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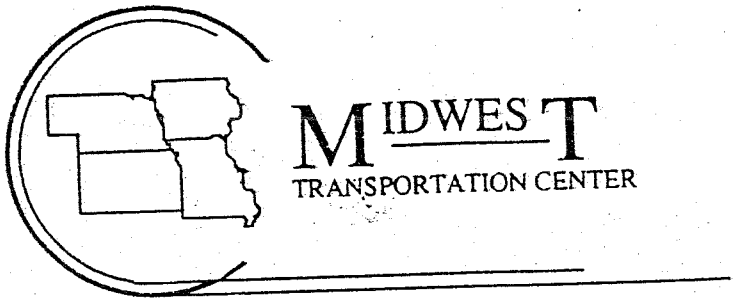

The Need for Transportation Alternatives for the Rural Elderly

Researchers

Mary Kihl, Principal Investigator
Professor of Community and Regional Planning

Willis Goudy, Research Associate
Professor of Sociology

Riad Mahayni, Research Associate
Professor of Community and Regional Planning

Research Assistants

Sarah May, Community and Regional Planning
Joyce Clause, Community and Regional Planning
Shabana Hameed, Community and Regional Planning
Rajiv Bakshi, Community and Regional Planning

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Midwest Transportation Center
Iowa State University
2521 Elwood Drive Suite 125
Ames IA 50010
Telephone: (515) 294-8103
FAX: (515) 294-0467

PREFACE

This report is the product of a research project in the University Transportation Centers Program. The Program was created by Congress in 1987 to "contribute to the solution of important regional and national transportation problems." A university-based center was established in each of the ten federal regions following a national competition in 1988. Each center has a unique theme and research purpose, although all are interdisciplinary and also have education missions.

The Midwest Transportation Center is one of the ten centers; it is a consortium that includes Iowa State University (lead institution) and The University of Iowa. The Center serves Federal Region VII which includes Iowa, Kansas, Missouri, and Nebraska. Its theme is "transportation actions and strategies in a region undergoing major social and economic transition." Research projects conducted through the Center bring together the collective talents of faculty, staff, and students within the region to address issues related to this important theme. This on-going project reflects the key mission of the Midwest Transportation Center by proposing responses to the transportation needs of the increasing elderly population of the Midwest region.

This particular project was carried out by an interdisciplinary research team at the Design Research Institute of Iowa State University. This center is a reflection of the university's dedication to applied research that seeks to respond to the needs of residents of the rural Midwest. The Institute's efforts frequently involve close interaction with community leaders and concerned citizens in small towns and rural areas.

The Principal Investigator is Professor Mary R. Kihl, Associate Director of the Design Research Institute. Co-investigators are Professor Willis Goudy of the Department of Sociology and Riad Mahayni of the Department of Community and Regional Planning. They have been assisted by Sarah May, Joyce Clause, Shabana Hameed, and Rajiv Bakshi, graduate research assistants from the Department of Community and Regional Planning.

ACKNOWLEDGEMENTS

A project as comprehensive as this could not be done without the assistance of many people. In particular, we wish to thank staff members at the Iowa Department of Transportation for their advice and for providing us with the extensive data needed to conduct our analysis. Brenda Schumann and J.P. Golinvaux were especially helpful in sharing their knowledge of rural transportation systems and Gus Horn was most helpful in sharing information on elderly driver safety.

We also want to thank the many senior residents of southern Iowa and northern Missouri who so generously contributed their time in offering suggestions regarding responsive transportation systems.

We are especially grateful to our Project Advisory Committee. The six person committee provided counsel throughout the project and carefully reviewed our draft progress report. Members of the committee include Peter Hallock of the Iowa Department of Transportation (Project Monitor), Fred Dean of the Iowa Department of Transportation, Gary Hemphill of Southern Iowa Trolley, Michael Landy of the Older Americans Transportation System, Fred Fravel of Ecosometrics, and Eileen Stommes of the U.S. Department of Agriculture Office of Transportation.

The University Transportation Centers Program of the U.S Department of Transportation deserves our thanks for making it possible for us to carry out this research. A matching contribution by the Iowa Department of Transportation also is gratefully acknowledged.

Virgene Monthei capably typed the progress report and provided good humor and support throughout the project. Gail Stecker and Kathie Cross provided valuable assistance in further typing of the final report. Special thanks is owed to Sarah May for yoeman service in all aspects of competing the final report. Thanks is also owed to John Scouten, Assistant Professor of Marketing for his valuable suggestions on marketing a rural transportation system. Colleagues at the Design Research Institute have continued to be most helpful in seeing this project through to conclusion.

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INTRODUCTION

The fastest growing portion of American society is that including those over age 65, and a disproportionate number of those older Americans live in rural areas. In some southern Iowa counties, for example, over 25% of the total population is now over 65. Most of these people age in place, remaining on family homesteads in part by choice and in part because they are unable to find buyers for their homes in an age with a declining agricultural base. Ironically, while they stay, their small hometowns continue to decline. Many small towns can no longer provide essential goods and services. Grocery stores are generally only found in larger towns with populations over 2,000, and clothing stores are even less readily available. Mobility is clearly a key to quality of life, and most equate the automobile with mobility. Despite concerns about driving, most older residents continue to drive long distances. There is no viable alternative for the majority of the trips which they wish to make.

THE PROBLEM ADDRESSED

The current study is seeking to explore the transportation needs of the current and future elderly in rural areas. The target area for the study includes six counties in southern Iowa and three adjacent counties in northern Missouri. The site was selected in part to take advantage of data gathered in connection with an on-going regional development project in southwest Iowa. Nevertheless, the area selected has several characteristics generally associated with rural transportation needs: a high proportion of elderly, a relatively high proportion of low income residents, and scattered population with no substantial urban areas. In addition, the site permitted an examination of the complexity associated with arranging for publicly funded transit across a state line.

In terms of existing services, the area has two active public transit services and four small taxi companies which serve only the larger towns. Given the large geographic area and the limited number of vehicles and drivers available, the public service in the area is focused primarily on nutrition sites and other human service needs.

The current project sought first to document the transportation patterns of the rural elderly in the target area, second to identify the potential need for alternative transportation services, and third to develop transportation alternatives and consider their viability.

RESULTS ACHIEVED

A telephone screen of a random sample of over 300 residents identified about 148 older residents who were willing to keep trip logs of their travels over a one week period. Ninety-eight logs were returned, divided almost evenly among residents aged 55-64, 65-74, and 75 and over. The logs revealed a generally mobile population making an average of over 8 trips a week. A follow-up set of logs kept by the same individuals during a week in February indicated no significant reduction in their mobility in the winter season, when they traveled on the average of 7.7 trips a week. While, as expected, the younger residents travel slightly more frequently, the travel patterns did not vary significantly with age. Income level was a far better predictor of trip frequency. Those with incomes under $5,000 made an average of five trips a week, while those with incomes over $20,000 made an average of ten trips a week. The length of the trips varied from five to over fifty miles, but the average was thirteen miles. Age had only a small impact on trip distance since goods and services are only available at fixed locations.

All but four of the respondents had a driver's license and most used it despite concerns about driving. Clearly personal auto was the mode used for the overwhelming majority of the trips. In contrast, 7.8% of the trips were in a friend's car. Only 0.6% of the trips used public transit, although the majority of respondents were aware of its availability. A survey accompanying the log asked respondents if they would consider a mode of transportation other than their car. The largest number again underscored a friend's car as a suitable alternative, especially for shopping. The most common trip purposes were visiting (11.6% of the trips) and grocery trips (11.5%). Only 0.7% of the trips were to senior centers. Travel patterns did not vary significantly between the respondents in the two states.

OBSERVATIONS

The logs and surveys do indicate the need for an alternative form of transportation for the elderly. When demand models are applied in the target area, the results identify a relatively small number of potential riders. Nevertheless, some seriously need transportation and others might be encouraged to ride if the system met their needs.

About 10% of the respondents to the survey accompanying the trip logs indicated that they had a driving disability of some sort. The majority of these individuals were females over age 75. The average trip rate of those claiming a driving disability was 5.5, somewhat lower than the overall average of 8.2 trips. Three individuals made only one trip during the week and one did not drive at all.

In addition to those indicating that they had driving disabilities, a much larger number indicated concerns about driving under various conditions. For example, over 50% indicated a concern about driving in crowded areas. Another group of potential transportation dependent individuals were those who rode in the family car but did not drive themselves. Of the log keepers, 13% did not drive by themselves. The majority of these trips (69%) were made by females, generally traveling with husbands. A breakdown by age indicated that 44.7% of these trips were by the youngest cohort, age 55-64, 38.3% by those 65-74, and 8.5% by those 75 and older. This pattern is reflective of the high incidence of elderly widows who are forced to drive themselves because they cannot find another mode of transportation.

The concerns of older drivers with respect to driving situations are frequently well placed. Although the overall proportion of accidents attributable to seniors is far lower than that attributed to other age groups, these figures rise considerably when adjusted for miles driven and the proportion of drivers in the age class. Accident rates per mile driven are higher for those over 75 than those for any other class of drivers. Even more significant is the heavy rate of fatal accidents involving the elderly. In Iowa, where the number of very elderly (over 75) licensed drivers has risen over 7% since 1987, those over 85 experienced 40 fatal accidents per million miles driven, while those aged 35-65 experienced only one fatal accident per million miles driven. Such individuals might well be encouraged to try other modes of transportation. Yet the existing rural transportation systems do not really provide an alternative mode for accomplishing independent or discretionary trips. What seems to be indicated is a flexible system involving automobiles as shared ride taxis and volunteer drivers in addition to the existing van operated rural transit service.

In an effort to determine what the demand for such an alternative demand-responsive mode of transportation might be in a rural area, the macro demand-responsive model developed by Jon Burkhardt at Ecosometrics in 1976 was employed. Other models developed more recently either required a level of sophistication in data beyond that available for such a potential rural system or were related to urban settings. When applied to two counties in the target area, the Burkhardt model indicated a range of potential elderly riders per month from Decatur County, Iowa of between 69 and 215, depending on the number of vehicle miles provided. The parallel range of potential riders per month for Worth County, Missouri was 55 to 172. When the pool of potential riders was increased to include the low income residents as well as the elderly, the figures for Decatur County became 75 to 235 and for Worth County 61 to 193. These figures are low, but consistent with the small population bases in the counties.

In reviewing the potential applicability of a rural jitney service or a volunteer driver system to such a target area, both relative efficiency and effectiveness were assessed. Since the costs of a system would be a major factor in adopting a specific innovation, and drivers' salaries would be the primary cost associated with the rural jitney, an effort was made to examine the potential capacity of a single vehicle and driver. The potential capacity of a single path SMART model, developed by SYSTAN for UMTA in 1983, shows that the service could easily supply the needed capacity given low demand figures. Statistical information relating to costs and operations of volunteer driver systems were derived from a series of interviews with operators of rural volunteer systems and from an extensive report prepared for UMTA on volunteer driver programs in 1986.

Although an increasing number of rural systems are reporting considerable success with newly established volunteer driver programs, the more established systems are noting the strain of maintaining an adequate pool of drivers to provide needed service without over-taxing the fine individuals who volunteer their time. This factor becomes especially important since volunteer drivers are generally over age 65. They are usually carefully screened and trained, but they still are frequently over-taxed seniors transporting other elderly. Concerns may be raised about potential accidents.

Relying on at least one paid driver as the backbone of the system would provide needed stability and help build confidence in the reliability of the system. Volunteers could then augment the system when multiple in-town trips were requested or when individual long trips to medical centers were required. In addition, volunteers could help with escort service as needed. Linkage with the intercity bus' few remaining stops would be accomplished by the shared-ride jitney in counties bordered by the interstate and by volunteers in other counties. The costs for introducing a shared-ride jitney or a volunteer system are not widely different, especially when the time involved in start up and maintaining and scheduling the volunteer pool are factored in. Mileage reimbursement for volunteers is also higher than the costs of maintaining a car as part of the fleet attached to an existing service. With a mixed system, it would be possible to share the duties of the coordinator and the start up costs.

The costs of introducing an automobile-based system would be in part reduced by adding on to an existing system, but costs would still be between $15,000 and $19,000 per county. While social service contracts would cover a large part of the operating costs, additional costs would remain. Among those responding to the surveys, over 50% indicated a willingness to contribute between $2.00 and $4.00 a trip for flexible service. Those able could certainly be encouraged to contribute on a more regular basis through subscriptions, more clearly indicated

contribution levels, or through a type of sliding scale contribution system using coupons or tickets. Ultimately this rural transportation concept will only succeed if it is effectively marketed using the personalized marketing techniques which have proved to be most effective in appealing to the elderly to try an innovation.

THE NEED FOR TRANSPORTATION ALTERNATIVES FOR THE RURAL ELDERLY

INTRODUCTION

The fastest growing portion of American society is that including those over 65 years of age. For the country as a whole census projections estimate that this group will make up 13 percent of the population by the year 2000 and 21 percent by 2030. The number of elderly population living in rural areas has increased disproportionately. While the proportion of the population over age 65 in metropolitan areas was 10.7% in 1980, it was 13% in rural areas, as the chart in Table 1 indicates. In the Midwest the proportion of elderly in rural areas has already surpassed these levels. The 1980 census found that the largest concentrations of the rural elderly were found in Iowa, Kansas, Missouri and Nebraska. In some counties in southern Iowa the population over 65 is already over 25 percent of the total population.

While rural youth have migrated out of rural areas in large numbers the elderly have remained partly by choice and partly because changes in the agricultural economy have made it difficult for them to sell their homes and move (Brown, 1987). The rural life style certainly has appeal to those who have lived there most of their lives. In a recent attitudinal survey of residents of rural southern Iowa, 83% of the respondents of all ages agreed that various home counties were fine places to live (SIDD survey, 1989).

Factors contributing to this opinion were perceived lower living costs, neighborliness and a sense of greater personal safety in addition to traditional loyalties to their communities. Interestingly, only 30% of these respondents believed that their area would attract new residents from other parts of the state or elsewhere. In fact few do move in.

The rural renaissance that was widely discussed a few years ago related to exurbia but was not a major factor in the rural Midwest. With a declining agricultural base and a limited number of nonagricultural jobs available, there has been very little immigration. This has made it very difficult for the elderly to sell farm homesteads or houses in small towns when they feel the need to move closer to services. The decline of small towns reflected in the closing of a number of retail shops, even groceries, in small towns has magnified the problem (Stommes, 1989).

