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ALONE ON THE NUTRITION STATUS OF OLDER ADULTS

2008

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Effect of Living Arrangement and Meals Eaten Alone
on the Nutrition Status of Older Adults

BY

Kelly L. Boeger

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2008

YEAR

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Effect of Living Arrangement and Meals Eaten Alone on the
Nutritional Status of Older Adults

Kelly Boeger

Eastern Illinois University
Spring 2008

Abstract

The purpose of the study was to determine if older adults who live alone are at greater nutritional risk than those who do not live alone and to determine if eating with others increases nutritional status in older adults. A questionnaire, adapted from the "Determine Your Nutritional Health Checklist" developed by the Nutrition Screening Initiative, was administered to 100 older adults 65 years of age or older. Ninety-four survey participants were included in the study.

Nutrition scores from the nutrition assessment portion were compiled for each subject by categorizing each questionnaire as low, moderate, or high, depending on level of nutritional risk determined by the nutrition risk assessment. Each questionnaire was categorized as alone or not alone, depending on living arrangement.

The percentages of subjects who were at low, moderate, and high nutrition risk were 24%, 44%, and 32%, respectively. Most subjects (76%) were found to be at moderate or high nutrition risk. Forty-six percent of subjects reported living alone, while 53% reported living with at least one other person. A chi-square analysis was used to determine the relationship between living alone and high nutrition risk and revealed that a significant

relationship exists between living alone and high nutritional risk. A correlation analysis was used to determine the relationship between the average number of meals eaten with others each day and level of nutrition risk. The correlation analysis revealed a weak negative correlation (-0.328) between average number of meals eaten alone and level of nutrition risk.

The results of this study indicate that there is a relationship between living alone and incidence of high nutrition risk. Additionally, the majority of subjects were found to be at moderate or high nutrition risk, indicating that all older adults, regardless of living arrangement, could benefit from programs designed to improve nutritional status among this population.

Dedication

This work is dedicated to my parents, who have given me everything I need to succeed in life and have supported me in all of my endeavors.

Acknowledgements

I would like to thank the faculty members who assisted with this study. I would especially like to thank Dr. Karla Kennedy-Hagan, my thesis advisor, for all of her assistance, patience, and guidance. I would like to further extend my thanks to Dr. Jeanne Snyder and Dr. Richard Wilkinson for serving on my thesis committee. Additionally, I would like to thank my family and friends for their continual support, encouragement, patience, and love, which has been imperative in helping me to achieve my goals.

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Chapter I

Introduction

Many nutritional issues and risks accompany older adulthood. Decreased sense of hunger and appetite is one of these risks and may be caused by a variety of factors. As a person ages, hunger and satiety cues become weaker, forcing them to rely on external cues for hunger, such as time of day or social situations involving food. Failure to rely on these external cues may put the older person at risk for under-nutrition, which can lead to vitamin and mineral deficiencies, decreased immune function, and infection (Brown, 2005). Certain diseases and conditions, such as dysphagia, Alzheimer's disease, tooth or mouth problems, and physical disabilities are also linked to under-nutrition in older adults (Salva & Pera, 2001). Loneliness, social isolation, depression, and bereavement can psychologically affect older adults, resulting in poor appetite and weight loss (Johnson & Fischer, 2004).

Statement of Research Problem

A major nutritional risk factor for the older population is living alone. Older adults who live alone may not want to cook for just one person or may have difficulty grocery shopping or preparing food. Many older adults who live alone have experienced the loss of a loved

one and may be suffering from loss of appetite caused by grief or depression (Brown, 2005).

Several researchers have studied the eating behaviors of older adults, but few have investigated the effects of living alone on nutritional status (Beck & Ovesen, 2003; Gustafsson & Sidenvall, 2002; and Walker & Beauchene, 1991). Research involving the eating behaviors and nutritional status of those living alone is limited and outdated. Rainey, Mayo, Haley-Zitlin, Kemper, and Cason (2000) suggest that further research be done in this area. Research is needed to determine the effects of living alone on the nutritional status of older adults since they are at risk for under-nutrition. Nutrition intervention, in the form of senior meal programs and nutrition education programs, may increase quality of life for these individuals while decreasing their risk for nutrient deficiencies and disease (Gollub & Weddle, 2004; Millen, Ohls, Ponza, & McCool, 2002).

One study reviewed for this research suggests a need for further research in the area of nutrient and energy intake of independently living older adults (Neyman, Zidenberg-Cherr, & McDonald, 1996). Other studies recommend investigating the need for community nutrition programs for older adults to increase energy consumption

and social interaction among this population (Rainey, et al., 2000; Wellman & Kamp, 2004). In addition to investigating the need for nutrition programs, research should address the issue of desire for such programs among the older adult population. That is, many older adults who are eligible for food assistance and community nutrition programs are reluctant to participate due to the stigma that often accompanies these programs (Ferrini & Ferrini, 2000; Wilde & Dagata, 2002). Previous research indicates that there is a stigma associated with participation in programs designed to improve nutrition status among older adults. Many older adults have feelings of embarrassment, a sense of failure, hurt pride, dislike of receiving government assistance, and the perceived loss of independence in using nutrition programs (Sing, Cody, Sinclair, Cohen, & Ohlms, 2005). Despite the perceived stigmas, nutrition education programs would benefit these individuals by teaching them the importance of developing and maintaining healthy eating habits throughout their adult years (Drewnowski & Evans, 2001).

Research in this area will greatly benefit the older adult population by identifying ways to improve their health by means of various nutrition intervention strategies. This research will especially benefit those

who live alone or have limited social interaction with others.

Purpose of the Research

The purpose of the study was to determine if older adults who lived alone were at greater nutritional risk than those who did not live alone and to determine if eating alone decreased nutritional status in older adults.

Significance of the Research

The significance of this research is that the availability of studies specifically addressing the effect of living alone and eating meals alone on the nutritional status of older adults is limited. This research will contribute to the knowledge base on effect of living arrangement and regularly eating meals alone on the nutritional status of older adults. The findings of this study can aid in determining effective nutrition intervention strategies for the older adult population. Therefore, this research is significant because few other studies address these issues and the information obtained from the research may aid in developing nutrition programs for older adults.

