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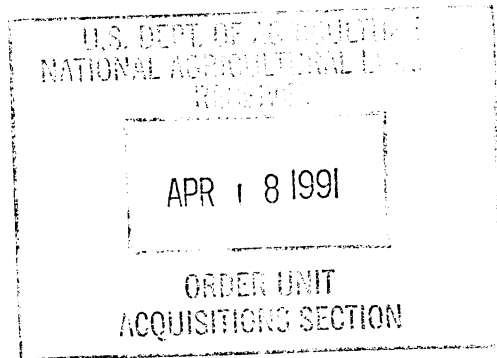
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FOOD DEMAND ANALYSIS  
Implications for Future Consumption

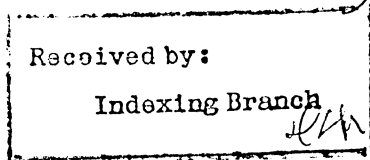
Edited by  
Oral Capps, Jr. and Benjamin Senauer

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Department of Agricultural Economics  
Virginia Polytechnic Institute and State University  
Blacksburg, Virginia 24061

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## Effects of Increasing Elderly Population on Future Food Demand and Consumption

Ronald A. Schrimper<sup>1</sup>

The proportion of consumers in the United States who are elderly has been increasing in recent years. This share will increase in the future and will probably have marked effects on the demand for food and other products. Between 1970 and 1980, the proportion of the United States population 65 years of age and older increased from 9.8 to 11.3% (U.S. Bureau of Census, 1984b). Although this age group is not going to be increasing as rapidly over the next couple of decades as it has in the recent past, it is projected to account for approximately 13% of the population by year 2000. A more rapid rate of growth is expected during the beginning of the next century. Within 45 years, approximately 1 of every 5 persons in the United States is likely to be 65 years of age or older.

A more than 100% increase in the number of individuals 85 and older by the turn of the century is expected to cause an increase in the institutionalized component of the aged population. Currently a little over 5% of the elderly population is institutionalized, but this proportion has been moving steadily upward over the last decade or so as the proportion of older persons in the elderly age group increases (U.S. Bureau of Census, 1984a). Not only has the number of elderly increased and is expected to continue to increase, but the elderly as a group have become more of a focal point of public policy because many government decisions have direct impacts on the well-being of the elderly through Social Security payments, Medicare, and other programs.

This paper reviews accumulated knowledge about expenditure patterns of the elderly with special emphasis on food purchases. This information is analyzed to identify implications of an increasing proportion of elderly on the demand for food at the beginning of the next century. The first part of the paper presents some information about recent changes in the economic well-being of the elderly. The second part examines savings and aggregate expenditure behavior of the elderly. This examination is followed by a more detailed discussion of food expenditures and nutrient intakes of the elderly. The final part uses the information presented in the earlier sections to examine future implications for the demands for food.

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<sup>1</sup>Professor of Economics, N.C. State University. The author acknowledges helpful comments of R. L. Clark and R. A. King on an earlier draft of this manuscript.

### Changes in Economic Well-Being of the Elderly

Average income of the elderly population has increased substantially during the last two decades. For married couples with a household head 65 years of age or over, real median income increased more than 65%, from \$3,171 to \$5,248 between 1960 and 1980 (U.S. Bureau of the Census 1984a, U.S. Department of Agriculture, 1975 and 1982). Comparable data for couples of all ages indicate an increase of around 42% from \$6,621 to \$9,376 during the same period. Similar changes are observed in comparing families with single household heads as well as unrelated individuals. Even though average incomes of the elderly are still considerably less than those of other households, they increased faster than those of the rest of the population during the 1960s and 1970s.

Incomes increased in spite of a reduction in labor force participation by elderly households. These relative increases in income occurred primarily as a result of an expansion in many government programs including Social Security and other income-maintenance programs. Other types of public programs such as Medicare and Food Stamps have increased the availability of in-kind benefits that are not directly reflected in cash income measures. The total value of all direct federal expenditures for persons 65-or-older is estimated to have increased from \$12.8 billion in 1960 to \$196.2 billion in 1982 (Clark, et al. 1984). Some of this increase is attributable to the number of elderly individuals having increased by more than 50% and prices more than tripling over this period as measured by the Consumer Price Index. Another way of expressing the growth in federal expenditures for the elderly is that these expenditures represented 2.5% of GNP in 1960 and rose to 5.9% by 1982.