TABLE 1

Total Population and Population Aged 65 and Over for Rural/Urban and Metropolitan/Nonmetropolitan Areas of the United States, 1980

Residence Areas	All Ages	Number 65 & Older	Percentage
TOTAL	226,546[a]	25,549	11.3
URBAN	167,051	19,046	11.4
Inside urbanized areas	139,171	15,158	10.9
Central cities	67,035	8,015	12.0
Urban fringe	72,136	7,182	10.0
OUTSIDE URBANIZED AREAS	27,880	3,848	13.8
10,000 plus	13,482	1,736	12.9
2,500 to 10,000	14,398	2,112	14.7
RURAL	59,495	6,503	10.9
1,000 to 2,500	7,038	1,085	15.4
Other	52,457	5,418	10.3
METROPOLITAN	169,431	18,080	10.7
NONMETROPOLITAN	57,115	7,424	13.0

[a] Numbers in thousands.

Source: 1980 Census of Population, Volume 1, Characteristics of the Population, Chapter B, General Population Characteristics, Part 1, United States Summary, Table 43, Bureau of the Census, May, 1983.

Lack of access to services becomes as important as the poor quality of available services themselves. The single most important and immediate living environment or life space includes, as Cantor points out in his study on the psychology of the elderly: "the self-sustaining facilities", such as the essential medical services, retail shops, and "the life enriching aspects" such as family, neighbors or even cultural activities represented by senior centers (Cantor, 1979). Family members, sometimes friends, provide transportation for visits to the doctor or grocery store. But little is done about transportation to other destinations. Ex-drivers among the elderly are particularly depressed about their immobility, although all elderly persons are aware that their satisfaction and the quality of their lives depend upon their mobility which is in turn contingent upon available transportation facilities. In terms of a rural society, it is apparent that senior citizens need to travel several miles from their homes not only to provide for maintenance but for sociability and personal fulfillment as well. Hence, the quality of life for this aging population depends to a large extent on travel to towns a number of miles away. Transportation in whatever form becomes in itself an aspect of the environment and at the same time a means of access to other personal and environmental goals.

Many rural communities are experiencing great changes in the geminschaft nature of their environments due to the weakening of traditional community and kinship structures. Despite this, visiting and socializing with friends and neighbors still forms an important rural past time. For most elderly residents, contact with friends remains an important source of personal satisfaction. A very large percentage of the rural elderly are widows (Aging America, 1987-1988). For them, the possible combination of isolation, loneliness, and in some cases, poverty can cause mental and even physical damage. Nevertheless, most men and women prefer living alone rather than with relatives. Frequently, the result is isolation (Posers, Keith and Goudy, 1979). These problems will be compounded as the proportion of frail elderly increases. According to census estimates, over 41% of the senior population was over age 75 in 1986, indicating a greatly expanded cohort of "frail elderly". By the year 2000 half of the elderly population are projected to be over age 75.

The majority of the elderly, even the older elderly, have drivers licenses. In fact, the proportion of licensed drivers over the age 70 is increasing rapidly. The number of drivers over age 70 increased 4.8% from 1987-1988 as compared to a 1.6% increase in drivers aged 16-25 for the same years (Iowa DOT, Safety Gram, 1989). Over the years drivers licenses have helped to define a life style built on expectations of continued mobility, where travel distances were less significant than access to desired goods and services (Bell, 1987). Consequently most elderly residents will continue to drive even if their reflexes are no longer sharp enough to respond to critical driving cues (Carp, 1988). Concerns about the capabilities of these older drivers has

prompted the AARP and the AAA among others to focus on the driving patterns of the elderly (Krout, 1986).

Recent literature on the assessment of the relative safety of older drivers focuses on two different but nonetheless related areas: relative accident exposure and the perception of risk. A quick review of accident statistics recording accidents per age group underscores the heavy proportion of accidents attributable to those age 16-24 with a contrastingly few accidents attributable to drivers over age 65. For example, a recent study conducted in New Brunswick, Canada noted an annual accident frequency of 4.5 for those under age 25 and less than 1 for those over 65. Comparable figures for Iowa note that only 3.4% of all accidents in 1988 involved drivers over 75 and 16.3% involved drivers over age 65. In contrast, 36% of the accidents involved drivers under age 25. ("Who Was Involved in 1988", Iowa Dot, 1988). Telephone interviews with agents from four major insurance companies identified only one company which increased its rates for drivers over age 65. That company raised its rates in two increments, 5% at age 70 and an additional 5% at age 75. The rest of the companies cited the relatively low number of accidents attributed to elderly drivers, and, in fact, offered discounts to drivers over 50.

However, when accident figures are adjusted for miles traveled and total numbers of drivers in the age group, the accident rate for those over 65 does rise markedly. Considering that those between ages 66-80 drive only one half as far as those under age 65, the New Brunswick study noted a dramatic increase in accidents per million kilometers driven from less than three for those under age 61 to over five for those over age 75 (Hildebrand, 1990). In Iowa, drivers aged 35 to 65 are involved in about four crashes per one million miles traveled while drivers over 85 are involved in 40 crashes per one million miles driven (Safety Gram, Iowa DOT, 1989).

The level of responsibility for the accidents also rises with age. A study conducted in Michigan in 1982 on major highways demonstrated an overinvolvement of older (over 65) as well as younger drivers (under 25) in accidents. In fact the involvement rate for all crashes of drivers over 75 was about twice that of middle aged drivers, and their fatal crash involvement was about four times as great because of their greater susceptibility to injury. When reviewed in terms of relative responsibility for accidents, drivers over age 65 had an overinvolvement ratio of 1.24 while those drivers under age 24 had an overinvolvement ratio of 1.18, and those between 25 and 54 were responsible for fewer crashes than the total number in which they were involved (McKelvey, 1989). This finding is corroborated by the New Brunswick study which found that drivers over age 75 are charged with responsibility for accidents in which they are involved over 70% of the time. The corresponding figure for the 16-20 year old drivers is about 60%. Again by far the

lowest proportion of accidents are caused by middle aged drivers, 36 to 50 years old (Hildebrand, 1990). In Iowa elderly drivers were responsible for 85% of the 64 fatal crashes involving seniors in 1989. Of these 41% of the drivers involved were over age 80 ("Traffic Fatalities Involving Persons Age 65 and Over", Iowa DOT, 1989).

The rise in proportion of accidents caused by the older drivers is largely linked with the aging process. Among the most wide-spread concerns are those related to vision. Visual acuity declines with age, specifically the ability to distinguish contrasts, to see sharply at night, to use peripheral vision, to read road signs, to judge stopping distance, and to distinguish detail in moving objects. Driving also requires the cognitive performance skills reflected in attentiveness and rapid information processing, factors which also begin to decline with age. These aspects contribute to a decline in the speed of motor response of older drivers (TRB Report, Vol 1, 1988, pp. 53-67 and "The Aging Process and Driving", newssheet, General Motors and the American Medical Association, June, 1988).

Some older drivers perceive the risks involved and respond to these physical changes by voluntarily limiting their driving during peak hours, at night, on major highways, or in other particularly challenging situations. Some even drive around several blocks to avoid making a left turn in an intersection (Winter, 1988). These drivers, fearing that an accident or a violation would result in loss of a driver's license and the independence it affords, sometimes exaggerate the perception of risk. They then overcompensate by driving very slowly or by driving infrequently, thereby getting out of practice. Ironically the result frequently is greater involvement in accidents.

Other older drivers underestimate the relationship of their own actions to problems leading to accidents. Malfetti, in his 1986 study conducted for the AAA, found that over 80 percent of the older drivers he surveyed felt that they had total control over accidents and 90% felt that the cause for any accident in which their vehicle was involved had nothing to do with their driving behavior (Malfetti, survey, 1986). When questioned about their most obvious errors such as failure to yield, failure to observe signs, careless crossing of intersections, improper changing of lanes, etc., most claimed to be unaware of these problems. In fact some older drivers practice driving procedures which they regard as deferential and courteous such as slowing to allow another driver into a traffic lane or out of a parking place, giving pedestrians extra time to cross the street, or motioning others ahead at an intersection. Ironically, others who are not expecting these behaviors become confused and accidents sometimes ensue (Winter, 1988).

The response in various states to the growing phenomenon of older drivers has included annual

relicensing exams and or counseling (Waller, 1988). Fifty Plus driving programs have been instituted in some locations while others have moved to enlarge road signs so as to improve the environment for senior drivers. Rarely are licenses revoked unless there has been an accident (Winter, 1988). Despite what has been described as "agism", a bias against the older drivers, few inspectors wish to revoke a driver's license from an elderly driver for whom this would mean revoking his or her independence. In rural areas with limited alternative means of transportation available these concerns are frequently well placed.

In some rural areas the only alternative form of transportation available is rural transit which is primarily dedicated to medical or nutritional trips. As successful as this type of transit has been in serving the basic needs of a particular segment of the rural elderly population, it has not necessarily met the needs of all, especially not the needs for discretionary trips to visit friends in nursing homes or for specialized shopping.

The current paper helps to document the variation in travel patterns and needs represented by the elderly in one target area of the Midwest. While recognizing the significant differences in travel needs represented by variations in the rural context in different parts of the country, the focus here is upon the variations in travel patterns among the elderly even in one fairly homogeneous rural setting.

A number of studies have identified transportation needs through analyses of ridership surveys of rural transit riders or through surveys of clients of social service agencies. In contrast, the current paper considers the elderly at the household level. The expectation was that this approach would identify a wider range of transportation patterns and a broader understanding of the transportation needs of the elderly public than a study based upon the experiences of a preselected or self-selected group of elderly. Since any planning for the transportation of the rural elderly requires a look at the future elderly as well as the current elderly, the study also considers the travel patterns of those individuals 55 to 65 as well as those over 65 and then moves on to suggest a set of criteria for assessing the appropriateness and viability of transportation alternatives for the rural elderly.

THE TARGET AREA

The target area for the study, a nine county area on the Iowa-Missouri border, was selected largely because of the heavy proportion of senior residents (19-27 percent) and its essentially rural character. Previous studies conducted in the region also had documented a relatively high proportion of low income residents and communities facing economic challenges. The area is served by two active rural transit systems but has in recent years had limited access to other types of passenger service. The bi-state region not only reflected documented rural travel problems, but also provided the opportunity to explore alternative approaches to rural interstate travel.

Specifically the target area for the study contained six counties in southern Iowa: Adams, Clarke, Decatur, Ringgold, Taylor, and Union and three in northern Missouri: Harrison, Nodaway, and Worth. The map in Figure 1 points out the target area which encompassed 4755 square miles and included 86 towns ranging from a population of less than 100 to 9500. However, only three towns had population levels of over 5000: Osceola, Iowa, with a population of about 8300; Creston, Iowa, with a population of about 8400; and Maryville, Missouri, with a population of about 9500. The next tier of towns include Bethany, Missouri, with a population of 3300 and Lamoni and Leon, Iowa, both with populations somewhat over 2000.

Table 2 indicates the distribution of the elderly across the counties. The number of elderly was expected to increase in all counties, although the proportion of elderly was expected to stabilize in several. All counties would continue to rely heavily on transfer payments (largely from social security) as a major factor in supporting the local economy. For example, the percentage for Worth County, Missouri, is 24%. The proportion of the population below the poverty level ranged from 15 to 25% in 1980 as Table 3 indicates. These proportions increased considerably in 1985, so that, for example, the majority of the Iowa counties had more than 20% of their populations below the poverty level. In terms of highway access, most areas are fairly remote. Interstate Highway 35 touches the edge of the region and affects positively Osceola and Bethany, but most towns within the region are reachable only by state highway.

The area is replete with the problems of declining service centers indicated above. For example, there are only seven hospitals in the nine county area. The applicable telephone books' yellow pages list doctor's offices only in 13 towns. Although there certainly are doctors who do not list in the yellow pages, this limited list gives some reason for concern. Only 15% of the towns have medical clinics. More than 68% of the towns have no banking services and 84% have no drug stores. Grocery stores are not available in 48% of the towns, although somewhat

FIGURE 1

TARGET AREA

Map by Joyce Clause

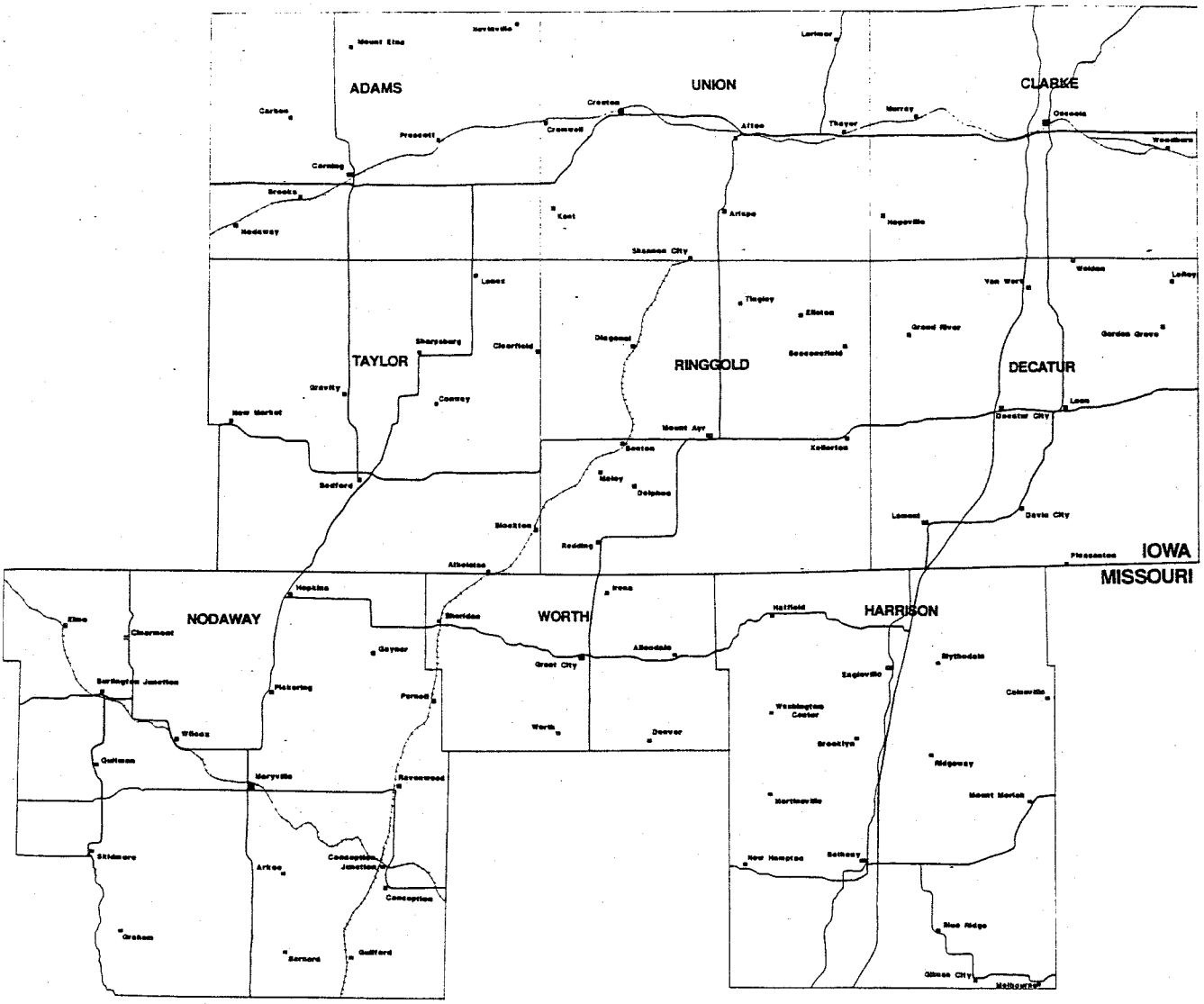


TABLE 2

PERCENT ELDERLY (65 AND OLDER) BY COUNTY (1980)

