

CONSUMER KNOWLEDGE OF AND SATISFACTION

WITH THE MICROWAVE OVEN

By

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PREFACE

This study is concerned with microwave oven owners' knowledge of the operation of a microwave oven, their attitudes toward it, how they actually use the appliance, their satisfaction with it, and the impact of the microwave oven on their purchase of convenience food and disposable products. Rural microwave oven owners in Alfalfa, Major, and Woodward counties in Oklahoma are interviewed. One of the major tasks undertaken in this study is the development of an instrument to assess owners' knowledge and use of the microwave oven.

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CHAPTER I

INTRODUCTION

Since the introduction of the microwave oven for home use in 1955, consumers are continuing to watch its progress. These early, large, free-standing models are, by today's standards, unreliable, inefficient, and expensive. The first countertop model has been on the market since 1967 (\$500 in cost). The increase in microwave oven purchases in 1971, is considered a result of improvements being made in the oven and consumers becoming more aware of the benefits of microwave cooking. Sales that year record over 100,000 units--more units than in all of the previous years. The safety standards set by the United States Department of Health, Education and Welfare and going into effect in 1971, are also credited with further improving the consumer's acceptance of the appliance.

With new features added each year and with the improvements and advances in microwave ovens, Americans are buying the appliance in increasing numbers. According to industry figures, a microwave oven will be used in over nine percent of American homes by the end of 1977, and by 1985, it is predicted that one out of every two American families will cook with a microwave oven (Huffman, 1976).

Manufacturers of microwave ovens are expanding their facilities and are still up to two months behind in filling retailers' orders, as of February, 1976. At a time when sales of conventional ranges are

down, microwave oven sales in 1978 are expected to exceed the combined sales of both electric and gas ranges and are expected to top the list of major appliances sold (George, 1977). Today over 35 different brands of microwave ovens are available at prices to suit most budgets and in combinations to fit most kitchens.

Many appliance dealers, trying to keep up with this buying trend, need more knowledge to answer consumers' questions about microwave ovens. Often the owner will not take time to read the manual or the instructions contained in the cookbook that comes with the microwave oven and does not understand microwave energy and its application.

Research on microwave ovens has, for the most part, dealt with their safety and operation, the effects of microwave heating on appearance and nutritive quality of food products, and the consumer's reasons for purchasing a microwave. Studies are also available that compare the energy consumption between microwave ovens and conventional ranges.

Reports of consumer knowledge and consumer satisfaction with the microwave oven have not been widely publicized, and for the most part, are confined to semitechnical sources of industry newsletters. Since projections indicate that more consumers will be buying and using the microwave oven, there is a need for a study to assess how much knowledge owners have about their microwave oven and the effect this knowledge has on their attitudes toward the use of the appliance.

Purpose and Objectives

The purpose of this study is to learn how much a sample of microwave oven owners know about the operation of a microwave oven, their opinions about the functions of a microwave oven, how they actually

use the appliance, their satisfaction with it, factors leading to the purchase of the microwave oven, and the impact of the microwave oven on their purchase of food and utensils. The specific objectives for the study are:

- a) to assess the level of knowledge about microwave ovens-- technical aspects, use, and maintenance--among microwave oven owners in a rural population.
- b) to assess the extent of usage of the microwave oven by family members.
- c) to assess what products consumers purchase in order to utilize the microwave oven.
- d) to assess the degree of satisfaction owners express concerning their microwave ovens.
- e) to make recommendations of ways to further educate the microwave oven owner.

Research Questions

Based on the objectives listed above, the following research questions are explored:

Factors Related to Purchase of Microwave Oven

1. What is the relationship between who decides to purchase the microwave oven and the frequency of use by husband and wife?
2. What is the relationship between who decides to purchase the microwave oven and whether comparison shopping occurs before the purchase of the microwave oven?

3. What is the relationship between purchase behavior and the knowledge of how the microwave oven functions and how to use and care for it?
4. What is the relationship between who decides to purchase the microwave oven and the expressed satisfaction with the microwave oven?

Factors Related to Knowledge of the Microwave Oven

1. What is the relationship between the extent to which the owner reads the use-and-care manual and the knowledge of microwave oven operation, use, and care?
2. What is the relationship between the extent to which the owner reads the use-and-care manual and the degree of satisfaction with the microwave oven?
3. What is the relationship between being informed about the technological aspects of the microwave oven and satisfaction with the microwave oven?

Assumptions

The following conditions are assumed for this study:

1. The participants in the study will give accurate information.
2. The microwave ovens, which the participants own, are in good working condition.

Limitations

The following limitations are cited for this study:

1. Most participants will be married women.

2. The conclusions are only valid for the population from which the sample is taken.
3. Participants are limited to the owners of the major brands of microwave ovens prevalent to the area surveyed.

Definitions of Terms

The following definitions are pertinent to this study:

Convenience Food - A menu item in a preserved state, with objective finishing instructions, allowing the serving of that menu item without need for a skilled cook or baker to assure acceptance of that item (Dungan and Lacey, 1969, p. 6).

Microwave Oven - Oven that cooks with a very short wave length (micro = short), regardless of size, voltage requirements, and wattage output (Witt, 1973).

Rural - An area under 2,500 in population (U.S. Bureau of the Census, 1975).

Summary

With the growing interest in the microwave oven, it is important that consumers understand this appliance both before and after its purchase. Retailers and manufacturers of microwave ovens also need to know how consumers use the appliance and how they can help the consumer become knowledgeable about the microwave oven.

CHAPTER II

REVIEW OF THE LITERATURE

This review of the literature covers the operation and features of the various types of microwave ovens, the government regulations concerning the oven's safety and how lifestyles affect the purchase of microwave ovens. Also reviewed are studies on the microwave oven's energy consumption, along with studies on food products and utensils for the microwave oven. The need for education is also reviewed.

Microwave Oven Operation

Microwave ovens are electronic devices that heat foods rapidly as microwave energy is absorbed by the food. Microwaves are a form of non-ionizing electromagnetic energy similar to radio waves and infrared waves, but they are in no way related to radioactivity. Microwaves do not affect the nutritional value of foods in any way that is different from conventional cooking (Consumer News, 1974). When, however, foods are kept warm on steam tables or in food warmers, vitamin losses can be significant, and in these instances, heating with microwave energy is preferred from a nutritional standpoint (The ABC's of Microwave Cooking).

Microwave ovens are designed to prevent microwaves from escaping outside the oven cavity. Metallic materials, such as oven walls and screens reflect microwave energy, while glass, paper, and plastic allow microwaves to pass through them. When microwaves are absorbed by

food, they cause the molecules to oscillate very rapidly. This friction of the molecules produces heat which cooks the food. The degree of heating depends on the moisture content, starting temperature, quantity, size, and density of the food (Bennett, 1975).

The term "electronic ovens" is a result of the discovery in 1945, that microwaves could be boxed to cook food. "Electronic" is a word associated with a device containing a vacuum tube. The vacuum tube, in this case, is a magnetron which emits the microwave energy. Since the 1960's, the evolution of microwave cooking has brought about the more popular term, microwave ovens (Witt, 1973).

Government Regulations

The two federal government agencies regulating microwave ovens are the Bureau of Radiological Health and the Federal Communications Commission. The Bureau of Radiological Health is under the jurisdiction of the United States Department of Health, Education, and Welfare (HEW), the Public Health Service (PHS), and the Food and Drug Administration (FDA). They are charged with the responsibility of policing and enforcing the regulations under the Radiation Control for Health and Safety Act of 1968 (DeBiasio, 1973). This act requires industry to take corrective action when an electronic product fails to comply with a performance standard or has a radiation defect which relates to its safe use. Microwave ovens are included in this category of electronic products.

The Bureau of Radiological Health has a radiation control standard for microwave ovens which requires that a new microwave oven must not

have a leakage level in excess of one milliwatt per square centimeter when new, and five milliwatts per square centimeter over its life. Quality control tests now suggest that ovens change very little in use, and therefore the five milliwatt level is seldom reached with used ovens (Snyder, 1975). If any leakage does occur, it will be around the oven door, so radiation leakage is measured at a distance of two inches from the door.

The Bureau of Radiological Health along with industry has safety standards that set a maximum permissible exposure for anyone working near microwave ovens. The exposure limit has generally been fixed at 10 milliwatts per square centimeter (Steinmann, 1976).

The standard also requires that ovens manufactured after October 6, 1971, be equipped with at least two independently operating safety interlocks to shut off radiation as oven doors are opened. Ovens manufactured after August 6, 1974, must become inoperable if one or both interlocks fail to function (We Want You to Know About Microwave Oven Radiation). Another part of the Bureau's program is periodical in-plant inspections to insure compliance with the federal regulations.