The availability of special in-kind benefit programs permits elderly individuals to allocate their expenditures on market goods and services differently than if these programs were not available. Thus, any analysis of elderly spending behavior is conditioned by the particular regime of governmental programs in existence. Because of the expansion of government in-kind programs for the elderly, comparisons over time of real cash incomes do not necessarily represent total changes in economic welfare. Special preferential tax provisions for the elderly also are important considerations in such comparisons. For example, Social Security benefits and other types of transfer payments are generally nontaxable. Also, the elderly are permitted a double personal exemption in calculating taxable income as well as a one-time exemption of capital gains realized through the sale of a principal residence by anyone 55-or-older.

### Saving and Aggregate Expenditure Behavior

Considerable controversy exists about the importance of household savings to finance consumption of elderly households after retirement. During the last thirty years, life cycle models emphasizing wealth accumulation early in the life cycle to finance consumption during later stages have been popular models of household financial decision making. Under a specified set of assumptions, predictions of such models are that

consumption would increase with age until some point in the life cycle and decrease thereafter. Also, positive savings would occur up to a certain age, but consumption would eventually exceed income either exhausting total wealth or providing desired amounts for bequests at time of death.

Empirical evidence has provided mixed results about the implications of the life cycle models with regard to behavior of elderly households. Research by Kotlikoff and Summers (1981) suggests that a large proportion of household net worth arises from intergenerational transfers of capital rather than from being consciously accumulated by restricting consumption during early stages of the life cycle. Mirer's (1979) analysis of Social Security data also indicates that the wealth of the aged increases rather than decreases. The latter result is consistent with the 1972-73 BLS expenditure survey, which indicated that elderly households' expenditures (including taxes) generally were less than total income. On the other hand, Friedman and Sjogren (1981) indicate that participants in the Retirement History Study had a slight decline in total assets between 1969 and 1975, after adjusting for price increases. Home equity accounted for around 40% of total assets. Hamermesh (1984) cites other studies that report decreasing wealth of the elderly, but far more slowly than implied by simple life cycle models.

Consumption patterns of elderly households are more consistent with predictions of life cycle models. Cross-sectional analyses of expenditure data clearly indicate decreases in total expenditures with age after peak earning years. Hamermesh (1984) estimated that average consumption (including an implicit rental value for owned housing) for a sample of households included in the Retirement History Survey in 1973 and 1975 was 14% greater than potential annuity income that could be generated by their financial wealth, including pensions and Social Security benefits. Between 1973 and 1975, this sample of households decreased consumption by a rate sufficient to generate increases in net financial worth within a few years after retirement.

#### Expenditure Survey Evidence

The 1972-73 BLS data also indicate a consistent decrease in total expenditures across age groups among older households (Table 1)<sup>2</sup>. These data not only confirm a decrease in total expenditures but also indicate changes in composition of expenditures among older households. The share of total expenditures allocated to food, housing, health, and personal care tended to be higher even though actual expenditures were lower among households with older heads relative to those with younger households. Average incomes as well as food expenditures were higher in 1973 than in 1972 for all five elderly age groups. Despite a 13.2% increase in food

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<sup>2</sup>Most studies combine 1972 and 1973 data since it was part of the same survey, but this aggregation can present some problems in a study of budget shares. Potential problems arise because expenditures are a function of relative prices that change over time. The Consumer Price Index was 6.2 percent greater in 1973 than in 1972.



