FISH/SEAFOOD CONSUMPTION PATTERNS OF MIDWEST FAMILIES, 1987-1988: A CONSUMER PREFERENCE AND EXPENDITURE STUDY

By

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1984

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
May, 1989

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ACKNOWLEDGEMENTS

The author wishes to dedicate this thesis to Judith Lee Hush, mother, who passed away on March 2, 1987, and to God. With their love, inspiration and guidance, the completion of this thesis was possible.

My gratitude is also extended to Dr. J. K. Leong, major advisor, who helped in more ways than can be described.

Sincere appreciation is expressed to the other committee members, Dr. Barbara J. Stoecker for her interest and wisdom, Dr. G. Baker Bokorney for his strength and sense of humor, and Dr. William D. Warde for his enduring patience.

A very special thank you is given to Harold Nehls for his continued financial support throughout the course of my study.

Lastly, a very special thank you is extended to Rachel Johnson, whose patience and long hours at the computer makes this reading possible.

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CHAPTER I

INTRODUCTION

The 1980's is a period which is experiencing a resurgence in health awareness and physical fitness by the American people. This resurgence is in response to ongoing medical and nutritional research which have found that a diet low in fat and cholesterol, and high in polyunsaturated fats may reduce the incidence of cardiovascular disease (CVD) (Bronsgeest-Schoute, et al., 1981; Craft, et al., 1984; Dyerberg, et al., 1978; Fehily, et al., 1983; Goodnight, et al., 1982). In particular, attention has focused on the apparent beneficial effects of n-3 polyunsaturated fatty acid (n-3 PUFA) consumption in reducing the incidence of this disease (Harris, et al., 1984; Herold, et al., 1986; Houwelingen, et al., 1987; Illingworth, et al., 1984). The consumption of fish and seafood products is being promoted as an excellent example of how an individual can increase his total n-3 PUFA intake while maintaining a lower risk of CVD.

Not all polyunsaturated fatty acids are equally beneficial in lowering the risk of cardiovascular disease. The most beneficial PUFA in lowering the risk of CVD is n-3, while n-6 and n-9 PUFA's have demonstrated properties that

actually promote CVD (Knapp, et al., 1986; Phillipson, et al., 1985; Spector, et al., 1981). Since it is almost impossible to purchase polyunsaturated products void of n-6 and n-9 PUFA's the consumer is advised to purchase polyunsaturated products with a high n-3:n-6 ratio.

The most important of the n-3 PUFA's are eicosapentaenoic acid (EPA) and decosahexaenoic acid (DHA). Examples of n-6 PUFA's include linoleic acid (LA) and arachidonic acid (AA).

Studies have shown that positive (>0) n-3/n-6 ratios result in inhibition of thrombotic eicosanoid thromboxane synthesis, increased production of prostacycline (Hearn, et al., 1987), decreased production and decreased anti-aggregatorial properties of serum platelets, increased bleeding time (Houwelingen, et al., 1987; Herold, et al., 1986; Bronsgeest-Schaute, et al., 1981), decrease in total plasma triglycerides (Herold, et al., 1986), a decrease in VLDL-cholesterol concentration and an increase in HDL-cholesterol concentration (Herold, et al., 1986; Dyerberg, et al., 1978; Bronsgeest-Shoute, et al., 1981).

Hearn, et al., (1987) analyzed the fatty acid composition of forty-one different fish species. All forty-one species registered positive n-3/n-6 PUFA ratios. Studies have demonstrated that diets supplemented with fish oils and/or fish products, with positive n-3/n-6 ratios, actually promote favorable conditions that lower the risk of cardiovascular disease, (Bronsgeest-Schoute, et al., 1981;

Dyerberg, et al., 1978; Exler, et al., 1975; Hearn, et al., 1987; Herold, et al., 1986; Houwelingen, et al., 1987).

But the question is "How effective are research studies in modifying the high fat, high cholesterol diets of present day Americans?" In 1982, the United States was third in world annual per capita consumption of beef and veal consuming 105.9 pounds. Only Argentina and New Zealand reported higher annual per capita consumption figures, 174.8 pounds and 115.4 pounds respectively (National Food Review, 1987). During this same year, the United States recorded one of the lowest annual per capita consumption figures for fish and seafood, 36.6 pounds, with numerous countries reporting fish and seafood consumption in excess of 75.5 pounds per person annually. Although American consumption of fish and seafood is one of the lowest in the world, recent data has reported that the consumption of fish and seafood is rising among American households (National Food Review, 1987). From 1951-1985, an increase of 19.8% was observed in annual per capita consumption of fish and seafood. More recently, National Food Review reports that from 1975-1985, a 9.0% increase was seen in annual per capita fish and seafood consumption.

The current trend of American household consumption patterns of meat items is reflecting a decrease in red meat expenditures and in the percentage of households purchasing red meat items (Agricultural Outlook, 1983; Smallwood, et al., 1987). On the other hand, food expenditures for

poultry, fish, and seafood products are rising in American households. Changing tastes and preferences for red meats, poultry, and fish are the subject of intense discussion among livestock producer groups, consumer interest groups, and agricultural economists. The question is, "Have consumers shifted some consumption from red meats to poultry and fish because of health concerns over fat and cholesterol?" A recent study by Haidacher, et al., indicated that the overwhelming determinants of consumer spending on these foods have not been health concerns, but rather have been changing incomes and prices. These results suggest that other variables do exist which have pronounced effects in determining consumer consumption behavior.

The intent of this study was to isolate and evaluate selected socioeconomic and demographic variables that may be responsible for influencing consumer consumption of fish and seafood products by Midwest families.

Using these results, one can determine the similarities and disparities of consumer consumption behavioral patterns of households differing in size, race, income, geographic location, and other socioeconomic and demographic features. This information is valuable for assessing existing market conditions, product distribution patterns, consumer buying habits, and consumer living conditions. Combined with demographic and income projections, this information may be used to anticipate consumption trends.

Purpose and Objectives

The 1980's reveal a society that is greatly concerned with health and fitness. Diet has become a major focal point in this era. Nutritionists and physicians alike have stressed the advantages of including fish and seafood in the diet. However, other variables have limited their incorporation into the diet. A recent study indicates that the overwhelming determinants of consumer spending on fish products have not been health concerns, but rather fluctuating incomes and market prices (Agricultural Outlook, 1983).

The purpose of this study was to conduct a survey of Midwest homemakers that would identify their attitudes, opinions, interests, and concerns related to fish and seafood. The results were used to identify the perceptions of the families and their willingness to consume fish/seafood. The overall objective of this study was to identify those factors that have influenced the consumption of fish and seafood at and away from home.

Specific objectives were to:

a) identify the demographic variables that have influenced consumption patterns (i.e. age, sex, race, family composition, income, etc.) of Midwest families;

b) identify the variables associated with nutrition education that are related to consumption patterns (i.e. highest degree received, nutrition classes, health benefits from fish consumption) of Midwest families;

c) identify the variables associated with health perceptions that are related to consumption patterns (i.e. doctor's advice, weight loss programs, food restrictions, etc.) of Midwest families;

d) identify the marketing variables that are related to the consumption patterns (i.e. major food shopper, food store utilization, food expenditures) of Midwest families;

e) identify the "consumption" variables that are related to consumption patterns (i.e. food-away-from-home, frequency, food expenditures, purchasing criteria, food preparation, etc.) of Midwest families;

f) identify the psychographic variables that are related to consumption patterns of Midwest families

Hypotheses

The hypotheses postulated for this study were:

H_o1: There will be no significant difference between the variables comprising demographic data and fish/seafood consumption patterns of Midwest families.

H_o2: There will be no significant difference between the variables encompassing nutrition education and fish/seafood consumption patterns of Midwest families.

H_o3: There will be no significant difference between the variables encompassing health perceptions and fish/seafood consumption patterns of Midwest families;

H_o4: There will be no significant difference between the variables comprising marketing information and

fish/seafood consumption patterns of Midwest families.

H_O5: There will be no significant difference between the variables encompassing "consumption" information and fish/seafood consumption patterns of Midwest families.

H_O6: There will be no significant difference between the variables comprising psychographic data and fish/seafood consumption patterns of Midwest families.

Assumptions

The following assumptions were formulated for this study:

a) the questionnaire was completed by the family member who is the primary food shopper and menu planner (this instruction was conveyed in the cover letter accompanying the questionnaire); and

b) all participants in the research sample completed the questionnaire without any difficulty.

Limitations

The following limitations were observed for this study:

a) 1988 phone directories from cities in selected Midwest states were used in obtaining the random sample population. Persons without telephones, persons with unlisted phone numbers, and transients (people who are moving and don't have their phone number in the directory) were unavailable for possible selection.

b) 1988 telephone directories, for the selected

Midwest states, were limited to include only individuals living in major metropolitan areas and surrounding suburbs.

Definitions

The following terms referred to throughout the study are defined and used as follows:

Agonists - substances capable of combining with an appropriate cellular receptor and producing a typical response for that particular substance.

Angina Pectoris - paroxysmal retrosternal or precordial pain, often radiating to the left shoulder and arm, due to inadequate blood and oxygen supply to the heart.

Anthropometric Measurements - the scientific measurement of the human body for assessing nutritional status. The major categories in clinical use are body weight, fat, and fat-free mass. Measurement sites include triceps, biceps, thigh, calf, subscapular and suprailiac skinfold.

Apolipoprotein - a lipoprotein without its characteristic prosthetic group.

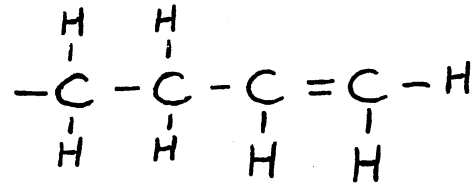
Atherogenesis - the development of atherosclerosis.

Atherosclerosis - a variable combination of changes in the intima of arteries consisting of the focal accumulation of lipids, complex carbohydrates, blood and blood products, fibrous tissue, and calcium deposits, and associated with medial changes.

Baader method - a severe method for extracting crab meat; employs a sheering, grinding action on the body parts with the final extrusion of edible crabmeat.

Brine method - a flotation method which centrifuges the cooked parts of crab in a brine solution and allows the meat to rise to the surface.

Cis - double bonds - characterized by the following molecular conformation



Chemotaxis - the response of organisms to chemical stimuli.

Chylomicronemia - an excess of chylomicrons in the blood, usually due to a deficiency of lipoprotein lipase.

CVD - coronary vascular disease.

DHA - decosahexanoic acid, 22:6n-3.

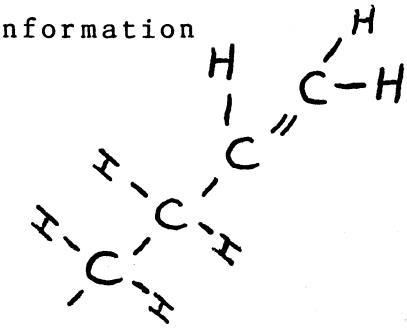
Diastolic Blood Pressure - minimum arterial blood pressure during ventricular diastole.

EPA - eicosapentanoic acid, 20:5n-3.

Epidemiologic - the sum of all factors controlling the presence or absence of a disease.

FAME - fatty acid methyl esters

Gauche - double bonds - characterized by the following molecular conformation



HDL - high-density lipoprotein.

Hyperlipidemia - an excess of lipid substances in the blood.

Hypertriglyceridemia - an excessively high level of serum triglycerides.

Hypolipidemic - lowered fat concentration in the blood.

Ischemic Heart Disease - heart disease characterized by local diminution in the blood supply due to obstruction of inflow of arterial blood or to vaso-constriction.

LDL - low-density lipoproteins.

Leukocytes - one of the colorless, more or less ameboid cells of the blood, having a nucleus and cytoplasm. Those found in normal blood are usually divided according to their staining reaction into granular (neutrophils) and nongranular (lymphocytes, monocytes) leukocytes.

Macrophages - a phagocytic cell belonging to the reticuloendothelial system; important in resistance to infection and in immunological responses.

Monocytes - large mononuclear leukocytes with a more or less deeply indented nucleus, slate-gray cytoplasm, and fine usually azurophilic granulation.

Neutrophils - any histologic element which will bind the neutral eosinazure methylene blue complex.

Normolipidemia - normal concentrations of lipid substances in the blood.

Omega-3 - a family of polyunsaturated fatty acids characterized by the presence of a double bond on the third carbon from the omega end; alpha-linolenic acid, 18:3n-3, is the direct precursor (i.e. EPA, DHA).

Omega-6 - a family of polyunsaturated fatty acids characterized by the presence of a double bond on the sixth carbon from the omega end; linoleic acid, 18:2n-6, is the direct, precursor (i.e. arachidonic acid).

Omega-9 - a family of polyunsaturated fatty acids characterized by the presence of a double bond on the ninth carbon from the omega end. Oleic acid, 18:1n-9 is the direct precursor to desaturation - elongation products.

Omnivore - person subsisting on a wide variety of food; of both animal and plant origins.

PL - phospholipids

Prostacyclins - members of the prostaglandin family that are formed within the blood vessel wall and have demonstrated platelet anti-aggregating functions, (PGI_3) EPA serves as the functional substrate.

PUFA - polyunsaturated fatty acid.

SMSA - standard metropolitan statistical area. An SMSA is a county or group of contiguous counties which contain at least one city of 50,000 inhabitants or more or "twin

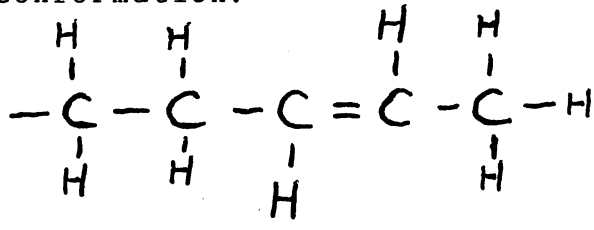
cities" with a combined population of at least 50,000. In addition to a county or counties containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city.

Systolic Blood Pressure - the maximum systemic arterial blood pressure during ventricular systole.

Thrombosis - the formation of a clot of blood within the heart or blood vessels.

Thromboxanes - members of the prostaglandin family formed in platelets that participate in a pro-aggregating role (TXA_2). TXA_2 - arachidonic acid is the direct precursor: TXA_3 - a biologically inert metabolite derived from EPA supplementation displaying neither pro- or anti-aggregating properties.

Trans-double bonds - characterized by the following molecular conformation:



Triglycerides - an ester of glycerin in which all three hydroxyl groups of the latter are esterified with a fatty acid.

Vegans - vegetarians who exclude from their diet all protein of animal origin.

CHAPTER II

REVIEW OF LITERATURE

We are living in a society that is becoming increasingly aware of health consciousness, understanding the advantages of a physical exercise program, and the necessity for a well-balanced nutritional regimen. The consumer believes that adhering to these programs will reduce their chances of developing heart disease and cancer. Nutritional awareness, including dietary intake and the types of foods consumed, leads the way toward the goal of heart disease and cancer prevention. Nutritionists and physicians, both, have stressed the importance of consuming low-fat, low-cholesterol diets. Ultimately, the emphasis of these restrictions is placed on reducing the intake of red meats, while encouraging the consumption of fish, and shellfish. With this in mind, the question is, "Have consumers shifted some consumption from red meats to fish because of health concerns over fat and cholesterol?" The answer is supplied from a recent study conducted by Haidacher, et al., which indicated that the overwhelming determinants of consumer spending on these foods have not been health concerns, but rather have been changing incomes and prices. The information provided in Haidacher's report

suggested that variables other than those of noneconomic origin exist that exert a strong influence on the consumer consumption process. This hypothesis has been confirmed in other studies which have researched consumer consumption patterns in response to supply-side and demand-side economics (Putnam, et al., 1984; Rogers, 1984: Allen, et al., 1984; Agricultural Outlook, June 1983; Blaylock, February, 1983).

The definitions of supply, demand, and preferences are furnished to provide the reader with a basic understanding of their use in the terminology. Demand is the amount of a commodity that people are ready and able to buy at a given time for a given price, whereas, supply is the amount of a commodity available for meeting a demand or for purchase at a given price (Waud, 1980). Preference is the granting of precedence or advantage to one over others.

A correlation between demand and preference must be made: one cannot look at demand without first attempting to understand consumer preference.

When analyzing consumer preference for red meats, fish, and shellfish, the following factors must be considered: price, availability, quality, quantity, variety, appearance, and convenience. Preferences are intrinsic behavioral characteristics uniquely individual to each consumer. Therefore the characteristic make-up of each individual will place different emphasis on what he/she prefers. Demographic data including sex, age, race, religion, marital

status, household size and composition, income, geographic location, and season of the year are all important variables in isolating a preference-demand relationship (Blaylock, 1983; Putnam, et al., 1984; Riggs, et al., 1985).

This section of the literature review will isolate each of the demographic variables and explain its importance in contributing to the overall consumer consumption process of red meats, fish and shellfish.

Sex

From 1970-1986, the labor force witnessed a dramatic 32.8% increase in the percentage of all women employed (National Food Review, 1987). In 1986, the percentage of total women occupying jobs outside the home reached 66.4% with the greatest percentage of women in the age groups 20-24 (72.4%) and 25-34 (71.6%). This dramatic increase of women in the labor force is due to several factors which include: increased urbanization, lower birth rates, greater education, growth in the service sector, increase in real wages paid to women, inflation, rising household expenditures, and a rise in the number of single, divorced, and widowed women (National Food Review, 1987).

It is theorized that, as a result of the increasing female labor force, the responsibilities of meal planner, food shopper, and food preparer may be adjusted to include the participation of the husband, the children, or other outside agencies. Working women also have the ability to

contribute to total household income creating an increase in the number of two-paycheck households. With women allocating more time to duties outside of the home, the allocation of time for duties in the home may be affected. These factors may represent an increase in food expenditures for food eaten away-from-home, food purchased away-from-home but eaten at home, and an increase in food expenditures for convenience items.

This increase in working women, represents an important variable in determining the relevance of data relating to consumer consumption patterns of fish and seafood. However, in the studies under review, researchers have failed to isolate and segregate the demographic variable sex into its substituent categories male and female. Therefore, no significant data can be presented using sex as a determinant in the consumer consumption process involving red meats, fish and shellfish. However, the variable sex was isolated in the research study contained herein to determine its role as a variable on the consumption process.

Age

America is becoming an aging population (National Food Review, 1987). Since 1970, America's total population has increased 14.7% from 1970-1985, the age groups with the greatest degree of change have been those aged 5-13, which decreased 20.2%; 25-34, which increased 54.0%; 35-44, which increased 35.0%; and 65-over, which increased 35.8%. It is

projected that by the year 2000 the age groups 25-44 and 45-64 will represent approximately 52.7% of the total population, 29.9% and 22.8% respectively (National Food Review, 1987). By the year 2000, National Food Review also predicts that the age group 10-24 will fall to its lowest percentage in over forty years representing only 20.7% of the total population.

These changes in the aging population will represent significant implications on the consumer consumption process and the demand for fish and seafood. The age group 25-64 is significant to the consumer consumption cycle in many ways: 1) this age group will represent 52.7% of American's total population by the year 2000; 2) a large percentage of this age group will have received a college degree implying that members of this group will be well educated; 3) this age group will represent America's working class which will harbor in excess of 60% of total consumer spending; 4) marital status and household composition will be important individual considerations; and 5) preparations for retirement will become more highly focused.

From 1980-1985 the age group 25-64 increased 9.38% over the total population. During this time, Americans were becoming more aware of the advantages of eating a low fat, low cholesterol diet and participating in a regular exercise regimen. Tables I and II illustrate and compare the average weekly per person food expenditures and percentage of urban

TABLE I

HOUSEHOLDER'S AGE, 1982: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Age of Householder					
		under 25	25-34	35-44	45-54	55-64	over 64
Average weekly per person food expenditure:				DOLLARS			
Red meats	2.56	1.68	2.13	2.35	3.Ø8	3.35	3.Ø2
Fish & Seafood	Ø.43	Ø.31	Ø.42	Ø.36	Ø.44	Ø.61	Ø.48
Households purchasing in a week:				PERCENT			
Red meats	43.7	32.6	4Ø.2	49.8	53.2	5Ø.5	4Ø.3
Fish & Seafood	27.9	17.9	26.8	32.4	34.6	32.6	24.1

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 16Ø-177.

TABLE II

HOUSEHOLDER'S AGE 1984: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Age of Householder					
		under 25	25-34	35-44	45-54	55-64	over 64
Average weekly per person food expenditure:				DOLLARS			
Red meats	2.38	1.96	2.05	2.24	2.81	2.78	2.70
Fish & Seafood	0.51	0.26	0.34	0.42	0.93	0.51	0.58
Households purchasing in a week:				PERCENT			
Red meats	42.9	31.7	40.0	49.1	52.1	46.2	39.6
Fish & Seafood	27.6	15.3	25.5	32.9	35.1	29.3	26.1

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 160-177.

households purchasing food items in a week from 1982-1984 categorized according to age classification.

In 1982, the total, average, weekly, per person food expenditure for all age groups was $21.55, with $14.Ø8 considered food eaten at-home. In 1982, the largest weekly food expenditures were observed in the age groups 55-64 ($25.64; $17.62, food eaten at home) and 45-54 ($23.52; $15.51, food eaten at home). The age group representing the lowest weekly food expenditure were those individuals aged 18-25 ($19.Ø9; $1Ø.6Ø, food eaten at home). Interestingly, these same age groups were represented as spending the most and the least per week for red meats, fish and shellfish.

From 1982-1984 the total average, weekly, per person food expenditure for all age groups increased 4%, with those aged 45-54 and 64-over showing the greatest increase, 8.12% and 11.14% respectively. Of the 4% increase in total food expenditures, food eaten at home accounted for 3% of the increase, with no significant difference observed between age groups. When comparing Table I and Table II, a significant difference can be seen in the allocation of food dollars for red meats, fish and seafood among the age groups surveyed. From 1982-1984, an overall decrease of 7.1% was observed in food expenditures for red meats while a concomitant 18.6% increase was observed in expenditures for fish and seafood. Decreases in red meat expenditures were found in all age groups except those 18-25, where an increase of 16.6% was observed. The age groups showing the

greatest percentage decrease in red meats expenditures were those 55-65 (17.1%), and 65-over (10.6%). Expenditures for fish and seafood received variable responses from the age groups. However, a 111.3% increase recorded by those aged 45-54, and a 20.8% increase by those 65-over, offset a 16.4% decrease in the 55-64 age group to record an overall increase of 18.6% for weekly fish and seafood expenditures.

Accompanying the 7.1% overall decrease in total red meat expenditures was an overall decrease of 1.95% in the total number of urban households purchasing red meats in a week. Decreases in red meat purchases were seen in all age categories with the age groups 45-54 and 55-64 showing the greatest change, 2.1% and 8.42% respectively. What is surprising are the results reflecting the overall purchasing patterns of fish and seafood. Although fish and seafood expenditures increased by 18.6% from 1982-1984, the actual number of urban households purchasing these commodities decreased 1.1%. The largest decreases in household purchases were found among 18-25 (14.53%) year olds and those aged 55-64 (10.13%). The largest increase in household purchases of fish and seafood was found in the age group 65-over (8.3%), while those 45-54 showed a slight increase.

When evaluating the data represented in Tables I and II, it is important to understand the economic condition of the country during this time period. While inflation was hovering between 7-9% nationally, the unemployment figures

in most states represented double digits. The data contained within the tables do not reflect or isolate the effects of inflation or other recession related variables. Caution is warranted when making generalizations.

Race

Racial differences have been found in many studies to be important determinants of food consumption patterns (Blaylock, 1983; Smallwood, et al., July, 1987). By isolating racial differences and accounting for differences in income, region, degree of urbanization, and other demographic factors, it is possible to estimate the amount of meat consumption due solely to racial differences. In a 1983 study conducted by Blaylock, it was reported that blacks consumed 62 percent more total meat prepared or consumed at home than nonblacks, and 113 percent more fish and shellfish. In every meat category investigated, it was found that blacks consumed more per person than their nonblack counterparts. Blaylock suggested that the results obtained may reflect the finding that a smaller number of meals are eaten away from home by blacks (7.5%) than by whites (12.5%).

Tables III and IV present the average weekly per person food expenditures of urban households among racial classifications during 1982-1984. These tables also include the mean householders income before taxes to demonstrate the isolation of the variables race and income. In 1982, the

TABLE III

RACE, 1982: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Race		
		White	Black	Other
Household characteristics:				
Mean Age of householder (years)	46	46	43	37
Income before taxes (dollars)	21086	21986	13919	23683
Average weekly per person food expenditure:			DOLLARS	
Red meats	2.56	2.63	2.19	2.30
Fish & Seafood	0.43	0.42	0.47	0.57
Households purchasing in a week:			PERCENT	
Red meats	43.7	43.8	43.4	44.9
Fish & Seafood	27.9	27.8	28.7	27.2

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 142-159.

TABLE IV

RACE, 1984: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Race		
		White	Black	Other
Household characteristics:				
Mean Age of householder (years)	46	47	44	40
Income before taxes (dollars)	23547	24726	15086	24720
Average weekly per person food expenditure:			DOLLARS	
Red meats	2.38	2.41	2.14	2.62
Fish & Seafood	0.51	0.50	0.43	1.07
Households purchasing in a week:			PERCENT	
Red meats	49.2	43.0	40.2	51.0
Fish & Seafood	27.6	27.6	25.3	41.9

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 142-159.

total, average weekly, per person food expenditure was $21.55 ($14.Ø8 eaten at home). Whites spent, on the average, 49.27% more for food per week than their nonwhite counterparts while consuming 91.8% more away from home than blacks. in 1982, the average weekly expenditures for red meats, and fish/seafood were $2.53 and $.43 respectively for all races. Although blacks allocated less per week for red meats than nonblacks, the black householders allocated approximately 12% more for fish and seafood than whites. Races in the other category spent a significant, 32.55%, more per week for fish than whites and blacks combined. From 1982-1984, all races combined for an average increase of 4.6% in weekly per person food expenditures, with other races accounting for a 7.3% increase. In this same period, expenditures for red meats fell 7.1%, and expenditures increased for fish and seafood 18.6% for all races. These results, though, are seen to be racially oriented and display great degrees of variation. For example, though an average decline in red meat expenditures was found, the other race category noticed a 13.9% increase in red meat expenditures per week. The same degree of variation also can be seen with expenditures for fish and shellfish. From 1982-1984, expenditures for fish and seafood increased, on the average, 18.6% for all races. However, this increase reflects a 19.Ø% increase by whites, an 8.2% decrease by blacks, and an 87.71% increase by other races.

From 1982-1984, a decrease of 1.9% in total household weekly purchases of red meats was seen in all races, with blacks recording a 7.4% decrease and other races registering a 1.3% increase. Though fish and seafood expenditures recorded an average increase of 18.6%, the actual number of households purchasing fish and seafood fell 1.1%, with blacks recording the greatest decrease, 11.8%, and other races showing a significant 54.0% increase in total household purchases.

When evaluating data for determining changes in consumer patterns, one must be cautious when viewing only expenditure results. Though decreases in food expenditures may be reported, a concomitant increase in consumption may result due to food item substitution (steak vs. cod fillets), or replacement with less expensive cuts or types. It is thus more reliable to use data that give the consumers consumption patterns in pounds.

Household Size and Composition

In 1970, single member and two member households represented 45.8% of the total households in America. By the year 1990, it is projected that these same household groups will account for 56.8% of total households, with the largest increase occurring in single member households, 8.2% (Putnam, et al., 1984). The rise in single member households is mainly attributed to a rapidly increasing divorce rate and single adults delaying marriage for the

pursuit of careers and leisure. By 1990, the U.S. Census predicts that the greatest percentage of households will be those consisting of two family members (31.6%).

If the projections of the U.S. Census Bureau are accurate, the rise in single and two member households will have a definite impact on the consumer consumption cycle. Some important characteristics associated with these two groups include:

- increased number of single adults pursuing active careers and leisure life
- more disposable personal income available
- increase in the number of dual income families
- an increased need for convenience items
- an increase in number of meals eaten away from home.

Tables V and VI list the average weekly per person food expenditures of urban households during 1982 and 1984 classified according to household size. In 1982, the total, per person, weekly food expenditure was $21.55 for all household sizes with $14.08 being the total, average at-home food expenditure. Single member and two member households reported the largest per person expenditures, $29.05 and $25.88 respectively, while per person food expenditures declined with increasing household size. In 1982, single member households allocated 104.8% more on food eaten away from home than food eaten at home, while households with six or more members allocated only 27.7%

TABLE V

HOUSEHOLD SIZE, 1982: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Household Size (members)					
		One	Two	Three	Four	Five	Six or More
Household characteristics:							
Mean Age of householder (years)	46	47	52	42	40	40	43
Income before taxes (dollars)	21086	12289	22401	24000	28953	26837	26105
Average weekly per person food expenditure:				DOLLARS			
Red meats	2.56	1.99	3.16	2.85	2.39	2.37	2.09
Fish & Seafood	0.43	0.51	0.50	0.48	0.38	0.32	0.33
Households purchasing in a week:				PERCENT			
Red meats	43.7	23.2	47.3	52.3	55.9	61.3	65.1
Fish & Seafood	27.9	16.4	27.6	33.1	37.8	38.3	41.7

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 34-51.

TABLE VI

HOUSEHOLD SIZE, 1984: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Household Size (members)					
		One	Two	Three	Four	Five	Six or More
Household characteristics:							
Mean Age of householder (years)	46	49	51	43	39	40	42
Income before taxes (dollars)	23547	13549	24797	28645	31407	29589	27540
Average weekly per person food expenditure:				DOLLARS			
Red meats	2.38	2.07	2.44	2.52	2.56	2.09	1.77
Fish & Seafood	0.51	0.45	0.54	0.54	0.38	0.37	0.85
Households purchasing in a week:				PERCENT			
Red meats	42.9	22.9	44.2	51.1	58.2	57.7	55.9
Fish & Seafood	27.6	14.1	27.5	34.3	36.9	39.6	40.5

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 34-51.

From 1982-1984, the average total, weekly food expenditure rose 4.6% with at-home food expenditures rising 3.1%. A greater percentage increase, however, was reported in households with three and six or more members, increasing 11.1% and 12.5% respectively. From 1982-1984, the average, total weekly expenditure for red meats fell 7.1%, from $2.56 per person to $2.38. Although slight increases were reported in single and four member households, large decreases were seen in two (22.7%), three (11.5%), five (11.8%) and six (15.3%) member households. During this same period, total weekly expenditures for fish and seafood increased 18.6% over all household sizes. Six or more and five member households showed the greatest increases with 157.5% and 15.6%, while single member households showed a decrease of 11.7% in weekly expenditures for fish and seafood.

Accompanying the decrease in average, weekly red meat expenditures was a decline of Ø.8% in the total households purchasing red meat each week (Tables V and VI). Households with six or more members recorded the greatest percentage decline, 9.1%, while households with four members showed an increase of 2.3%. Although fish and seafood expenditures, on the average, rose 18.6% from 1982-1984, the total households purchasing these items in a week fell Ø.3%. The only households reporting an increase in purchasing activity were the three and five member households with 1.2% and 1.3% respectively.

Income

The consumer consumption process is dependent upon an individual's level of personal income. The decisions to rent or buy a home; go to a movie or rent a videotape; buy or lease a second car, these behavioral patterns assist in constructing an individual's overall consumption process, and each is uniquely dependent on the level of disposable personal income (DPI) of the individual.

Income has been shown to be an important determinant of red meat, fish, and seafood consumption (Blaylock, 1983). During the fourth quarter of 1986, the nation's DPI climbed to $2.9 trillion, 8.8% higher than in 1984. Personal Consumption Expenditures (PCE) totaled 93% of DPI, or $2.7 trillion (National Food Review, 1987).

