.9	80.4	151.5	4.2	4.3	0.00
Jam	9.4	1.6	0.2	0.2	7.7	1.0	0.2	0.1	12.6	1.7	0.2	0.2	0.03
Fruit juice	11.2	11.8	1.7	0.3	10.4	7.2	1.7	0.2	12.5	11.3	1.8	0.2	0.11
Mushrooms	49.1	12.3	1.0	0.1	56.3	16.7	1.0	0.2	59.1	22.2	1.1	0.2	0.00
Algae	57.6	12.1	1.1	0.1	60.8	14.7	1.1	0.2	65.7	19.0	1.1	0.2	0.00
Fish	64.2	56.7	2.4	4.3	64.3	58.6	2.4	4.3	64.4	57.6	2.9	4.0	0.85
Processed fish	64.6	32.0	1.7	2.8	71.1	34.9	1.7	3.1	76.8	37.6	1.9	3.2	0.06
Meat	76.6	45.6	1.9	5.8	81.8	55.6	1.9	6.6	79.2	60.5	2.3	6.8	0.00
Poultry	33.3	17.1	1.5	1.3	31.1	18.9	1.5	1.4	32.5	24.1	1.7	1.8	0.00
Organs	3.1	1.5	0.4	0.1	2.9	1.0	0.4	0.1	3.2	2.3	0.5	0.1	0.10
Eggs	81.3	38.5	1.2	3.1	79.8	36.1	1.2	2.8	76.6	34.7	1.4	2.6	0.09
Dairy products	72.4	121.0	5.0	4.8	73.7	125.8	4.9	4.9	73.8	129.2	4.9	4.5	0.51
Oil	90.2	10.6	0.3	4.8	91.0	11.2	0.3	5.0	87.4	11.1	0.4	4.8	0.37
Sweets	53.1	40.0	2.0	7.0	51.6	34.8	2.0	5.9	49.7	31.4	1.6	5.2	0.01
Alcoholic drinks	45.2	68.4	5.8	1.8	48.0	51.1	5.8	1.5	49.5	42.8	14.5	1.3	0.01
Beverages	94.3	585.6	14.9	1.3	94.8	601.7	14.8	1.1	94.8	647.4	15.4	1.1	0.01
Condiments	99.9	95.7	3.1	5.3	100.0	97.1	3.1	6.1	100.0	103.7	4.0	6.4	0.17
Spices	26.5	0.3	0.0	0.0	25.3	0.3	0.0	0.0	27.3	0.3	0.1	0.0	0.89
Dietary supplements	18.1	14.6	2.2	0.6	21.9	18.7	2.2	0.6	23.6	14.3	1.6	0.7	0.30

Means with SE. Mean adjusted for age by GLM.

LVD: 150.7 g (<224.0 g), MVD: 291.9 g (224.0–360.2 g), HVD: 511.0 g (360.2–1,388.9 g).

beans, fruit, mushrooms, algae, processed fish, and meat had a positive association with vegetable intake. Most of those foods (that increase directly with vegetable intake) were low in energy density. Exceptions were for processed fish and meat. On the other hand, women with HVD ate more potatoes, sugar, soy beans, fruit, jam, mushrooms, algae, meat, poultry and beverages. Although sugar was higher in HVD, the intake was less than 10% of the total calories (23). In addition, women with HVD had less wheat, sweets and alcoholic beverages, of which the latter two groups are rich in energy.

Furthermore, we also observed that mushrooms and potatoes had the highest correlation with vegetable intake in men and women (data not shown). The positive correlation of mushrooms and potatoes with vegetable intake could be related with the season in which the survey was carried out. In November, autumn in Japan, it is very popular to have hot-pot meals, as well as braised meat with potatoes and other meals which

are made by seasoning food and combining those meals with foods typically used in Japan, such as tofu (bean curds). Natto (fermented soybeans) was another traditional food with higher intake among this group of subjects than in the LVD. It has been reported that consumption of soy might reduce risk of prostate and breast cancer because of the high amount of isoflavones (25, 26). In addition, it was suggested that natto might prevent the development of osteoporosis (27).

Processed fish also was associated positively with vegetable intake. It could be because Japanese add canned fish in salad or use bonito flakes as topping in various dishes, and also, to make Japanese soup (miso soup). Furthermore, in men and women, the percentage of Japanese that ate each group of food was higher in most of the subjects with HVD than LVD, suggesting that HVD had not only larger amounts of food by weight, but also a wider variety of it, and thus, a higher intake of nutrients in the diet. Foote et al. and Torheim et al.

Table 5. Nutrient density intake according to vegetable intake in men.

