

Dietary Characteristics of the Elderly Living Alone from Low Income Status in Bucheon City

Jin Kyung Park, Sook Mee Son[†]

Department of Food Science and Nutrition, The Catholic University of Korea, Bucheon, Korea

ABSTRACT

This study was performed to investigate the dietary characteristics and related factors of the elderly female living alone. The subjects were 70 single living elderly female residing in Bucheon city and receiving benefits from the government based social welfare programs. Seventy nine percent of the subjects had self reported monthly income less than 200,000 (won) and forty one percent of the subjects were paying more than 100,000 (won) for food expense. The number of side dishes for a meal was two or three (35.71%) or one or two (31.40%) ; fifty seven percent of the subjects ate reheated left-over for lunch and 70.0% for dinner. The proportion of the single living elderly at high nutrition risk (≥ 6 as evaluated with Nutrition Risk Index Score) was 77.1%. Cereals and their products contributed most to the macronutrients like energy, protein and carbohydrates and vitamin B. In contrast vegetables and their products contributed most to the fiber, minerals (Ca and Fe) and vitamins (vitamin A, vitamin B and vitamin C). The mean total score of depression was 8.59 ± 2.69 (full score : 12) meaning that the extent of depression was serious. (*J Community Nutrition* 5(3) : 160~172, 2003)

KEY WORDS : elderly living alone · food habit · nutrition risk index · depression.

Introduction

The increase of the population of elderly, a worldwide phenomenon, has been regarded as a serious problem of the modern society. In Korea, the population of elderly aged over 65 has sharply increased from 3.8% in 1980s to 7.3% in 2000s and is projected to increase to 10% in 2010, making the country the super-aging society. Moreover, the population of elderly is expected to represent 34.4% in 2050, recording Korea the fourth country of the huge population of the elderly, following Spain (37.6%), Japan (36.4%) and Italy (35.9%) (Ministry of Health & Welfare 1998, Korean National Statistical Office 2001). As with this increase of the population of the elderly, their life styles have been changing to avoid living with their children and prefer to live independently.

The elderly living alone are defined as the ones who do not live nor share life with any spouse, relatives or others (Lee

1997). The proportion of the elderly living alone out of all the elderly increased by 4% - from 16.2% in 1994 to 20.1% in 1998.

The elderly living alone get little economic support or assistance for self care on their physical illness from their families and face with emotional problems like loneliness, frustration, and social isolation with losing their spouses (Lee 1999).

In the case of the elderly, social isolation or depression have negative influences on their appetites (Silver 1988). Davies (1992) also reported that the environmental factors such as lack of tasty foods, loneliness and depression related to loss of appetite result in nutrition deficiency and are regarded as warning signals to the elderly. Known barriers to provide adequate nutrition to older adults include poverty, living alone, lack of transportation, chronic disease, sensory declines, and lack of access to nutrition services (Campbell et al. 1994 ; Olson et al. 1997 ; Rolls 1992). Nutrition risk of the elderly is frequently evaluated with DETERMINE.

About 25% of the elderly were estimated as having a NRS (Nutrition Risk Score) over 6, considered as high risk (Nutrition Screening Initiatives 1995). Significantly higher Nutrition Risk Scores were found among the home-bound elderly than the independent-living elderly. Responses to the checklist que-

[†] Corresponding author : Sook Mee Son, Department of Food Science and Nutrition, The Catholic University of Korea 43-1 Yeok-gok 2-dong, Wonmi gu, Bucheon 422-743, Korea
Tel : (032) 340-3318, Fax : (032) 340-3310, 3111
E-mail : sonsm@catholic.ac.kr

stions indicated major problems exist in the following areas : 40% of the subjects were taking more than one medication, 37% had an illness or condition requiring changes in the diet, 37% ate alone, and 24% consumed inadequate amounts of fruits and vegetables. The validity of the screening tool detecting risk of malnutrition of elderly is also an area of concern since some questions, such as the ones regarding alcohol use and living alone (Wilson, Benedict 1996) .

Many subjects (20%) reported living and eating alone were particularly frequent among elderly females (30%) . Special diets (16%) , depression (9%) , or difficulty of chewing or swallowing (5%) were reported as major problems noted by some participants. More than half of the subjects did not meet intakes of vegetables, milk products, fruits, or grains suggested in the Food Pyramid Guidelines. Polypharmacy was common, with 40% of subjects taking three or more medications daily (Jensen 1996) .

Hui (1997) pointed that the elderly living alone had problems in their dietary behaviors, based on the results of the research done for single living poor elderly in Hong Kong ; their intake of fruits and dairy products was poor, their diet was monotonous and simple, 20% of them had no access to refrigeration and 40% of them had reheated dinner meals.

In the study of the over 60-year-old elderly in some urban districts by DOCCA (DeKalb Community Council on Aging) , in America, the results estimated with Food Frequency Questionnaire (FFQ) , showed elderly living alone had lower food frequencies in lentils, meat, pasta, and desserts than elderly living with family members. Also, the study pointed out that the food expense/wk/person, the amount of cooked weekend meals and the frequency of eating weekend meals in restaurants, the ability to leave home unassisted and available help in sickness were significantly lower (Prothro, Rosenbloom 1999) .

Korean elderly females showed higher percentage of living alone than elderly males. The elderly female was poor as their monthly income was less than the minimum urban living costs, and the prevalence of depression was significantly higher than the male elderly (Yim 1997) . Also, the percentage of the participation in economic activities of the elderly female over age 65 was 22.7% that is about the half of the one of the elderly male with the same age, and, 58.3% out of them were engaged in the agriculture, fishing or livestock farming industry and 28.3% of them are engaged in simple labors, which means that their job status is much more unstable compared to the male elderly.

Therefore is expected that the nutritional status of the single living elderly female in Korea is much more serious, but there are few researches on the dietary behavior of the elderly female living alone (Korean National Statistical Office 2001) .

Therefore, this study aimed to investigate the dietary characteristics and related factors like economic levels, food habit, depression score, the degree of the nutritional risk and the amount of the nutrients intake for each food group. It is hoped that the results can be used as the basic materials for the food supplying program for the elderly living alone.

Subjects and Methods

1. Subjects

The subjects were 70 single living elderly females over age 65, receiving benefits from the government based social welfare program, in Ojung-Gu, Bucheon City. The survey was carried out in March, 2000.

2. Methods

Data were collected by interviewing the subjects with a questionnaire by a trained dietitian on the basis of home visits. Variables in the questionnaire included the followings :

1) The general socioeconomic characteristics

It includes the period of living alone, their present jobs, ways of getting living expense, monthly income, and food expense.

2) The degree of self-managing of the activity of daily life and the degree of depression

The extent of self handling of the daily activity evaluated using five Likert scales in each question. The depression was evaluated using the score with 12 questions (Cass, Mary 1996) . They suggested the full score as 12 and the higher score as more depressed.

