

Influence of Living Arrangements on Dietary Adequacy for U.S. Elderly: 1987-1988 Nationwide Food Consumption Survey

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Abstract:

Research has suggested that elderly people who live with someone have better dietary adequacy, thus illustrating the important role of social interaction. This study evaluated the differences in dietary adequacy between independent and non-independent elderly (age 65 and older). Data were obtained from the National Food Consumption Survey (1987-1988) in which a National sample of individuals completed a three-day food consumption survey. Those who lived alone were classified as independent (n=316) and those who lived with someone were classified as non-independent (n=740) were included in the analysis. An analysis of covariance indicated that independent elderly had significantly lower intakes of calories, total fat, and cholesterol. Independent elderly had a higher intake of vitamins A, E, B6, ascorbic acid, and folacin. Independent elderly had a significantly lower intake of calcium, phosphorus, iron, and magnesium than their non-independent elderly counter parts ($p<.005$). Overall, this study did not find sufficient evidence that non-independent elderly had better nutritional intake than independent elderly as suggested by earlier studies. These findings may suggest that there is little difference between elderly who live alone compared to elderly that live with someone in terms of overall nutritional adequacy.

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Introduction

Chronic diseases such as arthritis, diabetes, heart disease, high blood pressure, obesity, and cancer account for over three-quarters of death among the elderly (Longino, 1988; HHS, 1988). These chronic problems have significantly increased the need for long-term health care and services (Hama & Chem, 1988; Biegel, Shore, & Gordon, 1984). Eighty-five percent of those 65 years of age and older have some form of chronic disease (Natow, 1980). Most of chronic disease and disability among the elderly are related to nutrition and dietary adequacy (Clancy, 1979). Half of these chronic diseases, including cardiovascular disease, high blood pressure, arteriosclerosis, and obesity, are thought to be caused by improper nutrition (Clancy, 1979).

Living arrangements have been shown to be related to dietary quality. Davis, Randall, Forthofer, Lee, & Marger (1985) believe living alone may contribute to reduced nutritional intake in the elderly. Being married, living with someone, and having close neighbors were all associated with higher intakes of nutrients. Similarly, Ryan and Bower (1989) found that those who lived with a spouse had a more favorable dietary pattern. The literature implies that dietary adequacy in the elderly improves with an increase in social contact (Clancy, 1979; Davis et al., 1985; Ryan et al., 1989).

However, literature also indicate inconsistencies in regard to the effects of living arrangements on dietary adequacy of the elderly. One study found no relationship between living arrangements and nutrient intake (Schafer & Keith, 1982). Similarly, Walker and Beauchene limitations of the previous studies. The majority of the studies were based on regional or local data with small sample sizes. These studies were also limited in the number of nutrient variables that were examined.

The United States Department of Agriculture (USDA) conducted a Nationwide Food Consumption Survey (NFCS) in 1987-1988, in which a national sample was used to gather data on food consumption behaviors. The purpose of this study was to examine the relationship of living arrangements (living with someone -vs- living alone) to nutritional intake of elderly persons 65 years of age and older using the NFCS. Using a national sample provides a better indication of how living arrangements may be related to dietary adequacy and should help clear up inconsistencies of previous studies.

Methodology

The 1987-1988 NFCS database is based on a 3-day food and nutrient intake of individuals of all ages surveyed throughout the 48 contiguous states. Data collection occurred between April 1987 and August of 1988. The first day dietary intake was collected during a personal in-home interview using a 1 day dietary recall. The second and third day dietary intake data were collected using a self-administered 2-day dietary recall. The NFCS collected data on 10,172 individuals nationwide. This study examined those individuals 65 years of age or older (n= 1056) who completed a 3-day dietary recall. Independent elderly (n=316) were identified as those who reported living alone. Non-independent elderly (n=740) reported living with someone (e.g. spouse, family member, friend, etc.).

It should be noted that the NFCS experienced a relatively low response rate of near 35 percent. This brings to light the issue of a possible nonresponse bias. As a result, an expert panel from the Federation of American Societies for Experimental Biology was convened to determine if indeed a nonresponse bias existed within this sample. This panel concluded that it was not possible with absolute certainty to demonstrate the presence or absence of a non response bias.