Men	LVD (n=768)		MVD (n=769)		HVD (n=768)		p value
	Mean intake (g)	SE	Mean intake (g)	SE	Mean intake (g)	SE	
Total vegetables (g)	135.7	3.21	283.2	3.18	508.7	3.20	0.00
Energy (kcal)	2,162	16.9	2,314	16.7	2,452	16.9	0.00
Energy without beverages (kcal)	1,911	16.0	2,040	15.9	2,214	16.0	0.00
Total food weight (g)	2,227	23.9	2,495	23.7	2,783	23.8	0.00
Food weight without beverages (g)	1,312	12.3	1,524	12.2	1,844	12.3	0.00
Total energy density (kcal/g)	1.03	0.01	0.96	0.01	0.91	0.01	0.00
Energy density without beverages (kcal/g)	1.49	0.01	1.35	0.01	1.22	0.01	0.00
Protein (g/1,000 kcal)	35.6	0.3	36.5	0.3	37.6	0.26	0.00
Fat (g/1,000 kcal)	26.0	0.3	26.6	0.3	27.0	0.28	0.04
Carbohydrate (g/1,000 kcal)	138.4	0.8	136.8	0.8	138.6	0.81	0.21
Salt (g)	5.41	0.07	5.76	0.07	6.18	0.07	0.00
Sodium (mg/1,000 kcal)	2,130	27.3	2,266	27.0	2,432	27.2	0.00
Potassium (mg/1,000 kcal)	972.7	10.2	1,130.0	10.1	1,323.7	10.2	0.00
Sodium/potassium (mg/1,000 kcal)	2.30	0.03	2.07	0.03	1.90	0.03	0.00
Calcium (mg/1,000 kcal)	209.4	3.51	237.9	3.48	273.7	3.51	0.00
Magnesium (mg/1,000 kcal)	117.7	1.14	126.1	1.13	141.2	1.14	0.00
Vitamin A (μ gRE/1,000 kcal)	298.9	13.6	397.5	13.4	558.5	13.5	0.00
Folate (μ g/1,000 kcal)	120.6	2.1	145.5	2.1	184.3	2.12	0.00
Vitamin C (mg/1,000 kcal)	31.5	0.97	43.9	0.97	57.0	0.97	0.00
Fiber (g/1,000 kcal)	5.21	0.08	6.60	0.08	8.51	0.08	0.00
Saturated fat (g/1,000 kcal)	6.56	0.09	6.69	0.09	6.61	0.09	0.61
Monounsaturated fat (g/1,000 kcal)	8.85	0.11	9.07	0.11	9.22	0.11	0.07
Polyunsaturated fat (g/1,000 kcal)	6.10	0.08	6.20	0.08	6.50	0.08	0.00
Cholesterol (g/1,000 kcal)	167.4	3.13	165.6	3.10	163.2	3.13	0.63

Means with SE. Mean adjusted for age by GLM.

found that dietary diversity would contribute to nutrient adequacy (28–30). We clearly demonstrated that men and women in HVD also had greater density of fiber, potassium, magnesium, calcium, vitamin A, folic acid and vitamin C. Moreover, those nutrients were taken mainly from vegetables, except for calcium and magnesium. Because of that, we suggest that people who had higher vegetable intakes were likely to have a diet with a better dietary quality. The nutrients selected for these analyses are well known for improving health, and preventing cardiovascular diseases and osteoporosis (23).

Although HVD had higher dietary quality, we found that the average intake of salt in HVD was 6.2 g/1,000 kcal and 6.6 g/1,000 kcal, in men and women, respectively. These values are as much as 38 and 47% higher than the maximum recommendation of 4.5 g/1,000 kcal for Japanese aged between 1 and 69 y (31). The sources were related with ingredients and foods that are typically present in Japanese meals, such as soy sauce, miso, and pickles as was shown in the NHNS 2003 (19). Thus, although the Japanese diet is characterized as "healthy" (9, 10), the high salt intake in Japan (19, 33) has also been an issue to be overcome in public health programs. The large amount of salt consumed in the Japanese diet was related to an increase of stroke risk (33). Shimazu et al. found that although subjects with high consumption of sodium were related

with higher prevalence of hypertension, the Japanese dietary pattern was associated with lower cardiovascular mortality (34). Those results could be explained by other components in the diet that compensated for the high sodium intake, such as soybeans, seaweed, and green tea. Our study also showed a higher consumption of those foods in the HVD. Although we did not have information about urine excretion of sodium and potassium, we calculated the ratio of sodium/potassium intake. In the HVD, this ratio was the lowest because of the high potassium intake among those Japanese.

