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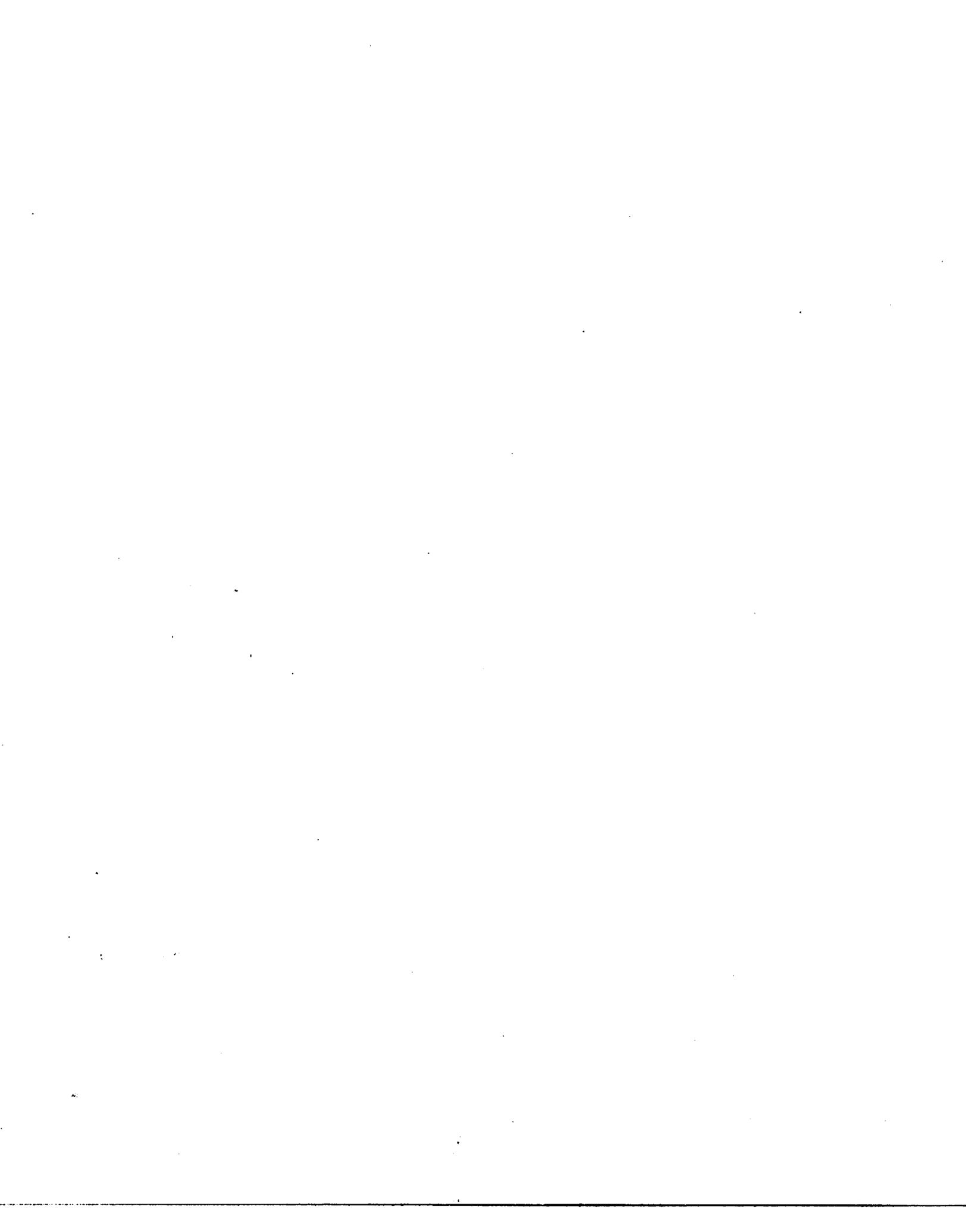
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**FOOD GARDENS AND SOME CHARACTERISTICS DISTINGUISHING
GARDENING AND NON-GARDENING HOME-OWNING HOUSEHOLDS IN A
LOW-INCOME CENSUS TRACT OF TUCSON, ARIZONA**

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GARDENING AND NON-GARDENING HOME-OWNING HOUSEHOLDS
IN A LOW-INCOME CENSUS TRACT OF TUCSON, ARIZONA**

by

Daniela Soleri

**A Thesis Submitted to the Faculty of the
DEPARTMENT OF AGRICULTURAL EDUCATION
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA**

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ABSTRACT

The purpose of this study was to determine if there are differences in certain household characteristics, household income and attitudes between home-owning households with food gardens and those without in a low-income census tract in Tucson, Arizona.

Two random block samples, one of 15 food gardening households and the other of 15 non-gardening households from census tract 10, were interviewed during home visits. In addition to questions relating directly to the objectives of the study, information about existing gardens was also collected.

The results showed that compared with non-gardening households, those with food gardens have more members, had a larger proportion of higher incomes among them, were aware of insect problems in the garden and tended to perceive gardening not as work but as a source of pleasure and relaxation.

In addition, there were indications of cultural differences among gardeners as expressed by their gardens and two garden types were identified. This information raises questions regarding concepts of gardens specifically and the influence of culture generally which are important for any community development efforts.

CHAPTER 1

INTRODUCTION

Solutions to the basic problems of hunger and malnutrition in the "developing" countries are being sought increasingly on the local level. The contributions of small scale community or household efforts which make efficient use of available resources are now recognized. Household food production, in this case gardening, is an example of a strategy with the potential to improve the nutritional well-being of the household as well as reducing their outside expenditures on food. As James P. Grant, Executive Director of UNICEF said,

It seems that virtually everyone agrees that local food production is very important for the alleviation of food shortages and hunger. This includes the role of the small farmer but also the small-plot, family production commonly referred to as gardening. There is evidence that the contribution this can make, not only to providing more food and a better balanced diet, but to providing some cash income as well as certain non-food household necessities, has been considerably underestimated . . . We must put greater efforts into this area, which lends itself so readily to popular participation (in Sommers n.d.).

But hunger and malnutrition are not confined to the developing world. For example, in 1985 food assistance was given an estimated 118,348 times each day in Tucson (Townesley and Bourque 1985). Yet there is evidence that, as in the developing world, household gardens could provide nutritional and economic benefits to gardeners in this country.

An evaluation of a USDA sponsored urban gardening project begun in 1978 in Jacksonville, Florida found that by the program's third year 42% of the 3678 gardens were producing an excess of \$200 worth of vegetables per year, with over 4100 people participating (Stephens, Kelt and Seely 1980).

Recent research in Tucson on urban household food gardens established and maintained by amateurs using simple, low-cost techniques found that in one garden during an average year a total of 152.7 hours (less than three hours per week) of gardening produced 134.4 kilograms of food with a net market value of \$109 (Cleveland, Orum and Ferguson 1985) and providing 28,000kcal (Cleveland 1982:14). This garden also supplied the gardener with significant amounts of the United States Recommended Daily Dietary Allowances for such nutrients as vitamin A, ascorbic acid, iron, phosphorus, calcium, riboflavin, thiamin, potassium and niacin (Cleveland and Soleri 1985a). These results indicate that even in the arid environment of Tucson the economic and nutritional benefits of household gardens can be significant. In addition, there is reason to believe that gardening may offer meaningful psychological benefits such as pleasurable, stimulating experiences with nature (Kaplan 1973).

With the frequency of food assistance in Tucson up over 25% between 1983 and 1985 (calculated from Townsley and Bourque 1985), and cutbacks in public programs, low-cost solutions to malnutrition and hunger are needed. Along with the major structural and systemic changes needed to address these problems, small-scale, local solutions

are also required. While not an answer to hunger, especially caloric deficits, household food production could be a way for people with limited resources to make meaningful contributions to their own well-being. It may also serve as a model or example for other actions grounded in feelings of self-reliance and responsive to most people's desire for greater control over their daily lives (Gallup Organization 1979:13).

Need for the Study

Social service and nutrition professionals contacted for the most recent survey of hunger in southeastern Arizona cited insufficient fresh fruits and vegetables as one of the most important food needs of their clients (Townesley and Bourque 1985:34-35). Household and community gardens could be one way of addressing this need.

If household food gardens are ever to be promoted among low income households in Tucson as they are in other parts of this country and the world we must first understand why households which are already gardening do so, and why those which are not, do not. As Arnold Pacey, author of Oxfam's Gardening for Better Nutrition writes,

What matters more than the technical details of how to run a garden are the social and cultural factors which decide whether people will wish to initiate or improve vegetable gardens (Pacey 1978:61).

With an understanding of the constraints, incentives and cultural traditions which affect people's decisions to garden, the feasibility of promoting household gardens among low-income Tucsonans would be clarified. In addition, by identifying limiting factors such as

land and water consumption for example, it may be possible to resolve these limitations without compromising the value of the gardens or losing the interest of the people involved.

Problem Statement

In light of the preceding discussion this research attempts to answer the following question. What are the characteristics which distinguish households with food gardens from those without them among owner occupied households within a low-income census tract in Tucson Arizona?

Objectives

To respond to the problem statement the following specific questions were addressed:

1. Are household characteristics such as ethnicity, household composition, dietary preferences, familiarity with gardening, familiarity with the environment, location of the residence, use of outside space and interest in support services significant distinguishing characteristics between households with and without food gardens?
2. Is income a significant distinguishing characteristic between gardening and non-gardening households?
3. Among households gardening, what are considered by them to be the benefits and shortcomings of household gardening as expressed in their attitudes? Are these different from the benefits and shortcomings perceived by non-gardeners?

Assumptions

The following assumptions were made at the onset of this study:

1. Household food production (gardening in this case) can make a viable and valuable contribution to household well-being, nutritionally, economically and even psychologically.
2. Low-income households are subject to economic and nutritional constraints which are detrimental to their well-being.
3. The possible factors affecting a household's decision to garden or not can be identified by available literature and gardeners.
4. A survey questionnaire administered by an "outsider" can usually elicit accurate and meaningful results.

Limitations

The integrity of the research design could have been compromised due to a misinterpretation of interview questions. However, this was minimized by field-testing the survey instrument.

Delimitations

The applicability of the results of this research to the target population of Tucson's low-income home-owners could be jeopardized because:

1. The year (1985) during which these data were collected may have affected people's activities and attitudes. However, to consider gardening as having some value for low-income households, the socio-economic and historic context in which this activity occurs is

meaningful and relevant and does not detract from the validity of the research.

2. Because the accessible samples were being limited to a single census tract of low mean income they did not include and therefore may not represent all of Tucson's low-income, home-owning households. For this reason conclusions of this study are only considered relevant to the population of that census tract. However, the conclusions of this research may, in many ways, be suggestive of the larger population of Tucson's low-income home-owners.

3. The small sample size may cause it to be unrepresentative of some aspects of the population's diversity. However, this shortcoming was addressed by random sampling.

4. Seasonality may influence attitudes and receptivity to gardening. However, this research elicited information on gardening in all seasons.

5. A reactive arrangement may have influenced some interviewees. However, gardening as a topic is not popularly associated with any political or economic interest, questions were designed to elicit responses without violating subject's concerns for privacy and the interviewer remained as neutral as was possible during the interview.

