

: 1 2 1998

가 , \* ,  
 \*\*, \*\*\*  
 \* . \* . \*\* . \*\*\* . \*

1988 65  
 4.8%가 1991  
 60 37%가 1가

1990 71.3  
 2000 74.3 가  
 가 65 가  
 1997 6.6% 2000 7%, 2022  
 14% 가 1,2)  
 가

1960  
 1960 28.8% 1989  
 73.1% 가 가 .

10-12%가 65 4) 가 가  
 28.7% 52.7% 가가 5)  
 1) , , , , ,  
 85.9%가 , , , , ,  
 89.2% 83.4% , , , , ,  
 1/3 가 6)  
 7) ,  
 40.4%가 8-15) , , , , ,  
 가 3) , , , , , 가  
 16) 17)  
 18)  
 1997 21 가

가

19-22)

85%

1.

1

60

1997

7

14

7. 24.

11

가

가

23)

8

1937

12

31

60

24)

8,963

2

(cluster sampling)

25-29)

. 1

가

1

1

2

1

55

가

26

60

31.6%

2,830

301

2.

1)

1)

2)

2) MMSE-K(Minimetal Status Examination,

3)

Korean Version)

12 30

4)

(orientation), (registration),

(recall), (attention and calculation), (language), (reasoning and judgement) 6 12 2 2 3 , 30 .

1 time orientation, attention, language 가 .  
 26 가 3 . MMSE , 19-25 , 18 8) 24 , , , , 가 , .

3) (The Brief MAST) 9) 가(Mini-Nutritional Assessment)  
 10 29 6 가 , 6 .

4) Geriatric Depression Scale(GDS)-Short form 가, 가, 가 가, 가,  
 15 6 , 6 가, 가, 가 가 4 24 가 , 17 23.5 .

5) (ADL-Activities of Daily Living) , 17 , 17 .  
 Katz 3 .

6) (IADL-Instrumental Activities of Daily Living) , , , t-  
 ADL 가 t-

7) (Social support network) .  
 (social network) 가 (social support) , , , , , .

**Table 1.** Variables Used in Study

Variable	Content	Measurement
Dependent Variable	Mini-Nutritional Assessment	0-30 points(18 questions)
Independent Variable		
Socio-demographics	Age	in years
	Sex	1: male      2: female
	Education	1: uneducated      2: educated
	Literacy of Hangeul(the Korean alphabet)	1: illiterate      2: literate
	Self-income per month	in 10,000s of won
	Self-expenditure per month	in 10,000s of won
	Marital status	1: married      2: else
	Religion	1: not believe      2: believe
	Type of residence	1: own house      2: lease
	Number of persons in the household	1: 3      2: 4
Mental state	MMSE-K	0-30 points
	GDS	0-15 points
	MAST	0-29 points
Physical state	Presence of current illness	1: no      2: yes
	Number of drugs in current use	1: 2      0: 3
	Presence of stress	1: no      0: yes
	IADL(Instrumental Activity of Daily Living)	sum of 9 item's points(1: independent, 2: partial dependent, 3: total dependent)
Social support network	Social activity(2 items)	
	Instrumental(3 items)	sum of each item's points(1: supported 0: not supported)
	Emotional(3 items)	
Dietary pattern	Number of meals	1: 2      2: 3
	Regularity of meal	1: regular      2: irregular
	Change of taste	1: non or a little      2: much
	Satisfaction in food	1: unsatisfied      2: satisfied
	Persons at meal	1: alone or spouse      2: family
	Unbalanced diet	1: no      2: yes

(hierarchical

multiple regression analysis)

가 ( 0.7 ) 1 .  
 가 71  
 . 가 1/3, 가 2/3 .  
 가 50.8% 가 37.2%  
 88%가

가 56.1% 가 32 500 가 1 8.3% 가 1 가 80.8% 가 27 300 가 24.9% (Table 2).