Energy density (kcal/g) was negatively associated with vegetable intake. On the other hand, we observed that men with HVD showed a higher intake of protein density and fat density than those with LVD. Higher fat density intake in the HVD than LVD could be explained by the high amount of meat and milk consumed by this group of subjects. Nevertheless, density of saturated fat and cholesterol were not associated with vegetable intake, which are factors that increase risks of cardiovascular diseases. In women with HVD, we found that protein density intake was higher than LVD, but energy density and cholesterol intake were the lowest, suggesting that those were women concerned with health care.

We selected subjects who consumed between 1,500 and 3,712 kcal of energy to exclude confounding data for the analyses. On the other hand, energy density was calculated based only on food intake excluding all bev-

Table 6. Nutrient density intake according to vegetable intake in women.

Men	LVD (n=774)		MVD (n=767)		HVD (n=771)		p value
	Mean intake (g)	SE	Mean intake (g)	SE	Mean intake (g)	SE	
Total vegetables (g)	152.2	3.28	292.1	3.26	509.3	3.29	0.00
Energy (kcal)	1,907	12.95	1,949	12.88	2,058	13.01	0.00
Energy without beverages (kcal)	1,749	12.69	1,800	12.63	1,910	12.75	0.00
Total food weight (g)	2,005	19.11	2,181	19.00	2,502	19.19	0.00
Food weight without beverages (g)	1,219	10.47	1,393	10.41	1,655	10.52	0.00
Total energy density (kcal/g)	1.00	0.01	0.93	0.01	0.85	0.01	0.00
Energy density without beverages (kcal/g)	1.48	0.01	1.31	0.01	1.17	0.01	0.00
Protein (g/1,000 kcal)	36.9	0.26	38.3	0.26	39.5	0.26	0.00
Fat (g/1,000 kcal)	29.0	0.27	29.6	0.27	29.3	0.27	0.33
Carbohydrate (g/1,000 kcal)	141.3	11.7	139.9	11.7	141.1	11.8	0.31
Salt (g)	5.62	0.07	6.13	0.07	6.62	0.07	0.00
Sodium (mg/1,000 kcal)	2,213	28.7	2,413	28.6	2,607	28.9	0.00
Potassium (mg/1,000 kcal)	1,122	4.43	1,323	4.40	1,585	4.44	0.00
Sodium/potassium (mg/1,000 kcal)	2.08	0.02	1.88	0.02	1.71	0.02	0.00
Calcium (mg/1,000 kcal)	263.5	1.27	291.9	1.26	339.6	1.27	0.00
Magnesium (mg/1,000 kcal)	128.1	14.8	141.1	14.8	160.3	14.9	0.00
Vitamin A (μ gRE/1,000 kcal)	370.7	2.34	490.8	2.33	699.8	2.35	0.00
Folate (μ g/1,000 kcal)	141.6	1.67	176.2	1.67	225.3	1.68	0.00
Vitamin C (mg/1,000 kcal)	47.3	0.09	63.2	0.09	79.2	0.09	0.00
Fiber (g/1,000 kcal)	6.60	0.09	8.08	0.09	10.44	0.09	0.00
Saturated fat (g/1,000 kcal)	7.68	0.10	7.71	0.10	7.45	0.10	0.13
Monounsaturated fat (g/1,000 kcal)	9.76	0.12	10.02	0.12	9.83	0.12	0.25
Polyunsaturated fat (g/1,000 kcal)	6.63	0.09	6.85	0.08	6.97	0.09	0.02
Cholesterol (g/1,000 kcal)	180.5	3.24	174.2	3.22	167.7	3.25	0.02

Means with SE. Mean adjusted for age by GLM.

erages (35). Although this study has the advantage of a large number of Japanese adults from a representative sample, the food weighing method for one day in November may not be a fair representation of the typical dietary consumption because of the under- or over-reporting of food. Therefore, we are not able to generalize these patterns for all Japanese who had high vegetable diet because of the day-to-day food intake variations and the change of food intake in different seasons. Further studies are needed to examine the association of vegetable intake and socioeconomic, lifestyle, and other factors.

CONCLUSION

These analyses demonstrated the beneficial effects of HVD on dietary quality in the population because the subjects with HVD had higher intakes of fiber and several vitamins and minerals. Therefore, we conclude that recommendations for adequate vegetable intake are expected to improve diet quality among Japanese adults, especially for the group between 20 to 39 y of age.