Table 1. Distribution of total expenditures by age of household head for those 55 years of age or older, 1972-1973 CCES data.<sup>a</sup>

Category	Age Group and Year									
	55 - 59		60 - 64		65 - 69		70 - 74		75	older
	1972	1973	1972	1973	1972	1973	1972	1973	1972	1973
Food <sup>b</sup>	17.4	17.1	17.6	17.8	19.7	19.3	21.0	21.7	22.3	23.0
Housing	18.7	18.0	19.5	19.7	22.5	24.4	26.9	24.9	29.6	30.0
Apparel	5.5	5.1	4.9	5.2	5.0	5.2	5.3	4.9	4.3	4.3
Transportation	14.3	15.2	14.3	13.6	14.1	13.0	13.6	13.8	8.6	8.5
Health <sup>c</sup>	4.7	4.5	5.5	5.1	6.3	6.5	8.0	8.0	9.2	9.1
Personal Care	1.1	1.0	1.2	1.2	1.4	1.3	1.4	1.4	1.5	1.4
Recreation	7.8	8.1	7.6	7.3	7.9	7.8	7.8	6.5	5.6	6.0
Insurance and Pensions	7.2	7.5	6.1	6.9	3.7	3.6	2.6	3.4	2.3	1.7
Gifts and Contributions	5.0	5.0	6.2	6.4	8.8	6.5	7.7	9.4	10.1	9.3
Taxes	<u>18.3</u>	<u>18.5</u>	<u>17.1</u>	<u>16.8</u>	<u>10.6</u>	<u>12.4</u>	<u>5.7</u>	<u>6.0</u>	<u>6.5</u>	<u>6.7</u>
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Expenditures (\$11,336)(\$12,952)	(\$ 9,444)(\$10,641)	(\$ 7,040)(\$ 7,794)	(\$ 5,265)(\$ 6,405)	(\$ 4,591)(\$ 4,812)						
Total Income <sup>d</sup> (\$12,492)(\$14,232)	(\$10,353)(\$11,556)	(\$ 7,288)(\$ 8,142)	(\$ 5,355)(\$ 6,263)	(\$ 4,726)(\$ 5,340)						

<sup>a</sup>Calculated from information on interview tape.

<sup>b</sup>Includes alcohol and tobacco expenditures.

<sup>c</sup>Premiums for private health insurance are included in this category.

<sup>d</sup>Sum of averages for various components of income for each age group.

prices between 1972 and 1973, the share of total expenditures allocated to food did not increase between these two years in all cases.

A positive relationship between the proportion of income allocated to food and age was also noted in a report by Gallo, et al. (1979). The latter study indicated that households with a head 65 years of age or older spent 21.5% of their before-tax income on food in 1972-73. This figure is in contrast to 16.9% spent by households headed by younger individuals. Gallo's proportions are based on shares of income rather

than on total expenditures and thus are not directly comparable to those in Table 1. Gallo's estimates are also inflated somewhat because they are based on published values of average income for age groups regardless of whether households reported income information.<sup>3</sup> Another difference is that expenditures on alcoholic beverages and tobacco are included in the food expenditure data in Table 1 but excluded from the food category used by Gallo. A final difference is that data in Table 1 came from the interview part of the survey rather than from the diary phase that provided expenditure information used by Gallo.

Increases in shares for food and other categories among older age groups in the 1972-73 data set were offset by the fact that proportions of total expenditure allocated to apparel, transportation, recreation, insurance, and pensions and taxes declined with age. The sharp drop in taxes is associated with lower taxable incomes. Taxes were included as a separate expenditure category to account for all outlays even though there may be somewhat less choice involved in the actual amount of taxes paid relative to other expenditure categories. It is clear, however, that all households with similar incomes do not pay the same amount of taxes.

#### Effects of Household Characteristics on Expenditure Patterns

Decreases in total expenditures by elderly households are consistent with decreased household size and income. The effects of these and other variables on elderly household expenditures have been examined by estimating a set of budget equations using the 1973 BLS data for the five age groups included in Table 1 (Schrimper and Clark, 1985). Regression results indicated that larger sized elderly households consistently spent larger proportions of their total expenditures on food. Each extra person in the household was associated with an increase of 2 or 3 percentage points in the budget share for food.

Regression results also indicated that expenditures for food, housing, personal care and health change proportionately less than total expenditures, consistent with expenditure elasticities less than one. Expenditures for the other categories generally changed proportionately more than total expenditures. Expenditure elasticities for food were the smallest of any expenditure category, ranging from .5 to .7. The latter values are more than twice as large as the estimates of income elasticity for food by older households reported by Murray (1978) of approximately .2. Murray's analysis was based on 1969 and 1973 data from the Retirement History Study.