Research Questions

The research questions of this study included:

1. Are older adults who live alone at greater nutritional risk than those who do not live alone?
2. Is there a relationship between the average number of meals eaten alone per day and level of nutritional risk among older adults?

Research Hypotheses

The hypotheses of this research included:

1. Older adults who live alone are at greater nutritional risk than those who do not live alone.
2. Regular consumption of meals with others decreases the level of nutrition risk among older adults.

Assumptions

It was assumed that approximately fifty percent of the participants would live alone and approximately fifty percent would live with others. It was also assumed that participants would answer questions truthfully. Finally, it was assumed that participants would be able to read and comprehend the questionnaire and consent form.

Limitations

There were some limitations to the study. First, the convenience sampling method did not give a true representation of the older adult population and the

results could not be generalized. Second, using a convenience sampling method did not ensure equal numbers of participants who do or do not live alone. Another limitation of the study was the large age range of participants who are 65 years of age or older. For example, a 90-year-old person was likely to have more problems affecting nutritional status than a person who was 65 years of age, although each fit in the age range of the study.

Definition of Terms

1. Nutritional risk: characteristics known to be associated with nutrition problems (Bloch, Maillet, Howell, & Winkler, 2006).
2. Nutritional status: a person's state of health as it is influenced by intake and utilization of nutrients (Hulse, 1995).
3. Older adults: individuals who are 65 years of age or older (Gist & Hetzel, 2004).
4. Living alone: a one-person household where the householder lives by himself or herself in an owned or rented place of residence in a non-institutional setting, including board and care facilities, assisted living units, and group homes (Oklahoma Department of Human Services, 2006).

5. Community nutrition programs: programs that provide for congregate and home-delivered meals, along with other nutrition services provided in a variety of settings, that are designed to improve dietary intakes of participants (Administration on Aging, 2003)

Summary

In summary, few research studies have investigated specifically the effect of living alone on nutritional status of older adults. The research questions of the study compare the level of nutritional risk between older adults who live alone and those who do not, in addition to comparing number of meals eaten alone each day with level of nutrition risk among this population. It is hypothesized that living alone increases nutritional risk and eating meals with other decreases nutritional risk. Although some limitations exist, this research gives insight into prevalence of certain nutrition risk factors and need for nutrition programs to serve the older adult population.

Chapter 2

Review of Literature

Several characteristics have been identified as risk factors of nutritional status for persons over the age of 65 years. Among these characteristics are living alone and social isolation. Many older adults do not feel motivated to cook for only one person. Others may not be able to shop or cook for themselves. These conditions may put older adults at a greater level of nutritional risk (Johnson & Fischer, 2004). Studies have found that several factors play a role in maintaining good nutritional health in the later years of life.

Previous research in the area of eating practices of older adults has focused on several subgroups of the population from various areas of the United States and other countries. Some studies investigate the level of social engagement and feelings of loneliness among older adult populations (Davis, Murphy, Neuhaus, & Lein, 1990; Walker & Beauchene, 1991). Other studies have focused on a specific gender or on current living arrangements, such as alone in the home or in a nursing home facility (Rainey, Mayo, Haley-Zitlin, Kemper, & Cason, K.J., 2000; Gustafsson & Sidenvall, 2002; Neyman, Zidenberg-Cherr, & McDonald, 1996; Beck & Ovesen, 2003). All of these articles give

valuable insight into the issue of nutritional status of older adults who live alone.

This review of literature summarizes research related to living arrangement, meals eaten alone, and nutritional status of older adults. Topics included in the review of literature are social isolation, nutritional habits, congregate meals, and living arrangement.

Social Isolation

Early studies indicated a relationship between loneliness and decreased nutrient intake among older adults (Davis, Murphy, Neuhaus, & Lein, 1990; Walker & Beauchene, 1991). Those who had larger social networks had less risk of nutritional inadequacy. The dietary insufficiencies, seen in older adults who lived alone, were due to inadequate energy consumption, not poor-quality foods (Davis, et al., 1990). Specifically, dietary inadequacies present among older adults were not related to eating foods that were low in nutrients. They were more commonly caused by inadequate consumption of calories. Walker and Beauchene (1991) suggest that future investigations examine whether there is a difference in dietary intake between older adults who eat alone and those who eat with others and whether senior meal programs are effective in decreasing levels of loneliness in this population.

A study by Walker and Beauchene (1991) specifically targeted independently living older adults and analyzed dietary adequacy and degree of loneliness. Participants kept three-day food records and social contact diaries. Participation in congregate meal programs did not affect loneliness scores, although these programs support adequate nutrient intake and increase social interaction. Subjects who were more socially active reported fewer feelings of loneliness, which was related to increased nutrient intake. The study revealed that there is a relationship between loneliness and nutrient intake but the relationship was not significant (Walker & Beauchene).

Nutritional Habits

Several studies have investigated the nutritional habits of the older adult population as a whole. Older adults have been found to have poor nutritional habits and inadequate diets and do not meet Healthy People 2010 objectives set by the U.S. Department of Health and Human Services (2000). Some contributing factors to this problem are poverty, functional disability, depression, social isolation, and living alone (Brown, 2005). These factors lead to inadequate intake of calories, protein, and other vital nutrients.

Rainey and associates (2000) studied the eating patterns of 49 older adult women during six focus group interviews. Ninety-two percent of the women in the focus groups were 65 years of age or older. Six major themes regarding nutrient status of older adults were seen throughout the groups: a. food preferences based upon taste and childhood familiarity; b. beliefs about benefits and detriments of eating certain foods; c. influence of health conditions on food choices; d. perceived barriers to purchasing, preparing, and consuming certain foods; 5. cues to action regarding food selection, supplement use and meal patterns; and e. nutrition information needs. The study revealed that most of the women in the study frequently ate alone and ate more when they were with others. One of the main reasons for meal skipping was the low motivation to cook for one. This study indicates that increased nutrient intake may be seen when older adults have the opportunity to eat with others. Therefore, congregate meal sites, such as a community senior center, were found to be useful in encouraging regular meal consumption among older adults (Rainey, et al.).