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Reprint

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Original Article

Mid-term evaluation of "Health Japan 21": focus area for the nutrition and diet

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This paper provides a review of the mid-term evaluation of "Health Japan 21" and discusses the status of progress towards the goals of items within the "Nutrition and diet" area. Among 14 items investigated, an improving trend was observed in eight items, though there was no improvement in five items. Whilst the percentage of obese individuals significantly increased during the 25 years from 1976 to 1999, secular trend showed that it has become unchanged since 2000, when "Health Japan 21" was enacted, regardless of gender and age. Another favorable finding was a decreasing trend of salt intake especially in the age group of 50-59 years. Besides, the analyses of the proportion of the persons "who have interest in dietary improvement" among the ones "who believe there are problems in their diet" showed that an increased awareness of inappropriate diet and also in the motivation to improve it, especially among males aged 50-59 years. On the other hand, some items showed worsening trend; e.g. decrease in vegetable intake, decrease of persons who are aware of their own optimal weight and practice weight control. Thus, the progress within Health Japan 21 was assessed as not necessarily satisfactory. In order to ensure the progress of "Health Japan 21" towards 2010, it is now crucial to effectively incorporate "Japanese Food Guide Spinning Top" and a new strategy of non-communicable diseases prevention focusing on the control of metabolic syndrome, which will be launched in April 2008, into the national health promotion program.

Key Words: national health promotion policy, Health Japan 21, mid-term evaluation, nutrition and diet, Japan

BACKGROUND AND PURPOSE OF THE ESTABLISHMENT OF "HEALTH JAPAN 21"

In 1978, an international conference of the World Health Organization (WHO) proposed the Declaration of Alma Ata, which encouraged a shift in focus from advanced medical care to the concept of "primary health care," which places emphasis on primary prevention.¹ In the same year, a national health promotion program was launched in Japan. Major activities of the first National Health Promotion Program included; 1) promotion of the programs focusing on nutrition, exercise and resting for health promotion throughout ones' lives, 2) establishment of municipal health centers for enhancement of personal health services at the community level, 3) establishment of health promotion councils in all municipalities across the country and also the Japan Health Promotion Foundation. In this way, a great effort has been made to disseminate and enlighten the concept of health promotion.

In 1988, the Second National Health Promotion Program (Active 80 Health Plan) was initiated, with a further emphasis on primary prevention. The Active 80 Health Plan was intended to address the upcoming super-aging society in the 21st century, by supporting the elderly to become active, so that they could take care of themselves and participate in society, even at the age of 80. The second program aimed to emphasize primary prevention and enhance active health promotion utilizing the private sector, in addition to the focus of the first one, that is, the

establishment of a balanced lifestyle in terms of nutrition, exercise and rest.

In Japan, however, lifestyle-related diseases still remain a major cause of death. With a rapid aging of society as a result of the declining birth rate, Japan faces with the fear that lifestyle-related diseases may increase healthcare costs and the burden of nursing care of the elderly people in the 21st century. Since it is expected that the aging society would further increase morbidity and the burden of nursing care, and also that economic growth may not continue, it will become important to reduce social burdens related to disease prevention/treatment, and nursing care. Under this circumstance, the Ministry of Health, Labour and Welfare established the "National Health Promotion in the 21st Century (Health Japan 21)" in March 2000, as the Third National Health Promotion Program, in order to create a vital society where all nationals can live healthy and fulfilling lives.²

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The missions of "Health Japan 21" are to reduce late-middle-age deaths, to extend healthy life expectancy and to improve quality of life (QOL).

These missions constitute the concept of health promotion, and objectives with target values to be achieved have been established for several focus areas lifestyles and specified diseases. Conventionally, various surveys have proposed their own indicators, but the establishment of "Health Japan 21" clarified goals which can be monitored in a systematic way. "Health Japan 21" also encourages the involvement of the society as a whole in the program, making suggestions to health-related organizations etc. in order to improve each individual's awareness of health promotion and facilitate each to address the issue independently. "Health Japan 21" was initiated in 2001 as a 10-year plan, which places even greater emphasis on "primary prevention" than the secondary program.³

OVERALL TRENDS OF "HEALTH JAPAN 21"

To realize its ultimate goals, "Health Japan 21" comprises four basic policies: 1) placing emphasis on primary prevention, 2) creating a supportive environment for health promotion, 3) establishing and assessing goals, etc., and 4) promoting effective, well-coordinated activities by the various implementing bodies.