During the fourth quarter of 1986, consumers continued to spend more on food. Food price increases of 0.3% and higher DPI boosted total food expenditures to $437 billion, 5% above a year earlier.

Food expenditures amounted to 14.7% of DPI, with 10% ($297 billion) spent for food-at-home and 4.7% ($139 billion) for food away-from-home. Expenditures for food at home made up over 68% of the PCE for food (National Food Review, 1987).

The degree to which a household adjusts its at-home meat consumption to changes in its income varies widely among meat products. When an increase in household income is experienced, positive responses are found for those items

which are typically higher priced, while negative responses are found for lower priced items (Blaylock, 1983). For example, Blaylock reported that a 1% increase in income is found to be associated with a Ø.Ø% increase in at-home beef consumption and a Ø.12% increase in at-home fish and shellfish consumption. This same 1-percent increase in income, however, is associated with a Ø.Ø4% decline in at-home poultry consumption, and a Ø.Ø6% decline in at-home pork consumption. In addition to showing how households would respond to changes in income, Blaylock reported that higher income households eat more of the higher priced meats and less of the lower priced meats than do the lower income households.

The consumption of red meats, fish and seafood by the lower income households reflects the associations of demand elasticity, which implies that the demand for a given quantity of a good is determined by three factors: the price of that good, the price of every other good, and the amount of DPI available (Craven, et al., 1983).

The elasticity measures which seem to govern meat consumption pattern of low income households include own-price, cross-price, and income elasticity. Own-price elasticity refers to the percentage change in quantity demanded for a good when that good experiences a 1% price increase. Cross-price elasticity refers to the percentage change in quantity demanded when other similar goods experience a 1% price increase. Income elasticity refers to

the quantity of a good purchased in relation to a 1% increase in income.

Low income households and higher income households place varying degrees of emphasis on the types of meats consumed and the price for which meat expenditures are allocated. However, it is reported, that, meat consumed from home supplies - eaten at home or prepared at home and eaten elsewhere is virtually the same on a per person basis, regardless of income (Blaylock, 1983). This analysis of total meat consumption suggests that when household incomes go up or down, consumers make greater adjustments in food eaten away from home than for food eaten at home. This theory is supported by studies which found that a 10-percent increase in consumer's income results in a 5.5 -11.6% rise in the role of meals and snacks away from home, assuming there are no changes in other (Putnam, et al., 1984; National Food Review, 1987).

Tables VII and VIII list the average weekly per person food expenditures of urban households during 1982-1984 classified according to income class. Tables VII and VIII also describe the percentage of urban households purchasing food items in a week during 1982-1984, classified according to income class. In 1982, the mean income before taxes was $21,086 over all income classes with a mean 1.3 earners per household. The average weekly per person food expenditures for red meats, fish and seafood were $2.56 and .43 respectively. The under $5,000 income class reported the

TABLE VII

INCOME CLASS, 1982: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Income Class						
		Under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $29,999	$30,000 to $39,999	$40,000 and Over
Household characteristics:								
Earners per household (number)	1.3	0.6	0.7	1.1	1.3	1.6	1.9	2.1
Average weekly per person food expenditure:					DOLLARS			
Red meats	2.56	1.81	2.22	2.55	2.80	2.71	2.67	3.08
Fish Seafood	0.43	0.35	0.36	0.44	0.42	0.41	0.46	0.60
Households purchasing in a week:					PERCENT			
Red meats	43.7	27.5	37.6	46.1	46.3	50.7	51.7	54.0
Fish & Seafood	27.9	15.3	23.8	31.1	28.9	32.8	33.2	36.7

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 124-141.

TABLE VIII

INCOME CLASS, 1984: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Income Class						
		Under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $29,999	$30,000 to $39,999	$40,000 and Over
Household characteristics:								
Earners per household (number)	1.4	0.7	0.6	1.1	1.3	1.6	1.9	2.1
Average weekly per person food expenditure:					DOLLARS			
Red meats	2.38	1.84	2.15	2.43	2.51	2.41	2.46	2.70
Fish & Seafood	0.51	0.32	0.45	0.42	0.48	0.51	0.41	0.58
Households purchasing in a week:					PERCENT			
Red meats	42.9	27.2	37.3	44.0	45.7	45.0	50.9	51.1
Fish & Seafood	27.6	15.6	23.8	24.6	27.4	28.0	34.4	36.8

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 124-141.

least weekly food expenditures for both red meats, fish and seafood, while the $40,000 and over income class reported the greatest weekly food expenditures for both items. Table XIII illustrates that, in 1982, weekly food expenditures for red meats, fish and seafood increased as the total household income increased.

In 1984, the mean income before taxes was $23,547 over all classes, an increase of 11.6% from 1982. The greatest changes in income were reported by households earning under $5,000, which decreased 6% and households earning $40,000 and over which increased 4.9%. No significant change in total income was observed among the other income classes. From 1982-1984, average weekly per person food expenditures for red meats fell 7.0% while expenditures for fish and seafood rose 18.6%. Decreases in weekly expenditures for red meats were observed in all income classes except those households earning under $5,000, which reported an increase of 1.6%. The largest percentage decline in weekly red meat expenditures was found in the income class $40,000 and over (12.3%), while the $15,000 and $20,000 income classes also showed significant declines, 10.3% and 11.0% respectively. From 1982-1984 weekly expenditures for fish and seafood rose 18.6%, however, varied results were seen among the income classes. Four of the seven income classes reported decreases in weekly expenditures for fish and seafood with the income classes under $5,000 and $30,000 showing the largest declines, 8.6% and 10.8%. The income classes

$5,000, $15,000, and $20,000, on the other hand, showed significant increases which offset the declines reported among the other income classes (25%, 14.2%, and 24.4% respectively).

In 1982, the percentage of urban households purchasing red meats, fish and seafood weekly were 43.7% and 27.9% respectively. In 1984, the percentage of urban households making weekly purchases had declined 0.85% and 0.3% respectively. Decreases in weekly household purchases for red meats were recorded in all income classes with the largest declines, 5.7% and 2.9%, reported by those households earning $20,000 and $40,000 respectively. Although fish and seafood expenditures rose from 1982-1984, the total percentage of households making weekly purchases fell. Only three of the seven income classes showed increases in weekly household purchases, with the income class $30,000 recording the largest increase in households making weekly purchases, 1.2%. The most significant decreases in weekly household purchases of fish and seafood were recorded by the income classes $10,000 and $20,000 which recorded declines of 6.5% and 4.8% respectively.

Geographic Location

Total at-home meat consumption varies little among regions (Blaylock, 1983). The difference between per person consumption in the Northeast and the West, the highest and lowest consumption regions respectively, is 10 percent. But

large relative differences were found in the per person consumption of fish and seafood. Fish consumption is highest in the South where the average weekly per person consumption is Ø.44 pounds, 13% higher than the Northcentral region. Households living in the West have recorded an average weekly per person home fish consumption of Ø.35 pounds.

Substantial variation in the amount of meat prepared or consumed at home exists, on a per capita basis, according to the degree of urbanization of a household (Blaylock, 1983). Households residing in a central city, suburban, and nonmetropolitan areas were surveyed, by Blaylock, to determine whether total weekly meat consumption was independent of household location. Blaylock's results indicated that households residing in a central city consumed, on the average, 4.86 pounds of total meats per week, 7% more meat than their suburban neighbors and 9% higher than nonmetropolitan households. The largest disparity in meat consumption from the different locales existed for fish and seafood consumption. Households located within the central city were reported as consuming the most fish and seafood per wee, Ø.43 pounds, while suburban and nonmetropolitan areas recorded significant differences, 13% and 24% less than central city households respectively.

Table IX lists the average weekly per person food expenditures of urban household for 1982-1984 classified

TABLE IX

REGION AND CITY SIZE: 1982, 1984: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES OF URBAN HOUSEHOLDS

Item	All	SMSA			
		North-east	Mid-west	South	West
Average weekly per person food expenditure:			DOLLARS	1982	
Red meats	2.56	2.71	2.51	2.52	2.51
Fish & Seafood	Ø.43	Ø.54	Ø.33	Ø.4Ø	Ø.5Ø
Average weekly per person food expenditure:			DOLLARS	1984	
Red meats	2.38	2.53	2.56	2.31	2.34
Fish & Seafood	Ø.51	Ø.69	Ø.36	Ø.58	Ø.48

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 52-6Ø.

TABLE X

REGION AND CITY SIZE: 1982, 1984: PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	SMSA			
		North-east	Mid-west	South	West
Households purchasing in a week:			PERCENT 1982		
Red meats	43.7	43.8	42.7	43.2	46.9
Fish & Seafood	27.9	32.9	24.4	26.Ø	32.2
Households purchasing in a week:			PERCENT 1984		
Red meats	42.9	42.7	43.7	42.3	43.2
Fish & Seafood	27.6	32.8	23.9	25.3	3Ø.3

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 61-69.

according to region and city size. Table X lists the percentage of urban households purchasing food items in a week from 1982-1984 classified according to region and city size.

In 1982, the average weekly per person food expenditure for red meats was $2.56 for all regions. The Northeast region recorded the greatest weekly red meat expenditure, $2.71 per person, while the other reported regions allocated approximately 7.4% less for total red meats. During this same year, wide variations in weekly expenditures for fish and seafood existed among the regions under study. The average weekly fish and seafood expenditure for all regions was $0.43 per person, with the Northeast and the Midwest reporting the highest and lowest allocations per person respectively, $0.54 and $0.30.

From 1982-1984, average weekly food expenditures for red meats decreased 7.0%. All reported regions, except the Midwest, showed significant differences in per person allocations for red meats, with an average decline of 7.2%. The South recorded the largest decline in weekly red meat expenditures, 8.3%, while red meat expenditures increased 2% in the Midwest. Significant changes were also reported for the average weekly expenditures for fish and seafood. An average increase of 18.6% was reported for all regions, with the South, Northeast, and Midwest all recording significant

increases, 45%, 27.7%, and 9.Ø% respectively. The West, however, represented a 4.Ø% decrease in weekly expenditures for fish and seafood.

Accompanying the decrease in average weekly red meat expenditures was a Ø.85% decrease in total households purchasing red meat in a week. The West region recorded the largest percentage decrease, 3.7%, while the total households purchasing red meat in a week increased 1.Ø% in the Midwest. From 1982-1984, decreases were observed in all regions for total households purchasing fish and seafood in a week. Despite an 18.6% rise in weekly fish and seafood expenditures, the percentage of total households purchasing fish and seafood dropped Ø.3% with households in the West reporting the greatest percentage decline, 1.9%.

Season

Season of the year is an important variable in determining the overall consumption pattern of households purchasing red meats, fish and seafood. Expenditure studies using season as a variable in determining consumption patterns are available, however, researchers fail to discuss the implications that may be present. It is possible that during the Spring season, overall expenditures and consumption of fish and seafood may be high due to lower availability of red meat products accompanied by higher prices, and by the religious observance of Lent. It may also be possible, that fish and seafood consumption may be

highest in the Summer season, but reflected by low weekly expenditures, due to the availability of fish products from personal fishing ventures. In trying to evaluate consumer consumption patterns, the more variables that can be isolated and measured will yield a more reliable and accurate representation of the behavior under study.

Table XI lists the average weekly per person food expenditures, for red meats, fish and seafood, of urban households from 1982-1984 classified according to season. Table XII lists the percentage of urban households purchasing red meats, fish and seafood in a week from 1982-1984 classified according to season.

In 1982, average weekly food expenditures for red meats, fish and seafood were highest during the same seasons, spring and fall, with the lowest weekly allocations for fish and seafood occurring during the summer season, $Ø.37 per person.

From 1982-1984, average weekly food expenditures for fish and seafood significantly rose during all four seasons while red meat expenditures experienced significant declines in the spring and fall seasons, 14.5% and 15.1% respectively. The winter and fall seasons contributed increases of 34.1% and 23.5% respectively, whereas, the overall increase in fish and seafood expenditures was 18.6%.

From 1982-1984 an overall decrease of Ø.85% and Ø.3% was reported for percentage of households purchasing red meats, fish and seafood in a week. Decreases in household

TABLE XI

SEASON: 1982, 1984: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES OF URBAN HOUSEHOLDS

Item	All	Season			
		Winter	Spring	Summer	Fall
Average weekly per person food expenditure:			DOLLARS	1982	
Red meats	2.56	2.43	2.69	2.41	2.71
Fish & Seafood	Ø.43	Ø.41	Ø.42	Ø.37	Ø.51
Average weekly per person food expenditure:			DOLLARS	1984	
Red meats	2.38	2.51	2.3Ø	2.45	2.3Ø
Fish & Seafood	Ø.51	Ø.55	Ø.45	Ø.4Ø	Ø.63

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 70-78.

TABLE XII

SEASON: 1982, 1984: PERCENTAGE OF URBAN HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Season			
		Winter	Spring	Summer	Fall
Households purchasing in a week:			PERCENT 1982		
Red meats	43.7	44.1	44.8	42.5	43.6
Fish & Seafood	27.9	27.4	30.0	26.8	27.2
Households purchasing in a week:			PERCENT 1984		
Red meats	42.9	45.0	42.5	41.9	41.9
Fish & Seafood	27.6	31.5	27.6	26.2	25.3

Source: Smallwood, D.M., Blaylock, J.R., et al. (July, 1987). Food spending in American households, 1982-1984. USDA, ERS, SBN 753: Washington D.C., 70-78.

red meat purchases were observed in all seasons except winter, where a slight Ø.85% increase was reported. Decreases in household purchases of fish and seafood were also observed in all seasons except winter, where an increase of 4.1% was recorded. It is interesting to note, that, although weekly expenditures for fish and seafood rose significantly from 1982-1984, the average percentage of urban households purchasing fish and seafood fell Ø.3% during this same time period.

Other Variables of Interest

Other variables are present that may affect the overall consumer consumption process for fish and seafood. Studies show that consumer unfamiliarity, cost, offensive nomenclature, and inexperience in preparing fish are major contributors for the under utilization of fish and seafood products (Madeira, 1985). Other factors affecting frequency of fish preparation include taste, texture, odor, lack of availability, the and/or form preferred, and not thinking to prepare it. These factors, however, do not rate as highly as the previously mentioned contributors.

Madeira and Penfield conducted a survey in which 39 panelists were asked to respond to a questionnaire that asked for various demographical data, frequency of use and familiarity with fish, and availability of various types of ovens for fish preparation. Results indicated that: a) 8Ø% of the respondents prepared fish at least three times per

month, b) the most widely used method of preparation was the conventional oven (65%), c) baking and broiling were most desired cooking methods for fish (69% and 72% respectively), and d) flounder and salmon appeared to be the fish most preferred for at home preparation, with at least 59% of the respondents stating that they have prepared these species.

Table XIII lists the primary reasons for not preparing fish more frequently at home as reported by the 39 respondents. As indicated in the table, 41% of the respondents indicated cost as one of the primary reasons for not preparing fish more often, with 54% of the respondents not preparing fish more frequently due to lack of available preferred species.

The remainder of this review will investigate and discuss the biological composition of fish and seafood species and how these determinants reflect upon the health advantages associated with fish and seafood consumption. The effects of processing techniques and cooking methods will also be discussed.

Lipid and Fatty Acid Content of Important Finfish

The total lip content, fatty acid composition, and cholesterol content of fish and seafood products may vary widely. These variations are due to many factors, including species differentiation, seasonal variation, seasonal trends in fat metabolism, reproductive cycles, food availability,

TABLE XIII

PRIMARY REASONS FOR NOT PREPARING FISH MORE FREQUENTLY AT HOME AS REPORTED BY 39 RESPONDENTS

Reason [b]	% of Respondents [a]
Other	59
Kind and/or form I like not readily available	54
Cost too much	41
Don't think of it	41
Unfamiliar with ways to prepare fish	28
Unfamiliar with fish, generally	23
Don't like its taste and/or texture and/or color	18

[a] Percentages add up to more than 100% because some respondents gave more than one response.

[b] Reasons most frequently included in this category by respondents was that others living in the same household did not like fish and/or the method of preparation that respondents did.

Consumption and use of fresh and frozen fish as reported by a consumer panel. (1985, Jan/Mar). Tennessee Farm and Home Science, 6-7.

and geographic location (Exler, et al., 1975; Krgynowek, et al., 1985). Table XIV lists the most common fatty acids found in marine and freshwater fish and their usual range expressed as weight percent. This table, along with Table XV, is included herein to enable the reader to actually see the differences in total lipid content, fatty acid composition, and cholesterol content of various fish and seafood species.

The season of the year is a generic variable that is responsible for catalyzing biochemical and environmental processes that play a major role in determining total lipid and fatty acid composition. The season of the year is directly related to fat metabolism cycles, reproductive cycles and the availability of food in the environmental surroundings.

In the summer and fall, when the food supply is plentiful, the fat fish (which store triglycerides in their flesh) are reported to have a maximum total lipid content. Total lipid decreases in fall and winter to a minimum value in late winter and then begins to rise in the spring.

Total lipid content is also affected by the reproductive cycle of each species. Herring, for example, have their lowest total lipid concentrations prior to and during spawning, with their highest concentrations during the months of active feeding. Heat-loving fish, however,

TABLE XIV

USUAL RANGE OF FATTY ACIDS AS WEIGHT PERCENT IN MARINE AND FRESHWATER FISH SPECIES

Fatty acid [A]	Marine fish	Freshwater fish
4:0	-	-
6:0	-	-
8:0	-	-
10:0	-	-
12:0	-	-
14:0	2-8	2-6
16:0	10-30	10-20
18:0	2-6	3-4
20:0	-	-
14:1	-	-
16:1	2-11	7-11
18:1	12-28	18-28
18:2	1-3	4-6
18:3	0.5-1.2	3-5
18:4	0.7-4	1-2
20:1	1-10	1-3
20:4	0.5-4	2-4
20:5	6-14	5-7
22:1	1.5-9	0.5-3
22:5	0.6-3	2.5-4
22:6	8-20	8-20

[A] Carbon atoms: double bonds.

Source: Exler, et. al. (May, 1975). Lipids and fatty acids of important finfish: new data for nutrient tables. Journal of the American Oil Chemists Society, 52, 154.

TABLE XV

COMPARISON OF CALORIES, OMEGA-3 FATTY ACID CONTENT, FAT AND CHOLESTEROL IN SELECTED FISH

Fish (98 grams raw fillet)	Calories	Omega-3 Fatty Acid Content (grams)	Fat * (grams)	Cholesterol (milligrams)
Albacore tuna	170	1.3	7.2	55
Atlantic herring	150	1.6	8.0	60
Atlantic Mackerel	175	2.5	10.7	80
Bluefin tuna	160	1.5	6.1	40
Brook trout	110	0.4	2.5	70
Dungeness crab	87	0.38	1.2	60
Flounder	85-95	0.2	1.2	50
Gulf brown shrimp	100	0.18	0.8	140-160
Haddock	85	0.2	$\leq$ 1	65
Lobster	100	0.27	1.2	70-95
Northern pike	85	0.1	$\leq$ 1	40
Ocean perch	105	0.2	2.8	40
Pacific halibut	105	0.4	2.2	30
Rainbow trout	130	1.1	5.8	55
Red Snapper	110	0.2	1.2	40
Skipjack tuna	130	0.4	2.7	45
Sockeye salmon	160	2.7	7.9	35
Sole	75-90	0.1	1.3	50
Striped bass	95	0.8	2.2	80
Yellowfin tuna	125	0.6	2.5	45

*: Varies widely with species, geographic location, season, analysis and other factors. Fat content usually higher in dark meat portions.

Source: Safeway's Nutrition Awareness Program. (September/October 1987). Fish and seafood. Foods Unlimited, 5 (5), 2-3.

are reaching their highest total lipid concentrations during spawning and maintaining low lipid concentrations just prior to sexual maturation.

The environmental temperature differences also influence the amount of total lipid deposited within a species. Heat-loving fish range from 5-6% while cold-loving fish range from 16-24%.

Processing techniques utilized by industry (Krgynowek, 1985), and location of fish/seafood portions (Exler, et al., 1975) will also contribute to variations in total lipid content, fatty acid composition, and cholesterol content. In a study conducted by Krgynowek, et al, the effects of four different processing techniques were evaluated in determining their effect on, if any, the content of total lipid, fatty acids and cholesterol. The four processing techniques used included, the hand picked method, the roller method, the brine method, and the Baader method. The seafood products were pasteurized and sterilized. The contributions from each of the processing techniques were measured over a period of storage time. The results showed that the type of processing technique used did have a significant effect on the total amount of fatty acids available, and the total cholesterol content. The effect of storage on the quantity of fatty acid methyl esters (FAME) and cholesterol also showed significant increases when compared to the fresh (zero storage time) product. These

results led the researchers to hypothesize the possible occurrence of enzymatic reactions. However, further research is needed to confirm this belief.

The location of the fish/seafood portion can also contribute to the variability in total lipid content, fatty acid composition and cholesterol content. Thick steaks ahead of the dorsal fin, the lateral line tissue, and the belly flap are areas generally higher in total lipid content than the relatively lean white muscle. Table XVI illustrates the variability of total lipid content from different portions of selected fish.

TABLE XVI

TOTAL LIPID CONTENT OF STEAKS FROM DIFFERENT PORTIONS OF FISH

Fish	Total Lipid (percent of sample)	
	Thick Steak	Tail Steak
Cod	Ø.96	1.15
Atlantic halibut, whole	3.1	1.2
Atlantic halibut, dark	8.5	3.9
Pink salmon	4.3	2.4
Coho salmon	7.76	3.41
Atlantic mackerel, winter	18.8	12.6
Atlantic mackerel, summer	3.2	4.9

Source: Exler, et al. (May, 1975). Lipids and fatty acids of important finfish: New data for nutrient tables. Journal of the American Oil Chemists Society, 52, 155.

The type of cooking method used in preparing fish and seafood products can also contribute to the total lipid content, fatty acid composition, and cholesterol content of the final product (Gall, et al., 1983). In a study by Gall, et al., the effects of baking, broiling, deep frying, and microwave cooking were analyzed for their possible contribution on the proximate and fatty acid composition of grouper, red snapper, Florida pompano and Spanish mackerel. The lipid content of raw fillets from the four species ranged from less than 1% in the lean species grouper to almost 14% in the fatty species Spanish mackerel. The results showed that the changes observed in the amount of total lipid present in cooked fillets appeared to be directly related to the original lipid content of the raw fillet. Although moisture was lost in all four cooking methods, baking, broiling, and microwave cooking had no significant effect on the amount of total lipids present in the cooked fillet. Deep frying, however, contributed significantly to the amount of total lipids present. This was attributed to the significant amount of lipid that was absorbed from the soybean cooking oil medium. A greater percentage of absorbed lipid was observed in the leaner species grouper with significant, but lesser amounts, being absorbed by species with increasing lipid content (from the original raw fillets). Spanish mackerel, a fatty fish, showed an apparent net loss of lipid into the cooking medium. The results obtained by Gall, et al., thus

indicates that the amount of absorption of lipid from cooking in oil decreases as the lipid concentration in the raw fillet increases until a saturation level is reached where there is no net absorption or elution of lipid. As the lipid content increases further there appears to be a net loss of lipid to the cooling oil. A further increase in the absorption of lipid from the cooling medium would be seen if breading was present.

The results obtained in evaluating fatty acid composition from the four cooking methods paralleled the results shown for total lipid content. Baking, broiling, and microwave cooking showed no significant difference in the concentrations of fatty acids or in the fatty acid profile. Deep frying, however, significantly lowered the EPA, DHA, and predominantly shorter chain saturates while increasing the incorporation of the major fatty acids found in the soybean oil (19:1, 18:2, 18:3, 20:1). Once again, the results showed greater significance with the leaner species, grouper, than the fatty fish, Spanish mackerel.

Nutritional Significance of Omega-3 and Other Polyunsaturated Fatty Acids

Alpha-linolenic acid (18:3n-3) and its derivatives eicosapentanoic acid (EPA; 20:5n-3) and docosahexanoic acid (DHA; 22:6n-3) are at the center of much research and debate (Herold, et al., 1986; Phillipson, et al, 1985; Houwelingen, et al., 1987: Bjerve, et al, 1987). These polyunsaturated fatty acids (PUFA) of the omega-3 (n-3) class have been receiving much attention as possibly lowering the risk factors associated with ischemic cardiovascular disease (CVD) in man (Bjerve, et al., 1987; Houwelingen, et al., 1987; Herold, et al., 1986).

EPA, DHA and other omega-3 fatty acids were found to be protective factors against coronary heart disease (CHD) and thrombosis in Greenland Eskimos (Dyerberg, et al, 1978; Idem, 1979; Bang, 1972). The n-3 fatty acids displaying this protective measure were found in large quantities in the Eskimo diet which consists largely of seal, whale, and fish. The Eskimo diet differs from the average American diet in at least two ways. First, it is lower in saturated fatty acids. Second, the primary polyunsaturated fatty acids in the Eskimo diet are of the omega-3 family; largely, EPA and DHA, rather, than linoleic acid (18:2n-6) which is the predominant fatty acid in the American diet.

Linoleic acid is the primary PUFA found in vegetable oils, such as corn and safflower oils. This omega-6 fatty acid has been shown to lower concentrations of plasma

cholesterol and low-density lipoproteins (LDL's) in normal subjects, but only omega-3 rich oils were found to decrease levels of plasma triglycerides and very-low-density lipoproteins (VLDL's) (Herold, et al., 1986; Dyerberg, et al., 1978; Bronsgeest-Schoute, et al., 1981).

Omega-3 fatty acids have also been shown to inhibit thrombotic eicosanoid thromboxane synthesis (Hearn, et al., 1987); increase production of prostacycline (Hearn, et al., 1987); decrease production and anti-aggregatory properties of serum platelets with concomitant increase in bleeding time (Houwelingen, et al., 1987; Herold, et al., 1986; Bronsgeest-Schoute, et al., 1981); and increase high-density lipoprotein (HDL) cholesterol concentration (Herold, et al., 1986; Dyerberg, et al., 1978; Bronsgeest-Schoute, et al., 1981).

Membrane Lipid Composition, Cellular Function, and Metabolism of Omega-3 Fatty Acids

Before proceeding further into the studies that have utilized dietary n-3 supplementation, it is necessary for the reader to have a fundamental background in the area of membrane lipid composition, cellular function and metabolism of n-3 fatty acids. This review will help in understanding how omega-3 PUFA's may play a role in reducing the risk factors associated with CVD.

Membrane Lipid Composition

Cell membranes, of most mammals, consist of a lipid bilayer composed primarily of phospholipids (PL) and cholesterol. Proteins that have important cellular functions, such as receptors, transporters, and enzymes are also located within the lipid bilayer. The PL components comprising the lipid membrane include phosphotidycholine and phosphotidylethanolamine with minor proportions of phosphotidyl-inositol, phosphotidylserine and sphingomyelin. The lipid composition, but especially the fatty acid composition of the membrane lipids, will vary among biological membranes. The fatty acid composition of the membrane is susceptible to change according to dietary modification as well as to various biochemical factors including changes in temperature, availability of fatty acids in the fatty acid pool, and synthesis of fatty acids (structure: cis versus trans).

The polar part of the lipid molecules is located in the outer perimeter of the bilayer with the nonpolar tail pointing toward the interior. Both the polar heads and hydrocarbon tails of the phospholipid molecules play an important part in determining the structure and chemical properties of the lipid bilayer.

Distribution of (n-3) Fatty Acids in Animals

The (n-3), as well as (n-6), fatty acids that appear in the lipid membrane must be supplied from the diet or from precursors in the diet, because the synthesis of their precursor forms 18:3n-3 and 18:2n-6, has not been detected in mammals. The basic precursor forms are found predominantly in plant products (i.e., vegetable sources), whereas, desaturation-elongation products of these precursors are made available in animal products.

18:3n-3 fatty acids are commonly found as constituents of triglycerides and cholesterol esters. 18:3n-3 fatty acids seem to be mainly associated with storage and transport form of lipids.

20:5n-3 is most commonly found in membrane structures of marine animals. 20:5n-3 fatty acids are constituents of cholesterol esters, triglycerides and phospholipids. In mammals, 20:5n-3 can appear in membranes, however, their presence is mainly associated with storage and transport capacities.

22:6n-3 fatty acids are strongly concentrated in the phospholipid structure of mammals and very little is found in triglycerides or cholesterol esters. Thus, the function or presence of 22:6n-3 is mainly associated with the polar lipids of membranes.

The distribution of the n-3 fatty acids also varies among organs within a species. For example, in mammals,

22:6n-3 is found in the highest concentrations in brain phospholipids while in marine animals n-3 fatty acids are abundant in all lipid classes.

Brain. In the human brain, the main n-3 fatty acid present is DHA (22:6n-3), with EPA (20:5n-3) being almost excluded. The 22:6n-3 present in the brain is concentrated in the ethanolamine and serine phospholipids and is much higher in phospholipids of the gray matter than in the white matter.

The lipid composition and concentration of 22:6n-3 in the brain changes during development. The concentration of 22:6n-3 is negligible after twelve weeks of fetal development, whereas, in the adult brain the concentration of 22:6n-3 accounts for approximately 34% of total fatty acids.

The percentage of 22:6n-3 in ethanolamine and serine phospholipids, in respect to the gray and white matter, also changes during human development. The percentage of 22:6n-3 in ethanolamine increases with age in the gray matter (11%-12 week fetus; 34% - adult), whereas, the percentage of 22:6n-3 in the white matter decreases with age (16%-newborn; 3-9% - adult). Ethanolamine and serine phospholipids together account for 42-56% of total phospholipid in cerebral brain tissue, depending on age.

Oligodendroblastoma, a pathological condition characterized by elevated levels of 22:6n-3 and abnormally

low levels of 20:4n-6 in cholesterol esters of the white matter displays the importance that the omega-3 fatty acids may play in normal brain function (Alling, et al, 1969).

Retina. Phospholipids in human, whole retina include 43-48% choline, 30-35% ethanolamine, 7-10% serine, and 4-6% inositol phospholipids. In whole retinas, 22:6n-3 was the most abundant n-3 fatty acid found, accounting for 13-32% of total fatty acids in serine and ethanolamine phospholipids.

Testis and Spermatozoa. The phospholipids of spermatozoa all contain a 22-carbon fatty acid as the main PUFA. This 22-carbon fatty acid is 22:6n-3.

Adipose Tissue. The availability of n-3 and n-6 fatty acids in adipose tissue is dependent on a number of variables. The main determinant of lipid composition in adipose tissue is the amount and type of fatty acid available in the diet. Age, sex, living conditions, and genetic background are also variables in determining adipose tissue lipid composition.

The lipid composition of marine animals is an excellent example of how diet can influence lipid composition of an organism. Fish, plankton, and seaweed are excellent sources of long-chain polyunsaturated fatty acids. Fish, plankton, and seaweed also comprise the main diet of animals living in or near the sea. Thus, marine animals are excellent dietary sources for 22:6n-3 and 20:5n-3 PUFA's.

Membrane Lipid Modification

The fatty acid composition of cell membranes can be modified by alterations of phospholipids, sphingolipids, cholesterol, and triglycerides. The main mechanism of lipid modification appears to be fatty acyl substitution, although other mechanisms may exist (Holman, 1986; Spector, et al., 1985). Tinoco, et al., and Spector et al., have altered the fatty acid composition of cell membranes utilizing medium supplementation and incubation techniques. Using these techniques, the linoleic content of cells, along with alpha-linolenic, EPA, DHA, and arrachidonic acid (AA), can be raised or lowered by supplementation of a medium with specific fatty acids (Spector, et al., 1985). Phospholipid composition can also be modified by altering the availability of compounds used to form the polar heads (Glaser, et al., 1974). These modifications are dependent on the time of exposure to the supplemental fatty acid and its concentration.