It is not surprising that with elasticities less than unity the share of total income or expenditures allocated to food tends to increase

<sup>3</sup> Average income for the sample with complete income information was \$1,112 higher than the average for the entire sample (Table 1, U.S. Department of Labor, 1977b). The corresponding difference in annual food expenditures between the sample with complete income information and the total sample was only \$27.04.

among older households as they experience declining incomes. The food budget share would increase with age even more than the 5 to 6 percentage points indicated in Table 1 as incomes decline were it not for a simultaneous reduction in average household size. A 60% difference in total income and expenditures between the 55-59 and the 75-and-older age groups in conjunction with elasticities in the .2 and .7 range imply a 5 to 10 percentage point difference in food budget shares. A difference in average household size of approximately one person between these two age groups provides an offsetting influence of 2 to 3 percentage points in food budget shares.

Significant differences in elderly expenditure patterns in the 1973 BLS data were also associated with marital status. Elderly households headed by single women spent smaller fractions of their total expenditures on food but more on housing and apparel compared to households in the same age category in which a husband and wife were both present. Spending patterns of elderly households headed by single men were more similar to those of married households than they were to those households headed by single women.

Retirement status was not a very significant factor associated with expenditure patterns. This finding was in sharp contrast to results reported by McConnell and Deljavan (1983) who used 1972-73 CES data but slightly different procedures in their study. Additional analysis suggested that the contrast in results likely occurred because McConnell and Deljavan did not control for age differences. Thus, their retirement variable is likely to have reflected age, since retirement status is highly correlated with age among older households.

Other variables whose effects on elderly expenditure patterns were studied by Schrimper and Clark (1985) include race and urbanization. Elderly nonblack households spent significantly smaller proportions of their total expenditures on apparel and in many cases food, insurance, and pensions compared to elderly black households. No significant differences in budget shares for food were observed among urbanizations after adjusting for the effects of other variables.

An extension of this work indicated that the largest effects of exogenous increases in budget shares allocated to health expenditures were on the amounts spent for food, housing, transportation, and taxes. The relative adjustments in expenditures for each of the latter categories in response to increased health expenditures were greater than the respective shares of total expenditures. In the case of food, the responses also were substantially greater among the two oldest age groups for which the budget shares for food were estimated to decrease by 1 percentage point for each 3 percentage point increase in the health share of total expenditures.

#### Away-from-Home Food Expenditures

Although the proportion of total expenditures allocated to food increases with age, the proportion of total food expenditures spent on

away-from-home food by elderly households definitely decreases. This result is confirmed by data from both the 1972-73 and the 1980-81 BLS expenditure surveys.<sup>4</sup> In summarizing the findings from the 1972-73 Survey, Gallo et al. (1979) reported senior citizen households spent about 25% less per capita on away-from-home food than did the average of all other age groups and around a third less than the youngest age groups. These values likely underestimate actual age-related differences in away-from-home eating because purchases made while on vacation, away from home overnight, or on expense accounts, are excluded. Higher percentages of younger households reported some food expenditures while on vacation and likely account for a higher proportion of expense account eating. The average expenditure for vacation food by the 65-and-older group in 1972-73 was 54% of the average of the 55-64 age group and less than half of the average of the 45-54 age group (U.S. Department of Labor 1977a).

Relative differences in per capita away-from-home food expenditures among various age groups in 1980-81 were similar to those observed in 1972-73 (U.S. Department of Labor, 1983). The 65-and-older urban households had the largest relative increase in away-from-home food expenditures of any age group between the two surveys when the comparisons are based on average household expenditures. When relative changes in per capita expenditures are compared, however, the 65-and-older group and the 55-64 age group had smaller increases in away-from-home expenditures between 1972-73 and 1980-81 than did younger age cohorts (U.S. Department of Labor, 1983). Decreases in household size between 1972-73 and 1980-81 for younger age groups are responsible for more moderate changes in total household away-from-home expenditures than indicated by per capita values. The proportion of total food expenditures allocated to away-from-home food expenditures by all urban households increased from 28.1 to 32.4% between 1972-73 and 1980-81. Comparable values for the 65-and-over age group were 21.2 and 24.3%.