Procedure

The methods used in gathering the information needed for this research are described below.

Population and Sampling Procedures

The target population for this study was home-owning households in the low-income census tract 10 of Tucson, Arizona (U.S. Department of Commerce 1983). Random selection of blocks within the census tract determined the order in which households were to be interviewed. Following that order all home-owning households on each block were interviewed until the two samples were complete. One sample was of 15 food-gardening, home-owning households, the other was of 15 home-owning households without food gardens. The sampling unit was the individual household.

Design of the Study

The research was conducted using the descriptive survey technique. Nine criteria identified in the literature and from the researcher's personal experience were investigated. All of these criteria sought to determine whether a particular characteristic is most commonly associated with households from the gardening or non-gardening sample. These characteristics, the independent variables of this study are, ethnicity, household composition, income, familiarity with gardening, familiarity with the environment, dietary preferences, location of the residence, use of outside space and attitudes. The presence or absence of household food gardens was the dependent variable being investigated. In addition, among households which do garden, information regarding their gardens and gardening techniques was recorded.

Data Collection and Instrumentation

For collecting the information an interview schedule was prepared in both Spanish and English. Questions administered in interviews during home visits were both direct and indirect. Most followed an open format with responses quantified as nominal data with the exception of information regarding age and amount of income which was interval data. A limited number of questions sought personal opinions and history. Discussion and comments were encouraged, especially after the formal interview was completed. The survey was field-tested with two households selected in the same manner as the sample was, one with a garden and one without. Since only minimal changes and adjustments were necessary the results of the field test units were used in the survey. In addition, the researcher also completed a map with descriptive data about some of the physical characteristics of each residence.

Analysis of the Data

Data gathered with the questionnaire and map were used to determine frequencies, percentiles and means of responses. Where appropriate, these were then analyzed to determine if a statistically significant relationship existed between the dependent and independent variables. Calculations were done using the chi square, Fisher's exact test of probability, and, in the case of amount of household income, a t-test. All statistical analysis was done at the .05 level of significance.

Definitions

Annual Garden: A food garden of predominantly annual plants.

Attitudes: Beliefs or perceptions affecting behavior, influenced by cultural, social or physical characteristics as well as educational experience and popular conceptions.

Food Garden: Cultivation of plants for fruits and/or vegetables for the household on a more extensive scale than a single pot or tree.

Hispanic: Of Spanish ethnic or cultural ancestry.

Household: A production and consumption unit and a basic decision making unit often, but not necessarily, synonymous with the family.

Household Food System: Activities and resources devoted to the household's function of feeding itself.

Low-Income: Having income at or below 200% of the current poverty level as established by the federal government.

Low-Income Census Tract: A U.S. census tract in which the majority of residents have low-incomes.

Perennial Garden: A food garden of predominantly perennial plants.

CHAPTER 2

LITERATURE REVIEW

This chapter contains a review of the literature which contributed to the formulation of many of the survey questions. It also includes a brief discussion of the survey topics which were chosen based on the researcher's own experience.

Gardens

Small scale household food production or gardening is a practice common to many regions and cultures (Bittenbender 1985, Cleveland and Soleri 1985b, Niñez 1984). Gardens are found in urban and rural areas, humid and arid climates, in industrialized and non-industrialized countries. Like other elements of society, gardens both express and adapt to the environment in which they occur, giving rise to distinct garden types.

A recent review of home gardens in less developed countries (Bittenbender 1985) describes some traditional garden types from Africa, Asia, the Caribbean, and Latin America. Bittenbender acknowledges the difference between these and the Western European garden and points out the importance of this variation when he states,

Horticulturalists trained in the United States or Europe view vegetable and flower gardens and lawns with shrubs, fruit and shade trees as separate components of the overall landscape or yard. These standards are too limiting for less developed countries where the home garden should be defined as a

family-managed food, fiber, ornamental and medicinal production system . . . (Bittenbender 1985:645)

A survey of gardens in the small, Black community of Brushy in rural Texas described six kinds of 'dooryard' gardens ranging from "folk" to "contemporary" types (Wilhelm 1973). At one end of this continuum was a unique, traditional garden type characterized by a multi-level vertical profile, a variety of both perennial and annual crops, and areas of bare, hard-packed earth. At the other end was a relatively new style of landscaping excluding food gardens altogether, emphasizing instead extensive lawns and few trees and based on a more recent national model of residential landscaping than the traditional one. Community members associated the first type with "poverty and cultural stagnation", while the latter represented a new, "higher socioeconomic status", modernity, and was "the ultimate goal of house holders in Brushy" (Wilhelm 1973:87).

In the United States until recently, the popular image of household gardens has been based on the gardens grown in the more humid, temperate areas of this country. Seed packages sold nationally carry planting directions which are often exactly opposite what is appropriate for hot, dry areas such as Tucson. Books, periodicals and supply company cataloges often still base their information and advertising on the assumption that one kind of garden is appropriate nationally (see for example USDA 1977).

The difference in cultural models of gardens can lead to misunderstandings and oversights among people representing differing perspectives (Cleveland and Soleri 1985c). For this reason the definition

of food gardens used in this research (see Chapter One) was purposefully broad. This allowed for the 'discovery' and inclusion of gardens types in the survey which may not have been anticipated but which still fulfill the role of home production of fruits and vegetables to supplement the diet and/or income of the household.

Ethnicity

Tucson was formerly a part of Mexico, and its distinctive character is partially a result of its large Hispanic population. Twenty-five percent of the city's population is Hispanic, with approximately 50% of these being low-income (U.S. Department of Commerce 1983). Hispanics comprise 75% of the population of the census tract used in this study. The influence of Hispanic culture is strong and has been an integral part of the city's development. For this reason ethnicity has been an important consideration in this research.

Household Composition

Literature on household gardens indicated that household composition could be meaningfully divided into three sub-variables, all of which were included in the survey.

Size

The number of household members was one of the elements of household composition found to influence a household's likeliness to garden in a recent study based on national data (Blaylock and Gallo 1983a:727-728). Single adult households were determined least likely to garden of all household sizes.

Age

Another element of household composition found to influence the likelihood that a household would garden was the age of members. The same study cited above found that "households with members over 55 years old had a higher probability of gardening than other households" (Blaylock and Gallo 1983a:727), while those with preschool children (less than 6 years old) were less likely.

Education

The profile of gardening households from the 1984-85 Gardens For All/Gallup Organization (Gardens For All n.d.) national survey found that 14% of these had only grade school educations while 53% had just completed high school and 33% had college educations.

Diet

Between 1980 and 1984 American consumption of vegetables rose from 202.8 lbs/capita to 209.2 lbs/capita. Fruit consumption was up just slightly from 142.3 to 142.9 lbs/capita. Of these amounts an estimated 72% of all vegetables and over 50% of all fruits were consumed fresh (Hecht 1985).

Low-income households nationally spend approximately 17% of their food dollar on fruits and vegetables (Allen and Gadson 1984). How frequently they eat this produce and the kinds of fruits and vegetables that they like and wish to eat could influence the value and desirability of gardens for those households.

Frequency of Consumption

Interviewees were asked how frequently during a week their household consumed a) fresh fruits, and b) fresh vegetables. It was hoped that these questions would provide insight into what people like to eat, and thus whether the products of gardens would be used by them.

Perception of Cost

By asking interviewees if they found fresh fruits and vegetables to be expensive it was hoped to detect any economic influence on consumption of these foods and/or gardening activities.

Acceptability of Garden Produce

From a list of foods readily produced by household gardens in Tucson, interviewees were asked to indicate which products they eat or would like to eat. The list was of vegetables only, not including any perennial fruits. The author felt this information would be useful as a lack of interest in some of the specific foods which a Tucson garden could produce would be an obvious reason for not gardening.

Familiarity with Gardening

Past experience and childhood memories of family gardening were sought as a measure not only of familiarity with gardening, but as an indicator of a garden tradition, which could influence the household's concept of gardens.

Familiarity with the Environment

Learning to cope with the hot, arid conditions in Tucson can be a difficult adjustment for gardeners who move to this city from cooler, wetter areas. Planting schedules are completely different than those in the northeast for example, and many people may never have had to think about watering their gardens before living in Tucson. Whether these conditions discourage the gardening efforts of newcomers and how both newcomers and long-time residents adapt their gardens to the environment were judged worthy of consideration. For this reason all interviewees were asked about their length of residence in the region, southeastern Arizona and northwestern Mexico, and, if not native, where they were from.

Location of the Residence

One of the most important reasons for gardening found by the Gardens For All national survey was pleasure/relaxation. It is possible that the location of a residence could influence the potential for a pleasurable gardening experience. Therefore this quality was noted on the survey sketch maps.

Use of Outside Space

How people use the outside area which they control can be indicative of personal qualities which in turn could relate to gardening. Those qualities include a concern with the appearance/aesthetic of the space, familiarity with working with plants, use of the

space as a social area, and other demands on the space such as for work, play, keeping animals or storing goods.

Interest in Assistance with Gardening

Interviewees were asked about their interest in having assistance with their gardening efforts, including neighborhood demonstrations and classes and home visits. Responses were hoped to provide some indication of the potential clientele for extension and community development activities regarding household gardening in this part of Tucson.

Income

Three sub-variables of the income variable were cited as influencing household gardening in the literature.

Amount

The study by Blaylock and Gallo reviewed amount of income in terms of wage rates and used this to determine the opportunity cost to the household for the time spent gardening. Using this interpretation, higher income households were judged less likely to garden as their returns would be lower than those possible through paid labor. Theoretically this contrast would be greater for them than it would for households with lower incomes and lower opportunity costs. Thus, lower income households have a higher potential for savings and were therefore judged more likely to garden than those with higher incomes (Blaylock and Gallo 1983a:728). The authors did not wish to venture a greater quantification of this relationship, noting that

since the allocation of time to market work may be inflexible, the relevant cost of time for home production may not equal the market wage (Blaylock and Gallo 1983a:726).

They do, however, note that extremely low incomes (not defined) may inhibit gardening because of "low asset levels which constrain the purchase of gardening inputs" (Blaylock and Gallo 1983b:26). Of course this is a strictly economic approach which does not take into consideration other, non-economic values of the time spent gardening.

Distribution of Income

The distribution of income levels within a gardening sample sheds light on differing relationships between those levels and the likelihood of gardening. The Gardens For All survey found the following annual income breakdown among gardeners nationwide;

\$40,000 and over:	16%
\$30-39,999:	13%
\$20-29,999:	22%
\$15-19,999:	14%
\$10-14,999:	19%
under \$10,000:	15%.

Type of Income

Blaylock and Gallo (1983a, 1983b) reviewed the effect of the type of income received by the household on gardening. They distinguished two types; 1) labor (e.g. wage) income and 2) non-labor income (e.g. benefits), and found that "non-labor income encouraged home gardening while labor income had the opposite effect" (Blaylock and Gallo 1983b:26). While perhaps suggestive of a relationship between 'free-time' and gardening, this analysis is necessarily limited as the definition given of non-labor income must encompass such diverse

circumstances as wealthy 'trust fund' recipients as well as those dependent on social service allocations for their survival.

Attitudes Towards Gardening

Perceptions of positive and negative qualities are important indicators of motivations and expectations regarding any activity.