As stated earlier in the text and exemplified by marine animal lipid composition, significant changes in lipid composition of cell membranes can be achieved through dietary intake of specific fatty acids. This form of fatty acid supplementation allows for an increase in the fatty acid pool of the desired fatty acyl units that are then available for fatty acid synthesis and incorporation in cell membranes.

Membrane Function: The Role of Omega-3 and other Polyunsaturates

At the present time, no specific membrane functions have been assigned to any of the n-3 fatty acids in warm-blooded animals. However, the structural characteristics of n-3 and other polyunsaturates, which make up the membrane, may impose specific membrane conformational states leading to altered membrane function (Seeling, et al., 1977; Ladbrooke, et al., 1969; Brenner, et al., 1981; Mabrey, et al., 1977; Tinoco, 1981). The structural characteristics associated with the n-3 and other polyunsaturates that may lead to functional changes in the membrane include: a) the presence and number of double bonds and b) the configuration of the molecule.

The Presence and Number of Double Bonds. Omega-3 and other polyunsaturates are distinguished from saturated fatty acids by the presence of double bonds located within the structure of the molecule. Placement of the double bonds within the molecule will yield either a cis C-C orientation, a trans C-C orientation, or a gauche C-C orientation. The number of double bonds within the molecule is variable. The location and number of double bonds present, along with the C-C sequence, will designate the specific fatty acid available. Double bonds produce specific effects upon its hydrocarbon chain. They decrease the melting point of the hydrocarbon chain and its parent phospholipid. Double bonds

produce a large variety of possible structural conformations and their presence introduces rigid elements in an otherwise flexible hydrocarbon chain. The number of possible conformations and rigid elements each increase with the increase in double bonds.

The Configuration of the Molecule. The configuration of the hydrocarbon chain is dependent upon the presence and number of double bonds within the structure and the type of double bonds produced (i.e. cis, trans, gauche). As stated earlier, many conformations can exist for each unsaturated acid, due to the flexibility of the C-C chain and the incorporation of rigid units within the molecule.

Omega-3 fatty acids are characterized by the presence of cis double bonds. The incorporation of cis double bonds leads to coiling of the hydrocarbon chain. This coiling is increased by double bonds nearer to the center of the molecule or by an increased number of double bonds. The coiling of the hydrocarbon chain has two effects: one, it allows the hydrocarbon chain configuration to resemble an egg, versus a flat, extended configuration for trans and saturated fatty acids; two, coiling allows for further separation of the Sn-1 and Sn-2 chains in the lipid bilayer. Thus, omega-3 fatty acid molecules can be bent, kinked, partially extended, or coiled.

Based on structural characteristics of n-3 and other polyunsaturates, two of the most understood modifications of membrane functions involve membrane fluidity and gel-liquid

crystalline phase transition (Brenner, 1984; Seelig, et al., 1977). The effect on membrane fluidity by n-3 and other cis polyunsaturates is largely a result of molecular conformation. As previously mentioned, cis polyunsaturates are capable of assuming a coiled conformation. This coiling allows for a separation of the Sn-1 and Sn-2 side chains of the phosphoglyceride. The separation of hydrocarbon chains is important in altering the "packing" density of the membrane. This would decrease the packing of the membrane making it more fluid, enlarging its surface, and reducing its thickness. In contrast, trans-unsaturated and saturated fatty acids have an extended conformation which allows for more dense packing. The increased fluidity of the membrane allows for increased molecular motion in the hydrophobic portion of the membrane.

The incorporation of cis double bonds has also been shown to lower the transition temperature (Tt) of the gel-liquid crystalline phase transition of biological membranes (Ladbrooke, et al., 1969, Sackmann, et al., 1973). This result is due largely to the disruption in the packing of the hydrocarbon chains which causes the chains to contract and the Van der Waals forces to diminish. In contrast, the Tt of the lipid bilayer can be increased by the incorporation of trans and saturated fatty acids.

Membrane lipid composition does seem to be a factor in determining membrane function, however, the lipid composition of the membrane also seems to be a factor in

many cellular functions. The exact mechanisms of action are not fully understood. Some of the cellular functions undergoing investigation are carrier-mediated transport mechanisms (Burns, et al., 1979; Yorek, et al., 1984), activities and properties of membrane bound enzymes (Malkiewicz-Wasowicz, et al., 1977; Sinha, et al., 1977), properties of membrane receptors (Ginsberg, et al., 1982; Ginsberg, et al., 1982(A)), prostaglandin production (Kaduce, et al., 1982; Denning, et al., 1982), and cell growth (Spector, et al., 1979; Spector, et al., 1982).

Omega-3 Supplementation: Metabolism and Cellular Interaction

Research involving the use of omega-3 fatty acid supplementation is being conducted in many laboratories (Phillipson, et al., 1985; Simons, et. al., 1985; Bronsgeest-Schoute, et al., 1981; Lee, et al., 1985). This intensive effort in determining the physiological functions of n-3 fatty acids has been generated due to findings that an increased consumption of n-3 fatty acids may lead to lower risks of coronary heart disease (Herold, et al., 1986; Fehily, et al., 1983; Fehily, et al, 1982; Kromrout, et al., 1985). The relationship between n-3 consumption and CHD was first observed in Greenland Eskimos, who have significantly lower deaths attributed to CHD than Western civilizations, and whose diet consists largely of marine animals (rich in n-3 PUFA), (Bang, et al., 1980). Compared to subjects who

consume Western diets, Greenland Eskimos had lower triglyceride, cholesterol, low-density lipoprotein, and very low-density lipoprotein levels; they had higher high-density lipoprotein levels; prolonged bleeding time; decreased platelet aggregation; and an increase in n-3 fatty acid incorporation in platelet phospholipids; all factors associated with a decreased risk of CVD (Herold, et al., 1986; Bang (A), et al., 1980). Other physiological factors that appear to be influenced by increased consumption of n-3 fatty acids include modulation of tissue prostagladin synthesizing capacity (Marshall, et al., 1982; Knapp, et al., 1986; Dyerberg, et al., 1978; Herold, et al., 1986); prostacyclin synthesis (Marshall, et al., 1982; Knapp, et al., 1986; Herold, et al., 1986); blood pressure (Houwelingen, et al., 1987; Fehily, et al., 1982); cellular enzyme activity (Houwelingen, et al., 1987; Conroy, et al., 1986); and hemoglobin (Houwelingen, et al., 1987; Herold, et al., 1986).

Triglycerides

Patients with hypertriglyceridemia respond markedly well with n-3 fatty acid (EPA, DPA, DHA) supplementation (Phillipson, et al., 1985). In a study by Phillipson, et al., hypertriglyceridemic patients all had significant decreases (m = 64%) in plasma triglycerides when supplemented with fish oil that accounted for 20-30% of total calories (2600 kcal/day). Triglycerides in VLDL and

chylomicrons showed the greatest degree of change falling from a mean of 216 mg/dl and 443 mg/dl to 55mg/dl and 22 mg/dl respectively. In contrast, when n-6 vegetable oils replaced n-3, slight increases to dramatic increases in plasma triglycerides were noted (increases were from the mean established by n-3 supplementation).

Similar decreases in plasma triglycerides have been reported by Herold, et al., (m = 61%); Bronsgeest-Shoute, et al., (m = 47%, 280 g/day for 2 wk; m = 60%, 20-30g/day for 28 days using hypertriglyceridemics); Simons, et al., (22% in type IIA hyperlipidaemia; m = 28% in type IIb; m = 41% in type IV; m = 63% in type V; Fehily, et al., (m = 6.7%); Kromhout, et al., (no mean value given, just stated).

The most likely reasons for the hypolipidaemic effects reported with n-3 supplementation appear to be the depression of VLDL and LDL synthesis, and increased fecal excretion of steroids (Phillipson, et al., 1985).

Cholesterol: Total, VLDL, LDL, HDL

When evaluating the data presented for cholesterol and the cholesterol fractions in n-3 supplementation studies, one will find much variation and contradiction among researchers. The variations found in representing cholesterol generally include total cholesterol (decrease vs. no significant change), HDL cholesterol (increase vs. no significant change), and LDL cholesterol (increase vs. decrease vs. no significant change). However, reported

literature does seem to agree that VLDL cholesterol does decrease with n-3 supplementation (Herold, et al., 1986; Simons, et al., 1985; Fehily, et al., 1982; Phillipson, et al., 1985).

Total cholesterol. Upon review of the literature, a careful assumption can be made concerning the effect of n-3 supplementation on total cholesterol levels: no significant difference in total cholesterol level was seen in normal, healthy subjects (Kromhout, et al., 1985; Fehily, et al., 1983; Fehily, et al., 1982; Herold, et al., 1986), however, marked decreases in total cholesterol content were seen in hyperlipidaemia patients (Phillipson, et al., m = 27% in type IIB, m = 45% in type V, m = 14% in type III; Simons, et al., m = n.s. in type IIA, m = 3% in type IIb, m = 6% in type IV, m = 26% in type V). A 38% decrease in total cholesterol has also been reported in alpha-linolenate deficient men receiving ethyl-linolenate supplementation (Bjerve, et al., 1987). In the above studies, using normal, healthy subjects, decreases in total cholesterol were only achieved after supplementation using high dosages of MaxEPA indicating the possibility of a dose-response effect.

VLDL and LDL Cholesterol. When evaluating total cholesterol variances in n-3 supplementation studies it is essential to isolate and determine the cholesterol content of the VLDL and LDL lipoproteins. It has been suggested, that, variances in total cholesterol content may be due to

interactions between VLDL and LDL lipoproteins, and/or, mechanisms involving VLDL and LDL lipoprotein synthesis (Phillipson, et al., 1985; Bronsgeest-Schoute, et al., 1981; Herold, et al., 1986). In order to understand the importance of comparing VLDL and LDL content, one must first recognize the sequence of interactions that exist between the lipoprotein components (Linscheer, et al., 1988). The sequence of lipoprotein classes are characterised according to their triglyceride, cholesterol, and apo-protein content. The classes include: chylomicrons --> VLDL --> IDL --> LDL --> HDL. When an individual consumes a carbohydrate and saturated fatty acid rich diet, an increase in the production of chylomicrons and VLDL lipoproteins results. LDL is produced as a result of interactions between HDL_3 and VLDL in which cholesterol esters replace a percentage of triglycerides within the VLDL package. HDL is formed in plasma or in extracellular space as a result of HDL (without apo-protein E) accepting cholesterol from peripheral tissues. Upon examining the sequence of interactions involving lipoprotein production, one would assume that a decrease in VLDL production would concommitantly create a decrease in LDL and HDL synthesis. Herein lies the cholesterol controversy associated with n-3 supplementation.

Present research, utilizing n-3 supplementation, reports many inconsistencies on the effects of VLDL and LDL by the polyunsaturated fatty acids (Phillipson, et al., 1985; Herold, et al., 1986). These inconsistencies stem

from the inability to discriminate the precise mechanism(s) by which dietary fish oils exert an effect on VLDL and LDL synthesis. One mechanism of action, as postulated by Phillipson, et al., cites an increased removal of VLDL from peripheral tissues or by the liver. Their hypothesis states that it is possible that a relative block in the conversion of VLDL to LDL is removed, thus allowing abnormally low LDL levels to rise. However, this assumption was contradicted in a study conducted by Herold. In this study, using type IIB hypertriglyceridemic patients, a significant decrease in VLDL content (control vs. fish oil) was accompanied by a nonsignificant decrease. Other mechanisms of action that have been hypothesized include reduction of VLDL synthesis in the liver (Harris, et al., 1984), increased excretion of steroids and bile acids in the feces (Goodnight, et al., 1982), and a reduction in the rate of LDL synthesis (Illingworth, et al., 1984).

To illustrate the variability of results accounting for VLDL and LDL content, three studies appear to support the hypothesis postulated by Phillipson (Fehily, et al., 1982; Bronsgeest-Shoute, et al., 1981; Fehily, et al., 1983). In a study by Bronsgeest-Schoute, et al., VLDL and LDL lipoproteins were isolated and compared from five groups of normal, healthy men undergoing fish oil administration. Although non-significant changes were encountered in each group, VLDL exhibited a mean decrease of 24.8%, while LDL exhibited a mean increase of 6.4%. In a study by Fehily, et

al., (1983), LDL increased only by a mean of 2.8%, with no values given for VLDL. In a third study, conducted by Fehily, et al., (1982), the researchers attempted to prove that significant increases in LDL would result from increasing concentrations of fish oil added to the diet. The subjects were divided into five groups, with group one serving as the control (0g fish oil). The values of fish oil concentration ranged from 0g ->300g. The mean LDL value obtained by the control group was 3.61 mmol/L. The results obtained by the other four groups were varied; >100 g = 3.57, 100-199 g = 3.64, 200-299 g = .3.75, >300g = 3.00. The results obtained in this study were all non-significant differences, however, it is interesting to note that when the fish oil concentration was > 300 g., a <u>decrease</u> of .61 mmol/L was obtained. Researchers hypothesized this variance to be dose related.

The information contained within this section clearly displays the inconsistencies and controversies associated with n-3 supplementation in plasma VLDL and LDL content. Until the precise mechanism(s) for VLDL and LDL metabolism are discovered, researchers and interested readers should interpret VLDL and LDL values with caution.

<u>HDL Cholesterol</u>. The effects of n-3 supplementation on HDL cholesterol, like LVDL and LDL, are inconsistent and controversial. Many studies have been reported that display quite opposite results varying in degree (Herold, et al.,

1986; Fehily, et al., 1982; Fehily, et al., 1983; Bronsgeest-Schoute, et al., 1981). However, researchers have seemed to agree, that, changes in HDL cholesterol content may be dose related. Once again, knowledge of HDL function is limited due to the inability to recognize a specific mechanism(s) of action.

Studies by Fehily, et al., (1983) and Herold, et al., (1986), both demonstrated no significant differences in HDL-C or HDL% (HDL expressed as a percentage) of normal, healthy subjects receiving n-3 supplementation. In two studies, one by Fehily, et al., (1982), and another by Bronsgeest-Schoute, et al., (1981) varying degrees concerning the high density lipoprotein were reported. In the study by Bronsgeest-Schoute, five groups of adult men were evaluated for changes in HDL-C and HDL% after a dietary supplementation period involving varying degrees of n-3 fatty acids (0-8 g/day). In all five groups, no significant differences were found to exist in HDL-C when starting values were compared with ending values. However, differences did exist in HDL% composition among the five groups. Group one (0 g/day) showed a decrease in DHL from 185 mg/100 ml to 164 mg. Group two (1 g/day) resulted in a 33.5% increase in HDL (137 mg/100 ml to 183 mg). Group three, like group two, also displayed an increase going from 158 mg/100 ml to 185 mg. However, groups four and five, 5 g/day and 8 g/day respectively, showed quite different results. Group four showed a measurable decrease in HDL

falling from 179 mg/100 ml to 136 mg. Group five, on the other hand, remained unchanged at 164 mg/100 ml. What these results suggested was that a plateau of maximal HDL stimulation may exist between daily consumptions of 2 and 4 g/day with greater intakes displaying an inhibitory effect or no effect. Fehily, et. al., (1982) confirmed the results of Bronsgeest-Shoute in a study of 117 normal, healthy men assigned to five groups consuming varying intakes of n-3 fatty acids. Fehily discovered, that, although no significant changes were seen in HDL-C among the five groups, significant differences were seen in HDL% (0 g/wk = 22.58; <100 g/wk = 23.05; 100-199 g/wk = 23.56; 200-299 g/wk = 24.02; > 300 g/wk = 28.51).

Although there appears to be no significant effect of n-3 supplementation on HDL-C, the reader is reminded to use caution when interpreting reported results.

Bleeding Time

A positive correlation seems to exist between n-3 supplementation and template bleeding times (Knapp, et al., 1986; Houwelingen, et al., 1987). In these studies bleeding times were significantly prolonged in subjects receiving n-3 supplementation with Knapp's subjects showing maximal results after one week (mean time = 1.77), and Houwelingen's subjects showing greatest results after six weeks (mean time = 1.65).

Thromboxanes, Prostacyclins, and Platelet Aggregation

One major area of concern for researchers investigating n-3 fatty acid relationships is how EPA/DHA (20:5n3/22:6n3) supplementation functions in lowering the risks of cardiovascular disease. Three factors that are prominent variables associated with CVD, (triglycerides; cholesterol: VLDL, LDL, HDL; bleeding time) and how n-3 supplementation may function in lowering their risk of incidence of CVD have been discussed. In determining the relationships between risk factors and n-3 fatty acids, one area of study seems to have eluded the controversy and inconsistencies and provided a clear understanding of the mechanism of action. This area of study, which continues to undergo investigation, looks at the formation of thromboxanes and prostacylins and their role(s) in platelet aggregation (Dyerberg, et al., 1978; Knapp, et al., 1986; Herold, et al., 1986; Bronsgeest-Shoute, et al., 1982; Bjerve, et al., 1987; Kromhout, et al., 1985).

In plasma, thromboxanes (TXA) are formed in platelets and participate in a pro-aggregating role (TXA_2), whereas, prostacyclins (PGI) are formed within the vessel wall and have demonstrated anti-aggregating functions. The balance between the formation of these two compounds is suggested to control platelet aggregation in vivo (Moncada, et al., 1978).

TXA_2 and PGI_2 are metabolic products that have

arachidonic acid (AA; 20:4n6) as their precursor. TXA and PGI can also be formed using EPA as a functional substrate. These metabolic products are denoted TXA_3 and PGI_3. In reducing the risks of thrombosis, atherosclerosis, and other cardiovascular diseases, researchers have looked for methods in which the formation of the pro-aggregating thromboxanes can be inhibited or reduced, and the formation of the anti-aggregating prostacyclins can be increased (Dyerberg, et al., 1978; Knapp, et al., 1986). The use of EPA supplementation has proved to be successful in these attempts. In studies conducted by Dyerberg, et al., Herold, et al., and Knapp, et al., EPA supplementation significantly reduced TXA_2 formation as evidenced by decreased urinary excretion of the metabolite, and decreased formation of the metabolite during cell activation, ex vivo, in response to ADP and collagen stimulation. The reduction of TXA_2 concomitantly produced an increase in the metabolite TXA_3, which is a biologically inert metabolite displaying no aggregatory function. The reduction in TXA_2 synthesis and the increase in TXA_3 was found to be significant in both groups under study by the authors (atherosclerotic patients and normal, healthy volunteers).

In contrast, however, PGI_2 and PGI_3 formation varied among groups. PGI_2 formation in the normal, healthy volunteers showed no significant decline, however the presence of PGI_3 in the plasma increased significantly over a non-detectable initial value. In contrast, the PGI_2 value

in the atherosclerotic patients decreased significantly with the highest degree of significance seen after one week. The presence of PGI_3, in this same group, concomitantly displayed a significant increase.

The mechanism of action which produces this favorable anti-aggregatorial ratio (20:5n3/20:4n6) involves competitive inhibition between EPA and AA on the enzyme cyclo-oxygenase (Kromhout, et al., 1985; Bjerve, et al., 1987; Herold, et al., 1986; Knapp, et al., 1986). Cyclo-oxygenase, which is responsible for TXA2 and PGI2 formation, has demonstrated a higher affinity for EPA over the AA molecules. This substrate-enzyme complex is favored over the AA substrate when EPA is supplemented in the diet. This favorable inhibition of AA causes a decrease in TXA2 formation and an increase in TXA_3 and PGI3 formation. Thus, the subsequent increase in n-3 prostanoids creates a favorable anti-aggregatory environment. The studies indicated within this section also demonstrated that no excessive amount of n-3 fatty acids were necessary to create effects that might be responsible for lowering the risks of cardiovascular disease.

Incorporation into Phospholipids

The subject of n-3 fatty acyl substitution and incorporation into cellular membrane phospholipids was discussed in some detail in an earlier section. In this section, specific n-3 supplementation studies will

be cited and effects on fatty acid composition will be discussed.

Dietary modification is the most effective technique used in determining fatty acid compositional changes in vivo (Spector, et al., 1985; Holman, 1986). In determining the efficiency of n-3 incorporation into cellular phospholipids, researchers have isolated and evaluated the fatty acid compositions of phosphatidylcholine (PC), phosphatidylethanolamine (PE), and triglycerides (TG) (Conroy, et al., 1986; Simons, et al., 1985; Bjerve, et al., 1987; Bronsgeest-Schoute, et al., 1981; Herold, et al., 1986). The fatty acids analyzed in these studies included palmitate (16:0), palmitic (16:1), linoleic (18:2n6), linolenic (18:3n3) and their metabolites; stearate (18:0), oleic (18:1), arachidonic (20:4n6), EPA and DHA (20:5n3 and 22:6n3) respectively. In the studies: 1) EPA supplementation created slight, but nonsignificant decreases in the saturated and n-6 content of the phosphoglycerides and the triglycerides (excluding arachidonic acid), 2) EPA supplementation created significant decreases in the content of AA incorporated into the phosphoglycerides and the triglycerides, 3) EPA supplementation significantly increased the content of 20:5n-3 and 22:6n-3 in the phosphoglycerides and triglycerides, 4) increased dosage of the EPA supplement was positively correlated with increasing n-3 concentrations in the phosphoglycerides and triglycerides, 5) after the experimental treatments ended,

plasma lipid fatty-acid levels returned to pre-treatment values within a few days or a couple of weeks.

It is interesting to note that EPA supplementation created a significant difference only with AA. One may generalize that the decrease seen in AA content, by EPA supplementation, may be a result of an inhibition mechanism in the desaturation-elongation process of linoleic acid (18:2n6) to arachidonic acid (20:4n6). This hypothesis is supported in three ways: 1) only AA is significantly affected by EPA supplementation. The other saturated and unsaturated fatty acids under investigation are not significantly affected, nor, are their metabolites, 2) the substrate to AA, linoleic acid, is not significantly affected by EPA supplementation, 3) the AA content in phosphoglycerides and triglycerides returns to pretreatment values a few days after the conclusion of the experiment.

Recall, that AA is a substrate for cyclo-oxygenase in the synthesis of TXA_2 and PGI_2. EPA supplementation also alters this enzyme-substrate specificity by being a more highly specific substrate for cyclo-oxygenase. A link between this mechanism and the inhibition mechanism seems to exist. With caution, one can assume that with EPA supplementation, the synthesis of AA from linoleic acid is inhibited creating a decrease in the availability of AA to react with the cyclo-oxygenase. A concomitant increase in EPA created a highly favorable 20:5n-3/20:4n-6 ratio that allows for the increased affinity of EPA to cyclo-oxygenase.

Further evaluation into the decrease of AA content may be due to the form in which the n-3 supplementation is given. If the supplement is given in the form of a food item (i.e. 4 oz. of ocean perch), research has shown that this addition to the diet will replace an otherwise ordinary menu item (i.e., meat, dairy products, or other foods with saturated and/or n-6 fatty acid content) (Sanders, et al., 1978; Fehily, et al., 1983). Over a period of time, it may be assumed, that the decrease in AA may be a result of the elimination of certain food items replaced by EPA containing foodstuffs. This assumption is highly unlikely, but should not be overlooked. The contradiction to the above assumption can be seen by significant decreases in AA when MaxEPA capsules or cod liver oil are given in addition to a normal, unrestricted diet. (Phillipson, et al., 1985; Simons, et al., 1985).

Blood Pressure

The effects of n-3 supplementation on overall blood pressure are conflicting and not well understood (Croft, et al., 1984; Houwelingen, et al., 1987; Herold, et al., 1986). In an animal study conducted by Croft, et al., no significant differences in systolic blood pressure were observed between rats consuming diets containing various levels of either safflower, linseed, coconut or cod liver oil. In a human study conducted by Herold et al., subjects consuming a daily intake of 280 g of mackeral, for two

weeks, experienced a mean drop in systolic pressure of 12% and a 9% drop in diastolic pressure. However, no significant changes were rated when the same subjects consumed similar quantities of herring for the same length of time. In a third study conducted by Houwelingen et al., normal, healthy subjects from three cities in Norway were measured for blood pressure variances (control and experimental). In the mackeral supplemented groups, subjects from two cities showed significant decreases in systolic pressure, however, at the same time, comparable results were seen in the control groups of the same two cities. After combining the results of all three cities, a significant decrease in systolic pressure was clearly indicated, once again, however, their measurements were not significantly different from those received in the control groups. Thus, no specific effect of n-3 fatty acids can be attributed to significant changes in blood pressure. More research, in this area, is needed before any clear assumptions can be attempted.

Cell Enzymes

A number of enzyme activities and biochemical variables exist within the cell structure. In this section, I will limit my discussion to five of the more familiar enzyme activities known and their changes, if any, as a result of n-3 supplementation. The enzyme activities to be discussed include lactate dehydrogenase (LDH), isocitrate dehydro-

genase (ICDH), glutamate dehydrogenase (GLDH), asparatate aminotransferase (ASAT), and alanine aminotransferase (ALAT). In a study conducted by Houwelingen, et al., enzyme activities of two groups (control = meat paste, experimental = mackeral paste) from three cities were compared after a six week experimental treatment period. All five enzymes (LDH), (ICDH), (GLDH), (ASAT), and (ALAT), showed significant decreases after three weeks of mackeral supplementation. No significant differences were seen, however, after the third week. Comparable findings were also seen in the control groups, with a significant decrease in enzyme activity after three weeks, but, no significant changes between three and six weeks. The comparable findings between the two groups coupled with inconsistent changes between cities makes the importance of the changes in the mackeral group questionable. In studies conducted by Spector, et al., results similar to those of Houwelingen's were observed, where n-3 supplementation displayed no significant changes in the enzyme activity of (LDH) (GLDH) (ALAT) and (ASAT). These are only five of many enzyme systems located within a cell. The results from these two authors do not infer that all enzyme activities display non-significant changes with n-3 supplementation. Further research and isolation of specific enzymes is needed to accurately convey any relationships that may exist between n-3 fatty acids and enzyme systems.

Hematological Values, Fibrinogen, and Viscosity

Research has been conducted to determine if a relationship may exist between hematological values and n-3 supplementation (Houwelingen, et al., 1987) or between n-3 supplementation and viscosity and fibrinogen (Fehily, et al., 1982). In both studies, n-3 supplementation showed no significant change in any of the variables under investigation. Significant differences that were observed were attributed to other factors, such as smoking habit, body mass, alcohol consumption, age, and dietary fiber intake.

CHAPTER III

METHODOLOGY

Fish/seafood consumption patterns of homemakers of five Midwest states in 1988 were assessed. Information on the research design; population/sample; data collection which includes instrumentation, procedure and scoring; and data analysis are included in this chapter.

Research Design

A cross-sectional survey was used in this study. The cross-sectional survey consists of standardized information that is collected from a sample drawn from a predetermined population. This survey technique allows for exploration of possible relationships between variables (Borg, Gall, 1983).

In this study, the dependent variable is consumer preference for fish and seafood products as reflected by fish/seafood expenditures and consumer consumption patterns. The values expressing the dependent variable were obtained from the completed instrument. The independent variables include selected personal variables (age, sex, race, religious affiliation, marital status, household composition, household income, household expenses, nutrition education, health awareness, marketing variables,

consumption patterns and psychographic data).

The study sample was comprised of 1200 households randomly selected from the populations of Nebraska, Kansas, Missouri, Oklahoma and Texas. The list of households, from the selected populations, were obtained from available 1988 phone directories, on microfiche, at the Oklahoma State University library. The phone directories which were used to draw the sample included; Omaha (NE); Wichita (KS); Columbia, Springfield, Kansas City (MO); Oklahoma City, Tulsa, Stillwater (OK); Dallas, El Paso, Lubbock (TX). The simple random sample sampling technique was used in this study. A table of random numbers was generated by the OSU computer science department using a SAS package. Using the table, the sample was chosen by selecting every third number (which was represented by seven digits); the first two digits corresponded to the page number of the phone directory and the adjacent three numbers corresponded to the name on the desired page which was counted down from the first listing. Sample sizes from each phone directory are listed on the following page.

Sample Source:	Sample Size:
1988 Phone directories	N
Omaha	240
Wichita	240
Columbia	80
Springfield	80
Kansas City	80
Oklahoma City	100
Tulsa	100
Stillwater	40
Dallas	100
Lubbock	40
El Paso	100
	N=1200

Data Collection

Instrumentation

The research instrument was constructed by the researcher and his major advisor. Input for the research instrument was also obtained from Mary Y. Hamer, Director of the Human Nutrition Information Service, U.S. Department of Agriculture. The research instrument was divided into ten parts. Parts one and two of the questionnaire investigated general demographic and financial information. Parts three and four contained statements concerning educational and nutritional background. Part five of the questionnaire contained diet and health awareness issues. Parts six, seven and eight contained statements that investigated the overall consumer consumption process (marketing information,

food-away-from-home, and food preparation). Part nine of the questionnaire presented psychographic statements which attempted to further describe behavioral characteristics associated with the consumer consumption process. Part ten contained additional financial statements (college expenditures, housing information and expenses) that were optional in recording. A draft questionnaire was pretested using 100 randomly selected households from the Tulsa, Oklahoma area. The researchers graduate commmittee then checked the instrument for content validity, clarity and format prior to printing.

Procedure

A letter of introduction was mailed to each of the households in the sample. The purpose of this letter, which preceeded the instrument by ten days, was to introduce the researchers and the research topic to the prospective homemaker. The letter of introduction was sent, also, to stimulate participant interest in hopes of receiving maximal instrument returns for the researchers. A cover letter explaining the study and outlining participant instructions was developed to accompany the instrument. The cover letter and instrument for all households was printed on green paper. Individual numerical codes were placed on the return address label of the instrument which identified the participants geographical location.

The questionnaires were distributed via Central Mailing

Services of Oklahoma State University. Four weeks was allowed for the completion of the questionnaire. A follow-up letter was not sent to the households due to financial limitations of the researchers.

Recording

Responses recorded in the instrument were assigned the values 0 and 1. Zero indicates no response (selection of answers to individual questions left blank), and a one indicates a response (selection of answers to individual questions with a distinguishable mark). Part nine of the instrument contained psychographic statements which described unique consumption related behavioral patterns. Each statement was answered on a 1-5 scale. One indicates "Always like me" and a five indicates "Never like me." Responses to the psychographic statements were also assigned the values of 0 and 1 and recorded in the manner described above.

Data Analysis

Statistical Analysis

Data from the questionnaires were coded and transcribed onto a computer using a PC-file. Statistical procedures including frequency tables and chi-square were generated using a SAS computer program and were used to analyze the data. The designated significance level was $p < .05$.

CHAPTER IV

RESULTS AND DISCUSSION

The questionnaires were distributed to randomly selected households in each of the five Midwestern states under study. From the 1200 total questionnaires distributed, 149 or 12.4% responded: 37 or 15.4% from Kansas; 24 or 10% from Missouri; 34 or 14.6% from Nebraska; 34 or 14.6% from Oklahoma; and 18 or 7.5% from Texas.

The questionnaires which were received from the five Midwestern states were recorded onto PC-File and tested using chi-square statistical procedures. The chi-square analysis evaluated for positive levels of significance, $p \leq .05$, that existed between the respondent's demographic information and variables specific to the researcher's objectives (nutrition education, health perceptions, marketing information, consumption, consumption behavior and psychographic data).

The results which demonstrated positive levels of significance, $p \leq .05$, are discussed below categorically.

Sex

Forty-seven males or 31.8% and 100 females or 67.6% responded to the questionnaire. Two questionnaires failed to designate gender classification and were thus removed from analysis when evaluating for sex significance.

A significant difference was seen between sex and the household member who is the major food shopper. Forty-five percent of the males who responded claimed to be the major food shopper for the household, while 69.0% of the female respondents claimed that the female was the major food shopper. When both sexes are combined 50.3% of the major household food shopping is performed by the female while only 15.6% is performed by the male. Twenty-two percent of the female respondents reported dual participation (female-male) in major food shopping activities, with 38.3% of the male respondents also reporting male-female participation. When both sexes were combined the role of major household food shopper exhibiting dual responsibility accounts for 27.2% of the responses.