3) Food purchase and cooking

The subjects, ability of purchasing food, and the frequencies, places and the amount of money spent for purchasing foods were included. Degree of feeling of satisfaction with purchasing food, the way of cooking, the numbers of side dishes and access to the kitchenwares were also investigated.

4) Regularity of meals, snacks and dining-out

Regularity of meals such as breakfast, lunch, dinner, sna-

cks, dining-out were investigated.

5) Food habit and dietary behavior

Ten items about the food habit were obtained from the study of Boren et al. (1983) and modified. It was evaluated that the higher the sum of the score (full score : 30), the better their dietary habits, by giving 3 points for 'always', 2 for 'often', and 1 for 'rarely'. Items about dietary behavior were obtained from Susan (1985) and modified. Dietary behavior score with 11 items was evaluated in a similar way.

6) Nutrition Risk Index : NRI

Nutrition Risk Index, was assessed using, DETERMINE (Nutrition Screening Initiatives 1995) consisted of 10 questions with a full score of 10. Zero to two was regarded as 'good', three to five as 'moderate risk' and over 6 as 'high risk'.

7) Health status

Perceived health status, dental status, activities, sleeping time, long hospitalization, weight change, the onset of menopause and so on were investigated.

8) Nutrients intake for each food group

Based on the result of the 24hr-recall method, nutrients intake for each 19 food group were analyzed. Foods were divided into 19 food groups according to the ones shown in the report of the 98' Korean Health and Nutrition Survey (Ministry of Health and Welfare 1998). Nutrient intakes were estimated with Canpro (The Korean Nutrition Society 2002).

3. Statistical analysis

All data were analyzed using a SAS program package (SAS Institute Inc. 1995). The significance of the data for categorical variables, expressed with frequency or percentage

Table 1. Socioeconomic characteristics of the subjects

	65 - 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)	N (%)
				χ^2 value
Years of living alone				
< 10 years	1 (2.63)	1 (3.13)	2 (2.86)	
< 30 years	12 (31.58)	12 (37.50)	24 (34.29)	0.979
< 50 years	15 (39.47)	10 (31.25)	25 (35.71)	
50 years ≤	8 (21.05)	6 (18.75)	14 (20.00)	
No answer	2 (5.26)	3 (9.38)	5 (7.14)	
Kinds of working (including part-time)				
A public work	2 (5.26)	0 (0.00)	2 (2.86)	
Collection of waste articles	3 (7.89)	0 (0.00)	3 (4.29)	7.541
Service job	2 (5.26)	0 (0.00)	2 (2.86)	
The others (manual work etc.)	31 (81.58)	31 (96.88)	62 (88.57)	
No job	0 (0.00)	1 (3.13)	1 (1.43)	
Ways of getting living expense				
Totally depend on well-fare program	30 (78.95)	29 (90.63)	59 (84.29)	
Totally depend on family or relatives	0 (0.00)	1 (3.13)	1 (1.43)	5.207
Make money by myself	4 (10.53)	0 (0.00)	4 (5.71)	
Others	4 (10.53)	2 (6.25)	6 (8.57)	
Monthly income				
10,000 ≤ < 100,000	9 (23.68)	6 (18.75)	15 (21.43)	
100,000 ≤ < 200,000	22 (57.89)	18 (56.25)	40 (57.14)	6.808
200,000 ≤ < 300,000	3 (7.89)	8 (25.00)	11 (15.71)	
300,000 ≤	3 (7.89)	0 (0.00)	3 (4.29)	
No answer	1 (2.63)	0 (0.00)	1 (1.43)	
Food expense/month (unit : won)				
10,000 ≤ < 50,000	8 (21.05)	9 (28.13)	17 (24.29)	
50,000 ≤ < 100,000	7 (18.42)	10 (31.25)	17 (24.29)	3.032
100,000 ≤	19 (50.00)	10 (31.25)	29 (41.43)	
No answer	4 (10.53)	3 (9.38)	7 (10.00)	

1) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 (by chi-square (χ^2)-test)

was evaluated with Chi-square test. T-test and ANCOVA were used to analyze the significance of mean differences between hyperlipidemic and control groups. Logistic regression analysis was used to estimate the relative risk of hyperlipidemia.

Results and Discussion

1. The general characteristics of the subjects

With regard to the length of single living, less than 50 years (35.71%) and less than 30 years (34.29%) were most common (Table 1). The subjects were engaged in various working like government based public works or service jobs.

With regard to their economic status, most of them were registered to the social welfare program and were provided with a part of their living expenses. Seventy nine percent of the subjects had self reported monthly income less than 200,000 (won) and forty one percent of the subjects were paying more than 100,000 (won) for food expense, meaning that more than half of the monthly income was spent for foods.

According to Lee (1994), Marshall et al. (1999) and Prothro, Rosenbloom (1999), nutrients intakes of the elderly showed positive correlations with their income, and the amount of foods purchased depended much on their economic status.

There were no significant differences between the two age groups for the socioeconomic variables.

2. The degree of self-care and depression of the subjects

In this study the extent of self-managing to do the activity of daily life was investigated with five scales for each item, all of the subjects reported "so-so" or hard (Table 2). A similar study to this, Kim (1997) surveyed the single elderly in Kwangju city and reported that the self-managing ability of preparing meals as 3.0 (so-so) and grocery shopping as 2.77 (between so-so and hard) when they were evaluated in terms of the instrumental activity of daily living (IADL) with 5 scales-the higher the score, the better the ability.

According to the research of the Ministry of Health and Welfare in 2001, which surveyed elderly over the age of 65,

Table 2. Degree of self-managing and depression in subjects

	65 - 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)
Degree of self-managing ¹⁾			
Living alone	2.63 ± 0.81 ²⁾	2.75 ± 0.84	2.09 ± 0.83
Cooking alone	2.47 ± 0.86	2.59 ± 0.79	2.53 ± 0.83
Grocery shopping alone	2.52 ± 0.86	2.56 ± 0.80	2.54 ± 0.3
Eating alone	2.86 ± 0.70	2.75 ± 0.62	2.81 ± 0.67
Riding vehicles alone	2.31 ± 0.87	2.03 ± 0.86	2.19 ± 0.87
Mental depression ³⁾			
1. Are you basically satisfied with your life?	0.84 ± 0.36	0.81 ± 0.39	0.83 ± 0.38
2. Have you lost many of your interests?	0.71 ± 0.45	0.65 ± 0.48	0.69 ± 0.47
3. Do you feel that your life is empty?	0.78 ± 0.41	0.78 ± 0.42	0.79 ± 0.41
4. Are you often bored?	0.84 ± 0.36	0.75 ± 0.43	0.80 ± 0.40
5. Do you feel good most of the time?	0.71 ± 0.45	0.65 ± 0.48	0.69 ± 0.47
6. Are you afraid that something bad is going to happen?	0.63 ± 0.48	0.62 ± 0.49	0.63 ± 0.49
7. Do you feel happy most of the time?	0.89 ± 0.31	0.78 ± 0.42	0.84 ± 0.37
8. Do you often feel helpless?	0.57 ± 0.50	0.65 ± 0.48	0.61 ± 0.49
9. Do you prefer staying home, rather than going out and doing new things?	0.52 ± 0.50	0.40 ± 0.49	0.47 ± 0.50
10. Do you feel you have more problems with your memory?	0.57 ± 0.50	0.65 ± 0.48	0.61 ± 0.49
11. Do you often feel worthless for yourself?	0.76 ± 0.43	0.78 ± 0.42	0.77 ± 0.42
12. Do you think that most people are happier than you are?	0.71 ± 0.45	0.71 ± 0.45	0.69 ± 0.47
Total score	8.78 ± 2.48	8.37 ± 2.95	8.60 ± 2.70