Based on these basic policies, 70 specific goal items have been established in nine focus areas: (1) Nutrition and diet, (2) Physical activity and exercise, (3) Rest and Mental Health, (4) Tobacco, (5) Alcohol, (6) Dental health, (7) Diabetes, (8) Cardiovascular diseases, and (9) Cancer.⁴ These areas are divided into two; the areas related to lifestyle (1 - 6)), and the ones directly related to disease, such as the secondary prevention of disease (7 - 9)).⁵

In 2002, the Health Promotion Law was enacted to enhance these health promotion measures, focusing on "Health Japan 21." The Health Promotion Law stipulates that each prefecture/municipalities should establish health promotion plans, under the basic policies of "Health Japan 21".^{6,7}

In response to enactment of the law, the National Nutrition Survey, which was previously conducted under the Nutrition Improvement Law, renamed the National Health and Nutrition Survey in 2003,⁸ where the role of monitoring the progress of "Health Japan 21" was clearly demonstrated.^{9,10} Moreover, it is stipulated that efforts must be made to implement measures for the prevention of environmental Tobacco smoke. Furthermore, a 10-year strategy (Health Frontier Strategy),¹¹ starting from the 2005 fiscal year, was established, which focused on the "promotion of the measures against lifestyle-related diseases" and the "promotion of prevention of the need for nursing care" under the basic goal of extending people's healthy life expectancy.

In the 2008 fiscal year, a new disease control program will be started, mainly based on the high-risk approach, with the focus on control of metabolic syndrome (visceral fat syndrome). It is also expected that this new program will further promote "Health Japan 21", formulating the basis to control lifestyle-related diseases.¹²

TRENDS IN THE FOCUS AREA FOR "NUTRITION AND DIET"

This paper focuses on the focus area for "Nutrition and Diet", which is closely related to many lifestyle-related diseases and also with one's QOL. The goal within this area is to develop a physically, mentally, and socially favorable diet to improve health and quality of life. Fourteen specific goal items have been established for individual behavior modification and for the creation of a supportive environment.

To realize these goals, various efforts are being made, including (1) implementation of the National Health and Nutrition Survey, and the accumulation and organization of scientific evidence for establishment of the "Dietary Reference Intakes"; (2) dissemination and enlightenment of such resources as the "Dietary Guidelines" and the "Japanese Food Guide Spinning Top",¹³ as well as the improvement of food environment; (3) establishment of the "Basic Plan for Promotion of Shokuiku" for the purpose of promoting dietary education to develop a well-rounded character in a comprehensive and systematic manner; and (4) development of human resources such as registered dietitians and volunteers (e.g. dietary improvement promotion staff).

Moreover, for health promotion planning, "knowledge and attitude (that would motivate individuals)", "resources and skills (that is needed to take action)", and "support from surrounding people" are regarded as the influencing factors on behavioral change, and "environment" is regarded as the one on health and QOL. Therefore, with considering all these factors comprehensively, the goals were set using the data from the National Nutrition Survey (currently, the National Health and Nutrition Survey) in three levels: "nutritional status and nutrient (food) intake level", "knowledge, attitude and practice level" and the "environment level".^{13,14}

BACKGROUND AND PURPOSE OF THE MID-TERM EVALUATION

The purposes of the mid-term evaluation of "Health Japan 21" are to establish the new goals and to appropriately assess the outcome of the specific activities to attain these goals, as well as to obtain the necessary information to enhance the measures for health promotion so that the information can be reflected in future measures. In particular, the main purpose is to identify the problems that remain to be solved for improvement of the goal items in "Health Japan 21", by examining the current achievement status and the related promoting and inhibiting factors.

The mid-term evaluation of "Health Japan 21" was therefore undertaken in 2005-2006 (five years after its enactment), where the reviews were implemented at the national and prefectural levels concerning the issues such as; the analysis of the mid-term achievement values of the 70 goal items in the nine areas, evaluation of measures in each area, establishment of numerical targets for newly introduced goal items, selection of representative goal items and establishment of the new goal items. The trends of indicators, the current activities and their problems were reviewed to evaluate the measures taken in each area and discuss the future strategies to achieve the final goals in 2010.¹⁵

OVERVIEW OF THE MID-TERM EVALUATION

The main findings of the overall evaluation at the national level are summarized below:

1. The introduction of numerical targets has made it possible to incorporate the data obtained in the various other surveys into the annual National Health and Nutrition Survey, by which it is now possible to monitor and evaluate such information both systematically and continuously.^{9,10}
2. All prefectures have established own prefectural plans. Out of all 1,859 municipalities, 1,001 (about 54%) have established their own plans as of July 2006.⁶
3. The mid-term achievement values indicated a decreasing trend in the age-adjusted mortality rates of stroke and ischemic heart disease and a halt in the increases in the percentage of energy from fat in adult diet and

Table 1. Goals regarding "Nutrition and Diet" Area and Status (Mid-term evaluation, 2006)¹⁵