A significant difference between sex and weekly away-from-home food spending was exhibited. Forty-two percent of the female respondents and 59.5% of the male respondents reported spending $15 or less per week on away-from-home food items. In contrast, 58.0% of the female respondents and 40.4% of the male respondents reported spending in excess of $15 per week. When both sexes were combined 47.6%

of the respondents reported spending $15 or less on food items away-from-home while 52.3% reported spending in excess of $15 per week.

Coinciding with the differences found between sex and away-from-home food spending, a significant difference was found to exist between sex and the number of meals eaten away-from-home per week. Twenty percent of the females who responded reported eating four or less meals away-from-home per week while their male counterparts reported 40.4%. Eighty percent of the females who responded reported eating five or more meals away-from-home per week while 59.5% was reported for the male respondents. When both sexes were combined 26.5% of the respondents reported eating four or less meals away-from-home per week while 73.4% reported eating five or more.

As was expected, a significant relationship developed between the variables sex and main meal planner, and sex and main meal preparer. These results closely resemble the results seen between the variables sex and major household food shopper, discussed earlier. When sex was tested versus main meal planner, 97.6% of the female respondents reported the female as the main meal planner, while 64.7% of the male respondents reported the male as the main meal planner. Interestingly, 35.2% of the male respondents reported the female as the main meal planner while only 2.3% of the females attributed meal planning activities to the men.

When both sexes were combined, 79.6% of the respondents reported females as the main meal planner, while only 20.3% attributed the activities to male participation.

Similar percentages were also recorded when sex was tested versus main meal preparer. Ninety-six percent of the females who responded attributed meal preparation activities to the female while 61.1% of the male respondents reported the male as the main meal preparer. When both sexes were combined, 78.8% of the respondents reported females as the main meal preparer, while only 21.1% attributed the activities to male participation.

A significant difference was found to exist between sex and the influences of family members in purchasing fish and seafood products. Of the 93 females who responded 13.0% reported that family likes/dislikes of fish/seafood products sometimes influenced the purchase of these products; 14.0% said that family likes/dislikes had no effect on fish and seafood purchases; and, 66.0% said that family likes/dislikes did influence the purchase of fish and seafood products. The male respondents, however, recorded results in contrast with their female counterparts. 19.0%, of the 47 male respondents, stated that family likes/dislikes of fish/seafood products sometimes influenced their purchase of these products; 31.9% stated that family likes/dislikes had no effect on fish and seafood purchases; and 48.9% stated that family likes dislikes did influence their purchases. When both sexes were combined, 60.5% of

the respondents stated that family likes/dislikes did influence their decision in purchasing fish and seafood products.

A significant difference was found to exist between sex and purchasing fish and seafood items when seeking a change of pace. The psychographic statement to which the statistical significance applies reads as follows, "I usually buy/prepare fish/shellfish items when I seek a change of pace." Sixty-three percent of the male respondents reported that this was very characteristic of their purchasing behavior while only 42.6% of the female respondents agreed. Thirty-six percent of the male respondents reported that this statement was not characteristic of their purchasing behavior, with 57.3% of the female respondents reporting the same. When both sexes were combines, however, an equal distribution agreeing and disagreing with the statement is reported, 49.5% and 50.5% respectively.

The final significant result, when testing for sex differences, occurred when sex was associated with similar menu item. The psychographic statement to which the statistical significance applies reads, "When out to eat with friends, your friends order first. They decide to have a fish/shellfish menu item. Will their decision prompt you to order a similar menu item?" Eighty-eight percent of the 79 female respondents reported no, with 73.5% of the 34 male respondents also reporting no. The response no, in this

case, indicates that a negative behavioral characteristic is associated within the situation represented by the statement. Ayes response would indicate a positive behavioral characteristic. On the other hand, 26.4% of the male respondents replied positively while only 11.3% of the female respondents said yes. When both sexes were combined, an overwhelming majority of the respondents, 84.Ø%, replied negatively to the statement with only 15.9% indicating a favorable reply.

The significance of the results associated between the male and female sexes, in this study, are limited and should be interpreted with caution. The results indicated that the female respondents were involved, to a greater degree than males, in household shopping, meal planning, meal preparation, meals eaten away-from-home and away-from-home food spending. The behavioral characteristics significant to the female respondent suggested that she was more easily influenced and/or considerate of family preferences and less likely to make food purchases when confronted with specific environmental factors. The significant results obtained, however, do not reflect whether the impact of household size and composition contributed to the significant results attributed to the female respondents. Of the 1ØØ females who responded, 69 were classified as married and 32 were classified as single. In contrast, 29 of the males who responded were classified as married and 18 of the males were reported as single. It is possible that the

significant results obtained with meals eaten away-from-home, away-from-home food spending and family influences may have reflected the total household food expenditures and total number of household meals as reported by the female respondents. The intent of evaluating for sex significances, however, was to evaluate for per capita food expenditures and person behavioral characteristics as they applied to the individual respondent. However, it is difficult to determine, from the questionnaires, whether they respondents recorded their individual behavior or recorded the behaviors of all the household members. When evaluating for sex significance it is important to present information to the respondent that clearly indicates the type of response(s) desired.

Table XVII illustrates the average weekly per capita food expenditures and percentage of Midwest households purchasing food items weekly classified according to gender. A comparison of red meats and fish/seafood are made to coincide with the literature presented in chapter two. In 1988, the average weekly per capita expenditure for red meats and fish/seafood was $3.81 and $1.56, respectively, for both sexes. Male householders, who reported being the major household food shopper, recorded the greatest per capita expenditures for both red meats and fish/seafood. Male householders recorded spending 27.8% more for red meats and 29.4% more for fish and seafood than their female counterparts. Caution must be used when interpreting the

TABLE XVII

SEX, 1988: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF MIDWEST HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Sex of householder	
		Male	Female
Household characteristics:			
Households	147	47	100
Mean age of householder (years)	47	46	48
Income before taxes (dollars)	29974	29000	30265
Members per household (number)	2.5	2.1	2.7
Earners per household (number)	1.4	1.4	1.5
Average weekly, at home, per person food expenditures:		DOLLARS	
Red meats	3.81	4.36	3.41
Fish & Seafood	1.56	1.76	1.36
Households purchasing in a week:		PERCENT	
Red meats	87.1	83.3	86.3
Fish & Seafood	72.5	71.4	69.3

results from these tables. The data represented within the table are not indicative of actual quantities purchased or consumed. Greater expenditures may be due to more expensive cuts, forms or types of fish and seafood. This information is not made available from this study.

Table XVII also illustrates the percentage of Midwestern urban households purchasing food items in a week. In 1988, 87.1% of all responding households reported making weekly purchases of red meats while 72.5% of all households reported purchasing fish and seafood weekly. In contrast to the weekly expenditures for red meats, a greater percentage of female householders purchased red meats weekly than did their male counterparts, 86.3% and 83.3% respectively. Weekly purchases of fish and seafood items were consistently equal among the sexes (male = 71.4%; female = 69.3%) despite a 29.4% increase in weekly expenditures recorded for male householders.

Race

One hundred forty-one or 95.3% of the sample who responded were Caucasian/While; two or 1.3% were Black; and five or 3.4% were Hispanic. The researchers were unfortunate in not being able to obtain a more fairly equal representation of white and non-white respondents. Therefore, the variable race was not evaluated for significance.

TABLE XVIII

SEX, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$).

Item		Sex		
Dependent Variable	Response	Male	Female	All
1). Household member who is the major food shopper	a) male	44.68	2.00	15.65
	b) female	10.64	69.00	50.34
	c) male/female	38.30	22.00	27.21
		93.62*	93.00*	93.20*
		(X^2=3.96; df=1; $p \leq .047$)		
2). Weekly away-from -home food spending	a) < $15	59.57	42.00	47.62
	b) ≥ $15	40.43	58.00	52.38
		100.00	100.00	100.00
		(X^2=3.96; df=1; $p \leq .047$)		
3). Number of meals eaten away-from -home per week	a) ≤ 4	40.43	20.00	26.53
	b) ≥ 5	59.57	80.00	73.47
		100.00	100.00	100.00
		(X^2=6.84; df=1; $p \leq .009$)		
4). Household member who is the main meal planner	a) male	64.71	2.38	20.34
	b) female	35.29	97.62	79.66
		100.00	100.00	100.00
		(X^2=58.02; df=1; $p \leq .00$)		
5). Household member who is the main	a) male	61.11	3.66	21.19
	b) female	38.89	96.34	78.81
		100.00	100.00	100.00
		(X^2=49.45; df=1; $p \leq .00$)		

TABLE XVIII (Continued)

Item		Sex		
Dependent Variable	Response	Male	Female	All
6). Likes/dislikes of family members in influencing fish and seafood purchases	a) yes	48.94	66.00	60.54
	b) no	31.91	14.00	19.73
	c) sometimes	19.15	13.00	14.97
		100.00	100.00	100.00
		(X^2=10.83; df=1; p≤.013)		
7). Purchasing fish/ seafood items when seeking a change of pace	a) 1,2 or 3	63.64	42.65	49.50
	b) 4 or 5	36.36	57.35	50.50
		100.00	100.00	100.00
		(X^2=3.91; df=1; p≤.048)		
8). Psychographic statement - similar menu item	a) 1,2 or 3	26.47	11.39	15.93
	b) 4 or 5	73.53	88.61	84.07
		100.00	100.00	100.00
		(X^2=4.03; df=1; p≤.045)		

* Percentages do not add up to 100.00 due to respondents recording answers which deviated from the options being tested with chi-square.

** The 1, 2 or 3 response signifies that the consumer would act favorably if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 response signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

Age

Thirty-five or 37.2% of the sample who responded were between 19-39 years of age; 54 or 36.5% were between 40-59 years of age; and, 37 or 25.0% were aged 60 years or older. Two questionnaires failed to designate age classification and were thus removed from analysis when evaluating for age significance. The age classification was collapsed into two groups, < 40 and ≥ 40 years, to accommodate a 2x2 chi-square analysis.

A significant difference was seen between age and odor (a purchasing criterion for fish and seafood). Respondents were asked to rate the importance of selected purchasing criteria for fish/seafood products, according to the criteria's impact on the purchasing decision. A scale of one to five was provided for each criterion with one representing "most important". Sixty-nine percent of the respondents aged < 40 reported that odor was a most important criterion in their decision to purchase fish and seafood items. Sixty percent of those aged ≥ 40 years of age also reported that odor was a most important criterion, however, significantly less than those aged < 40 years. Fourteen percent of the respondents aged < 40 stated that odor was not an important purchasing criterion, and 9.0% of these same respondents indicated an indifference to odor as a purchasing criterion. In contrast, only 5.4% of the respondents aged ≥ 40 years or older reported odor as a least important criterion with 12.0% indicating an attitude

of indifference. Twenty-two percent of those aged ≥ 40 and 7.2% of those aged < 40 failed to indicate odor's importance as a criterion in fish and seafood purchases. When both age groups were combined, the majority of the respondents, 63.7%, reported that odor was a most important criterion in their purchasing decision, with 8.9% indicating a least important factor and 10.9% reporting an attitude of indifference.

A significant difference was also observed when age was tested versus price (a purchasing criterion for fish and seafood). Sixty-two percent of the respondents aged < 40 reported that price was a most important factor in determining fish and seafood purchases. A lower percentage, 52.7%, was observed by respondents ≥ 40, indicating that although importance is placed on the product's price, price was not as significant a factor in determining purchasing behavior as it was in the age groups < 40. This finding was further supported by the result that 10.9% of the respondents aged ≥ 40 replied price as a least important criterion, while only 3.6% was reported for the respondents aged < 40. Twenty-seven percent of the respondents aged < 40 indicated an indifference to price as a purchasing criterion, with 7.2% failing to respond. Sixteen percent of the respondents aged ≥ 40 also indicated an indifference to the criterion price, and 19.7% failed to respond. When both age groups were combined, 56.1% of the respondents reported

price as a most important purchasing criterion; 8.2% as least important; and 20.5% indicated an indifference to price as a purchasing criterion for fish and seafood.

Another purchasing criterion, texture, was found to be significantly associated with the respondent's age. Thirty-six percent of the respondents aged $\geq$ 40 reported texture as a most important criterion in fish and seafood purchases, with 8.7% stating that texture was least important. In contrast, 47.2% of the respondents aged $<$ 40 reported texture as a most important criterion, and 12.7% replied least important. Thirty-one percent of the respondents aged $<$ 40 and 23.0% of the respondents aged $\geq$ 40 reported an attitude of indifference to texture as a purchasing criterion, with 9.0% and 31.8%, respectively, failing to reply. When both age groups were combined, 40.4% of the respondents claimed that texture was a most important factor in their decision to purchase fish and seafood items. Ten percent stated that texture was a least important criterion and 26.0% of the respondents indicated an attitude of indifference to texture as a purchasing criterion.

A significant difference was observed when age was tested versus knowledge of cooking methods (a purchasing criterion for fish and seafood). Forty percent of the respondents aged $\geq$ 40 and 56.3% of the respondents aged $<$ 40 reported that knowledge of cooking methods was a most important criterion in determining fish and seafood purchases. Nineteen percent of the respondents aged $\geq$ 40

stated that knowledge of cooking methods was a least important factor, while a significantly lower percentage, 10.9% was reported by respondents aged < 40. Twelve percent of the age group ≥ 40 indicated an attitude of indifference to knowledge of cooking methods as did 23.6% of the respondents aged < 40. Twenty percent of the responding sample failed to reply. When both age groups were combined, 46.5% of the respondents reported knowledge of cooking methods as a most important purchasing criterion; 16.4% as least important; and 16.4% indicated an attitude of indifference.

A significant difference was observed between age and the reluctance to purchase fish/seafood items because of the unfamiliarity of possible cooking methods. This psychographic variable attempted to reveal the respondent's purchasing behavior in view of his/her knowledge of possible cooking methods. Eighty-nine percent and 72.2% of the respondent's aged ≥ 40 and < 40, respectively, replied that fish and seafood purchases were not hindered due to their unfamiliarity of cooking methods. In contrast, 10.9% of the respondents aged ≥ and 27.7% of the respondents aged < 40 reported that unfamiliarity of cooking methods did inhibit their purchasing of fish and seafood products. when both age groups were combined, 83% of the respondents reported that fish and seafood purchases were not dependent

on cooking knowledge, while 17% of the respondents stated that purchases were dependent on their familiarity of cooking methods.

A significant difference also was observed between age and the psychographic variable cooking literature. The psychographic variable cooking literature varied from the variable unfamiliarity of cooking methods in the respect, that, cooking literature attempts to reveal increased consumer purchases of fish and seafood items from consumers who presently purchase fish and seafood, whereas, unfamiliarity attempted to reveal purchasing behavior of consumers who were unfamiliar with fish and seafood cooking methods. Significant differences in the responses by the two age groups were observed for cooking literature. Fifty-eight percent of the respondents age < 40 reported that if literature describing fish/seafood cooking methods were made available their purchases of fish and seafood items would increase. In contrast, only 35.4% of the respondents aged $\geq$ 40 said that increased fish and seafood purchases would be related to available cooking literature. Forty-two percent of the respondents aged < 40 reported that available cooking literature would not increase their present purchasing activity of fish and seafood, while a large percentage, 64.5%, of the respondents aged $\geq$ 40 responded similarly. when both age groups were combined, 44.7% of the

respondents stated that available cooking literature would reflect positively on fish and seafood purchases, with 55.2% responding negatively.

The final significant result, when testing for age differences occurred when age was associated with similar menu item. This psychographic variable attempted to reveal consumer purchasing behavior for fish and seafood items when eating out with friends, and the friends purchasing a fish/seafood menu item. Ten percent of the respondents aged $\geq$ 40 reported that, if their friends ordered a fish/seafood menu item, then, they would order a similar item. However, the majority of the respondents aged $\geq$ 40, 89.5%, reported that the purchasing behavior of friends did not have a direct influence on their own purchasing decisions. In contrast, 24.3% of the respondents aged $<$ 40, reported that peer activity directly influenced their menu item selection, with 75.6% indicating a negative behavioral response in relation to the menu choice of friends. When both age groups were combined, an overwhelming majority of the respondents, 84.2%, reported that the menu choice of friends did not influence their behavior in making similar or alternate menu choices.

Significant results have been reported when age was rested versus selected fish and seafood purchasing criteria, and when age was tested versus selected psychographic variables. When age was tested versus selected purchasing criteria, more emphasis was placed on the significant

criteria (price, texture, odor, cooking methods) by the respondents aged < 40. These results would seem to suggest that although both age groups consider the purchasing criteria important in their decision making process for fish/seafood purchases, respondents < 40 are more aware of and sensitive to deviations in fish/seafood prices and quality. These results represent important findings that can help the seafood industry to better understand and accommodate the needs and desires of its consumers. With this information, the seafood industry can develop specific strategies that are targeted at insuring the consumer of receiving high quality fish and seafood products at reasonable prices. Also, when age was tested with the psychographic statements, although lack of cooking knowledge, for fish and seafood items, did not significantly alter the purchasing behavior of the respondents, 44.7% of the respondents stated that they would buy more fish and seafood products if literature explaining preparation methods was made available.

Table XIX illustrates the average weekly per capita and percentage of Midwest households purchasing food items weekly classified according to age. In 1988, the average weekly per capita expenditure for red meats and fish/seafood was $3.81 and $1.56, respectively, for all ages. Respondents aged 50-59 were reported as allocating the greatest per capita expenditures for red meats and fish/seafood, $4.87 and $2.24, respectively, while

TABLE XIX

HOUSEHOLDER'S AGE, 1988: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF MIDWEST HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Age of householder				
		19-29	30-39	40-49	50-59	60-over
Household characteristics:						
Households	145	21	33	26	28	37
Income before taxes (dollars)	29974	24880	33166	35769	36479	21757
Members per household (number)	2.5	2.4	3.3	3.0	2.0	1.8
Earners per household (number)	1.4	1.4	1.5	1.7	1.4	1.2
Average weekly, at-home, per person food expenditures:				DOLLARS		
Red meats	3.81	3.85	3.18	4.04	4.87	2.90
Fish & Seafood	1.56	1.59	.97	1.40	2.24	1.74
Households purchasing in a week:				PERCENT		
Red meats	87.1	90.0	92.3	86.3	80.7	82.3
Fish & Seafood	72.5	70.0	65.3	68.1	69.2	79.4

respondents aged 30-39 and 40-49 were reported as allocating the least per capita expenditures for fish and seafood, $0.97 and $1.40, respectively.

Table XIX also illustrates the percentage of midwestern urban households purchasing food items in a week. In 1988, 87.1% of all responding households reported making weekly purchases of red meats, while 72.5% of all households reported purchasing fish and seafood weekly. In contrast to weekly expenditures for red meats, fish and seafood, the respondents aged 50-59 were reported as the lowest percentage of households making weekly purchases of red meats, 80.7%, and were near lowest, 69.2%, in households making weekly purchases of fish and seafood. The respondents aged 30-39 and 19-29 were reported as the largest percentage of households purchasing red meats weekly, 92.3% and 90.0% respectively, while the respondents aged $\geq$ 60 and 19-29 reported the largest percentage of households purchasing fish and seafood weekly, 79.4% and 70.0% respectively.

From 1982-1988 dramatic increases in average weekly, at-home, per capita food expenditures were seen for red meats and fish and seafood products: red meat expenditures increased 48.8% and fish/seafood expenditures increased 262.8%, over the national average. Shifts were seen also in the age groups which represents the greatest and the least per capita weekly expenditures for red meats and fish/seafood. In 1982, the age groups 55-64 and < 25 were

reported as spending the most and the least, respectively, for red meat items weekly, whereas, in 1988, the age group 50-59 was reported as spending the most per person for red meats while the age group ≥ 60 was reported as spending the least. In 1982, the age groups 55-64 and < 25 were reported as spending the most and the least, respectively, per capita per week for fish and seafood items. In 1988, however, the age groups 50-59 and 30-39 were represented as the households spending the most and the least, respectively, per week for fish and seafood items. Increases were seen also in the percentage of households making weekly purchases of red meats and fish/seafood items from 1982-1988. From 1982-1988, the percentage of households making weekly red meat purchases increased 43.3%, while the percentage of households making weekly purchases of fish and seafood increased 44.6%. In 1982, the age groups 45-54 and < 25 were represented as the percentage of households making the greatest and the least weekly purchases of red meat items, respectively. However, in 1988, the percentage of households reporting the greatest and the least weekly purchases of red meat items were reported by the age groups 30-39 and 50-59, respectively. A similar shift was observed in the percentage of households representing the greatest and the least weekly purchases of fish and seafood items. In 1982, the age group 45-54 was reported as the percentage of households making the greatest weekly purchases of fish and seafood items, whereas, in 1988, the greatest weekly

purchases of fish and seafood were represented by the age group $\geq$ 60. Similarly, in 1982, the age group < 25 was reported as the percentage of households making the least weekly purchases of fish and seafood items, whereas, in 1988, the least weekly purchases was represented by the age group 30-39.

Marital Status

Ninety-eight or 66.2% of the sample who responded were married and 50 or 33.7% of the sample were classified as single, which includes; widowed, divorced, and never married. A significant relationship existed between marital status and the household member who is the major food shopper. Fifty percent and 36.0% of the respondents classified as single reported that the female, and the male, respectively, was the major food shopper. Six percent of other respondents, classified as single, reported that the major food shopping activities for the household were performed by both the male and female heads of household suggesting that the household composition consisted of roommates or adult living situations. In contrast to the single respondents, 38.7% of the married respondents reported that household food shopping activities were performed by both the male and female household members, with only 5.1% of the respondents attributing the activity to the male member. In comparison to the results reported by the respondents, 50.5% of the married respondents

TABLE XX

AGE, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Sex		
Dependent Variable	Response	<40 yrs	≥40 yrs	All
	Importance			
1). Odor: a purchasing criterion for fish & seafood	a) most	69.09	60.44	63.70
	b) least	14.55	5.49	8.90
	c) indifferent	9.09	12.09	10.96
		92.73*	78.02*	83.56*
		(X^2=8.34; df=3; $p \leq .039$)		
	Importance			
2). Price: a purchasing criterion for fish & seafood	a) most	61.82	52.75	56.16
	b) least	3.64	10.99	8.22
	c) indifferent	27.27	16.48	20.55
		92.73*	80.22*	84.93*
		(X^2=8.25; df=3; $p \leq .041$)		
	Importance			
3). Texture: a purchasing criterion for fish & seafood	a) most	47.27	36.26	40.41
	b) least	12.73	8.79	10.27
	c) indifferent	30.91	23.08	26.03
		90.91*	68.13*	76.71*
		(X^2=10.0; df=3; $p \leq .019$)		
	Importance			
4). Knowledge of cooking methods: a purchasing criterion for fish & seafood	a) most	56.36	40.66	46.58
	b) least	10.91	19.78	16.44
	c) indifferent	23.64	12.09	16.44
		90.91*	72.53*	79.46*
		(X^2=11.87; df=3; $p \leq .008$)		

TABLE XX (Continued)

Item		Sex		
Dependent Variable	Response**	<40 yrs	≥40 yrs	All
5). Don't buy fish due to unfamiliarity of cooking methods	a) 1,2 or 3	27.78	10.94	17.00
	b) 4 or 5	72.22	89.06	83.00
		100.00	100.00	100.00
		(X^2=4.63; df=1; p≤.031)		
6). Increased fish/ seafood purchases due to available literature explaining cooking methods	a) 1,2 or 3	58.14	35.48	44.76
	b) 4 or 5	41.86	64.52	55.24
		100.00	100.00	100.00
		(X^2=5.27; df=1; p≤.022)		
7). Similar menu item	a) 1,2 or 3	24.39	10.45	15.74
	b) 4 or 5	75.61	89.55	84.26
		100.00	100.00	100.00
		(X^2=3.72; df=1; p≤.05)		

* Percentages do not add up to 100.00 due to respondents recording answers which deviated from the options being tested with chi-square.

** The 1, 2 or 3 response signifies that the consumer would act favorably if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 response signifies that the consumer would act unfavorable if placed in this consumer setting. A five would indicate a "never" response.

reported that the major household food shopping was performed by the female household member. when both groups were combined, 50.0% of the respondents reported that the female member was largely responsible for the household food shopping; 15.5% attributed the activity to the male household member; and 27.7% stated that the household food shopping activities were performed by both the male and female household members.

A significant difference was seen between marital status and weekly at-home food expenditures. Ninety-two percent of the respondents classified as single reported that weekly at-home food expenditures were $50, and 8.0% were reported as spending ≥ $50 per week. In contrast, 41.8% of the married respondents reported spending < $50 per week, while 58.1% reported spending ≥ $50 per week on food-eaten-at-home. When both groups were combined, 58.7% of the respondents stated that weekly food-at-home expenditures were < $50 with 41.2% reporting weekly food-at-home expenditures ≥ $50.

A significant relationship was observed when marital status was associated with weekly away-from-home food expenditures. Sixty-six percent of the single respondents reported that weekly away-from-home food spending was < $15, with 34.0% reporting weekly expenditures ≥ $15. In contrast, 44.9% of the married respondents reported that weekly away-from-home food spending was < $15, and 55.1% of the respondents stated that weekly expenditures were ≥ $15.

When both groups were combined, 52.0% of the respondents reported that weekly expenditures for food eaten away-from-home was < $15, while 47.9% of the respondents reported weekly expenditures ≥ $15.

A significant difference was observed when marital status was tested versus the main meal planner. Forty-three percent of the single respondents attributed the activity of household meal planner to the male member, while 56.5% of the respondents credited the activity to the female member. Only 5.4% of the married respondents were reported as crediting the male household member with the responsibility of meal planning, while 94.5% of the respondents reported the female as the main meal planner for the household. When both groups were combined, 20.1% of the respondents stated that the male household member was the main meal planner, while 79.8% of the respondents attributed the activity to the female member.

A significant result also was observed between marital status and the influence of family members on fish and seafood purchases. Forty percent of the single respondents reported that the likes/dislikes of family members did influence their purchasing behavior for fish and seafood products. 44.0% of the same respondents stated that family likes/dislikes did not influence their purchasing decisions, while 10.0% of the single respondents reported that family influences sometimes directed their purchasing behavior for fish and seafood items. In a significant contrast between

groups, 71.4% of the married respondents reported that the likes/dislikes of family members played a significant role in influencing fish and seafood purchases, compared with only 7.1% of other respondents stating that the likes/dislikes of family members did not influence their purchasing decisions. Seventeen percent of the married respondents stated that family members sometimes influenced their purchasing behavior for fish and seafood items. When both groups were combined, the majority of respondents, 60.8%, reported that family likes/dislikes had a positive influence in directing their purchasing behavior; 19.5% of the respondents said no; and, 14.8% of the respondents replied that family influences sometimes influenced their purchasing behavior for fish and seafood.

A significant result was achieved when marital status was tested versus the psychographic statement in-store food samples. This psychographic variable attempted to reveal the consumer's purchasing behavior after testing a favorable in-store food sample. Twenty-four percent of the single respondents reported that if they tasted a favorable in-store food sample they would respond by purchasing the sampled item. However, 75.8% of the single respondents stated that in-store samples rarely influenced their purchasing behavior. In contrast, 46.1% of the married respondents reported that they would purchase the sampled item if the sample was liked. Fifty-four percent of the married respondents, however, replied that purchasing

behavior was not influenced by in-store samples. When both groups were combined, 38.2% of the respondents reported a favorable purchasing response to approved in-store samples, while 61.7% of the respondents stated that purchases were not dependent on the likes of in-store samples.

A significant difference was seen to exist between the variables marital status and the psychographic statement fish before beef. This psychographic variable attempted to reveal the consumer's purchasing behavior when the consumer reached the seafood section of the supermarket before the red meat department. Thirty-one percent of the single respondents reported that if they reached the seafood section prior to the red meat department, they would be very likely to include fish and seafood items in their purchases. Sixty-eight percent of the single respondents, however, replied that inclusion of fish and seafood items would not occur if this situation was to exist. An even lower degree of behavioral influence to this situation was reported by the married respondents. Only 13.8% of the married respondents replied that they would include fish and seafood items with their purchases, while 86.1% of the respondents stated that fish and seafood purchases were not likely in this scenario. When both groups were combined, 19.6% of the respondents stated that fish and seafood purchases were most likely to occur, while 80.3% of the respondents stated that inclusion of fish and seafood items were not likely to occur.

A significant difference was exhibited between the variables marital status and the psychographic statement friends. This psychographic variable attempted to reveal the consumer's purchasing behavior for fish and seafood items if their close friends were known to frequently purchase and prepare fish and seafood products. Twenty-five percent of the single respondents stated that if friends were known to buy and prepare fish and seafood items frequently, then they would be more likely to include fish and seafood items in their purchases. In contrast, only 10.8% of the married respondents replied that the purchasing activity of friends did have a direct influence on their own purchasing behavior. Seventy-four percent of the single respondents and 90.1% of the married respondents reported that they were not likely to purchase fish and seafood items just because their friends frequently did so. When both groups were combined, 15.6% of the respondents exhibited positive behavioral responses to the influences of friends purchasing behavior, while 84.4% of the respondents reported that the frequency of seafood purchases and preparation by friends would not contribute to the inclusion of fish and seafood products into their purchases.

The final relationship, when testing for marital status significance, occurred when marital status was tested versus the psychographic statement similar menu item. This psychographic statement attempted to reveal the consumer's purchasing behavior for fish and seafood items when eating

out with friends, and their friends ordering first. Twenty-seven percent of the single respondents reported that if out-to-eat with friends and their friends ordered a seafood item, then they would select a similar menu choice. However, only 9.4% of the married respondents agreed with the statement and responded in a positive manner. In contrast, 72.5% of the single respondents and 90.5% of the married respondents reported that the menu choices of friends did not influence their decisions in selecting a similar or alternate menu choice. When both groups were combined, 15.7% of the respondents stated that they too would order a seafood menu item if a seafood menu item was first chosen by their dining partners. Alternatively, 84.2% of the respondents replied that their purchasing behavior was independent of the choices made by friends.

When evaluating for significant relationships among marital groups, it is important not only to distinguish between single and married respondents but, it is also important to characterize the household composition of the marital groups. For example, the sex of the single household member; the age of the household members; the number of children and their ages; the amount of disposable income available to each household; and the type of living arrangements present (i.e. roommates, relatives, etc.) will help in creating an environment that will influence the purchasing behavior of the household members. The composition of the household and the influences of the

family members are variables which will contribute to significant differences between households having only one family member and households having two or more family members. This theory is supported by the results presented within this section. In this study married respondents were characterized as equally distributing the duties of household food shopper between the female and the male and female household members, whereas the single respondents reported an almost equal distribution between the male member and the female member, which might possibly be representative of the sex of the single household. Married households were found to spend more per week on food eaten-at-home and on food eaten-away-from-home than their single counterparts. These results probably reflect the differences in household size. Married respondents reported the female as the main meal planner and the married respondents were reported as being more easily influenced by family members in their purchasing decisions. When evaluating for differences between marital status and psychographic variables, it was found that the married respondents were not as easily influenced by environmental stimuli, as were the single respondents, when making purchasing decisions.