IOWA	
Adams	29.8%
Clarke	17.1%
Decatur	18.3%
Taylor	22.2%
Union	17.8%
Ringgold	21.3%
MISSOURI	
Harrison	22.6%
Nodaway	15.4%
Worth	25.4%

COUNTIES ACCORDING TO PERCENT OF POPULATION BELOW POVERTY LEVEL (1980)

11.5% TO 15.0%	15.1% TO 20.0%	20.1% TO 24.7%
ADAMS-IA	CLARKE-IA	RINGGOLD-IA
UNION-IA	DECATUR-IA	
	TAYLOR-IA	
	HARRISON-MO	
	NODAWAY-MO	
	WORTH-MO	

surprisingly 33% of the towns with populations under 500 still have groceries. Several groceries have, however, closed recently. Only 10% of the largest towns have more than one grocery store. Eating establishments seem to be more widely distributed permitting the social interaction that is enjoyed with eating out. Almost half of the towns under 500 population (48%) have at least one eating establishment.

Given these characteristics, the target area seems to be illustrative of the settlement pattern of the Midwest farm belt, an area developed in response to agricultural expansion and now reflective of a declining agricultural base. The percent of change in agricultural earnings declined 50-80% in two of the Iowa counties, Taylor and Ringgold, and only sightly less in the other counties. Such an area characterized by small towns, limited services, a declining tax base and an aging population seemed an appropriate target for a study of transportation for the rural elderly.

STUDY ORIENTATION AND METHODOLOGY

A study focused on transportation needs for the future elderly by definition must deal not so much with existing transportation systems as with the interests and travel patterns of the rural residents themselves. Few such studies currently exist. The national travel surveys for 1977 and 1982 provided an aggregate assessment of travel patterns on the national level, but under represented the travel patterns of rural residents with limited transportation options. Similarly state intercity bus studies focused on bus system users rather than on those without access to bus transportation. Recent studies of changing elderly travel patterns conducted by Rosenbloom (Aging and America, 1987-88) and others concentrate primarily upon the urban and suburban elderly while referencing the point that rural travel patterns might be under represented. The need for a household-based study focused specifically on rural elderly residents and their travel patterns seems to be clearly indicated. The current study seeks to meet that need.

A study of this type involves several key data collection phases:

1) Telephone screens to identify elderly residents willing to participate in the study.

2) Attitudinal surveys and travel logs.

3) Assessment of communities' potential trip attractors.

4) Interviews with existing rural service providers, intercity bus stop operators, and taxi operators.

5) Interviews with current rural transportation users.

A study focused on transportation patterns at the household level invites a survey of residents, requesting information on their trip making patterns. The traditional approach would, therefore, involve household interviews with a random sample of residents. However, to conduct a household survey over a nine county area by using personal interviews of residents proved to be impractical for this study. Logistical considerations would have placed considerable strain on a small project staff and costs would have exceeded the limited budget. Nevertheless, it was important to gain as much information as possible from a random sample which included residents of the two states in the target area as well as from a variety of different towns and rural areas.

TELEPHONE SCREEN

A combination of attitude surveys and trip logs seemed to be a most appropriate means of generating not only information on perceived preferences but also on actual trip making. A first step, however, was to identify a sample of elderly residents who would be willing to participate in the study. The only available lists of elderly residents in the area were those associated with the Area Agency on Aging and other social service agencies. Use of such a list, however, would have severely biased the study toward current users of rural transit systems and not represented the broad range of travel patterns of other more independently mobile elderly residents in the area. Hence it was necessary to devise a screen which would help to identify potential participants (those aged 55 and older) from among the general population of the area.

The approach selected was a telephone screen followed by mail surveys and trip logs. A similar approach had been used by the Denver Regional Council of Governments in a travel update study conducted in May 1985 (Kurth, TRR, #1097) and by a study of travel patterns of retirement city residents in Arizona (Comsis Corp, 1986). Names were selected for the telephone screens from the most recent telephone books for towns in the target area. This type of random selection of names from the directories seemed to be far more appropriate than random digit dialing for this purpose because the broad-based nine county target area includes a considerable number of telephone exchanges and even telephone companies. Even in using the existing telephone books considerable care was required to avoid duplication in the resident pool since the territory covered by the regional telephone books frequently overlapped and included towns outside the target area. All listings were reviewed for eligibility prior to including them in the pool for possible random selection. Commercial numbers were also left out of the pool. This type of pre-screening would never have been possible with random digit dialing. Since research has shown that the Midwest is the area of the country with the smallest number of unlisted telephone numbers (Anderson et al, p. 5), it was assumed that this factor would not make a significant difference in this study. The very small proportion of households in Iowa without telephones was also reassuring.

In order to assure proportional presentation of both Iowa and Missouri households in this cross state study, samples were drawn in two clusters--two-thirds from among the six counties in Iowa in the target area and one-third from the residents of the three Missouri counties. Prior to conducting the telephone screen, announcements were included in the local newspapers and aired on local radio stations in order to minimize concern and hopefully increase response rates.

A total of 600 telephone numbers were selected for the screen with the hope that they would yield about 100 residents who would be eligible and would in turn agree to participate in the

household study. Each selected number was called at least three times on different days, but if there still was no answer the numbers were replaced with other names chosen at random from the same telephone exchange. The primary objective through this process was to be sure to include representation from as many communities as possible.

Calls were completed during the first two weeks of June, 1989 by a team of trained assistants associated with the project. Of the initial 600 calls attempted, 300 respondents actually completed the brief telephone screen included as Appendix II. These respondents were asked basic questions about travel patterns as well as the age of household members. Those over 55 were asked whether they would participate in Phase II of the study which was to include keeping a trip log. Answers to the travel questions were later compared with the responses of those agreeing to keep trip logs as a means of corroborating the trip log information with information taken from a broader segment of the population. The 300 screens netted 148 respondents who indicated an initial willingness to participate in Phase II of the study. These individuals were then sent travel surveys as well as trip logs to keep track of their trips for a period of one week. (A sample survey and log are included as Appendix IV.) The one week period was selected as more relevant for rural residents than a shorter period because previous studies had indicated that older rural residents might not make trips more than a few times a week. A longer time period would have been harder to monitor. Respondents were asked to indicate additional trips that occurred regularly, but less than once a week.

All those agreeing to participate were then telephoned during the week in which they were keeping the logs. They were asked whether they had any difficulty in filling in the logs and were encouraged to return the logs on schedule by using the prepaid self-addressed mailer. Those who did not respond within a few days were called again as a reminder. In an effort to reassure the respondents, the same person who had identified them during the telephone screen conducted the follow-ups. As a result, 98 (66.2%) of the surveys and logs were returned. Although some who initially agreed to participate later declined, the most common reason for non-response (24% of the non-responders) was that initially both husbands and wives had agreed to participate but then they reported during the telephone follow-up that they had taken all their trips together and they would therefore be only returning one form. In itself this was a useful commentary on the travel patterns of the rural elderly. The returned logs and associated travel surveys provided a primary source of data for the study.

In February, 1990 a follow-up study was conducted to determine whether there were differences between summer and winter driving patterns among the senior residents in Iowa. Logs

accompanied by a brief questionnaire were sent to all those who had kept logs in June. The approach was to use the summer log keepers as a type of panel, thereby allowing a direct comparison between summer and winter travel patterns. This procedure also permitted using a follow up questionnaire to request further information on two issues which had proven to be particularly interesting in the summer survey--concerns about driving and willingness to pay for alternative forms of transportation. Of the 98 logs distributed in the winter, 66 were returned for a 67 percent return rate. Two respondents, however, completed only the questionnaire portion of the survey and refused to fill out the trip log portion. As the graph in Figure 2 point out, however, there was a difference in the proportion of log keepers in the different age ranges in the follow-up survey. Only 28% of the winter log keepers were in the youngest group age 55-64 as compared to 36% of the summer log keepers; 36% of the winter log keepers were over age 75, while only 27% of the summer log keepers were over 75.

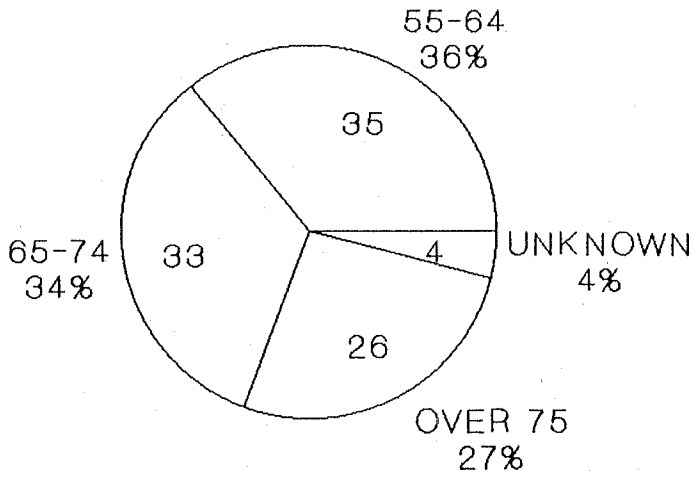
COMMUNITIES AS VIABLE TRAVEL DESTINATIONS

A parallel effort identified existing retail and service centers within each community in the target area. All services and retail establishments were noted in association with appropriate SIC codes. The effort was to identify communities which had the potential for attracting retail and service trade and then to relate this information to the actual travel patterns identified in the travel logs. The Iowa Business Directory and the parallel Missouri Business Directory, which are both based on yellow page listings, served as sources for this information. The yellow pages do underreport the number of small establishments since they do not always pay to advertise. This is of special concern in small communities which tend to have smaller firms, but there was no other common source of this type of data for the two states. Nevertheless since the purpose of the effort was not to develop a definitive list of firms but rather to identify trip generators and towns which could potentially satisfy the needs for multipurpose trips, the yellow pages were able to provide most of the requisite information.

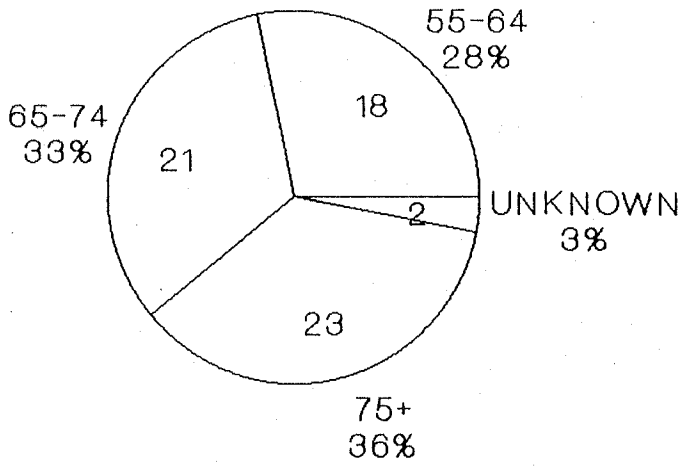
Information generated from another study which included a mail survey with about 600 respondents from the same Iowa counties helped to partially validate the data on availability of goods and services. Respondents were asked how close to their homes it was possible for them to acquire a particular type of product or service and then asked where they actually bought the items or engaged the service.

One additional source of information was a series of interviews conducted with rural elderly residents who are current users of the rural transit systems. Interviews were conducted at four congregate meal sites, three served by the Southern Iowa Trolley and one served by Older

AGE DISTRIBUTION COMPARISON OF LOG KEEPERS



Summer Logs



Winter Logs

Summer - 98 Respondents
Winter - 64 Respondents

FIGURE 2

Americans Transportation Service (OATS). The structured interviews following the form included in Appendix III were intended to gain input from residents who are not as independently mobile as the group identified through the telephone screen and to gain their perspectives on transportation needs in their area. The interrelated information gained from these various sources provided the basis for the following analysis of rural travel patterns and perceived needs of the elderly in rural areas.

SURVEY FINDINGS

Before proceeding to an analysis of the current state of transportation of the rural elderly in the target area it is necessary to describe more fully the data generated.

TELEPHONE SCREENS

The age distribution for those answering the telephone screen is indicated in the chart in Figure 3. What is surprising is that 73% of the respondents indicated that they were over 55 years of age. Fortunately the senior respondents to the screens were rather evenly distributed among the three cohorts included in the study: 22% of the respondents were in the 55-64 bracket, 26% in the 65-74 age group, and 22% aged 75 and older. Two-thirds of all the screen respondents indicated that they lived in a town while one-third indicated that they lived in rural areas. Ninety-two percent of those living in rural areas lived on farms, typically not more than five miles from town. As might be expected more of the younger elderly lived on farms. Among the telephone screen respondents 40% of those between ages 55 and 65 lived on farms. This was also true of 37% of those between the ages of 65 and 75. The percentage dropped dramatically to only 15% of those over age 75, however, and only four percent of those over age 75 lived over ten miles from a town. These responses are indicative of the Midwest farm belt which is dotted with small towns. As indicated above, whenever possible older residents cluster in towns largely to have better access to goods and services.