Goal items (guidelines for indicators)	Target	Baseline value	mid-term achievement value	Target value
Relationship to disease and health: nutrition status and nutrition (food) intake level				
1.1 Increase the proportion of persons maintaining optimal weight (Percentage of obese individuals)	obese schoolchildren (more than 20% above standard weight based on the Hibi method)	10.7%	10.2%	7% or less
	underweight (BMI<18.5) problems among females aged 20-29 years	23.3%	21.4%	15% or less
	obese (BMI≥25.0) problems among males aged 20-69 years	24.3%	29.0%	15% or less
	obese (BMI≥25.0) problems among females aged 40-69 years	25.2%	24.8%	20% or less
	persons aged 20-49 years	27.1%/day	26.7%/day	25% or less
1.2 Reduce average daily fat energy ratio (Percentage of average daily intake)	adults	13.5g/day	11.2g/day	less than 10g
1.3 Reduce average daily salt intake (Percentage of average daily intake)	adults	292g/day	267g/day**	350g or more
1.4 Increase average daily vegetable intake (Percentage of average daily intake)	adults	107g/day	101g/day**	130g or more
1.5 Increase average daily intake of calcium-rich foods in adults (Percentage of average daily intake)	beans	76g/day	85g/day**	100g or more
	deep-colored vegetables	98g/day	89g/day**	120g or more
Factors contributing to behavior change: knowledge, attitude, and behavior				
1.6 Increase the proportion of persons who know their proper weight and practice weight control (Percentage of individuals who practice weight control)	males aged 15 years or over	62.6%	60.2%	90% or more
	females aged 15 years or over	80.1%	70.3%	90% or more
1.7 Reduce the proportion of persons who skip breakfast (Percentage of individuals who skip breakfast)	junior high school / high school students	6.0%	6.2%	0%
	males aged 20-29 years	32.9%	34.3%	15% or less
	males aged 30-39 years	20.5%	25.9%	15% or less
1.8 Increase the proportion of persons who eat balanced meals in term of quality and saize (Percentage of individuals who eat proper meals, in the company of 2 or more persons, such as family members, taking at least 30 minutes per meal, at least once a	adults	56.3%*	61.0%	70% or more
	males aged 20-69 years	20.1%	18.0%	30% or more
1.9 Increase the proportion of persons who read nutrition labels when dining out or purchasing food (Percentage of individuals who refer)	females aged 20-69 years	41.0%	40.4%	55% or more
	adult males	65.6%*	69.1%	80% or more
1.10 Increase the proportion of persons who know the appropriate size of meal for maintaining optimal weight	adult females	73.0%*	75.0%	80% or more
	adult males	55.6%	59.1%	80% or more
1.11 Increase the proportion of persons who desire dietary improvement among those who believe there are problems in their (Percentage of individuals who have the motivation)	adult males	67.7%	67.3%	80% or more
	adult females	67.7%	67.3%	80% or more
Environment—building for support of behavioral change: environment level				
1.12 Increase the availability and user of healthy menus in cafeterias at workplaces etc., restaurants, and food retailers (Number of available menus, and percentage of users)	males aged 20-59 years	34.4%	—	50% or more
	females aged 20-59 years	43.0%	—	50% or more
1.13 Increase the opportunities to obtain information on health and nutrition in the community and at the work place and increase the number of people (Number of opportunities for study, and percentage of participants)	males aged 20 years or over	6.1%	7.4%	10% or more
	females aged 20 years or over	14.7%	15.3%	30% or more
1.14 Increase the number of voluntary groups involved in study and activities related to health and nutrition in the community and at the workplace	males aged 20 years or over	2.4%	3.5%	5% or more
	females aged 20 years or over	7.8%	7.4%	15% or more

* The survey that provided the baseline value at establishment is different from the survey that provided the interim result value.

** Conversion of weight change ratio is required due to the revision of the Tables of Food Composition in Japan.

the percentage of obese females. On the other hand, there was no improvement in the morbidity of life-style-related diseases, such as hypertension and diabetes, especially among middle-aged and older males. Some items even showed worsening trend; e.g. increased percentage of obese males, decreased number of steps taken during daily living activities. Overall, the achievements were not necessarily satisfactory.

The goals in the focus area for "Nutrition and diet" and their current status are shown in Table 1. Of the 14 items, a careful consideration is needed for five items when the secular changes are examined, and new target values were set for four items. Although an improving trend was observed in eight items, there was no improvement in five items (For the remained one item, there was no mid-term achievement value) (Table 1). In the present paper, we aim to examine the indicators especially at the "nutritional status and nutrient (food) intake level" and the "knowledge, attitude and practice level" which can be improved by enhancing individual awareness.¹⁵

ASSESSMENT OF THE "INDICATORS AT THE NUTRITIONAL STATUS LEVEL"

Overweight (obesity) is used as an indicator of the nutritional status that reflects the unbalance between the energy intake and energy expenditure.^{16,17} For which, the current and target values are demonstrated.