**Table 2.** Sociodemographic Characteristics

Characteristics		Frequency(%)
Age(years)	mean ± SD	71.2 ± 7.1
Sex	male	101(33.6)
	female	200(66.4)
Education	uneducated	150(50.8)
	elementary	113(37.2)
	junior high	23( 7.6)
	high	5( 1.6)
	above college	3( 1.0)
	no response	5( 1.6)
Marrital status	married	169(56.1)
	seperated by death	122(40.5)
	second marriage	5( 1.7)
	others	2( 0.6)
	no response	3( 1.0)
Income (10,000won)	mean ± SD	32.1 ± 49.9
Expenditure (10,000won)	mean ± SD	26.6 ± 35.2
Religion	none	98(32.6)
	protestant	71(23.6)
	buddhism	91(30.2)
	catholic	36(12.0)
	others	2( 0.7)
	no response	3( 1.0)
Type of residency	own house	243(80.8)
	lease	38(12.6)
	lease(monthly rent)	9( 3.0)
	others	6( 2.0)
	no response	5( 1.7)
Number of persons in the household	1	25( 8.3)
	2	75(24.9)
	3	35(11.6)
	4	31(10.3)
	5	58(19.3)
	6	70(23.2)
	no response	7( 2.3)

(Table 6).

2. MMSE-K 22.7 ± 4.5 6. 가  
 23 46.5% 24 82.7% 3 1 가  
 40.5% . GDS 11.3% . 70.4%  
 6.9 ± 3.7 5 25.2% . 가  
 34.9% 가 34.9%  
 56.5% . MAST 60.7% .  
 가  
 70.1% 6  
 4.0% (Table 3).

**Table 3.** Characteristics of Mental State

Mental State	Frequency(%)	Mean ± SD
MMSE-K		22.7 ± 4.5
23	140(46.5)	
24	122(40.5)	
no response	39(13.0)	
GDS		6.9 ± 3.7
5	105(34.9)	
6	170(56.5)	
no response	26( 8.6)	
MAST		2.7 ± 4.2
5	78(25.9)	
6	12( 4.0)	
no response	211(70.1)	

3. 가  
 59.1%, 가 35.5% .  
 3 가 78.7% 3  
 18.6% .  
 가 21.6%, 가 75.4%  
 (Table 4).

**Table 4.** Characteristics of Physical State

Physical State	Frequency(%)
Presence of current illness	
yes	178(59.1)
unknown	8( 2.7)
no	107(35.5)
no response	8( 2.7)
No. of drugs currently use	
2	237(78.7)
3	56(18.6)
no response	8( 2.7)
Presece of stress	
yes	65(21.6)
no	227(75.4)
no response	9(13.0)

4. 가  
 20.6% 가  
 15.6%, 14.6% .  
 , , 8.3%, 8.7%  
 10.3%가 (Table 5).  
 5. 가  
 80%  
 가 69.1%,  
 가 69.1% .  
 가 51.5% 64.1%



**Table 7.** Characteristics of Diet Pattern

Diet Pattern	Frequency(%)
Number of meal(per day)	
1	1( 0.3)
2	32(11.0)
3	249(82.7)
no response	19( 6.3)
Regularity of meal	
regular	212(70.4)
irregular	76(25.2)
no response	13( 4.3)
Change of taste	
unchanged	105(34.9)
a little	85(28.5)
much	97(32.2)
no response	13( 4.3)
Satisfaction in food	
unsatisfied	19( 6.3)
nutral	109(36.2)
satisfied	3(53.2)
no response	13( 4.3)
Persons at meal	
alone	52(17.3)
spouse	81(26.9)
children or grandchildren	32(10.6)
family	120(39.9)
no response	16( 5.3)
Unbalanced diet	
no	226(75.1)
neutral	37(12.3)
yes	25( 8.3)
no response	13( 4.3)

8.3% (Table 7).

7 .  
 가 17  
 3.0% 17  
 23.5  
 24  
 50.5% . 가  
 가  
 38.5%

(Table 8).

8 .  
 가 24.2 ± 3.3, 가 23.3 ± 3.4 가  
 MNA 가 (p<0.05).  
 70 70  
 24.2 ± 3.1, 70 22.9 ± 3.5  
 (p< 0.01).  
 22.9 ±  
 3.4 24.4 ± 3.2 가  
 (p< 0.01). 가 24.0 ± 3.4  
 23.0 ± 3.3 가  
 가 (p< 0.05). 10  
 10 23.2 ± 3.3, 10  
 24.2 ± 3.3 (p<  
 0.05). 10 10  
 23.5 ± 3.4, 10 24.3 ± 3.1  
 (p< 0.05).  
 가 23.8 ± 3.0, 가 23.5 ± 3.5  
 (p> 0.05).  
 가 23.7  
 ± 3.3 23.1 ± 3.6 가  
 (p>0.05)(Table 9).  
 9 .  
 MMSE-K가 23  
 MNA 23.4 ± 3.5 24  
 24.1 ± 3.0  
 0.05 (p- value 0.08).  
 GDS 가 6  
 MNA 22.7 ± 3.2  
 5 25.5  
 ± 2.5 (p=  
 0.0001)  
 MAST 가 6  
 MNA 22.8 ± 3.0  
 5  
 24.3 ± 3.0