Before a microwave oven can be sold, it must be approved by the Federal Communications Commission. The purpose is to insure that the microwave ovens do not emit radio frequency noise that would interfere with other types of communications (DeBiasio, 1973).

Microwave Oven Safety

Microwave oven safety is a topic which confuses much of the public. Consumers' Research Magazine states that the home microwave oven has been in use for an amount of time sufficient enough to show any possible

dangers that might occur from units that are within the limits set by Health, Education, and Welfare. Consequently, Consumers' Research holds the position that the leakage limits set by the Department of Health, Education, and Welfare in 1968 are adequate (Consumers' Research Magazine, 1976).

In a 1973 article, Consumers Union appliance testers, appraising microwave ovens, label all ovens as "not recommended" due to possible radiation leakage (Consumer Reports, 1973). Consumer Union's more recent tests (June, 1976) show that because oven door seals and interlock designs have improved since the earlier report, the ovens (as a group) present less of a possibility of leaking radiation than do the earlier models. Consumer Reports also states that there is no evidence of injury occurring from the radiation of a microwave oven. The only documented accounts of tissue damage in humans have been high levels of microwave exposure--much higher than the exposure likely to occur near a microwave oven (Consumer Reports, 1976).

According to a government publication, microwave ovens that meet the federal standard are safe for home use (We Want You to Know About Microwave Oven Radiation). Tests show that all models of microwave ovens produced since the standard has been in effect present no radiation hazard when used according to manufacturer instructions. Ovens produced before October, 1971, should be tested for leakage with a properly designed instrument since these ovens are not necessarily designed to the strict criteria required of microwave ovens built since that time. Many state health departments are equipped to make the check, as are some appliance repairmen. Microwave ovens should also

be checked once a year if they get frequent use or are used by persons not disposed to read and follow directions.

The primary sources of a potential leak are abused doors and door seals, the build-up of grease and food particles around the door seals, improper servicing, and with older ovens, failure to replace or repair worn out door hinges and latches. A properly fitted door is essential to completely confine the energy, and food particles around the door seal form a pathway for microwave energy leakage (Wooding, 1972).

Because of the concern that misuse of the oven could permit radiation leakage in excess of standards, microwave ovens manufactured after October 3, 1974, must carry a warning label telling the user not to try to operate the oven with an object caught in the door, a door that does not close properly, or an oven with a damaged door, hinge, latch, or sealing surface. Manufacturers who prove that their ovens operate within the emission standards, even when conditions of the warning label are violated, can be given an exemption from carrying the warning label (Craig, 1977).

Many people question the safety of the microwave oven in relation to the cardiac pacemaker. With certain types of pacemakers manufactured in the past, there can be an interaction of microwave signals with the pacemaker. This is true of the demand pacemaker which operates only when it senses the heart weakening. It is the few early, unshielded models of demand pacemakers that are susceptible to interference from electromagnetic fields caused by auto ignition systems, light dimmers, electric shavers, television sets, and microwave ovens. The interference can result in temporary interruption of the pacemaker's pulsed output and may be a potential hazard to the user (Seal, 1973).

According to Seal, pacemaker manufacturers are aware of the interference problem and are now manufacturing pacemakers that are properly shielded (1973, p. 6). Fears of microwave ovens interfering with pacemakers prompt many people to post warning signs near the oven. The Bureau of Radiological Health, however, has stated a policy against such practice because the signs unnecessarily create unwarranted doubts about the product's safety in the minds of the general public.

Types of Microwave Ovens

There are three types of consumer microwave ovens on the market, and these are divided into two categories: countertop microwave ovens, which account for 90 percent of the sales, and microwave ranges, sales of which some believe will grow even faster in the future than the countertop market (George, 1977). There are two types of microwave ranges: double-oven ranges and combination ranges. The newest type of consumer microwave is the double-oven range which features an eye-level microwave oven mounted over a conventional range to produce a double oven configuration (Witt, 1973). The combination range looks like a conventional, free-standing electric range but features a lower oven which cooks with either conventional heat or with microwave energy or both simultaneously.

In 1976, the microwave industry is credited with selling 100,000 microwave ranges representing over \$90 million in retail sales. In 1977, it is estimated that 175,000 microwave ranges will be sold, which will be 17 percent of all microwave sales that year (George, 1977).

Microwave Oven Features

As recently as 1970, the microwave oven is credited with handling only 25 to 30 percent of the items cooked in the average home. Today, that number is up to 95 percent (George, 1977). This increase in cooking capabilities is caused by technical advances made in the oven's cooking capabilities since 1972. As some in the industry see it, microwave oven sales have increased largely because new features have vastly improved the oven's performance (Business Week, 1976). These features include variable power, automatic temperature control, electronic digital controls, larger oven interiors, automatic defrost, micro-browning, and improved cooking patterns.

Browning is often an issue in microwave cooking because few foods are cooked for the length of time needed for browning in the microwave oven. One solution to browning is the heating element at the top of the countertop microwave oven. In ovens not equipped with this element, browning is accomplished in the form of a browning dish. This glass ceramic dish, coated with tin-oxide, absorbs microwaves when preheated and converts them into thermal heat (Ludvigson, 1976). The foods are then seared when they are placed on the hot surface. In a combination microwave range, browning is automatic. Conventional heat browns and crisps, while microwave energy cooks the food.

Energy Consumption of the Microwave Oven

An energy consumption study done in 1972 shows the 120-volt microwave oven consuming less electrical energy than the conventional electric range with a lower cost of operation (Pinta, 1973). Since

1972, energy savings is attracting more attention to the microwave oven. One reason which is given for the boom in microwave oven sales is energy conservation (George, 1975). Microwave ovens, on the average, use 50 to 75 percent less energy than conventional electric ranges (George, 1977). According to Ludvigson (1976), microwave ovens save so much energy because they heat the food molecules, thus no energy is lost heating the air space or the kitchen.

In one survey, energy savings is listed as one of the main reasons for purchasing a microwave (Ludvigson, 1976). It is estimated that by 1985, microwave oven users will save 32.3 billion kilowatt hours of electricity just by substituting microwave for conventional cooking for 80 percent of their cooking (George, 1977).

Savings from microwave oven use will not only be from reduced electrical power, but also in less food waste. Small amounts of leftovers, which might be discarded because of the effort to reheat them conventionally are now kept for reheating in the microwave oven.

Limitations of the Microwave Oven

Some foods are best prepared by conventional methods. These include foods that are usually cooked by frying or boiling in large amounts of water. Boiling water for cooking food is impractical, as no time is saved over conventional cooking methods. Other foods that are not suitable for the microwave require the hot air of the conventional oven (angel food cake and breads, for example) and do not do as well in the cold air of microwave cooking (Payne, 1973).

Scott (1976) finds that the microwave oven is best for preparing food for up to six people but that conventional methods work better

for larger meals. Even though the source of the oven's popularity is speed (the oven cooks all foods in about a quarter of the time of any other method), some food writers complain that the microwave oven threatens the traditional aspects of food cooking: the time spent to prepare and perfect a dish (Heime, 1977).

Demographics of the Microwave Oven Buyer

The microwave oven is one product that is a direct result of changing lifestyles, as consumers are increasingly involved in activities outside the home and desire to spend less time in food preparation. There are 37 million women in the labor force; 44 percent or 21 million of these women are married. By 1980, it is projected that married women who are employed outside the home will increase by 21 percent, to 25.5 million, which means that more than half of all married women will be employed (Hess, 1976).

Hess (1976) cites findings from a study which reveal that lack of time is a dominant functional problem of this group of employed women. In an Amana Refrigeration study it is found that more than 50 percent of the wives in families that own microwave ovens are employed outside the home. Thirty percent of the 23,000 households in the study say that time-savings is the reason for buying a microwave oven (McConnell, 1976). McConnell (1976) further states that the majority of the features that are liked about the microwave oven focus on a reduction in time for meal preparation and freeing the person to accomplish other things, either because one or both persons are working outside the home, or because they are involved in activities outside the home.

Another Amana Refrigeration market research project, surveying 1,000 microwave oven owners, reveals that consumers who most frequently use microwave ovens are between 35 and 50 years old, are married, and have children (Decareau, 1977). The study shows that women are the most frequent microwave oven users, and men are the principal users in 12 percent of the survey's households. Over 90 percent of the owners use their microwave oven at least once a day. More than 80 percent of the owners use the microwave oven for breakfast, lunch, dinner, and for snacks (Decareau, 1977).

A 1973 study by Time, Incorporated discloses that of the study's respondents, 91 percent use their microwave oven for reheating leftovers. Defrosting and heating snacks are also shown to be main uses of the microwave oven. Other findings of the study reveal that 72 percent of the respondents think food cooked in the microwave oven tastes as good as or better than food cooked in a conventional oven. Time efficiency, easier clean-up, and better tasting reheated foods are main reasons for buying a microwave oven (Time, Incorporated, 1974). Time, Incorporated (1974) also says that demographically, almost six in ten heads in microwave oven households are college educated, and the median income for microwave oven owning households is \$19,736.