Regarding the goal item "increase the proportion of persons maintaining optimal weight", there was almost no change between the baseline value (10.7%) and the mid-term one (10.2%) in terms of the percentage of obese children, defined by Hibi's methods for the school-aged children (more than 20% above standard body weight) (Table 1-1.1).¹⁵ As for adults, whilst the proportion of obesity, defined as those with a BMI ≥ 25 , had decreased in females aged 40-69 years (baseline value 25.2% vs.

mid-term value 24.6%), it increased in males aged 20-69 years (baseline value 24.3% vs. mid-term value 29.0%)(Table 1).¹⁵ These figures were derived from the data of the survey results in 1997 and 2004. Secular changes in the proportion of obesity among children indicated a significant increasing trend from 1976 to 1990, after which it remained unchanged. Similar trend was also observed among females aged 40-69 years. Secular changes in the percentage of obese males aged 20-69 years are shown in Figure 1. During the 25 years from 1976 to 1999, the rate of increase in the percentage of obese individuals was significant in all age groups. However, since 2000, when "Health Japan 21" was started, the rate of increase has decreased or became unchanged, especially among younger people.

These results suggest that the increase in the percentage of obese individuals has not been as significant as before the enactment of "Health Japan 21", regardless of gender and age.

ASSESSMENT OF THE "INDICATORS AT THE NUTRIENT AND FOOD INTAKE LEVEL"

Lifestyle-related diseases closely associated with nutrition and diet include hypertension, hyperlipidemia, ischemic heart disease, stroke, cancer, diabetes and osteoporosis. The possible dietary factors would be excessive energy intake, excessive intake of fat and sodium, and insufficient intake of dietary fiber, antioxidant vitamins and calcium. Therefore, specific target values have been set for the goal items such as; "increase the proportion of persons maintaining optimal weight", "decrease the proportion of obesity in school-aged children", "Reduce fat energy ratio in adults", "Reduce salt intake in adults", "Increase vegetable intake" and "Increase intake of calcium rich foods".