**Table 8.** Mini-nutritional Assessment

	Frequency(%)				
	Malnutrition (<17)	At risk of malnutrition (17-23.5)	Well-nourished ( 24)	No response	Total
Age(yrs)					
-69	1( 0.8)	39(32.5)	80( 66.7)	7( 5.5)	127( 42.2)
70-79	4( 3.3)	61(50.0)	57( 46.7)	13( 9.6)	135( 44.9)
80-	4(11.8)	16(47.1)	14( 41.2)	4(10.5)	38( 12.6)
No response	0( 0.0)	0( 0.0)	1(100.0)	( 0.0)	1( 0.3)
Sex					
Male	4( 4.0)	29(28.7)	57( 56.4)	11(10.9)	101( 33.6)
Female	5( 2.5)	87(43.5)	95( 47.5)	13( 6.5)	200( 66.4)
Total	9( 0.0)	116(38.5)	152(50.5)	24( 8.0)	301(100.0)

**Table 9.** MNA Score According to Sociodemographic Characteristics

Demographics	MNA Score(mean $\pm$ SD)	t-value	p-value
Sex			
male(N=90)	24.2 $\pm$ 3.3	2.01	<0.05
female(N=187)	23.3 $\pm$ 3.4		
Age			
70(N=137)	24.2 $\pm$ 3.1	3.37	<0.01
>70(N=139)	22.9 $\pm$ 3.5		
Education			
uneducated(N=145)	22.9 $\pm$ 3.4	-3.88	<0.01
educated(N=129)	24.4 $\pm$ 3.2		
Marital status			
married(N=155)	24.0 $\pm$ 3.4	2.54	<0.05
else(N=122)	23.0 $\pm$ 3.3		
Income(10,000 won)			
10(N=117)	23.2 $\pm$ 3.3	-1.57	<0.05
>10(N=118)	24.2 $\pm$ 3.3		
Expenditure(10,000 won)			
10 (N=118)	23.5 $\pm$ 3.4	-2.08	<0.05
>10(N=123)	24.3 $\pm$ 3.1		
Religion			
not believe(N=94)	23.8 $\pm$ 3.0	0.68	>0.05
believe(N=183)	23.5 $\pm$ 3.5		
Type of residency			
own(N=235)	23.7 $\pm$ 3.3	1.10	>0.05
lease(N=50)	23.1 $\pm$ 3.6		

(Table 10).

10. 가 24.1 ± 3.2 (p<0.01). IADL 9 24.2 ± 3.2

가 22.8 ± 3.5 가 (p<0.01)(Table 11).

가 22.9

3 IADL

±3.4, MNA 24.5 ± 3.1 (p<0.01).

3 21.5 ± 3.3 3 가

**Table 10.** MNA Score According to Mental State

Mental State	MNA Score(mean ± SD)	t-value	p-value
MMSE-K(N=248)		-1.72	0.0829
23 (N=133)	23.4 ± 3.5		
24 (N=115)	24.1 ± 3.0		
GDS(N=259)		7.64	0.0001
5 (N= 99)	25.5 ± 2.5		
6 (N=160)	22.7 ± 3.2		
MAST(N=85)		1.60	0.1317
5 (N= 73)	24.3 ± 3.0		
6 (N= 12)	22.8 ± 3.0		

**Table 11.** MNA Score According to Physical State

Physical State	MNA Score(mean ± SD)	t-value	p-value
Physical illness		3.96	<0.01
yes(N=173)	22.9 ± 3.4		
no(N=99)	24.5 ± 3.1		
Number of drugs in current use		-5.22	<0.01
3(N=53)	21.5 ± 3.3		
< 3(N=224)	24.1 ± 3.2		
Has suffered stress in the past 3 months		-5.47	<0.01
yes(N=64)	21.6 ± 3.7		
no(N=214)	24.2 ± 3.0		
IADL		3.39	<0.01
independent in all items(N=157)	24.2 ± 3.2		
dependent in at least 1 item(N=109)	22.8 ± 3.5		

0.01), MNA 가 (p< 23.6  
 12). (Table ±3.6 가  
 (p<0.01)(Table 13).

