A STUDY OF NUTRITION AND OTHER MEASURES OF HEALTH AMONGST ELDERLY KOREANS

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23.1 INTRODUCTION

This is a study of the influence of ageing and nutrition on cognitive function among elderly Koreans. This study was performed to investigate the correlation between cognitive function and other related factors of 293 elderly Koreans, aged 50 to 95. Related factors are ageing, physical strength, health status, psychological state, socio-economic status (SES), food habits and nutrition. To examine these aspects, data were collected by interviewing 80 men and 213 women living in Seoul, Masan (in Kyungsangnam Province) and Chonju (in Chunrabuk Province). Food intake was measured by the 24-hour recall method.

Firstly, changes of cognitive function, physical function, psychological function, food habits, and nutrition, were investigated according to age. Secondly, the correlation between cognitive function and other factors was examined. Thirdly, the equations for predicting the state of cognitive function of the elderly were estimated by a stepwise multiple regression analysis based on various factors. Finally, the correlation between cognitive function and nutritional aspects was analysed.

23.2 RESULTS

23.2.1 Sociodemographic characteristics of the subjects

For inclusion in this study, one had to be over 50 years of age. Some 16.7% of the population was below 60, and almost 45% of the population was below 69 years, leaving 55% in the age comparable to the IUNS studies. The socio-demographic characteristics with respect to numbers of individuals in different gender, age-group, educational, occupational, income and housing categories are shown in Table 23.1. It also gives data for the size of households lived in by the elderly. Although the elderly come from three different locations, including urban (Seoul) and

interior (Masan, Chonju) settings, the data have not been analysed with stratification for geography.

Table 23.1. Socio-demographic characteristics of the subjects.

Characteristics		n	%
Sex	Men	80	27.3
	Women	213	72.7
Age (yrs)	50-59	49	16.7
	60-69	112	38.2
	70-79	98	33.4
	80-89	27	9.2
	90-99	7	2.4
Member of family	1-3	108	36.9
	4-6	155	52.9
	7-9	30	10.2
Education	Illiterate	52	17.7
	Elementary s.	125	42.7
	Middle school	40	13.7
	High school	41	14.0
	College	23	7.8
Occupation	Labour	53	18.1
	Service	13	4.4
	Marketing	26	8.9
	Blue-collar	14	4.8
	White-collar	31	10.6
	Housewife	155	52.9
Income (100000 Won /month)	< 20	29	9.9
	21-50	69	23.5
	51-100	101	34.5
	101-150	83	28.3
	> 150	8	2.7
Housing	Rental house	37	12.6
	< 30 Pyeong	103	35.2
	31-50 Pyeong	104	35.5
	> 50 Pyeong	48	16.4

A composite socio-economic status (SES) score contributed to by educational attainment, occupation, income and housing in 30:25:25:20 proportions was devised and the data is presented in Table 23.2, stratified by age-groups, up to 64 years, and 65 years and older.

Table 23.2. Socio-economic status (SES) score between two age groups.

SES	Education	SES (1) Occupation	Income	Housing

Age	mean	(SD)	sig	mean	(SD)	sig	mean	(SD)	sig	mean	(SD)	mean	(SD)
50-64	56.9	(17.0)	*	14.5	(6.2)	***	12.6	(6.4)	*	14.4	(5.2)	12.7	(4.8)
65+	52.0	(13.3)		11.2	(5.7)		11.3	(5.4)		14.4	(5.3)	12.8	(4.5)
Total	53.7	(14.8)		12.3	(6.1)		11.6	(5.8)		14.4	(5.3)	12.7	(4.6)

*, p<0.05; ***, p<0.001;
(1), SES (100 points) = Education (30) + Occupation (25) + Income (25) + Housing (20)

23.2.2 Anthropometry

Basic anthropometry (height, weight) were measured using conventional methods, and the data are presented in Table 23.3, alongside reference data for mature and elderly adults from the 1989 Korean recommended daily allowances document. As expected, weight and height were both lower in the older age-group. Stature was comparable to the Korean standard figures, but the mean weight was 4 to 5 kg heavier in men and 2 to 3 kg heavier in women than the Korean standards.

Table 23.3. Height and weight between age groups.