Congregate Meals

Participation in congregate meals increases social engagement among older adults and provides balanced meals

and nutrition education (Wellman & Kamp, 2004). However, participants in congregate meal programs may not always have higher nutritional status than those who do not participate, as reported in a study by Neyman, Zidenberg-Cherr, and McDonald (1996). The results of this study, which compared nutrient intakes of participants of senior meal programs with non-participants, were contradictory to other studies that were reviewed. The 135 subjects of this study were between the ages of 60 and 85 years. The subjects were separated into two groups: participants of congregate meal programs or non-participants. Subjects kept three-day food records and were assessed biochemically using blood samples. The results of the study revealed that the protein, vitamin, and mineral intake among groups did not vary significantly. However, the study concluded that 26% of all study participants were nutritionally at-risk and the most common deficiency among the groups was iron. The authors suggested that more research is needed to assess the nutrient intakes of socially isolated, older individuals who participate in congregate-site meal programs (Neyman, Zidenberg-Cherr, & McDonald).

Living Arrangement

In a study of nursing home residents, social engagement was not a significant predictor of energy or

micronutrient intake (Beck & Ovesen, 2003). Forty nursing home residents between the ages of 80 and 85 years were evaluated using dietary records over four days to determine the impact of social engagement and dining location on nutritional intake and body mass index (BMI). Low levels of social engagement were associated with decreased BMI, but no differences in dietary intake were seen among groups. A common barrier to eating with others in the dining room was the inappropriate behavior some residents displayed during meals. The researchers did not believe social engagement was needed among nursing home residents to increase nutrient intake or weight status (Beck & Ovesen).

A study by Davis, Murphy, Neuhaus, and Lein (1990) examined the relationship between living arrangements and nutrition in 4,202 people 55 years of age and older. The study subjects were those who participated in the Nationwide Food Consumption Survey in 1977 to 1978. Three-day food records for each subject were analyzed to determine if the Recommended Daily Allowances were met for nine different nutrients. For men living alone, the percentage of those with poor quality diets increased with each age group. These men were also at higher risk of poor dietary quality than those living with a spouse. More

women who lived alone had poor-quality diets than did those living with a spouse. More women had poor-quality diets than did men, but a higher percentage of men living alone had poor-quality diets than did women living alone. The dietary analysis portion of the study revealed that lower intake of total calories was more indicative of poor nutritional status than choosing foods with poor nutritional value. The overall results of the study suggest that older adults who live alone are at higher risk for poor nutritional status than those who live with a spouse (Davis, Murphy, Neuhaus, & Lein).

Davis, Murphy, Neuhaus, Gee and Quiroga (2000) conducted another study that had different results than the previous study. The researchers examined the association of four living arrangements with dietary quality among 6525 U.S. adults aged 50-64 years old and those 65 years and older in the third National Health and Nutrition Examination Survey (NHANES III 1988-1994). The four living arrangements included living alone, living with spouse, living with spouse plus at least one other person, and living with another person other than spouse. Dietary quality was analyzed using 24-hour recalls. Poor dietary quality was defined as below 67% of the recommended dietary allowance of 15 different nutrients. The researchers found

that most older adults reported diets that were low in multiple nutrients, including magnesium, folate, calcium, zinc, and vitamin E. The middle aged and Caucasian adults living with a spouse tended to have better dietary quality than all other groups of the study. The authors suggest that future research should be conducted to examine whether certain household composition characteristics differ in their effect on dietary quality for various races and ethnicities (Davis, Murphy, Neuhaus, Gee, & Quiroga).

A study by Gustafsson and Sidenvall (2002) had similar results. Qualitative interviews with 18 older women over the age of 65 who lived alone or cohabited revealed that the participants preferred eating with others because it made mealtime more pleasant. The women who lived with someone enjoyed cooking and made special meals more often, while the women who lived alone ate sandwiches regularly and skipped meals more often. The women who lived alone saw eating as more of a chore or source of energy than a social experience. These women participated in fewer social events involving food, such as parties or church socials. Additionally, the women who cohabited ate more nutritionally sound meals and consumed more calories than did the women living alone. The researchers concluded that eating meals in fellowship heightens the well being of

older adults and improves health by increasing caloric intake (Gustafsson & Sidenvall).

Sanlier and Yabanci (2006) conducted a mini nutritional assessment (MNA) on 429 older adults categorized in three groups: living alone, living with family and living in nursing homes. The MNA had three categories: malnourished, risk of malnutrition, and normal. Surprisingly, more subjects were at risk of malnutrition than malnourished. About one-third (34%) of participants were at risk of malnutrition or malnourished. The researchers concluded that the group living alone had the highest occurrence of malnutrition when compared with the other two groups (Sanlier & Yabanci).

Gender and living alone was compared with fruit and vegetable consumption of 369 older adults in a study by Donkin, et al. (1998). The overall mean number of fruits and vegetables consumed per day was 4.1 servings, whereas the men who lived alone had a mean intake of 2.66 servings per day. Subjects who were older and less educated ate fewer vegetable servings and subjects who had a lower income ate fewer fruit servings. Men also relied on easy-to-prepare foods and had a lower level of cooking skills and knowledge than women, which negatively impacted their consumption of fruits and vegetables. This study concluded

that men who lived alone were more likely to have poor intake of fruits and vegetables than those who live with others (Donkin, et al.).

Charlton (1997) studied the nutrient intakes and attitudes toward nutrition education among older adult men. The sample size of 66 men were 70 years of age or older and all lived alone. About half (47%) of the subjects had inadequate intakes of vitamin D, energy, and fiber. Additionally, most (53%) of the men were underweight. Taste and enjoyment were the factors that most influenced food choice. When asked if they would benefit from nutrition education, only half believed they would and 58% indicated willingness to participate in nutrition education programs. The researchers concluded that the majority of participants were underweight and had inadequate energy intake. Additionally, this population was a difficult group to target for nutrition education programs since the participants had poor recognition of the benefits of participating in such programs (Charlton).