12 . 13 .  
 가 3 MNA  
 MNA 24.0 ± 24.2 ± 3.2 21.9 ± 3.4  
 3.2 가 (< 0.01).  
 23.3 ± 3.4 가 24.5 ± 3.0,  
 22.4 ± 3.5 가 (<  
 2 MNA 0.01).  
 24.1 ± 3.3 23.1 ± 3.4 가 24.2 ± 3.0  
 가 가 가 (< 0.01)  
 가 가 가 가 24.0 ± 3.3  
 가 가 3 가 가 22.1 ± 3.3 가 가  
 MNA 24.0 ± 3.2 (<0.01)(Table 14).

**Table 12.** MNA Score According to IADL

IADL	MNA Score(mean ± SD)		t-value	p-value
	Independent	Dependent		
Using telephone	23.9 ± 3.3	23.9 ± 3.3	2.66	0.008
Ability to travel	23.8 ± 3.3	22.1 ± 3.6	2.76	0.006
Shopping	23.8 ± 3.3	22.1 ± 3.4	2.77	0.005
Cooking	23.8 ± 3.3	21.5 ± 3.3	3.30	0.001
Cleaning	23.8 ± 3.2	21.1 ± 3.5	3.88	0.000
Doing housework	23.9 ± 3.2	21.9 ± 3.6	3.73	0.000
Doing laundry	23.9 ± 3.2	21.9 ± 3.6	3.42	0.000
Managing medication	23.9 ± 3.2	20.6 ± 3.9	4.49	0.000
Managing money	23.6 ± 3.4	23.4 ± 3.4	0.57	0.569

**Table 13.** MNA Score According to Social Support

Social support	Number of supported items	MNA Score(mean ± SD)	t-value	p-value
Emotional(3 items)	< 3(N=166)	23.3 ± 3.4	-1.60	0.41
	3(N=108)	24.0 ± 3.2		
Social activity(2 items)	< 2(N=129)	23.1 ± 3.4	-2.57	<0.01
	2(N=145)	24.1 ± 3.3		
Instrumental(3 items)	< 3(N= 83)	22.6 ± 3.6	-3.17	<0.01
	3(N=191)	24.0 ± 3.2		



**Table 16.** Hierarchical Regression Model for Nutritional Status

Variables	Model 1	Model 2	Model 3	Model 4	Whole model
<b>Demographics</b>					
sex	-0.6	-0.6	-0.1	0.2	0.4
age	-0.1**	-0.1**	-0.0	-0.0	-0.0
education	1.0*	0.9*	0.6	0.3	1.0*
<b>Social support network</b>					
social activity		0.4 <sup>#</sup>	-0.0	-0.1	-0.2
instrumental		0.7**	0.9**	1.0**	0.7**
<b>Physical state</b>					
IADL			-0.2 <sup>#</sup>	-0.1 <sup>#</sup>	-0.1
current illness			-0.7**	-0.5	-0.3
no. of drugs			1.8*	1.7**	1.4**
stress			2.2**	1.5**	1.4**
<b>Mental state</b>					
MMSE-K				0.1	0.1 <sup>#</sup>
GDS				-0.3**	-0.1*
<b>Diet pattern</b>					
no. of meals					0.9
regularity					-1.2**
change					-0.4
satisfaction					0.7 <sup>#</sup>
persons at meal					0.3
have unbalanced diet					-1.2**
F-value	8.3**	8.5**	12.2**	13.0**	10.9**
Adj-R <sup>2</sup> (%)	7.4	12.2	28.3	37.9	45.1