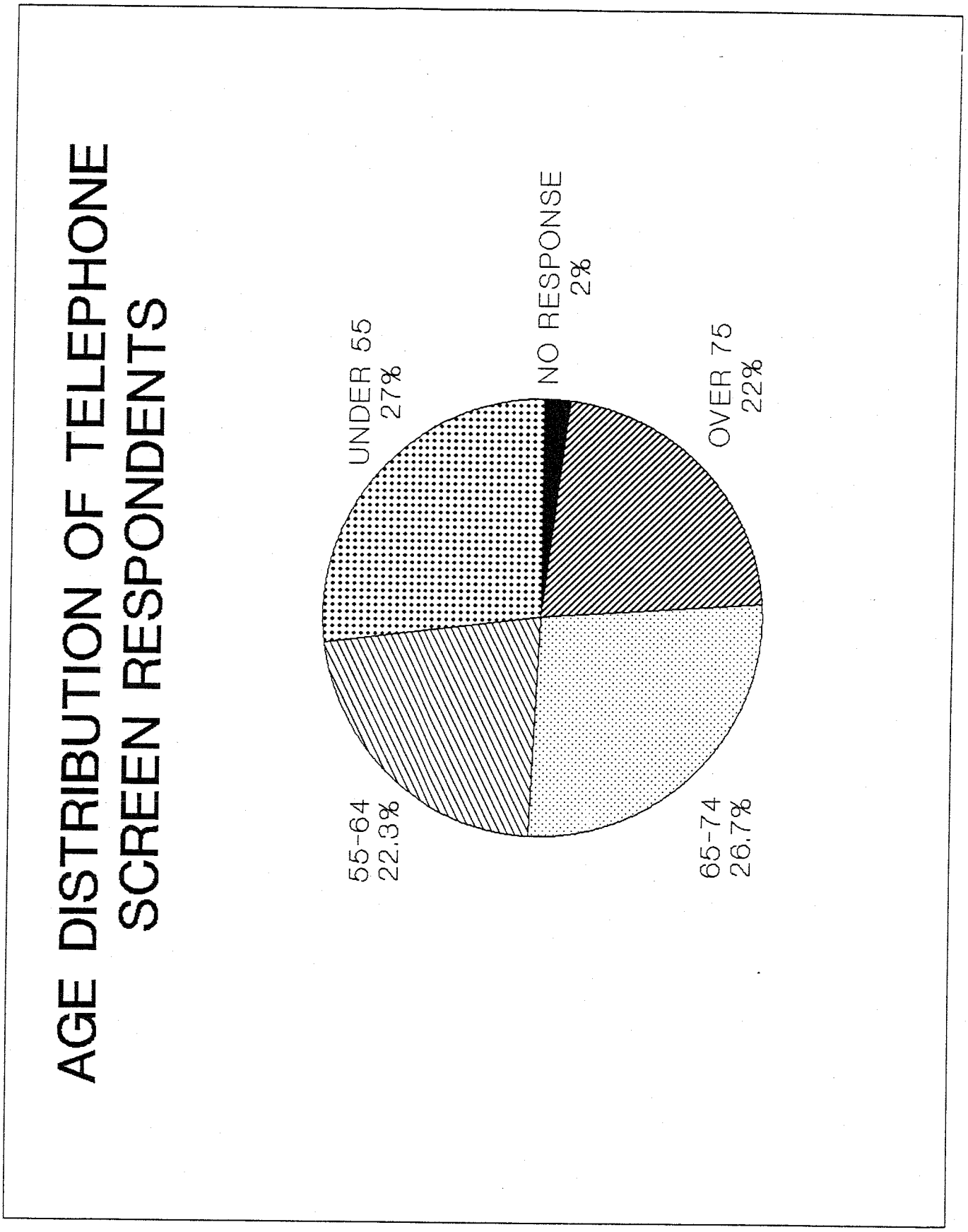
The respondents were well distributed across the target region, coming from 48 different towns and the surrounding rural areas. The largest towns, Creston and Maryville contributed 12% and 5% of the respondents respectively, while percentages from the smaller communities were proportional to their total populations. With 83% of the respondents coming from smaller towns and rural areas, the sample did reflect the type of residents which were to be the focus of the study.

TRIP LOGS

RESPONDENT CHARACTERISTICS

Sixty-three percent of those participating in the telephone screen who were over age 55 agreed to take part in Phase II, the trip log phase. They were asked to record all trips taken during a one week period and also to respond to a short survey questionnaire. For purposes of this study trips were defined as one way going toward the destination. Return trips were not considered. Of the 148 logs initially distributed, 98 were returned. These 98 respondents reported a total of 812 trips, an average trip rate of 8.3 with a mode of 7 trips per respondent. The gender mix included 47 (48%) female and 39 (39.8%) male. The age distribution of the respondents was as follows: 35

FIGURE 3


AGE DISTRIBUTION OF TELEPHONE SCREEN RESPONDENTS
UNDER 55 27%
NO RESPONSE 2%
OVER 75 22%
55-64 22.3%
65-74 26.7%

(37.2%) in the 55-64 age group, 33 (33.7%) in the 65-75 age group and 26 (26.5%) over age 75. Four respondents declined to indicate their age. Approximately two-thirds (65.3%) of those returning summer logs lived in towns while the rest (34.75%) lived in rural areas.

When the 98 individuals who had kept trip logs in the summer were sent a follow-up log and survey questionnaire, 64 responded (a 65% response rate). Winter respondents included 33 females (52%) and 25 males (39%). (The chart in Figure 4 shows the gender distribution for both surveys.) Their responses indicated that their trip pattern changed very little from summer to winter. Together the 64 winter log keepers reported a total of 495 trips with an average trip rate of 7.7 and a mode of 7 trips per respondent. The age distribution among winter log keepers included 28% in the age group 55-64 , 33% in the 65-74 age group and 36% over age 75.

As expected, a substantial number of respondents, 22 (23%) in the summer and 12 (19%) in the winter, declined to indicate their income. Those who did answer that question reported incomes ranging from under $5,000 to over $40,000. For both the summer and winter logs, the largest percentage or respondents reported incomes in the range of $10,000 to $20,000, 32% and 30% respectively. The chart in Figure 5 shows the percentage of respondents in each income bracket for both the summer and winter logs. This chart indicates that the income distribution was similar in both the summer and winter. Over 27% of those answering the question in the summer reported annual incomes of over $20,000; all those with incomes over $30,000 were in the youngest age group, reflecting the fact that most of these respondents were still working. This information, however, indicates a responding group with incomes far more varied than the group typically served by social service agencies.

Since the variation between trips reported was so minimal, from summer to winter, most of the referencing in the remainder of this paper will refer only to the summer figures, for purposed of simplicity. Table 4 provides comparative data on trip rates between the two surveys.

Much as reported in the national literature (Rosenbloom, 1988) the overwhelming majority of the respondents had drivers licenses. All but four respondents to the summer logs answered the question regarding availability of a drivers licenses, and 89 (94.7%) of them did have licenses. Of the five who reported not having a license, three did have licenses at one time and only two (2%) of them said that they never had a license. Among those keeping logs, 9.2% reported that they had a disability which made it difficult to drive. In general, however, this group of senior respondents was accustomed to the independence that came from being able to drive wherever they wanted to go.

FIGURE 4

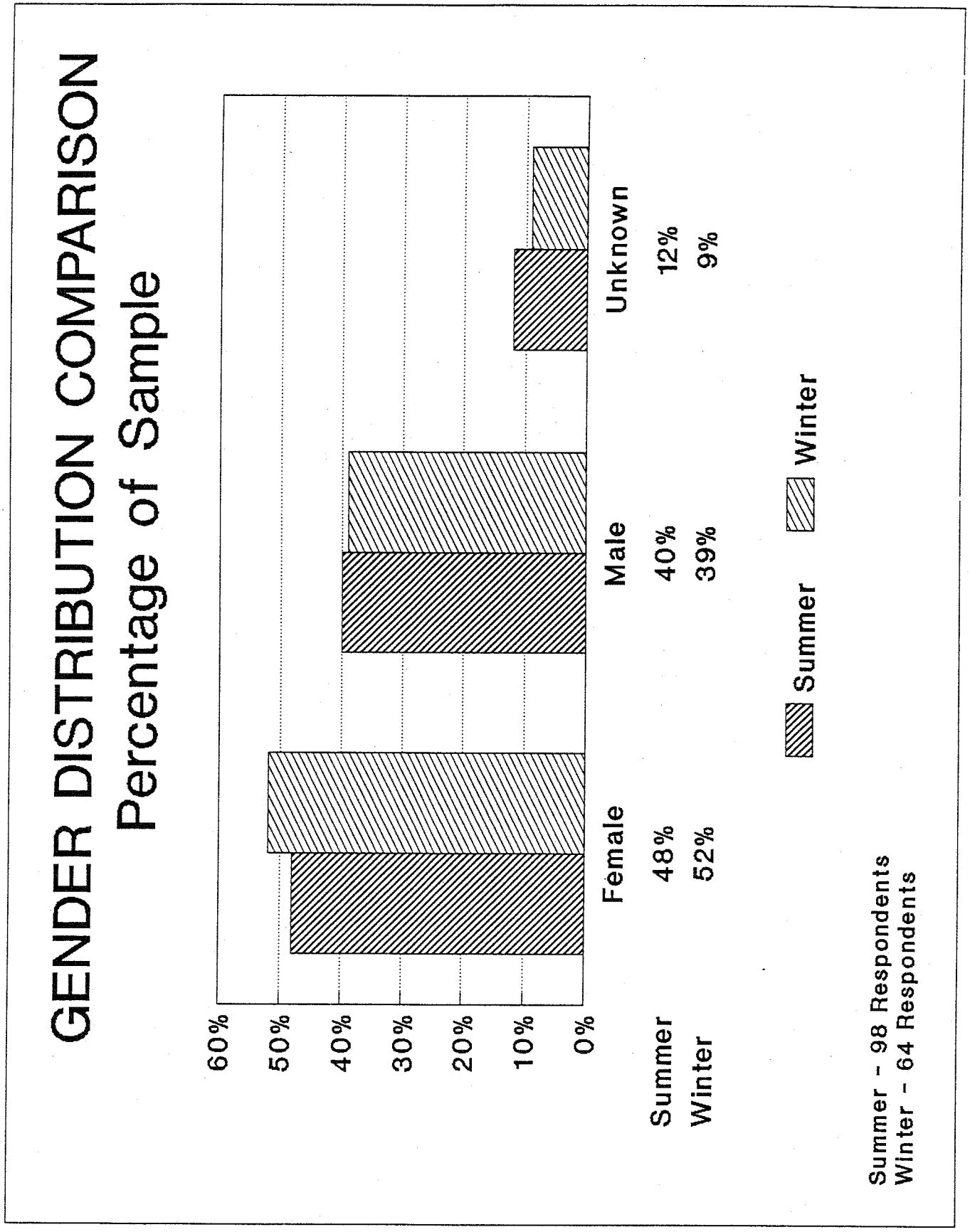
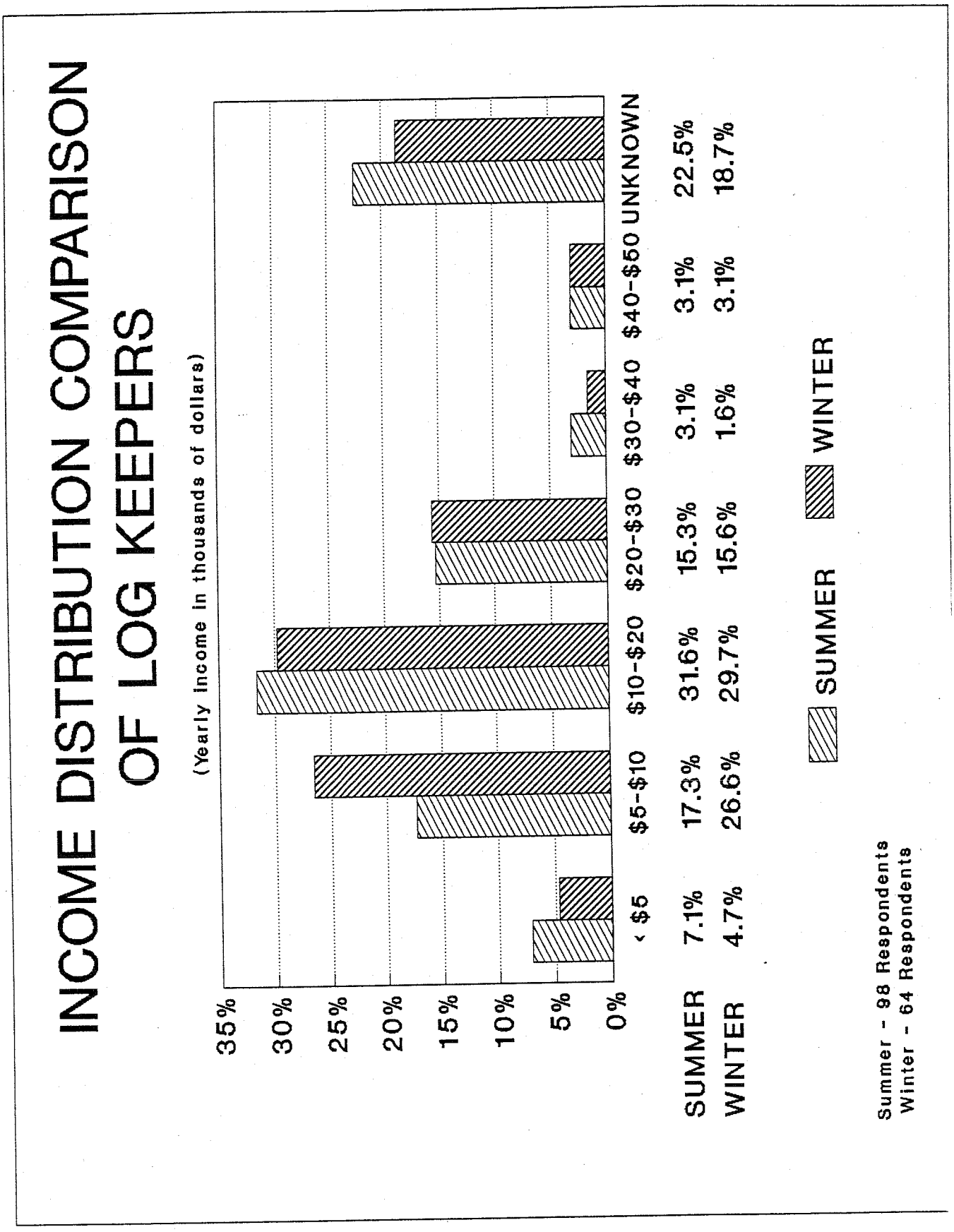

GENDER DISTRIBUTION COMPARISON
Percentage of Sample
60%
50%
40%
30%
20%
10%
0%
Female
Male
Unknown
Summer 48% 40% 12%
Winter 52% 39% 9%
Summer
Winter
Summer - 98 Respondents
Winter - 64 Respondents

FIGURE 5


INCOME DISTRIBUTION COMPARISON
OF LOG KEEPERS
(Yearly income in thousands of dollars)
35%
30%
25%
20%
15%
10%
5%
0%
< $5
$5-$10
$10-$20
$20-$30
$30-$40
$40-$50
UNKNOWN
SUMMER 7.1% 17.3% 31.6% 15.3% 3.1% 3.1% 22.5%
WINTER 4.7% 26.6% 29.7% 15.6% 1.6% 3.1% 18.7%
SUMMER
WINTER
Summer - 98 Respondents
Winter - 64 Respondents

WINTER & SUMMER LOG COMPARISONS

	SUMMER	WINTER
Number of Respondents	98	64
Total Number of Trips	812	495
Overall Average Trip Rate	8.3	7.7
Overall Trip Rate Mode	7.0	7.0
AVERAGES FOR:		
Females	7.0	6.4
Males	10.1	9.4
Age 55-64	8.5	6.9
Age 65-74	8.8	9.0
Age 75 +	6.6	7.3

TABLE 4

TRAVEL PATTERNS

TRIP FREQUENCIES. As indicated above those returning trip logs made a total of 812 trips in the summer. The 64 respondents keeping logs in the winter made 495 trips. Those in the 55-64 age group made an average of 8.5 trips a week in the summer and 6.9 trips in the winter, while those 65 to 74 made an average of 8.8 trips per week in the summer and 9 in the winter. The number did decline somewhat for those over 75. They made an average of 6.6 trips a week in the summer, but they actually increased their trip rate in the winter to 7.3 trips. These minor variations in trip numbers among the age groups in the winter survey may be a factor of the small sample, but there is a clear indication that the log keepers did not change their trip patterning significantly in the winter months.