Contrary to most other research studying nutritional status of older adults living alone, Pearson, Schlettwein-Gsell, van Stavern, and de Groot (1998) concluded that living alone did not adversely affect the nutrient intake and nutritional status of older adults. In fact, the

subjects in the study who lived alone had higher intakes of water, vitamin A, riboflavin, and calcium when compared with others living with at least one other person. The study included a total of 1909 subjects who lived alone, with a spouse, or with another person who was not a spouse or partner. Nutritional habits were measured using three-day food records. Additionally, anthropometrics and biochemical data were collected. Biochemical data included serum cholesterol, hemoglobin, and plasma retinol. The overall result of the study was that living alone did not have an adverse affect on the nutritional status of the older adult participants (Pearson, Schlettwein-Gsell, van StaVERN, & de Groot).

Similarly, another study by Pearson, Schlettwein-Gsell, Brzozowska, van Staveren, and Bjørnsbo (2001) revealed that nutritional risk was associated with diminished cognitive status and diminished self-care ability, but not associated with living alone. Study participants were 80-85 years of age, living alone, with a spouse or partner, or with others. Cognitive and functional ability were found to be stronger predictors of risk for malnutrition in the oldest old than in younger adults (Schlettwein-Gsell, Brzozowska, van Staveren, & Bjørnsbo).

An unpublished study was conducted at Eastern Illinois University during the fall semester of 2005 to determine the effect of living alone on nutritional status (Boeger, 2005). The study included 20 participants, all of whom were over the age of 65 years. The subjects were chosen using a convenience sampling method at two churches. Each participant completed a questionnaire that was developed by the researcher. The questionnaire consisted of four multiple-choice questions that assessed eating habits, as well as a dietary assessment portion that measured average number of daily servings eaten from each food group of the USDA Food Guide Pyramid. The results of this study suggest that the percentage of older adults who have adequate dietary intake is low, regardless of living arrangement.

Summary

Topics included in the review of literature are social isolation, nutritional habits, congregate meals, and living arrangement. The review of literature demonstrates that research focusing on the impact of living alone and frequency of meals eaten alone on nutritional status of older adults has yielded inconsistent results. It can be concluded that there is a need to determine the nutritional status of older adults who live alone in order to establish their level of nutritional risk. The information can then

be used to develop appropriate interventions, including nutrition education and senior meal programs.

Chapter 3

Methodology

The previous review of literature indicates that research on the nutritional habits of older adults living alone is inconsistent. The purpose of this study was to determine if older adults who lived alone were at greater nutritional risk than those who did not live alone and to determine if eating with others increased nutritional status in older adults. The following chapter describes methods used in developing the instrument, recruiting subjects, and collecting and analyzing data.

Design of Study

This study was a quantitative research study. This study served as a needs assessment among the population. Therefore, it is formative research.

The Institutional Review Board (IRB) at Eastern Illinois University approved this research on November 16, 2006. The IRB number assigned to this research was 06-100.

Sample

Subjects were chosen using a convenience method. Volunteers were recruited from a midwestern church to complete the questionnaire. The population for this study consisted of members of the church congregation. Ninety-seven completed questionnaires were collected. Individuals

who indicated residing in a nursing home, retirement home, group home, assisted living facility, or other were not included in the study. Only those participants who indicated house or apartment as their living arrangement were included in the study. One participant indicated living in a nursing home and two participants were under the age of 65 years. Therefore, a total of 94 older adults 65 years of age or older were included in the study sample.

Instrumentation

The study utilized a questionnaire, which had two sections. The first section, developed by the researcher, contained multiple choice and short answer questions pertaining to demographic information, eating habits, living arrangement, and sources of food. Demographic information included age and gender. The questionnaire assessed eating habits, specifically the average number of meals eaten alone and with others per day.

The second section of the questionnaire served as the nutritional risk assessment portion. This section was adopted from the publication entitled "Determine Your Nutritional Health", which has been used effectively in a similar study of free-living older adults (Spangler & Eigenbrod, 1995). The nutritional risk questionnaire was developed by the American Academy of Family Physicians, the

American Dietetic Association, and the National Council on Aging, Inc. to assess the nutritional status of older adults. This questionnaire is available for use by the public for educational purposes (American Dietetic Association, 2006). It was found to have content validity in a study by Spangler and Eigenbrod (1995). No available sources have addressed the reliability of the questionnaire. The responses from the questionnaire were used to determine each participant's level of nutritional risk based on living arrangement and meal patterns. Answers to the questions on the questionnaire correspond to point values, which are compiled to give a total score. A score of zero to two indicates no nutritional risk, a score of three to five indicates moderate nutritional risk, and a score of six or more indicates high nutritional risk (Nutrition Screening Initiative, 1991). The scores were used to determine the subjects' level of nutritional risk.

The questionnaire was printed on white paper with black lettering in 14-point font for those with visual impairments. The questionnaire was also written in simple language to ensure comprehension of the questions and instructions. The research questionnaire may be viewed in Appendix A.

Data collection

The researcher distributed the questionnaire to each participant following the two church services held at the church during the spring of 2007. Participants were informed that the survey was to be completed only once. A notice in the church bulletin was used to invite subjects to participate in the research. The bulletin was distributed to each person in attendance. Signs were posted throughout the building to encourage the subjects to participate.

At the conclusion of each church service, the researcher administered questionnaires to the subjects. The purpose of the study and instructions for completing the questionnaire were explained to each subject individually.

Written, informed consent was collected from each subject. The researcher was available to answer any questions subjects had while completing the questionnaire. After completion, the questionnaires were collected by the researcher and placed in an envelope to ensure confidentiality. Anonymity was ensured, as names of participants were not written on the questionnaires. The subjects were offered a sample-size box of high-fiber cereal as a gift for participating in the study.

Data analysis

Nutritional status was determined by analyzing data collected from the questionnaires. Nutrition scores from the second section of the questionnaire were compiled for each subject. Each participant was categorized as low, moderate, or high, depending on level of nutritional risk. Additionally, each participant was categorized by living arrangement. Questionnaires with nursing home or assisted living facility marked in the living arrangement portion were not included in the data analysis. Descriptive statistics were used to describe the demographic characteristics of the sample.

All data from the questionnaires were analyzed using the SPSS for Windows, version 15.0 software program. The degree to which living alone is related to nutritional status was determined by a chi-square analysis. A chi-square analysis was used because this test of independence assesses whether paired observations on two variables are independent of each other. In this study, the two variables are living alone and nutritional risk.