<sup>#</sup>: p<0.1, \*: p<0.05, \*\*:p<0.01

Sex : 1; male 2; female  
Age : years  
Education : 1; uneducated 2; educated  
Social activity : sum of 2 item's points (1; supported, 0; not supported)  
Instrumental : sum of 2 item's points (1; supported, 0; not supported)  
IADL : sum of 9 item's points (1; independent, 2; partial dependent, 3; total dependent)  
Current illness : 1; no 2; yes  
Number of drugs : 1; <3 0; 3  
Stress : 1; no 0; yes  
MMSE-K : 1-30 points  
GDS : 1-15 points  
Number of meals : 1; 2 2; 3  
Regularity (of meals) : 1; regular 2; irregular  
Taste : 1; unchanged, or a little changed 2; much changed  
Satisfaction (in food) : 1; unsatisfied 2; satisfied  
Persons at meal : 1; alone or with a spouse 2; with family  
Unbalanced diet : 1; no 2; yes

45.1% , MMSE-K, GDS, (Table 15). MMSE-K 가 23

46.5% 24 40.5% 1991

가 Guigoz<sup>30)</sup> MMSE-K 24 가 31.6%<sup>36,37)</sup>

가 17 3.0% 17 23.5 2-23%, 11.3%<sup>61)</sup>

24 38.5% MMSE-K가<sup>36)</sup>

50.5% (Table 8).

가 5-8%,<sup>39,40)</sup> 30-60%<sup>15,31,32)</sup> MMSE-K

가 가 가 가 가

가 가 가 folate, vitamine B12 가

70 가 가 riboflavin<sup>41)</sup> 가

가 가 가 가

10 가 가 가

33) , 가 가 가

가 가 42) GDS 15

34,35) , 43,44) 30

가



7.5% :  
6.7%, 22.2%,  
23.7%, 23.8% 60 1997 7  
14 7 24 11 2  
45.1% (cluster sampling)  
가 ,  
가 , 가 , Mini Mental Status Exam(MMSE-K), Geriatric Depression Scale(GDS),  
가 (Brief MAST),  
(IADL), ,  
t-test, multiple  
regression  
: 가 71.2 ± 7.1  
가 101 (33.6%), 200 (66.4%)  
가 41.5%  
가 가 t-test 가 ,  
가 , , , MMSE-K  
GDS, , , ,  
가 , IADL, ,  
, 가 3 가 (p<0.05).  
, 7.47%, 25.3%,  
가 6.7%, 가 23.8%,  
22.2% .  
45.1% , , , ,  
, , , ,  
: 가가 : 가  
가 가 가  
가



= Abstract =

## Factors Related to Nutritional Status of Elderly in a Korean Rural Community

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**Background :** Nutrition is closely related to morbidity and mortality, and active intervention is known to be effective in their prevention. This study evaluates the factors related to nutritional status of elderly, to be used as a basic reference for effective prevention program.

**Methods :** The cross-sectional study evaluates the nutritional status of community-living elderly, aged 60 and older, in a Korean rural community. The subject were selected from a two stage cluster sampling. Questionnaire contained demographics, the Mini-Nutritional Assessment(MNA), Mini-Mental Status Exam-Korean(MMSE-K), Geriatric Depression Scale(GDS), IADL, Social support network, and dietary patterns. T-test and hierarchical regression models were constructed to explore the factors related to nutritional status.

**Results :** Mean age was  $72 \pm 7.1$  with 101 male subjects and 200 female subject. The MNA score revealed 41.5% of subjects who were at risk of malnutrition. The mean MNA score showed significant differences in terms of following factors: gender, age, education, marital status, income, expenditures, MMSE-K, GDS, social support, instrumental support, regularity of meal, changes in taste, satisfaction in food, unbalanced dietary habit, number of family members sharing the meal, IADL, presence of disease, number of medications( $p < 0.05$ ). Multiple regression analysis revealed that demographic

characteristics explained 7.5% of nutritional status, social support network 6.7%, mental disease 25.3%, dietary pattern 23.8%, and physical disease 22.2% correspondingly. Whole model explained 45.1% of nutritional status. The significant variables were the number of medications, presence of stress, unbalanced dietary habit, regularity of meal, instrumental support, depression, cognition, and satisfaction in food( $p < 0.05$ ).

**Conclusion :** Mental and physical state, dietary pattern, social support network, demographic characteristics were related to nutritional status.

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**Key Words :** Mini-Nutritional Assessment, Social support network, Functional assessment, Depression, Cognitive function

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