1) 1 : very hard, 2 : hard, 3 : so-so, 4 : easy, 5 : very easy

2) mean ± SD

3) depress : yes(1), no(0) total score = 12

Table 3-1. Food purchasing and of the subjects

	65 - 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)	N(%)
χ^2 value				
Do you purchase foods by yourself?				
Yes	36 (94.74)	29 (90.63)	65 (92.86)	0.443
No	2 (5.26)	3 (9.38)	5 (7.14)	
How often do you buy grocery?				
Once everyday	2 (5.56)	1 (3.45)	3 (4.62)	4.985
Two-three times a day	10 (27.78)	5 (17.24)	15 (23.08)	
Once a week	9 (25.00)	4 (13.79)	13 (20.00)	
Once a month	1 (2.78)	0 (0.00)	1 (1.54)	
Irregular	14 (38.89)	19 (65.52)	33 (50.77)	
How much at least do you spend for groceries?				
100 - 1000 won	12 (33.33)	7 (24.14)	19 (29.23)	1.385
1000 - 3000 won	10 (27.78)	10 (34.48)	20 (30.77)	
3000 - 5000 won	2 (5.56)	2 (6.90)	4 (6.15)	
5000 won ≤	1 (2.78)	2 (6.90)	3 (4.62)	
No answer	11 (30.56)	8 (27.59)	19 (29.23)	
How much at most do you spend for groceries?				
1000 - 3000 won	6 (16.67)	5 (17.24)	11 (16.92)	0.716
3000 - 5000 won	7 (19.44)	5 (17.24)	12 (18.46)	
5000 - 10000 won	16 (44.44)	11 (37.93)	27 (41.54)	
10000 won ≤	4 (11.11)	5 (17.24)	9 (13.85)	
No answer	3 (8.33)	3 (10.34)	6 (9.23)	
Where do you usually go for grocery shopping?				
Traditional market	11 (30.56)	10 (34.48)	21 (32.31)	4.483
Supermarket	4 (11.11)	0 (0.00)	4 (6.15)	
Wholesale market	19 (52.78)	15 (51.72)	34 (52.31)	
Others	2 (5.56)	4 (13.79)	6 (9.23)	

1) * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$ (by chi-square (χ^2)-test)

57.5% were capable of living independent lives, and 30.8% had disability in only Instrumental Activities of Daily Living (IADL) without any difficulties in the Activities of Daily Living (ADL), and 11.7% had handicap even in Activities of Daily Living (The Ministry of Health and Welfare 2001).

Degree of depression rates of the subjects were investigated using a depression score with 12 questions. There were no significant differences between the two age groups, the total score was 8.59 ± 2.69 meaning that the extent of depression was serious. Single living elderly could be incapable of overcoming the feeling of sadness because of their isolated lives with low economic status (Schwartz et al. 1984). In the Western countries, elderly with no family had more chances to feel depressed (Ames, 1991; Snowden, Donnelly, 1986). The health status or the perceived health status had the significant correlation to depression (Cuijpers, Lammeren 1999; Park 1999).

According to the study by Yim et al. (1997), 18% of the

elderly males and 37% of the elderly females had serious depression, which had negative influences on their physical health status, and harmful effects on the whole of dietary behaviors. In the study by Park et al. (1998), the elderly females had higher depression than the male. Kim et al. (1993) also reported that the elderly females felt sadness more compared to the male elderly, which may be related to the interaction between genetic factors and environmental factors. It was reported depression was particularly higher in the elderly without spouse, with few family members, not having much allowances and not feeling well.

3. Food purchasing and cooking

It was found that single living elderly were purchasing food by themselves (92.86%) and many of them were purchasing it irregularly (50.77%) (Table 3-1). The distribution of the elderly for 3,000 - 5,000 won, 1,000 - 3,000 won and 100 - 1,000 won were 30.8%, 29.3% and 29.2%, respectively. Many

Table 3-2. continued

				N(%)
	65 - 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)	χ^2 value
What is your main consideration when buying food?				
Quantity/cost	27 (75.00)	22 (75.86)	49 (75.38)	1.777
Health	7 (19.44)	7 (24.14)	14 (21.54)	
The others	2 (5.56)	0 (0.00)	2 (3.08)	
Are you satisfied with your groceries?				
Absolutely not	4 (11.11)	3 (10.34)	7 (10.77)	0.933
No	24 (66.67)	21 (72.41)	45 (69.23)	
So-so	7 (19.44)	5 (17.24)	12 (18.46)	
Yes	1 (2.78)	0 (0.00)	1 (1.54)	
Absolutely yes	0 (0.00)	0 (0.00)	0 (0.00)	
Do you cook for yourself?				
Yes	35 (92.11)	31 (96.88)	66 (94.29)	0.734
No	3 (7.89)	1 (3.13)	4 (5.71)	
The way of cooking				
Cooking a sophisticated way	15 (42.86)	11 (35.48)	26 (39.39)	1.404
Cooking a convenient way	20 (57.14)	19 (61.29)	39 (59.09)	
The others	0 (0.00)	1 (100.00)	1 (1.52)	
The number of side dishes per meals?				
One-two	12 (31.58)	10 (31.25)	22 (31.43)	4.149
Two-three	14 (36.84)	11 (34.38)	25 (35.71)	
Three-four	6 (15.79)	5 (15.63)	11 (15.71)	
More than five	3 (7.89)	0 (0.00)	3 (4.29)	
No answer	3 (7.89)	6 (18.75)	9 (12.86)	
Do you have a home kitchen?				
Yes	37 (97.37)	32 (100.00)	69 (98.57)	0.854
No	1 (2.63)	0 (0.00)	1 (1.43)	

1) * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$ (by chi-square (χ^2)-test)

of them preferred visiting the traditional market (52.31%) for grocery shopping for economic reasons, and the supermarket (32.31%) followed it. In the question "what do you consider most in purchasing food", seventy five percent answered the large quantity and the low cost sixty nine percent reported they were not satisfied with the quantity of foods (Table 3-2). Ninety four percent of them were cooking for themselves, and the number of side dishes for a meal was two to three (35.71%) or one to two (31.43%).