The relationship between the average number of meals eaten alone per day and level of nutritional risk among older adults was analyzed using correlation analysis. A correlation analysis was used because this test measures

the relationship between two or more independent variables. In this study, the variables are number of meals eaten alone per day and level of nutritional risk.

The previously described methods were used to compile the results of the present study. The results of the data analysis, as well as discussion, are included in the following chapter.

Chapter 4

Results and Discussion

As described in the previous chapter, a questionnaire was used to collect data for the present study. The data are reported, analyzed, and discussed in this chapter.

Description of the Sample

Ninety-four participants met the criteria for the study and were included in the data analysis. The sample consisted of 47% men ($n = 44$) and 53% women ($n = 50$). The percentages of subjects who were at low, moderate, and high nutrition risk were 24%, 44%, and 32%, respectively (Figure 1). Most subjects (76%) were found to be at moderate or high nutrition risk.

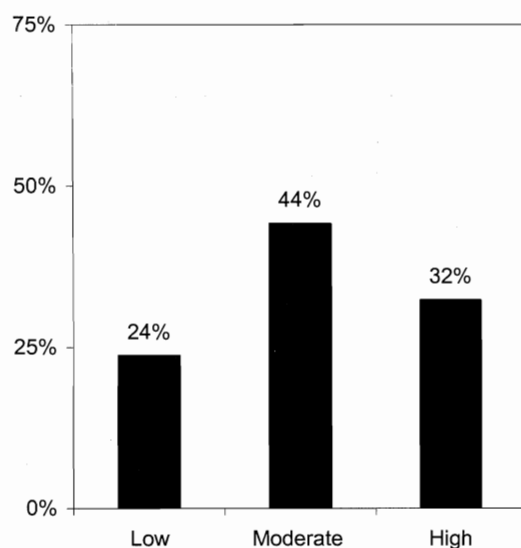


Figure 1. Distribution of low, moderate, and high nutrition risk among subjects

Forty-six percent of subjects reported living alone (n=43), while 54% (n=51) reported living with at least one other person. Of the subjects living alone, nine percent were at low nutrition risk, 47% were at moderate nutrition risk, and 44% were at high nutrition risk. Of the subjects living with others, 36% were at low nutrition risk, 42% were at moderate nutrition risk, and 22% were at high nutrition risk. Nutrition risk level according to living arrangement is depicted in Figure 2.

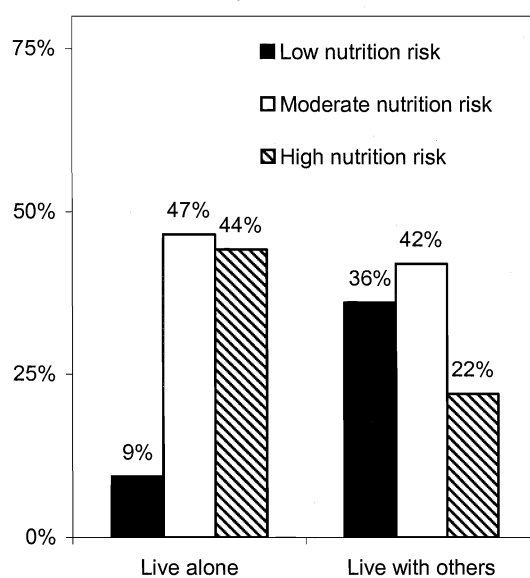


Figure 2. Level of nutrition risk according to living arrangement

Six age ranges were included in the study: 65-70 years, 71-75 years, 76-80 years, 86-90 years, and 91 years and over. One quarter of the participants were between the

ages of 71 and 75 years, which was the mode of the six age ranges. Age ranges of subjects are shown in Figure 3.

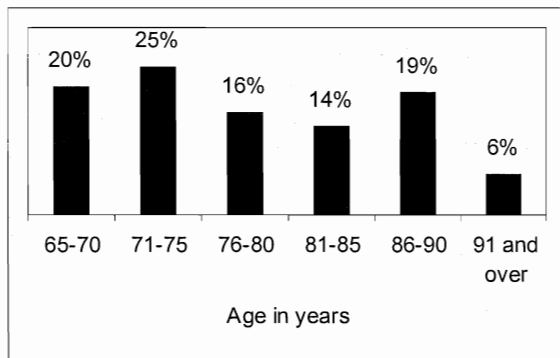


Figure 3. Age ranges of subjects.

The majority of participants (70%) reported eating zero or one meal alone each day on average, while 16% reported eating two meals alone per day on average. Nearly one quarter (24%) of participants reported eating three meals alone per day on average. Percentages of average number of meals eaten alone per day among participants can be viewed in Figure 4.

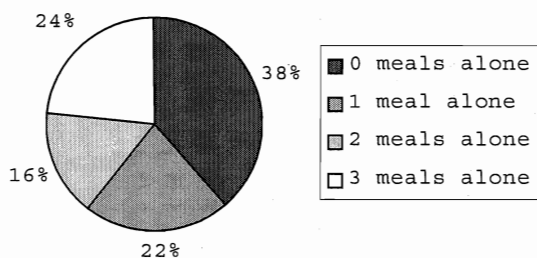


Figure 4. Comparison of average number of meals eaten alone per day among study participants

Positive responses to the nutrition risk assessment portion of the questionnaire were compiled. The most frequent positive response was "Do you take three or more different prescribed or over-the-counter drugs a day?" Sixty-seven percent of the participants indicated that they take three or more prescription drugs per day. Results from the nutrition risk portion of the questionnaire can be viewed in Table 1.

Table 1

Nutrition risk assessment portion positive responses

Question	N	%
Do you have an illness or condition that made you change the kind and/or amount of food you eat?	34	36%
Do you eat fewer than two meals per day?	7	7%
Do you eat only a few fruits or vegetables, or milk products?	31	33%
Do you have three or more drinks of beer, wine, or liquor almost every day?	4	4%
In the past six months, have you been unable to buy the food you need?	12	13%
Do you have tooth or mouth problems that make it hard to eat?	28	30%
Do you eat alone most of the time?	46	49%
Do you take 3 or more different prescribed or over the counter drugs a day?	63	67%
Have you gained or lost 10 pounds in the last 6 months without wanting to?	12	13%
Do you have a physical disability that keeps you from shopping, cooking, and/or feeding yourself?	14	15%

Research Hypothesis 1: Older adults who live alone are at greater nutritional risk than those who do not live alone.