		Subjects						Korean Standard (1)	
		Height (cm)			Weight (kg)			Height	Weight
Sex	Age	mean	(SD)	sig	mean	(SD)	sig	(cm)	(kg)
Male	50-64	169.2	(4.5)	ns	67.4	(9.5)	ns	168	63.0
(n=80)	65+	165.1	(8.7)		62.3	(8.9)		167	61.0
Female	50-64	156.6	(5.3)	***	57.1	(10.4)	**	156	54.0
(n=213)	65+	152.9	(7.6)		52.7	(8.4)		156	53.0

Mean + standard deviation in parenthesis; (1), From the table of Korean recommended daily allowances (RDA) (1989); *, p<0.05; ***, p<0.001; ns, p>0.05

23.2.3 Dietary intake and food behaviours

Dietary data for selected nutrients and fibre are shown in Table 23.4 for men and Table 23.5 for women, stratified into age-groups. Both genders show a decline in energy intake in the later years; this trend was also seen for protein, but was not consistent through the micronutrients. Adequacy of intake in terms of the Korean RDA exceeded 100% for all nutrients, except energy in the younger men (97%).

This identical pattern was seen in women, with the younger women consuming 97% of their energy recommendation, as well. Since geographic disaggregation was not performed, the data do not reveal potential inequalities of distribution between metropolitan and provincial localities. Because of an interest in the relationship of sensory changes on food intake and dietary habits with ageing, extensive survey data were taken on preferences of foods, of specific primary tastes (flavours) and for behaviour of seasoning foods (Tables 23.6 - 23.10). In these analyses, the

groups are combined by gender and geography and stratified by age.

Table 23.4. Daily nutrient intake of male subjects.

Nutrient	50-64 mean	50-64 (SD)	50-64 % RDA	65+ mean	65+ (SD)	65+ % RDA	Total mean	Total SD
Energy (Cal)	2134.1	(568.6)	97.0	1922.3	(393.1)	101.1	2025.5	(495.1)
Protein (g)	88.0	(33.0)	125.7	75.6	(21.8)	108.0	81.6	(28.3)
Fat (g)	34.8	(15.0)		35.8	(17.8)		35.3	(16.4)
Carbohydrates (g)	354.1	(114.7)		321.3	(71.2)		337.7	(95.7)
Fibre (g)	12.2	(19.4)		7.4	(4.7)		9.8	(14.1)
Calcium	790.3	(341.4)	131.7	681.2	(362.6)	113.5	734.4	(354.4)
Iron	23.7	(8.3)	237.0	17.3	(10.4)	173.0	20.4	(21.2)
Vitamin A	1029.0	(903.7)	147.0	825.4	(65.7)	117.9	924.7	(935.7)
Vitamin B1	1.5	(1.4)	136.4	1.2	(0.7)	120.0	1.4	(1.1)
Vitamin B2	1.5	(0.6)	136.4	1.7	(0.8)	141.7	1.6	(0.7)
Niacin	33.3	(18.4)	229.7	30.9	(16.9)	237.7	32.0	(17.6)
Vitamin C	102.3	(55.5)	186.0	92.4	(44.1)	168.0	97.2	(49.9)

Table 23.5. Daily nutrient intake of female subjects.

	50-64			65+			Total	
Nutrient	**mean**	**(SD)**	**% RDA**	**mean**	**(SD)**	**% RDA**	**mean**	**SD**
Energy (Cal)	1839.8	(396.3)	96.8	1752.5	(392.2)	109.5	1777.5	(394.5)
Protein (g)	75.0	(22.1)	125.0	73.9	(23.7)	123.2	74.2	(23.2)
Fat (g)	32.0	(14.9)		30.6	(13.1)		31.0	(13.6)
Carbohydrates (g)	312.4	(76.9)		293.3	(68.4)		298.8	(71.3)
Fibre (g)	10.6	(11.3)		8.7	(6.4)		9.2	(8.1)
Calcium	739.9	(345.2)	131.7	734.9	(342.3)	122.5	736.3	(342.3)
Iron	17.4	(2.3)	174.0	18.5	(12.8)	185.0	18.2	(12.6)
Vitamin A	772.5	(468.8)	110.4	846.9	(1336.1)	120.9	825.6	(1155.4)
Vitamin B1	1.1	(0.9)	110.4	1.2	(1.0)	120.0	1.2	(1.0)
Vitamin B	1.5	(0.6)	125.0	1.5	(0.8)	125.0	1.5	(0.8)
Niacin	28.1	(12.4)	216.2	31.1	(17.4)	239.2	30.2	(16.2)
Vitamin C	98.7	(44.7)	179.5	92.7	(48.2)	168.5	94.4	(47.2)

Table 23.6. Preference of food between age groups.