The mean trip distance for all those keeping logs was 13.3 miles in the summer with very little variation among age groups. The gender difference in trip making noted in other studies (Rosenbloom, 1988 p. 31-32) was somewhat supported by those keeping logs: females made an average of 7.0 trips a week while males made an average of 10.1 trips a week, in the summer. In the winter, however, the trips numbers were almost identical with 10 trips on the average for males and 11 trips on the average for females. This difference can in part be explained by the fact that in the summer the largest proportion of the males (46%) were in the youngest age groups. Income level was somewhat associated with trip making as Table 5 indicates. Those with incomes of under $5,000 made an average of five trips a week while those with incomes in the $20,000 to $30,000 range made an average of ten trips a week. For the younger groups with incomes over $30,000 the number of trips is apparently no longer a factor of income.

TRIP DISTANCE. The mean trip distance for all those keeping logs was 13.3 miles with very little variation among age groups. The mean trip distance for the 55-64 age group was 15.5 miles, while that for the 65-74 age group was 12.8 miles. For the oldest group the mean trip distance was still 11.06 miles. However, the overwhelming majority of trips for the two upper age groups were less than five miles each, indicating a number of short trips with a limited number of long trips each week. For the youngest group (55-64) the majority of the trips were between five and seven miles long. Again this variation was very slight. Overall 57% of all trips reported were less than five miles in length indicating that it is usually possible to meet trip purposes within that radius of home even in this rural area.

TRIP DIRECTION. In considering the trip direction the trip logs, as expected, indicated that most of the trips were to and within towns. In fact 93.9% of the trips originating in a town also ended in a town, while 87.7% of the trips originating in rural areas also ended in towns. The map

TRIP RATE BY INCOME FOR TRIP LOG RESPONDENTS

INCOME	TRIPS TAKEN	AVERAGE TRIPS/WEEK
Under $5,000	35	5.0
$5,001-$10,000	118	6.9
$10,001-20,000	247	8.0
$20,001-$30,000	150	10.0
$30,001-$40,000	45	15.0
$40,001-$50,000	33	11.0
Income Unknown	184	
TOTAL	812	

Summer Logs (98 Respondents)

in Figure 6 shows this trip distribution. Only a little over 12 percent of the trips begun in a rural area also ended in a rural area. The majority of all of these rural based trips were to the nearest town. However, there were some notable exceptions which indicated towns with unexpected attractions. For example, 13 trips were made from the rural area around Mt. Ayr to the smaller town of Tingley. Conversely some towns did not have the expected level of attraction to nearby rural residents. For example only 20% of the trips originating in rural Grant City, Missouri were attracted to that city. Overall, however, 62.2% of the trips reported were intercity trips and the major attractors of outside trips were the larger communities such as Maryville which attracted trips from seven other towns. Although there was no consistent pattern linking trip distance and place of origin, trips from smaller communities such as Diagonal and Beaconsfield tended to be longer than those originating in more self-contained cities like Bethany and Creston.

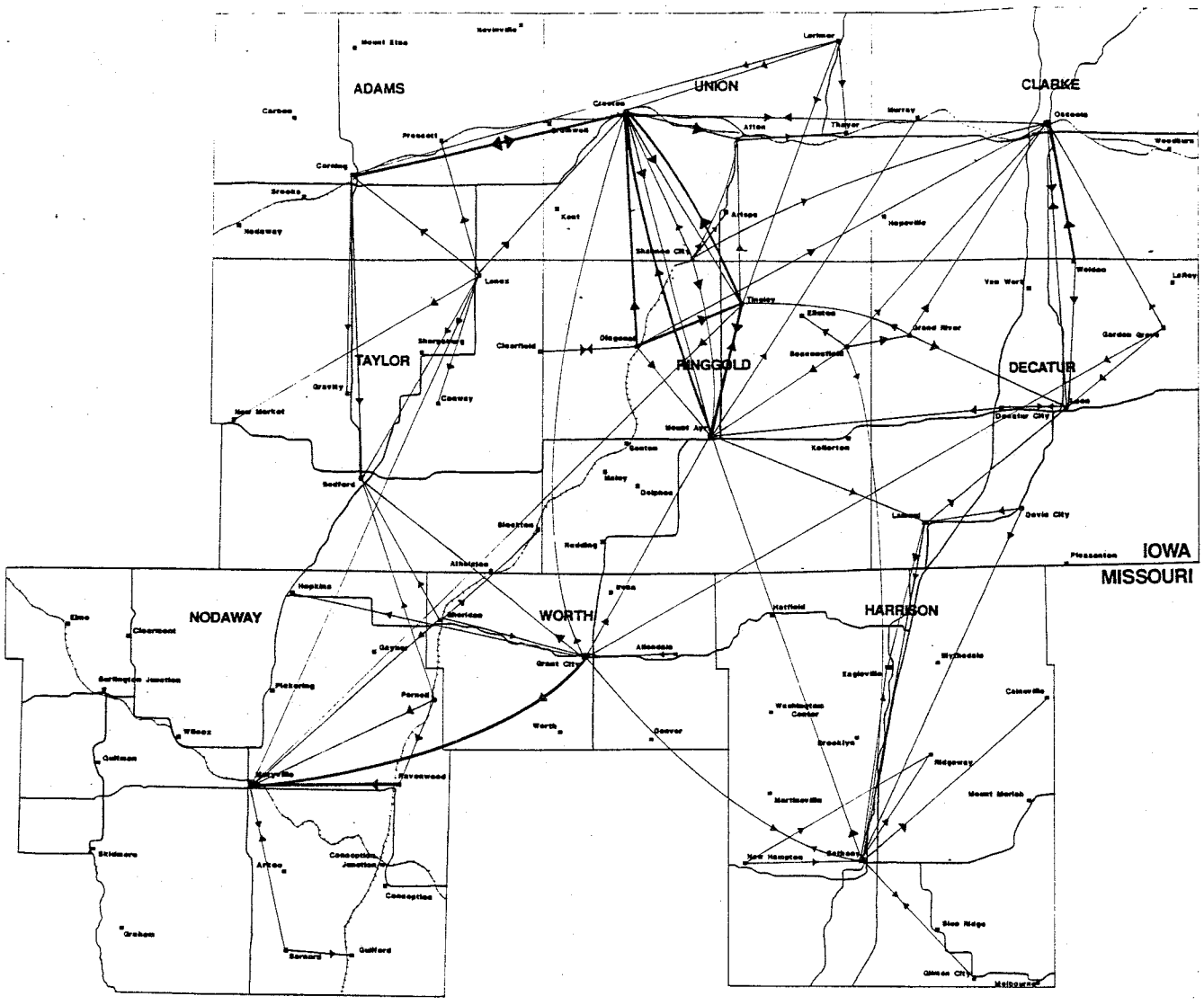
TRIP PURPOSE. When considering the purpose for the trips the prominence of a few of the major towns becomes more apparent. Table 6 indicates the wide variety of trip purposes described in the trip logs. Each respondent was asked to indicate up to three purposes for each trip so as to identify multipurpose trips.

Approximately 20% of the trips reported proved to be multipurpose. Overall the trip purpose mentioned most frequently was visiting (11.6% of the trips reported). Grocery shopping was listed next most frequently (11.5%). Those who worked or carried out voluntary service did so daily, making the proportion for work trips high (11.2% of all reported trips). Recreational trips were the next most common (10.5%). Following these were other shopping trips and trips to church or other organizations (8.9% and 8.7% respectively). Eating out, another voluntary social activity, was a reported purpose of 8.4% of the trips. Other purposes such as personal business, banking, drug store, beauty shop were even less frequently reported. Trips to the doctor were far less frequently reported (5.9%). Only 0.6% of the trips were to the senior citizen center. This independent group of respondents obviously preferred their own form of leisure activities.

In terms of direction for these trips seven of the towns served as full service communities with such essential services as a doctor, banking facilities as well as a grocery store and other shopping opportunities. Three additional towns attracted trips for most essential services but not for trips to the doctor. Some towns like Sheridan, Missouri, appear to have a specialized appeal for one purpose such as eating out. As might be expected the largest number of towns and rural areas (29) attracted trips for social visits. What also is interesting in terms of trip generation is the limited number of towns that attract trips for such essential purposes as grocery shopping. Only 19 (41%) of the 46 towns represented by the log keepers attracted grocery trips, 14 (30%) attracted trips for

FIGURE 6

TRIP PATTERNS SHOWN ON TRAVEL LOGS
Map by Joyce Clause



TRIP PURPOSES

PURPOSE	FREQUENCY	PERCENT
VISITING	118	11.6
GROCERIES	116	11.5
WORK/VOLUNTEER	114	11.2
AMUSEMENT/RECREATION	103	10.2
SHOPPING	90	8.9
CHURCH/ORGANIZATION	89	8.8
EATING OUT	86	8.4
DOCTOR	60	5.9
PERSONAL BUSINESS	24	2.4
PERSONAL SERVICES	24	2.4
BANKING	21	2.1
BEAUTY/BARBER SHOP	20	2.0
AUTO REPAIR	15	1.5
DRUGSTORE	9	.9
GASOLINE	9	.8
AUTO PARTS	8	.8
SENIOR CENTER	7	.7
OTHER	100	9.9
TOTAL	1013	100.0

Summer Logs (98 Respondents)

TABLE 6

other types of shopping and only 10 towns (21.7%) attracted banking trips, and seven towns (15%) attracted trips for personal business. Most trips to the doctor apparently required going outside of the nine county target region since only nine towns (19.5%) of those within the region attracted medical-related trips. In fact, the average trip to the doctor was more than nineteen miles long. A considerable proportion of shopping trips (18%) were also to points outside the target area. Given the limited number of towns which can attract multiple purpose trips it is interesting to note that 24% of the trips taken by those keeping logs were nonetheless multipurpose trips.

TRAVEL PATTERN VALIDATION

With a sample as small as 98, questions naturally arise as to how well they represent the travel patterns of residents in the area. Hence an effort was made to validate these findings by comparing them with the findings of a mail survey administered to a random sample of 1600 residents of southwest Iowa during June and July, 1989. Of the nine counties included in that mail survey six overlapped with those in the target region. The larger number of respondents to that survey (622) included residents ranging in age from 20 to over 80. They answered questions regarding how far from their homes they would have to travel to reach specific goods and services and then how far they usually traveled to reach those same goods and services. Of this larger sample, 73% indicated that groceries were available within five miles of their homes, but 51% of them traveled much further to buy groceries. In fact 21% traveled over 15 miles to buy groceries. Among those in the larger sample who were over 65, 17% traveled over 15 miles to get groceries even though some groceries were available within five miles of their homes. Reasons given for the longer trip were selection and price. The type of grocery within five miles of a rural residence is very often a convenience store where it is not possible to buy a full grocery order.

Selection became even more important when considering women's clothing purchases. Of the full larger sample 52% indicated that they could buy women's clothes within five miles of their home, but 40% of these people traveled over thirty miles to the location where they usually bought women's clothing. Although the tendency to travel this far for women's clothes was greater among the younger respondents, 23% of those over 65 years of age reported that they usually travel over 30 miles to buy these clothes. The same pattern held among those seniors shopping for men's clothing and shoes.

Fortunately medicine and drugs were available to 65% of the large sample within five miles of their homes and a much smaller percentage (14%) traveled a distance of over 15 miles for these. The proportion of seniors making lengthy trips for this purpose was similarly lower. When

needing banking services, 94% of the respondents found them within 15 miles of home and of these 73% found them with 5 miles of home. The difference is that in the case of banking most respondents, younger and older, used the services available close to home. Only 7% of the seniors and 11% of the youngest group used other than the closest bank. In terms of legal services the younger group seems to be willing to travel further. Of the seniors only 11% went beyond the closest lawyer, whereas this was true of 26% of the youngest group. Lawyers are obviously selected by specialty and reputation while most banks offer similar services and being known to the banker is considered a major benefit in small towns.

The pattern that emerged from the large sample mail questionnaire is that of a mobile population, in which the travel patterns of seniors are very consistent with those of the population at large. This is the same type of mobility indicated by those keeping the trip logs who had access to private automobiles.

TRIP MODE

Among the trips reported in the summer trip logs 91.3% were made in their personal automobile, 7.8% in a friend's car, 0.6% in a public bus or van and 0.2% in a taxi. The pattern in the winter was very similar with 92% of all trips taken in personal cars, 6.3% in a friend or relative's car, 0.2% in a public van and 0.2% in a taxi. Among the trip purposes served by other than one's own private automobile were trips to the doctor, grocery, shopping, eating out, church, visiting and trips to the senior citizen center. A small number used a rural transit van for grocery shopping and banking. In the winter trips to the churches or other organizations accounted for 39% of the trips taken in friends' cars.