Lee, Lee (1999) investigated the risk factors related to malnutrition for the poor single living elderly and found that the highest proportion of the elderly answered that they don't have enough money for the foods. They also reported that more females (94.6%) were cooking for themselves than males (83.3%). In the study of the elderly in some urban areas by DOCCA (DeKalb Community Council on Aging) of America, 57% of the subjects responded that they needed others' help for food purchasing, 29% of them needed help

for cooking, and 58% of them ate alone (Prothro, Rosenbloom 1999). Also, in another study (Stevens et al. 1992) of the elderly in urban and rural areas, 77% needed others' help for shopping for food, 50% needed for cooking, and 63% ate alone.

It seems that community dwelling single living elderly in Korea are relatively healthy to self manage the activity of daily life.

4. Meals, snacks and dining-out

With regard to the subjects' meals, sixty percent of them cooked a fresh dish personally for breakfast, but fifty seven percent of them ate reheated left-over for lunch and 70.0% for dinner (Table 4). With regard to the frequency of intake of snacks, 62.86% responded that they hardly had snacks, the most popular snacks (59.26%) were beverages such as tea, coffee, milk and soft drink, in contrast to the fruit (50.4%) in the study of the elderly in Chuncheon City by Lee et al (2001).

Table 4. Meals, snacks and dining-out in subjects

	65 – 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)	N(%)
Breakfast				
1. Cook fresh dish personally	23 (60.53)	19 (59.38)	42 (60.00)	
2. Eating leftover	10 (26.32)	6 (18.75)	16 (22.86)	1.209
3. Skip mostly	5 (13.16)	7 (21.88)	12 (17.14)	
4. Having free delivered meals from welfare facilities	0 (0.00)	0 (0.00)	0 (0.00)	
Lunch				
1. Cook fresh dish personally	7 (18.42)	2 (6.24)	9 (12.86)	
2. Eating leftover	18 (47.37)	22 (68.75)	40 (57.14)	3.910
3. Skip mostly	7 (18.42)	4 (12.50)	11 (15.71)	
4. Having free delivered meals from welfare facilities	6 (15.79)	4 (12.50)	10 (14.29)	
Dinner				
1. Cook fresh dish personally	9 (23.68)	8 (25.00)	17 (24.29)	
2. Eating leftover	28 (73.68)	21 (65.63)	49 (70.00)	1.556
3. Skip mostly	1 (2.63)	3 (9.38)	4 (5.71)	
4. Having free delivered meals from welfare facilities	0 (0.00)	0 (0.00)	0 (0.00)	
Frequency of snack				
Irregular, often	1 (2.63)	1 (3.13)	2 (2.86)	
Once-twice a day	13 (34.21)	6 (18.75)	19 (27.14)	2.281
Once per 2 – 3 days	2 (5.26)	3 (9.38)	5 (7.14)	
Hardly have anything between meals	22 (57.89)	22 (68.75)	44 (62.86)	
Kinds of snack				
Bread, biscuit or rice cake	1 (5.88)	1 (1.00)	2 (7.41)	
Rice jelly, rice cracker, candies	1 (5.88)	4 (40.00)	5 (18.52)	10.705
Drink (tea, coffee, milk, soft drink etc.)	14 (82.35)	2 (20.00)	16 (59.26)	
Fruits	1 (5.88)	3 (30.00)	4 (14.81)	
Frequency of dining-out				
Everyday	1 (2.63)	0 (0.00)	1 (1.43)	
Once per 2 – 3 days	2 (5.26)	1 (3.13)	3 (4.29)	4.440
Twice-three times a month	6 (15.79)	1 (3.13)	7 (10.00)	
Mostly not	29 (76.32)	30 (93.75)	59 (84.29)	

1) * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$ (by chi-square (χ^2)-test)

For the frequency of dining-out in the restaurant, 84.29% responded they are 'hardly dining-out', which meant most of the low-income elderly did not have enough money for eating out.

5. Food habit and dietary behavior

The average food habit score using ten questions was 2.38 ± 0.53 (between always and often) (Table 5). Two items that showed significant differences according to the age were 'I eat whatever I want' and 'I'm very interested in getting nutrition and health information'. The item showing the lowest score was "try to eat various foods that appeals to me" and the highest score "try not to skip meals and eat enough" (Table 5).

It is known that the food habits and dietary behaviors are affected by a variety of factors like sex, age, education econo-

mic level, nutrition knowledge or interests in health. It was reported that people with more family members gets better food habits scores (Rhie, Park 1998).

The dietary behavior score for each question was not significantly different between two the age groups (Table 6). The mean score was 2.06 ± 0.48 and 1.90 ± 0.42 for each age group, respectively, whose total mean score was 1.97 ± 0.32 . The questions manifesting the score less than 2 were 'Do you have dish of meat, fish, egg or bean for every meal?', 'Do you have food cooked with oil for every meal?', 'Do you have milk every day?' and 'Do you have fruits every day?'. The results were in accordance with the research done by Kim et al (1997) that the elderly showed low frequencies in the intake of dishes cooked with oil, dairy products, fruits and meats

Table 5. Mean score of food habits of the subjects

	65 – 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)
1. Try not to skip meals and eat enough. ³⁾	2.57 ± 0.55 ¹⁾	2.53 ± 0.67	2.56 ± 0.61
2. I eat whatever I want.	2.28 ± 0.72	1.86 ± 0.74 ^{*2)}	2.06 ± 0.76
3. I'm very much interested in getting nutrition and health information.	1.89 ± 0.76	2.25 ± 0.67 [*]	2.06 ± 0.74
4. I would really like to change my eating habits.	2.55 ± 0.60	2.43 ± 0.71	2.50 ± 0.65
5. Try to eat various foods that appeal to me.	1.92 ± 0.48	1.90 ± 0.64	1.91 ± 0.56
6. I'm not satisfied with meals.	2.10 ± 0.83	2.34 ± 0.70	2.21 ± 0.78
7. Try to eat healthy foods even if it's not my favorite.	2.21 ± 0.70	2.18 ± 0.78	2.20 ± 0.73
8. Try to prefer healthy foods to favorite one.	2.21 ± 0.66	2.28 ± 0.72	2.24 ± 0.69
9. For better health, I will try a food I hadn't eaten before.	2.28 ± 0.73	2.31 ± 0.64	2.30 ± 0.69
10. Try to maintain good health.	2.28 ± 0.73	2.56 ± 0.61	2.41 ± 0.69
Mean score	2.38 ± 0.71	2.39 ± 0.82	2.38 ± 0.53

1) mean ± SD

2) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 (by t-test)