Beresford (1975), in another study, states that two-thirds of the microwaves sold are sold to both the husband and the wife. And, according to another author, the average consumer selects a full-featured microwave oven that costs between \$400 and \$500 (Cubisino, 1976).

In a more recent Better Homes and Gardens survey, it is reported that ownership is higher in the two person households, in the 25 to 34

age group and in households with women employed outside the home. Owners report that the ovens are used most often for reheating leftovers and thawing foods, and the greatest attribute is time savings (Eby, 1977). A survey concerning Consumer Reports' readers shows that they like microwave cooking because it "saves time" and means fewer utensils to wash, and because the oven is easy to clean and doesn't heat the kitchen (Consumer Reports, 1976).

The Need for Education

A 1965 study of electronic range users and non-users reports that consumer information about the electronic range is limited, and the average non-user knows little about the appliance. In fact, findings show that uninformed non-users expect to use the electronic range in the same way they would use the conventional range (Van Zante, 1966).

Today, this has all changed. Consumers are aware of the microwave oven through advertising, magazine and newspaper articles, and television programs. However, since features are becoming more complex with product invasion, there is a need for additional education, not only for the consumer, but also for utility representatives, and sales and marketing people. A survey of 210 students in microwave classes reveals that prior to attending the class, 75 percent used their ovens mainly for reheating (Hamernik, 1977). Hamernik (1977) goes on to say that many microwave oven owners are hesitant to try other uses of their ovens--they need to see foods prepared and to learn the basics to gain confidence.

The results of a survey assessing users' knowledge of microwave ovens show that many consumers do not understand the technical aspects

of microwaves and microwave cooking. Many of the survey's respondents are unsure of the techniques to employ for safe use of the microwave oven and for maintenance of the appliance (Drew, Rhee, and Stubbs, 1977).

What this means to the microwave oven industry is a need for instruction in microwave cooking at all levels--junior and senior high schools, community colleges, universities, and adult education. According to George (1975), one of the strongest tools for the microwave retailer is the in-store demonstration, which helps to overcome objections by answering questions through examples.

Summary

The microwave oven is one appliance that has been closely supervised since its discovery. Meeting strict government and industry regulations and guidelines, the microwave oven is judged quite safe for use by the public. Microwave oven sales are increasing, and consumers have a wide and varied field from which to choose. There are four basic reasons why consumers are buying microwave ovens. The first is cooking performance. Second is lifestyle and how the speed of cooking with microwave ovens fits that lifestyle. A third reason is energy savings. And the fourth reason is the value offered by a microwave oven. There are opportunities for the home economist in education concerning microwave ovens--educating the users of microwave ovens, food and packaging company specialists, retailers, and others who are interested in the way microwave ovens perform.

CHAPTER III

DESIGN AND PROCEDURES

This chapter outlines the procedures used to carry out the research involving owners of microwave ovens. The procedure involves these steps: (1) determining the research method, (2) sampling, and (3) instrumentation.

Research Design

This study assesses the amount of knowledge that a sample of rural microwave oven owners have concerning the microwave oven and what influence this knowledge has on the way the oven is used and the consumer's degree of satisfaction with the microwave oven. To accomplish this, the survey method of research is used. The survey method best serves the purpose of assessing opinions and attitudes of individuals. An interview schedule is used for the data collection (Appendix B).

Sample Selection

According to the 1970 census definition, a rural area is one under 2,500 in population (U.S. Bureau of the Census, 1975). For this study, the population is microwave oven owners living in a rural area of Oklahoma, and the sample of the study is those people who own a microwave oven in rural areas of Alfalfa, Major, and Woodward counties in Oklahoma. Since only those owners who have a rural address are asked to

participate, this includes anyone within the counties other than those living within the city limits of Fairview and the city of Woodward. All other towns in the counties are considered rural and therefore owners in these communities are included in the study.

Names of microwave oven owners living in the three counties are taken from lists supplied by microwave oven dealers in Cherokee, Fairview, and Woodward. Retailers in these communities are selected, since these are the closest appliance shopping centers for the surrounding areas. Four major brands of microwave ovens are sold by appliance dealers in these communities (Litton, Amana, General Electric, and Panasonic). Sixty-five names of rural microwave oven owners now living in the counties constitute the sample. From a table used to determine sample size from a given population, the sample size required to be representative of the opinions of 65 persons is determined to be 56 (Krejcie and Morgan, 1970). From the 65 names provided by retail dealers, owners are contacted until 56 interviews are complete.

A letter, sent to those selected, explains the research project and asks for their assistance. The letter also explains that the interview will be an opinionnaire done by telephone. This letter is included in Appendix A.

Instrumentation

Instrumentation for this study is composed of questions selected from two previous studies of microwave oven owners. One study, written as a master's thesis at the University of Washington, deals with consumer satisfaction in the use of the microwave oven (Madigan, 1974). Twenty microwave oven owners from an urban area (Seattle) are interviewed

in the study, and upon completion of the research, Madigan (1974) recommends that studies be done on other populations to verify the results. Questions are taken from this study to assess the degree of satisfaction among owners regarding their microwave oven's performance. The second research study conducted by the Consumer Research Center, Texas A & M University, deals with the microwave oven owner's knowledge of the appliance, their use and maintenance practices, and their satisfaction with the oven. The study, which involves an urban area, also assesses the impact of owning a microwave oven on food and disposable product buying habits (Drew, Rhee, and Stubbs, 1977). After personal communication with the research team in Texas, many of the questions from the Texas study are eliminated, because the interview is judged as too long, thus reducing the accuracy of the responses. Questions from the two studies are combined, and the length of each interview is approximately 10 minutes.

The instrument, pre-tested by interviewing microwave oven owners in Kay County, is checked for clarity. From this pre-testing, the instrument is revised.

A telephone survey is used in conducting the present study. This type of survey method is chosen, because telephone surveys have the advantage of being easy to administer, and in a comparison of personal and telephone interviewing, there is found to be no large differences in the responses (Truax, 1978). However, the study comparing the two methods of interviewing finds that faster paced questioning yields less complete answers on open-ended items. For this reason, open-ended questions are kept to a minimum in the instrument.

The instrument collects demographic and economic characteristics of owners, along with information concerning their use of and satisfaction with their microwave oven. Responses are recorded by the interviewer, and the interview schedule includes a coding system. The complete survey instrument is included in Appendix B.

Statistical Analysis

Responses to statements regarding knowledge, use and care, and opinions about the microwave oven, as well as other items regarding owner's response to having a microwave oven are reported in frequencies. Relationships between variables identified in the research questions in Chapter I are analyzed using analysis of variance. Other relationships are measured using Pearson correlation. Chapter IV presents the findings of this study.

CHAPTER IV

ANALYSIS OF THE DATA

Family Characteristics

This study of knowledge and attitudes of microwave oven owners includes 56 respondents. Of the 56 respondents, 55 are women and one is a man. Fifty-four of the persons are married, and two are single. Other family characteristics are shown in Table I. Family size ranges from one to seven persons per household, with the mean family size being 3.13 persons. Twenty-one of those who are married do not have children living at home. One couple has no children, while the remaining couples have one to five children living at home, with 18 percent having teen-age children. Two-person households are the most representative of family size and involve 41 percent of the sample.

The majority of homemakers (71 percent) are between the ages of 30 and 60 years, with 40 percent of the homemakers interviewed between the ages of 30 and 44 years. Over 43 percent of the women and over 36 percent of the men in the families are high school graduates. Almost 13 percent of the women and 25 percent of the men have completed college.