RELUCTANT DRIVERS

A further indication of potential future travel need was provided by several questions on the summer survey which accompanied the log. Using some of the questions raised on the AAA 55+ Drivers self-evaluation test as a guide, a series of questions was developed asking about any concerns regarding driving (Malfetti, 1988). The point raised in the literature is that someone admitting to having several of these concerns probably should not be driving. Not unexpectedly the most widely shared concern of these rural respondents was associated with driving in crowded areas (62.8% of them noted that). Although each respondent probably had his or her own image of a crowded area, this clearly indicated a reluctance to drive in the major metropolitan areas where trips to the doctor are frequently made. The second most common concern was regarding driving in winter, a major feature in the northern Midwest (52.6% of them mentioned that). Next most common were concerns about night driving and long distance driving (44.9% and 36.8%

respectively). (See graph in Figure 7.)

Over 53% of the respondents indicated multiple concerns, including 21.8% of the respondents who were concerned about all four aspects of driving, and 14.1% of the respondents who underscored three concerns. Among those who indicated that they were most concerned about driving, all but five also indicated that they drove regularly. Most of these respondents (65% of them) however, also took trips with a family member or friend when such options were available. Three of the five respondents who did not drive took advantage of the rural transit service; one who lived in town relied on a taxi and friend while one other respondent relied completely on family members. What emerges is a response pattern whereby 4.7% of those keeping logs admitted no concerns about driving and drove regularly; but a fairly sizable proportion of the respondents did admit to concerns about driving and responded to transportation alternatives when they were available.

The survey questionnaire accompanying the winter trip logs inquired further into the type of concerns of the log keepers. Understandably in a winter survey, the largest proportion of the respondents were concerned about winter driving (53%). As Figure 8 indicates only a relatively small proportion of the respondents underscored concerns which the AAA study and others have connected with accidents involving elderly drivers. Twenty percent indicated a concern with interstate highway driving, but the national studies note that most elderly compensate for this by driving on state highways on which the traffic does not move as quickly. Being passed by faster moving vehicles and making left hand turns concerned only 18.5% of the respondents even though left hand turns are nationally a major factor in car accidents involving seniors. Meeting other cars at intersections seemed not to be a major factor in rural areas. Some respondents even marked that question "not applicable." Fortunately rural Iowa drivers are apparently able to change driving patterns to avoid the most stressful driving situations. They drive during the day on state highways and rural roads and avoid driving in bad winter weather. Nevertheless, as the Iowa Department of Transportation Traffic Fatality Report for 1989 indicates, rural elderly drivers are still exposed to risk. Of the 64 fatal accidents involving elderly drivers in 1989, 47% were on U.S. or state highways, and an additional 37% were in cities and towns. Only 6% of the fatal accidents in Iowa involving elderly drivers were on interstate highways. (Iowa DOT, "Iowa Traffic Fatalities Involving Persons Age 65 and Older", 1989).

When winter log keepers were asked whether they would consider a variety of different types of transportation alternatives, they responded as follows: 21.7% indicated that they would

FIGURE 7

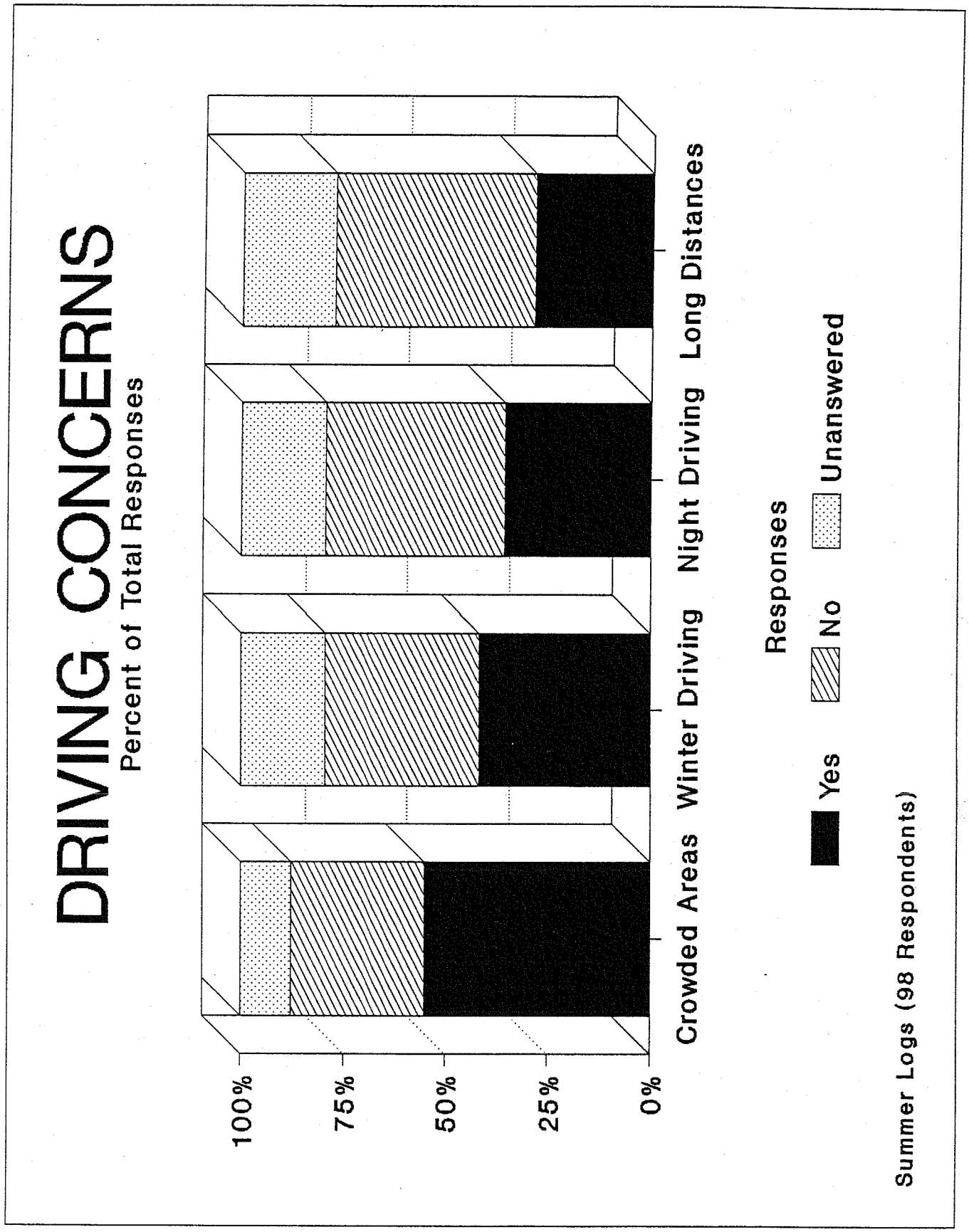
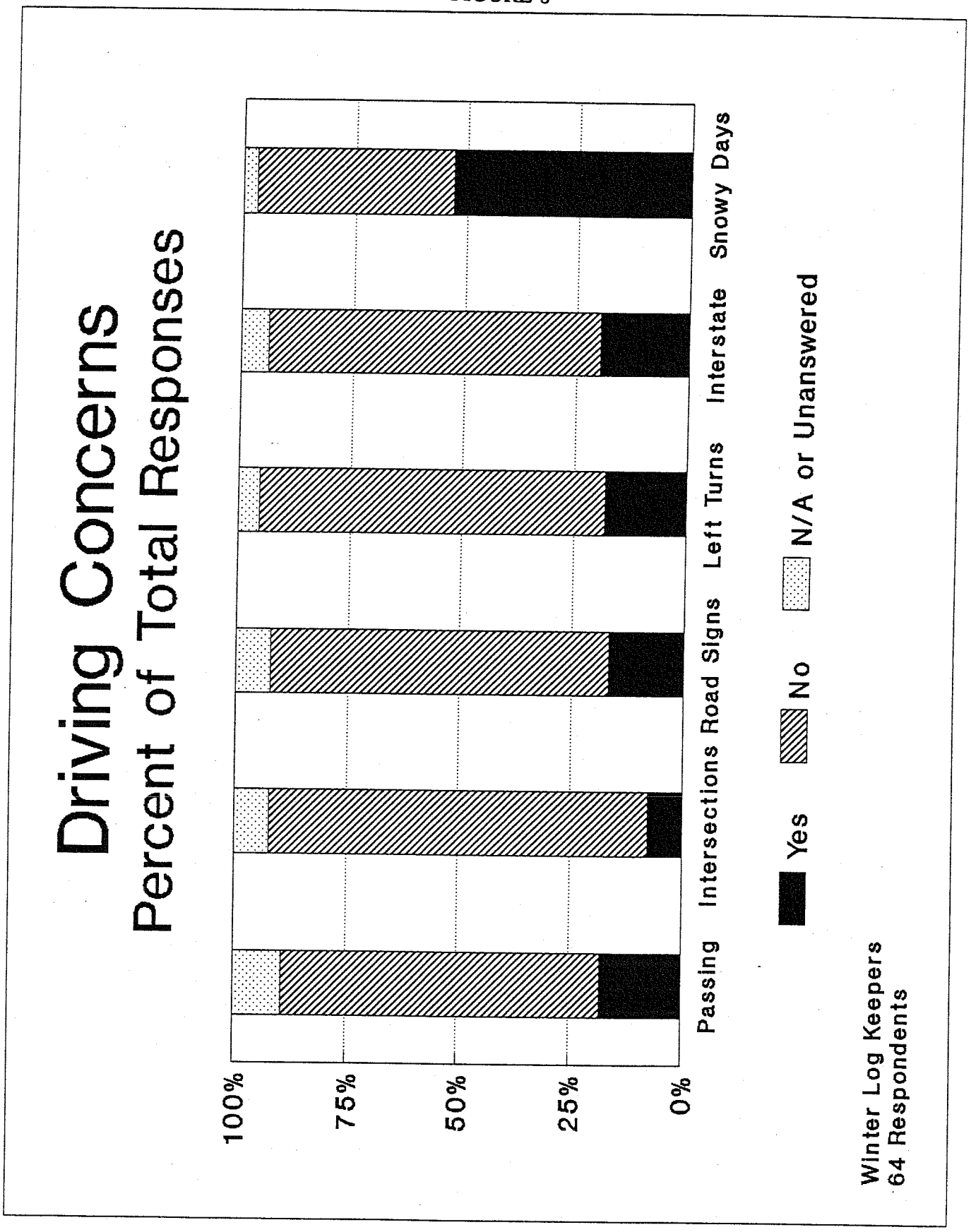

DRIVING CONCERNS
Percent of Total Responses
100%
75%
50%
25%
0%
Crowded Areas
Winter Driving
Night Driving
Long Distances
Responses
Yes
No
Unanswered
Summer Logs (98 Respondents)

FIGURE 8


Driving Concerns
Percent of Total Responses
100%
75%
50%
25%
0%
Passing
Intersections
Road Signs
Left Turns
Interstate
Snowy Days
Yes
No
N/A or Unanswered
Winter Log Keepers
64 Respondents

consider a shared-ride system, while 18.3% indicated that they would consider a car pool. As expected a large proportion, 51.7% said that they would consider riding with a friend. While these responses offer no assurance that the log keepers would actually take advantage of these transportation alternatives, they do offer some indication of interest in riding with others if options were available.

TRANSPORTATION ALTERNATIVES

After reviewing the results of the trip logs and surveys in the light of other data collected regarding the distribution of goods and services in the target region, a set of criteria emerged for assessing appropriate transportation alternatives for the rural elderly in this area. Several key factors emerged as follows:

1) The need for variety in type of service offered given the array of trip needs and purposes underscored by the different segments of the rural elderly community. This includes providing for variation in trip purpose, direction, and level of assistance provided.

2) The need to provide an alternative to driving for those who are reluctant drivers but who see no other way of meeting their travel needs in rural areas and retaining their independence.

3) The need to make full use of existing systems in serving as wide a segment of the elderly population as possible.

4) The need for involvement of the residents, including the potential users, in designing transportation alternatives in order to insure adequate use of a system.

5) The need for cost effectiveness in providing for the needs of a scattered population in an area characterized by widely distributed goods and services.

A review of existing services in light of these criteria indicates that some purposes and segments of the population are being well served while others were still awaiting the identification of appropriate alternatives.

TRAVEL PREFERENCES

When asked of their preference in terms of transportation alternatives respondents selected those modes which they felt offered the greatest opportunity for continued independence. Of the respondents to the summer survey, 28.8% indicated that they preferred a bus although only 4.9% of the respondents had actually traveled by bus in the last year. The preference for bus travel was clearly linked with age: 48% of those indicating an interest in bus travel were over age 75, 42% were between 65 and 75, and only 10% were age 55 to 65. The purpose for which they would use a bus was overwhelmingly reported (55.6%) as recreation. Clearly they associated a bus with the

independent discretionary travel that it used to provide for residents of small towns. Riding with a friend or relative was considered a viable alternative mode by approximately the same number of respondents, but they would use this alternative for shopping (as noted by 53.8% of the respondents). This choice was not associated with age.

A rural transit van was considered as an alternative mode by 19.2% of the respondents. They would use it for grocery shopping as well as for recreational travel. This choice was not as closely associated with age since 36% of those indicating a willingness to use a van were over age 75, the same proportion were age 65-75, with 28% in the youngest group of elderly. Since taxis are available in only four towns in the region it is not surprising that only 6.8% of the respondents saw a taxi as a viable alternative mode.

EXISTING SERVICES

Transportation options available in the target region are currently limited. The area is, as indicated above, served by two regional rural transit systems--the publicly provided Southern Iowa Trolley in Iowa and the private non-profit Older American Transit System (OATS) in Missouri. Other alternatives are limited to small taxi companies operating in Osceola, Creston, Bethany, and Maryville. The Jefferson Bus Company makes five stops along Interstate 35 on the way between Minneapolis and Kansas City and the Greyhound line makes one stop in Maryville on the line between Omaha and Kansas City. Within Missouri, Jefferson Lines is available and does contract for charter service with the OATS system for trips to St. Joseph and Kansas City. One new charter line, Five Oaks Charters, services work trips between Lorimor and Des Moines on a subscription basis but no parallel private regular route system serves seniors wishing to make medical or shopping trips to Des Moines. Five Oaks is available for charter trips for seniors.

Unlike many areas of Iowa and Missouri, two towns in Iowa have operating AMTRAK stations, Creston and Osceola. In addition to these services for the general public including seniors, specialized services are provided by private nursing homes for their clients.