Age		Meat	Fish and Shells	Vegetables	All Foods	Total
50-64	n	5	12	35	48	100
	% row	5	12	35	48	
	% column	18.5	31	38	36	
65+	n	22	27	58	86	193
	% row	11.4	14	30	45	
	% column	81.5	69	62	64	
Total	n	27	39	93	134	293
	%	9	13	32	46	100

Chi-square=3.801 (p=0.284) ns

Table 23.7. Preference of salty taste between two age groups.

Age		Salty	Medium	Not Salty	Total
50-64	n	26	53	21	100
	% row	26	53	21	
	% column	31	37.6	31	
65+	n	58	88	47	193
	% row	30	45.6	24	
	% column	69	62	69	
Total	n	84	141	68	293
	%	29	48	23	100

Chi-square=1.447 (p=0.485) ns

Table 23.8. Preference of sweet taste between age groups.

Age		Sweet	Medium	Not Sweet	Never Eat	Total
50-64	n	14	28	22	36	100
	% row	14	28	22	36	
	% column	22.6	36.4	34	40	
65+	n	48	49	43	53	193
	% row	25	25	22	27.5	
	% column	77	64	66	59.5	
Total	n	62	77	65	89	293
	%	21	26	22	30.4	100

Chi-square=5.433 (p=0.143) ns

Table 23.9. Preference of hot taste between age groups.

Age		Hot	Medium	Not hot	Total
50-64	n	33	48	19	100
	% row	33	48	19	
	% column	45	32	26.4	
65+	n	40	100	53	193
	% row	21	52	27.5	
	% column	55	67.6	73.6	
Total	n	73	148	72	293
	%	25	50.5	24.6	100

Chi-square=6.092 (p=0.048)*

Data are presented both by number of individuals expressing a preference, by frequency and by accumulated (overall) frequency in all related tables. For those who expressed a specific preference, meat was preferred more by the older (65+) than the younger (50-64) with the inverse relation for vegetables. Overall, 45% said they liked all food-groups (meat, fish and shellfish, and vegetables) equally. With respect to tastes (primary flavours), a slightly greater percentage of older persons preferred salty over not salty than younger. For sweet taste, again there were differences. Those under 65 liked sweet less and a greater proportion never ate sweet items as compared with those 65 and over. For a hot, spicy taste it was the younger group of adults who showed a preference for spicy over "medium" or "not hot," whereas among the older a greater percentage answered "not hot" than "hot." Table 23.10 shows a balanced pattern of use of large, medium and small amounts of seasonings.

Table 23.10. Preference of seasonings between age groups.

Age		Use large amount	Medium	Use small amount	Total
50-64	n	51	41	8	100
	% row	51	41	8	
	% column	36	31	42	
65+	n	91	91	11	193
	% row	47	47	6	
	% column	64	69	58	
Total	n	142	132	19	293
	%	48.5	45	6.5	100

Chi-square=1.292 (p=0.524) ns

23.2.4 Descriptive findings on functional tests

In Table 23.11, cognitive function was assessed with regard to a scoring on a 100 point basis of contributions from mathematical calculations, language use, and recall of the numbers 19,23,58. Overall point scores declined from almost 90.7 in the 50 to 64 age group, to 78.1 after 65, a -13.9% change. The decline was most severe in calculations and least in language. Analysis by gender and region was not included. Similarly, an ageing function score on a 100 point basis distributed equally among function, appearance and mental status was used (Table 23.12).

Table 23.11. Cognitive function score between two age groups.(Unit: points)

Age Groups	Cognitive function(1) mean	(SD)	sig	Calculation mean	(SD)	sig	Language mean	(SD)	sig	Memory mean	(SD)	sig
50-64	90.7	(12.3)	***	16.5	(4.2)	***	20.8	(3.3)	***	53.5	(7.0)	***
65+	78.1	(18.3)		13.1	(6.5)		18.6	(4.2)		46.4	(10.5)	
Total	82.4	(17.5)		14.2	(6.0)		19.4	(4.1)		49.9	(10.0)	
Change (2)	-13.9%			-20.6%			-10.6			-13.3%		

Mean and standard deviation (in parenthesis); (1), Cognitive function (100 points) = Calculation (19) + Language (23) + Memory (58); (2), Rate of change between scores of two age groups; ***, p<0.001.