The majority of women (54 percent) are not employed outside the home, while 91 percent of the men are employed full-time. Forty percent of the husbands work as farmers or farm managers--this being the most frequently mentioned occupation. Sixteen percent of the men work

TABLE I
FAMILY CHARACTERISTICS OF THE SAMPLE

Family Characteristics	Number Reporting	Percent
<u>Age of Homemaker</u>		
Less than 30 years	10	18.18
30 through 44 years	22	40.00
45 through 60 years	17	30.91
60 years and over	<u>6</u>	<u>10.91</u>
Total	55	100.00
<u>Education of Homemaker</u>		
Less than high school	8	14.55
High school graduate	24	43.64
Attended college	16	29.09
College graduate	<u>7</u>	<u>12.72</u>
Total	55	100.00
<u>Education of Husband</u>		
Less than high school	8	14.55
High school graduate	20	36.36
Attended college	13	23.64
College graduate	<u>14</u>	<u>25.45</u>
Total	55	100.00
<u>Employment of Homemaker</u>		
Full-time	18	32.73
Part-time	7	12.73
Not employed	<u>30</u>	<u>54.54</u>
Total	55	100.00
<u>Employment of Husband</u>		
Full-time	50	90.91
Part-time	1	1.82
Not employed	<u>4</u>	<u>7.27</u>
Total	55	100.00
<u>Occupation of Husband</u>		
Professional, technical worker	3	5.46
Manager, administrator	9	16.36
Salesworker	1	1.82
Clerical worker	4	7.27
Craft worker	5	9.09

TABLE I (Continued)

Family Characteristics	Number Reporting	Percent
<u>Occupation of Husband (Continued)</u>		
Operative, excluding transport	6	10.91
Farmer and farm manager	22	40.00
Service worker	1	1.82
Retired worker	<u>4</u>	<u>7.27</u>
Total	55	100.00
<u>Occupation of Homemaker</u>		
Professional, technical worker	4	7.27
Manager, administrator	5	9.09
Homemaker	28	50.90
Salesworker	1	1.82
Clerical worker	14	25.46
Service worker	1	1.82
Retired worker	<u>2</u>	<u>3.64</u>
Total	55	100.00
<u>Yearly Family Income</u>		
Less than \$10,000	1	1.85
\$10,000 - \$14,999	15	27.78
\$15,000 - \$24,999	17	31.48
\$25,000 and over	<u>21</u>	<u>38.89</u>
Total	55	100.00
<u>Family Size</u>		
One person	1	1.79
Two persons	23	44.07
Three persons	13	23.21
Four persons	11	19.64
Five persons	4	7.14
Six persons	3	5.36
Seven persons	<u>1</u>	<u>1.79</u>
Total	55	100.00
<u>Family Life Cycle Stage</u>		
Young couple, no children	1	1.82
Pre-school children	3	5.45
Elementary age children	12	21.82
High school age children	18	32.73
Empty nest (pre-retirement)	18	32.73
Couple, retired	<u>3</u>	<u>6.45</u>
Total	55	100.00

as managers or administrators. Over 50 percent of the women are homemakers. Eighteen percent of the women are employed full-time; of these, over 25 percent are employed as clerical workers.

Of the 54 families who responded, all except one have yearly incomes over \$10,000 with 39 percent having annual incomes over \$25,000. Thirty-one percent have incomes between \$15,000 and \$24,000 per year.

Findings Regarding Consumer Knowledge of the Microwave Oven

The statements in the first three sections of the questionnaire are worded as correct statements. It is assumed that respondents who agree with the correct statements are aware that it is a correct statement. The responses are scored: Agree (3), Undecided (2), and Disagree, (1). The statements from the questionnaire are presented in Table II and discussed below.

General Knowledge

Questions one through five in the questionnaire deal with general knowledge about the microwave oven. All respondents agree that foods cook faster in the microwave oven than in a conventional oven. Almost nine percent do not know that microwave ovens are manufactured to meet safety standards, and almost 13 percent do not know that countertop models can be used where there is a separate 115-volt electrical outlet. Only 37.5 percent of the respondents agree that microwaves dissipate rapidly if they leave the oven; over half are unsure of what happens if microwaves leave the oven. The majority (93 percent) say that the best way to determine if a microwave oven is leaking microwaves is to have

TABLE II
 CONSUMER KNOWLEDGE PATTERNS OF THE
 MICROWAVE OVEN

Statements	Percent of Responses		
	Agree	Disagree	Undecided
<u>General Knowledge</u>			
1. Microwave ovens are now manufactured to meet established safety standards.	91.1	---	8.9
2. A microwave oven cooks food faster than a conventional oven.	100.0	---	---
3. Portable microwave ovens can be used anywhere there is a separate 115-volt AC electrical outlet.	87.5	---	12.5
4. Microwaves dissipate rapidly if they leave the oven.	37.5	5.4	57.1
5. The best way to determine if an oven is leaking microwaves is to have it checked by an authorized service person.	92.9	---	7.1
<u>Specific Knowledge</u>			
6. The terms "microwave" and "electronic" are used to describe the same type of oven appliance.	17.9	32.1	50.0
7. Microwaves are a non-ionizing form of energy produced by a magnetron.	35.7	---	64.3
8. Microwave leakage may occur only around the door of the oven.	50.0	23.2	26.8
9. Microwaves do not make food radioactive.	87.5	1.8	10.7
10. Excessive microwave exposure can cause skin burns and may affect eyes and other organs.	46.4	26.8	26.8
<u>Knowledge of Use and Maintenance</u>			
11. Cooking speed is influenced by the moisture content, shape, size, and amount of food being cooked.	92.9	---	7.1
12. The operation of an empty microwave oven can damage it.	71.4	8.9	19.7

TABLE II (Continued)

Statements	Percent of Responses		
	Agree	Disagree	Undecided
<u>Knowledge of Use and Maintenance</u> (Continued)			
13. Microwave leakage can be caused by allowing grease and food particles to build up around a door seal.	76.8	5.4	17.8
14. The use of metal cookware can damage the microwave system.	96.4	---	3.6
15. Glass ovenware (and) serving dishes, paper products, and many plastics may be used as cooking containers.	100.0	---	---
16. A standard meat thermometer cannot be used in the microwave oven while the oven is operating.	80.3	5.4	14.3
17. A microwave oven is easily cleaned with a damp cloth.	100.0	---	---
<u>Consumer Opinions of the Microwave Oven</u>			
18. Food cooked in a microwave oven is as nutritious as that cooked in a conventional oven.	98.2	---	1.8
19. The microwave oven is a convenience appliance.	94.6	5.4	---
20. The microwave oven should be standard equipment in a kitchen.	76.8	17.8	5.4
21. A conventional oven is not needed if one has a microwave oven.	5.4	91.1	3.5
22. The microwave oven is a safe cooking appliance when properly used.	100.0	---	---
23. You are glad you have a microwave oven.	100.0	---	---
24. The microwave oven has saved you time.	100.0	---	---
25. The microwave oven has an advantage in preparing small servings as compared with the standard oven.	100.0	---	---

TABLE II (Continued)

Statements	Percent of Responses		
	Agree	Disagree	Undecided
<u>Consumer Opinions of the Microwave Oven</u> (Continued)			
26. The microwave oven is desirable for its ability to heat food in the dish in which it is served.	100.0	---	---
27. Food reheated in a microwave oven is better tasting than food reheated by standard appliances.	89.3	3.6	7.1

(N=56) Percentages total across rows to equal 100 percent.

it checked by an authorized service person. As noted above, for each item there is a possible response of one, two, or three, so that when the responses to these five statements are totaled, scores range from five (all errors) to 15 (all correct answers). In the General Knowledge category, the mean score for all respondents is 14, indicating a high level of general knowledge regarding the microwave oven.

Specific Knowledge

Questions six through ten are designed to test specific knowledge about the microwave oven. Respondents' scores are slightly lower on this section. The mean score is 11.54 on a five (all errors) to 15 (all correct answers) scale. Only 18 percent of the respondents realize that the terms "microwave" and "electronic" refer to the same appliance. Although the majority of respondents (87.5 percent) know that microwaves do not make food radioactive, over 64 percent do not

know that microwaves are a non-ionizing form of energy produced by a magnetron. Respondents appear to be less sure of their answers to the statements concerning microwave leakage occurring only around the door of the oven and the fact that excessive microwave exposure can cause skin burns and may affect eyes and other organs. Approximately one-fourth of the participants respond either incorrectly or undecided about these two statements.

Use and Maintenance

Use and maintenance knowledge of the microwave oven is assessed by questions 11 through 17. All respondents agree that a variety of cooking utensils can be used in the microwave oven, and over 96 percent know that metal cookware can damage the microwave system. All respondents agree that the microwave oven can be cleaned easily, but 23 percent are undecided or disagree with the fact that food particles built up around the door seal can cause microwave leakage.

Over 28 percent are unsure or do not know that the operation of an empty microwave oven can damage it, and only 80 percent agree that a standard meat thermometer cannot be used in the microwave oven. The majority of respondents (93 percent), however, are aware that many factors influence microwave cooking speed. On a scale of seven (all incorrect) to 21 (all correct), the respondents have a mean score of 19.98 for use and maintenance knowledge.

Consumer Opinions of the Microwave Oven

Other questions in the instrument deal with owners' opinions and attitudes toward the microwave oven. Statements are worded positively

so as to be favorable toward the microwave oven. All respondents feel the microwave oven is a safe cooking appliance when properly used, and over 98 percent think food cooked in a microwave oven is as nutritious as food cooked by conventional methods (Table II). Almost 95 percent agree that the microwave oven is a convenience appliance. Although 100 percent of those surveyed are glad to have their microwave oven, only 77 percent say it should be standard equipment in a kitchen. Those who disagree cite cost and individual use preference of others as the main reasons for disagreeing. Ninety-one percent of the owners say that a conventional oven is also needed even if one has a microwave oven.