3) always : 3 often : 2 rarely : 1

Table 6. Mean score of dietary behaviors of the subjects

	65 – 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)
1. Do you have meals regularly? ²⁾	2.23 ± 0.81 ¹⁾	2.18 ± 0.85	2.21 ± 0.83
2. Do you eat slowly?	2.26 ± 0.86	1.93 ± 0.71	2.11 ± 0.81
3. Do you overeat?	2.55 ± 0.55	2.34 ± 0.65	2.46 ± 0.61
4. Do you try to eat various kinds of foods?	2.31 ± 0.61	2.31 ± 0.73	2.31 ± 0.67
5. Do you try not to eat salty food?	2.15 ± 0.67	1.93 ± 0.75	2.06 ± 0.72
6. Do you have cooked rice, bread or noodles every meal?	2.52 ± 0.60	2.53 ± 0.62	2.53 ± 0.61
7. Do you have meat, fish, egg or bean every meal?	1.15 ± 0.36	1.21 ± 0.42	1.19 ± 0.39
8. Do you have food cooked with oil every meal?	1.18 ± 0.51	1.37 ± 0.60	1.27 ± 0.56
9. Do you have milk every day?	1.39 ± 0.67	1.37 ± 0.60	1.39 ± 0.64
10. Do you have vegetables every meal?	2.57 ± 0.64	2.46 ± 0.62	2.53 ± 0.63
11. Do you have fruits every day?	1.65 ± 0.74	1.40 ± 0.55	1.54 ± 0.67
Mean score	2.06 ± 0.48	1.90 ± 0.42	1.97 ± 0.32

1) mean ± SD

2) agree : 3 neutral : 2 disagree : 1

3) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 (by t-test)

Table 7. Nutrition risk index (NRI) of the subjects

	65 – 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)
1. I have an illness or condition that makes me change the kind and/or amount of food I eat. (2) ³⁾	1.42 ± 0.91 ¹⁾	0.87 ± 1.00 ^{*2)}	1.17 ± 0.99
2. I eat fewer than 2 meals a day. (3)	1.02 ± 1.44	1.12 ± 1.47	1.07 ± 1.45
3. I rarely eat fruits, vegetables, or milk products. (2)	0.47 ± 0.86	0.87 ± 1.00	0.66 ± 0.95
4. I have 3 or more drinks of beer, liquor or wine almost everyday. (2)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
5. I have tooth or mouth problems that make it hard for me to eat. (2)	0.52 ± 0.89	0.50 ± 0.87	0.51 ± 0.88
6. I don't always have enough money to buy the foods I need. (4)	3.26 ± 1.57	3.12 ± 1.68	3.20 ± 1.61
7. I eat alone. (1)	0.86 ± 0.34	0.90 ± 0.29	0.89 ± 0.32
8. I take 3 or more prescribed or over the counter drugs a day. (1)	0.36 ± 0.48	0.09 ± 0.29 ^{**}	0.24 ± 0.43
9. Without wanting to, I have lost or gained 5kg last in the 6 months. (2)	0.05 ± 0.32	0.12 ± 0.49	0.09 ± 0.41
10. I am not always physically able to shop, cook and/or feed myself. (2)	0.31 ± 0.73	0.18 ± 0.59	0.26 ± 0.67
Total score	8.31 ± 3.67	7.81 ± 3.01	8.09 ± 3.37

1) mean ± SD

2) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 (by t-test)

3) () = score, total score = 10

group. Kim (2000) also reported that the intake of fruits of the elderly living alone was poor compared to the elderly living with other family members. Consequently, the food

supply program for the poor single elderly females in urban areas need to be planned to solve these problems.

6. The Nutrition Risk Index(NRI)

The mean total score of NRI was 8.09 ± 3.37 , regarded as the level of high risk (Table 7). The questionnaires whose scores showed significant difference between the two age groups were two – “I have an illness or condition that made me change the kind and/or amount of food I eat ($p < 0.05$)” and “I take 3 or more different prescribed or over the counter, drugs a day ($p < 0.01$)”. In an other study with other NRI consisted of 12 questions, Lee et al (1998) reported that the most serious problems of low-income single living elderly were not having enough money to buy foods and not having other’s

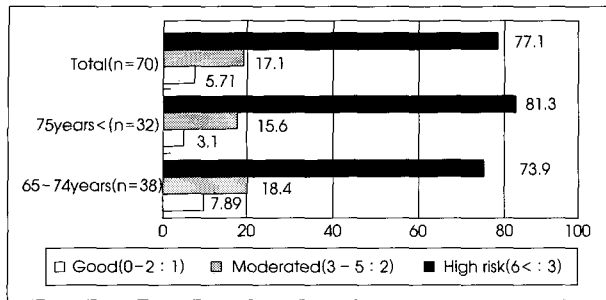


Fig. 1. The proportion of the subjects at nutrition risk evaluated with NRI, N(%), 1) * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$ (by chi-square (χ^2)-test)

Table 8. Health status of the subjects

	65 – 74 (N = 38)	75 ≤ (N = 32)	Total (N = 70)	N(%)
				χ^2 value
Self perceived health status				
Very healthy	4 (10.53)	8 (25.00)	12 (17.14)	4.556
Normal	11 (28.95)	11 (34.38)	22 (31.43)	
Not healthy	16 (42.11)	11 (34.38)	27 (38.57)	
Sick	7 (18.42)	2 (6.25)	9 (12.86)	
Dental status				
All natural teeth	5 (13.16)	7 (21.88)	12 (17.14)	2.450
Only few natural teeth	17 (44.74)	11 (34.38)	28 (40.00)	
Denture	7 (18.42)	6 (18.75)	13 (18.57)	
Natural + artificial teeth	9 (23.68)	7 (21.88)	16 (22.86)	
Have no teeth	0 (0.00)	1 (3.13)	1 (1.43)	
Activity				
Can walk without a stick	31 (81.58)	29 (90.63)	60 (85.71)	1.161
Use a stick or walker for walking	7 (18.42)	3 (9.38)	10 (14.29)	
Use a wheelchair or can't move	0 (0.00)	0 (0.00)	0 (0.00)	
Average sleeping time				
1 – 3 hours	5 (13.16)	4 (12.50)	9 (12.86)	0.219
4 – 6 hours	10 (26.32)	7 (21.88)	17 (24.29)	
6 hours ≤	23 (60.53)	21 (65.63)	44 (62.86)	
Long hospitalization				
Yes	9 (23.68)	17 (53.13)	26 (37.14)	6.449 ¹⁾
No	28 (76.32)	15 (46.88)	44 (62.86)	
Gain or loss of weight for last 5 years				
Lost more than 6kg	4 (10.53)	3 (9.38)	7 (10.00)	6.453*
Lost 1 – 5kg	12 (31.38)	3 (9.38)	15 (21.43)	
Hardly change	14 (36.84)	14 (43.75)	28 (40.00)	
Gain 1 – 5kg	5 (13.16)	6 (18.75)	11 (15.71)	
Gain more than 6kg	2 (5.26)	5 (15.63)	7 (10.00)	
No answer (don't know)	1 (2.63)	1 (3.13)	2 (2.86)	
Onset of menopause				
40 – 45 years old	14 (36.84)	15 (46.88)	29 (41.43)	6.521*
45 – 50 years old	17 (44.74)	6 (18.75)	23 (32.86)	
50 – 55 years old	5 (13.16)	8 (25.00)	13 (18.57)	
55 years old ≤	2 (5.26)	2 (6.25)	4 (5.71)	
No answer (don't remember)	0 (0.00)	1 (3.13)	1 (1.43)	