The SAS statistical package was used to analyze all data in this study. Frequency statistics and chi-square were used to analyze the differences of demographic and health status variables between independent and non-independent elderly. Analysis of covariance (ANCOVA) adjusting for age and income levels was used to examine the macronutrients, micronutrients, and nutrient adequacy ratios (NAR). The NAR is the ratio of nutrient intake to the recommended dietary allowance (RDA) for that nutrient. A value of 1.00 or above indicates that the intake of that nutrient met or exceeded the RDA. Because of large numbers of comparisons, the alpha level was reduced to .005 instead of .05 to control for possible Type 1 error inflation (Dawson-Saunders & Trapp, 1990).

Findings

Demographic and health status comparisons between independent and non-independent elderly are presented in Table 1. Independent elderly were older and more likely to be female. There was a significantly higher percentage of independent elderly who lived below the poverty income level. Independent and non-independent elderly were not different in perceiving their health or diet status. Non-independent elderly were more likely to participate in exercise. In addition, there was no difference in health status as diagnosed by a physician between independent and non-independent elderly.

Table 1
Demographic and Health Status Information for Independent and Non-independent Elderly

Variable (n=316)	Independent (%) (n=740)	Non-independent (%)
Age (years)	75.02	72.29**
Race		
White	86.62	91.76
Black	12.42	7.16

Sex		
Female	83.23	48.65**
Poverty Income Below	30.91	13.940*
Perceived Health		
Excellent/Good	70.07	69.78
Perceived Diet		
Excellent/Good	85.76	86.48
Participation in Exercise	21.45	26.81
Reported Diabetic(a)	11.94	11.75
Reported Hypertension(a)	46.62	40.47
Reported Heart Disease(a)	26.05	24.31
Reported Cancer(a)	6.84	8.81
Reported Osteoporosis(a)	7.52	4.90

(a) Diagnosed by a physician

** Significant at the .005 alpha level

Macronutrients

Since the age and income levels were significantly different between independent and non-independent elderly, the ANCOVA was used to control for these two factors. Table 2 reports the means and results of ANCOVA of macronutrients of independent and nonindependent elderly. Non-independent elderly had a significantly higher intake of total calories. There were no significant differences in protein or carbohydrate intake between independent and nonindependent elderly. Non-independent elderly, however, had a significantly higher intake of total fat. When fat is broken into saturated, monounsaturated, and polyunsaturated, there was no significant difference in intake between independent and nonindependent elderly. Non-independent elderly showed a significantly higher intake of cholesterol compared to independent and also had a higher intake of fiber, although not significant.

Table 2
Means and Independent Elderly ANCOVA on Macronutrients of Independent and Non-independent Elderly

Variable (n=316)	Independent (%) (n=740)	Non-independent (%)
Caloric Intake	1429	1616"
Protein (g)	59.09	68.06
Carbohydrate (g)	175.40	189.52
Total Fat (g)	56.29	65.445**
Saturated (g)	20.29	22.63
Monounsaturated (g)	20.74	24.57
Polyunsaturated (g)	10.79	13.06

Cholesterol (mg)	239.81	273.27**
Fiber (g)	12.91	14.16

**Significant at the .005 alpha level

Dietary composition, as reflected by the percentage of total calories derived from each macronutrient, also demonstrated differences between independent and non-independent elderly (Table 3). Non-independent elderly had a significantly higher percentage of total calories derived from protein but a significantly lower percentage from carbohydrates. There was no difference when fat was broken into saturated, monounsaturated, and polyunsaturated.

Table 3
Percent of Total Caloric Intake from Macronutrients for Independent and Non-independent Elderly

Nutrient	Independent (%) (n=316)	Non-independent (%) (n=740)
Protein	16.82	17.18**
Carbohydrate	49.13	47.05"
Total Fat	35.11	6.09
Saturated	12.64	12.47
Monounsaturated	13.04	14.44
Polyunsaturated	6.72	7.20

**Significant at the .005 alpha level

Micronutrients

Means and results of ANCOVA on NARs for independent and non-independent elderly are presented in Table 4. Vitamin adequacy seems to be sufficient for both independent and non-independent elderly except for vitamin E, which is very close to being adequate. Although vitamin intake is adequate for both groups, there is a trend in which independent elderly have higher intakes of most of the vitamins. Independent elderly have NAR levels less than the RDA on all minerals and all are significantly lower than non-independent with the exception of zinc.