Table XXI illustrates the average weekly per capita food expenditures and percentage of Midwest households purchasing food items weekly classified according to household size. In 1988, weekly per capita expenditures for

TABLE XXI

HOUSEHOLD SIZE 1988: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF MIDWEST HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Household size				
		1	2	3	4	5 or more
Household Characteristics:						
Households	147	31	58	23	20	15
Mean Age of householder (years)	47	50	50	45	40	34
Income before taxes (dollars)	29974	23783	30809	30409	34842	31266
Earners per household (number)	1.4	1.0	1.5	1.5	1.8	1.5
Average weekly, at-home, per person food expenditures:			DOLLARS			
Red meats	3.81	4.58	4.18	3.06	3.82	2.85
Fish & Seafood	1.56	6.76	2.08	0.69	1.36	0.67
Households purchasing in a week:			PERCENT			
Red meats	87.1	84.0	83.6	90.4	83.3	84.6
Fish & Seafood	72.5	68.0	75.4	61.9	77.7	53.8

red meats and fish/seafood were $3.81 and $1.56, respectively, for all household sizes. Households consisting of one family member were reported as having the greatest weekly per capita expenditures for both red meats and fish/seafood, $4.58 and $6.76, respectively, while two member households were reported as second in weekly per capita expenditures spending $4.18 for red meats and $2.Ø8 for fish and seafood. As the household size increased in members, weekly per capita expenditures for red meats and fish/seafood uniformly declined (with the exception of households having four members) with households of five or more members reporting the least per capita expenditures, $2.85 and $Ø.67, respectively.

Table XXI also presents the percentage of midwestern households purchasing food items in a week. In 1988, 87.1% and 72.5% of the households responding reported making weekly purchases of red meats and fish/seafood, respectively. In contrast to weekly food expenditures, where household sizes of three and five were reported as spending the least for red meats, households having three and five members were reported as representing the largest percentage of households making weekly purchases of red meats, 9Ø.4% and 84.6%, respectively. However, these same two groups were responsible for reporting the lowest percentage of households making weekly purchases of fish and seafood, 61.9% and 53.8%, respectively. Households having four and two members were reported as having the greatest

percentage of households making weekly purchases of fish and seafood, 77.7% and 75.4%, respectively.

From 1982-1988 dramatic increases in average weekly at-home, per capita food expenditures were seen for red meats and fish and seafood products: red meat expenditures increased 48.8% and fish/seafood expenditures increased 262.8%, over the national average. Shifts were seen also in the households which represented the greatest and the least per capita weekly expenditures for red meats and fish/seafood. In 1982, two members and one member households were reported as spending the most and the least, respectively, for red meats while households having five or more members were reported as spending the least. In 1982, one member households and five member households were reported as spending the most and the least, respectively, per capita, per week for fish and seafood items. In 1988, one member households still were represented as the households spending the most per week for fish and seafood items, while, households with five or more members were reported as spending the least. Increases were seen also in the percentage of households making weekly purchases of red meats and fish/seafood items from 1982-1988. From 1982-1988 the percentage of households making weekly red meat purchases increased 43.3%, while the percentage of households making weekly purchases of fish and seafood increased 44.6%. In 1982, households with six or more members and households with one member were represented as

the percentage of households making the greatest and the least weekly purchases of red meat items, respectively. However, in 1988, the percentage of households reporting the greatest and the least weekly purchases of red meat items were represented by household with three members and four members, respectively. A similar shift was observed in the percentage of households representing the greatest and the least weekly purchases of fish and seafood items. In 1982, households with six or more members were reported as the percentage of households making the greatest weekly purchases of fish and seafood items, whereas, in 1988, the greatest weekly purchases of fish and seafood were represented by households having four members. Similarly, in 1982, households with one member were reported as the percentage of households making the least weekly purchases of fish and seafood items, whereas, in 1988, the least weekly purchases was represented by households having three members.

Religious Affiliation

Forty or 27% of the sample responding were categorized as catholic and 102 or 68.9% of the respondents were classified as protestants. Six respondents failed to designate religious affiliation and thus were not included in the results when testing for chi-square significance.

TABLE XXII

MARITAL STATUS, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Marital Status		
Dependent Variable	Response	Single	Married	All
1). Household member who is the major food shopper	a) male	36.00	5.10	15.34
	b) female	50.00	50.00	50.00
	c) male/ female	6.00	38.78	27.70
		92.00*	93.88*	93.24*
		(X^2=35.88; df=6; $p \leq .000$)		
2). Weekly at-home food expenditures	a) < $50	92.00	41.84	58.78
	b) ≥ $50	8.00	58.16	41.72
		100.00	100.00	100.00
		(X^2=34.28; df=1; $p \leq .000$)		
3). Weekly away-from-home food expenditures	a) < $15	66.00	44.90	52.03
	b) ≥ $15	34.00	55.10	47.97
		100.00	100.00	100.00
		(X^2=5.91; df=1; $p \leq .015$)		
4). Household member who is the main meal planner	a) male	43.48	5.48	20.17
	b) female	56.52	94.52	79.83
		100.00	100.00	100.00
		(X^2=25.31; df=1; $p \leq .000$)		
5). Influence of family members on fish and seafood purchases	a) yes	40.00	71.43	60.81
	b) no	44.00	7.14	19.59
	c) some-times	10.00	17.35	14.86
		94.00*	95.92*	95.26*
		(X^2=29.80; df=3; $p \leq .000$)		

TABLE XXII (continued)

Item		Marital Status		
Dependent Variable	Response**	Single	Married	All
6). Influence of in-store samples on purchasing behavior	a) 1, 2 or 3	24.14	46.15	38.27
	b) 4 or 5	75.86	53.85	61.73
		100.00	100.00	100.00
		(X^2=3.82; df-1; $p \leq .05$)		
7). Fish/seafood section before red meat department	a) 1, 2 or 3	31.43	13.89	19.63
	b) 4 or 5	68.57	86.11	80.37
		100.00	100.00	100.00
		(X^2=4.60; df=1; $p \leq .032$)		
8). Influence of friends on fish and seafood purchases	a) 1, 2 or 3	25.71	10.81	15.60
	b) 4 or 5	74.29	89.19	84.40
		100.00	100.00	100.00
		(X^2=4.01; df=1; $p \leq .045$)		
9). Similar menu item	a) 1, 2 or 3	27.50	9.46	15.79
	b) 4 or 5	72.50	90.54	84.21
		100.00	100.00	100.00
		(X^2=6.36; df=1; $p \leq .012$)		

* Percentages do not add up to 100.00 due to respondents recording answers which deviated from the options being tested with chi-square.

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 response signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

A significant difference was seen when religion was tested versus weekly meals eaten away-from-home. Sixty percent of the catholics who responded reported eating $\leq$ 4 meals away-from-home each week, with 40% of the responding catholics eating $\geq$ 5 meals away-from-home. In contrast, 77.9% of the protestants who responded stated that $\leq$ 4 meals were eaten away-from-home each week, while 22.0% reported eating $\geq$ 5 meals away-from-home. when both groups were combined, 73.1% of the respondents reported eating away-from-home $\leq$ 4 times a week, with 26.8% replying that $\geq$ 5 meals were eaten away-from-home.

A significant result also was seen when religious affiliation was associated with the psychographic statement impact of commercial advertisement. This psychographic variable attempted to reveal the impact of commercial advertisement (i.e. TV, radio, newspapers, etc.) on the consumer's purchasing behavior for fish and seafood products. Forty-eight percent of the catholics who responded stated that the brands of fish and/or seafood products that they purchased were brands that they remembered seeing/hearing from commercial advertisements. In contrast, only 19.5% of the protestants who responded replied that fish and/or seafood purchases were made as a result of commercial advertisement influences. Fifty-two percent of the responding catholics and 80.4% of the responding protestants stated that commercial advertisements did not influence their purchasing behavior for specific

brands of fish and/or seafood products. When both groups were combined, only 26.6% of the respondents stated that commercial advertisements did have an impact on their purchasing behavior in selecting specific brands of fish and/or seafood. Seventy-three percent of the respondents, however, replied that purchasing behavior was not influenced by commercial advertisements.

Although few significant relationships existed between religious affiliation and variables specific to fish and seafood consumption, it is important to understand the impact that religious observances may have in determining the replies recorded by the respondents. The questionnaires used in this study were distributed to the respondents during Lent. During Lent, Catholics are characterized as not eating meat products on Friday. It is assumed that other food items, including fish and seafood, may be a substitute for the meat items which are not eaten. The Lent season, therefore, may cause the fish and seafood consumption responses to be seasonally exaggerated. Other religious affiliations such Judaism, Hinduism, and Islam are known to observe specific religious observances or practices which exclude certain food items from the diet. Therefore, it is important for the researcher to recognize the time period in which the study is being conducted. It also is important for the researcher to isolate individual religious sects and evaluate for their impact on the study being conducted.

TABLE XXIII

RELIGION, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Religious Affiliation		
Dependent Variable	Response**	Catholic	Protestant	All
1). Weekly meals eaten away-from-home	a) ≤ 4	60.00	77.98	73.15
	b) ≥ 5	40.00	22.02	26.85
		100.00	100.00	100.00
		($X^2=4.82$; df=1; $p \leq .028$)		
2). Influence of commercial advertising on fish/seafood purchases	a) 1, 2 or 3	48.15	19.51	26.61
	b) 4 or 5	51.85	80.49	73.39
		100.00	100.00	100.00
		($X^2=8.53$; df=1; $p \leq .003$)		

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 response signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

Household Income

Thirty-eight or 25.7% of the sample responding reported earning an annual household income of ≤ $17,000; 30 or 20.3% of the respondents reported an annual household income between $17,001 - $27,000; 27 or 18.2% were reported as earning between $27,001 - $37,000; and 47 or 31.7% of the respondents stated that annual household earnings were ≥ $37,001. Six respondents failed to designate household income classification and were thus not included in the results when testing for chi-square significance. In this study, the researchers have collapsed the income classifications into two representative groups for the purpose of accommodating a 2x2 chi-square analysis. The two representative income groups include those households earning ≤ $32,000 annually and ≥ $32,001 annually.

A significant difference was observed between household income and weekly away-from-home food expenditures. Sixty-five percent of the respondents earning ≤ $32,000 annually reported that weekly away-from-home food expenditures were < $15, while 34.9% of the same income group reported weekly expenditures ≥ $15. In contrast, 65.1% of the respondents earning ≥ $32,001 annually were reported as spending ≥ $15 per week on food eaten away-from-home. Thirty-five percent of the respondents earning ≥ $32,001 annually reportedly away-from-home food expenditures to be < $15. When both income groups were combined, 51.6% of the respondents reported weekly away-from-home food expenditures to be <

$15, while 18.3% of the respondents were reported spending ≥ $15 per week on food eaten away-from home.

A significant difference was seen to exist between the variables household income and the household member who is the main meal planner. Twenty-six percent of the respondents earning ≤ $32,000 annually contributed the household meal planning activity to the male member, while only 11.7% of the respondents earning ≥ $32,001 annually reported the male as the main meal planner. Seventy-three percent of the respondents earning ≤ $32,000 and 88.2% of the respondents earning ≥ $32,001 reported that the female household member was the main meal planner. When both income groups were combined, 20.1% of the respondents reported that the household meal planning activity was performed by the male member, while 79.8% of the respondents stated that the female was the household's main meal planner.

A significant result also was seen when household income was associated with the psychographic statement impact of commercial advertisement. This psychographic variable attempted to reveal the impact of commercial advertisement (i.e. TV, radio, newspapers, etc.) on the consumer's purchasing behavior for fish and seafood products. Thirty-four percent of the respondents earning ≤ $32,000 annually stated that the brands of fish and/or seafood products that they purchased were brands that they remembered seeing/hearing from commercial advertisements.

In contrast, only 17.0% of the respondents earning ≥ $32,001 annually replied that fish and/or seafood purchases were made as a result of commercial advertisement influences. Sixty-six percent of the respondents earning ≤ $32,000 and 82.9% of the respondents earning ≥ $32,001 stated that commercial advertisements did not influence their purchasing behavior for specific brands of fish and/or seafood products. When both income groups were combined, only 26.6% of the respondents stated that commercial advertisements did have an impact on their purchasing behavior in selecting specific brands of fish and/or seafood. Seventy-three percent of the respondents, however, replied that purchasing behavior was not influenced by commercial advertisements.

A significant difference occurred when household income was tested versus purchasing desire. This psychographic variable attempted to reveal the consumer's purchasing behavior when fish/seafood purchases were based on desire, not price. Forty-six percent of the respondents earning ≤ $32,000 annually reported that personal desire for fish/seafood products was sometimes placed before the price when making purchases. In contrast, 71.4% of the respondents earning ≥ $32,001 annually also reported that personal desire was sometimes placed before price when making fish/seafood purchases. Fifty-three percent of the respondents earning ≤ $32,000 and 28.5% of the respondents ≥ $32,001, however, reported that price influenced the purchasing decisions of fish/seafood products more than

their personal desire for these items. When both income groups were combined, 58.1% of the respondents reported that personal desire was sometimes more influential than price when deciding upon fish/seafood purchases, while 41.9% of the respondents stated that fish and/or seafood purchases were influenced by price more than their personal desire for the products.

A significant relationship was seen to exist between household income and unfamiliar fish/seafood products. This psychographic variable attempts to reveal the consumer's purchasing behavior for fish and/or seafood products when introduced to unfamiliar types and/or forms. Fifty-five per cent of the respondents earning $\leq$ $32,000 annually reported that they were wary of purchasing fish and/or seafood products that were unfamiliar to them. Only 34.6% of the respondents earning $\geq$ $32,000 annually reported behavioral characteristics similar to the respondents earning $\leq$ $32,000. Forty-four percent of the respondents earning $\leq$ $32,000 and 65.3% of the respondents earning $\geq$ $32,000 stated that fish and/or seafood purchases were not inhibited as a result of product unfamiliarity. When both income groups were combined, 46.0% of the respondents reported that fish/seafood unfamiliarity negatively influenced their purchasing behavior for these products, while 53.9% of the respondents stated that product unfamiliarity did not impact upon the purchasing behavior for these items.

The final result, when testing for income significance, occurred when household income was tested versus unfamiliarity of cooking methods. This psychographic variable attempted to reveal the consumer's purchasing behavior for fish and/or seafood products despite the unfamiliarity of cooking methods for these items. Twenty-seven per cent of the respondents earning $\leq$ $32,000 annually reported that they did not buy fish/seafood products that often because they were unfamiliar with cooking methods for these items. In contrast, only 8.3% of the respondents earning $\geq$ $32,001 reported that their fish/seafood purchases were inhibited due to a lack of cooking knowledge for these items. Seventy-three per cent of the respondents earning $\leq$ $32,000 and 91.6% of the respondents earning $\geq$ $32,001 stated that fish and/or seafood purchases were not dependent on the familiarity of cooking methods for these items. When both income groups were combined, 18.4% of the respondents stated that they did not buy fish and/or seafood products that often due to the unfamiliarity of cooking methods for these items. However, 81.5% of the respondents stated that fish and/or seafood purchases were not influenced by their lack of cooking knowledge for these items.

In this study, few significant relationships were found to exist when testing household income against an array of varying dependent variables.

It is important for the reader to understand that the significant relationships found between household income and

fish/seafood consumption patterns not only reflects the differences between income groups, but also in the number of income earners per household. In this study, it was found that as the total household income rose, a concomitant rise in the number of household earners was observed. Therefore, households earning $\geq$ $32,001 were characterized as having a greater number of dual incomes, whereas, households earning $\leq$ $32,000 were more frequently reported as having one income earner. However, from the significant relationships that were found to exist, certain assumptions can be made that may prove helpful to the seafood producers and retailers. The results of this study, when testing for household income significance, found that when annual income exceeded $32,000 per year approximately 48.2% more households increased their away-from-home food expenditures to $\geq$ $15 per week. The results also showed that households earning $\geq$ $32,001 annually spent more per week on food eaten away-from-home than their counterparts who reported earning $\leq$ $32,000. Female household members were reported to be the main meal planner, to a greater degree, in households earning $\geq$ $31,001 than in households earning $\leq$ $32,000 annually. Significant behavioral characteristics were also observed between the two income groups. Households earning $\geq$ $32,001 annually may be characterized as consumers who are not easily influenced by environmental stimuli; consumers who are more apt to buy on impulse than be influenced by price; and as consumers who are not inhibited in making

purchases that may be unfamiliar or require additional information for proper preparation. In contrast, households earning ≤ $32,000 annually illustrate behavioral characteristics that are more conservative, cautious, price-conscious, and commercially receptive.

Table XXIV illustrates the average weekly per capita food expenditures and percentage of Midwest households purchasing food items weekly classified according to income class. In 1988, weekly per capita expenditures for red meats and fish/seafood were $3.81 and $1.56, respectively, for all income classes. Households earning ≤ $12,000 and between $12,001 - $17,000 were reported as having the greatest weekly per capita expenditures for red meats, $4.84 and $4.07, respectively, while households earning between $22,001 - $27,000 were reported as having the lowest weekly per capital expenditures for red meat, $2.92. The largest weekly per capita expenditures for fish and seafood was recorded by households earning in excess of $50,000, $2.55, and households earning ≤ $12,000 were second in weekly fish/seafood expenditures at $2.15 per person. The lowest weekly per capita expenditures for fish and seafood were reported by households earning between $22,001 - $27,000 and between $37,000 - $50,000, $0.77 and $0.91, respectively.

Table XXIV also presents the percentage of Midwestern households purchasing food items in a week classified according to income class. In 1988, 87.1% and 72.5% of the

TABLE XXIV

INCOME CLASS, 1988: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGES OF MIDWEST HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Income Class						
		$12,000 or Below	$12,000 to $17,000	$17,001 to $22,000	$22,001 to $27,000	$27,001 to $37,000	$37,001 to $50,000	$50,001 and Over
Household Characteristics:								
Households	141	25	12	15	15	27	20	27
Mean Age of householder (years)	47	46	60	50	46	42	41	48
Members per household (number)	2.5	2.0	2.2	2.4	2.6	2.9	2.6	2.7
Earners per household (number)	1.4	1.1	1.5	1.2	1.7	1.5	1.4	1.7
Average weekly, at-home per person food expenditures:					DOLLARS			
Red meats	3.81	4.84	4.07	3.75	2.92	3.42	3.67	3.43
Fish & Seafood	1.56	2.15	1.09	1.74	0.77	1.12	0.91	2.55
Households purchasing in a week:					PERCENT			
Red meats	87.1	86.3	91.6	85.7	73.3	92.3	100.0	80.0
Fish & Seafood	72.5	86.3	66.6	71.4	60.0	73.0	56.2	80.0

households responding reported making weekly purchases of red meats and fish/seafood, respectively. The largest percentage of households making weekly purchases of red meats was reported by the households earning between $37,001 - $50,000 and between $27,001 - $37,000, 100.0% and 92.3%, respectively. The lowest percentage of households making weekly purchases of red meats belongs to the same income class which was reported as having the lowest weekly per capita expenditures for red meats. This income class represents those households which earn between $22,001 - $27,000, in which 73.3% of the households are reported as making weekly purchases for red meats. The largest percentage of households making weekly purchases of fish and seafood coincides also with the income classes which reported the greatest weekly per capita expenditures for fish and seafood. Eighty-six per cent of all households earning $\leq$ $12,000 and 80.0% of all households earning in excess of $50,000 reported making weekly purchases of fish and seafood products. The lowest percentage of households, 56.2%, making weekly purchases of fish and seafood is represented by the income class $37,001 - $50,000. Coincidently, this same income class was reported as representing households with one of the lowest weekly per capita expenditures for fish and seafood.

From 1982-1988 dramatic increases in average weekly, at-home, per capita food expenditures were seen for red meats and fish/seafood products; red meat expenditures

increased 48.8% and fish/seafood expenditures increased 262.8%, over the national average. Shifts were seen also in the income classes which represented the greatest and the least per capita weekly expenditures for red meats and fish/seafood. In 1982, households earning ≥ $40,000 per year and households earning ≤ $5,000 were reported as spending the most and the least, respectively, for red meat items weekly, whereas, in 1988, households earning ≤ $12,000 per year and households earning between $22,000 - $27,000 per year were reported as spending the most and the least for per capita weekly purchases of red meat items. In 1982, households earning ≥ $40,000 per year and households earning ≤ $5,000 per year were reported as spending the most and the least, respectively, per capital per week for fish/seafood items. In 1988, households earning ≥ $50,000 per year still were represented as the income class spending the most per week for fish and seafood items, while households earning between $22,000 - $27,000 per year were reported as spending the least. Increases were seen also in the percentage of households making weekly purchases of red meats and fish/seafood items, from 1982-1988. From 1982-1988, the percentage of households making weekly red meat purchases increased 43.3%, over all income classes while the percentage of households making weekly purchases of fish and seafood increased 44.6%. In 1982, households earning ≥ $40,000 per year and households earning ≤ $5,000 per year were represented as the percentage of households making the

greatest and the least weekly purchases of red meat items, respectively. However, in 1988, the percentage of households reporting the greatest and the least weekly purchases of red meat items were represented by households earning between $37,000 - $50,000 per year and households earning between $22,000 - $27,000 per year, respectively. A similar shift was observed in the percentage of households representing the greatest and the least weekly purchases of fish and seafood items. In 1982, households earning $\geq$ $40,000 per year were reported as the percentage of households making the greatest weekly purchases of fish and seafood items, whereas, in 1988, the greatest weekly purchases of fish and seafood were represented by households earning $\leq$ $12,000 per year. Similarly, in 1982, households earning $\leq$ $5,000 per year were reported as the percentage of households making the least weekly purchases of fish and seafood items, whereas, in 1988, the least weekly purchases was represented by households earning between $37,000 - $50,000 per year.

Highest Degree

Sixty-six or 44.6% of the sample responding was classified as earning a high school diploma or GED equivalent; 16 or 10.8% of the respondents were classified as earning a two-year associates degree; and 60 or 40.6% of the respondents were classified as earning a bachelor of science degree or beyond; and six or 4.1% of the respondents

TABLE XXV

INCOME, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Household income		
Dependent Variable	Response**	≤$32000	≥$32001	All
1). Weekly away-from-home food expenditures	a) <$15	65.06	34.85	51.68
	b) ≥$15	34.94	65.15	48.32
		100.00	100.00	100.00
		(X^2=13.44; df=1; $p \leq .00$)		
2). Household member who is the main meal planner	a) male	26.47	11.76	20.17
	b) female	73.53	88.24	79.83
		100.00	100.00	100.00
		(X^2=3.91; df=1; $p \leq .048$)		
3). Influence of commercial advertising on fish/ seafood purchases	a) 1, 2 or 3	33.87	17.02	26.61
	b) 4 or 5	66.13	82.98	73.39
		100.00	100.00	100.00
		(X^2=3.88; df=1; $p \leq .049$)		
4). Fish & seafood purchases based on desire not price	a) 1, 2 or 3	46.43	71.43	58.10
	b) 4 or 5	53.57	28.57	41.90
		100.00	100.00	100.00
		(X^2=6.71; df=1; $p \leq .010$)		

TABLE XXV (continued)

Item		Household income		
Dependent Variable	Response**	≤$32000	≥$32001	All
5). Unfamiliarity in influencing fish & seafood purchases	a) 1, 2 or 3	55.36	34.62	46.09
	b) 4 or 5	44.44	65.38	53.91
		100.00	100.00	100.00
		(X^2=5.02; df=1; p≤.025)		
6). Don't buy fish due to unfamiliarity of cooking methods	a) 1, 2 or 3	27.27	8.33	18.45
	b) 4 or 5	72.73	91.67	81.55
		100.00	100.00	100.00
		(X^2=6.11; df=1; p≤.013)		

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 response signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

reported that none of the above degrees or diploma had been obtained. The only relationships to exist, when testing for highest degree significance, occurred when highest degree was tested versus availability (a purchasing criterion for fish and seafood).

Forty-three per cent of the respondents who earned a high school diploma and/or an associates degree reported that availability of the desired fish/seafood types and/or forms was a most important criteria in the purchasing decision for fish and seafood. In contrast, 52.2% of the respondents who have obtained at least a B.S. degree reported that availability of desired types and/or forms was an important purchasing criterion. Ten per cent of the respondents who have obtained at least a B.S. degree stated that availability was a least important purchasing criterion, whereas, 37.5% of the respondents with a high school diploma and/or an associates degree replied that availability of desired fish/seafood types and/or forms was least important in determining their purchasing behavior for fish and seafood products. Nineteen per cent of the respondents with a high school diploma and/or an associates degree and 18.1% of the respondents with at least a B.S. degree stated that they felt indifferent to availability as a purchasing criterion for fish and seafood products. Twenty per cent of the respondents with at least a B.S. degree failed to respond. When both groups were combined,

51.3% of the respondents stated that availability of desired fish and seafood types and/or forms was a most important purchasing criterion, while 12.8% of the respondents stated that availability was a least important purchasing criterion. Eighteen per cent of the respondents reported an attitude of indifference toward availability and its influence on fish and seafood purchases.

Table XXVI illustrates the average weekly per capita food expenditures and percentage of Midwest households purchasing food items weekly classified according to level of education. In 1988, the average weekly, at-home, per capita food expenditures for red meats and fish/seafood were $3.81 and $1.56, respectively, for all levels of education. In 1988, respondents who had reported earning a two year associates degree were reported as spending 57.4% more on red meats per week than the average respondent, $6.00. Respondents who reported earning a high school diploma and respondents who reported earning no diploma/degree, were also reported to be the largest per capita spenders for red meats, $3.86 and $3.62, respectively, whereas, the respondents who were reported as having a M.S. or Ph.D., were reported as having the lowest weekly per capita expenditures for red meats, $2.64. In 1988, the respondents who had received a two year associates, degree and the respondents who had earned a M.S. or Ph.D. were reported as allocating the greatest expenditures for weekly per capita

TABLE XXVI

LEVEL OF EDUCATION 1988: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF MIDWEST HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Level of Education				
		High School Diploma	2-year Associate Degree	B.S. or B.A.	M.S. &/or Ph.D.	None of the Following
Household Characteristics:						
Households	147	64	17	47	13	6
Mean age of householder (years)	47	49	42	45	46	56
Income before taxes (dollars)	29974	23024	31058	36311	41269	21000
Members per household (number)	2.5	2.7	2.2	2.4	2.5	2.0
Earners per household (number)	1.4	1.4	1.4	1.5	1.6	1.3
Average weekly, at-home, per person food expenditures:				DOLLARS		
Red meats	3.81	3.86	6.00	2.69	2.64	3.62
Fish & Seafood	1.56	1.36	2.11	1.34	1.68	1.20
Households purchasing in a week:				PERCENT		
Red meats	87.1	89.8	88.2	70.7	76.9	100.0
Fish & Seafood	72.5	72.8	58.8	68.2	61.5	60.0

purchases of fish and seafood, $2.11 and $1.68, respectively. In contrast, the respondents who were classified as earning no diploma/degree were reported as spending the least for weekly purchases of fish and seafood items, $1.20.

Table XXVI presents the percentage of Midwestern urban households purchasing food items in a week. In 1988, the average percentage of households purchasing red meats and fish/seafood weekly were 87.1% and 72.5%, respectively, for all levels of education. In 1988, households earning no diploma/degree and households earning a high school diploma were reported as representing the largest percentage of households making weekly purchases of red meats, 100% and 89.8%, respectively, whereas, households who were reported to have earned a B.S. or B.A. degree were representative of the lowest percentage of households making weekly red meat purchases, 70.7%. In 1988, the largest percentage of households making weekly purchases of fish and seafood items were represented by the respondents who had received a high school diploma and the respondents who were reported to have earned a B.S. or B.A. degree. 72.8% and 68.%, respectively. In contrast, households who have reported earning a two year associates degree represented the lowest percentage of households making weekly purchases of fish and seafood items, 58.8%.

TABLE XXVII

HIGHEST DEGREE, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Highest degree		
Dependent Variable	Response	H.S. Diploma &/or Associate	B.S. or Beyond	All
1). Availability - a purchasing criterion for fish & seafood	a) Most important	43.75	52.27	51.35
	b) Least important	37.50	9.85	12.84
	c) Indifferent	18.75	18.18	18.24
		100.00	80.30*	82.43*
		(X^2=11.85; df=3; $p \leq .008$)		

* Percentages do not add up to 100.00 due to the failure of respondents to reply.

Physician's Advice

Forty-one or 27.7% of the sample responding reported that a physician or some other source had advised them to increase their consumption of fish and/or seafood products. One hundred six or 71.6% of the sample responding stated that no one had advised them to increase their consumption of fish and/or seafood products.

The variable, physician's advice, was used as an independent variable to record the number of respondents who have been advised, by a physician or someone else, to increase their consumption of fish and/or seafood products. These results were then tested against the questions located within the questionnaire to determine if the advice of a physician, or someone else, did significantly influence the consumer's purchasing behavior for fish/seafood products.

A significant difference was observed when physician's advice was tested versus weekly away-from-home fish/seafood purchases. This variable attempted to reveal the number of meals eaten away-from-home per week which included a fish and/or seafood item. Eighty per cent of the respondents who had received a physician's, or someone else's advice, reported that ≤ 1 meal eaten away-from-home each week consisted of a fish and/or seafood item. In contrast, 87.7% of the respondents who had received no advice stated that ≤ 1 meal eaten away-from-home each week consisted of a fish and/or seafood item. Twelve per cent of the respondents who had received a physician's, or someone else's advice,

and 12.2% of the respondents who had received no advice were reported as including fish and/or seafood into their menu choices $\geq$ 2 times per week when eating away-from-home. When both groups were combined, 85.7% of the respondents reported that when eating away-from-home $\leq$ 1 meat per week consisted of a fish and/or seafood item. In contrast, only 12.2% of the respondents stated that $\geq$ 2 meals per week, eaten away-from-home, consisted of a fish and/or seafood item.

A significant relationship existed between the variables physician's advice and frequency of fish/seafood preparation at-home. Nineteen per cent of the respondents who had been advised by a physician, or someone else, reported that the frequency of fish/seafood preparation for at-home consumption was between Ø.5 - 1 times a month, whereas 4Ø.5% of the respondents who had not received any advice were also reported as preparing fish/seafood items Ø.5 - 1 times a month. In contrast, a significant 8Ø.4% of the respondents who had received the advice of a physician, or someone else, reported that fish/seafood was prepared at-home $\geq$ 2 times a month, while only 59.4% of the respondents not receiving advice reported a similar frequency for at-home fish/seafood consumption. When both groups were combined, a frequency of Ø.5 - 1 times a month was reported by 34.6% of the respondents, and 65.3% of the respondents stated that fish/seafood items were prepared at-home $\geq$ 2 times a month.

TABLE XXVIII

PHYSICIAN'S ADVICE, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Physician's Advice		
Dependent Variable	Response	Yes	No	All
1). Number of meals eaten away-from-home per week that include a fish/seafood item	a) ≤ 1	80.49	87.74	85.71
	b) ≥ 2	12.20	12.26	12.24
		92.69*	100.00	97.95*
		($X^2=7.93$; df=2; $p \leq .019$)		
2). Frequency of at-home preparation of fish/ seafood items	a) .5-1 per mo.	19.51	40.57	34.69
	b) ≥ 2 per mo.	80.49	59.43	65.31
		100.00	100.00	100.00
		($X^2=5.78$; df=1; $p \leq .016$)		

* Percentages do not add up to 100.00 due to the failure of respondents to reply.

Family Influences

The likes/dislikes of family members was used as an independent variable to measure the impact of family influences on the consumer's purchasing behavior for fish and seafood items. Interestingly, only one relationship was found to exist when testing for family influence significance. This relationship occurred when family influences were tested versus fish/seafood health advantages.

This psychographic variable attempted to reveal the consumer's purchasing behavior for fish and/or seafood when the consumer was aware of their health advantages. Seventy-nine per cent of the respondents who stated that family influences did impact purchasing decisions reported that fish/seafood items were purchased because of the definite health advantages attributed to their consumption. Likewise, however, significantly lower, 68.7% of the respondents who stated that family influences did not affect purchasing decisions reported that fish/seafood items were purchased because of the definite health advantages attributed to their consumption. In contrast, 20.6% of the respondents reporting positive family influences; 31.2% of the respondents reporting negative family influences; and 15.3% of the respondents reporting occasional family influences stated that fish and/or seafood purchases were not dependent on their knowledge of attributable nutritional significance. When all groups were combined,

74.7% of the respondents stated that fish and/or seafood items were purchased because of their attributed nutritional significance, while 25.2% of the respondents stated that fish and/or seafood purchases were not dependent on their knowledge of nutritional significance.