1) * : $p < 0.05$ (by chi-square (χ^2)-test)

Table 9-1. Nutrients intakes through 19 food groups by 24hr-recall method

Food groups	Total intakes (g)		Energy (kcal)		Protein (g)		Fat (g)		Carbohydrates (g)		Fiber (g)		Calcium (mg)	
1 (cereals and their products)	240.22 ± 70.36	784.69 ± 211.03	15.23 ± 4.24	3.97 ± 4.80	166.29 ± 45.81	0.53 ± 0.22	16.29 ± 8.28							
2 (roots and starches)	23.00 ± 44.13	18.37 ± 50.45	0.44 ± 0.63	0.01 ± 0.08	3.65 ± 11.59	0.14 ± 0.30	2.92 ± 10.33							
3 (sugar, sweeteners and their products)	3.32 ± 5.93	11.85 ± 24.26	0.02 ± 0.13	0.11 ± 0.94	2.30 ± 4.04	0.00 ± 0.00	0.26 ± 1.12							
4 (beans and their products)	29.83 ± 31.70	38.58 ± 50.50	3.62 ± 4.34	1.85 ± 2.08	1.96 ± 4.74	0.29 ± 0.60	38.67 ± 40.30							
5 (nuts, seeds and products)	2.78 ± 11.37	3.16 ± 6.01	0.07 ± 0.11	0.19 ± 0.32	0.22 ± 0.81	0.02 ± 0.04	4.11 ± 6.81							
6 (vegetables and their products)	281.84 ± 142.46	66.53 ± 35.82	5.83 ± 3.28	1.02 ± 0.64	10.31 ± 6.24	3.08 ± 1.67	145.52 ± 96.68							
7 (mushrooms)	0.14 ± 0.89	0.03 ± 0.20	0.01 ± 0.03	0.00 ± 0.00	0.00 ± 0.02	0.00 ± 0.01	0.00 ± 0.03							
8 (fruits)	73.03 ± 105.55	28.18 ± 41.52	0.44 ± 0.69	0.17 ± 0.32	6.41 ± 9.73	0.40 ± 0.62	9.19 ± 13.54							
9 (meats and their products)	27.21 ± 41.81	49.82 ± 84.19	5.52 ± 8.82	2.84 ± 5.24	0.07 ± 0.31	0.00 ± 0.00	1.91 ± 3.08							
10 (eggs and their products)	6.21 ± 15.99	9.68 ± 25.24	0.77 ± 0.02	0.65 ± 1.63	0.04 ± 0.13	0.00 ± 0.00	2.92 ± 7.52							
11 (fishes, shellfishes and their products)	25.59 ± 31.27	44.49 ± 47.31	7.27 ± 7.42	1.32 ± 2.07	0.31 ± 1.23	0.00 ± 0.00	128.36 ± 125.34							
12 (seaweeds)	3.46 ± 7.50	5.24 ± 11.53	0.56 ± 1.55	0.04 ± 0.09	0.78 ± 1.92	0.06 ± 0.11	16.80 ± 34.05							
13 (milk and dairy products)	11.27 ± 41.78	8.27 ± 25.54	0.37 ± 1.34	0.50 ± 1.39	0.54 ± 1.97	0.00 ± 0.00	12.73 ± 44.54							
14 (fats and oils)	4.91 ± 5.35	43.28 ± 47.32	0.00 ± 0.00	4.86 ± 5.34	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00							
15 (beverages, alcohol beverages and carbonated non-alcohols)	8.11 ± 22.73	1.16 ± 3.42	0.01 ± 0.04	0.00 ± 0.01	0.14 ± 0.81	0.02 ± 0.07	0.18 ± 0.47							
16 (seasonings and spices)	31.63 ± 19.56	46.21 ± 32.91	3.19 ± 2.20	1.36 ± 1.06	4.65 ± 4.18	0.91 ± 0.63	21.18 ± 14.17							
17 (processed foods)	0.29 ± 2.39	0.53 ± 4.45	0.02 ± 0.18	0.02 ± 0.13	0.08 ± 0.67	0.00 ± 0.00	0.09 ± 0.79							
18 (others)	0.18 ± 1.23	0.49 ± 3.79	0.02 ± 0.19	0.00 ± 0.01	0.10 ± 0.78	0.01 ± 0.06	0.37 ± 2.73							
19 (baby foods)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00							

help for purchasing or cooking foods.

The proportion of the elderly evaluated as high risk group (≥ 6) in this study was 77.1%, which was much higher, compared to the study of the low-income elderly in Seongnam City by Lee, Lee (1999) (Fig. 1).

7. The health status of the subjects

Fifty one percent of the subjects perceived their status as “not healthy” or sick (Table 8). Kim (2000) reported that most of the elderly living alone had negative attitudes to their health status. They perceived themselves as “not healthy” and complained that they could not have sound sleep. Lee et al (2001) also reported that a higher proportion of elderly living with their spouse perceived themselves as “healthy” than the elderly living alone. The proportion of the elderly who perceived themselves as “not healthy” varied according to the surveyed region-16% in Chuncheon City (Lee et al. 2001), 30% in Incheon city, and 40 – 45% in Suwon city (Yim et al. 1998).

Yim (2003) reported that the perceived poor health status of the elderly was related to underweight (BMI < 18.5), living alone, poor exercise, having artificial teeth, skipping meal, and so on. Son (1999) also reported that the elderly group that perceived themselves as “not healthy” had lower PIBW and fasting blood sugar.

With regard to the teeth status, 40.0% responded that they had ‘only few natural teeth’. In the study of the elderly in the local communities by Appollonio et al. (1997), inadequate dentition had significant correlation with the high rate of death. The dental status had significant correlation with dietary intake and, in particular, with micronutrients like folate.

With regard to physical movements, 85.71% responded that they could walk, 6.86% answered their average sleeping time was more than six hours, and 40.00% responded that their weights for the last 5 years have hardly changed. The single elderly group aged over 75 were facing longer hospita-