All the owners agree that the microwave oven has definite advantages over conventional equipment. They agree that it saves time, is a more efficient means of preparing small servings than the conventional oven, and is desirable for its ability to heat food in the serving dish. Slightly more than 89 percent think food reheated in the microwave oven tastes better than food reheated by standard appliances. The mean score for respondents' opinions and attitudes is 23.02 on a scale of 10 to 30. While these microwave oven owners have generally favorable opinions about microwave oven cooking, their responses to questions 20 and 21 (Table II) tend to lower the mean score.

Consumer Use Patterns of the Microwave Oven

Questions in the instrument are designed to evaluate how owners use their microwave oven. For meal preparation, 64 percent of the families use the microwave oven every day for the evening meal (Table III). Fifty-three percent use the microwave oven daily for the noon

meal and for snacks. Breakfast has the lowest frequency of use, with 25 percent saying the microwave oven is never used for breakfast preparation and only slightly more than one-third using it daily.

TABLE III
USE PATTERNS OF THE MICROWAVE OVEN FOR MEALS

Type of Meal	Frequency of Use Per Week									
	Never		Once a Week		2-3 Times		4-6 Times		At Least Once a Day	
	n	%	n	%	n	%	n	%	n	%
Breakfast	14	25.0	6	10.7	8	14.3	8	14.3	20	35.7
Lunch	8	14.3	1	1.8	10	17.8	7	12.5	30	53.6
Dinner	1	1.8	-	--	11	19.6	8	14.3	36	64.3
Snacktime	4	7.2	5	8.9	12	21.4	5	8.9	30	53.6

(n=56) Percentages total across rows to equal 100 percent.

The wife uses the microwave oven the most, with 92 percent indicating daily use (Table IV). Of the wives, none report never using the microwave oven or using it only once a week. Teen-agers are the group who have the next highest proportion, using the microwave oven at least once a day (62 percent). An additional 24 percent of the teen-agers use the microwave oven four to six times per week. Husbands and younger children are very similar in their use patterns, with approximately two-fifths using the microwave oven at least once per day. Approximately one-fourth of the husbands and younger children never

use the microwave oven. There are only three families in which other adults are present. These other adults use the microwave oven two to three times per week, four to six times per week, and at least once a day, respectively.

TABLE IV
FAMILY MEMBER USE OF THE MICROWAVE OVEN

Family Members	Frequency of Use Per Week									
	Never		Once a Week		2-3 Times		4-6 Times		At Least Once a Day	
	n	%	n	%	n	%	n	%	n	%
Husband	12	21.8	4	7.3	6	10.9	9	16.4	24	43.6
Wife	-	--	-	--	2	3.6	3	5.5	50	91.9
Teen-Agers	1	4.8	-	--	2	9.5	5	23.8	13	61.9
Younger Children	4	26.7	-	--	4	26.7	-	--	7	46.6
Other Adult	-	--	-	--	1	33.3	1	33.3	1	33.3

(n=56) Percentages total across rows to equal 100 percent.

Table V presents the processes for using the microwave oven. Although over 78 percent indicate the microwave oven is used daily for preparing part of a meal, 46 percent of the respondents say the microwave oven is never used for preparing a complete meal. Nevertheless, nearly 18 percent indicate they prepare all of the meal once a week, and two to three times per week, respectively. Reheating leftovers is one of the daily uses of the microwave oven for 64 percent of the

households. The microwave oven is also used two or three times a week for defrosting in 34 percent of the homes.

TABLE V
PROCESS FOR USING THE MICROWAVE OVEN

Type of Process	Frequency of Use Per Week									
	Never		Once a Week		2-3 Times		4-6 Times		At Least Once a Day	
	n	%	n	%	n	%	n	%	n	%
Defrosting	4	7.1	9	16.1	19	33.9	8	14.3	16	28.6
Reheating Leftovers	-	--	3	5.4	7	12.5	10	17.8	36	64.3
Preparing Part of Meal	-	--	1	1.8	4	7.1	7	12.5	44	78.6
Preparing All of Meal	26	46.4	10	17.9	10	17.9	6	10.7	4	7.1

(n=56) Percentages total across rows to equal 100 percent.

All but one of the families interviewed say that their microwave oven is never turned on when it is empty (Table VI). And, although everyone indicates that the safety switches on their microwave oven have never been adjusted, the fact that the microwave oven has safety switches is new information for some. Over 92 percent of the microwave ovens have never been checked for microwave emission. Over half (64 percent) of the owners use conventional recipes for food prepared in the microwave oven, and 89 percent stir or turn the food during the cooking process.

TABLE VI
CONSUMER USE PRACTICE OF THE MICROWAVE OVEN

Statements	Frequency of Responses			
	Yes		No	
	n	%	n	%
Do you ever turn your oven on while it is empty?	1	1.8	55	98.2
Have you ever adjusted the safety switches on your oven?	-	--	56	100.0
Have you ever had the microwave emission from your oven checked?	4	7.1	52	92.9
Do you stir, turn, or rearrange food during the cooking process?	50	89.3	6	10.7
Do you use your conventional recipes to fix food in the microwave oven?	36	64.3	20	36.7

(n=56) Percentages total across rows to equal 100 percent.

When asked how often it is necessary to clean the microwave oven, almost 54 percent indicate wiping the oven out at least once a day. Over one-fifth say it is necessary to clean the microwave oven once a week.

Information Available to Consumers

Forty-three percent of the sample say they read the use-and-care manual cover-to-cover before operating the microwave oven, while almost 29 percent state they read everything except the recipes (Table VII). Five percent indicate that they read none of the use-and-care manual before operating the microwave oven.

TABLE VII
EXTENT OF READING THE USE-AND-CARE MANUAL

Portions of Use-and-Care Manual	Frequency of Responses	
	n	%
Cover-to-cover	24	42.9
Everything except the recipes	16	28.6
Operating instructions necessary for immediate use	13	23.2
Did not read	<u>3</u>	<u>5.3</u>
	56	100.0

Besides reading the manual, almost 64 percent say they received information about the appliance from friends or relatives. Sixty-one percent report salespersons provided helpful information, and over half (55 percent) report attending a demonstration on the microwave oven given by a home economist. Of those attending a demonstration, all but one indicate that the home economist's demonstration was helpful.

Factors Related to Microwave Oven Purchase

The decision to purchase the microwave oven is made by over 46 percent of the husbands in the sample (Table VIII). Only 14 percent of the women indicate making the purchase decision, while over 30 percent of the decisions are made by both husband and wife. The majority (59 percent) of the owners say that no comparison shopping is done before purchasing the microwave oven. This includes both brand and model comparison.

TABLE VIII
MICROWAVE OVEN PURCHASE DECISION

Decision Maker	Frequency of Responses	
	n	%
Wife	8	14.3
Husband	26	46.4
Both wife and husband	17	30.4
Someone else (includes gifts)	<u>5</u>	<u>8.9</u>
	56	100.0

Before buying the microwave oven, owners have done very little research on their purchase. Only 30 percent say they read Consumer Reports (Table IX). Twelve percent are recorded as reading manufacturer's booklets, and another nine percent point to other material, such as popular magazines or newspapers, for purchase information.

Impact of the Microwave Oven on Purchasing

In the survey, the respondents are almost equally divided on whether or not there has been an increase in the amount of convenience-type foods purchased since owning the microwave oven. The majority (55 percent), however, indicate no increase in convenience food purchases. As for the purchase of disposable products, 71 percent say there has been an increase since acquiring the microwave oven. Paper towels are now purchased more often by over 79 percent, followed by an increase in paper plate purchases by 64 percent of the households. Plastic wrap and wax paper are purchased more often by over one-fourth

of the sample. No one indicates an increase in the purchase of aluminum foil.

TABLE IX
LITERATURE READ BEFORE PURCHASING
THE MICROWAVE OVEN

Literature	Frequency of Responses			
	Yes		No	
	n	%	n	%
<u>Consumer Reports</u>	17	30.4	39	69.6
<u>Consumers' Research</u>	2	3.6	54	96.4
Manufacturer's booklets	7	12.5	49	87.5
Appliance textbooks	1	1.8	55	98.2
U.S. Government bulletins	1	1.8	55	98.2
Trade association journals	-	--	56	100.0
Other (magazines, newspapers)	7	9.3	49	90.7

(n=56) Percentages total across rows to equal 100 percent.

Additional Information Obtained

All but two of the participants in the survey are satisfied with the timer on the microwave. Of the two who express dissatisfaction, one feels that the timer is too long, while the other thinks the timer on her microwave oven is not long enough. Three of the 56 households interviewed are dissatisfied with their microwave oven's capacity. Two rate the capacity as too small, the third says the oven's capacity is too large.