Benefits

Results of the 1984-85 Gardens For All survey report people's reasons for gardening in order of popularity as having fresh fruits and vegetables, better quality foods, pleasure/relaxation, canning and preserving and saving money.

Shortcomings

Findings of the Gardens For All study show that for those already gardening their five biggest problems were; insects, weeds, not enough water, too much water, and animals.

The top five reasons people did not garden were; they had no space, had no time, it required too much work, they were not physically able, and they had failed in the past.

Attitudes towards water for gardening were considered important in this research, and interviewees were asked specifically about this. Being located in the Sonoran desert of North America, receiving an average annual rainfall of 283mm and relying solely on pumped groundwater, water is an important resource in Tucson. Alarm at falling water tables accompanied by rising water costs, has led to efforts in the city and surrounding areas to cut consumption (see Wade and

Mezainis 1983) and a growing public awareness of the importance of water conservation in this arid region.

Source of Information About Gardening

Where gardeners get their information for gardening activities can affect how they garden, the types of crops grown, the inputs purchased and their attitudes, among other things. Starting with the most popular, the Gardens For All survey found the top five sources of gardening information to be seed packets, other packaging information, friends, newspapers and relatives.

Purchased Inputs

Food gardening is a popular activity in this country done by over 40% of American households in 1984. It is also big business with over \$2.3 billion dollars spent in retail sales in 1984 by fruit and vegetable gardeners alone. Nationally, a typical garden (approximately 41m²) is estimated to cost \$32/year (Gardens For All n.d.).

Determining what gardeners spend their money on may offer some insight into their attitudes towards the economics of gardening and help identify ways for cutting gardening costs.

CHAPTER 3

METHOD OF INVESTIGATION

The procedure used to reach the objectives of this study is described in the following sections of this chapter: 1) population and sample, 2) instrumentation and data collection, 3) analysis of data.

Population and Sample

Low-income, home-owning households in Tucson were the target population for this study. Based upon information from the most recent United States Census data for Tucson (1979-1980), census tract ten (see Appendix A), having one of the lowest means of household income was selected, being the accessible population. Using United States Census block information for that tract, blocks with owner occupied houses were identified and numbered. With a table of random numbers these blocks were selected for the order in which they would be surveyed. Following that order, all owner occupied households in each consecutive block were interviewed until the samples were complete. The samples were 1) 15 non-gardening home-owning households and 2) 15 gardening home-owning households. The sampling unit was the individual household as represented by the member predominantly responsible for the household food system, or the gardener if those were different.

Instrumentation and Data Collection

The interview schedule (see Appendix B) developed for this research was based on a review of the literature and the researcher's own experience. The schedule, available in both Spanish and English, collected the same basic household information from both gardening and non-gardening households. There were also special sections, one designed only for households with gardens and another for the non-gardeners. The interviews were done during October 1985, between midmorning and dark, depending on convenience for the household. No interviews were done from about 11:30am until 1:30pm, after 5:30pm, or on Sundays so as not to disturb the households during meals or on what is for many an important religious day.

Interviews were conducted by going from door to door on foot. In either Spanish or English the researcher introduced herself and the purpose of her visit, following from memory an outline of important points. These were; 1) this is a survey of homeowners, 2) it is completely voluntary, 3) it is completely confidential, 4) its purpose is to find out about things people grow to eat, 5) the interview takes about 15-20 minutes, if it is inconvenient now it can be done another time, 6) if there are questions you do not wish to answer that is alright.

If the house was owner occupied and the appropriate person was willing to cooperate they were interviewed. Of all the home-owners approached 2 (6%) declined to participate in the survey. After the interview the researcher drew a sketch map of each residence noting

orientation, location, use of outside space and the plants being grown (see Appendix C for examples).

Analysis of Data

The author filled out the interview schedules during the course of the interviews. She then reviewed these at the end of each day of data collection, for clarification and addition of any comments while the interview was still fresh in her memory. Responses to the survey were hand tabulated into frequencies, means and percentages. Where appropriate, statistical analysis using chi square, Fisher's exact test for probability and, in the case of amount of income, a t-test, were done to determine if differences noted between the two samples were significant (Blalock 1972, Seigel 1956).

CHAPTER 4

FINDINGS

This chapter gives the results of information gathered during the survey which address the objectives of the study. The first part of this chapter is a brief description of the gardens observed and any special features noted. In the remainder of the chapter the results are grouped into sections presented in the same order as the objectives, listed in Chapter One, to which they respond.

Gardens

During one of the first two interviews done for this research the author was sitting under a mulberry tree in a woman's back yard in the late afternoon. As they talked about plants, food and the neighborhood, the woman's brother who lives next door came over to join them and "see what this Anglo girl wanted". The author explained the research, saying she was interested in food gardens. "Do you have a garden?" she asked him. "No", he shook his head, "you won't find many gardens around here anymore". They continued to talk and walked over to look more closely at his yard. Noticing an oregano plant and a loquat tree she said, "But you do have a food garden here!" "Well", he replied, "I do have quite a few things going, but nothing you would call a garden". He proceeded to show her a yard filled with numerous edible plants; eggplants, peppers, tomatoes, garlic, onions, mint,

oregano and asparagus, avocado, orange, lemon, plum, mulberry and loquat trees and a grape vine. Though it did not look the way the author had been taught a garden should, it was a garden indeed.

The gardens observed in the course of this research can be separated into two types, predominantly annual gardens and those which are predominantly perennial. The annual gardens often looked like miniatures of field plots as grown in contemporary Western agriculture. Perennial gardens were reminiscent of traditional practices of mixed gardening which have been observed in many parts of the world (Bittenbender 1985, Cleveland and Soleri 1985b, 1985c).

Annual gardens were usually clearly defined plots in the yard with seasonally changing crops planted in rows. Most often the rows were formed by ridges and furrows to facilitate irrigation. Crops which had been grown in these gardens in the last 6 months are listed in Table 1.

Perennial gardens were more integrated into the outdoor area, crops could be scattered throughout the yard, often interspersed with ornamentals, grown as a living fence or clustered together in an oasis of vegetation. These gardens had less obvious formal structure, often mixing large, woody perennials with smaller herbaceous ones. Watering basins around the plants' bases were common. Crops grown in these gardens are also listed in Table 1.

There was a small difference in the number of perennial (9) and annual (6) gardens in the gardening sample. Analyzing these according to ethnicity of the household, in this case Hispanic and non-Hispanic

Table 1. Common and Latin Names of Edible Plants Grown in Household Gardens in Census Tract 10, Tucson, Arizona.

Perennials		Annuals	
Common Name	Latin Name	Common Name	Latin Name
Apple	<u>Malus spp.</u>	Beet	<u>Beta vulgaris</u>
Apricot	<u>Prunus armeniac</u>	Broccoli	<u>Brassica oleracea</u>
Artichoke	<u>Cynara scolymus</u>	B. sprouts	<u>Brassica oleracea</u>
Asparagus	<u>Asparagus officinalis</u>	Cabbage	<u>Brassica oleracea</u>
Avocado*	<u>Persea americana</u>	Carrot	<u>Daucus carota</u>
Chiltepin	<u>Capiscum frutescens</u>	Cilantro	<u>Coriandrum</u> <u>sativum</u>
Chives	<u>Allium spp.</u>	Collards	<u>Brassica oleracea</u>
Citrus	<u>Citrus spp.</u>	Corn	<u>Zea mays</u>
grape fruit		Cucumber	<u>Cucumis sativus</u>
kumquat		Eggplant	<u>Solanum melongena</u>
lemon		Garlic	<u>Allium sativum</u>
lemon-lime		Lettuces	<u>Lactuca sativa</u>
orange (sweet & sour)		Melons	<u>Cucumis spp.</u>
tangerine		Onions	<u>Allium cepa</u>
Coffee*	<u>Coffea spp.</u>	Peas	<u>Pisum spp.</u>
Fig	<u>Ficus carica</u>	Pepper	<u>Capiscum spp.</u>
Grapes	<u>Vitus spp.</u>	Radish	<u>Raphanus sativas</u>
Jujube	<u>Ziziphus jujuba</u>	Spinach	<u>Spinacea oleracea</u>
Loquat	<u>Eriobotria japonica</u>	Squash	<u>Cucurbita spp.</u>

Table 1--Continued.

Perennials		Annuals	
Common Name	Latin Name	Common Name	Latin Name
Mint	<u>Mentha spp.</u>	Sunflower	<u>Helianthus annus</u>
Mulberry	<u>Morus spp.</u>	Swiss chard	<u>Beta vulgaris</u>
Nopalitos	<u>Opuntia ficus-indicus</u>	Tomato	<u>Lycopersicon</u>
Olive	<u>Olea europea</u>		<u>lycopersicon</u>
Oregano	<u>Origanum vulgare</u>	Verdulaga	<u>Portulacas</u>
Peach	<u>Prunus persica</u>		<u>oleracea</u>
Pineapple*	<u>Ananas comosus</u>	Watermelon	<u>Citrullus lanatus</u>
Plum	<u>Prunus spp.</u>		
Pomegranite	<u>Punica granatum</u>		
Quince	<u>Cydonia oblonga</u>		
Rosemary	<u>Rosmarinus officinalis</u>		
Sage	<u>Salvia spp.</u>		

* Though they will not produce fruit in Tucson, these plant are worth mentioning because they are edibles propagated by people from the foods that they eat and are evidence of propagation abilities and an interest in experimentation.

as in Table 2, showed a significant difference between the type of garden grown by these two ethnic categories. Based on the figures in that table it can be calculated that all of the perennial gardens (9) were grown by Hispanic households, while of the 6 annual gardens observed, 4 (67%) were grown by non-Hispanic households and 2 (33%) belonged to Hispanic households.

Ethnicity

The two samples had almost identical ethnic composition, as illustrated in Table 3. All Hispanics surveyed for this study were of Mexican descent. Among the 15 gardening households 11 or 73% were Hispanic, 3 (20%) were Anglo, and 1 (7%) was Black. Twenty percent (3) of the non-gardening households were Anglo, the remaining 80% (12) being Hispanic. These figures are similar to the ethnic profile of the census tract whose population is 75% Hispanic and 10% Black.

Household Composition

The sub-variables of household composition analyzed were household size or number of members, age of the head(s), and their educational level.

Size

This research found a significant difference in household size between the two samples being compared, as shown in Table 4. Looking only at Hispanic households in the two samples also showed a significant difference in the household size. The average size of gardening households was 3.1 members, Hispanic gardeners had households just

Table 2. Frequency and Percentage of Kinds of Gardens Observed
Among Hispanic and Non-Hispanic Gardening Households
According to Predominant Type of Plants.