SOUTHERN IOWA TROLLEY. The rural transit services in the region are meeting a current need for service particularly among the older elderly on fixed incomes. When the random sample of residents in the target region who took part in the telephone screen were asked about their familiarity with the respective system in their area the responses were overwhelmingly positive. Of the respondents coming from Iowa, 84.6% were aware of the Southern Iowa Trolley and 86.7% of the respondents from Missouri were familiar with OATS. This included more than 86% of the younger residents as well as a similar proportion of the older residents. When asked whether they

had personally used the system, however, the proportions were considerably smaller. Among the Missouri respondents 17.9% had used OATS and 10.6% of the Iowa respondents had used the Southern Iowa Trolley. The primary reason given for not using these services were that the respondents had automobiles available for their trips.

Although it is difficult to estimate how many different individuals use the Iowa service, the estimate is about 1240 people, approximately 38% of whom are senior citizens. The other passengers include the developmentally disabled who attend sheltered workshops and children attending headstart programs. The system which operates 21 vehicles provides approximately 437 trips a day over a seven county region. (The region includes Adair county as well as the six Iowa counties in the target area). Specific service arrangements differ among the counties but in general, service to seniors focuses on the nutrition sites. Vans bring residents from the small surrounding towns to the meal sites on a regular weekly schedule. In some cases the trip to the meal site is also coupled with a stop at the grocery store or other essential shopping locations in the same town as the meal site.

For rural residents there is little unscheduled time available for demand responsive trips. However, some demand responsive service is available in the larger towns. In Creston, the largest town in the Iowa target area, almost all service is demand responsive.

OATS. The senior transportation system operating in northwestern Missouri, OATS, is the same system that operates in 88 of the counties in the state. Three vans operate in the three county region included in the sample and they provide over 67,000 rides a year for residents from these counties. Service is arranged so that elderly residents in each town in the county service area are served at least three times a month. Usually these trips are to one of the larger towns in the county, such as Maryville where the rural residents can eat at the meal site and then have the use of the van for personal business, medical appointments or shopping for the rest of the day before they are returned home. Special medical trips outside the target area to the city of St. Joseph or Kansas City are available at least three times a month while longer distance shopping trips are arranged to towns outside the region once a month. Trips to Kansas City to a play or dinner spot are planned at least once a month, but those making these trips pay the full cost of the trip. Special charter trips across the country are also arranged through OATS and again the elderly pay the full cost of these trips. Although available to the general public, about 90% of the trips on OATS are taken by seniors.

OATS & SOUTHERN IOWA TROLLEY. Interviews with 35 rural public transit users at four meal sites revealed some basic similarities both in user characteristics and in interests (see survey instrument in Appendix V). Those interviewed were all over 75 years of age and ranged up to 99 years, clearly placing them in the older elderly group. All but one of the riders were women. The overwhelming majority of the riders were frail and appreciated the assistance of the drivers in getting them in and out of the van. Although more than half of those interviewed had drivers licenses only about one-third currently used them. They felt insecure driving long distances and preferred to travel by van when possible. Only one respondent indicated that she drove regularly and only used the van in order to travel with a friend. All were regular users of the system and in each group everyone knew each other well. In fact the riders on one van were going to make a stop at one passenger's home to celebrate her birthday.

When asked for suggestions as to how to improve the system the riders' remarks focused on their desire to take longer trips (Iowa) and more frequent trips to the grocery store and other shopping (Missouri). Although the OATS van did take people to the stores in the larger city, the riders complained that because of the large number of passengers on the van and their many different travel purposes, shoppers had very little time in the stores. Some Iowans who only got van service one time a week complained about infrequent service while those who had access to the demand responsive trip making in Iowa were very satisfied.

A common theme, however, through their remarks was that they wished there was a service which would take them to visit their friends, particularly those friends now in nursing homes. Since visiting and social trips were reported very frequently by those with cars who were keeping trip logs, this need is understandable. In the four towns with taxi service this need would be met very appropriately. The problem comes in rural areas and small towns where there is no such service available.

THE INTERCITY BUS. Until the Bus Deregulation Act of 1982 and the years immediately proceeding that, intercity bus transportation had been a major source of discretionary trips for the elderly. They could travel independently to visit relatives and friends as well as to out-of-town medical facilities and larger shopping centers. For most of the residents of the target area, however, this opportunity is no longer available. The buses that still do stop travel down the interstate highway which is at the far western edge of the target area; in addition, one bus travels through Maryville on its way from Omaha to Kansas City.

The commission agents at each of the remaining six stops were interviewed in an effort to

determine current ridership and potential for feeder linkage with rural public transit vans. Since the commission agents reported that they had served in their posts from a few months to 21 years, their knowledge of operations over time differed as well. One of the stops was well established and a second one had been in existence for three years. The others had moved recently, although one of these had just moved down the street. Of the stops two were in hotels/motels, two in retail stores and two in cafes/truck stops. As such they are representative of variety of locations used as bus stops in the Midwest (Kihl, 1989).

The actual number of scheduled Jefferson Line stops ranged from two to seven. One stop has the option of flagging additional buses. The one Greyhound stop serves several buses a day. The times for the stops were between 10:30 A.M. and 10:00 P.M., times that are at fairly convenient times of day. Despite this, the number of tickets sold was very low, ranging from 1-25 a week, with a mode of 10 a week. At most of the stops the passengers were typically seniors or college students and included about equal numbers of men and women. Most passengers reached the bus stops by being dropped off or by driving their own cars. In the three towns with taxi service that service was also used to access the bus.

All bus stop operators reported that the bus is usually within 15 minutes of schedule. All reported that they had seating available as well as rest rooms and that food was available for passengers near by if not at the stop. Three of the locations were not open when the bus stopped at night, but all were open during the day and had schedule material available. Some of the agents thought feeder programs with the rural public transit might make it easier for the passengers since frequently families have to drop them off, but this concept is as yet untried in the target region. The intercity bus appears to be an underutilized resource in the target region.

AMTRAK. As indicated above AMTRAK does make two stops in the region at fairly convenient times of day, although the trains are frequently quite late. The rail passengers represent a broader cross section of the population including younger as well as senior residents, but overall these opportunities are also underutilized. The number of passengers using the Creston stop, for example, is the lowest in the state (9400 in 1988). The other stop in the area, Osceola, experienced a 36% increase in ridership since 1980 but it attracts passengers from the Des Moines area as well as local riders since Des Moines is less than one hour away by interstate highway (Iowa State Rail Plan, draft, 1989). There is no AMTRAK service in northern Missouri. Given the infrequent service, the usual delays, the limited number of stops, and the relatively high costs of passenger rail service, however, AMTRAK cannot play a major role in addressing the travel needs of the rural elderly.

ASSESSMENT

When these existing services are reviewed in the light of the travel patterns evidenced in the trip logs and the criteria outlined above, it is clear that further alternatives must be developed if the elderly are to be able to retain a basic quality of life without relying on driving their own automobiles. Several indications derived from the trip log survey pointed to a need for alternative transportation for the elderly.

The first indicator is the number who claimed to have a driving disability. About 10% of those answering this question on the survey claimed to have a driving disability of some sort. The majority of these individuals were over age 75 and female. The average trip rate of 5.5 by those claiming a driving disability is lower than the overall average trip rate of 8.2. However, 67% of these individuals made four or more trips during the week. Three of the individuals made only one trip during the week and did not drive at all. One relied on her husband for all trips made during the week. Another woman relied on friends and relatives when possible, but still drove herself occasionally.

A second indication of need for alternative forms of transportation derived from the travel survey is the responses given to questions regarding reluctance to drive under various conditions. Concerns about driving under various conditions were prevalent as noted earlier.

The third indicator was a bit less obvious but none-the-less real. Using one's own car was clearly the most popular mode of travel (90.8% of the 812 trips recorded). For 13% of those trips, however, the individual keeping the log did not drive himself or herself. The majority of these trips were made by females (69%), generally travelling with their husbands. A breakout by age showed that 44.7% of these types of trips were made by individuals in the lowest age bracket of 55 to 64, 38.3% by individuals in the 65 to 74 bracket, and 8.5% by those 75 and older. Since most of these trips involved wives travelling with their husbands, the lesser frequency of trips in the older age brackets is reflective of the high incidence of elderly widows who no longer have a husband to drive and are either forced to drive themselves or find another mode of transportation. Amusement and recreation was the most common primary purpose (20.2%) for trips in which the log keeper's car was used but the individual did not drive. Shopping was the next most popular primary purpose (14.9%), followed by visiting (11.7%), and eating out (10.9%).

A fourth indicator was the number of trips which were made in a friend's car. For all the trips recorded on the trip logs, a friend's car was the second most popular mode. Sixty-three of the 812

trips were made by this mode (7.8%). About 29% of the participants used a friend's car as their mode of transportation at least once during the week as the graph in Figure 9 indicates.

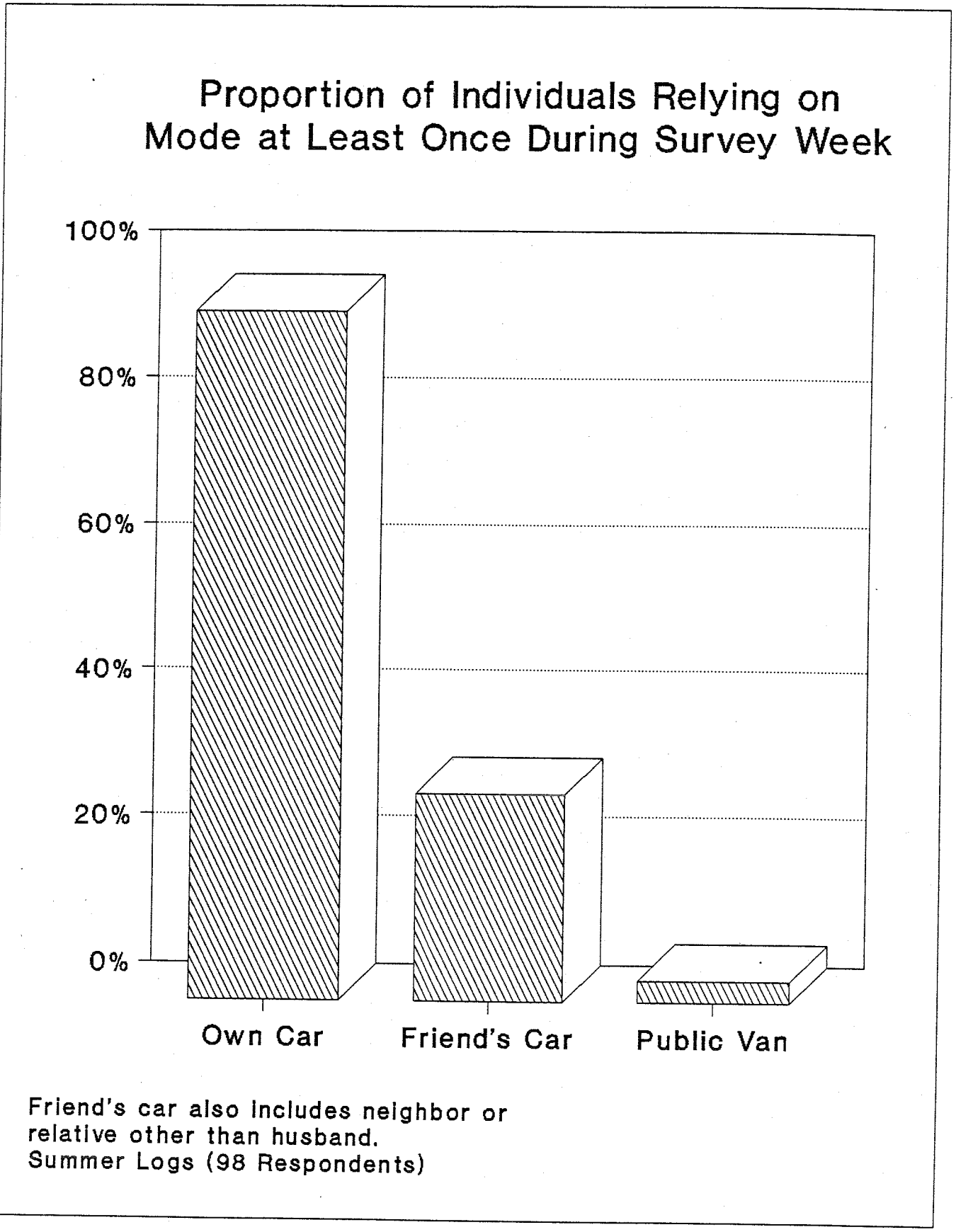
The existing transportation alternatives provide adequately for the needs of the current frail elderly for social interaction at meal sites as well as for essential medical service and some grocery shopping. In transporting these people the drivers provide needed personal assistance in boarding at points of origin and destination. These residents still have not met transportation needs, however, in that they have limited opportunities for shopping and no way to visit friends who do not also go to the meal sites.

The needs of the more mobile elderly who are reluctant drivers are not being met human service vehicles. These residents are not anxious to participate in pre-established social events such as congregate meals but rather want to maintain their independence. They would apparently willingly give up much of their driving if they had available a type of transportation system which would take them where and when they wanted to go. Many of these rural elderly find it difficult to purchase key goods and services close to home because of costs and limited selection. Nevertheless most residents in the target area are able to meet most of their needs within fifteen miles of home. Hence what seems to be indicated is a system focusing primarily upon relatively short, frequent trips with some opportunity for longer shopping trips to larger multi-purpose centers.

No type of "many-to-one" system can really address the needs of a scattered population with scattered preferred destinations. Although nine or eleven passenger vans are efficient in transporting a group of people down the road from one small community to a meal site, they become far less efficient in collecting all these residents at their homes and escorting them to a variety of different destinations in town. Except for the handicapped who need to use a wheel chair lift, senior residents also tend to find it difficult to get in and out of the seats in a large van.

In considering transportation options for the majority of rural senior residents, particularly the future elderly who place strong importance on personal mobility, the focus turns quickly to the automobile. The automobile which has made it possible for these rural residents to maintain a high quality of life, appears to hold the key to their future mobility as well (Carp, 1988). Several options for systems using the automobile are being explored.