Table 23.12. Ageing function score between two age groups. (Unit: points)

Age Groups	Ageing(1) mean	(SD)	sig	Functional mean	(SD)	sig	Appearance mean	(SD)	sig	Mental mean	(SD)	sig
50-64	90.2	(9.7)	***	30.2	(4.2)	***	29.6	(3.1)	***	30.4	(4.8)	***
65+	70.05	(11.0)		24.8	(4.7)		22.2	(4.1)	23.5	(5.0)		
Total	77.1	(12.1)		26.6	(5.2)		24.7	(5.2)	25.8	(5.9)		
Change(2)	-21.8%			-17.9%			-25.0%			-22.7%		

Mean and standard deviation (in parenthesis).
(1) Ageing (100 points) = Functional (33) + Appearance (33) + Mental (33)
(2) Rate of change between scores of two age groups
*** p<0.001

Ageing function score declined with ageing, as expected, with the greatest impact in the appearance of ageing, followed by mental status, with function being the best preserved across age-groups. The overall decline in those older than 65 from those younger than 65 years-old in our sample was almost 22%. Next a two-component health score was devised on a basis of 43 points for activities of daily living and 57 points for physical activity. This declined across age by almost 8% with a greater reduction in physical activity than loss of ADL capacity (Table 23.13).

Table 23.13. Physical strength score between two age groups. (Unit: points)

Age Groups	Physical strength(1) mean	(SD)	sig	ADL mean	(SD)	sig	Physical activity mean	(SD)	sig
50-64	93.7	(6.7)	***	42.3	(1.0)	***	51.4	(6.1)	***
65+	86.6	(10.3)		41.2	(2.6)		45.3	(8.8)	
Total	89.0	(9.8)		41.6	(2.3)		47.4	(8.5)	
Change (2)	-7.6%			-2.6%			-11.9		

Mean and standard deviation (in parenthesis)
(1) Physical strength (100 points) = ADL (43) + Physical activity (57)
(2) Rate of change between scores of two age groups
*** p<0.001.

In Table 23.14, we present the age-stratified results and changes across age-groups for a 110-point health status index composed of general health (24), bone complaints (23), circulation (23) and skin and trachea (30) as components. The overall point totals were 77.7 in the younger and 74.8 in the older group. No breakdown by gender or region is made. Finally, a psychological state score, partitioned between self-concept (40) and ego integrity (60) was computed. It had a value of 67 basically in both age-groups with a 4.4% decline in self-concept with age compensated by a 4.3% increase in ego-intensity, but with little dynamic overall (Table 23.15).

Table 23.14. Health status score between two age groups. (Unit: points)

Age Groups	Health(1) mean	(SD)	sig	General mean	(SD)	sig	Bone mean	(SD)	sig	Circulatory mean	(SD)	sig	Skin and trachea mean	(SD)	sig
50-64	77.7	(11.2)	ns	15.7	(4.4)	ns	17.2	(3.2)	***	19.6	(2.9)	ns	25.2	(3.9)	ns
65+	74.8	(11.7)		15.5	(4.2)		15.5	(4.0)		19.0	(3.4)		24.7	(3.9)	
Total	75.8	(11.6)		15.6	(4.3)		16.1	(4.0)		19.2	(3.3)		24.9	(3.9)	
Change (2)	-3.7%			-1.3%			-9.9%			-3.1%			-2.0		

Mean and standard deviation (in parenthesis)
(1) Health (100 points) = General (24) + Bone (23) + Circulation (23)+ Skin, trachea (30)
(2) Rate of change between scores of two age groups
ns p>0.05
*** p<0.001.

Table 23.15. Psychological state score between two age groups. (Unit: points)

Age Groups	Psychological state (1) mean	(SD)	sig	Self concept mean	(SD)	sig	Ego integrity mean	(SD)	sig
50-64	67.2	(11.5)	ns	29.8	(5.7)	ns	37.4	(7.8)	ns
65 +	67.5	(15.4		28.5	(7.2)		39.0	(9.8)	
Total	67.4	(14.2)		28.9	(6.8)		38.5	(9.2)	
Change (2)	+0.7%			-4.4%			+4.3%		

Mean and standard deviation (in parenthesis)

(1) Psychological state (100 points) = self concept (40) + ego integrity (60)
(2) Rate of change between scores of two age groups
ns: $p>0.05$.