Ethnicity of Household	Predominant Type of Plants				Fisher's test
	Perennials		Annuals		
	Fre.	%	Fre.	%	
Hispanic n=11	9	82	2	18	* p=.011
non-Hispanic n=4	0	0	4	100	
Totals	9	60	6	40	

* significant at .05 level

Table 3. Frequency and Percentage of Ethnic Composition in Samples

Sample	Ethnicity					
	Hispanic		Anglo		Black	
	Frequency	%	Frequency	%	Frequency	%
Gardeners n=15	11	73	3	20	1	7
Non-gardeners n=15	—	—	—	—	—	—
Totals n=30	23	77	6	20	1	3

Table 4. Means of Selected Characteristics of Gardening and Non-gardening Households. (n=15 for both samples unless otherwise indicated)

Characteristic	Means		Fisher's Test
	Gardeners	Non-gardeners	
Household (Hh) size	3.1 members	1.8 members	*p < .018
Hh size, Hispanic only	3.2 members	1.8 members	*p < .045
Age	55.3 years	53.7 years	p > .05
Age and Ethnicity (years)	His. 60.9 Ang. 32.3 Blk. 62.0	His. 58.5 Ang. 34.8	N.A.
Years of Education	10.3 years	10.4 years	N.A.
Years of Education and Ethnicity	His. 9.0 Ang. 16.0 Blk. 7.0	His. 9.6 Ang. 13.6	N.A.
Years Residence in Region (non-natives)	16.0 years (n=4)	5.0 years (n=3)	N.A.

* significant at .05 level
N.A. = analysis not appropriate

slightly larger at 3.2 members on average. Non-gardening households had an average 1.8 people, with no variation between Hispanic and non-Hispanic sampling units.

Although not shown in the table it is interesting to note that none of the gardening households were single person units whereas 47% (7) of the non-gardening households were, a finding consistent with the results of the national study by Blaylock and Gallo (1983a).

Age

As shown on Table 4, ages among the two groups were similar, the means being 55.3 years and 53.7 years for gardeners and non-gardeners respectively. Unlike the results of Blaylock and Gallo's national study, the presence of young (less than 6 years) or older (over 55 years) household members did not appear to influence the likelihood for gardening. The distribution of ages according to ethnicity was also similar in both groups with the Anglo households being substantially younger than their non-Anglo neighbors. Among gardeners, Anglos mean age was 32.3 years and non-Anglos 60.9 years. The mean age of Anglo non-gardeners was 34.8 years and 58.5 years for non-Anglos.

Education

Analysis of levels of education in the two samples found them to be insignificantly different. When primary ownership of, and responsibility for the household was shared among two or more adults the mean of their levels of education was calculated to represent that household in the following figures. The years of education does not include kindergarten.

In the gardening households 27% (4/15) and in non-gardening households 40% (6/15) of the heads had 8 years of school or less, with the mean years of school attended being just over 10 for both groups, see Table 5. The proportion of gardening households with only a grade school education was almost twice as high as that found nationally by Gardens For All (14%), and probably can be attributed to the age and ethnic composition of the Tucson sample.

Table 5. Frequency and Percentage of Selected Characteristics of Gardening and Non-gardening Households. (n=15 for both samples unless otherwise indicated)

Characteristic	Gardeners		Non-gardeners		Analysis
	Frequency	%	Frequency	%	
< 8 years Education	4	27	6	40	* $\chi^2 = .964$
Gardening Experience	14	93	14	93	** $p > .05$ (NS)
Interest in Assistance	5	33	6	40	** $p > .05$ (NS)
Interest in Assistance, Hispanics only	3	60	4	67	** $p > .05$ (NS)

(NS) Not significant at .05 level

** Fisher's test of probability

* $\chi^2 > 5.99$ at significance = .05

Difference in levels of education between ethnic groups across both samples showed much greater contrast. Using the ethnically disaggregated information on average years of education from both of the samples shown in Table 5, it was possible to calculate that the average years of formal education among all the Anglos interviewed was 14.8, while among all the Hispanics it was 9.3 years.

Diet

Frequency of Consumption

Information regarding frequency of consumption was difficult to obtain and the survey results are inconclusive in this area. There was no difference between the reported average weekly fresh fruit and vegetable consumption, being approximately 5.5 times and 7 times

respectively, in both gardening and non-gardening households, see Table 6. However, because of publicity and education efforts regarding eating daily from the four basic food groups (see Expanded Food and Nutrition Education Program (EFNEP) literature for examples applicable to low-income households), and growing discussion in the popular media regarding the health benefits of fruit and vegetable consumption (for example National Health Quiz on PBS, fall 1985) these responses may be the result of respondents trying to give 'correct' answers and may not be truly representative of household diets.

Table 6. Diet: Reported Mean Fresh Fruit and Vegetable Consumption

Variable	Mean		Fisher's test
	Gardeners	Non-gardeners	
Fresh Fruit Consumption	7 times/week (n=15)	7 times/week (n=15)	p>.05 (NS)
Fresh Vegetable Consumption	5 times/week (n=15)	6 times/week (n=15)	p>.05 (NS)

(NS) Not significant at .05 level

Perception of Cost

When asked whether they consider fresh fruits expensive, 79% (11/14) gardeners and 63% (5/8) non-gardeners said they were or can be at certain times of the year. Sixty-four percent (9/14) of gardeners and 50% (4/8) of non-gardeners found fresh vegetables expensive, as shown on Table 7. The difference between the two samples is

Table 7. Diet: Frequency and Percentage of Cost Perceptions Regarding Fresh Fruit and Vegetables

Variable	Gardeners		Non-gardeners		Fisher's test
	Frequency	%	Frequency	%	
Fresh Fruit is Expensive	11 (n=14)	79	5 (n=8)	63	p>.05 (NS)
Fresh Vegetables are Expensive	9 (n=14)	64	4 (n=8)	50	p>.05 (NS)

(NS) not significant at .05 level

statistically insignificant and thus insufficient to imply any sort of conscious economic motivation for gardening distinguishing the two groups. Similarly, these findings cannot provide any conclusive evidence of a relationship between the consumption of these foods and the constraints of perceived cost, especially because there is reason to doubt the accuracy of the responses regarding frequency of consumption. A more meaningful assessment regarding diet and gardens was provided by responses to the question regarding acceptability of garden produce.

Acceptability of Garden Produce

The results of this question, illustrated in Table 8, show that on average, 77% of the gardeners and 75% of the non-gardeners eat or like to eat each of the vegetables listed. This question also identifies tomatoes and lettuce as the most popular vegetables across the two groups and okra as the most unpopular (or perhaps unfamiliar) followed by radishes, tomatillos and beets.

Table 8. Diet: Frequency and Percentage of Acceptability of Potential Garden Produce. (n=15 for both samples)

Produce	Gardeners		Non-gardeners	
	Frequency	%	Frequency	%
Broccoli	13	87%	13	87%
Cabbage	7	47%	6	40%
Carrots	11	73%	11	73%
Cauliflower	13	87%	13	87%
Chilis	13	87%	13	87%
Chiltepin	12	80%	7	47%
Cilantro	12	80%	11	73%
Corn	15	100%	14	93%
Cucumbers	14	93%	14	93%
Green beans	12	80%	12	80%
Lettuce	15	100%	15	100%
Melons	14	93%	12	80%
Mint (fresh)	14	93%	13	87%
Nopalitos	9	60%	12	80%
Okra	4	27%	5	33%
Peas	12	80%	15	100%
Radishes	6	40%	6	40%
Spinach	12	80%	11	73%
Squash	15	100%	13	87%
Tomatillos	7	47%	5	33%
Tomatoes	15	100%	15	100%
Verdulaga	9	60%	9	60%
Sample Means		77%		75%

Of additional interest, though not identified in the table, none of the non-Hispanic households in either group indicated eating verdulaga (Portulaca oleracea) or nopalitos (Opuntia ficus-indicus) which are popular traditional food plants in this region.

Familiarity with Gardening

Only one household in each of the two samples reported no family gardening experience during their childhood, refer to Table 5.

Both of the inexperienced sampling units were young, Anglo households. All others had memories of participating in family gardens during their youth. The older, non-Anglos had strong memories of their families' extensive traditional gardens, many of which were grown around the very houses which the interviewees now occupy. In fact it was common to find perennials in these gardens which were established by family members one or two generations preceding the current gardeners.

Several non-gardeners who had grown up in rural areas or whose childhood home had included a large lot where their family had grown "milpas" or maize plots with other vegetables intermingled, maintained this as their garden model. In the interviews, experience with this field style garden was associated with the feeling that a large space was needed for a garden and it was best done by those who "live in the country on ranches".

Familiarity with the Environment

Initially it was assumed that longer residence may result in greater familiarity with the environment manifest in gardening techniques more adapted to the hot, dry conditions in Tucson. For that reason this variable was to be measured in years of residence in the region (southeastern Arizona and northwestern Mexico). The results of the survey showed that only the non-Hispanic members of each sample were not natives, having lived in the region an average 16 years for gardeners and 5 years for non-gardeners, see Table 4. This difference reflects the influence of the Black gardening household, Tucson residents for 33 years, 20 years more than the other non-native households in both samples.

However, the intent of this variable was to discern familiarity with the environment in terms of gardening techniques and it soon became apparent that the length of residence was not an indicator of this. Rather, basic concepts often established during childhood and images portrayed in the popular media appeared to be the strongest influences on the adaptedness of people's gardening techniques.

One example of this was the Black gardening household originally from southeast Texas. The gardener had many strong memories of family gardens in Texas and even after living in southern Arizona for over 33 years her garden, modeled on those of her childhood, was noticeably different from the Hispanic and Anglo gardens observed in several ways. At the time of the survey the gardener was growing collards, a crop not even mentioned by other gardeners. She grew the

plants in straight furrows of exposed soil with no provision for irrigation and watered the plants by spraying the water "just like rain" either by hand or with a pressure sprinkler. In response to the difficult conditions and expensive water in Tucson, this gardener has cut back drastically on the size of her garden over the years, but has not waived from the style of cultivation she associates with a "real garden".

The other influence on people's familiarity with the environment as expressed by the appropriateness of their gardening techniques is the effect of the popular media and advertising. Promotion both commercially and educationally of crops and techniques developed for gardeners in moister, cooler areas of the country and world leads to gardening poorly adapted to the desert environment and frequently more expensive and time consuming to maintain. An example of this is one Anglo gardening household who used raised beds modeled on those popularized by promoters of the French intensive gardening technique. These gardeners spoke of being discouraged by the high water demands of their summer garden. Many factors can contribute to inefficient water use, and gardening in Tucson during the summer can indeed be difficult. Still, raised beds which create more surfaces from which water can evaporate and make deep, rapid watering difficult, do not help the situation.

Location of the Residence

This variable was determined by the subjective judgement of the researcher from viewing the residence and its surroundings as well as

by interviewees comments. Characteristics noted were such things as privacy, noise, security and type of neighborhood (residential, commercial, industrial).

Being directly below and next to the freeway, bordering on empty lots which are more like refuse dumps, and being directly adjacent to a chemical refinery did not appear to have been disincentives to the gardeners in these locations.

On the other hand, privacy and the ability to create a pleasant micro-environment within the garden did seem to be important. Most of the gardens were small oases of trees, other edible plants and flowers surrounded by adobe, wood or chain link fences which were often lined with bushes or vines. Only two gardens were relatively exposed to the street, both were in front of houses on quiet residential streets in yards defined by low brick and adobe walls and both belonged to non-Hispanic households.