Over 42 percent state that the microwave oven has saved on electricity costs. Fifty-two percent of the sample are undecided about this question. The reasons they cite for their uncertainty include not specifically checking for a savings in electricity and the fact that those who own gas ranges as opposed to electric ranges will realize no savings in electricity by substituting the microwave oven for the gas range.

Over 94 percent say that the manufacturer of the microwave oven provided adequate use instructions; however, only 82 percent of the participants feel they received adequate maintenance instructions, while 16 percent are undecided on this question. Thirteen of the 56 respondents (23 percent) say their microwave ovens have had some type of malfunction. These malfunctions range from defects in the oven when it was purchased (timer or fan not working) to damages caused by the owner. One owner reports operating the microwave oven when it is empty, thus ruining the magnetron. Three other owners say their microwave ovens are not on a separate electrical circuit, and this resulted in the fuse being burned out.

Since the brands of microwave ovens in the survey do not have built-in browning units, owners are asked if they brown food in a conventional broiler after it is cooked in the microwave oven. Forty-eight (86 percent) say they do not use their broiler for this purpose. Thirty-eight persons (68 percent) in the sample own browning dishes; however, only 55 percent of these owners report using the browning dish, while 45 percent say they never use it.

Relationship of Purchase Decision and the Use of the Microwave Oven

One of the research questions is the relationship between who decides to purchase the microwave oven and the frequency of use by the husband and wife. The relationship between decision to purchase and frequency of use by the husband is examined. The chi square value (8.38) is not statistically significant; however, it appears that husbands who decide to purchase the microwave oven more often use it daily, as indicated by the 21.82 percent of husbands in that cell. The purchase decision as related to the wife's use of the microwave oven is found to be not statistically significant as the chi square value of 3.60 indicates. Regardless of who decides to purchase the microwave oven, wives are likely to use the appliance at least once a day.

Purchase Decision and Shopping Practices

The relationship between who decides to purchase the microwave oven and the comparison of brands is found to be not statistically significant, as the low chi square value indicates (3.03). Of families who report that husbands make the decision to purchase, twice as many families report not engaging in comparison shopping as those who do comparison shopping. Of families who report that wives make the purchase decision, three times as many do not comparison shop as those who do.

Reading various types of literature before buying the microwave oven is not related to who decides to purchase the microwave oven.

This holds true for a variety of consumer literature, such as Consumer Reports, manufacturer's booklets, and U.S. Government bulletins.

Purchase Behavior and Knowledge of and
Satisfaction with the Microwave Oven

The research question concerning the relationship between purchase behavior and the knowledge of how the microwave oven functions and how to use and care for it is explored through the analysis of variance technique. These relationships between who purchases the microwave oven and knowledge of how it functions, and between who purchases the microwave oven and its proper use and care, are found to be not statistically significant. Scores on knowledge, use, and care are generally high regardless of who made the decision to purchase.

The relationship between who decides to purchase the microwave oven and the expressed satisfaction with the appliance is explored through analysis of variance and is found to be not statistically significant. Respondents express satisfaction with the microwave oven regardless of who decides to purchase it.

Extent of Reading the Manual and Knowledge,
Use, Care, and Satisfaction

In the relationship between the extent to which the owner reads the use-and-care manual and the knowledge of microwave oven operation, use, and care, there is no statistical significance as measured by analysis of variance. The relationship between the extent to which the owner reads the use-and-care manual and the degree of satisfaction with the microwave oven is also explored and this relationship is found

to be not statistically significant. The respondents express a high level of satisfaction regardless of the extent to which the use-and-care manual is read.

Knowledge and the Expressed Satisfaction with the Microwave Oven

One of the relationships explored deals with being informed about the technical aspects of the microwave oven and satisfaction with the microwave oven. Pearson correlation is used to measure the relationship between specific knowledge, general knowledge, and opinions of the microwave oven. The correlation between specific knowledge and general knowledge is only .10; the correlation between general knowledge and the sum of the opinion scores is only .03; and the correlation between the specific knowledge and sum of the opinion scores is -.12. There seems to be no apparent explanation for the low levels of correlation.

Likes and Dislikes About the Microwave Oven

In responding to an open-ended question about what participants especially like about the microwave oven, speed and convenience are mentioned by over 76 percent of the sample. Thirty percent list reheating leftovers, which cuts down on food waste, while 16 percent mention defrosting. Other advantages named include energy savings, fewer dishes to wash, ease of cleaning, and the fact that the microwave oven does not heat the kitchen. Sixteen percent like the way vegetables cook in the microwave oven, with potatoes and corn mentioned as examples. Other foods they name as foods that cook well are bacon and pudding. One respondent says the microwave oven helps cut down

on fried foods, while another owner mentions that the microwave oven is safe for children to use.

When asked what the participants would change about the microwave oven, the majority find nothing to change. The fact that foods don't brown is mentioned by three of the owners. Another owner says that the oven's exterior is difficult to clean, and three participants wish they had waited to buy a newer model with more features.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Present Research

The purpose of this study is to explore owners' knowledge about the operation of the microwave oven, their attitudes and opinions toward it, how they use the microwave oven, their degree of satisfaction with the appliance, and the impact of the microwave oven on their purchases of convenience food and disposable products among a sample of rural Oklahomans. The study is limited to 56 respondents in the Oklahoma counties of Alfalfa, Major, and Woodward.

The method of data collection is personal telephone interviews. The interview schedule is designed to assess general knowledge, specific knowledge, and use and maintenance knowledge of the microwave oven. Opinions, attitudes, and use information are also obtained, plus information related to owner satisfaction. Purchase data and family characteristics are also secured.

Of the 56 participants, 55 are women and one is a man; 54 are married and two are single. The majority are between 30 and 60 years of age, and over 85 percent have at least high school educations. Yearly incomes are over \$15,000 for more than 70 percent of the sample. Forty-six percent of the wives are employed either part or full-time, while 91 percent of the husbands are employed full-time. The mean family size of the sample is just over three persons.

All 56 microwave ovens in use are countertop units purchased from appliance dealers. In the sample, there are four different brands represented. The units have been in the respondents' homes from two months to over five years. The majority (58.9 percent) of the microwave ovens have been in the homes less than two years.

The results of the interview show that the rural microwave oven owners in the sample have a high level of general knowledge about the microwave oven; however, their level of specific knowledge is somewhat lower. A deficiency is noted in the respondents' understanding of the technical aspects of the microwave oven. Over 82 percent do not know that the terms "microwave" and "electronic" refer to the same appliance. Although 87 percent of the participants agree that food is not made radioactive in the microwave oven, over half do not understand the meaning of microwave energy and its properties. This information is needed for consumers to form knowledgeable opinions about the safety of the microwave oven, to have certainty in its operation, and to follow proper procedures when using the appliance. The majority of owners are aware of how to use and care for the microwave oven. All participants agree that a variety of cooking containers can be used for microwave cooking, and 93 percent are aware of factors affecting microwave cooking speed; however, over 28 percent do not know that the operation of an empty microwave oven can damage it.

All microwave oven owners in the survey are positive in their attitude toward the appliance and all are glad they have a microwave oven. Ninety-one percent feel that a conventional oven is also needed, and almost 77 percent think the microwave oven should be standard equipment in a kitchen.

It appears that household usage of the microwave oven is an everyday occurrence and not limited to occasional use. Family members using the microwave oven most frequently are the wife and teen-agers. Over one-fifth of the husbands never use the microwave oven, even though 46 percent of the husbands have made the decision to purchase the appliance. Over 85 percent of the respondents use the microwave oven for preparing lunch, dinner, and snacks, with 75 percent using it for breakfast preparation. The microwave oven is used most often for the main meal, with only two percent saying it is never used for dinner preparation.

The microwave oven is looked upon as a convenience appliance for quick preparation of foods. Most frequent uses of the appliance are preparing part of a meal and reheating leftovers. Over 28 percent also say the microwave oven is used daily for defrosting. The oven is rarely used for preparation of a complete meal; instead, it is used in addition to other appliances.

Before purchasing the microwave oven, the majority (59 percent) of respondents do no comparison shopping, and the majority do not read any literature (such as Consumer Reports) about the appliance. Those who mention reasons for not comparing brands cite dealer preference or brand reliability in other appliances. Over half of the owners have attended a microwave oven demonstration given by a home economist, and all but one person say they were helped by the demonstration.

Owners say they have not altered their food purchasing habits since acquiring the microwave oven; however, 71 percent agree that their purchase of disposable products has increased. High on the list are paper towels and paper plates.