Another data source verifying an age-related difference in away-from-home eating is the 1977-78 Household Food Consumption Survey. In summarizing preliminary data from the spring and summer components of this survey, Rizek and Peterkin (1980) noted that households with a head 65 or more years of age reported that about 15% of their total money value of food was used to purchase away-from-home food. All other households reported about 25% of their food dollars were spent for away-from-home food.

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<sup>4</sup>The two surveys are not directly comparable since the 1980-81 survey includes only urban households, whereas the 1972-73 survey sampled the entire U.S. population. Also in the 1980-81 tabulations, students living in college- or university-regulated housing were considered as separate consumer units rather than being included as part of their parent's household as was the case in 1972-73.

### At-Home Food Expenditures

Expenditures for at-home food consumption by elderly households are also different from the values reported by younger households. Based on the 1972-73 CES data, Gallo, et al. (1979) reported that senior citizens spent less of their at-home food dollars on red meats, dairy products, beverages, and prepared food products than did other age groups. A considerably greater proportion of their at-home food dollar was spent on poultry, fresh vegetables, and fresh as well as processed fruits. Data from the 1980-81 CES indicate most of the same age-related differences were present under a new set of price relationships for a different set of elderly cohorts (U.S. Department of Labor, 1983). The contrast in food spending patterns between the 55-64 and 65-and-older groups are quite distinct in each data set. For example, the 65-and-older groups spent a bigger proportion of their at-home food dollars for cereal and bakery products, dairy products, and fruits and vegetables than the 55-64 age group. They also had smaller proportions of their at-home food expenditures allocated to red meats, beverages and prepared foods relative to the 55-64 age group.

#### Household Food Consumption Survey Data

To examine more detailed age-related differences in food budget allocations, the average money value of consumption for various food categories for several subgroups of the elderly in the 1977-78 HFCS was calculated. Some difficulties occur in comparing results from the HFCS data to tabulations of BLS expenditure surveys because of differences in survey methodology. Nevertheless, some similar age-related differences in food dollar allocations are observed in both sets of data. For example, the proportion of before-tax income spent for all food generally increased with age in each sample. This increase occurred in the HFCS data among older households at least until age 75. Also, the share spent for away-from-home food consistently decreased with age among older households in each data set. The HFCS data indicate, however, that the 55-and-older group allocated larger proportions of their at-home food expenditures to red meats, poultry, fish, eggs, fruits and vegetables, fats and oils, and nonalcoholic beverages than younger households (Table 2). These increases were offset by smaller budget shares spent on cereals and bakery products, dairy products, sugar and sweets and other foods. The differences for red meats as well as for cereals and bakery products are a little misleading because the overall comparisons do not accurately reflect differences among the 65-and-older group. Actually, more variation in budget allocations of at-home expenditures was observed among groups of older households than between the 55-and-older group relative to younger households. In the case of red meats, the budget proportion drops rather sharply, especially for beef, after age 65. Just the opposite occurs in the case of cereals and bakery products as well as fruits and vegetables. Most of the differences in allocations for fruits and vegetables are associated with larger shares for fresh and processed vegetables and processed fruit. The shares allocated to fresh fruit and potatoes are fairly similar among all groups of older households.

Table 2. Allocation of at-home food expenditures by older households, 1977-78 HFCS<sup>a</sup>