Security of location was one reason for not gardening given by several non-gardeners. Three (20%) of the 15 non-gardeners sampled mentioned security from thievery and vandalism by school children as specific concerns. Many of the older people in both samples expressed concern about personal safety which discourages them from outdoor activities. Among many there was a nostalgic remembrance of the days when people slept outside during the summertime, taking advantage of cool night time temperatures, when doors were never locked and the neighborhood was a safe residential area inhabited by family and other familiar people. One older, non-gardening Hispanic woman explained

that she would have liked to have a food garden as her parents had had but out of fear chose instead to keep a dog in her back yard.

Use of Outside Space

The researcher found that in general, older, Hispanic households had the cleanest and most carefully tended outside space around their residences. Landscaping, flowers, bells, caged birds, bird baths and small religious shrines ("nichitos") were often seen at the residences of both gardeners and non-gardeners. In addition, medicinal herbs and plants such as rue (Ruta graveolens), basil (Ocimum basilicum) and Aloe vera were common at these houses and even households without food gardens often had them growing in a container or corner in the yard.

Two older, Hispanic, gardening households had large dogs making their outdoor space dirty and a bit torn up. There was no evidence of using the area for social/pleasure purposes but it was still used for storage and clothes drying. While both households lamented the damage done by the dogs; digging, compacting the soil, destroying plants and fruits and littering the yard with feces, both wanted the animals for security. Gardens at these households consisted almost entirely of large, woody perennials such as fruit trees and cactus.

Non-Hispanic and younger households had less carefully tended outdoor space around their residences. This could be a result of less time, shorter length of residence, or lack of interest or tradition, among other things.

Among both Hispanics and Anglos outdoor cooking areas, chairs, tables and even two dance floors indicated social use of outdoor space which was confirmed in discussions with interviewees.

Other uses of outdoor space observed among both gardening and non-gardening households of all ethnic groups were clothes drying on outdoor laundry lines, children's play areas, storage of cars, building materials or other goods in the open and in sheds, car and home repair workspace, raising chickens and a home-built "sweat", similar to a sauna and modeled on the tradition of some native North American peoples.

Assistance with Gardening

When asked if they would ever be interested in some form of support service for their gardening such as neighborhood classes, demonstrations or home visits, 6 (40%) non-gardeners said yes while 5 (33%) of the gardeners said yes, being an insignificant difference, as shown on Table 5. Overall, among both groups 11 (37%) of the households were interested in assistance with their gardens, of these 36% (4) were Anglo, the rest Hispanic. Several people said they did not have the time for such assistance. Often elderly respondents were not interested in leaving their homes.

Income

Household income was reviewed in terms of amount, distribution of income within the samples and type of income.

Amount

While the sample populations were from a low-income census tract, individual household incomes were obtained to determine if variation within this census tract demonstrated a meaningful difference between gardening and non-gardening households. As shown in Table 9, the mean annual household income for the gardening sample was \$12,887, for non-gardening households it was 18% less at \$10,584. The figure for non-gardeners was obtained from only eleven scores as two households refused to give this information and two others were extreme, may not have been correct and were at any rate unrepresentative of the population. Looking only at Hispanic sampling units the mean annual household income among gardeners was \$11,264 and among non-gardeners \$8,980, or 20% less (see Table 9).

Table 9. Average Annual Incomes of Gardening and Non-gardening Households of Complete Samples and Hispanic Households Only

Respondents	Average Annual Income		t-test
	Gardeners	Non-gardeners	
Entire Sample	\$12,887 (n=15)	\$10,584 (n=11)	*t=.005 (NS)
Hispanics Only	\$11,264 (n=11)	\$8980 (n=9)	**t=.008 (NS)

* $t > 2.064$ at .05 level significance

** $t > 2.101$ at .05 level significance

(NS) not significant at .05 level

Based upon the reported household incomes and sizes, it was possible to calculate that 3 of the 11 non-gardening households (27%) were below the federal poverty level. Twenty percent of gardening households sampled (3/15) were also below the poverty level. A few interviewees mentioned receiving help, both monetary and non-monetary, from grown children or other relatives, in times of need. This sort of support, either in kind or in cash could make a meaningful difference in the lifestyle of someone on a fixed, low income.

It is worth noting that since the time of the last census (1979) when the mean income level of home-owning households in census tract 10 was \$10,265, there has been a trend towards gentrification of the area evidenced by new development activities throughout the downtown area and the growing Anglo population in neighborhoods formerly predominantly occupied by some of the old Hispanic families of Tucson.

Using a t-test the difference between the mean incomes found in the two samples was insignificant, as shown on Table 9. However this calculation may not be conclusive due to the limitations of a small sample size for parametric analyses such as this requires. A larger sample would be needed to produce a more accurate and representative statistical summary.

If indeed the difference between the two samples was found meaningful, the samples may be representative of levels of income below which gardening is inhibited due to assumptions regarding the cost of

inputs, as mentioned by Blaylock and Gallo (1983b:26) and noted in Chapter Two.

Distribution of Incomes Within the Samples

Being from a low-income part of the community, the distribution of incomes in these samples is quite different from that found by Gardens For All nationally both in range of quantities and the nature of the distribution itself. Table 10 illustrates that when categorized into discrete income levels and analyzed using chi square the distribution of households across these levels was found to be significantly different between the gardening and non-gardening samples. Among households gardening 47% (7) had annual incomes \$9001-\$12000, with only 14% (2) having incomes equal to or less than \$9000. Fifty-five percent (6) of the non-gardening households had annual incomes of \$9000 or less and none fell into the \$9001-\$12000 bracket.

When analyzing only Hispanic households as in Table 11, a similar distribution is demonstrated, it is not, however, significant.

Type of Income

There was no difference in type of income (labor as opposed to non-labor) between the two samples. In each group 60% of the households (9/15) depended on non-labor income (e.g. social security, veteran's benefits, disability, unemployment and food stamps) and 40% (6/15) of the households in each sample relied on labor income (wages). Many of the 18 households relying on non-labor income received more

Table 10. Frequency and Percentage of Distribution of Annual Incomes Within Samples

Sample	Annual Income in Dollars					χ^2 *
	0-6000 Fre. %	6001-9000 Fre. %	9001-12000 Fre. %	12001-15000 Fre. %	15001 and above Fre. %	
Non-gardeners (n=11)	3 27%	3 27%	0 0%	2 18%	3 27%	10.705**
Gardeners (n=15)	1 7%	1 7%	7 47%	3 20%	3 20%	
Totals (n=26)	4 16%	4 16%	7 27%	5 19%	6 23%	

* $\chi^2 > 9.488$ at .05 level of significance

**significant at .05 level

Table 11. Frequency and Percentage of Distribution of Annual Incomes Within Samples:
Hispanic Households Only

Sample	Annual Income in Dollars										χ^2^*
	0-6000		6001-9000		9001-12000		12001-15000		15001 and above		
	Fre.	%	Fre.	%	Fre.	%	Fre.	%	Fre.	%	
Non-gardeners (n=9)	3	33%	3	33%	0	0%	2	22%	1	10%	7.86 (NS)
Gardeners (n=11)	1	9%	1	9%	6	55%	2	18%	1	11%	
Totals (n=20)	4	20%	4	20%	6	30%	4	20%	2	10%	

* $\chi^2 > 9.488$ at .05 level of significance
(NS) not significant at .05 level

than one of the benefits listed above, and they were all retired people on fixed incomes.

These findings did not support the results of Blaylock and Gallo's national study which found non-labor incomes to be more highly associated with household gardening than non-labor incomes.

Attitudes Towards Gardening

Probably one of the most important factors influencing people's gardening activity is their attitude. Percieved benefits and shortcomings create the motivations and disincentives for any behavior. Both gardeners and non-gardeners were asked what they felt were the benefits and drawbacks of household gardens. Almost all interviewees gave multiple responses to these open-ended questions. Tables 12 and 13 show the results of these responses, the percentage representing the proportion of the sample which listed each factor during questioning.

The difference between gardener and non-gardener attitudes toward gardening concerning the pleasure/relaxation benefit of this activity was statistically significant. Sixty-seven percent (10/15) of the gardeners felt this was a benefit while only 27% (4/15) of non-gardeners saw pleasure/relaxation as an attribute of gardening. Perhaps related to this difference was the finding that 20% (3/15) non-gardening households considered the 'work' of gardening to be a shortcoming, as compared with 0% of the gardeners (see Table 13). How this difference in attitudes operates in household decisions to initiate or continue gardening cannot be assessed from the findings of this research.

Table 12. Attitudes: Frequencies and Percentages of Perceived Benefits of Household Gardens. (n=15 for both samples)

Benefit	Gardeners		Non-gardeners		Fisher's test
	Frequency	%	Frequency	%	
Food Quality	12	80%	10	67%	p>.05
Pleasure/relaxation	10	67%	4	27%	*p=.033
Savings	5	33%	7	47%	p>.05
Shade	2	13%	0	0%	p>.05
None	0	0%	1	6%	p>.05

* significant at the .05 level

Table 13. Attitudes: Frequencies and Percentages of Perceived Shortcomings of Household Gardens. (n=15 for both samples)

Shortcoming	Gardeners		Non-gardeners		Fisher's test
	Frequency	%	Frequency	%	
Insects	8	53%	2	13%	*p=.025
Cost of Water	5	33%	7	47%	p>.05
Temperatures	3	20%	0	0%	p>.05
Soil Quality	1	6%	3	20%	p>.05
Lack of Skills	2	13%	2	13%	p>.05
Time	1	6%	3	20%	p>.05
Work/effort	0	0%	3	20%	p>.05
Security	0	0%	2	13%	p>.05
Birds	2	13%	0	0%	p>.05
Dogs	1	6%	1	6%	p>.05
Space	0	0%	3	20%	p>.05
Bermuda grass	1	6%	0	0%	p>.05
None	2	13%	0	0%	p>.05

* significant at the .05 level

The only other statistically significant difference found was that 53% (8/15) of gardeners cited insects as a problem, while only 13% (2/15) non-gardeners mentioned this (Table 13). This may be attributable to the difference made by current involvement in the activity.

The following summaries of the results list the factors in order from the most to least frequently mentioned.

Benefits

Among gardeners the benefits were seen to be food quality (e.g. no chemicals, freshness and taste), pleasure/relaxation, savings and shade. These results appear similar to those of the Gardens For All survey, although in that work "freshness" is distinguished from other food qualities, whereas in the Tucson survey it is included in "food quality". Also, the Tucson gardeners did not cite canning and preserving, perhaps because of the potential for year-round gardening in Tucson as opposed to other, more temperate parts of the country.

Non-gardeners stated the benefits as being food quality, savings and pleasure/relaxation.

Respondents felt strongly about food quality. Many complained about the taste of purchased fresh fruits and vegetables and were concerned that they did not know about and could not control the chemicals being used on their foods. There was frequent reference to the recent discovery of toxic chemical residues in California watermelons. One enthusiastic, older gardener who is an avid reader of the Tucson Garden Center's newspaper column expressed dismay about their emphasis on chemicals. He wanted to keep his plants and soil "clean" of

chemicals which he called "expensive and dangerous". And besides, he pointed out, having food that you know is free of chemicals is one of the greatest benefits of gardening.