Comparison of Present Findings with
Previous Research

Previous research concerning the microwave oven deals with its use in urban homes. In comparing some of these studies with the present findings dealing with rural ownership, many similarities are found. Many questions in the instrument are patterned after questions in a Texas study, which assesses urban owners' knowledge of the microwave oven (Drew, Rhee, and Stubbs, 1977). The results of both studies are quite similar; however, the rural sample scores slightly higher on the knowledge and use questions. This may be attributed to the fact that over half of the rural participants have attended a microwave oven demonstration, and of these, 97 percent find the demonstration helpful. It is not known whether or not any of the Texas participants have attended such a demonstration. Participants in both studies know more about the general functions of the microwave oven than they do about the more specific, technical functions of the microwave oven. Use and purchasing patterns of the two samples are also comparable.

Several studies list owners' reasons for liking the microwave oven, and these reasons appear to be universal. The major advantages include speed and convenience of the microwave oven, reheating leftovers, and defrosting. These advantages are listed by both urban owners and the rural sample.

In comparing the present findings with other research, some contrasts are found. A 1977 survey shows that microwave oven ownership is higher in two person households, in the 25 to 34 age group, and in

households with women employed outside the home (Eby, 1977). These findings do not hold true for the rural sample, where the families are older, and over half of the women are not employed outside the home. In the rural sample, 42 percent of the households consist of two persons; however, all but one of these families have children who are grown and not living at home. Demographics of the rural sample parallel instead the findings of another 1977 study in which consumers who most often use the microwave oven are between 35 and 50 years old, are married, and have children. In addition, over 90 percent of the owners use the microwave oven daily, and women are the most frequent users (Decareau, 1977).

Concern about the safety of the microwave oven is not mentioned by the rural sample, as it is by participants in a 1974 study (Madigan, 1974). However, this is probably due to the research and greater public awareness in the time lapse since 1974.

Recommendations

Because only 56 persons participated in this study, no claim can be made to providing final answers to questions of consumer knowledge of and attitudes about the microwave oven. However, even if the research is seen as investigative, the results and their implications are important to retailers, educators, and users of the microwave oven.

Recommendations for Further Research

Upon completion of this study and the analysis of data, several recommendations which merit further study are submitted:

1. A similar study should be conducted using other rural populations in order to verify the results reported here.
2. With a variety of cooking accessories being offered for the microwave oven, further studies could be made to determine which of these accessories are being used by the consumer.
3. A more in-depth study should be made concerning microwave oven shopping and purchase practices.
4. Using a rural sample, a study could be done to determine what types of food are prepared using the microwave oven, and what types of food are preferred using conventional methods of cooking.
5. A study to determine what appliances are used to complement the counter-top microwave oven should be made, as this would give insight to retailers concerning advertising promotions. For example, are food processors, toaster ovens, blenders, or other appliances in conjunction with the microwave oven?
6. A comparable study should be done using owners of the combination range to determine knowledge, attitudes, and use practice of this appliance.

A Note on Research Design

The attempt to use analysis of variance with the present data results in non-significant relationships between variables, primarily because of the limited response categories. Three responses (agree, disagree, uncertain) are given in questions assessing consumer knowledge,

use and opinions of the microwave oven. This structure is due to the desire to keep the interview brief since it is conducted by telephone and to avoid confusing the respondent by offering a wider range of responses without the visual image of what those categories are as is available in a printed questionnaire. Most responses cluster at one end of the three response categories, thus reducing variability and the efficacy of the statistical procedure.

It is suggested that future researchers use a printed questionnaire with a Likert-type scale to measure the degree of respondents' agreement with statements. This type of measurement is expected to more readily discriminate between those consumers who are thoroughly informed and those with moderate levels of information.

Recommendations for Program Development

There is a need for educating the consumer, not only in the areas of microwave oven food preparation, but also in the operation of the appliance, both before and after purchase. Pre-purchase education can help the consumer to understand the techniques for safe, efficient use of the microwave oven. Because many adult consumers wait until after the purchase of the microwave oven to attend a class or demonstration, education prior to the purchase should be done within the retail store. A home economist who knows family use patterns can be a complete source of information to the retail sales personnel and to the consumer. In a retail store capacity, the home economist can provide prospective microwave oven owners not only with information about the use of the appliance within the home, but she can supply operation information after the sale, an area in which many retail sales people

are deficient. Other opportunities for consumer education for adults are through community service programs, extension programs, and college classes.

Survey results show that the teen-agers' use of the microwave oven is second in the family only to the wife's use of the appliance. Educating the family's children in the use of the microwave oven is often overlooked. Home economics departments in the junior and senior high schools should be encouraged to implement microwave oven education in their foods and consumer programs. Retail dealers can help in this area by providing a microwave oven or by making the schools aware of special discount programs for the purchase of a microwave oven. Special programs can also be offered to educate the home economics teachers in the use of the microwave oven. Besides the classroom, areas where education can also be implemented for the young are in 4-H, Future Homemakers of America, Scouting, Camp Fire Girls, and other such programs.

With the projection that half of all American homes will contain a microwave oven by the year 1985, the need for educating the consumer in the use of the microwave oven is pressing. The opportunities for home economists in this area are numerous.

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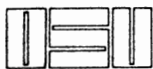
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APPENDIXES

APPENDIX A

INTRODUCTORY LETTER



Oklahoma State University

DIVISION OF HOME ECONOMICS
Department of Housing, Design and Consumer Resources

STILLWATER, OKLAHOMA 74074
HOME ECONOMICS WEST BUILDING
(405) 624-5048

January 31, 1978

I am currently doing research to complete requirements for a Master's degree in Home Economics at Oklahoma State University. My research deals with the microwave oven--how it is used in the home and consumer satisfaction.

Your name was selected from lists of microwave oven owners kept by appliance dealers in the area. It is important for the research procedure that you participate in the study. I will be calling you within the next three weeks concerning your use of and satisfaction with your microwave oven. The interview will be conducted over the phone. I hope you can give me about 20 minutes of your time.

I expect the study will be helpful in developing instructional aids and programs for future microwave oven buyers. Your name will not be included in the report of the results of the study.

I look forward to talking with you. Thank you very much.

Sincerely,

Dixie Thomas
Graduate Assistant

As the major advisor of this research project, I want to assure you that all the guidelines for research procedure and privacy of participants are being met. Your interest in and support of this project are greatly appreciated.

Sincerely,

Dr. Sharon Nickols
Assistant Professor

APPENDIX B

INTERVIEW SCHEDULE

Family Name _____ Subject _____

Telephone Number _____ Date _____

I. GENERAL KNOWLEDGE CONCERNING THE MICROWAVE

FIRST, I WOULD LIKE TO KNOW YOUR OPINION TOWARD THE FOLLOWING STATEMENTS CONCERNING MICROWAVE OVENS. PLEASE INDICATE WHETHER YOU AGREE WITH, DISAGREE WITH, OR ARE UNCERTAIN ABOUT THE STATEMENTS.

A D U

- | | | | |
|-------|-------|-------|--|
| _____ | _____ | _____ | 1. Microwave ovens are now manufactured to meet established safety standards. |
| _____ | _____ | _____ | 2. A microwave oven cooks food faster than a conventional oven. |
| _____ | _____ | _____ | 3. Portable microwave ovens can be used anywhere there is a separate 115-volt AC electrical outlet. |
| _____ | _____ | _____ | 4. Microwaves dissipate rapidly if they leave the oven. |
| _____ | _____ | _____ | 5. The best way to determine if an oven is leaking microwaves is to have it checked by an authorized service person. |

II. SPECIFIC KNOWLEDGE CONCERNING THE MICROWAVE

- | | | | |
|-------|-------|-------|---|
| _____ | _____ | _____ | 6. The terms "microwave" and "electronic" are used to describe the same type of oven appliance. |
| _____ | _____ | _____ | 7. Microwaves are a non-ionizing form of energy produced by a magnetron. |
| _____ | _____ | _____ | 8. Microwave leakage may occur only around the door of the oven. |
| _____ | _____ | _____ | 9. Microwaves do not make food radioactive. |
| _____ | _____ | _____ | 10. Excessive microwave exposure can cause skin burns and may affect eyes and other organs. |

III. USE AND MAINTENANCE

- | A | D | U | |
|---|---|---|---|
| — | — | — | 11. Cooking speed is influenced by the moisture content, shape, size, and amount of food being cooked. |
| — | — | — | 12. The operation of an empty microwave oven can damage it. |
| — | — | — | 13. Microwave leakage can be caused by allowing grease and food particles to build up around a door seal. |
| ✓ | — | — | 14. The use of metal cookware can damage the microwave system. |
| — | — | — | 15. Glass ovenware (and) serving dishes, paper products, and many plastics may be used as cooking containers. |
| — | — | — | 16. A standard meat thermometer cannot be used in the microwave oven while the oven is operating. |
| — | — | — | 17. A microwave oven is easily cleaned with a damp cloth. |

IV. OPINIONS ABOUT THE MICROWAVE OVEN

- | | | | |
|---|---|---|---|
| — | — | — | 18. Food cooked in a microwave oven is as nutritious as that cooked in a conventional oven. |
| — | — | — | 19. The microwave oven is a convenience appliance. |
| — | — | — | 20. The microwave oven should be standard equipment in a kitchen. |
| — | — | — | 21. A conventional oven is not needed if one has a microwave oven. |
| — | — | — | 22. The microwave oven is a safe cooking appliance when properly used. |

V. ATTITUDE TOWARD MICROWAVE OVEN

NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS RELATED TO YOUR FEELINGS ABOUT YOUR MICROWAVE OVEN.