23.2.5 Correlational and associative analyses: cognitive, psychological and functional domains

The following 9 tables (Tables 23.16 - 23.24) contain bivariate correlations between overall scores, and subcomponent scores across the various instruments taken in various combinations. Significant correlations of different magnitude were generally found between cognitive function and ageing, physical strength, health status and psychological state. This generally held on a subcomponent to subcomponent basis and when stratified by age; the weakest relationship were found with health and cognitive function. Cognitive function and its components also showed associations with SES, with memory generally being the least determinant.

Table 23.16. Correlation between cognitive function and ageing.

	Ageing	sig	Functional	sig	Appearance	sig	Mental	sig
Cognitive function	0.4034	***	0.3048	***	0.3363	***	0.3900	***
Calculation	0.3041	***	0.2628	***	0.2621	***	0.2966	***
Language	0.2938	***	0.2323	***	0.2603	***	0.2607	***
Memory	0.4011	***	0.3082	***	0.3190	***	0.3907	***

*** p<0.001

Table 23.17. Correlation between cognitive function and physical strength.

	Physical strength	sig	ADL	sig	Physical activity	sig	
Cognitive function		0.4590	***	0.3475	***	0.4374	***
Calculation	0.3811	***	0.2641	***	0.3698	***	
Language	0.3224	***	0.2202	***	0.3137	***	
Memory	0.4414	***	0.3643	***	0.4125	***	

*** p<0.001

Table 23.18. Correlation between cognitive function and physical strength among age groups.

Age		Physical strength	sig	ADL	sig	Physical activity	sig
50-64	Cognitive function	0.3210	**	0.0803		0.3224	**
	Calculation	0.2351	*	0.0599		0.2360	*
	Language	0.2387	*	0.0074		0.2489	*
	Memory	0.2986	**	0.1100		0.2938	**
65 +	Cognitive function	0.4003	***	0.3279	***	0.3735	***
	Calculation	0.3368	***	0.2401	***	0.3249	***
	Language	0.2662	***	0.2048	***	0.2524	***
	Memory	0.3792	***	0.3428	***	0.3443	***

* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 23.19. Correlation between cognitive function and health status.

	Health	sig	General	sig	Bone	sig	Circulatory		sig	Skin,	sig
Cognitive function	0.2949	***	0.1717	*	0.3495	**	0.1719	**	0.1889	**	
Calculation	0.2475	***	0.1460	*	0.2780	***	0.1453	*	0.1715	**	
Language	0.1586	**	0.0736	ns	0.2476	**	0.0899	ns	0.0629	ns	
Memory	0.3011	***	0.1818	**	0.3372	***	0.1739	**	0.2075	**	

* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 23.20. Correlation between cognitive function and health status by age groups.

Age		Health	sig	General	sig	Bone	sig	Circulatory	sig	Skin, trachea	sig
50-64	Cognitive function	0.2126	*	0.1745		0.2800	**	0.0855		0.0884	
	Calculation	0.1918		0.1656		0.2737	**	0.0100		0.1012	
	Language	0.0477		0.1067		0.1119		0.0082		-0.0952	
	Memory	0.2250	*	0.1491		0.2534	*	0.1549		0.1258	
65 +	Cognitive function	0.2969	***	0.1812	*	0.3156	***	0.1732	*	0.2182	**
	Calculation	0.2406	***	0.1438	*	0.2292	**	0.1626	*	0.1884	**
	Language	0.1686	*	0.0572		0.2436	***	0.0926		0.1112	
	Memory	0.3018	***	0.2056	*	0.3061	***	0.1556	*	0.2321	**

* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 23.21. Correlation between cognitive function and psychological state.

	Psychological state	sig	Self concept	sig	Ego integrity	sig
Cognitive function	0.2598	***	0.2984	***	0.1810	**
Calculation	0.2566	***	0.2772	***	0.1918	***
Language	0.1774	***	0.2112	***	0.1181	*
Memory	0.2258	***	0.2707	***	0.1490	*

* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 23.22. Correlation between cognitive function and psychological state between age groups.