Shortcomings

Shortcomings listed by gardeners were insects, water requirements (e.g. cost), temperature extremes, followed by two clusters; lack of skills/birds, and finally soil conditions/bermuda grass invasion/dogs/space. These findings are very similar to those of the Gardens For All survey with the notable exceptions of water and temperature (e.g. heat and frost). This difference may be symptomatic of the big contrast in environmental conditions between Tucson and the regions for which much of the information and images of gardens in this country are developed.

The main drawback among non-gardeners was seen to be water. This was followed by three clusters of factors; space/work/time/soil quality; security/insects/lack of skills; and overall cost/dogs.

As mentioned above, the important influence of Tucson's arid environment on gardeners and non-gardeners alike is evident when comparing their attitudes to water and gardening with those found in the Gardens For All study. Of the non-gardening households sampled 47% (7/15) said that the cost of water is a disincentive for gardening. In the national survey insufficient water was not even cited among the reasons why people do not garden.

Among gardening households surveyed in Tucson, 33% (5/15) cited lack of water due to cost as being a drawback to gardening in this

city. Nationally only 16% of gardeners found lack of water to be a problem (Gardens For All n.d.).

On the local level the difference between attitudes towards water among gardening and non-gardening households was insignificant.

Source of Information About Gardening

Gardeners were asked where they went for information and assistance with their gardens. This was an open-ended question with respondents being encouraged to list as many sources as they wished. For this reason the results as shown in Table 14 indicate the proportion of households using each of these sources and therefore the total is more than 100%. The most frequently identified sources of information and assistance were books, while seed packages, the number one source identified by the Gardens For All study, were not even mentioned by the Tucson gardeners. It is interesting to note that of the seven gardening households which cited books, only two used ones specifically written for the southwestern United States. The next most important sources of information were mentioned in the following order, family, friends, and finally newspapers/magazines and nurseries.

Another difference between these findings and those of the Gardens For All survey is the importance of family and friends as sources of information and assistance among the Tucson gardeners. This may reflect a population in which family members live in close proximity and which has a living gardening tradition.

Table 14. Frequency and Percentage of Gardeners Using Sources of Information and Assistance. (n=12)

Source	Gardener's Choices	
	Frequency	%
Books	7	58%
Family	6	50%
Friends	5	42%
Magazines/newspapers	3	25%
Nurseries	3	25%

Purchased Inputs

Inputs purchased by gardeners solely for their household gardens (excluding city water) are listed in Table 15. The figures show the percentage and number of households which purchased these goods for their gardens. The most frequently purchased garden inputs were; soil amendments (chemical and 'organic' fertilizer, soil sulphur, citrus food), seeds, seedlings, supports and shades, chemicals, and a drip system installed by one Anglo household. It is interesting that while 53% (8) households purchase seeds, an overlapping 66% (10) of the households also save some of their own seeds.

The information presented in this chapter was the research findings which responded to the objectives of the study as laid out in Chapter One.

Table 15. Frequency and Percentage of Gardeners Purchasing Inputs Excluding Water. (n=15)

Inputs	Gardeners Purchasing	
	Frequency	%
Soil Amendments	9	60%
Seeds	8	53%
Seedlings	8	53%
Supports and Shades	4	27%
Chemicals	3	20%
Drip System	1	7%
Nothing	3	20%

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In this chapter a summary of the research findings as well as conclusions and recommendations based on those findings are presented.

Problem Statement

This research attempted to identify some of the characteristics that may distinguish households with food gardens from those without food gardens among owner occupied households within a low-income census tract in Tucson, Arizona. To do that the following questions were addressed:

1. Are household characteristics such as ethnicity, household composition, dietary preferences, familiarity with gardening, familiarity with the environment, location of the residence, use of outside space and interest in support services significant distinguishing characteristics between households with and without food gardens?
2. Is income a significant distinguishing characteristic between gardening and non-gardening households?
3. Among households gardening, what are considered by them to be the benefits and shortcomings of household gardening as expressed by attitude? Are these different from the benefits and shortcomings perceived by non-gardeners?

Summary of Findings

The research findings are summarized below in the order of the objectives to which they correspond.

Household Characteristics

The first objective was to determine if there was a difference in certain household characteristics between gardening and non-gardening households in the samples.

Among the household characteristics surveyed and analyzed, only household size showed a statistically significant difference between gardening and non-gardening households.

Ethnicity. The ethnic composition of the samples was quite similar. The gardening sample was 73% Hispanic, 20% Anglo and 7% Black. The non-gardening sample was 80% Hispanic and 20% Anglo. In turn, both were close to the ethnic composition of the census tract from which they were drawn.

Household size. There was a statistically significant difference between the size of gardening and non-gardening households. The mean household size for gardeners was 3.1 members, while for non-gardeners it was only 1.8 members. Forty-seven percent of the non-gardening households had only one member whereas all of the gardening households had more than one. Unlike other characteristics surveyed, the difference between the size of Hispanic households in the two samples mirrored the difference between the two complete samples and was also significant. This was unusual, because for all other characteristics except distribution of incomes, the Hispanic sub-groups from

the two samples were more similar to each other than they were to the rest of the sample of which they were a part.

Age of householders. Average ages in the two samples, 55.3 years for gardeners and 53.7 years for non-gardeners, were insignificantly different and both showed the same pattern of distribution with the small portion of Anglos being substantially younger than the non-Anglos. This distribution reflects the relatively new phenomenon of gentrification with young Anglos purchasing and renovating homes in this neighborhood. All other owner occupied houses appear to follow a pattern of family residence for generations, perpetuated by multi-generational households and inheritance practices.

Educational level of householders. Once again, the difference between the two samples was insignificant. Both samples showed a mean of 10 years of education with 27% of gardeners and 40% of non-gardeners having had 8 or less years of school. The difference according to ethnic group within the samples was striking with Anglos in both samples having an average 14.8 years and Hispanics 9.3 years of education.

Diet: Frequency of consumption. Fresh fruit and vegetable consumption was reported to be the same in both samples, 5.5 and 7 times/week respectively, and showed no ethnic variation within the samples. However, doubts as to the accuracy of this data make it inconclusive.

Diet: Perception of cost. More gardeners (79%) than non-gardeners (63%) found fresh fruits and vegetables were expensive though the difference was not statistically significant.

Diet: Acceptability of garden produce. Acceptance of potential garden foods was high in both groups. An average 77% of gardeners and 75% of non-gardeners reported eating or a desire to eat each of the foods. Consumption of the local crops verdulaga and nopalitos can be assumed to be strongly influenced by ethnicity, with only Hispanics in both samples eating these.

Familiarity with gardening. Familiarity with gardening was high and ethnic differences identical in both samples. Only one Anglo household in each sample did not have pre-adulthood experiences with this activity making this characteristic ethnically uniform within and across both samples.

Familiarity with the environment. As an indication of understanding environmental conditions and therefore being better equipped to adapt garden techniques to these conditions, years of residence in the region was found to be inadequate. Instead, cultural concepts about gardening established early in life and the popular media appear to be of greater influence, but the actual relationship cannot be understood from this research.

Location of the residence. Location of the residence did not appear to distinguish gardening from non-gardening households. However, concerns regarding personal safety were mentioned as disincentives for gardening although it would be difficult to distinguish how

location interacts with personal characteristics such as old age and past experience in creating feelings of vulnerability.

Use of outside space. Outdoor space around the residence was used for a variety of purposes among households of all ethnic groups in both samples. Areas for work, play, storage, socializing and aesthetic displays were observed. Among gardeners food gardens were grown in addition to or integrated with other uses of space. Non-gardening households frequently had non-edible plants in this space. Generally, older, Hispanic households had the most carefully tended outdoor space.

Interest in assistance with gardening. The difference between gardeners (33%), and non-gardeners (40%) who said they would be interested in support services for food gardening was insignificant. Altogether 37% of all the households interviewed for this study were interested in such services, and 64% of these were Hispanic.

Income

The second objective of this study was to determine if some features of household income were different between the two samples.

Of the three sub-variables of income investigated only the distribution of incomes within the samples was found to be significantly different.

Amount of income. Mean annual household income among non-gardeners (\$10,584), was 18% less than that of gardeners (\$12,887). Looking only at Hispanic households, mean annual income for non-gardeners was 20% lower, being \$8980/year compared with \$11,264/year for gardeners. Analysis of the difference in income between the two

samples and between the two Hispanic sub-samples using a t-test found it insignificant. However, due to the small sample size and wide range of incomes resulting in a large variance, the insignificance of this difference is not conclusive.

Distribution of incomes within samples. Analysis of the distribution of households across the range of annual incomes in each sample showed a significant difference between the two samples. Among non-gardening households only 45% had incomes of more than \$9000/year compared with 87% of gardeners. Looking only at Hispanic households the same sort of distribution is evident although less extreme and not statistically significant.

Type of income. Within each of the samples, 6 households had labor income and 9 had non-labor income reflecting the large number of retired householders in the samples.

Attitudes Towards Gardening

The third objective of this study was to determine if attitudes regarding the benefits and shortcomings of household gardening were different between the two samples.

Benefits and shortcomings of household gardens perceived by gardeners and non-gardeners alike were similar with two exceptions. A 'pleasure/relaxation' quality of gardening was cited by a much larger number of gardeners (67%), than non-gardeners (27%). Perhaps a corollary of this difference is the proportion of gardeners (0%), compared to non-gardeners (20%) who consider the 'work' of gardening to be a shortcoming.

Significantly more gardeners (53%) reported insects to be a problem with gardening than did non-gardeners (13%), a difference perhaps resulting from recent experiences.

Benefits. Food quality was found to be the outstanding benefit, being cited by 80% of gardeners and 67% of non-gardeners.

Shortcomings. Among gardeners the most frequently listed shortcoming was problems with insects noted by 53% of the sample. For non-gardeners it was the cost of water, cited by 47% of that sample.

Concern about water costs was high among both groups although more non-gardeners (47%) were concerned than were gardeners (33%).

Gardens

In addition to the comparison of gardening and non-gardening households as stated in the objectives, this survey also provided the opportunity to better understand the gardens grown by some low-income home-owners in Tucson. Two survey questions and information from the map contributed to this understanding.

Source of information. The gardeners sampled rely most heavily on books as a source of information and assistance. It is important to note that only two of the seven households using books use ones adapted in any way to southwestern conditions. Family, friends, periodicals and nurseries were the other sources of information in descending order of popularity. To understand how these different sources influence each other requires more research.

Purchased inputs. Soil amendments were the most commonly purchased gardening inputs, being bought by 60% of the gardeners. While

53% of the gardeners bought both seeds and seedlings, 66% of the gardeners also saved some of their own seeds. Stakes and supports (27%), chemicals (20%) and a drip system (7%), were the other purchases cited. It is worth noting that 20% of the gardeners surveyed made no purchases for their gardens beyond payment for city water.

Map information. The maps of sampling unit residences recorded the physical layout of the gardens as well as the plants grown in them. Investigation of a noticeable difference in garden type observed during the course of the survey showed a statistically significant difference in the kind of gardens, as characterized by plant types, grown by Hispanic and non-Hispanic households. This in turn was observed to affect the gardens' form. Perennials dominated 82% of all the gardens, with 100% of these belonging to Hispanic households. Structurally the perennial gardens were multi-level systems which usually included some annuals, were more integrated with the rest of the outdoor space, and used watering basins which surrounded each plant or cluster of plants.