TABLE XXIX

FAMILY INFLUENCES, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Family influences			
Dependent Variable	Response**	Yes	No	Sometimes	All
1). Fish/seafood items are purchased because of their nutritional significance	a) 1, 2 or 3	79.37	68.75	84.62	74.75
	b) 4 or 5	20.63	31.25	15.38	25.25
		100.00	100.00	100.00	100.00
		(X^2=9.59; df=3; $p \leq .022$)			

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

Caloric Viewpoint

Three or 2.0% of the sample who responded reported that they generally viewed fish/seafood product as high in calories; 34 or 23.0% of the respondents reported that they generally viewed fish/seafood products as being moderate in caloric content; 86 or 58.1% of the respondents reported fish/seafood products as being low in calories; and 24 or 16.2% of the respondents stated an attitude of indifference in describing their caloric view of fish/seafood products. In this study, the researchers have opted to eliminate the three responses representing high caloric content from the significance testing, due to the low percentage of sample representation. The three classifications that were used, when testing for viewpoint significance, were moderate caloric content, low caloric content, and indifference to caloric content.

A significant relationship was seen to exist when caloric viewpoint was tested versus frequency of at-home fish/seafood preparation. Twenty-three per cent of the respondents who viewed fish/seafood as having moderate caloric content were reported as preparing fish and/or seafood items 0.5 - 1 time per month, at home, whereas, 76.4% of this same group reported an at-home preparation frequency of $\geq$ 2 times per month. In contrast, only 68.6% of the respondents who viewed fish/seafood as low in calories reported that fish and/or seafood items were prepared at-home $\geq$ 2 times per month, while 31.4% of the

respondents reported an at-home preparation frequency of Ø.5 - 1 times per month. Sixty-seven per cent of the respondents who reported an indifference to caloric content reported an at-home preparation frequency of Ø.5 - 1 times per month, while 33.3% of the respondents stated that fish and/or seafood items were prepared at home $\geq$ 2 times per month. When both groups were combined, 35.1% of the respondents reported that fish and/or seafood items were prepared at home Ø.5 - 1 times per month, whereas, 64.8% of the respondents reported an at-home preparation frequency of $\geq$ 2 times per month.

A significant result also was observed when caloric viewpoint was associated with the number of away-from-home meals which included a fish/seafood menu item. Seventy-three per cent of the respondents who viewed fish/seafood as having moderate caloric content were reported as eating $\leq$ 1 fish and/or seafood meal away-from-home per week, whereas, 26.4% of the respondents reported that $\geq$ 2 meals away-from-home per week consisted of a fish and/or seafood menu item. In contrast, only 8.1% of the respondents who viewed fish/seafood as low in calories were reported to include fish and/or seafood into their away-from-home meals $\geq$ 2 times per week, while 89.5% of the same respondents reported consuming $\leq$ 1 fish/seafood meal away-from-home each week. Ninety-six per cent of the respondents who reported an indifference to caloric content reported that $\leq$ 1 meal per week, away-from-home, consisted of a fish and/or seafood

item, while 4.1% reported consuming ≥ 2 fish/seafood meals away-from-home each week. When all groups were combined, 85.8% of the respondents stated that ≤ 1 away-from-home meals per week consisted of a fish and/or seafood menu item, while 12.1% of the respondents were reported as consuming ≥ 2 fish/seafood meals away-from-home each week.

TABLE XXX

RESPONDENT'S VIEWPOINT OF FISH/SEAFOOD, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Caloric viewpoint			
Dependent Variable	Response	Moderate	Low	Indifferent	All
1). Frequency of at-home fish/seafood preparation	a) .5-1 mo.	23.53	31.40	66.67	35.14
	b) ≥ 2 mo.	76.47	68.60	33.33	64.86
		100.00	100.00	100.00	100.00
		(X^2=27.1; df=8; $p \leq .001$)			
2). Number of meals eaten away-from-home which include a fish/seafood menu item	a) ≤ 1	73.53	89.53	95.83	85.81
	b) ≥ 2	26.47	8.14	4.17	12.16
		100.00	100.00	100.00	100.00
		(X^2=13.55; df=4; $p \leq .009$)			

Away-From-Home Fish/Seafood Purchases

Eighty-five or 57.4% of the sample who responded reported that when eating away-from-home at least one meal per week consisted of a fish and/or seafood menu item; 14 or 9.5% of the respondents reported that two-three meals per week consisted of a fish and/or seafood menu item; four or 2.7% of the respondents stated that four-five meals per week included a fish and/or seafood menu item; four or 2.7% of the respondents stated that four-five meals per week included a fish and/or seafood menu item; and 42 or 28.4% of the respondents stated that fish and/or seafood menu items were not chosen when eating away-from-home. Three of the respondents failed to answer the question and were thus not included in the results when testing for chi-square significance. In this study, the researchers have collapsed the response frequencies into two classifications. The two classifications represent the number of respondents who included fish/seafood $\leq$ 1 times a week and the number of respondents who included fish/seafood $\geq$ 2 times per week. The response frequencies were collapsed into two classifications to accommodate the significance testing using a 2x2 chi-square design.

A significant result was observed when away-from-home fish/seafood purchases was tested versus product packaging. This psychographic variable attempted to reveal the consumer's purchasing behavior according to the attractiveness of the product's package. Fifteen per cent

of the respondents who reported consuming $\leq$ 1 fish/seafood meal away-from-home per week stated that food items were often bought according to how attractive the product's package was. In contrast, 85.1% of the respondents who reported $\leq$ 1 meal per week stated that the attractiveness of the product's package did not influence their purchasing decision for food items. Twenty-eight per cent of the respondents who were reported as consuming $\geq$ 2 fish/seafood meals away-from-home per week stated that package appearance did impact on their food purchasing decisions, while 71.4% of these same respondents claimed that purchasing decisions were not influenced by the attractiveness of the product's package. When both groups were combined, 18.3% of the respondents reported that package attractiveness impacted favorably on purchasing decisions, whereas 81.6% of the respondents stated that food purchases were not dependent on the attractiveness of the product's package.

A significant relationship also existed between away-from-home fish/seafood purchases and personal desire. This psychographic variable attempted to reveal the consumer's purchasing behavior for fish and/or seafood when purchases were dependent primarily on personal desire rather than price. Fifty-six per cent of the respondents who reported consuming $\leq$ 1 fish/seafood meal away-from-home per week stated that personal desire for fish and/or seafood items influenced purchasing decisions more greatly than product

price. In contrast, 43.3% of the same respondents reported that personal desire for fish and/or seafood items were never placed before the price of the product.

Eighty-three per cent of the respondents who were reported as consuming $\geq$ 2 meals per week, stated that personal desire for fish/seafood products was always placed before the product's price, whereas 16.6% of the respondents stated that product price had a greater impact in influencing purchasing decisions than personal desire for the item. When both groups were combined, 58.6% of the respondents stated that personal desire for fish and/or seafood products influenced purchasing decisions more greatly than product price, whereas 41.3% of the respondent reported that product price was always evaluated prior to the influences of personal desire when making fish and/or seafood purchases.

TABLE XXXI

NUMBER OF MEALS EATEN AWAY-FROM-HOME PER WEEK THAT INCLUDED A FISH AND/OR SEAFOOD ITEM, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Number of meals		
Dependent Variable	Response**	≤ 1	≥ 2	All
1). Influence of packaging on consumer purchases	a) 1, 2 or 3	14.81	28.57	18.37
	b) 4 or 5	85.19	71.43	81.63
		100.00	100.00	100.00
		($X^2=6.32$; df=2; $p \leq .042$)		
2). Fish and/or seafood purchases based on personal desire rather than price	a) 1, 2 or 3	56.67	83.33	58.65
	b) 4 or 5	43.33	16.67	41.35
		100.00	100.00	100.00
		($X^2=6.0$; df=2; $p \leq .05$)		

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

Meal Planner

Ninety or 60.8% of the sample who responded reported that the female household member was the main meal planner for the household; 22 or 14.9% of the respondents reported that the household meal planning activities were performed by the male household member; 27 or 18.2% of the respondents reported that household meal planning activities were performed by both the female and male household members; and seven or 4.8% of the respondents reported that household meal planning activities were performed by someone other than the male or female household members. In this study, the researchers have collapsed the response frequencies into two classifications. The two classifications represent the number of respondents who reported the female as the household meal planner and the number of respondents who reported the male as the household meal planner. The response frequencies were collapsed into two classifications to accommodate the significance testing using a 2x2 chi-square design.

A significant result was observed when household meal planner was tested versus unfamiliarity of cooking methods. This psychographic variable attempted to reveal the consumer's purchasing behavior for fish and/or seafood products when they were unfamiliar with cooking methods for these items. Eleven per cent of the females who were classified as the household meal planner reported that fish and/or seafood products were not purchased that often

because of their unfamiliarity with cooking methods for these items. In contrast, 88.7% of the female household meal planners stated that fish and/or seafood purchases were not influenced by their knowledge of cooking methods for these items. Forty-four per cent of the males who were reported as the household meal planner reported that fish and/or seafood purchases were influenced by their knowledge of cooking methods, while 55.5% of the male meal planners stated that fish and/or seafood purchases were not dependent on their knowledge of cooking methods for these items. When both groups were combined, however, only 18.7% of the respondents reported that fish and/or seafood purchases were influenced by knowledge of cooking methods, while 81.2% of the respondents stated that fish and/or seafood purchases were independent of their cooking knowledge.

TABLE XXXII

MEAL PLANNER, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE ($p \leq .05$)

Item		Meal Planner		
Dependent Variable	Response**	Male	Female	All
1). Fish/seafood purchases influenced by unfamiliarity of cooking methods	a) 1, 2 or 3	44.44	11.29	18.75
	b) 4 or 5	55.56	88.71	81.25
		100.00	100.00	100.00
		(X^2=10.06; df=1; $p \leq .002$)		

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

Meal Preparation

Eighty-nine or 60.1% of the sample who responded reported that the household meals were prepared by the female household member; 22 or 14.9% of the respondents reported that the male household member prepared the majority of household meals; 27 or 18.2% of the respondents reported that meal preparation activities were performed by both the female and male household members; and eight or 5.4% of the respondents reported that household meals were prepared by someone other than the male or female household members. In this study, the researchers have collapsed the response frequencies into two classifications. The two classifications represent the number of respondents who reported the female as the household meal preparer and the number of respondents who reported the male as the household meal preparer. The response frequencies were collapsed into two classifications to accommodate the significance testing using a 2x2 chi-square design.

A significant result was observed when household meal preparation was tested versus unfamiliarity of cooking methods. This psychographic variable attempted to reveal the consumer's purchasing behavior for fish and/or seafood products when they were unfamiliar with cooking methods for these items. Twelve per cent of the female who were classified as the household meal preparer reported that fish and/or seafood products were not purchased that often because of their unfamiliarity with cooking methods for

these items. In contrast, 87.6% of the female household meal preparers stated that fish and/or seafood purchases were not influenced by their knowledge of cooking methods for these items. Forty-two percent of the males who were reported as the household meal preparer reported that fish and/or seafood purchases were influenced by their knowledge of cooking methods, while 57.8% of the male meal preparers stated that fish and/or seafood purchases were not dependent on their knowledge of cooking methods for these items. When both groups were combined, however, only 19.0% of the respondents reported that fish and/or seafood purchases were influenced by knowledge of cooking methods, whereas, 80.9% of the respondents stated that fish and/or seafood purchases were independent of their cooking knowledge.

TABLE XXXIII

MEAL PREPARATION, 1988: PERCENTAGE OF RESPONDENTS REPLYING TO AVAILABLE RESPONSES OF QUESTIONS THAT DISPLAYED CHI-SQUARE SIGNIFICANCE ($p \leq .05$)

Item		Meal preparation		
Dependent Variable	Response**	Male	Female	All
1). Fish/seafood purchases influenced by unfamiliarity of cooking methods	a) 1, 2 or 3	42.11	12.31	19.05
	b) 4 or 5	57.89	87.69	80.95
		100.00	100.00	100.00
		(X^2=8.46; df=1; $p \leq .004$)		

** The 1, 2 or 3 response signifies that the consumer would act favorable if placed in this consumer setting. A one would indicate an "always" response, whereas a three would indicate a "sometimes" response. A 4 or 5 signifies that the consumer would act unfavorably if placed in this consumer setting. A five would indicate a "never" response.

Geographic Location

One of the main objectives in this study was to determine the consumer expenditure patterns of Midwest households for red meats, fish and seafood. Tables illustrating consumer expenditure patterns based on age, sex, race, income, household composition, and level of education have previously been presented and discussed. Table XXXIV illustrates the average weekly per capita food expenditures and percentage of Midwest households purchasing food items weekly classified according to geographic location. In 1988, the average weekly, at-home per capita food expenditures for red meats and fish/seafood were $3.81 and $1.56, respectively for all states. In 1988, respondents from Texas and Nebraska were reported as spending the most for per capita consumption of red meats, $5.38 and $4.55, respectively whereas, respondents from Kansas were reported as spending the least for per capita consumption of red meats, $2.71. In 1988, respondents from Missouri and Nebraska were reported as the largest per capita spenders for fish and seafood products, $2.Ø4 and $1.78, while respondents from Oklahoma Were reported as spending the least for per capita consumption of fish and seafood, $1.Ø4.

Table XXXIV presents the percentage of Midwestern urban households purchasing food items in a week. In 1988, the average percentage of households purchasing red meats and fish/seafood were 87.1% and 72.5%, respectively, for all

TABLE XXXIV

GEOGRAPHIC LOCATION, 1988: AVERAGE WEEKLY PER PERSON FOOD EXPENDITURES AND PERCENTAGE OF MIDWEST HOUSEHOLDS PURCHASING FOOD ITEMS IN A WEEK

Item	All	Geographic location				
		KANSAS	MISSOURI	NEBRASKA	OKLAHOMA	TEXAS
Household Characteristics:						
Households	147	37	24	34	34	18
Mean age of householder (years)	47	47	47	44	43	53
Income before taxes (dollars)	29974	30057	30041	31596	29000	29176
Members per household (number)	2.5	2.7	2.2	2.4	2.5	2.7
Earners per household (number)	1.4	1.6	1.5	1.3	1.5	1.2
Average weekly, at-home, per person food expenditures:				DOLLARS		
Red meats	3.81	2.71	3.63	4.55	2.81	5.38
Fish & Seafood	1.56	1.24	2.04	1.78	1.04	1.72
Households purchasing in a week:				PERCENT		
Red meats	87.1	82.3	85.7	100.0	80.0	87.5
Fish & Seafood	72.5	70.5	76.1	71.4	63.3	81.2

states. In 1988, households in Nebraska and Texas were reported as representing the largest percentage of households making weekly purchases of red meats, 100.0% and 87.5%, respectively. Households in Oklahoma, however, were reported as representing the lowest percentage of households purchasing red meats, 80.0%. In 1988, households in the states of Texas and Missouri were reported as representing the largest percentage of households making weekly purchases of fish and seafood items, 81.2% and 76.1%, respectively, while households in Oklahoma were reported as representing the lowest percentage of households making weekly purchases of fish and seafood items, 66.3%.

From 1982-1988 dramatic increases in average weekly, at-home, per capita food expenditures were seen for red meats and fish and seafood products among Midwestern households: red meat expenditures increased 51.8% and fish/seafood expenditures increased 372.7%, over the national average. Increases were seen also in the percentage of Midwestern households making weekly purchases of red meats increased 44.4%, while the percentage of households making weekly purchases of fish and seafood increased 48.1%.

Other Variables of Interest

Tables XXV - XLIV present response frequencies to important questions that were asked in an attempt to reveal the consumer's behavioral sequences (though, information

seeking, information gathering, evaluation, purchasing behavior, post-purchase behavior) as they are associated with fish and seafood purchases.

Table XXXV illustrates the primary sources for obtaining nutrition information as reported by our respondents. The three most frequently replied sources were; newspapers and/or magazines, product labels and packaging, and physicians/nurses.

Table XXXVI illustrates the nutritional features associated with fish/seafood consumption that are familiar to our respondents. The three most frequently replied features were; decreases blood cholesterol, prevents heart disease, and decreases risk for atherosclerosis.

Table XXXVII illustrates the types of meat items that are reduced or removed from the diet when dieting as reported by our respondents. The three most frequently replied meat items were; beef/veal, pork, and none.

Table XXXVIII illustrates the types of meat items that are increased or added to the diet when dieting as reported by our respondents. The three most frequently replied meat items were; chicken/poultry, fish/shellfish, and none.

Table XXXIX illustrates the type of establishments frequented most often when eating out for fish and seafood as reported by our respondents. The three most frequently replied establishments were; fast-food, full-service restaurants, and specialty restaurants.

Table XL illustrates the eight most familiar types of fish/seafood products as reported by our respondents. The three most frequently replied types were; shrimp, tuna and catfish.

Table XLI illustrates the eight most familiar forms of fish/seafood products as reported by our respondents. The three most frequently replied forms were; frozen, fillets, and fresh.

Table XLII illustrates the season of the year in which fish/seafood was most frequently eaten as reported by our respondents. The three most frequently replied seasons were; spring, summer, and winter.

Table XLIII illustrates the appliances most often used in preparing fish/seafood as reported by our respondents. The three most frequently replied appliances were; oven, top burner of range, and microwave.

Table XLIV illustrates the cooking methods most often used in preparing fish/seafood as reported by our respondents. The three most frequently replied cooking methods were; baking, frying and broiling.

TABLE XXXV

PRIMARY SOURCES FOR OBTAINING NUTRITION INFORMATION AS REPORTED BY 148 RESPONDENTS

Source	% of Respondents*
Newspapers and/or magazines	77.7
Product labels and packaging	77.7
Physicians/nurses	50.7
Television	49.3
Friends	37.8
Professional journals	15.5
Other	12.9
Dentist	11.5
Mail circulars	9.5

* Percentages add up to more than 100% because respondents were asked to check all sources that were used.

TABLE XXXVI

NUTRITIONAL FEATURES ASSOCIATED WITH FISH/SEAFOOD CONSUMPTION THAT ARE FAMILIAR TO THE 148 RESPONDENTS

Features	% of Respondents*
Decreases blood cholesterol	63.5
Prevents heart disease	47.3
Decreases risk for atherosclerosis	43.9
Increases body's availability of omega-3 fatty acids	27.0
Positive effect on triglyceride metabolism	25.7
Decrease risk of blood clots	21.6
None	20.3
Decreases blood platelet counts	3.4

* Percentages add up to more than 100% because respondents were asked to check all features that were familiar.

TABLE XXXVII

FOODS THAT ARE REDUCED OR REMOVED FROM THE DIET WHEN DIETING AS REPORTED BY 148 RESPONDENTS

Foods	% of Respondents*
Beef/Veal	50.0
Pork	48.6
No meats are reduced or removed	19.6
Chicken/Poultry	5.4
Fish/Shellfish	3.4

* Percentages add up to more than 100% because respondents were asked to check all food options that applied.

TABLE XXXVIII

FOODS THAT ARE INCREASED OR ADDED TO THE DIET WHEN DIETING AS REPORTED BY 148 RESPONDENTS

Foods	% of Respondents*
Chicken/Poultry	52.7
Fish/Shellfish	50.7
No meats are increased or added	20.3
Beef/Veal	3.4
Pork	0.7

* Percentages add up to more than 100% because respondents were asked to check all food options that applied.

TABLE XXXIX

ESTABLISHMENTS FREQUENTED MOST OFTEN WHEN EATING OUT FOR FISH AND SEAFOOD AS REPORTED BY 148 RESPONDENTS

Establishment	% of Respondents*
Fast-food (i.e. Long John Silvers, Captain D's, etc.)	47.3
Full-service restaurant	41.9
Specialty restaurant (i.e. Red Lobster)	34.5
Cafeteria or buffet	29.1
Tavern	2.7
Someone else's home	2.7

* Percentages add up to more than 100% because respondents were asked to check all responses that applied.

TABLE XL

THE EIGHT MOST FAMILIAR TYPES OF FISH/SEAFOOD PRODUCTS AS REPORTED BY 148 RESPONDENTS

Types of Fish/Seafood	% of Respondents*
Shrimp	91.2
Tuna	86.5
Catfish	85.8
Lobster	80.4
Crab	75.0
Cod	72.3
Oysters	71.6
Perch	68.9

* Percentages add up to more than 100% because respondents were asked to check all types that were familiar.

TABLE XLI

THE EIGHT MOST FAMILIAR FORMS OF FISH/SEAFOOD PRODUCTS AS REPORTED BY 148 RESPONDENTS

Forms of Fish/Seafood	% of Respondents*
Frozen	93.9
Fillets	88.5
Fresh	87.2
Fishsticks	78.4
Breaded	74.3
Batter-dipped	70.9
Steaks	60.8
Whole	59.5

* Percentages add up to more than 100% because respondents were asked to check all forms that were familiar.

TABLE XLII

SEASON OF THE YEAR IN WHICH FISH/SEAFOOD WAS MOST FREQUENTLY EATEN AS REPORTED BY 148 RESPONDENTS

Season	% of Respondents*
Spring	56.1
Summer	55.4
Winter	44.6
Fall	37.2

* Percentages add up to more than 100% because respondents were asked to check all seasons that applied.

TABLE XLIII

APPLIANCES MOST OFTEN USED TO PREPARE FISH/SEAFOOD
AS REPORTED BY 148 RESPONDENTS

Appliance	% of Respondents*
Oven	73.6
Top burner of range	43.2
Microwave	36.5
Deep fryer	18.9
Barbecue grill	18.4
Electric frying pan	15.5
Wok	8.8

* Percentages add up to more than 100% because respondents were asked to check all appliances most often used.

TABLE XLIV

COOKING METHODS MOST OFTEN USED TO PREPARE FISH/SEAFOOD
AS REPORTED BY 148 RESPONDENTS

Cooking Method	% of Respondents*
Baking	67.6
Frying	45.3
Broiling	41.9
Microwave	29.3
Deep frying	16.2
Barbecuing	13.5
Poaching	8.8
Steaming	7.4

* Percentages add up to more than 100% because respondents were asked to check all cooking methods most often used.

CHAPTER V

CONCLUSION

This study was conducted in an attempt to identify the attitudes, opinions, interests, and concerns of Midwest homemakers in reference to fish and seafood products. Selected demographic variables were associated with statements to identify factors which may influence the consumption of fish and seafood at and away-from home. The results were evaluated to determine any significant relationships which would describe the willingness of Midwest homemakers to consume fish and seafood products. Significant relationships were found to exist between the demographic variables and their impact on fish/seafood consumption patterns of Midwest families.

The demographic variable sex revealed significant differences to exist between the male and female respondents for certain factors that may be responsible for influencing fish and seafood purchases. The results indicated that the female householders spent more per week for food eaten away-from-home and consumed more meals away-from-home per week than their male counterparts. More importantly, however, the male household members exhibited consumer behavioral characteristics which led to more

frequent purchases of fish and seafood, in certain situations. However, the results also indicated that the major household food shopping activities were performed by the females suggesting that the likelihood of fish and seafood purchases would be lower than if the male was the major food shopper.

The demographic variable age revealed significant differences to exist between the age groups $\geq$ 40 and $<$ 40 for certain factors that may be responsible for influencing fish and seafood purchases. We found that the respondents who were aged $<$ 40 placed greater importance on selected purchasing criteria for fish and seafood than the respondents who were aged $\geq$ 40. Odor, price, texture, and knowledge of cooking methods were found to influence the purchasing decisions of respondents $<$ 40 more than the purchasing decisions of respondents $\geq$ 40. Similar results were also reported in a study conducted by Madeira (1985). Although Madeira's study did not evaluate age variations, the study showed that product price, lack of availability, unfamiliarity with cooking methods, taste, texture and odor were major contributors to the under-utilization of fish and seafood products. In our study respondents aged $<$ 40 were more likely to purchase fish and seafood items if friends were making similar purchases and if literature was made available to them or preparation methods. These findings suggest that respondents aged $<$ 40 are more responsive to product changes and more easily influenced by environmental

stimuli in determining their purchasing behavior for fish and seafood products.

Religious affiliation was significantly related to meals eaten away-from-home and the impact of commercial advertisement. However, the significant differences that did exist may not have influenced the consumer's purchasing behavior for fish and seafood products.

The demographic variable marital status revealed significant differences to exist between the married and single respondents for certain factors that may be responsible for influencing fish and seafood purchases. Our results indicated that the female was the major household food shopper for both marital groups, with differences in male participation observed between the two groups. This finding suggests that the significant differences observed between marital groups may reflect more on the gender classification and its implications rather than the isolation of household size and composition as was intended. In this study, married respondents were reported as spending significantly more per week on total at-home food purchases than single respondents. Married respondents also reported that family likes/dislikes were a major influencing factor in determining household food purchases. However, unlike the married respondents, the single respondents were reported as possessing behavioral characteristics which led to more frequent purchases of fish and seafood items when in certain consumer settings. For instance, single respondents

were reported as being more likely to purchase fish and seafood items if similar purchases were made by friends; if their friends ordered a fish/seafood menu item when eating out; and if the seafood section of the supermarket was reached before the red meat department. Since price was not found to be significantly related to the marital groups, the primary variable in determining consumer purchases of fish and seafood, as it is related to marital status, is the influence of family members upon the household's major food shopper (for married respondents), and the influence of environmental stimuli (for single respondents).

The demographic variable household income revealed significant differences between households earning $\leq$ $32,000 and $\geq$ $32,001 for certain factors that may be responsible for influencing fish and seafood purchases. Households earning $\geq$ $32,001 per year were reported as spending significantly more per week on food eaten away-from-home than households earning $\leq$ $32,000. However, no significant difference was seen between the income groups and the number of meals eaten away-from-home per week. This result suggests that the difference observed in away-from-home food expenditures is a result of the higher income group purchasing more expensive meals away-from-home than the lower income group. Blaylock (1983) likewise found that higher income households tended to eat more of the higher priced meats and less of the lower priced meats than did the lower income households. Blaylock's study also supported

the data presented in Table XXIV which revealed that households earning ≥ $27,001 spent approximately 6.3% more per person, per week on fish and seafood items than households earning ≤ $27,000. Our results also coincide with the assumption presented by Blaylock who suggested that when household incomes go up or down, consumers make greater adjustments in food eaten away-from-home than for food eaten at-home. In our study, no significant relationship was found between income groups and the number of meals away-from-home which included a fish and/or seafood menu item. Households earning ≤ $32,000 did however exhibit certain behavioral characteristics which may be responsible for less frequent fish/seafood purchases. Households earning ≤ $32,000 were reported as being less likely to purchase fish and seafood items if the product was unfamiliar to them and if cooking methods for the items were unfamiliar. However, households earning ≤ $32,000 frequently purchased food items remembered from commercial advertisements. Unlike the households earning ≤ $32,000, the households earning ≥ $32,001 reported that fish and seafood purchases were frequently made without regard to the product's price. Blaylock likewise found that when an increase in household income was experienced, positive responses were found for higher priced items while negative responses were found for lower priced items.

When evaluating for significant differences between level of education and fish/seafood consumption patterns of

Midwest families, we found that the respondents who had earned at least a B.S. degree were less likely to purchase fish and seafood items if the preferred types and/or forms were not available.

Significant relationships were found between variables encompassing health perceptions and fish/seafood consumption patterns of Midwest families. In our study, we found that the respondents who had been advised by a physician to consume more fish and seafood products prepared fish and seafood products more frequently than the respondents who had not received a physician's advice. Concomitantly, the results revealed that the respondents who had received the advice of a physician were not influenced by price when including fish and seafood items in their purchases. This finding contradicts the results of a study reported by Agricultural Outlook (1983) which indicated that the overwhelming determinants of consumer spending on fish products have not been health concerns, but rather fluctuating incomes and prices. Our study also revealed that the nutritional significance associated with fish and seafood products a primary reason for their purchase. When asked, "When dieting, which foods do you reduce or remove from your diet?", the majority of the respondents replying indicated that red meats and pork items were wither reduced or removed, whereas, chicken/poultry and fish/seafood items were increased or added to the diet. This finding contributes to our assumption that, although not expressed

significantly, the consumption of fish and seafood products were in some way related to the consumer's perceptions of health issues.

In our study, no significant relationships were found between the variables comprising marketing information and fish/seafood consumption patterns of Midwest families.

Significant relationships were found between the variables encompassing "consumption" information and fish/seafood consumption patterns of Midwest families. Male household members who were reported as the household's main meal planner and meal preparer were less likely to purchase fish and seafood items if cooking methods were unfamiliar to them. Madeira (1985) likewise reported that inexperience in preparing fish was a major contributor to under-utilization of fish and seafood products. Our study also revealed that households who consumed $\geq$ 2 fish and seafood items per week were more likely to purchase fish and seafood items when purchases were based on personal desire for the product nd when purchases were based on the attractiveness of the product's package. From the significant data which was obtained, it was concluded that, households who consumed $\geq$ 2 fish and seafood meals per week were not influenced by product price when purchasing fish and seafood items. This result contradicts the results resented by Blaylock (1983). In our study, we also found that the majority of respondents who viewed fish/seafood as being moderate in calories and

low in calories were reported as preparing fish and seafood products $\geq$ 2 times per month. However, as reported in previous results, the frequency of at-home fish/seafood preparation was greatest among the respondents who had received advice from a physician. A significant result also was obtained between caloric viewpoint and the inclusion of fish/seafood menu items into away-from-home meals. Although the majority of respondents viewed fish and seafood items as being low-moderate in calories, this characteristic did not seem to influence the consumer's decision to include more fish/seafood items in away-from-home meals.

When conducting consumer expenditure-preference studies, it is relatively easy to obtain results regarding demographics, economics, frequencies and expenditures. However, it is difficult and often frustrating when attempting to obtain and evaluate results which attempt to describe consumer behavioral patterns. Consumer behavioral patterns are usually spontaneous reactions exhibited as a result of environmental stimuli which are unique to changing situations. When filling out a questionnaire, the respondent is attempting to predetermine his/her actual response to a given situation. Many times his/her reported response will be inconsistent with his/her actual behavior. In this study, many inconsistencies in responses to similar questions were observed. However, the responses that were recorded were evaluated as such. Further research should be conducted in an attempt to determine, as accurately as

possible, why consumers do or do not purchase fish and seafood items. However, careful consideration should be given to the construction and application of the desired research instrument for the purpose of obtaining accurate and reliable results. Research techniques other than the cross-sectional survey may help the researcher in eliminating unforeseeable biases generated as a result of gender, race, age, and family member influences. Techniques that may be more appropriate for this type of research may include one-on-one interviews with the selected consumers; weekly consumer diaries fulled out by the selected members; an evaluation of randomly selected cash register tapes from supermarkets; in-store video camera evaluation of consumer purchasing patterns; and the construction of in-store sample displays to monitor the fish and seafood purchases of the consumer. These techniques would allow the researcher to obtain data that would reflect more accurately the actual consumer purchases for fish and seafood products.