The directional hypothesis was that older adults who live alone are at greater nutritional risk than those who do not live alone. This hypothesis was accepted.

A chi-square test of independence was performed to examine the relation between living alone and nutrition risk. The chi-square test was used to determine if these nominal variables had statistically significant differences. Chi-square was used to examine the numerical rates of occurrence of participants' living arrangement and level of nutrition risk. The relation between these variables was significant, $X^2 (2, N = 94) = 11.342, p < 0.005$. The results of this analysis revealed that a statistically significant relationship exists between living alone and high nutritional risk. Based on the results of the chi-square analysis, the hypothesis that older adults who live alone are at greater nutritional risk than those who do not live alone is accepted. Results of the chi-square analysis can be seen in Table 2.

Table 2

Results of Chi-square analysis ($X^2 = 11.342$)

	Living Arrangement		p value
	Alone (n=43)	With others (n=51)	
Nutrition Risk Level:			0.003
Low	4	19	
Medium	20	21	
High	19	11	

Overall, the results of this test indicate that living alone is associated with higher level of nutritional risk. This result was hypothesized because feelings of loneliness are more prevalent among older adults who live alone (Walker and Beauchene, 1991). The literature supports that loneliness is a factor associated with decreased nutritional status in older adults and that living with others may improve nutritional status (Davis, Murphy, Neuhaus, & Lein, 1990, Donkin, et. al., 1998, Gustafsson & Sidenvall, 2002). For example, Davis, Murphy, Neuhaus, & Lein (1990) suggest that older adults who live alone are at higher risk for poor nutritional status than those who live with a spouse because those who lived alone had inadequate energy intake. The results of the present study are consistent with the findings of Walker and Beauchene (1991) in that living alone is identified as a risk factor for poor nutritional status since living alone incurs increased feelings of loneliness in older adults.

The results of the chi-square test support the need to improve the nutritional status of older adults who live alone, as this group is likely to be at high nutrition risk. One way to improve nutritional status and decrease feelings of loneliness of older adults who live alone is to provide these individuals with access to nutrition programs (Wellman & Kamp, 2004). Nutrition programs can help improve nutritional status among older adults by providing them with well-balanced meals, education, and socialization, which have been shown to improve nutritional status among this population (Wellman & Kamp, 2004). However, nutrition programs alone are not likely to completely solve the problem of poor nutritional status among older adults as most programs provide only one meal per day and usually are not available on weekends (Ferrini & Ferrini, 2000).

Research Hypothesis 2: There is a relationship between the average number of meals eaten alone per day and level of nutritional risk among older adults.

It was hypothesized that regular consumption of meals with others decreases the level of nutritional risk among older adults. This hypothesis was accepted.

A correlation analysis was used to determine the relationship between the average number of meals eaten

alone each day and level of nutrition risk. There was a weak positive correlation (0.258) between average number of meals eaten alone and level of nutrition risk. That is to say, as number of meals eaten alone increased, level of nutrition risk also increased. The results of the correlation analysis are statistically significant with p-value of 0.012. The hypothesis that older adults who regularly consume meals with others have increased nutritional status when compared with those who do not eat meals with others on a regular basis is accepted based on these findings.

This study revealed a significant relationship between regularly eating meals alone and level of nutritional risk, which was consistent with the findings of other researchers. Other researchers have found that social engagement and dining with others are two factors that positively impact the nutritional status of older adults by stimulating appetite and increasing caloric intake (Beck and Ovesen, 2003). Additionally, de Castro (2002) found a significant relationship between high levels of nutrient deficiencies and lower number of other people present at meals. Since these other researchers found that eating meals with others is associated with improved nutritional status, the results of the present study's correlation

analysis were not expected. For the present study, eating meals alone appears to be related to increased level of nutrition risk.

Summary

In summary, the results of this study support the hypothesis that older adults who live alone are at higher nutritional risk than those who do not live alone. Improvement of the nutritional status of older adults who live alone is needed since this group is likely to be at high nutrition risk. Nutrition programs that reach older adults who are living alone can help improve the nutrition status among this group. The programs can provide nutrition education, socialization, and nutritionally balanced meals.

The results of this study also support the hypothesis that regularly consuming meals with others increases nutritional status among older adults. Social engagement and dining with others are two factors that positively impact the nutritional status of older adults (Beck & Ovesen, 2003). The results of this study are consistent with the findings of others in that regularly eating meals others is related to improved nutritional status among older adults.

The results of this study can be used to verify the need for interventions to improve nutrition status among older adults. The following chapter provides conclusions and recommendations based on the findings of this study.

Chapter 5

Summary, Conclusions, and Recommendations

Summary

Poor nutritional status can lead to decreased overall health in the older adult population. Many factors can affect nutritional status in this population, including polypharmacy, tooth or mouth problems, depression, lack of financial resources, physical disability, illness, and social isolation. While social isolation may be a contributing factor to decreased nutritional status in older adults, it does not always determine increased nutritional risk. When determining the nutritional health of older adults, it is important to consider all risk factors, regardless of living situation or number of meals eaten alone.

Living alone. This study supports the first hypothesis that older adults who live alone are at greater nutritional risk than those who do not live alone. A statistically significant relationship between living alone and high nutritional risk was found using chi-square analysis. Only high nutrition risk was compared with living arrangement. Low nutrition risk and moderate nutrition risk were not compared with living arrangement in this study. However, the majority of subjects were found

to be at moderate or high nutrition risk (76%). This suggests that factors other than living arrangement, including physiological, socioeconomic, and psychological changes, can cause a decline in the nutritional status of older adults (Dovini, Savina, and Cannella, 2003).

Meals with others. The present study supports the second hypothesis that regular consumption of meals with others increases the nutritional status of older adults, as a significant correlation was found between average number of meals eaten alone per day and level of nutrition risk. In accordance with these findings, previous research indicates that social engagement and dining with others are two factors that positively impact the nutritional status of older adults by stimulating appetite and increasing caloric intake (Beck and Ovesen, 2003). Additionally, high levels of nutrient deficiencies are associated with lower number of other people present at meals (de Castro, 2002).