Age	Psychological state		sig	Self concept	sig	Ego integrity	sig
50-64	Cognitive function	0.3997	***	0.3094	**	0.3658	***
	Calculation	0.4362	***	0.3832	***	0.3658	***
	Language	0.2630	**	0.2182	*	0.2300	*
	Memory	0.2962	**	0.1970	*	0.2947	**
65+	Cognitive function	0.2496	***	0.2795	***	0.1856	**
	Calculation	0.2274	**	0.2322	**	0.1855	**
	Language	0.1625	*	0.1878	**	0.1165	
	Memory	0.2319	**	0.2720	***	0.1633	*

* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 23.23. Correlation between cognitive function and socio-economic status (SES).

	SES	sig	Education	sig	Occupation	sig	Income	sig	Housing
Cognitive function	0.4243	***	0.5439	***	0.2581	***	0.1558	**	0.0806
Calculation	0.3927	***	0.4924	***	0.2234	***	0.1734	**	0.0750
Language	0.2832	***	0.3992	***	0.1649	**	0.1262	*	-0.0099
Memory	0.3861	***	0.4909	***	0.2514	***	0.1086		0.0957

* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 23.24. Correlation between cognitive function and socio-economic status (SES) between age groups.

		SES	sig	Education	sig	Occupation	sig	Income	sig	Housing
50-64	Cognitive function	0.4334	***	0.4834	***	0.2379	*	0.3424	***	0.1279
	Calculation	0.4381	***	0.4722	***	0.2536	*	0.3653	***	0.1138
	Language	0.1780		0.4095	***	0.2417	*	0.3077	**	0.1548
	Memory	0.4024	***	0.2984	**	0.0759		0.1165		-0.0163
65+	Cognitive function	0.3853	***	0.5249	***	0.1106	*	0.1106		0.0766
	Calculation	0.3390	***	0.4641	***	0.1235		0.1235		0.0701
	Language	0.2824	***	0.4715	***	0.0572	*	0.0572		0.0903
	Memory	0.3469	***	0.3895	***	0.1375		0.1375		-0.0049

*p<0.05 ; **p<0.01 ; *** p<0.001

Table 23.25 shows the matrix of association for cognitive function and food preference, but stratified into persons with higher and lower cognitive functions across the distribution, and not stratified for age-group. By Chi-Square analysis this was not significant. Cognitive function has a mildly significant (0.041) association with preference for salty taste, with higher intellect associated with lesser preference (Table 23.26) but preferences for sweet taste (Table 23.27) or for hot taste (Table 23.28) failed to assort with higher and lower cognitive scores. This was also true for the use of seasoning (Table 23.29).

Table 23.25. Distribution of preference of foods between high and low cognitive function groups.

Groups		Meat	Fish and shells	Vegetables	All foods	Total
High cognitive groups	**Frequency**	9	11	31	46	97
	Row %	9.28	11.34	31.96	47.42	
	Column %	45.00	52.38	58.49	60.53	
Low cognitive group	**Frequency**	11	10	22	30	73
	Row %	15.07	13.70	30.14	41.10	
	Column %	55.00	47.62	41.51	39.47	
Total	**Frequency**	20	21	53	76	170
	Row %	11.76	12.35	31.18	44.71	100.00

Chi-square=1.792 (p=0.617) ns

Table 23.26. Distribution of preference of salty taste between high and low cognitive function groups.

Groups		Salty	Medium	Not Salty	Total
High cognitive groups	Frequency	19	50	28	97
	Row %	19.59	51.55	28.87	
	Column %	41.30	62.50	63.64	
Low cognitive group	Frequency	27	30	16	73
	Row %	36.99	41.10	21.92	
	Column %	58.70	37.50	36.36	
Total	Frequency	46	80	44	170
	Row %	27.06	47.06	25.88	100.00

Chi-square=6.403 (p=0.041) *Significant at 5% by Chi-Square test

Table 23.27. Distribution of preference of sweet taste between high and low cognitive function groups.

Groups		Sweet	Medium	Not sweet	Never eat	Total
High cognitive groups	**Frequency**	16	26	24	31	97
	Row %	16.49	26.80	24.74	31.96	
	Column %	47.06	57.78	57.14	63.27	
Low cognitive group	**Frequency**	18	19	18	18	73
	Row %	24.66	26.03	24.66	24.66	
	Column %	52.94	42.22	42.86	36.73	
Total	**Frequency**	34	45	42	49	170
	Row %	20.00	26.47	24.71	28.82	100.00

Chi-square=2.1680 (p=0.538)ns

Table 23.28. Distribution of preference of hot taste between high and low cognitive function groups.