Category	All Ages	Under 55	55 and older					
			All	55-59	60-64	65-69	70-74	75 and over
			percent					
Cereals and bakery products	12.3	12.6	11.6	11.4	11.1	11.7	11.7	12.8
Cereals	4.4	4.6	4.0	3.7	3.8	4.2	4.2	4.9
Bakery products	7.9	8.0	7.6	7.7	7.3	7.5	7.5	7.9
Red meats	27.1	27.1	27.2	28.3	28.4	26.7	26.0	24.5
Beef	14.2	14.2	14.2	15.2	14.7	13.9	13.3	12.3
Pork	8.3	8.2	8.5	8.6	9.1	8.4	8.3	7.9
Other	4.6	4.7	4.5	4.5	4.6	4.4	4.4	4.3
Poultry	4.5	4.4	4.8	4.6	4.8	4.7	5.4	5.0
Fish and shellfish	2.9	2.8	3.1	3.2	3.5	3.2	2.9	2.7
Eggs	2.1	2.0	2.3	2.1	2.3	2.3	2.5	2.7
Dairy products	13.6	13.9	12.8	13.1	12.4	13.0	12.4	13.3
Milk	8.2	8.5	7.5	7.6	7.3	7.4	7.3	7.9
Other products	5.4	5.4	5.3	5.5	5.1	5.6	5.1	5.4
Fruits and Vegetables	14.7	14.5	15.9	15.4	15.4	16.2	16.4	16.5
Fresh Fruits	4.0	3.8	4.6	4.5	4.6	4.6	4.9	4.5
Fresh Vegetables	4.3	4.1	5.0	4.7	4.8	5.1	5.1	5.2
Processed fruits	1.0	1.0	1.2	1.0	1.1	1.3	1.2	1.5
Processed vegetables	3.5	3.6	3.4	3.4	3.3	3.5	3.6	3.6
Potatoes and sweet potatoes	1.9	2.0	1.7	1.8	1.6	1.7	1.6	1.7
Sugar and Sweets	3.2	3.2	3.1	3.1	2.9	3.3	3.3	3.2
Fats and oils	3.4	3.3	3.5	3.3	3.5	3.5	3.7	3.7
Nonalcoholic beverages	11.3	11.0	11.9	11.8	12.0	11.7	12.2	11.8
Other foods	4.8	5.2	3.8	3.9	3.8	3.9	3.6	3.8

<sup>a</sup> Calculated for subset of households with complete income information in 1977-78 HFCS.

Expenditure patterns for the 75-and-over group also appeared to be different from those of 65-69 and 70-74 groups, especially with respect to at-home expenditures allocated to red meats, cereal, bakery, and dairy products. The proportion of at-home food expenditures the 75-and-over group allocated to red meats was considerably less, whereas the proportions spent on cereals, bakery, and dairy products were larger than those for other elderly age groups.

### Dietary Intake Data

Another source of information about food consumption patterns of older individuals is the 24 hour dietary intake information collected as part of the 1965-66 HFCS and the 1977-78 HFCS. For certain food categories similar changes were observed between 1965 and 1977 for all three of the older age groups for which averages were calculated (U.S. Department of Agriculture, 1983).<sup>5</sup> For example, consumption of cereals, poultry, citrus products, beverages other than coffee, and

<sup>5</sup> A slight difference in one of the age groups used for reporting results of the two surveys should be noted. In 1965-66, values were tabulated

legumes, nuts, and seeds by older age groups generally was larger in 1977 than in 1965. On the other hand, consumption of bakery products, beef, eggs, pork, sugar and sweets, coffee, and noncitrus fruits and juices declined.

Similar changes across multiple age-sex groups likely reflect the effects of modifications in relative prices and/or tastes and preferences of individuals over time. Several age-related consumption patterns observed in these data, however, seem to persist over time. For example, the 75 and older group reported substantially less consumption of beef, all types of beverages, citrus products, and legumes, nuts, and seeds relative to the 65-74 age group in 1965 as well as in 1977. On the other hand, the 75-and-older group consumed larger amounts of noncitrus fruit and juice than the next younger age group. Some of the same patterns are observed when consumption levels of the 65-74 group are compared to those of the next younger age group. This pattern especially holds for beef, beverages, and the legumes, nuts, and seeds categories.

#### Evaluation of Elderly Diets

Individual food intake data also can be used to evaluate the nutrient content of food eaten by older individuals. A comparison of the 1965 and 1977 individual intake data indicates a general improvement in elderly diets during this period (U.S. Department of Agriculture, 1972 and 1980)<sup>6</sup>. Calcium and calories are the only two nutrients for which average daily intakes of older individuals in 1977 were less than recommended dietary allowances (RDA). Older individuals reported higher intakes of calcium in 1977 than in 1965, but still not enough to meet the RDA standard. In the case of calories, older individuals reported smaller decreases than other age groups in calorie intake between 1965 and 1977.