Conclusions

The results of this study indicate that there is a relationship between living alone and high nutrition risk. Other research investigating the level of nutrition risk among older adults confirms these findings (Ritchie, et al., 1997). When older adults live alone, they are more likely to eat alone. Decreased number of other people

present at meals and living alone may be related to deficient nutrient intakes in older adults (de Castro, 2002; Ahn & Kim, 2004).

While the results of this study were not generalized due to the convenience sampling method that was used, certain conclusions can be drawn. First, data from this study indicate that the majority of the sample was at moderate to high nutritional risk. Therefore, community nutrition programs should focus on improving eating habits and nutritional status of all members of the older adult population. Community nutrition programs are programs that provide for congregate and home-delivered meals, along with other nutrition services provided in a variety of settings, that are designed to improve dietary intakes of participants (Administration on Aging, 2003). This study indicates that there is a need for community nutrition programs in the demographic area, as most of the subjects (76%) were found to be at moderate or high nutritional risk, regardless of living arrangement.

Recommendations

The recommendations from the present study can be separated into three categories. Recommendations are made from reviewing the literature, as well as recommendations for practice and for future research.

Recommendations from literature review. Most of the literature that was reviewed for this study suggests that regularly eating alone and living alone are two factors that contribute to the decline in nutritional status in older adults. For example, Davis, Murphey, Neuhaus, and Lein (1990) concluded that older adults who lived alone had inadequate energy consumption to meet their biological needs. Specifically, dietary inadequacies present among older adults were not related to eating foods that were low in nutrients but more commonly caused by inadequate consumption of calories (Davis, Murphy, Neuhaus, & Lein). Also, Donkin, et. al (1998) studied fruit and vegetable consumption among men who lived alone and who lived with a spouse and found that consumption of these foods was higher in those who lived with a spouse. After reviewing these studies, it is recommended that older adults who live alone should consume adequate energy, as well as the recommended servings from each food group, so as to prevent weight loss and nutrient deficiencies and to improve nutritional status.

Additionally, it is recommended that older adults utilize community nutrition programs, such as congregate meal sites, to improve nutritional status and increase social engagement (Rainey, et al., 2000, Gustafsson &

Sidenvall, 2002). Nutrition programs can help improve nutritional status among older adults by providing them with well-balanced meals, education, and socialization, which have been shown to improve nutritional status among this population (Wellman & Kamp, 2004). However, nutrition programs alone are not likely to completely solve the problem of poor nutritional status among older adults as most programs provide only one meal per day and usually are not available on weekends (Ferrini & Ferrini, 2000). Therefore, a combination of methods should be utilized to effectively improve nutritional status among older adults, such as a regular nutrition assessment by a health professional, involvement in community programs, and education on nutrition topics, including education on energy and nutrient needs of individuals.

Since many older adults are not likely to actively seek assistance in improving nutrition status, nutrition intervention should be readily available in places where older adults frequent (Sing, Cody, Sinclair, Cohen, & Ohls, 2005). For instance, nutrition information should be given to older adults at grocery stores, physicians' offices, community centers, and places of worship. Additionally, printed materials can be mailed to older adults. Providing older adults with information about nutrition will increase

awareness of the need to improve or maintain good nutrition status in the later years.

Recommendations for practice. Since most participants in the current study were found to be at moderate or high nutrition risk, regardless of living arrangement, nutrition risk assessments should be performed routinely among members of this population. Routinely assessing nutrition risk in older adults will identify risk factors and provide opportunities for intervention. Specific interventions may include referral to nutrition programs in the community, education on specific nutrition topics, or assessment of nutrient needs along with diet instruction to increase consumption of calories and nutrients. Nutrition risk can be assessed using simple tools like the "Determine Your Nutrition Risk" questionnaire that was used in this study. Once nutrition risk is identified, older adults should be encouraged to participate in programs that can improve nutritional status, such as congregate meal programs, education programs, and home-delivered meal programs.

Nutrition programs should be marketed to all older adults in a way that lessens social stigma that often can accompany participation in such programs. Efforts to make nutrition programs more commonplace may increase

participation and decrease social stigma associated with such programs (Sing, Cody, Sinclair, Cohen, & Ohls, 2005).

Recommendations for future research. Future research should focus on nutritional status of the older adult population as a whole. The high number of subjects in this study who were at moderate or high nutritional risk indicates that there are factors in addition to living arrangement that contribute to poor nutritional status among the older adult population. Additional research should investigate which nutrition risk factors are most prevalent among this population in order to improve nutritional status among individuals.

Future research should identify not only the relationship between living alone and high nutrition risk, but also living arrangement and moderate nutrition risk. Moderate nutrition risk appears to be prevalent and can lead to high nutrition risk (Dovini, Savina, and Cannella, 2003). Identifying a relationship between living alone and either high or moderate nutrition risk may justify a need to develop more nutrition programs to serve the older adult population in an effort to slow the rate of nutrition risk.

Additional research should be conducted to determine differences among men and women in this population. Several researchers focused on men or women separately and have

found that nutrition needs vary among men and women (Donkin, et al., 1998; Rainey, et al., 2000; Davis, Murphy, Neuhaus, and Lein, 1990; Charlton, 1997). Studying men and women separately may identify areas for improvement that are gender-specific. Determining which methods of interventions are preferred among men and women will aid in developing nutrition programs that are tailored to individuals' needs and preferences.

The method of identifying level of nutritional risk should be more in-depth. The "Determine Your Nutritional Health" questionnaire used to identify nutrition risk among participants rated level of nutrition risk. However, this study did not aim to identify the factors that were most prevalent in contributing to nutrition risk among older adults. Additional research studies should determine the most prevalent factors that contribute to decreased nutritional status among older adults. After these factors are identified, solutions can be formed to address each problem individually.

After identifying the most prevalent nutrition risk factors, research should focus on determining the best method of improving nutritional status based on the attitudes and preferences of older adults. Focus groups designed to gather the attitudes and opinions of older

adults regarding method of nutrition intervention will help ensure that resources are used effectively. After all, nutrition programs designed for older adults are not effective if this population does not utilize them.