- | Yes | No | DK | |
|-----|-----|-----|--|
| ___ | ___ | ___ | 23. Are you glad you have a microwave oven? |
| ___ | ___ | ___ | 24. Are you satisfied with the timer on your oven? |
| ___ | ___ | ___ | 25. (If no) Is it: (a) too short? ___
(b) too long? ___ |
| ___ | ___ | ___ | 26. Is the oven capacity satisfactory? |
| ___ | ___ | ___ | 27. (If no) Is it: (a) too small? ___
(b) too large? ___ |
| ___ | ___ | ___ | 28. Has your oven saved you time? |
| ___ | ___ | ___ | 29. Has your oven saved on electricity costs? |
| ___ | ___ | ___ | 30. Do you think the microwave oven has an advantage in preparing small servings as compared with the standard oven? |
| ___ | ___ | ___ | 31. Do you feel that the microwave oven is desirable for its ability to heat food in the dish in which it is to be served? |
| ___ | ___ | ___ | 32. Do you think food reheated in a microwave oven is better tasting than food reheated by standard appliances? |
| ___ | ___ | ___ | 33. Do you feel that the manufacturer gave adequate use instructions? |
| ___ | ___ | ___ | 34. Do you feel that the manufacturer gave adequate maintenance instructions? |

VI. USE PATTERN

THE FOLLOWING QUESTIONS ARE ABOUT HOW YOU USE YOUR OVEN.

35. For each of the following meals, how often to you use the microwave oven per week?

	<u>Never</u>	<u>Once a Week</u>	<u>2-3 Times</u>	<u>4-6 Times</u>	<u>At Least Once a Day</u>
a) Breakfast	___	___	___	___	___
b) Lunch	___	___	___	___	___
c) Dinner	___	___	___	___	___
d) Snacktime	___	___	___	___	___
Summary of frequency of use	_____				

36. How frequently do the following members of your household use the microwave oven during the week?

a) Husband	___	___	___	___	___
b) Wife	___	___	___	___	___
c) Teen-agers	___	___	___	___	___
d) Younger children	___	___	___	___	___
e) Other adult	___	___	___	___	___
Summary of family use	_____				

37. How often do you use your microwave oven for the following processes per week?

a) Defrosting	___	___	___	___	___
b) Reheating leftovers	___	___	___	___	___
c) Preparing part of meal	___	___	___	___	___
d) Preparing all of meal	___	___	___	___	___

VII. USE PRACTICE

WITH A YES OR NO, WOULD YOU ANSWER THE FOLLOWING QUESTIONS ABOUT HOW YOU USE YOUR MICROWAVE OVEN?

Yes No

- ___ ___ 38. Do you ever turn your oven on while it is empty?
- ___ ___ 39. Have you ever adjusted the safety switches on your oven?
- ___ ___ 40. Have you ever had the microwave emission from your oven checked?

VII. USE PRACTICE (Continued)

- Yes No
- ___ ___ 41. Has your oven had any type of malfunction?
If yes, what? _____
- ___ ___ 42. Do you brown food in a regular broiler after
it is cooked in your microwave oven?
- ___ ___ 43. Do you have a browning tray?
- ___ ___ 44. (If yes) Do you use your browning tray?
- ___ ___ 45. Do you stir, turn, or rearrange food during
the cooking process?
- ___ ___ 46. Do you use your conventional recipes to fix
food in the microwave oven?
47. How often do you find it necessary to clean your oven dur-
ing the week?
- _____
- Once a week 2-3 times 4-6 times at least once a day
48. How much of the use-and-care booklet did you read before
operating the microwave oven?
- ___ a) Cover-to-cover
- ___ b) Everything except the recipes
- ___ c) The operating instructions necessary for immediate
use
- ___ d) Did not read
49. Where did you get information on the operation of the mi-
crowave oven?
- Yes No
- ___ ___ Read manual
- ___ ___ Other reading material
- ___ ___ Friends and relatives
- ___ ___ Salesperson
- ___ ___ Demonstration and class

VII. USE PRACTICE (Continued)

50. Have you attended a demonstration on the microwave oven given by a home economist?

Yes No

____ ____

51. (If yes) Was the demonstration helpful to you?

Yes No

____ ____

VIII. FACTORS RELATED TO PURCHASE

52. When did you purchase the oven? Month _____ Year _____

Calculate: Number of months owned: _____

53. Who decided to purchase your oven?

____ a) Wife

____ b) Husband

____ c) Both

____ d) Other (includes gifts)

54. Did you compare other models or brands of microwave ovens before purchase?

Yes No

____ ____

55. Before buying your microwave oven, did you read any of the following literature?

Yes No

____ ____ a) Consumer Reports

____ ____ b) Consumers' Research

____ ____ c) Manufacturer's booklets

____ ____ d) Appliance textbooks

____ ____ e) U.S. Government bulletins

____ ____ f) Trade association journals

____ ____ g) Other _____

Calculate total: _____

IX. IMPACT OF OWNING A MICROWAVE OVEN ON PURCHASING

56. Has there been an increase in the amount of convenience-type foods purchased since owning the microwave oven?

Yes No

57. Have you noticed an increase in the disposable products bought since acquiring your microwave oven?

Yes No

58. (If yes) Indicate which products are now purchased more often:

Yes	No	
_____	_____	a) Plastic wrap
_____	_____	b) Wax paper
_____	_____	c) Aluminum foil
_____	_____	d) Paper towels
_____	_____	e) Paper plates

X. DEMOGRAPHIC INFORMATION

I NEED SOME INFORMATION ABOUT YOU AND THE MEMBERS OF YOUR HOUSEHOLD.

(1) Member	(2) Age				(3) Education				(4) Employment		
	Less than 30	30-44	45-60	60 and over	Less than HS	HS graduate	Some college	College grad	Full-time	Part-time	Unemployed
1) _____											
2) _____											
3) _____											
4) _____	Specific age of _____										
5) _____	children _____										
6) _____											

X. DEMOGRAPHIC INFORMATION (Continued)

6a. What kind of work does your husband do? _____

6b. What kind of work do you do? _____

7. In which of the following categories does your family income fall per year?

___ Less than \$10,000 ___ \$25,000 and over

___ \$10,000 - \$14,999 ___ No answer

___ \$15,000 - \$24,999

8. Now that you have used your microwave oven, what, in your opinion, could be done to improve its performance?

9. What do you especially like about the microwave oven?

THANK YOU!

VITA 2

Dixie Shaw Thomas

Candidate for the Degree of

Master of Science

Thesis: CONSUMER KNOWLEDGE OF AND SATISFACTION WITH
THE MICROWAVE OVEN

Major Field: Housing, Design, and Consumer Resources

Biographical:

Personal Data: Born in Cherokee, Oklahoma, May 10, 1951, the daughter of Harold John and Edith Jones Shaw; married to Gregory Thomas.

Education: Graduated from Burlington High School, Burlington, Oklahoma, in May, 1969; received Bachelor of Science degree in Home Economics from Oklahoma State University in May, 1973; completed requirements for teacher certification in home economics at Northwestern Oklahoma State University in 1976; completed requirements for the Master of Science degree at Oklahoma State University in May, 1978.

Professional Experience: Home service consultant for Oklahoma Gas and Electric Company, Oklahoma City, Oklahoma, 1973-1974; salesperson and news reporter, KSIW Radio, Woodward, Oklahoma, 1974-1977; home economics instructor, Woodward High School, Woodward, Oklahoma, 1976-1977; microwave oven consultant, Dulaney's, Inc., Oklahoma City, Oklahoma, 1976-present; microwave oven instructor, adult education, Marland Mansion continuing education and Ponca City school system, Ponca City, Oklahoma, 1977-present; graduate teaching assistant, Department of Housing, Design and Consumer Resources, Oklahoma State University, 1977-1978.

Professional Organizations: American Home Economics Association; Oklahoma Home Economics Association; Oklahoma State Home Economics Alumni Association; Omicron Nu; Phi Upsilon Omicron; Phi Kappa Phi; Home Economists in Business; International Microwave Power Institute.