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APPENDICES

APPENDIX A

CHI-SQUARE STATISTICAL RESULTS

SAS

TABLE OF SEX BY AWAYSPEN

SEX AWAYSPEN

FREQUENCY EXPECTED CELL CHI2 PERCENT ROW PCT COL PCT	1 (<$15)	2 (≥$15)	TOTAL
1 (female)	42 47.6 .663048 28.57 42.00 60.00	58 52.4 .602771 39.46 58.00 75.32	100 68.03
10 (MALE)	28 22.4 1.41074 19.05 59.57 40.00	19 24.6 1.28249 12.93 40.43 24.68	47 31.97
TOTAL	70 47.62	77 52.38	147 100.00

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF SEX BY AWAYSPEN

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.959	0.047
LIKELIHOOD RATIO CHI-SQUARE	1	3.972	0.046
CONTINUITY ADJ. CHI-SQUARE	1	3.286	0.070
MANTEL-HAENSZEL CHI-SQUARE	1	3.932	0.047
FISHER'S EXACT TEST (1-TAIL)			0.035

SAS

TABLE OF SEX BY MEALSAW

'SEX MEALSAW

FREQUENCY EXPECTED CELL CHI2 PERCENT ROW PCT COL PCT	1 (≤4)	2 (≥5)	TOTAL
1 (female)	20 26.5 1.60754 13.61 20.00 51.28	80 73.5 .580499 54.42 80.00 74.07	100 68.03
10 (MALE)	19 12.5 3.42029 12.93 40.43 48.72	28 34.5 1.2351 19.05 59.57 25.93	47 31.97
TOTAL	39 26.53	108 73.47	147 100.00

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF SEX BY MEALSAW

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	6.843	0.009
LIKELIHOOD RATIO CHI-SQUARE	1	6.587	0.010
CONTINUITY ADJ. CHI-SQUARE	1	5.836	0.016
MANTEL-HAENSZEL CHI-SQUARE	1	6.797	0.009
FISHER'S EXACT TEST (1-TAIL)			0.009

SAS

TABLE OF SEX BY GPLANML

SEX	GPLANML		
FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	F	M	TOTAL
1 (FEMALE)	82 66.9 3.40056 69.49 97.62 87.23	2 17.1 13.3189 1.69 2.38 8.33	84 71.19
10 (MALE)	12 27.1 8.40139 10.17 35.29 12.77	22 6.9 32.9055 18.64 64.71 91.67	34 28.81
TOTAL	94 79.66	24 20.34	118 100.00

FREQUENCY MISSING = 31

STATISTICS FOR TABLE OF SEX BY GPLANML

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	58.026	0.000
LIKELIHOOD RATIO CHI-SQUARE	1	56.144	0.000
CONTINUITY ADJ. CHI-SQUARE	1	54.243	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	57.535	0.000
FISHER'S EXACT TEST (1-TAIL)			0.000

SAS

TABLE OF SEX BY GPREPML

SEX	GPREPML		
FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	F	M	TOTAL
1 (FEMALE)	79 64.6 3.19649 66.95 96.34 84.95	3 17.4 11.8909 2.54 3.66 12.00	82 69.49
10 (MALE)	14 28.4 7.28089 11.86 38.89 15.05	22 7.6 27.0849 18.64 61.11 88.00	36 30.51
TOTAL	93 78.81	25 21.19	118 100.00

FREQUENCY MISSING = 31

STATISTICS FOR TABLE OF SEX BY GPREPML

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	49.453	0.000
LIKELIHOOD RATIO CHI-SQUARE	1	48.023	0.000
CONTINUITY ADJ. CHI-SQUARE	1	46.072	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	49.034	0.000
FISHER'S EXACT TEST (1-TAIL)			0.000

SAS

TABLE OF SEX BY FAMILY

SEX FAMILY

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY (0)	SOME-TIMES (1)	NO (10)	YES (100)	TOTAL
FEMALE (1)	7	13	14	66	100
	4.8	15.0	19.7	60.5	
	1.0519	.258259	1.66306	.491633	
	4.76	8.84	9.52	44.90	68.03
	7.00	13.00	14.00	66.00	
	100.00	59.09	48.28	74.16	
MALE (10)	0	9	15	23	47
	2.2	7.0	9.3	28.5	
	2.2381	.549487	3.53843	1.04603	
	0.00	6.12	10.20	15.65	31.97
	0.00	19.15	31.91	48.94	
	0.00	40.91	51.72	25.84	
TOTAL	7	22	29	89	147
	4.76	14.97	19.73	60.54	100.00

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF SEX BY FAMILY

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	10.837	0.013
LIKELIHOOD RATIO CHI-SQUARE	3	12.594	0.006
MANTEL-HAENSZEL CHI-SQUARE*	1	3.422	0.064
PHI		0.272	
CONTINGENCY COEFFICIENT		0.262	

SAS

TABLE OF SEX BY CHPACE

SEX CHPACE

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER (1)	ALWAYS (3)	TOTAL
FEMALE (1)	39	29	68
	34.3	33.7	
	.633346	.646013	
	38.61	28.71	67.33
	57.35	42.65	
	76.47	58.00	
MALE (10)	12	21	33
	16.7	16.3	
	1.30508	1.33118	
	11.88	20.79	32.67
	36.36	63.64	
	23.53	42.00	
TOTAL	51	50	101
	50.50	49.50	100.00

FREQUENCY MISSING = 48

STATISTICS FOR TABLE OF SEX BY CHPACE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.916	0.048
LIKELIHOOD RATIO CHI-SQUARE	1	3.952	0.047
CONTINUITY ADJ. CHI-SQUARE	1	3.121	0.077
MANTEL-HAENSZEL CHI-SQUARE	1	3.877	0.049
FISHER'S EXACT TEST (1-TAIL)			0.038
(2-TAIL)			0.058
PHI		0.197	
CONTINGENCY COEFFICIENT		0.193	

SAS

TABLE OF SEX BY MENUITEM

SEX MENUITEM

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1 (NEVER)	3 (ALWAYS)	TOTAL
1 (FEMALE)	70 66.4 .193411 61.95 88.61 73.68	9 12.6 1.02078 7.96 11.39 50.00	79 69.91
10 (MALE)	25 28.6 .449396 22.12 73.53 26.32	9 5.4 2.37181 7.96 26.47 50.00	34 30.09
TOTAL	95 84.07	18 15.93	113 100.00

FREQUENCY MISSING = 36

STATISTICS FOR TABLE OF SEX BY MENUITEM

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.035	0.045
LIKELIHOOD RATIO CHI-SQUARE	1	3.768	0.052
CONTINUITY ADJ. CHI-SQUARE	1	2.988	0.084
MANTEL-HAENSZEL CHI-SQUARE	1	4.000	0.046
FISHER'S EXACT TEST (1-TAIL)			0.045
(2-TAIL)			0.054
PHI		0.189	
CONTINGENCY COEFFICIENT		0.186	

SAS

TABLE OF AGE BY ODOR31A

AGE ODOR31A

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	0 (NO REPLY)	1 (LEAST)	2 (IN-DIFFERENT)	3 (MOST)	TOTAL
1 (≥40 yrs.)	20 15.0 1.69883 13.70 21.98 83.33	5 8.1 1.18812 3.42 5.49 38.46	11 10.0 .105844 7.53 12.09 68.75	55 58.0 .151739 37.67 60.44 59.14	91 62.33
2 (<40 yrs.)	4 9.0 2.81079 2.74 7.27 16.67	8 4.9 1.96579 5.48 14.55 61.54	5 6.0 .175125 3.42 9.09 31.25	38 35.0 0.25106 26.03 69.09 40.86	55 37.67
TOTAL	24 16.44	13 8.90	16 10.96	93 63.70	146 100.00

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF AGE BY ODOR31A

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	8.347	0.039
LIKELIHOOD RATIO CHI-SQUARE	3	8.805	0.032
MANTEL-HAENSZEL CHI-SQUARE	1	2.146	0.143
PHI		0.239	
CONTINGENCY COEFFICIENT		0.233	

SAS

TABLE OF AGE BY PRICE31A

AGE PRICE31A

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY 0	LEAST 1	In-different 2	MOST 3	TOTAL
≥ 40 yrs. 1	18	10	15	48	91
	13.7	7.5	18.7	51.1	
	1.3407	.849415	.731597	.189192	
	12.33	6.85	10.27	32.88	62.33
	19.78	10.99	16.48	52.75	
	81.82	83.33	50.00	58.54	
< 40 yrs 2	4	2	15	34	55
	8.3	4.5	11.3	30.9	
	2.21825	1.4054	1.21046	.313027	
	2.74	1.37	10.27	23.29	37.67
	7.27	3.64	27.27	61.82	
	18.18	16.67	50.00	41.46	
TOTAL	22	12	30	82	146
	15.07	8.22	20.55	56.16	100.00

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF AGE BY PRICE31A

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	8.258	0.041
LIKELIHOOD RATIO CHI-SQUARE	3	8.891	0.031
MANTEL-HAENSZEL CHI-SQUARE	1	4.812	0.028
PHI		0.238	
CONTINGENCY COEFFICIENT		0.231	

SAS

TABLE OF AGE BY TEXT31A

AGE TEXT31A

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY 0	LEAST 1	IN-DIFF-ERENT 2	MOST 3	TOTAL
≥ 40 yrs 1	29	8	21	33	91
	21.2	9.3	23.7	36.8	
	2.87698	.194736	.304365	.387308	
	19.86	5.48	14.38	22.60	62.33
	31.87	8.79	23.08	36.26	
	85.29	53.33	55.26	55.93	
< 40 yrs 2	5	7	17	26	55
	12.8	5.7	14.3	22.2	
	4.76009	0.3222	.503585	.640819	
	3.42	4.79	11.64	17.81	37.67
	9.09	12.73	30.91	47.27	
	14.71	46.67	44.74	44.07	
TOTAL	34	15	38	59	146
	23.29	10.27	26.03	40.41	100.00

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF AGE BY TEXT31A

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	9.990	0.019
LIKELIHOOD RATIO CHI-SQUARE	3	11.091	0.011
MANTEL-HAENSZEL CHI-SQUARE	1	6.681	0.010
PHI		0.262	
CONTINGENCY COEFFICIENT		0.253	

SAS

TABLE OF AGE BY COOKM31A

AGE COOKM31A

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY 0	LEAST 1	IN-DIFFERENT 2	MOST 3	TOTAL
≥40 yrs. 1	25	18	11	37	91
	18.7	15.0	15.0	42.4	
	2.12354	.618245	1.04773	0.68382	
	17.12	12.33	7.53	25.34	62.33
	27.47	19.78	12.09	40.66	
	83.33	75.00	45.83	54.41	
<40 yrs 2	5	6	13	31	55
	11.3	9.0	9.0	25.6	
	3.51349	1.02291	1.73352	1.13141	
	3.42	4.11	8.90	21.23	37.67
	9.09	10.91	23.64	56.36	
	16.67	25.00	54.17	45.59	
TOTAL	30	24	24	68	146
	20.55	16.44	16.44	46.58	100.00

FREQUENCY MISSING = 3

STATISTICS FOR TABLE OF AGE BY COOKM31A

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	11.875	0.008
LIKELIHOOD RATIO CHI-SQUARE	3	12.562	0.006
MANTEL-HAENSZEL CHI-SQUARE	1	8.895	0.003
PHI		0.285	
CONTINGENCY COEFFICIENT		0.274	

SAS

TABLE OF AGE BY DNBFISH

AGE DNBFISH

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
≥ 40yrs 1	57	7	64
	53.1	10.9	
	.283404	1.38368	
	57.00	7.00	64.00
	89.06	10.94	
	68.67	41.18	
<40 yrs. 2	26	10	36
	29.9	6.1	
	.503829	2.45987	
	26.00	10.00	36.00
	72.22	27.78	
	31.33	58.82	
TOTAL	83	17	100
	83.00	17.00	100.00

FREQUENCY MISSING = 49

STATISTICS FOR TABLE OF AGE BY DNBFISH

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.631	0.031
LIKELIHOOD RATIO CHI-SQUARE	1	4.450	0.035
CONTINUITY ADJ. CHI-SQUARE	1	3.514	0.061
MANTEL-HAENSZEL CHI-SQUARE	1	4.584	0.032
FISHER'S EXACT TEST (1-TAIL)			0.032
(2-TAIL)			0.050
PHI		0.215	
CONTINGENCY COEFFICIENT		0.210	

SAS

TABLE OF AGE BY HOWCOOK

AGE HOWCOOK

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
≥ 40 yrs 1	40	22	62
	34.2	27.8	
	.966195	1.19233	
	38.10	20.95	59.05
	64.52	35.48	
	68.97	46.81	
< 40 yrs 2	18	25	43
	23.8	19.2	
	1.39312	1.71917	
	17.14	23.81	40.95
	41.86	58.14	
	31.03	53.19	
TOTAL	58	47	105
	55.24	44.76	100.00

FREQUENCY MISSING = 44

STATISTICS FOR TABLE OF AGE BY HOWCOOK

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.271	0.022
LIKELIHOOD RATIO CHI-SQUARE	1	5.292	0.021
CONTINUITY ADJ. CHI-SQUARE	1	4.394	0.036
MANTEL-HAENSZEL CHI-SQUARE	1	5.221	0.022
FISHER'S EXACT TEST (1-TAIL)			0.018
(2-TAIL)			0.028
PHI		0.224	
CONTINGENCY COEFFICIENT		0.219	

SAS

TABLE OF AGE BY FRIENDS

AGE FRIENDS

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
≥ 40 yrs 1	60	7	67
	56.5	10.5	
	0.22277	1.19248	
	55.56	6.48	62.04
	89.55	10.45	
	65.93	41.18	
< 40 yrs 2	31	10	41
	34.5	6.5	
	0.36404	1.94868	
	28.70	9.26	37.96
	75.61	24.39	
	34.07	58.82	
TOTAL	91	17	108
	84.26	15.74	100.00

FREQUENCY MISSING = 41

STATISTICS FOR TABLE OF AGE BY FRIENDS

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.728	0.054
LIKELIHOOD RATIO CHI-SQUARE	1	3.616	0.057
CONTINUITY ADJ. CHI-SQUARE	1	2.751	0.097
MANTEL-HAENSZEL CHI-SQUARE	1	3.693	0.055
FISHER'S EXACT TEST (1-TAIL)			0.050
(2-TAIL)			0.062
PHI		0.186	
CONTINGENCY COEFFICIENT		0.183	

SAS

TABLE OF GCHURCH BY MEALSAW

GCHURCH . MEALSAW

FREQUENCY EXPECTED CELL CHI2 PERCENT ROW PCT COL PCT	NEVER 1	ALWAYS 2	TOTAL
NON-CATHOLIC 1	24 29.3 .946149 16.11 22.02 60.00	85 79.7 .347211 57.05 77.98 77.98	109 73.15
CATHOLIC 2	16 10.7 2.57826 10.74 40.00 40.00	24 29.3 .946149 16.11 60.00 22.02	40 26.85
TOTAL	40 26.85	109 73.15	149 100.00

STATISTICS FOR TABLE OF GCHURCH BY MEALSAW

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.818	0.028
LIKELIHOOD RATIO CHI-SQUARE	1	4.594	0.032
CONTINUITY ADJ. CHI-SQUARE	1	3.946	0.047
MANTEL-HAENSZEL CHI-SQUARE	1	4.785	0.029
FISHER'S EXACT TEST (1-TAIL)			0.025
(2-TAIL)			0.037
PHI		-0.180	
CONTINGENCY COEFFICIENT		0.177	

SAS

TABLE OF GCHURCH BY BRANDS

GCHURCH BRANDS

FREQUENCY EXPECTED CELL CHI2 PERCENT ROW PCT COL PCT	≥ 5 WEEK 1	≤ 4 WEEK 3	TOTAL
NON-CATHOLIC 1	66 60.2 .562145 60.55 80.49 82.50	16 21.8 1.55074 14.68 19.51 55.17	82 75.23
CATHOLIC 2	14 19.8 1.70725 12.84 51.85 17.50	13 7.2 4.70967 11.93 48.15 44.83	27 24.77
TOTAL	80 73.39	29 26.61	109 100.00

FREQUENCY MISSING = 40

STATISTICS FOR TABLE OF GCHURCH BY BRANDS

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	8.530	0.003
LIKELIHOOD RATIO CHI-SQUARE	1	7.949	0.005
CONTINUITY ADJ. CHI-SQUARE	1	7.126	0.008
MANTEL-HAENSZEL CHI-SQUARE	1	8.452	0.004
FISHER'S EXACT TEST (1-TAIL)			0.005
(2-TAIL)			0.006
PHI		0.280	

SAS

TABLE OF MARITAL BY WHOSHOP

MARITAL WHOSHOP

MALE FEMALE FEMALE
OTHER OTHER OTHER MALE MALE _ FEMALE

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1	10	100	1000	10000	10010	100000	TOTAL
1	1	1	2	3	18	0	25	50
	0.3	0.7	2.0	13.9	7.8	0.3	25.0	
	1.29784	.155676	4E-04	8.50111	13.4677	.337838	0	
	0.68	0.68	1.35	2.03	12.16	0.00	16.89	33.78
	2.00	2.00	4.00	6.00	36.00	0.00	50.00	
	100.00	50.00	33.33	7.32	78.26	0.00	33.78	
100	0	1	4	38	5	1	49	98
	0.7	1.3	4.0	27.1	15.2	0.7	49.0	
	.662162	.079426	2E-04	4.3373	6.87126	.172366	0	
	0.00	0.68	2.70	25.68	3.38	0.68	33.11	66.22
	0.00	1.02	4.08	38.78	5.10	1.02	50.00	
	0.00	50.00	66.67	92.68	21.74	100.00	66.22	
TOTAL	1	2	6	41	23	1	74	148
	0.68	1.35	4.05	27.70	15.54	0.68	50.00	100.00

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF MARITAL BY WHOSHOP

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	6	35.883	0.000
LIKELIHOOD RATIO CHI-SQUARE	6	38.699	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	0.100	0.752
PHI		0.492	
CONTINGENCY COEFFICIENT		0.442	

SAS

TABLE OF MARITAL BY SPENDING

MARITAL SPENDING

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	≥$50. WEEK	<$50. WEEK	TOTAL
SINGLE 1	4	46	50
	20.6	29.4	
	13.3845	9.38454	
	2.70	31.08	33.78
	8.00	92.00	
	6.56	52.87	
MARRIED 100	57	41	98
	40.4	57.6	
	6.82883	4.78803	
	38.51	27.70	66.22
	58.16	41.84	
	93.44	47.13	
TOTAL	61	87	148
	41.22	58.78	100.00

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF MARITAL BY SPENDING

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	34.386	0.000
LIKELIHOOD RATIO CHI-SQUARE	1	39.470	0.000
CONTINUITY ADJ. CHI-SQUARE	1	32.347	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	34.154	0.000
FISHER'S EXACT TEST (1-TAIL)			0.000
(2-TAIL)			0.000
PHI		-0.482	
CONTINGENCY COEFFICIENT		0.434	

SAS

TABLE OF MARITAL BY AWAYSPEN

MARITAL AWAYSPEN

FREQUENCY EXPECTED CELL CHI2 PERCENT ROW PCT COL PCT	1 (≥$15. WEEK)	2 (<$15. WEEK)	TOTAL
1 (SINGLE)	17 24.0 2.03494 11.49 34.00 23.94	33 26.0 1.87637 22.30 66.00 42.86	50 33.78
100 (MARRIED)	54 47.0 1.03823 36.49 55.10 76.06	44 51.0 .957332 29.73 44.90 57.14	98 66.22
TOTAL	71 47.97	77 52.03	148 100.00

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF MARITAL BY AWAYSPEN

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.907	0.015
LIKELIHOOD RATIO CHI-SQUARE	1	5.990	0.014
CONTINUITY ADJ. CHI-SQUARE	1	5.092	0.024
MANTEL-HAENSZEL CHI-SQUARE	1	5.867	0.015
FISHER'S EXACT TEST (1-TAIL)			0.012
(2-TAIL)			0.023
PHI		-0.200	
CONTINGENCY COEFFICIENT		0.196	

SAS

TABLE OF MARITAL BY GPLANML

MARITAL GPLANML

FREQUENCY EXPECTED CELL CHI2 PERCENT ROW PCT COL PCT	F	M	TOTAL
1 (SINGLE)	26 36.7 3.13093 21.85 56.52 27.37	20 9.3 12.3933 16.81 43.48 83.33	46 38.66
100 (MARRIED)	69. 58.3 1.97291 57.98 94.52 72.63	4 14.7 7.80945 3.36 5.48 16.67	73 61.34
TOTAL	95 79.83	24 20.17	119 100.00

FREQUENCY MISSING = 30

STATISTICS FOR TABLE OF MARITAL BY GPLANML

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	25.307	0.000
LIKELIHOOD RATIO CHI-SQUARE	1	25.653	0.000
CONTINUITY ADJ. CHI-SQUARE	1	23.001	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	25.094	0.000
FISHER'S EXACT TEST (1-TAIL)			0.000
(2-TAIL)			0.000
PHI		-0.461	
CONTINGENCY COEFFICIENT		0.419	

SAS

TABLE OF MARITAL BY FAMILY

MARITAL FAMILY

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY 0	SOME TIMES 1	NO 10	YES 100	TOTAL
SINGLE 1	3	5	22	20	50
	2.4	7.4	9.8	30.4	
	.170579	.796069	15.1987	3.56096	
	2.03	3.38	14.86	13.51	33.78
	6.00	10.00	44.00	40.00	
	42.86	22.73	75.86	22.22	
MARRIED 100	4	17	7	70	98
	4.6	14.6	19.2	59.6	
	0.08703	.406158	7.75443	1.81682	
	2.70	11.49	4.73	47.30	66.22
	4.08	17.35	7.14	71.43	
	57.14	77.27	24.14	77.78	
TOTAL	7	22	29	90	148
	4.73	14.86	19.59	60.81	100.00

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF MARITAL BY FAMILY

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	29.791	0.000
LIKELIHOOD RATIO CHI-SQUARE	3	28.774	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	11.879	0.001
PHI		0.449	
CONTINGENCY COEFFICIENT		0.409	

SAS

TABLE OF MARITAL BY SAMPLE

MARITAL SAMPLE

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
SINGLE 1	22	7	29
	17.9	11.1	
	.938476	1.51367	
	27.16	8.64	35.80
	75.86	24.14	
	44.00	22.58	
MARRIED 100	28	24	52
	32.1	19.9	
	.523381	.844163	
	34.57	29.63	64.20
	53.85	46.15	
	56.00	77.42	
TOTAL	50	31	81
	61.73	38.27	100.00

FREQUENCY MISSING = 68

STATISTICS FOR TABLE OF MARITAL BY SAMPLE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.820	0.051
LIKELIHOOD RATIO CHI-SQUARE	1	3.957	0.047
CONTINUITY ADJ. CHI-SQUARE	1	2.945	0.086
MANTEL-HAENSZEL CHI-SQUARE	1	3.773	0.052
FISHER'S EXACT TEST (1-TAIL)			0.042
(2-TAIL)			0.060
PHI		0.217	
CONTINGENCY COEFFICIENT		0.212	

SAS

TABLE OF MARITAL BY FISHBEF

MARITAL FISHBEF

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1 (NEVER)	3 (ALWAYS)	TOTAL
1 (SINGLE)	24	11	35
	28.1	6.9	
	.606589	2.48412	
	22.43	10.28	32.71
	68.57	31.43	
	27.91	52.38	
100 (MARRIED)	62	10	72
	57.9	14.1	
	.294869	1.20756	
	57.94	9.35	67.29
	86.11	13.89	
	72.09	47.62	
TOTAL	86	21	107
	80.37	19.63	100.00

FREQUENCY MISSING = 42

STATISTICS FOR TABLE OF MARITAL BY FISHBEF

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.593	0.032
LIKELIHOOD RATIO CHI-SQUARE	1	4.370	0.037
CONTINUITY ADJ. CHI-SQUARE	1	3.549	0.060
MANTEL-HAENSZEL CHI-SQUARE	1	4.550	0.033
FISHER'S EXACT TEST (1-TAIL)			0.032
(2-TAIL)			0.040
PHI		-0.207	
CONTINGENCY COEFFICIENT		0.203	

SAS

TABLE OF MARITAL BY FRIENDS

MARITAL FRIENDS

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1 (NEVER)	3 (ALWAYS)	TOTAL
1 (SINGLE)	26	9	35
	29.5	5.5	
	.424514	2.29737	
	23.85	8.26	32.11
	74.29	25.71	
	28.26	52.94	
100 (MARRIED)	66	8	74
	62.5	11.5	
	.200784	1.08659	
	60.55	7.34	67.89
	89.19	10.81	
	71.74	47.06	
TOTAL	92	17	109
	84.40	15.60	100.00

FREQUENCY MISSING = 40

STATISTICS FOR TABLE OF MARITAL BY FRIENDS

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	4.009	0.045
LIKELIHOOD RATIO CHI-SQUARE	1	3.776	0.052
CONTINUITY ADJ. CHI-SQUARE	1	2.957	0.086
MANTEL-HAENSZEL CHI-SQUARE	1	3.972	0.046
FISHER'S EXACT TEST (1-TAIL)			0.046
(2-TAIL)			0.053
PHI		-0.192	
CONTINGENCY COEFFICIENT		0.188	

SAS

TABLE OF MARITAL BY MENUITEM

MARITAL MENUITEM

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
SINGLE 1	29	11	40
	33.7	6.3	
	.651398	3.47412	
	25.44	9.65	35.09
	72.50	27.50	
	30.21	61.11	
MARRIED 100	67	7	74
	62.3	11.7	
	.352107	1.8779	
	58.77	6.14	64.91
	90.54	9.46	
	69.79	38.89	
TOTAL	96	18	114
	84.21	15.79	100.00

FREQUENCY MISSING = 35

STATISTICS FOR TABLE OF MARITAL BY MENUITEM

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	6.356	0.012
LIKELIHOOD RATIO CHI-SQUARE	1	6.061	0.014
CONTINUITY ADJ. CHI-SQUARE	1	5.071	0.024
MANTEL-HAENSZEL CHI-SQUARE	1	6.300	0.012
FISHER'S EXACT TEST (1-TAIL)			0.014
(2-TAIL)			0.016
PHI		-0.236	
CONTINGENCY COEFFICIENT		0.230	

SAS

TABLE OF INCOME BY AWAYSPEN

INCOME AWAYSPEN

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	≥ $15. WEEK 1	< $15. WEEK 2	TOTAL
≥ $32,001. 1	43	23	66
	31.9	34.1	
	3.86842	3.61722	
	28.86	15.44	44.30
	65.15	34.85	
	59.72	29.87	
< $32,000. 2	29	54	83
	40.1	42.9	
	3.07609	2.87634	
	19.46	36.24	55.70
	34.94	65.06	
	40.28	70.13	
TOTAL	72	77	149
	48.32	51.68	100.00

STATISTICS FOR TABLE OF INCOME BY AWAYSPEN

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	13.438	0.000
LIKELIHOOD RATIO CHI-SQUARE	1	13.637	0.000
CONTINUITY ADJ. CHI-SQUARE	1	12.255	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	13.348	0.000
FISHER'S EXACT TEST (1-TAIL)			0.000
(2-TAIL)			0.000
PHI		0.300	
CONTINGENCY COEFFICIENT		0.288	

SAS

TABLE OF INCOME BY GPLANML

INCOME GPLANML

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	F	M	TOTAL
1 (≥ $32,001.)	45	6	51
	40.7	10.3	
	.451128	1.78571	
	37.82	5.04	42.86
	88.24	11.76	
	47.37	25.00	
2 (< $32,000.)	50	18	68
	54.3	13.7	
	.338346	1.33929	
	42.02	15.13	57.14
	73.53	26.47	
	52.63	75.00	
TOTAL	95	24	119
	79.83	20.17	100.00

FREQUENCY MISSING = 30

STATISTICS FOR TABLE OF INCOME BY GPLANML

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.914	0.048
LIKELIHOOD RATIO CHI-SQUARE	1	4.105	0.043
CONTINUITY ADJ. CHI-SQUARE	1	3.054	0.081
MANTEL-HAENSZEL CHI-SQUARE	1	3.882	0.049
FISHER'S EXACT TEST (1-TAIL)			0.038
(2-TAIL)			0.065
PHI		0.181	
CONTINGENCY COEFFICIENT		0.178	

SAS

TABLE OF INCOME BY BRANDS

INCOME BRANDS

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1 (NEVER)	3 (ALWAYS)	TOTAL
1 (≥ $32,001.)	39	8	47
	34.5	12.5	
	.588232	1.62271	
	35.78	7.34	43.12
	82.98	17.02	
	48.75	27.59	
2 (< $32,000.)	41	21	62
	45.5	16.5	
	.445918	1.23012	
	37.61	19.27	56.88
	66.13	33.87	
	51.25	72.41	
TOTAL	80	29	109
	73.39	26.61	100.00

FREQUENCY MISSING = 40

STATISTICS FOR TABLE OF INCOME BY BRANDS

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	3.887	0.049
LIKELIHOOD RATIO CHI-SQUARE	1	4.020	0.045
CONTINUITY ADJ. CHI-SQUARE	1	3.072	0.080
MANTEL-HAENSZEL CHI-SQUARE	1	3.851	0.050
FISHER'S EXACT TEST (1-TAIL)			0.038
(2-TAIL)			0.053
PHI		0.189	
CONTINGENCY COEFFICIENT		0.186	

SAS

TABLE OF INCOME BY DESIRE

INCOME DESIRE

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
≥ $32,001. 1	14	35	49
	20.5	28.5	
	2.07879	1.49945	
	13.33	33.33	46.67
	28.57	71.43	
	31.82	57.38	
< $32,000. 2	30	26	56
	23.5	32.5	
	1.81894	1.31202	
	28.57	24.76	53.33
	53.57	46.43	
	68.18	42.62	
TOTAL	44	61	105
	41.90	58.10	100.00

FREQUENCY MISSING = 44

STATISTICS FOR TABLE OF INCOME BY DESIRE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	6.709	0.010
LIKELIHOOD RATIO CHI-SQUARE	1	6.819	0.009
CONTINUITY ADJ. CHI-SQUARE	1	5.722	0.017
MANTEL-HAENSZEL CHI-SQUARE	1	6.645	0.010
FISHER'S EXACT TEST (1-TAIL)			0.008
(2-TAIL)			0.011
PHI		-0.253	
CONTINGENCY COEFFICIENT		0.245	

SAS

TABLE OF INCOME BY NOTFAMIL

INCOME NOTFAMIL

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
≥ $32,001. 1	34	18	52
	28.0	24.0	
	1.26927	1.48481	
	29.57	15.65	45.22
	65.38	34.62	
	54.84	33.96	
< $32,000. 2	28	35	63
	34.0	29.0	
	1.04765	1.22556	
	24.35	30.43	54.78
	44.44	55.56	
	45.16	66.04	
TOTAL	62	53	115
	53.91	46.09	100.00

FREQUENCY MISSING = 34

STATISTICS FOR TABLE OF INCOME BY NOTFAMIL

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.027	0.025
LIKELIHOOD RATIO CHI-SQUARE	1	5.078	0.024
CONTINUITY ADJ. CHI-SQUARE	1	4.220	0.040
MANTEL-HAENSZEL CHI-SQUARE	1	4.984	0.026
FISHER'S EXACT TEST (1-TAIL)			0.020
(2-TAIL)			0.038
PHI		0.209	
CONTINGENCY COEFFICIENT		0.205	

SAS

TABLE OF INCOME BY DNBFISH

INCOME DNBFISH

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
1 (≥ $32,001.)	44 39.1 0.60198 42.72 91.67 52.38	4 8.9 2.66139 3.88 8.33 21.05	48 46.60
2 (< $32,000.)	40 44.9 .525365 38.83 72.73 47.62	15 10.1 2.32266 14.56 27.27 78.95	55 53.40
TOTAL	84 81.55	19 18.45	103 100.00

FREQUENCY MISSING = 46

STATISTICS FOR TABLE OF INCOME BY DNBFISH

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	6.111	0.013
LIKELIHOOD RATIO CHI-SQUARE	1	6.497	0.011
CONTINUITY ADJ. CHI-SQUARE	1	4.917	0.027
MANTEL-HAENSZEL CHI-SQUARE	1	6.052	0.014
FISHER'S EXACT TEST (1-TAIL)			0.012
(2-TAIL)			0.020
PHI		0.244	
CONTINGENCY COEFFICIENT		0.237	