Table 9-2. continued

Food groups	Iron (mg)	Vitamin A (R.E)	Vitamin B ₁ (mg)	Vitamin B ₂ (mg)	Niacin (mg)	Vitamin C (mg)	Cholesterol (mg)
1 (cereals and their products)	1.36 ± 0.63	14.80 ± 73.91	0.35 ± 0.22	0.10 ± 0.16	3.42 ± 2.16	0.87 ± 7.31	0.63 ± 5.30
2 (roots and starches)	0.15 ± 0.24	0.07 ± 0.40	0.02 ± 0.04	0.01 ± 0.02	0.24 ± 0.34	2.88 ± 5.30	0.00 ± 0.00
3 (sugar, sweeteners and their products)	0.02 ± 0.12	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.02	0.00 ± 0.00	0.00 ± 0.00
4 (beans and their products)	0.69 ± 1.02	0.02 ± 0.10	0.03 ± 0.05	0.02 ± 0.03	0.18 ± 0.27	0.00 ± 0.00	0.00 ± 0.00
5 (nuts, seeds and products)	0.05 ± 0.09	0.02 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	0.03 ± 0.05	0.01 ± 0.07	0.00 ± 0.00
6 (vegetables and their products)	3.64 ± 3.14	338.31 ± 339.19	0.18 ± 0.11	0.24 ± 0.18	1.81 ± 0.94	52.28 ± 31.70	2.17 ± 5.63
7 (mushrooms)	0.00 ± 0.01	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.02	0.00 ± 0.01	0.00 ± 0.00
8 (fruits)	0.46 ± 0.76	1.90 ± 3.27	0.04 ± 0.08	0.02 ± 0.03	0.22 ± 0.33	28.74 ± 52.05	0.00 ± 0.00
9 (meats and their products)	0.65 ± 1.01	1.85 ± 3.70	0.06 ± 0.14	0.05 ± 0.07	1.55 ± 2.35	0.51 ± 2.20	15.49 ± 25.49
10 (eggs and their products)	0.11 ± 0.29	9.68 ± 24.94	0.01 ± 0.02	0.02 ± 0.04	0.01 ± 0.03	0.00 ± 0.00	29.12 ± 72.81
11 (fishes, shellfishes and their products)	0.84 ± 0.94	2.49 ± 5.49	0.02 ± 0.03	0.03 ± 0.05	1.38 ± 1.39	0.13 ± 0.67	52.09 ± 58.10
12 (seaweeds)	0.33 ± 0.63	38.07 ± 146.76	0.01 ± 0.04	0.05 ± 0.12	0.21 ± 0.42	1.02 ± 3.60	0.32 ± 1.03
13 (milk and dairy products)	0.01 ± 0.04	4.30 ± 12.10	0.00 ± 0.02	0.02 ± 0.06	0.01 ± 0.04	0.10 ± 0.41	1.48 ± 6.12
14 (fats and oils)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.22 ± 0.76
15 (beverages, alcohol beverages and carbonated non-alcohols)	0.01 ± 0.03	0.83 ± 4.58	0.00 ± 0.00	0.00 ± 0.00	0.02 ± 0.07	0.02 ± 0.17	0.00 ± 0.00
16 (seasonings and spices)	0.60 ± 0.42	51.10 ± 62.43	0.02 ± 0.02	0.05 ± 0.03	0.55 ± 0.39	0.13 ± 0.28	0.07 ± 0.62
17 (processed foods)	0.00 ± 0.02	0.07 ± 0.58	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.04	0.01 ± 0.11	0.00 ± 0.00
18 (others)	0.05 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.01	0.00 ± 0.01	0.01 ± 0.07	0.00 ± 0.00
19 (baby foods)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00

lization, which is related to high medical fees. It seems more economic support is needed to the group with the social welfare program.

The onset of menopause was mostly distributed between 40 to 45 years old (41.43%) and 45 to 50 years old (32.86%).

8. The amount of nutrient intake through food groups (Table 9-1, 9-2)

The foods that the 70 elderly living alone consumed were categorized into 19 food groups (The Korean Nutrition Information Center 1998 The Korean Nutrition Society 2000), total intakes and nutrients intakes for each food group were evaluated. Group 1 (cereals and their products) contributed most to the nutrient intakes like energy, protein, carbohydrates, vitamin B₁, and niacin (Table 9-1, 9-2). Group 6 (vegetables and their products) contributed most to the nutrient intakes like fiber, calcium, iron, potassium, vitamin A, vitamin B₂, and vitamin C (Table 9-1, 9-2).

The major food source groups of calcium were vegetable and their product (145mg) and fish and shellfish and their product (128.4mg). The amount of milk and the product intake was only 11.3g which contributed to 12.7mg of daily calcium

intake. The major food sources of iron were cereals and their products (1.36mg) and vegetables and their products (3.64mg). Both of them are vegetable origin containing iron mostly as non-heme iron and accordingly the absorption rate is very low.

Conclusions

This study was performed to investigate the dietary characteristics and related factors of the elderly females living alone residing in Bucheon City. The subjects were 70 single living elderly female, receiving benefits from the government based social welfare program.

The results are as follows ;

1) Seventy nine percent of the subjects had self reported monthly income of less than 200,000 (won) and forty one percent of the subjects were paying more than 100,000 (won) for food expense, meaning that more than half of the monthly income was spent for food. 2) The mean total score of depression was 8.59 ± 2.69 (full score : 12) meaning that the extent of depression was serious. 3) More than 92% of the subjects answered they can self manage grocery shopping without any help. What they consider most in grocery shopping were the

large quantities and low prices. The number of side dishes for a meal was two to three (35.71%) or one or two (31.4%). 4) Fifty seven percent of the subjects ate reheated left-overs for lunch and 70.0% for dinner and 62.86% responded that they hardly had snacks. 5) The food habit items showing the lowest score were “try to eat various foods that appeals to me” and the highest score “try not to skip meals and eat enough.” 6) The mean total score of Nutrition Risk Index (NRI) was 8.09 ± 3.37 and the proportion of the group at high risk of Nutrition (≥ 6) was 77.1%. The proportion of the elderly who perceived themselves as not healthy was 51.0 and 40.0% responded that they had ‘only few natural teeth’. 7) Cereals and their products contributed most to the nutrient intakes like energy, protein, carbohydrate, vitamin B, and niacin. Vegetables and their products contributed most to the nutrient intakes like fiber, calcium, iron, potassium, vitamin A, vitamin B₂ and vitamin C.

It looks like meals of the single living elderly female are monotonous and simple.

A majority of them ate reheated leftovers for dinner with side dishes of less than 3. They were observed as having serious depression and high nutrition risk. They were largely dependent on cereals, vegetables or its products for macro and micronutrients. In contrast to the monotonous meals, high depression and nutrition risk, 85.7% of the subjects answered they can walk without a stick and 92% can self-manage grocery shopping without any help. It is hoped that the results can be used as the basic materials for the food supplying program for the elderly living alone.