Groups		Hot	Medium	Not hot	Total
High cognitive groups	Frequency	20	54	23	97
	Row %	20.62	55.67	23.71	
	Column %	57.14	62.79	46.94	
Low cognitive group	Frequency	15	32	26	73
	Row %	20.55	43.84	35.62	
	Column %	42.86	37.21	53.06	
Total	Frequency	35	86	49	170
	Row %	20.59	50.59	28.82	100.0

Chi-square=3.201 (p=0.202)ns

Table 23.29. Distribution of preference of seasonings between high and low cognitive function groups.

Groups		Use large amount	Medium	Use small amount	Total
High cognitive groups	**Frequency**	46	46	5	97
	Row %	47.42	47.42	5.15	
	Column %	60.53	55.42	45.45	
Low cognitive group	**Frequency**	30	37	6	73
	Row %	41.10	50.68	8.22	
	Column %	39.47	44.58	54.55	
Total	**Frequency**	76	83	11	170
	Row %	44.71	48.82	6.47	100.00

Chi-square=1.0680 (p=0.586)ns

As shown in Table 23.30, cognitive function strata showed some assorted low-order correlations of significance with the whole population considered. This was true with intakes of energy, total fat, animal fat, thiamine (vitamin B1), riboflavin (vitamin B2) and ascorbic acid (vitamin C). For the under 65 year old group, the association remained significant only for the two B vitamins and iron of animal origin also showed an association in the younger group. Riboflavin and ascorbic acid retained significant association in the 65 and over group.

Table 23.30. Correlation between cognitive function and nutrients.

	Total (n=293)	sig	50-64 (n=100)	sig	65+(n=193)	sig
Energy	0.1350	*		ns		ns
Protein		ns		ns		ns
Fat	0.1155	*		ns		ns
Animal fat	0.1150	*		ns		ns
Carbohydrates		ns		ns		ns
Fibre		ns		ns		ns
Calcium		ns		ns		ns
Phosphorus		ns		ns		ns
Iron		ns		ns		ns
Animal iron		ns	0.2094	*		ns
Vegetable iron		ns		ns		ns
Vitamin A		ns		ns		ns
Vitamin B1	0.1398	*	0.1985	*		ns
Vitamin B2	0.1717	**	0.2649	**	0.1617	*
Niacin		ns		ns		ns
Vitamin C	0.1578	**		ns	0.1447	*

ns: p>0.05 between cognitive function and nutrients; *p<0.05 ; ** p<0.01

As shown in Table 23.31, only scattered associations of cognitive classification and food groups with meat and fat and oils, and fruits robust in two columns, and green and yellow vegetables appearing for the younger group. These are interesting to forge hypotheses, but with the factor of multiple correlations without compensation for power, many of these associations may be a mere consequence of the large number of bivariate tests in the matrices."

Table 23.31. Correlation between cognitive function and food intake.

	Total (n=293)	sig	50-64 (n=100)	sig	65+ (n=193)	sig
Meat	0.1188	*	0.2299	*		ns
Fish and shells		ns		ns		ns
Eggs		ns		ns		ns
Beans and tofu		ns		ns		ns
Milk and diary products		ns		ns		ns
Dried bony fish		ns		ns		ns
Green, yellow veg		ns	0.2006	*		ns
Vegetable		ns		ns		ns
Seaweed, mushroom		ns		ns		ns
Fruit	0.1147	*		ns	0.1937	**
Cereals		ns		ns		ns
Potatoes		ns		ns		ns
Sugar		ns		ns		ns
Fat and oil	0.1452	*	0.1976	ns		ns
Alcohol		ns		ns		ns

ns: p>0.05; * p<0.05 ; ** p<0.01

Table 23.32 shows the results and coefficients and strength of correlations for the multiple stepwise regression with all of the population and cognitive function as the dependent variable. Physical strength, SES and ageing entered into the predictive equation for cognitive function classification. In the younger age group (Table 23.33), the predictive equation is constituted from ageing, SES and psychological state terms, whereas in the older group (Table 23.34) multiple stepwise regression for prediction of cognitive function includes only physical strength and SES terms.

Table 23.32. Multiple stepwise regression for dependent variable "cognitive function".