Discussion

This study was a secondary analysis of data collected from a national sample. The major advantage of using these data is that it permits use of a large sample that represents the population of the United States. To our knowledge, this is the first study to examine nutrition and dietary adequacy of independent and non-independent elderly using the 1987-88 NFCS.

The most consistent pattern of findings was the higher intakes of all macronutrients (see Table 2), especially the total fat, cholesterol, and calories of non-independent elderly. The significantly higher intake of calories by non-independent elderly found in this study is consistent with previous studies (Ryan et al., 1989; Schafer et al., 1982; Walker et al., 1991). These studies showed that a higher intake of calories was associated with better dietary adequacy (Ryan et al. 1989; Walker et al., 1991). However, these studies did not examine other nutrients such as fat and cholesterol. Our analysis indicated that non-independent elderly had significantly higher intakes of fat and cholesterol than the independent elderly. These findings would suggest that living with someone might have both a positive and negative effect on eating behavior in the elderly. Eating in social settings may increase the energy intake but may also increase the amount of fat and cholesterol in the diet. This might suggest that elderly who do have adequate nutrient intakes need to carefully monitor their intake of fat

and cholesterol. Limiting fat and cholesterol will have the benefit of lowering serum lipid levels and thereby reduce the risk of coronary artery disease, and perhaps even reduce the incidence of colon cancer, a major killer of older people (HHS, 1988).

In terms of minerals, independent elderly had lower intakes in all, with the exception of zinc, compared to non-independent elderly (see Table 4).

Table 4
Means and Comparisons of ANCOVA on Nutrient Adequacy Ratios (NAR) for Independent and Non-independent Elderly

Nutrient	Independent (%) (n=316)	Non-independent (%) (n=740)
Vitamins		
Vitamin A (IU)	1.72	1.66
Vitamin E (mg)	.95	.92**
Vitamin B12 (mg)	2.42	2.83
Vitamin B6 (mg)	1.35	1.19**
Ascorbic Acid (mg)	1.82	1.80**
Thiamin (mg)	1.11	1.16
Riboflavin (mg)	1.23	1.27
Folacin (mg)	1.54	1.38**
Minerals		
Calcium (mg)	.56	.70**
Phosphorus (mg)	.87	1.12**
Iron (mg)	.88	1.10**
Magnesium (mg)	.76	.77**
Zinc (mg)	.77	.75

**ANCOVA results for NAR values of Independent and Non-independent elderly. Significant at the .005 alpha level

Independent elderly also had values less than the RDA on all minerals compared to non-independent elderly having lower values on 3 of the 5 minerals. These findings indicated that those elderly living with someone may have a more adequate intake of minerals. This may suggest that there is something lacking in the diet that would attribute the lack of adequate mineral intake in both independent and non-independent elderly. Further studies may be required to examine the reason for inadequate mineral intake among the elderly.

The calcium intake for both independent and non-independent elderly were well below the RDA standards. A calcium deficiency in the elderly has been shown to be related to the development of osteoporosis. Other studies have also found calcium intakes lower than the RDA in most of the elderly population (Hama et al., 1988; Schafer et al., 1982; Walker et al., 1991). These findings indicate the need for both independent and non-independent elderly to increase calcium in their diets.

The vitamin intake of both independent and non-independent elderly were above the RDA for all the vitamins with the exception of vitamin E which was slightly below the RDA. Our findings suggested that living arrangement did not effect the vitamin adequacy of the elderly.

Taking all nutrients into account, this study did not find sufficient evidence that non-independent elderly had better nutritional intake than independent elderly as suggested by earlier studies (Clancy, 1979; Davis et al., 1985; Ryan et al., 1989). Our data supported findings reported by studies which did not find any clear indication

that those who live alone have a less adequate diet than those who live with someone (Schafer et al., 1982; Walker et al., 1991; McIntosh, 1984).

Recommendations

We found that living arrangements may be related to the dietary adequacy of the elderly, although not conclusive. There is a continued need to study the nutritional habits of the elderly, particularly those who are at high risk for disease. Although this study did not find conclusive evidence that living arrangements affect nutritional adequacy, health professionals need to be aware of factors that may put the elderly at higher risk for nutritional inadequacy.

Future studies should examine support systems, such as friends, community ties, and church ties as opposed to only living arrangements. Health practitioners should be knowledgeable about all the factors that could affect food intake of the elderly and should apply this information when designing and implementing nutrition programs.

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