Of the 6 predominantly annual gardens, 33% belonged to Hispanic households. These gardens were a more separate part of the yard and used irrigation furrows and, in one case, a drip system for watering.

Conclusions

The following conclusions can be drawn from the findings of this study:

1. There appear to be only a few differences between gardening and non-gardening home-owning households in census tract 10, Tucson, Arizona. Gardening households compared to non-gardening households were

larger, had a larger proportion of higher incomes, were aware of problems caused by some insects in the garden and tended to perceive gardens not as work, but as providing pleasure and relaxation.

2. Amount of income may be a meaningful distinguishing characteristic between the two groups represented in this study. Further research involving larger sample sizes would be required to determine whether or not this is true.

3. The influence of ethnicity seems to supercede all others in characterizing households in this study. Among the variables investigated in this study ethnically defined characteristics were most often consistent across both samples, and differentiated the ethnic groups within samples.

4. From the gardens observed in this study one could hypothesize that the form and content of small scale food production systems among the study population is a culturally relative phenomenon. The influence of early experience with gardens, most often with the family, seems to be important. Similarly, the popular media appears to affect concepts of and techniques for gardening. To test this hypothesis and to determine how, if at all, these two influences effect different members of the population would require further research.

Recommendations

So that the findings and conclusions of this research may be of practical use the following recommendations are made to individuals and organizations considering support of household gardens among low-income, home-owning households in Tucson, Arizona.

1. Further research is needed on gardeners and potential gardeners. A survey of gardens and gardening techniques already existing in the work area is vital for understanding culturally defined concepts of gardens. This indicates the level of experience and expertise already present and allows creation of programs which best fit the needs and interests of the population. As a starting place, gardening 'education' should consciously integrate nutritional awareness, economic practicality and sustainability to address some of the fundamental constraints on low-income households.

2. Activities should attempt to build on the foundation of positive existing practices, integrating improvements into these rather than changing them completely. An example of this might be encouraging people to grow a few dark green leafy vegetables in the watering basins around their trees or in among their flowers.

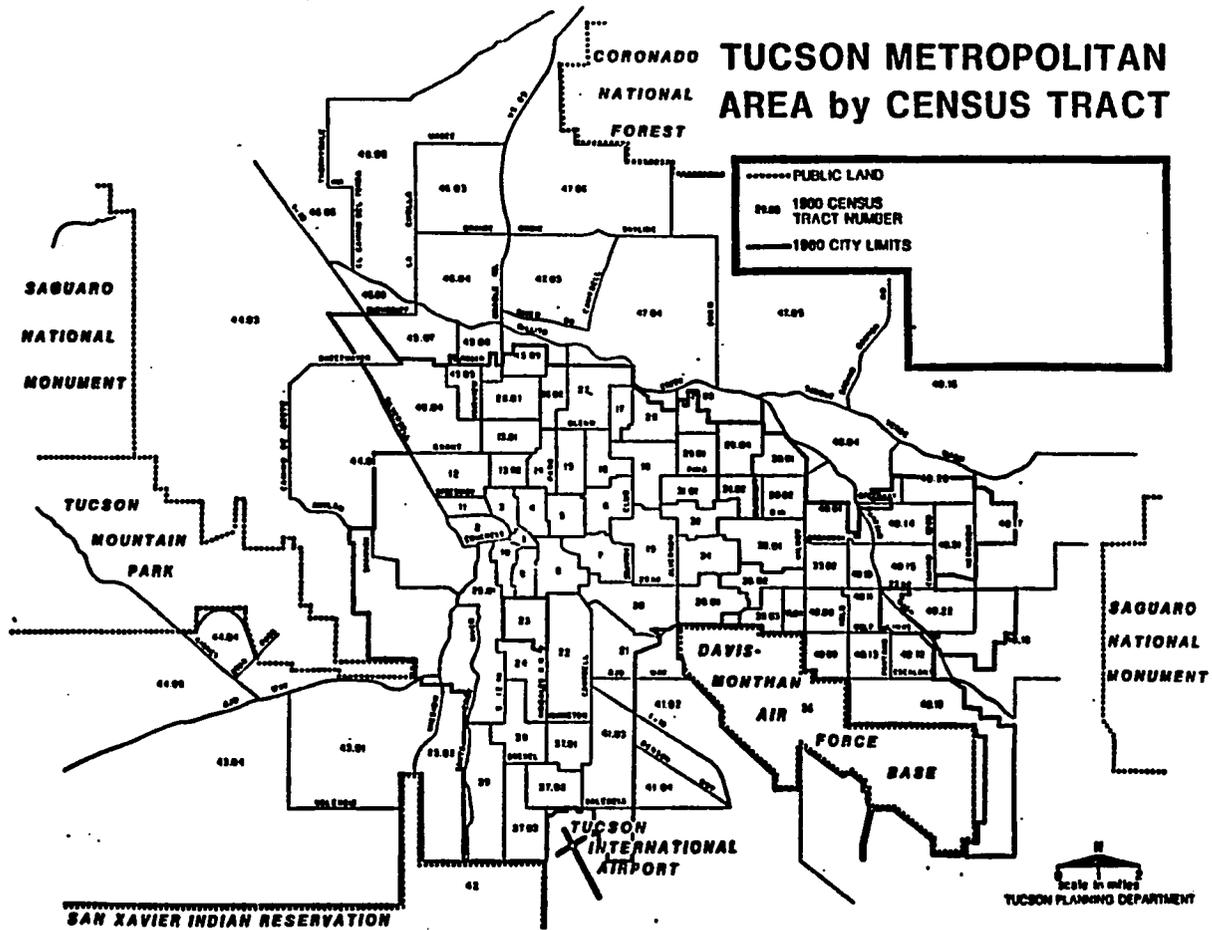
3. Further investigation to understand why single member households are not gardening could be useful. If, for example, there is a meaningful social reason for the absence of this activity, support of more socially oriented garden programs for selected groups such as the single elderly, may be appropriate.

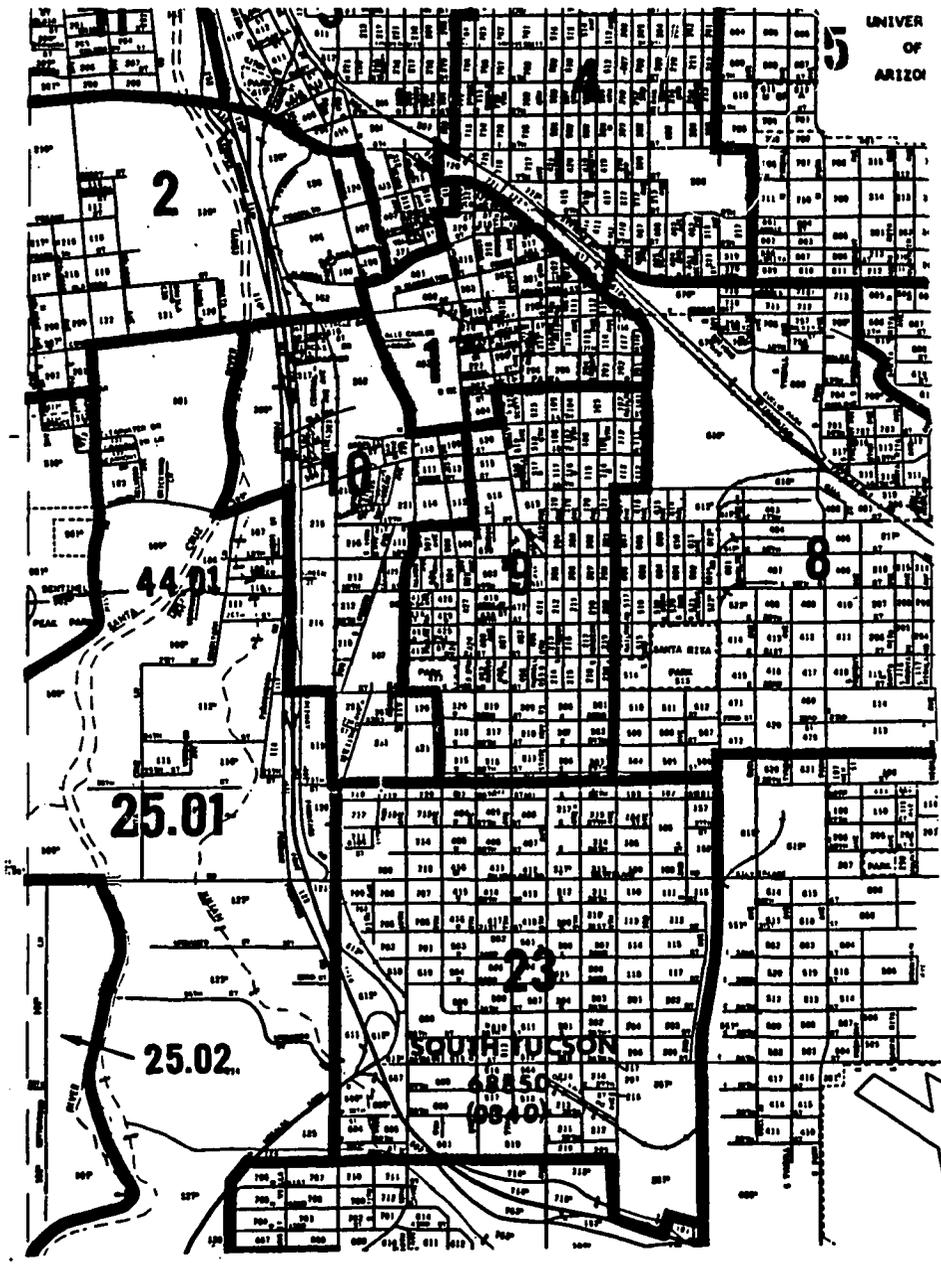
4. Dedication to developing and supporting techniques which are no- and low-cost could encourage households from lower income levels to participate. This includes avoiding promotion of images of household gardens which are financially unfeasible for many households. Alternatives to the purchased inputs now used most frequently by gardeners would be a first step in reducing the use of income in gardening.

5. Placing an emphasis on well adapted and low maintenance plants and techniques for gardening would decrease the work and money needed and increase the chances for positive gardening experiences in addition to providing nutritional and economic benefits to the household. This might make a difference in some people's perceptions of the pleasure and relaxation of gardening.