In this chapter, we examines the data on salt intake,

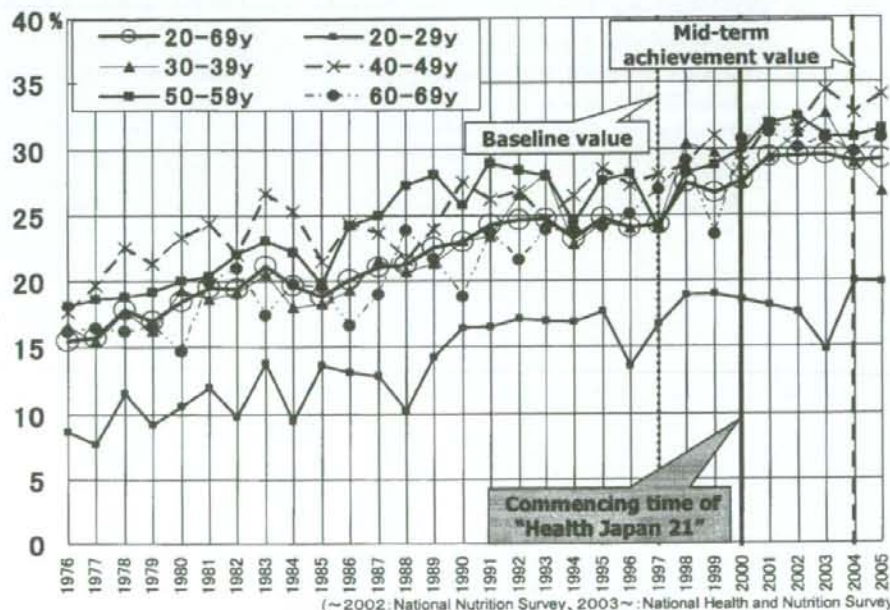


Figure 1. Secular changes in the percentage of obese (BMI ≥ 25) adult males

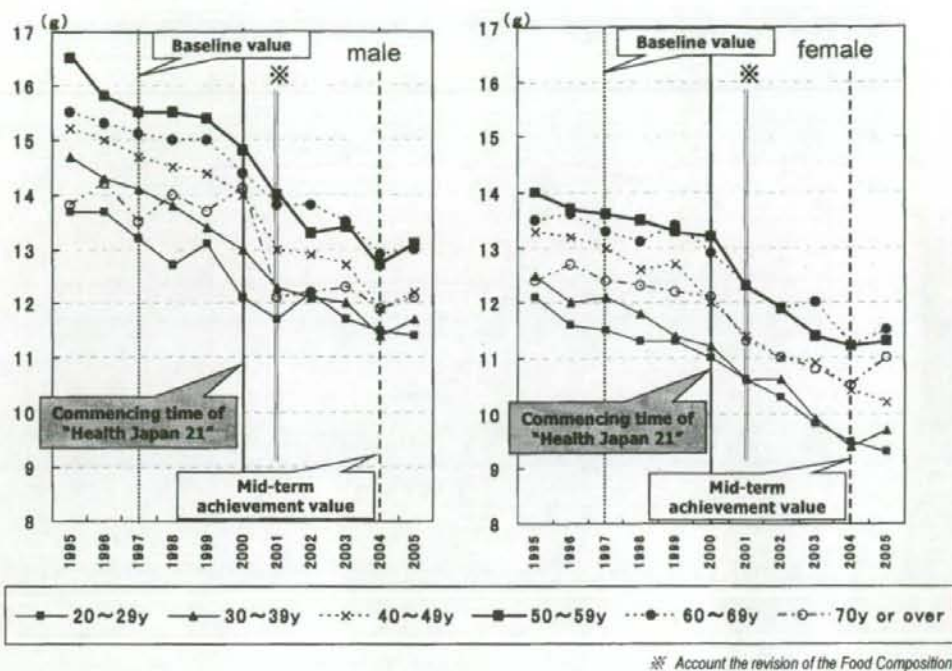


Figure 2. The secular changes in salt intake in adults (sex and age group)

which is associated with the risk of hypertension as one of the important health problems in the Japanese population, and those on vegetable intake, which is an important component for prevention of lifestyle-related diseases especially for control of cardiovascular diseases, cancer and obesity.

Regarding salt intake, from the perspective of prevention of hypertension, the recommended value is 6 g or less overseas in Western populations. In 1997, the average daily intake of salt in adults in Japan was still at an excessive level (13.5 g), and the tentative target value of the population average was set as less than 10 g.

Regarding the goal item "Reduce salt intake," the baseline value in 1997 was 13.5 g and the mid-term achievement value in 2004 was 11.2 g, indicating a decrease of 2.3 g (Table 1-1.3).¹⁵ However, a special attention must be paid to the comparison of data on salt intake, partly because the Food Composition Table in Japan was revised in 2001. Figure 2 shows the secular changes in salt intake in adults. Taking into account the revision of the Food Composition Table in Japan as well as the changes in the survey method, Figure 2 shows a decreasing trend of salt intake in both sexes and across all age groups. Most favorable finding was that a particularly significant decreasing trend was observed in males in the age group of 50-59 years, who have high risks of lifestyle-related diseases (Figure 2). Such improvements were observed possibly as a result of "Shokuiku (food education)" and health education incorporated in the activities of local governments, which provide health services directly to the communities, as well as in those of various organizations that implement projects related to health promotion.

It is regarded that the intake of potassium, dietary fiber, and antioxidant vitamins is effective for prevention of cardiovascular diseases and cancer. When the analyses were performed to examine the association with the amount of food intake, it was found that vegetable would greatly contribute to the intake of these nutrients.¹⁸ Since the consumption of 350-400 g of vegetables is known to be required to take sufficient amounts of potassium, dietary fiber, and vitamin C, the target value has been set at an average intake of 350 g or more in adults.

Regarding the goal item "increase vegetable intake," the baseline value in 1997 was 292 g and the mid-term achievement value in 2004 was 267 g, showing a decrease (Table 1-1.4).¹⁵ Figure 3 shows the secular changes in vegetable intake in adults. From 1997 to 2003, the vegetable intake in all adults remained almost unchanged. A comparison of vegetable intakes in 2003 and 2004, however, indicated a decrease of about 20 g in both sexes and across all age groups. The decreased intake may be resulted from the price rise of fresh vegetables, which were substantially higher in November 2004 than the average year, due to the decreased agricultural products as a result of bad weather conditions (e.g. typhoons). The fact that vegetable intake returned in 2005 to the previous level suggests that the decrease in 2004 was a temporary phenomenon. In addition, large differences were observed among generations. The average vegetable intake in the age group of 20-29 years was about 70 g lower than that in the age group of 60-69 years. Whilst the increase of vegetable intake is particularly expected in young population (≤ 39 years old), no increasing trend was observed in their vegetable intake (Figure 3).