Step	Variable	R	R2	F(1)	P>F	sig
1	Health	0.4589	0.2106	77.65	0.0001	***
2	Socio-economic status	0.5196	0.2700	23.59	0.0001	***
3	Ageing	0.5604	0.3141	18.58	0.0001	***
4	Psychological state	0.5724	0.3276	5.79	0.0168	*
5	Health	0.5728	0.3281	0.20	0.6522	

(1) F value variable entered each step *p<0.05 by F-test; ***p<0.001 by F-test
SES: Socio-economic status
<Equation to explain "cognitive function">
Y (cognitive function) = 8.0104 + 0.5030 physical strength = 0.2556 SES + 0.3273 ageing + 0.1444 psychological state.

Table 23.33. Multiple stepwise regression for dependent variable "cognitive function" of 50-64 age group.

Step	Variable	R	R2	F(1)	P>F	sig
1	Health	0.5495	0.3020	42.39	0.0001	***
2	Socio-economic status	0.6140	0.3770	11.67	0.0009	***
3	Psychological state	0.6476	0.4194	7.01	0.0095	**
4	Health	0.6581	0.4331	2.30	0.1330	
5	Physical strength	0.6589	0.4341	0.17	0.6782	

(1) F value variable entered each step; **p<0.01 by F-test; ***p<0.001 by F-test
SES: Socio-economic status
<Equation to explain "cognitive function">
Y (cognitive function) = 12.9080 + 0.8206 ageing + 0.1771 SES + 0.2449 psychological state

Table 23.34. Multiple stepwise regression for dependent variable "cognitive function" of 65+ age group.

Step	Variable	R	R2	F(1)	P>F	sig
1	Physical strength	0.4572	0.2090	50.47	0.0001	***
2	Socio-economic status	0.4969	0.2469	9.56	0.0023	**
3	Ageing	0.5046	0.2546	1.96	0.1627	
4	Psychological state	0.5066	0.2566	0.50	0.4803	
5	Health	0.5070	0.2570	0.09	0.7642	

(1) F value variable entered each step; **p<0.01 by F-test; ***p<0.001 by F-test;
SES: Socio-economic status
<Equation to explain "cognitive function">
Y (cognitive function) = 2.8382 + 0.5195 physical strength + 0.4472 SES

23.3 DISCUSSION AND CONCLUSIONS

Two-hundred ninety-three Korean adults made up of both men and women and persons from the capital and the interior, ranging from middle-age (50 years) into the tenth decade of life, were able to be studied in an extensive, multidimensional survey format linking nutrient intake, food intake, food and taste preferences with behavioural, social, psychological, and functional responses and with the process of ageing itself. In order not to reduce sample-size to cells with limited statistical power, the interesting dimensions of differences across gender (male to female) and differences across region (metropolitan, provincial) were deferred in favour of the contrast of age above and below 65 years. Not unexpectedly, across age categories there were changes that could be considered as increasing impairment or "deterioration" but the rates and magnitudes varied markedly with the type of variable and the subcomponents with composite scores. Only very occasional and weak interactions of food and nutrient intake and cognitive function were observed. The terms that constitute the predictive equation for cognitive functions and the amount of the variance that they explain can be seen in the final three tables.

23.4 SUMMARY

- This chapter reports the influence of health status, physical strength, psychological state, socio-economic status and nutrition on cognitive function amongst 293 elderly (M 80, F 213) aged 50-95 living in both urban and rural areas of Seoul.

- Food intake was measured by the 24-hour recall method.

- Cognitive function was assessed using a 100 point score according to contributions from mathematical calculations, language use, and recall of numbers (19:23:58). Overall point scores declined from 91 in the 50 to 64 age group, to 78 after 65. The decline was most severe in calculations and least in language.

- A two-component health score was devised on a basis of 43 points for activities of daily living (ADL) and 57 points for physical activity. The score declined across age by almost 8% with a greater reduction in physical activity than loss of ADL capacity.

- A psychological state score, partitioned between self-concept (40) and ego integrity (60) was computed. A score of 67 was found in both age-groups with a 4.4% decline in self-concept with age, compensated by a 4.3% increase in ego-intensity, but with little dynamic overall.

- Correlational and regressional analyses revealed that cognitive function had the weakest relationship with health and psychological state and the strongest with physical strength and socio-economic status.

- A higher score for cognitive function was also weakly associated with a preference for salty taste and with intakes of energy, total fat, animal fat, thiamine, riboflavin, ascorbic acid, meat, oils, fruits and green and yellow vegetables.

CHAPTER 23

A STUDY OF NUTRITION AND OTHER MEASURES

OF HEALTH AMONGST ELDERLY KOREANS