References

- 대한영양사회 인천지부(1999) : '98 인천광역시 노인영양 및 식품섭취조사 연구 결과보고
- 박영숙(1999) : 노인의 우울에 영향을 미치는 요인. *한국보건 통계학회지* 24(1) : 22-29
- 이기옥(1994) : 한국 노인 복지의 현황과 정책 과제. *한국영양학회 춘계학술대회 초록집* : 15-33
- Lee KW, Lee YM(1999) : Nutritional and health status of low-income and living-alone elderly in Sungnam. *대한지역사회 영양학회 춘계학술대회초록집 포스터* : p.102
- 임경숙(2003) : 노인 영양위험 평가도구 및 간이 식생활평가 도구 개발. *대한지역사회영양학회 노인성 질환의 예방과 영양 관리의 실용화 symposium*. pp.3-24
- 보건복지부(2002) : 계절별 국민영양조사-영양조사II : 430-431
- 한국보건사회연구원(2001) : 전국 노인장기요양보호서비스 육 구조사. *한국보건사회연구원*.
- Ames D(1991) : Epidemiological studies of depression among the elderly in residential and nursing homes. *Int J Geriatric Psychiatry* 156 : 667-675
- Boren AR, Dixon PN, Reed DB(1983) : Measuring nutrition attitudes among university students. *J Am Diet Assoc* 82 : 251-253
- Campbell WW, Crim MC, Dallal DE, Young VR, Evans WJ(1994) : Increased protein requirements in elderly people : New data and retrospective reassessments. *Am J Clin Nutr* 6 : 501-509
- Cass R, Mary ES(1996) : Recognizing depress in order adults-The role of the dietitian. *J Am Diet Assoc* 96(10) : 1042-1044
- Cuijpers P, Lammeren PV(1999) : Depressive symptoms in chronically ill elderly people in residential homes. *Aging & Mental Health* 3(3) : 221-226
- Gordon L, Jensen MD(1996) : Nutrition problem of free-living elderly-The rural elderly : Living the good life? *Nutr Rev* 54(1) : S17-21
- Han KH, Kim KN, Park DY(1998) : Drug Consumption and nutritional status of the elderly in Chung-Buk Area-I. Diseases and drug consumption-Korean *J Comm Nutr* 3(1) : 76-93
- Ildebrando A, Corrado C, Alessandra F, Marco T(1997) : Influence of dental status on dietary intake and survival in community-dwelling elderly subjects. *Age and Ageing* 26(6) : 445-455
- Johnnie WP, Christine AR(1999) : Description of a mixed ethnic, elderly population. II. Food group behavior and related nonfood characteristics. *J Gerontology* 54A(6) : M325-328
- Kim CI, Park YS(2000) : Comparing health-related behaviors, food behaviors, and the nutrient adequacy ratio of rural elderly by single-elderly families vs. extended. *Korean J Comm Nutr* 5(2) : 307-315
- Kim HK(1998) : Nutritional and health status of Korean elderly living in America. *Korean J Comm Nutr* 3(5) : 707-714
- Kim JH, Kwoun JH, Kim KJ, Koo BK, Lee YK, Lee SK, et al(1999) : Physical characteristics and instrumental activities of daily living of the elderly (85+) in Kyungpook Sung-Ju Area. *Korean J Comm Nutr* 4(3) : 403-411
- Kim JH, Lee MJ, Moon SJ, Shin SC, Kim MK(1993) : Ecological analysis of food behavior and life-styles affecting the prevalence of depression in Korea. *Korean J Nutr* 26(9) : 1129-1137
- Kim KN, Lee JW, Park YS, Hyun TS(1997) : Nutritional status of the elderly living in Cheongju-I. Health-related habits, dietary behaviors and nutrient intakes-Korean *J Comm Nutr* 2(4) : 556-567
- Kim MY(1997) : A study on the functional health status of living-alone elderly. *J Kor Comm Health Nursing Academic Society* 11(2) : 94-105
- Kim SY, Jung KA, Lee BK, Chang YK(1997) : A Study of the dietary intake status and one portion size of commonly consumed food and dishes in Korean elderly women. *Korean J Comm Nutr* 2(4) : 578-592
- Lee HS, Yee JA, Ahn SY, Kang KJ(2001) : A Study on health related and eating related behaviors by self-recognized health status. *Korean J Comm Nutr* 6(3) : 340-353
- Lee JW, Kim KA, Lee MS(1998) : Nutritional intake status of the elderly taking free congregate lunch meals compared to the middle-income class elderly. *Korean J Comm Nutr* 3(4) : 594-608
- Lee KW, Lee YM, Kim JH(2000) : The health and nutritional status of low-income, alone-living elderly. *Korean J Comm Nutr* 5

- (1) : 3-12
- Marshall JA, Lopez TK, Shetterly SM, Morgenstern NE, Baer K, Swenson C, et al(1999) : Indicators of nutritional risk in a rural elderly Hispanic and non-Hispanic white population : San Luis Valley Health and Aging Study. *J Am Diet Assoc* 99(3) : 315-322
- Nutrition Screening Initiative(1995) : A project of the American Academy of Family Physicians, the American Dietetic Association, and the National Council of Aging
- Olson CM, Rauschenbach BA, Frongillo EA, Kendall A(1997) : Factors contributing to household food insecurity in a rural upstate New York country. *Family Economics and Nutrition Review* 10 : 2-17
- Park DY, Han KH, Kim KN(1998) : Drug consumption and nutritional status of the elderly in Chung-buk Area-III. Psychological effect on drug consumption and nutritional status-*Korean J Comm Nutr* 3(2) : 245-260
- Prothro JW, Rosenbloom CA(1999) : Description of a mixed ethnic, elderly population. II. Food group behavior and related non-food characteristics. *J Gerontol A Biol Sci Med Sci* 54(6) : M325-328
- Rhie SG, Park YJ(1998) : A comparison of the dietary habit and nutrient intakes of Korean farmers according to different family patterns and farming types. *Korean J Comm Nutr* 3(5) : 739-747
- Rolls BJ(1992) : Aging and appetite. *Nutr Riew* 50 : 422-426
- Schwartz AN, Snyder CL, Peterson JA(1984) : Aging and life : An introduction to gerontology(2nd Ed.). NY : The Dryden Press
- Shim JE, Paik HY, Moon HK, Kim YO(2001) : Comparative analysis and evaluation of dietary intakes of Koreans by age groups : (2) Food and food group intakes. *Korean J Nutr* 34(5) : 568-579
- Snowdon J, Donnelly N(1986) : A study of depression in nursing homes. *J Psychiatric Research* 20 : 327-333
- Son SM(1999) : Nutritional status and related factors of elderly residing in Puchon City.-II. Related factors affecting to the nutritional status of elderly. The Catholic University. *Life Sci* 19(1) : 159-172
- Stevens DA, Grivetti LE, McDonald RB(1992) : Nutrient intake of urban and rural elderly receiving home-delivered meals. *J Am Diet Assoc* 92 : 714-718
- Susan, J, John M : Comparison of eating patterns between dietetic and college students. *J Nutr Edu* 17(2) : 47-50
- The Korean nutrition information center(1998) : Food values.
- The Korean Nutrition Society(2000) : Recommended dietary allowances for Koreans 7th revision.
- Wilson D, Benedict J(1996) : Nevada's elderly : Nutrition screening, risk, and intervention. *Nutr Rev* 54(1) : S45-47
- Yim KS, Min YH, Lee TY(1997) : Improve nutrition in the elderly : An analysis of health related factors and the nutritional risk index of the elderly. *Korean J Comm Nutr* 2(3) : 376-387
- Yim KS, Min YH, Lee TY, Kim YJ(1998) : Improve nutrition for the elderly in Suwon : Analysis of dietary behavior and food preferences. *Korean J Comm Nutr* 3(3) : 410-422