SAS

TABLE OF HD BY AVAIL31A

HD AVAIL31A

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY 0	LEAST 1	IN-DIFFERENT 2	MOST 3	TOTAL
DIPLOMA¹ +/OR ASSOCIATE	0 2.8 2.81081 0.00 0.00 0.00	6 2.1 7.58037 4.05 37.50 31.58	3 2.9 .002252 2.03 18.75 11.11	7 8.2 .180032 4.73 43.75 9.21	16 10.81
B.S./B.A.² +/OR BEYOND	26 23.2 .340704 17.57 19.70 100.00	13 16.9 .918833 8.78 9.85 68.42	24 24.1 3E-04 16.22 18.18 88.89	69 67.8 .021822 46.62 52.27 90.79	132 89.19
TOTAL	26 17.57	19 12.84	27 18.24	76 51.35	148 100.00

FREQUENCY MISSING = 1

STATISTICS FOR TABLE OF HD BY AVAIL31A

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	11.855	0.008
LIKELIHOOD RATIO CHI-SQUARE	3	12.134	0.007
MANTEL-HAENSZEL CHI-SQUARE	1	0.011	0.917
PHI		0.283	
CONTINGENCY COEFFICIENT		0.272	

SAS

TABLE OF DOCTOR BY INCFISH

DOCTOR INCFISH

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	≥ 2 month 0	≤ 1 1	≥ 2 2	TOTAL
NO 1	0	93	13	106
	2.2	90.9	13.0	
	2.16327	.050539	3E-05	
	0.00	63.27	8.84	72.11
	0.00	87.74	12.26	
	0.00	73.81	72.22	
YES 10	3	33	5	41
	0.8	35.1	5.0	
	5.59283	.130662	8E-05	
	2.04	22.45	3.40	27.89
	7.32	80.49	12.20	
	100.00	26.19	27.78	
TOTAL	3	126	18	147
	2.04	85.71	12.24	100.00

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF DOCTOR BY INCFISH

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	7.937	0.019
LIKELIHOOD RATIO CHI-SQUARE	2	7.845	0.020
MANTEL-HAENSZEL CHI-SQUARE	1	1.209	0.271
PHI		0.232	
CONTINGENCY COEFFICIENT		0.226	

SAS

TABLE OF DOCTOR BY PREPHOME

DOCTOR PREPHOME

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	≥ 2 month 12	.5-1 month 34	TOTAL
NO 1	63	.43	106
	69.2	36.8	
	0.55969	1.05353	
	42.86	29.25	72.11
	59.43	40.57	
	65.63	84.31	
YES 10	33	8	41
	26.8	14.2	
	1.447	2.72377	
	22.45	5.44	27.89
	80.49	19.51	
	34.38	15.69	
TOTAL	96	51	147
	65.31	34.69	100.00

FREQUENCY MISSING = 2

STATISTICS FOR TABLE OF DOCTOR BY PREPHOME

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	5.784	0.016
LIKELIHOOD RATIO CHI-SQUARE	1	6.163	0.013
CONTINUITY ADJ. CHI-SQUARE	1	4.892	0.027
MANTEL-HAENSZEL CHI-SQUARE	1	5.745	0.017
FISHER'S EXACT TEST (1-TAIL)			0.012
(2-TAIL)			0.020
PHI		-0.198	
CONTINGENCY COEFFICIENT		0.195	

SAS

TABLE OF FAMILY BY HEALTHAD

FAMILY HEALTHAD

NEVER ALWAYS

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1	3	TOTAL
0	5 1.8 5.91053 5.05 71.43 20.00	2 5.2 1.9968 2.02 28.57 2.70	7 7.07
1	2 3.3 0.50129 2.02 15.38 8.00	11 9.7 .169355 11.11 84.62 14.86	13 13.13
10	5 4.0 .227904 5.05 31.25 20.00	11 12.0 .076995 11.11 68.75 14.86	16 16.16
100	13 15.9 .531948 13.13 20.63 52.00	50 47.1 .179712 50.51 79.37 67.57	63 63.64
TOTAL	25 25.25	74 74.75	99 100.00

NO REPLY

SOMETIMES

NO

YES

FREQUENCY MISSING = 50

SAS

STATISTICS FOR TABLE OF FAMILY BY HEALTHAD

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	9.595	0.022
LIKELIHOOD RATIO CHI-SQUARE	3	8.331	0.040
MANTEL-HAENSZEL CHI-SQUARE	1	2.010	0.156
PHI		0.311	
CONTINGENCY COEFFICIENT		0.297	

SAS

TABLE OF VIEWFISH BY INCFISH

VIEWFISH INCFISH

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NO REPLY 0	≤1 1	≥2 2	TOTAL
NO REPLY 0	0 0.0 0.02027 0.00 0.00 0.00	1 0.9 .023462 0.68 100.00 0.79	0 0.1 .121622 0.00 0.00 0.00	1 0.68
INDIFFERENT 1	0 0.5 .486486 0.00 0.00 0.00	23 20.6 .280946 15.54 95.83 18.11	1 2.9 1.26151 0.68 4.17 5.56	24 16.22
LOW 10	2 1.7 .037817 1.35 2.33 66.67	77 73.8 .138993 52.03 89.53 60.63	7 10.5 1.14421 4.73 8.14 38.89	86 58.11
MODERATE 100	0 0.7 .689189 0.00 0.00 0.00	25 29.2 0.59763 16.89 73.53 19.69	9 4.1 5.72337 6.08 26.47 50.00	34 22.97
HIGH 1000	1 0.1 14.5053 0.68 33.33 33.33	1 0.6 .962776 0.68 33.33 0.79	1 0.4 1.10561 0.68 33.33 5.56	3 2.03
TOTAL	3 2.03	127 85.81	18 12.16	148 100.00

FREQUENCY MISSING = 1

SAS

STATISTICS FOR TABLE OF VIEWFISH BY INCFISH

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	8	27.099	0.001
LIKELIHOOD RATIO CHI-SQUARE	8	16.716	0.033
MANTEL-HAENSZEL CHI-SQUARE	1	0.114	0.735
PHI		0.428	
CONTINGENCY COEFFICIENT		0.393	

SAS

TABLE OF VIEWFISH BY PREPHOME

VIEWFISH PREPHOME

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	≥ 2 month (2)	.5-1 month (34)	TOTAL
0 (NO REPLY)	1 0.6 .190315 0.68 100.00 1.04	0 0.4 .351351 0.00 0.00 0.00	1 0.68
1 (INDIFFERENT)	8 15.6 3.67868 5.41 33.33 8.33	16 8.4 6.79141 10.81 66.67 30.77	24 16.22
10 (LOW)	59 55.8 .185431 39.86 68.60 61.46	27 30.2 .342334 18.24 31.40 51.92	86 58.11
100 (MODERATE)	26 22.1 .706015 17.57 76.47 27.08	8 11.9 1.30341 5.41 23.53 15.38	34 22.97
1000 (HIGH)	2 1.9 .001502 1.35 66.67 2.08	1 1.1 .002772 0.68 33.33 1.92	3 2.03
TOTAL	96 64.86	52 35.14	148 100.00

FREQUENCY MISSING = 1

SAS

STATISTICS FOR TABLE OF VIEWFISH BY PREPHOME

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	4	13.553	0.009
LIKELIHOOD RATIO CHI-SQUARE	4	13.395	0.009
MANTEL-HAENSZEL CHI-SQUARE	1	0.326	0.568
PHI		0.303	
CONTINGENCY COEFFICIENT		0.290	

SAS .

TABLE OF INCFISH BY PACKAGE

INCFISH PACKAGE

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER (1)	ALWAYS (3)	TOTAL
0 (NO REPLY)	1 2.4 .857313 1.02 33.33 1.25	2 0.6 3.81028 2.04 66.67 11.11	3 3.06
1 (≤ 1)	69 66.1 .125227 70.41 85.19 86.25	12 14.9 .556563 12.24 14.81 66.67	81 82.65
2 (≥ 2)	10 11.4 .178571 10.20 71.43 12.50	4 2.6 .793651 4.08 28.57 22.22	14 14.29
TOTAL	80 81.63	18 18.37	98 100.00

FREQUENCY MISSING = 51

SAS

STATISTICS FOR TABLE OF INCFISH BY PACKAGE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	6.322	0.042
LIKELIHOOD RATIO CHI-SQUARE	2	4.949	0.084
MANTEL-HAENSZEL CHI-SQUARE	1	0.000	0.989
PHI		0.254	
CONTINGENCY COEFFICIENT		0.246	

SAS

TABLE OF INCFISH BY DESIRE

INCFISH DESIRE

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1 (NEVER)	3 (ALWAYS)	TOTAL
0 (NO REPLY)	2 0.8 1.66413 1.92 100.00 4.65	0 1.2 1.17308 0.00 0.00 0.00	2 1.92
1 (≤1)	39 37.2 .085957 37.50 43.33 90.70	51 52.8 .060593 49.04 56.67 83.61	90 86.54
2 (≥2)	2 5.0 1.76774 1.92 16.67 4.65	10 7.0 1.24611 9.62 83.33 16.39	12 11.54
TOTAL	43 41.35	61 58.65	104 100.00

FREQUENCY MISSING = 45

SAS

STATISTICS FOR TABLE OF INCFISH BY DESIRE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	5.998	0.050
LIKELIHOOD RATIO CHI-SQUARE	2	7.068	0.029
MANTEL-HAENSZEL CHI-SQUARE	1	5.354	0.021
PHI		0.240	
CONTINGENCY COEFFICIENT		0.234	

SAS

TABLE OF GPLANML BY DNBFISH

GPLANML DNBFISH

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	1 (NEVER)	3 (ALWAYS)	TOTAL
F	55	7	62
	50.4	11.6	
	.424628	1.84005	
	68.75	8.75	77.50
	88.71	11.29	
	84.62	46.67	
M	10	8	18
	14.6	3.4	
	1.46261	6.33796	
	12.50	10.00	22.50
	55.56	44.44	
	15.38	53.33	
TOTAL	65	15	80
	81.25	18.75	100.00

FREQUENCY MISSING = 69

STATISTICS FOR TABLE OF GPLANML BY DNBFISH

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	10.065	0.002
LIKELIHOOD RATIO CHI-SQUARE	1	8.767	0.003
CONTINUITY ADJ. CHI-SQUARE	1	8.007	0.005
MANTEL-HAENSZEL CHI-SQUARE	1	9.939	0.002
FISHER'S EXACT TEST (1-TAIL)			0.004
(2-TAIL)			0.004
PHI		0.355	
CONTINGENCY COEFFICIENT		0.334	

SAS

TABLE OF GPREPML BY DNBFISH

GPREPML DNBFISH

FREQUENCY / EXPECTED / CELL CHI2 / PERCENT / ROW PCT / COL PCT	NEVER 1	ALWAYS 3	TOTAL
F	57	8	65
	52.6	12.4	
	.364749	1.55018	
	67.86	9.52	77.38
	87.69	12.31	
	83.82	50.00	
M	11	8	19
	15.4	3.6	
	1.24783	5.30326	
	13.10	9.52	22.62
	57.89	42.11	
	16.18	50.00	
TOTAL	68	16	84
	80.95	19.05	100.00

FREQUENCY MISSING = 65

STATISTICS FOR TABLE OF GPREPML BY DNBFISH

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	8.466	0.004
LIKELIHOOD RATIO CHI-SQUARE	1	7.446	0.006
CONTINUITY ADJ. CHI-SQUARE	1	6.644	0.010
MANTEL-HAENSZEL CHI-SQUARE	1	8.365	0.004
FISHER'S EXACT TEST (1-TAIL)			0.007
(2-TAIL)			0.007
PHI		0.317	
CONTINGENCY COEFFICIENT		0.303	

APPENDIX B

CORRESPONDENCE

OSU

Oklahoma State University

DEPARTMENT OF FOOD, NUTRITION AND INSTITUTION ADMINISTRATION
COLLEGE OF HOME ECONOMICS

STILLWATER, OKLAHOMA 74078-0337
HOME ECONOMICS WEST 425
405-624-5039

March 1, 1988

Dear Tulsa Area Consumer:

Today's supermarkets are quickly emerging to resemble warehouse distribution centers. They literally have thousands of items that you can choose from. But which items do you choose and why? Do you choose items that are low in fat; low in cholesterol; inexpensive; or because you know that from past experience the product will taste good?

My name is Keith Nehls and I am a graduate research assistant in the department of Food, Nutrition and Institution Administration at Oklahoma State University. I am presently conducting a study that focuses on the interests, opinions, concerns, and preferences, of consumers like yourself, toward fish and shellfish products. I am very interested in learning why consumers do or do not purchase fish and shellfish products. Attached to this letter is a questionnaire that will hopefully help me draw some very meaningful conclusions.

You have been chosen as one, of only 100, preferred Tulsa area consumers to participate in this study. Your participation and cooperation in completing this survey will be greatly appreciated. You will receive the benefit of being a major contributor in constructing a consumer profile that will depict consumer preferences toward fish and shellfish products. This information then can be used by the seafood industry to evaluate methods that will benefit consumers in purchasing fish and shellfish products.

Please complete the attached questionnaire and <u>return by March 14</u>. To return the questionnaire, remove this letter; refold the questionnaire so that the return address appears on top. Staple or scotch tape the questionnaire to close. No postage is necessary. Your responses will be treated confidentially and used only for research purposes. Thank you for your assistance in this study.

Sincerely,

Keith W. Nehls

Keith W. Nehls
Grad. Research Assistant

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Celebrating the Past . . . Preparing for the Future

OSU

Oklahoma State University

DEPARTMENT OF FOOD, NUTRITION AND INSTITUTION ADMINISTRATION
COLLEGE OF HOME ECONOMICS

STILLWATER, OKLAHOMA 74078-0337
HOME ECONOMICS WEST 425
405-624-5039

MARCH 18, 1988

DEAR

Today's supermarkets are quickly emerging to resemble warehouse distribution centers. They literally have thousands of items that you can choose from. But which items do you choose and why? Do you choose items that are low in fat; low in cholesterol; inexpensive; or because you know that from past experience the product will taste good?

Hi! My name is Keith Nehls. I am a graduate research assistant in the department of Food, Nutrition and Institution Administration at Oklahoma State University. In a few days, you will be receiving a very important questionnaire in the mail. The purpose of this questionnaire is to determine how you, the consumer, view fish and shellfish food items. By filling out the questionnaire, you will be helping to construct a consumer profile that can be used by the seafood industry to evaluate methods that will benefit consumers in purchasing fish and shellfish food items.

You are not obligated to participate, however, your participation and cooperation will be greatly appreciated. Even by answering a few questions, you will be helping to make this study a success. The questionnaire is easy to understand and easy to return. No postage is necessary. So, when the questionnaire arrives, please, take a few moments to relax and fill in the answers.

Thank you for your time and may you and your family have a happy Easter holiday and a prosperous Spring season!

Sincerely,

Keith W. Nehls

KEITH W. NEHLS
Grad. Research Assistant

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OSU

Oklahoma State University

DEPARTMENT OF FOOD, NUTRITION AND INSTITUTION ADMINISTRATION
COLLEGE OF HOME ECONOMICS

STILLWATER, OKLAHOMA 74078-0337
HOME ECONOMICS WEST 425
405-624-5039

MARCH 24, 1988

DEAR

Hello again! My name is Keith Nehls. A few days ago, you should have received a letter, from me, asking for your participation in my study. Attached to this letter is the questionnaire that you read about.

The study that I am conducting focuses on the interests, opinions, concerns and preferences of consumers towards fish and shellfish food items. I am very interested in learning why consumers do or do not purchase fish and shellfish food items. The questionnaire is an important tool that will hopefully help me draw some very meaningful conclusions.

You have been chosen as one of only , preferred area consumers to participate in this study. Your participation is totally voluntary, however, your participation and cooperation will be greatly appreciated. Here's how you can help. Please complete the attached questionnaire and return by April 12. The questionnaire should be completed by the family member who does the majority of the food shopping and menu planning. To return the questionnaire, remove this letter; refold the questionnaire so that the return address appears on top. Staple or scotch tape the questionnaire to close. No postage is necessary. Your responses will be treated confidentially and used only for research purposes.

Thank you for your assistance in this study, and have a wonderful Easter!

Sincerely,

Keith W. Nehls

KEITH W. NEHLS
Grad. Research Assistant

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APPENDIX C

RESEARCH INSTRUMENT

Oklahoma State University
Department of Food, Nutrition and Institution Administration

Consumer Preference-Expenditure Study

The purpose of this survey is to identify attitudes, opinions, interests, and concerns related to seafood of Midwest homemakers. These results will identify the perceptions of Midwest families and their willingness to consume seafood. The overall objective of this study is to identify those factors that have influence in the consumption of fish and shellfish at and away-from-home. The information that you provide will be kept strictly confidential.

I. General Information
Directions: Please check or fill in the answers that apply to you. It is important that you answer all the questions.

1. Sex: _____(1) male _____(2) female

2. Age group:
_____(1) 19-29
_____(2) 30-39
_____(3) 40-49
_____(4) 50-59
_____(5) 60-over

3. Race:
_____(1) Caucasian/white
_____(2) Afro-american/black
_____(3) Native american/indian
_____(4) Hispanic
_____(5) Other, please specify_____

4. What church do you attend? (check one)
_____(1) Catholic
_____(2) Baptist
_____(3) Lutheran
_____(4) Methodist
_____(5) Pentecostal
_____(6) Presbyterian
_____(7) Jewish
_____(8) Other, please specify_____

5. Marital status:
_____(1) Single/never married
_____(2) Divorced
_____(3) Married
_____(4) Widowed
_____(5) Separated

6. Members per household (include yourself in this number, and only those members presently living in your home):
_____

7. How many of your children are ages:
_____(1) 5-below
_____(2) 6-11
_____(3) 12-18
_____(4) 19-25
_____(5) Does not apply

8. Do you have any children attending college?

_____(1) Yes How many?_____
_____(2) No
_____(3) Does not apply

II. Financial Information

9. Your family's "total" income comes from: (check one)

_____(1) Head of household
_____(2) Head of household and spouse
_____(3) Head of household, spouse and children
_____(4) Income from government assisted programs (i.e., AFDC- aid for dependent children; WIC- Women infants and children; FS- food stamps; MA- medical assistance)
_____(5) Other, please specify_____

10. Average yearly income of "total" household income before taxes is: (check one)

_____(1) $12,000.00- below
_____(2) 12,001.00- 17,000.00
_____(3) 17,001.00- 22,000.00
_____(4) 22,001.00- 27,000.00
_____(5) 27,001.00- 32,000.00
_____(6) 32,001.00- 37,000.00
_____(7) 37,001.00- 45,000.00
_____(8) 45,001.00- 50,000.00
_____(9) More than 50,000.00

III. Educational Information

11. What is the highest degree that you have received? (check one)

_____(1) High school diploma
_____(2) GED certificate
_____(3) 2- year associate degree
_____(4) B.S. or B.A.
_____(5) M.S.
_____(6) Ph.D.
_____(7) None of the above

IV. Nutritional Background

DEFINITIONS:

a.) Fish: having scales, fins, gills (i.e., perch, bass, cod, salmon, etc.).

b.) Shellfish: having a shell or shell-like external covering (i.e., oyster, clams, shrimp, etc.).

12. While in school (high school or college), did you take any classes in nutrition:

_____(1) Yes
_____(2) No

13. What source or sources do you use to obtain nutrition information? (check all that apply)
_____(1) From friends
_____(2) Newspaper/magazines
_____(3) Television
_____(4) Product labels and packages
_____(5) Research journals (i.e., Clinical Nutrition, American Dietetic Association, etc.)
_____(6) Mail circulars
_____(7) Physicians/Nurses
_____(8) Dentist
_____(9) Other, please specify_____

14. The following are features related to eating fish/shellfish. Check those responses that you are familiar with in relation to the following statement: I know that eating fish/shellfish...

_____(1) Prevents heart disease.
_____(2) Has a positive effect on triglyceride metabolism.
_____(3) Increases my body's availability of omega-3 fatty acids.
_____(4) Significantly decreases blood platelet counts
_____(5) Decreases my blood cholesterol.
_____(6) Decreases my risk for blood clots.
_____(7) Decreases my risk for hardening of the arteries.
_____(8) I am not familiar with any of these attributes.

V. Diet and Health Awareness

c.) Diet: To manage or restrict amounts of food items for a desired purpose.

15. Has your doctor or any other source told you to eat more fish/shellfish:
_____(1) Yes Why?_____
_____(2) No

16. Do you diet?
_____(1) Yes
_____(2) No
_____(3) Sometimes

17. How many days in one month do you diet? (check one)
_____(1) 1-5 days
_____(2) 6-10 days
_____(3) 11-20
_____(4) More than 20 days
_____(5) I do not diet

18. Why do you diet? (check all that apply)
_____(1) To lose weight
_____(2) To feel healthier
_____(3) Requested by a doctor
_____(4) Because my friends are dieting
_____(5) Other (please specify)_____

19. When dieting, which of the following foods do you reduce or remove from your diet: (check all that apply)
_____(1) Beef, (red meat)
_____(2) Pork
_____(3) Chicken/poultry
_____(4) Fish/shellfish
_____(5) I do not reduce or remove any of these foods
_____(6) Does not apply

20. When dieting, which of the following foods do you increase or add to your diet: (check all that apply)
_____(1) Beef, (red meats)
_____(2) Pork
_____(3) Chicken/poultry
_____(4) Fish/shellfish
_____(5) I do not increase or add any of these foods
_____(6) Not applicable

21. In general, how do you view fish/shellfish:
_____(1) High in calories
_____(2) Moderate in calories
_____(3) Low in calories
_____(4) No specific view

VII. Marketing Information

22. Who usually does the major food shopping? (check one)
_____(1) The female head-of-household only
_____(2) The male head-of-household only
_____(3) The female and the male heads
_____(4) The female head and someone else (please specify)
_____

_____(5) The male head and someone else (please specify)
_____

_____(6) Someone other than these (please specify)
_____

23. How often do you grocery shop:(check one)
_____(1) 1- 2 times a week
_____(2) Once a month
_____(3) 2 times a month
_____(4) 3- 4 times a month

24. Where do you grocery shop the most?:
_____(1) Corner market
_____(2) Convenience store (i.e., 7-11, Open Pantry, Quick Trip, etc.)
_____(3) Full-service supermarket (i.e., IGA, Safeway, Kroger, etc.)
_____(4) Warehouse food store (i.e., Pick-n-Save, Food-4-Less, SUN, etc.)
_____(5) Specialty food store (i.e. health food store, Chinese food store, etc.)

25. Using your answer to question #24, how much (on the average) do you spend on all food items in one week: (check one)
_____(1) under $25.00
_____(2) $25.00-50.00
_____(3) $50.00-75.00
_____(4) $75.00-100.00
_____(5) more than $100

26. How much (on the average) do you spend on the following items in one week:
$_____(1) Beef, (red meat)
_____(2) Chicken/poultry
_____(3) Pork
_____(4) Fish/shellfish

VII. Food-Away-From Home

DEFINITIONS:

d.) Away-from-home: all food items that are paid for and eaten at places including; movie theaters, sporting events, restaurants, snacks from convenience stores, etc.

e.) Full-service restaurant: a restaurant that offers a varied menu (i.e., pasta, steaks, shellfish, hamburgers, breakfast entrees, etc.) with waiter/ress service to the table.

27. How much (on the average) do you spend on food eaten away-from-home in one week (i.e. restaurants, fast-food, sporting events, movies, etc.): (check one)
_____(1) below $5.00
_____(2) $5.00- 15.00
_____(3) $15.00- 25.00
_____(4) more than $25.00

28. How many meals are eaten away-from-home in one week: (check one)
_____(1) at least one
_____(2) 2- 4
_____(3) 5- 10
_____(4) more than 10

29. Using your answer from question #28, how many of these meals included fish/shellfish items: (check one)
_____(1) at least one
_____(2) 2- 3
_____(3) 4- 5
_____(4) more than 5
_____(5) zero

30. When "eating out" for fish/shellfish, which type of establishment do you frequent most: (check all that apply)
_____(1) Fast-food (i.e. Long John Silver, Captain D's, McDonalds)
_____(2) Full-service restaurant
_____(3) Specialty restaurant (i.e., Red Lobster)
_____(4) Cafeteria or self-serve buffet restaurant
_____(5) Tavern/bar
_____(6) Convenience store
_____(7) At someone elses home
_____(8) I do not eat out for fish

31. You are buying fish/shellfish products at your local supermarket, listed below are factors for buying these items. Indicate the importance of each factor by circling the correct number which identifies your response.

	Most Important				Least Important
(1) Appearance	1	2	3	4	5
(2) Availability	1	2	3	4	5
(3) Flavor	1	2	3	4	5
(4) Odor	1	2	3	4	5
(5) Price	1	2	3	4	5
(6) Texture	1	2	3	4	5
(7) Knowledge of cooking methods	1	2	3	4	5

32. When purchasing fish/shellfish products, does the attractiveness of the package influence your buying decision:

_____(1) Yes
_____(2) No
_____(3) Sometimes

33. Listed below are types of fish/shellfish products that are readily available in the market-place. Place a check (✓) by all of the types that are familiar to you:

_____(1) Catfish
_____(2) Cod
_____(3) Scallops
_____(4) Sole
_____(5) Flounder
_____(6) Perch
_____(7) Turbot
_____(8) Perch
_____(9) Red snapper
_____(10) Whiting
_____(11) Halibut
_____(12) Swordfish
_____(13) Tuna
_____(14) Mahi mahi
_____(15) Orange roughy
_____(16) Smelt
_____(17) White fish
_____(18) Shrimp
_____(19) Lobster
_____(20) Crab
_____(21) Clam
_____(22) Oysters
_____(23) Crayfish

34. Using the list above, or from present purchases, what are the three most purchased fish/shellfish products by your household:

_____(1)
_____(2)
_____(3)
_____(4) We do not buy fish/shellfish products

35. Listed below are forms of fish/shellfish products that are readily available in the market-place. Place a check (✓) by all of the forms that are familiar to you:

_____(1) Fresh
_____(2) Frozen
_____(3) Fillets
_____(4) Steaks
_____(5) Whole
_____(6) Breaded
_____(7) Microwave
_____(8) Stuffed
_____(9) Peeled/deveined
_____(10) Buttered
_____(11) Fishsticks
_____(12) Batter-dipped
_____(13) Heat-n-serve

36. Using the list above, or from present purchases, what are the three most purchased fish/shellfish forms by your household:

_____(1)
_____(2)
_____(3)
_____(4) We do not buy fish/shellfish products.

37. Would you say that the amount of fish/shellfish that you eat varies by season of the year:

_____(1) Yes
_____(2) No

38. In what season(s) of the year do you usually eat the most fish/shellfish (check all that apply)

_____(1) Spring
_____(2) Summer
_____(3) Fall
_____(4) Winter

VIII. Food Preparation

39. Who usually plans the meals: (check one)

_____(1) The female head-of-household only
_____(2) The male head-of-household only
_____(3) The female and the male heads
_____(4) The female head and someone else
(please specify) _____
_____(5) The male head and someone else
(please specify) _____
_____(6) Someone other than these
(please specify) _____

40. Who usually prepares the meals? (check one)

_____(1) The female head-of-household only
_____(2) The male head-of-household only
_____(3) The female and the male heads
_____(4) The female head and someone else
(please specify) _____
_____(5) The male head and someone else
(please specify) _____
_____(6) Someone other than these
(please specify) _____

41. How often do you prepare fish/shellfish items at home: (check one)

_____(1) One or two times per week
_____(2) 2-3 times per month
_____(3) One time per month
_____(4) 6- 10 times per year
_____(5) Less than 6 times per year
_____(6) Never

42. What appliances are most often used to prepare fish/shellfish at home: (check all that apply)

_____(1) Conventional oven
_____(2) Top burner of conventional range
_____(3) Electric frying pan
_____(4) Deep fryer
_____(5) Microwave oven
_____(6) Wok
_____(7) Barbecue grill

43. What methods of cooking are most often used to prepare fish/shellfish at home: (check all that apply)

_____(1) Baking
_____(2) Broiling
_____(3) Frying
_____(4) Deep-frying
_____(5) Steaming
_____(6) Poaching
_____(7) Barbecuing
_____(8) Microwaving

44. Do the likes/dislikes of family members influence your buying of fish/shellfish products:

_____(1) Yes
_____(2) No
_____(3) Sometimes

X. Activities, Interest, and Opinions

Directions: The statements below attempt to describe how you may act in a certain situation. After eading each statement, respond by circling the number hat best describes your actual behavior pattern to the situation.

	ALWAYS				NEVER
45. When nutrition facts of a certain food item are unclear to me, I will seek nutrition information before I buy the item.	1	2	3	4	5
46. I buy fish/shellfish items because I know that their consumption has definite health advantages.	1	2	3	4	5
47. When buying food items, I will read the label for nutrition information.	1	2	3	4	5
48. I will usually buy meat items that I can see, rather than meat items sealed in a box.	1	2	3	4	5
49. In-store displays and/or cooking demonstrations influence my buying decisions.	1	2	3	4	5
50. If I like a food sample given to me in a store, I will usually buy that product.	1	2	3	4	5

		ALWAYS				NEVER
51.	I often buy food items, according to how attractive the package is.	1	2	3	4	5
52.	The brands of fish/shellfish that I buy are brands that I remember from television commercials or other printed advertisements.	1	2	3	4	5
53.	My desire for buying fish/shellfish products is placed before the price of the product.	1	2	3	4	5
54.	I usually buy fish/shellfish products only when I am "hungry for them" but not on a regular basis.	1	2	3	4	5
55.	I am weary of buying fish/shellfish items that are not familiar to me.	1	2	3	4	5
56.	If I reach the seafood section of the supermarket before the meat section, I am more likely to include fish/shellfish in my purchases.	1	2	3	4	5
57	I usually buy/prepare fish/shellfish items when I seek a change of pace.	1	2	3	4	5
58.	I don't buy fish/shellfish products that often, because I am unfamiliar with cooking methods for these items.	1	2	3	4	5
59.	I would buy more fish/shellfish items if I had literature describing various ways to cook it.	1	2	3	4	5
60.	If my friends often buy/prepare fish/shellfish items, I am more likely to buy fish/shellfish.	1	2	3	4	5
61.	When out-to-eat with friends, your friends order first. They decide to have a fish/shellfish menu item. Will their decision prompt you to order a similar menu item?	1	2	3	4	5
62.	The amount of freezer space at home influences my decision in buying fish/shellfish products.	1	2	3	4	5

63. Do you think this survey has increased your awareness toward fish/shellfish:

_____(1) Yes
_____(2) No
_____(3) Indifferent

(2)

X. Optional Information

Directions: The following questions do not have to be answered, however, the answers that you provide will allow us to arrive at a more realistic value for net disposable income. Your participation is appreciated.

64. If you have a child or children attending college, how much money do you provide for your child's education in one year? (i.e., tuition, books, housing, spending money, clothes)
$_____(1)
_____(2) does not apply

65 Housing information; do you:
_____(1) Rent $_____ per month
_____(2) Own/mortgage $_____ per month
_____(3) Live with parents $_____ per month
_____(4) Other, please specify _____

66. On the average over the year, how much do you pay each month for:
(1) electricity $_____
(2) gas, oil, coal, wood, or other fuel for heating and/or cooking $_____
(3) water/sewage $_____
(4) other utilities, including trash collection $_____
(5) basic monthly telephone service $_____

Our sincere gratitude is extended to you for your cooperation in this study. You are a vital part of our research, and without your help, the benefits of this study would be impossible to achieve. The Department of Food and Nutrition and Institution Administration at Oklahoma State University thanks you and wishes you and your family the very best.

VITA

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