Average intakes of protein, iron, vitamin A, vitamin C, thiamin, and riboflavin by older individuals all exceeded RDA values in 1977. The fact that average daily intakes of older individuals exceed RDA values does not imply that everyone had adequate nutrient intake. In several instances, however, the average daily intakes by older individuals exceeded RDA amounts by a wide margin.

Generally, diets of older men exceeded RDA values by larger amounts than did those of older women. Diets of older individuals appeared to be more ample in iron, vitamin A, and vitamin C relative to diets of

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for males and females 51-64 years of age. In 1977-78, the closest corresponding age group was 55-64 years of age.

<sup>6</sup>Several changes in RDA levels for older individuals occurred between 1965 and 1977. The RDA levels for protein and riboflavin were lowered but calorie requirements were increased. Also, vitamin C levels for older women and thiamin levels for 65 and older men were increased. Vitamin A levels for older women were reduced but remained the same for older men. No changes occurred for calcium and iron.

individuals of all ages. On the other hand, older individuals' intakes of protein did not exceed RDA amounts by as big a margin as did other individuals'. Some of the improvement in elderly individuals' diets undoubtedly resulted from an increase in their real incomes and expansion of governmental food programs during this period.

#### Implications on Future Demand for Food

An important issue is what is the impact of changing characteristics of the elderly and of how they allocate their income to food purchases on the demand for food over the next several years. It seems clear that aging of the elderly population and resulting increases in the proportion of elderly consumers residing in various types of institutions may affect distribution channels for food. Although the increase in the institutionalized proportion of the elderly population might be fairly small, any increase would tend to divert demand from retail outlets to institutional providers and distributors. Because health problems increase with age, an increasing proportion of the oldest of the non-institutionalized elderly may experience more difficulty in shopping and preparing food for themselves. Thus, an increase in demand for prepared meals or home delivery of food products for the elderly can be anticipated, provided older households have sufficient resources with which to purchase such services or that government or voluntary social service programs help underwrite some or all of the costs.

The away-from-home food industry is likely to be negatively affected by an increasing proportion of the elderly in the population. The evidence is very strong that the elderly spend less of their food dollars away from home compared to younger individuals. An increase in the proportion of elderly consumers, therefore, does not seem to bode well for businesses providing the usual type of away-from-home eating opportunities unless low-cost delivery systems of ready-to-eat food can be developed. This negative effect will be reinforced by a declining number of young adults who allocate larger than average shares of their food dollars to away-from-home expenditures.

An increasing share of elderly population also could create some upward pressure on the aggregate share of U.S. disposable income that is spent for food, frequently used as an indicator of the efficiency of the U.S. agricultural sector. Aging of the baby-boom generation would be another factor causing an increase in this statistic. An increasing number of middle-aged and older individuals and a simultaneous decrease in the number of young adults would cause the aggregate proportion of income allocated to food to increase.

Considerable uncertainty concerning changes in elderly food purchases arises because future income levels of the elderly depend heavily on government policy. This uncertainty not only pertains to levels of Social Security and pension benefits but also is related to in-kind benefits such as health programs. If real incomes of the elderly continue to rise as they have in recent years, one would expect responsiveness in the demand for food and corresponding increases in food



expenditures especially for products with higher income elasticities. On the other hand, if policy decisions result in the reduction or slower rate of growth in real income of the elderly, food demand and expenditures would be reduced or moderated. Any reduction in real income of the elderly would reduce food expenditures and cause the share of total expenditures allocated to food to increase even more in view of the fact that the expenditure elasticity for food by the elderly is less than unity. Any change in Medicare or other elderly health programs that increases out-of-pocket costs for health services for the elderly would also be expected to decrease elderly demand for food. As elderly nutritional intakes and economic status receive more attention, some of the special provisions of federal food programs for elderly participants (e.g., differential asset and income eligibility levels) may be eliminated. Changes in the Food Stamp Program and other government subsidized food programs for elderly individuals would affect their food expenditures.