APPENDIX A

CENSUS TRACT 10





APPENDIX B

INTERVIEW SCHEDULES

- (14) Have you ever had a garden? (a) No-go to 16 /Yes (if so re. most recent)
 (b)when_____ (c)where_____ (d)why did you stop_____
- (15) Where did you learn to garden?_____
- (16) Have you ever helped with a garden? (a) No__ Yes__ (if so re. most recent)
 (b)when_____ (c)where_____ (d)whose_____
- (17) Growing up, did anyone in your family have a garden?(a) No__ Yes__
 (b)who_____ (c)when_____ (d)where_____
- (18) Would you ever be interested in having a food garden? (a)Yes__ (b)No
 Why?_____
- (19) What do think the biggest benefit of having a garden would be? _____

- (20) What do you think the biggest drawbacks to having a garden would be?_____
- (21) Do you think water would be a problem? Yes___ No___
- (22) If there were classes or demonstrations in your neighborhood about gardening would you be interested? Yes__ No__

- (14) garden type (a) furrow/ridge___ (b) raised bed___ (c) sunken bed___ (d) containers___
(e) other_____
- (15) What do you grow in your garden? _____

- (16) How long have you gardened in this region? _____
- (17) What memories do you have of gardens while growing up? _____
- (18) What do you buy for your garden? (a) seeds___ (b) seedlings___ (c) chemicals___ (d) tools___
(e) shades___ (f) mulch___ (g) stakes___ (h) org. fert___ (i) other_____
- (19) Do you save any seeds? Yes___ No___
- (20) Does anyone else work in garden w/you? (a) Yes (b) No Who? _____
- (21) What do you think are the benefits of gardening? _____

- (22) What do you think are the drawbacks/problems with gardening? _____

- (23) Is water a problem? Yes___ No___
- (24) Where do you buy garden supplies? _____
- (25) Where do you get info and advice? _____

- (26) If there were classes or demonstrations about gardening in your neighborhood would you be interested? Yes___ No___

- (14)?Ha tenido alguna vez un huerto donde crece comida? a) si__ no__ b) cuando fue la ultima vez _____ c) dónde _____ d)?Por qué no tiene un huerto ahora? _____
- (15)?Dónde aprendió mantener un huerto? _____
- (16)?Ha ayudado con un huerto alguna vez? a) si__ no__ b) cuando fue la ultima vez _____ donde _____ c)?De quién era el huerto? _____ d)?Por qué dejó de mantener su huerto o ayudar? _____ e)?Le gustaba jardinar o no? _____
- (17)?Había algien en tu casa que tenía jardín quando estaba chico? a) no__ si__ b) quien fue _____ c) cuando _____ d) donde _____
- (18)?Piensa que algún día tendrá interés en su propio huerto de comida? a) si__ no__ b) por qué _____
- (19)?En su opinion que son los beneficios de un huerto? _____

- (20)?En su opinion que cosas serían más problemáticas en el mantemiento de un huerto? _____

- (21)?Sería un problema l'agua? si__ no__
- (22)?Tendría interés en demostraciones o clases de jardineriá en su comunidad? si__ no__

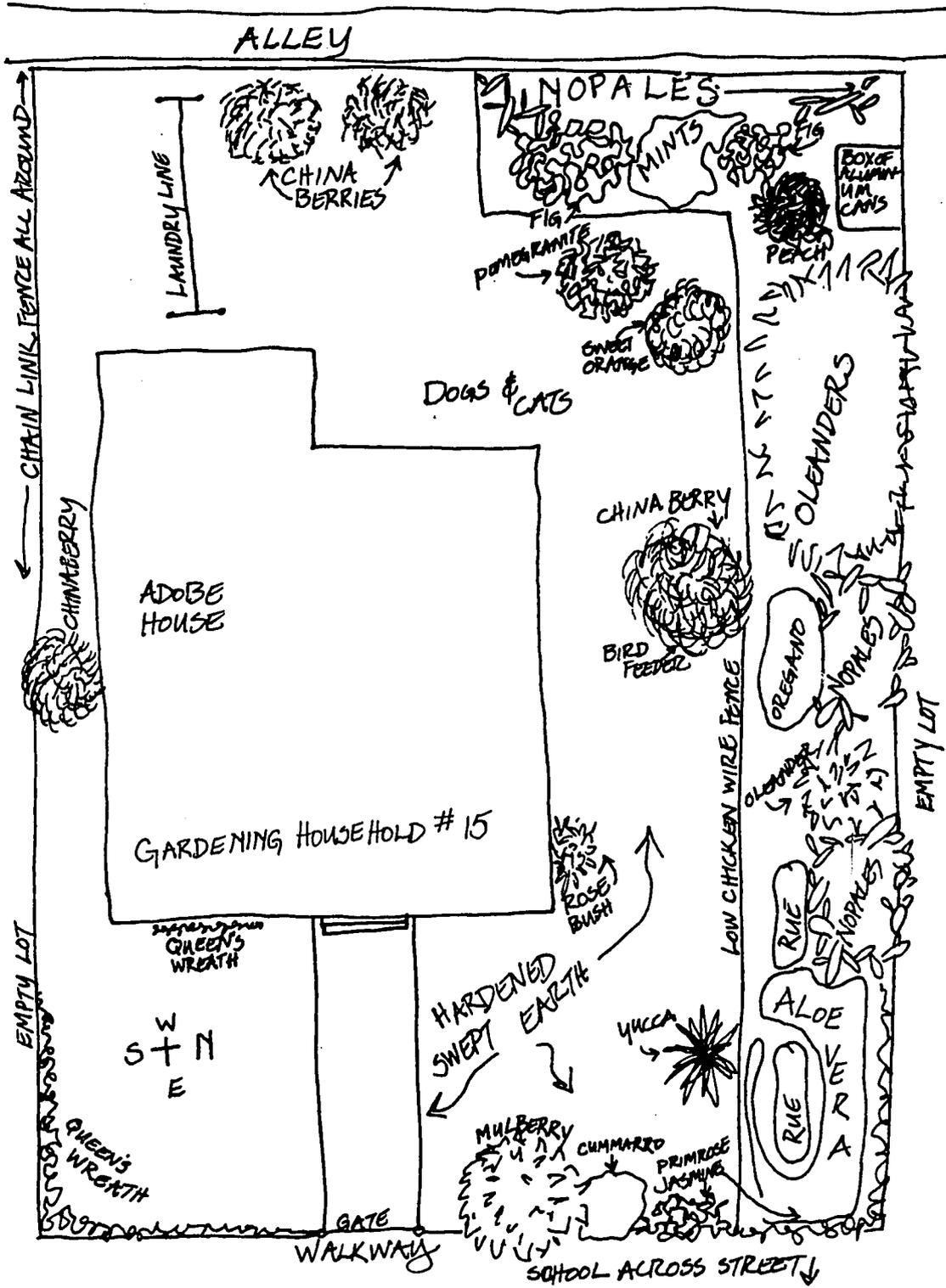
- (14)?Que tipo de huerto tiene usted? a)canaliza/loao___ b)cuadro levantado___
 c)cuadro sumido___ d)en maseta___ e)otro_____
- (15)?Que cosas cultivan en su jardín?_____
-
- (16)?Por cuantos años ha mantenido su jardín in esta región?_____
- (17)?Que impresiones tenía de los jardines cuando estaba chico? _____
-
- (18)?Que materiales compra usted para su jardín? a)semillas___ b)matitas___
 c)productos químicas___ d)fierros___ e)sombras___ f)estiércol___ g)estacas___
 h)fertilizante orgánica___ i)otro_____
- (19)?Guarda usted sus semillas? si___ no___
- (20)?Hay otra persona que trabaja con usted en el huerto? no___ si___
 quien_____
- (21)?En su opinion qué son los beneficios de tener un huerto?_____
-
- (22)?En su opinion que cosas serían más problemáticas en el mantemiento de un huerto?

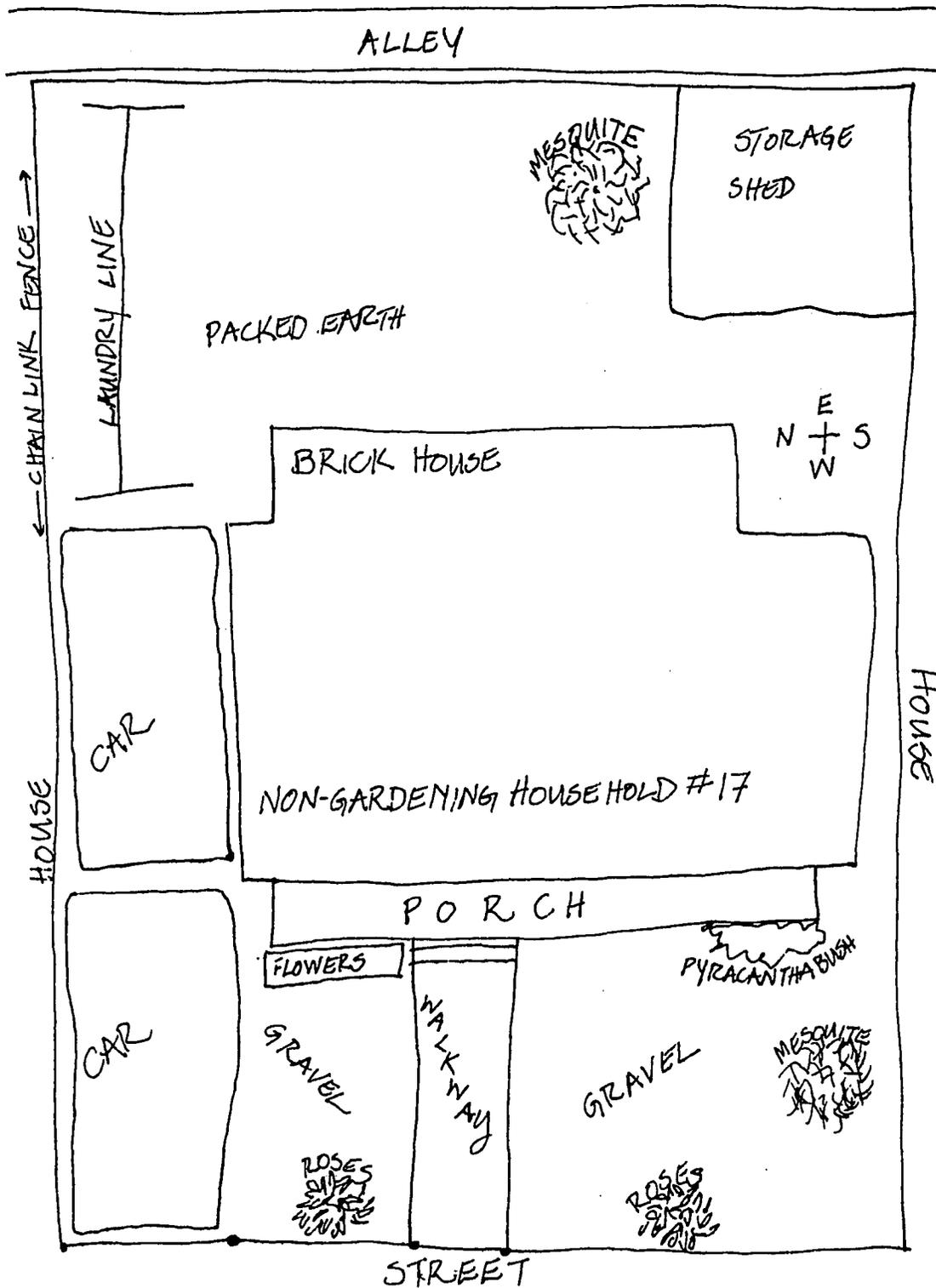
- (23)?Es un problema l'agua? si__ no__
-
- (24)?Dónde compra usted los materiales para su huerto?_____
- (25)?De dónde viene su información y los consejos que recibe a cerca de jardineriá?

-
- (26)?Tendría interés en deonstraciones o clases de jardineriá en su comunidad? si__
 no___

APPENDIX C

SAMPLE SKETCH MAPS





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