Analyzing the data according to nutrition risk within certain age ranges could give insight into unique nutrition-related problems that accompany various stages of aging. This could allow programs to meet individual nutrition needs of subjects based on age. For example, the issues affecting nutritional status among older adults varies by age. Older adults can be divided into two groups: young-old and old-old (Ferrini & Ferrini, 2000). Vast differences are seen among these groups, including differences in health and nutritional status, physical ability, and social involvement. Generally, the young-old have fewer health problems and more social engagement than the old-old (Ferrini & Ferrini). Gaining knowledge about the specific needs of these age groups is important and should be included in future research. Doing so will aid in developing solutions to the unique nutrition problems that accompany the individual phases of older adulthood.

Eating meals alone and living alone are only two of the factors that may have an effect on the nutritional status of older adults. Several other factors contribute

to decline in nutritional status among the older adult population (Ferrini & Ferrini, 2000). Factors affecting nutritional status of older adults should be continually researched to improve the overall health of this growing population.

Determining the nutritional status of older adults who live alone gives valuable insight into the need for senior meal programs for older adults in the Midwest region. This research will help meet the nutritional needs and improve the nutritional status of older adults in the area.

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Appendix A. Research Questionnaire

Please circle the correct response.

1. What is your gender? Male Female

2. What is your age category?
 65-70 71-75 76-80 81-85 86-90 91 or over

3. How many other people live with you?
 0 1 2 3 4 or more

4. On average, how many meals do you eat alone each day?
 0 1 2 3

5. On average, how many meals do you eat with others each day?
 0 1 2 3

6. What is your living arrangement?
 - a) House/Apartment
 - b) Nursing home
 - c) Retirement home
 - d) Assisted living facility
 - e) Group home
 - f) other

7. Do you have an illness or condition that made you change the kind and/or amount of food you eat?

 Yes No

8. Do you eat fewer than two meals per day?

 Yes No

9. Do you eat only a few fruits or vegetables, or milk products?

 Yes No

10. Do you have 3 or more drinks of beer, wine, or liquor almost every day?
- Yes No
11. Do you have tooth or mouth problems that make it hard to eat?
- Yes No
12. In the past 6 months, have you been unable to buy the food you need?
- Yes No
13. Do you eat alone most of the time?
- Yes No
14. Do you take 3 or more different prescribed or over-the-counter drugs a day?
- Yes No
15. Have you lost or gained 10 pounds in the last 6 months without wanting to?
- Yes No
16. Do you have a physical disability that keeps you from shopping, cooking, and/or feeding yourself?
- Yes No

Item numbers 1-6 were developed by the researcher and item numbers 7-16 were adopted from the Determine Your Nutritional Health Checklist developed by the Nutrition Screening Initiative.

Reference: Determine Your Nutritional Health Checklist. (1991). Nutrition Screening Initiative, Washington, D.C.

CONSENT TO PARTICIPATE IN RESEARCH

The Effect of Living Arrangement and Meals Eaten Alone on the Nutritional Status of Older Adults

You are invited to participate in a research study conducted by Kelly Boeger and Dr. Karla Kennedy-Hagan, from the School of Family and Consumer Sciences at Eastern Illinois University. Your participation in this study is entirely voluntary. Please ask questions about anything you do not understand, before deciding whether or not to participate.

• PURPOSE OF THE STUDY

The purpose of the study is to determine if older adults who live alone are at greater nutritional risk than those who do not live alone and to determine if eating with others increases nutritional status in older adults. The findings of this study can aid in determining effective nutrition intervention strategies for the older adult population.

• PROCEDURES

If you volunteer to participate in this study, you will be asked to complete a one-page survey, including questions about your gender, age range, living arrangement, eating habits, and nutritional status. Do not write your name on the survey.

Nutritional status is defined as the state of a person's health in relation to his or her diet.

Older adults are defined as individuals who are 65 years of age or older.

Living alone is defined as living in a location, such as a house or apartment, in which no other person resides.

• POTENTIAL RISKS AND DISCOMFORTS

While completing the survey, it is not likely that you will have any physical inconveniences or discomfort. Should you have any physical difficulty taking the survey, the researcher will be available to assist you.

While completing the survey, you may feel some degree of sadness or embarrassment due to the personal nature of the questions. Should these feelings become too overwhelming, you may discontinue the survey or make arrangements to complete the survey at a different time or location.

• POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

The results of this study will be used to determine the need for nutrition programs for older adults in the Collinsville, Illinois area. If you are eligible to participate in nutrition programs in the area, you may benefit directly from this research.

The results of the study may potentially benefit the community and society if they validate a need for additional nutrition programs to aid older adults who live alone or who regularly eat meals alone

- **INCENTIVES FOR PARTICIPATION**

In exchange for volunteering to participate in this research, you will receive a sample-size box of high-fiber cereal. You may obtain your gift from the researcher immediately, regardless of whether or not you choose to complete the survey.

- **CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of concealing the surveys and consent forms in separate envelopes so that no other person may view them. The researcher and faculty sponsor are the only individuals who will have access to the surveys and consent forms.

- **PARTICIPATION AND WITHDRAWAL**

Participation in this research study is voluntary and not a requirement or a condition for being the recipient of benefits or services from Eastern Illinois University or any other organization sponsoring the research project. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind or loss of benefits or services to which you are otherwise entitled.

You may also refuse to answer any questions you do not want to answer. There is no penalty if you withdraw from the study and you will not lose any benefits to which you are otherwise entitled.

- **IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about this research, please contact:

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- **RIGHTS OF RESEARCH SUBJECTS**

If you have any questions or concerns about the treatment of human participants in this study, you may call or write:

Institutional Review Board
Eastern Illinois University
600 Lincoln Ave.
Charleston, IL 61920
Telephone: (217) 581-8576
E-mail: eiuirb@www.eiu.edu

You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with EIU. The IRB has reviewed and approved this study.

I voluntarily agree to participate in this study. I understand that I am free to withdraw my consent and discontinue my participation at any time. I have been given a copy of this form.

Printed Name of Participant

Signature of Participant

Date