Individual food products whose demands are most likely to be affected by an increasing elderly population appear to be red meats, noncitrus fruits, vegetables, cereals, and bakery products. An increasing proportion of elderly consumers is not likely to be favorable for the red meat industry. All evidence suggests that the elderly definitely decrease consumption of red meats, especially beef. On the other hand, the poultry industry might experience some increase in demand. The elderly also tend to consume higher levels of noncitrus fruits, vegetables, cereals, and bakery products than younger consumers. Consequently, producers of the latter products could expect to see a continuous increase in the demand for their products over the next several years as a result of the aging of the population. These changes, of course, would be affected by changes in relative prices or other factors that cause all households to change their demands for particular types of foods from patterns observed in the past.

#### REFERENCES

Clark, Robert L., George L. Maddox, Ronald A. Schrimper, and Daniel A. Sumner, Inflation and the Well Being of the Elderly, John Hopkins Press, Baltimore, 1984.

Friedman, Joseph and Jane Sjogren, "Assets of the Elderly as They Retire," Social Security Bulletin, Vol. 44, No. 1, January 1981, pp. 16-31.

Gallo, Anthony E., Larry E. Salathe, and William T. Boehm, Senior Citizens: Food Expenditure Patterns and Assistance, Agricultural Economic Report No. 426, Economics Statistics and Cooperative Services, U.S. Department of Agriculture, Washington, D.C., June 1979.

Hamermesh, Daniel S. "Consumption During Retirement: The Missing Link in the Life Cycle," Review of Economics and Statistics, Vol. 66, No. 1, February 1984, pp. 1-7.

Kotlikoff, Laurence, J. and Lawrence H. Summers, "The Role of Intergenerational Transfers in Aggregate Capital Accumulation," Journal of Political Economy, Vol. 89, No. 4, August 1981. pp. 706-732.

McConnell, Charles E. and Firooz Deljavan, "Consumption Patterns for the Retired Household," Journal of Gerontology, Vol. 38, No.4, 1983, pp. 480-490.

Mirer, Thad W., "The Wealth-Age Relation among the Aged," American Economic Review, Vol. 69, No. 3, June 1979, pp. 435-443.

Murray, Janet H., "Changes in Food Expenditures, 1969-73: Findings from the Retirement History Study," Social Security Bulletin, Vol. 41, No. 7, 1978, pp. 21-29.

Rizek, Robert L. and Betty B. Peterkin, "Food Costs and Practices of Households with Working Women and Elderly Persons, Spring-Summer 1977," Family Economics Review, U.S. Government Printing Office, Washington, D.C., 1980, pp. 13-17.

Schrimper, Ronald A. and Robert L. Clark, "Health Expenditures and Elderly Adults," Journal of Gerontology. Vol. 40, No. 2, 1985, pp. 235-243.

U.S. Bureau of Census, Current Population Reports, Series P-23, No. 138, Demographic and Socioeconomic Aspects of Aging in the United States, U.S. Government Printing Office, Washington, D.C., 1984a.

U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 952, Projections of the Population of the United States by Age, Sex and Race: 1983 to 2080, U.S. Government Printing Office, Washington, D.C., 1984b.

U.S. Department of Agriculture Agricultural Statistics 1975, U.S. Government Printing Office, Washington, D.C., 1975.

U.S. Department of Agriculture, Agricultural Statistics 1982, U.S. Government Printing Office, Washington D.C., 1982.

U.S. Department of Agriculture, Agriculture Research Service, Food and Nutrient Intake of Individuals in the United States, Spring 1965, Household Food Consumption Survey 1965-66, Report No. 11, 1972.

U.S. Department of Agriculture, Science and Education Administration, Food and Nutrient Intakes of Individuals in 1 Day in the United States, Spring 1977, Nationwide Food Consumption Survey 1977-78, Preliminary Report No. 2, 1980.

U.S. Department of Agriculture, Human Nutrition Information Service, Consumer Nutrition Division, Food Intakes, Individuals in 48 States, Year 1977-78, Nationwide Food Consumption Survey, 1977-78, Report No. I-1, August 1983.

U.S. Department of Labor, Bureau of Labor Statistics, Average Annual Income and Expenditures for Commodity and Service Groups Classified by Family Characteristics, Consumer Expenditure Survey Series: Interview Survey, 1972-73, Report 455-4, 1977a.

U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey: Diary Survey, July 1972-June 1974, Bulletin 1959, 1977b.

U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey: Diary Survey, 1980-81, Bulletin 2173, 1983.