FIGURE 9


Proportion of Individuals Relying on Mode at Least Once During Survey Week
100%
80%
60%
40%
20%
0%
Own Car
Friend's Car
Public Van
Friend's car also includes neighbor or relative other than husband.
Summer Logs (98 Respondents)

ANALYSIS OF TRANSPORTATION ALTERNATIVES

As indicated above, the various surveys conducted as part of this study underscore the importance of flexibility and personal mobility, characteristics which are typically associated with the automobile. Hence the design of alternative systems focused on the potential for introducing some type of automobile based system. The predetermined objectives for the system would be to maximize flexibility and responsiveness while at the same time striving for efficiency and minimizing costs. Given the wide scatteration of the population in the target area and the relatively few full service communities still remaining in the area it became apparent that any system could at most only approximate the ideal. It was also established that any alternative system design would be regarded as augmenting rather than replacing existing systems. The Southern Iowa Trolley and the Older American Transit System have admirably served those elderly residents who orient themselves to the senior nutrition sites, and the four taxi companies in the region provide city wide service for the elderly as well as other residents of their respective cities. Additional transportation service would provide for discretionary trips for such purposes as shopping or visiting friends in nursing homes through modified many to many service for residents in small towns and rural areas.

The analysis focused on several key aspects which would be prerequisites to any type of systems design:

* first, potential demand;
* second, risk management and insurance;
* third, alternative design and relative capacity;
* fourth, operational alternatives and comparative cost effectiveness;
* fifth, willingness to pay and subsidy level; and
* sixth, marketing.

POTENTIAL DEMAND

The attempt to generate potential demand for an automobile based flexible system in a set of counties which have no existing service of this type is most complex. A number of demand models were considered for potential applicability but most required data or techniques beyond the scope of this project. A number were far more applicable to urban environments for which transit systems were currently available, and for which disaggregate travel data could be secured on a zonal basis (see for example, Ben-Akiva, 1974). Similarly, the more recent disaggregate models proposed by Koppleman to predict intercity demand, presuppose the availability of a modal choice

(Koppleman, 1989). For residents in the target area in this study there frequently is no option beyond an automobile since social service vans serve largely dedicated functions.

One approach of interest was the direct utility assessment technique which is based on individual responses to hypothetical travel situations (Kocur, George, Adler, et al., 1982). Since this model is based on behavioral intent and not on actual past choices, it would have been potentially useful for the current study. However, to employ this model would have required conducting an additional broad based survey which time and funding constraints did not allow.

The search for demand models which were applicable to the rural environment led to the work of Burkhardt and Lago who have derived regressions equations for predicting demand based on the experience of more than 120 rural systems. Using this massive set of data as a base they derived a two stage least squares simultaneous equation model for estimating transportation demand for rural elderly in 1980. This procedure seemed very appropriate for estimating demand for an existing or fully developed system for which supply side data could be obtained (Largo and Burkhardt, 1980). In the absence of such data it became necessary to revert to an earlier model developed by the same team to determine demand for demand-responsive systems as they were being established in the late 1970's. In fact, those who had developed the model reaffirmed its potential relevance for the current study: establishing a new demand responsive system in a rural area with widely scattered population now served by a social service oriented fixed route system.

The models of developed by Burkhardt and Largo were designed to enable planners to project the number of riders that will demand service from rural transportation systems (Burkhardt and Largo, 1976). The models provide numerical estimates of the probable number of riders based on the actual experience of other rural transportation systems. The models are applicable to fixed-route systems and demand-responsive systems. The macromodels focus on county-wide or system-wide estimates and the micromodels refer to small geographic areas. The macromodels were designed to determine general feasibility of proposed systems, and these are the models utilized for purposes of this study.

The models were derived using multiple regression techniques on information from a variety of small-scale, rural transportation systems. The data base which Burkhardt used was large enough to permit split-sample forecasting to verify the accuracy of the models. The sample was divided into two groups and the split-sample technique was used. Regression techniques were applied to the first group to derive the independent variables of the demand equation, and then the equation was used to forecast the dependent variable for the systems in the second half of the sample. The

forecasts were then compared to actual values for the dependent variables to determine the accuracy of the forecasts.

The procedures used to derive the models were based on three significant assumptions. The first is that the systems that were used to derive the model were representative of systems appropriate for rural areas and the variety or rural conditions that exist. Because of the variety of systems used in deriving the model, and the researcher's ability to test and control for the effects of variations in service and area characteristics, the assumption was assumed appropriate.

The second assumption was that counties are the appropriate geographical unit on which to focus projects of aggregate demand. The assumption was based on: 1) existing systems have been established along county lines, 2) a number of the services often sought by riders of such systems are provided through the offices of the county government, and 3) that towns of significant size, which are often the destinations of such systems, tend to be distributed regularly throughout counties.

The third assumption is that patterns of travel behavior vary for definite and discoverable reasons. These reasons include characteristics of the traveller and the transportation services available, and the spatial distribution of activities in the area. Because that assumption has been proven valid for travel demands in urban areas, the assumption was assumed valid for rural areas.

In order to determine whether the models were appropriate for our use, the macro model for fixed-route services was applied to one Iowa county (Taylor), and the results were compared to the actual fixed-route ridership experience of the Southern Iowa Trolley in that county. The results obtained from applying the model corresponded closely to the actual ridership; therefore, it was felt that the models were appropriate.

Since this report is concentrating on the feasibility of demand-responsive, automobile-based transportation services for the elderly, the macromodel for demand-responsive systems was applied, as a type of pilot, to two counties in the study area Decatur county, Iowa and Worth county, Missouri. The data required to apply this model included:

1) the total vehicle miles per month for all vehicles in the system (BMILES)

2) the average time in days required between a call for service and the time a vehicle arrives (RESVTIME)

3) the number of persons (expressed in hundreds) in the county who are likely users of the system (HIPROBPOP).

The logarithms of these variables were plugged into the macroequation which gave the logarithm of the number of round-trip passengers per month (RTPASS/M) that can be expected. The equation used was:

$$\log \text{RTPASS/M} = -1.879 + (1.099 * \log \text{BMILES}) - (0.217 * \log \text{RESVTIME}) + (0.194 * \log \text{HIPROBPOP})$$

As can be seen from the equation, the amount of service provided strongly influences the number of riders. In using the equation the reservation time was set at one day because this appears to be the standard reservation time required on similar automobile based, demand-responsive systems investigated. The total vehicle miles was varied to get a range of estimates for demand. The numbers used for total vehicle miles were based on analysis of trip purposes and origins and destinations obtained from the trip log surveys. The figures used for the high probability population were 1990 estimates of elderly population (65 and older) in the counties. The equations were also applied using a high probability population which included the poor as well as the elderly population.

A further equation was applied to account for the influence of fares. The equation was:

$$\text{Change in passengers} = (\text{FARE} - 150) * (\text{RTPASS}/150) * (-0.1668)$$

The fares used were \$0.00, \$1.00 and \$2.00. The results of applying these two models to the counties of are shown on Tables 7 and 8. As Tables 7 and 8 indicate, it is obvious we are dealing with a small number of riders. Despite the sizable proportion of elderly in the target area there still is an insufficient population base among the elderly alone to support such a system. Hence the indication is that the new system should be made available to the general public.

The predictions from these models are not meant to be iron-clad guarantees, but ball-park estimates. As Ecosometrics points out a number of factors can significantly influence, positively or negatively, the actual number of riders. The most important factor, according to Ecosometrics, is the director of the system. Dynamic, intelligent and experienced directors can often achieve much greater ridership on systems that are similar in all respects except for their leadership. The second and third factors have to do with marketing. Potential riders have to be made aware of the system and perceive the systems positively. Ridership can decrease if the system is perceived as for "poor folks" or as a system serving only a specific minority.

TABLE 7

Demand Estimates
Worth County, Missouri

Elderly only considered as high probability population. Numbers in parentheses represent round trip passengers per month if low income also included in high probability population.

Total Vehicle Miles	Round Trip Passengers Per Month $0.00 Fare	Round Trip Passengers Per Month $1.00 Fare	Round Trip Passengers Per Month $2.00 Fare
3500	172 (193)	155 (174)	139 (156)
3000	145 (162)	131 (147)	117 (131)
2500	118 (133)	107 (120)	95 (108)
2000	92 (104)	83 (94)	75 (84)
1500	68 (76)	61 (69)	55 (61)

TABLE 8

Demand Estimates
Decatur County, Iowa

Elderly only considered as high probability population. Numbers in parentheses represent round trip passengers per month if low income also included in high probability population.

Total Vehicle Miles	Round Trip Passengers Per Month $0.00 Fare	Round Trip Passengers Per Month $1.00 Fare	Round Trip Passengers Per Month $2.00 Fare
3500	215 (235)	194 (212)	174 (190)
3000	182 (197)	165 (178)	147 (160)
2500	148 (162)	134 (147)	120 (131)
2000	117 (127)	106 (115)	94 (103)
1500	85 (92)	77 (83)	69 (75)

This small number of users, and the wide variety of trip purposes found in the trip log surveys, reinforced the need to down-size the vehicle used in order to provide transportation more effectively in the rural areas under investigation. All of the counties in the study area are already served by transportation systems utilizing vans. This study proposes augmentation of these systems with the use of automobiles. Automobile-based systems have been successful in other rural areas, and results of the travel survey suggest a propensity of the elderly to ride with others in automobiles as an alternative to driving themselves.

RISK MANAGEMENT AND INSURANCE

Relative risk and risk management becomes an important consideration when assessing any type of transportation alternative for the rural elderly. Given the small size of many rural operations, the relatively high operating costs per mile, and limited budgets, most rural systems have been reluctant to initiate any type of innovative service that might raise insurance rates. These concerns were especially prevalent in the mid-1980s when insurance rates skyrocketed and liability coverage became increasingly difficult to acquire (Abacus Technology, 1989, p. 10-1).

The insurance industry's operations are clearly cyclical. In periods of hard markets the insurance seller is is in control--premiums are high, limits are low and coverage is difficult to achieve for different types of activities. The hard market that began in 1984 was in reaction to the underwriter losses in the soft market period on the early 1980s (MacDorman, 1988, p. I.4). In the late 1980s the insurance market again softened and a number of companies are actively seeking transit business. In fact, it was discovered that the loss ratios for transit systems in general were actually well under the 60 percent loss ration sought by insurers (MacDorman, 1988, p. I.9). For rural transit losses were even lower.

For transit operations the types of risk include general liability (personal or property losses to others outside the organization); liability to employees (workman's compensation); and physical loss to property from fire or theft. Beyond that are the potential of tort claims which are the result of presumed or actual negligence on the part of the employees or others expressly authorized to provide a service for the organization. In cases of tort proximate cause must be shown whereby breach of duty was the closest cause producing injury to the plaintiff (Williams and Heins, 1985, p. 112). Nevertheless, liability is usually interpreted to rest with the employer for the activities of the employee. The immunity from such claims enjoyed by governmental and charitable agencies is no longer in effect in two-thirds of the states (Williams and Heins, 1985, p. 115). For example, in a California Court case, Malloy v. Fong, a church was held liable for the negligent operation of a

vehicle by a volunteer who agreed to transport children to as public playground on a church outing. The church was ordered to pay $41,000 (Williams and Heins, 1985, p. 143). Fortunately to-date-settlements to transit agencies have not been too high, averaging $1500 to $5000 for bodily injury and $500 to $1000 for property damage (Abacus Technology, 1989, p. 4-10). The potential for a large claim is, however, very real especially for transit operations handling handicapped or frail riders. Within the last few years an award of $350,000 was made to a claimant who was injured on a wheel chair lift (Abacus Technology, 1989, p. 4-13). This is the type of risk that rural transit operations must be prepared to handle.

A variety of responses have been considered. Transit agencies have responded with efforts to avoid risk (loss control) while at the same time typically employing one of three basic approaches to risk financing: self insurance, pooling, or commercial insurance. These approaches are compared in Figure 10. In a few locations including Colorado, Tennessee, and Vermont a fourth procedure, Captive Formation, has been tried by transit systems. The Captive, which is governed by a Board of Directors operates with capital provided by selling stock or by funds mutually contributed by members, involves a long term commitment with an internal staff, brokers, and independent consultants. It is, therefore, tried where there is a favorable environment in terms of freedom from internal or premium taxes and limited insurance company regulations.

The relative advantages of the various approaches to risk financing are apparent in Figure 10, which was derived for the UMTA Risk Management Manual (Abacus Technology, 1989, p. IV-32). A survey administered to 350 different sized transit systems as part of the UMTA sponsored risk management study indicated that commercial insurance is the most common method of risk financing, with 53% of all transit firms using that approach (Abacus Technology, 1989, p. IV-6). Self-insurance was the second most common method, but no system with a budget of below $10 million indicated the use of self-insurance for liability or workman's compensation. For rural transit systems funding levels typically provide for operating costs but do not allow for a sufficient overage to cover potential claims. Similarly rural systems are unlikely to participate in a self insurance pool.

With the limitations on funds available rural transit systems are effectively dependent upon commercial insurance and unable to avoid the cyclical variations in premium levels. Efforts to reduce costs and increase coverage focus primarily upon joint bidding based on the combine assets of several smaller companies. They can then acquire a package of insurance including comprehensive general liability, contractual liability, liability to employees, and property loss. As expected the key criteria used by the smaller services, according to the UMTA survey, were cost

COMPARATIVE ADVANTAGES OF RISK FINANCING METHODS

ADVANTAGE	METHOD			
	SELF INSURANCE	POOL	CAPTIVE	COMMERCIAL INSURANCE
Least risk		△	△	▲
Stability of premium costs	△	▲	▲	
Reduced overhead charges	▲	▲	△	
Realized investment income	▲	▲	▲	
Professional risk and claims management	△	▲	▲	▲
Spread costs of loss prevention programs		▲	▲	▲
Least state regulation requirements	△	△		▲
Combined purchasing power for excess insurance		▲	▲	
Least administrative responsibilities		△	△	▲
Control over claims management	▲	△	△	
Retention of funds until claim is paid	▲	△	△	
Minimal formation or acquisition requirements	△			▲
Broadened coverage available		△	△	
Lower cost excess coverage		▲	▲	△

▲ Full Advantage

△ Partial Advantage

FIGURE 10

followed by scope and service (Abacus Technology, Vol.2, 1989, p. F-12).

This basic coverage may by supplemented by adding basic automobile coverage on specific vehicles, those owned by the agency, and then expanded to include "employers' non-ownership liability" which is designed to protect the employer from liability that may arise out of an employee's use of his or her own automobile in the employer's business. If the employee has coverage on his or her own automobile, the policy automatically includes the employer as an insured for liability for the acts of the employee. There is a danger, however, that the employee's policy may be inadequate. In that case the employer's non-ownership liability coverage will cover the interest of the employer but not the employee. To cover this eventuality some rural transit agencies carry umbrella or excess coverage.

Umbrella liability insurance is not standardized and varies greatly among insurers, but in general it covers excess insurance over the insured's traditional comprehensive general liability insurance policies. It can also cover sources of liability not covered under the insured's other policies, usually subject to a sizable minimum deduction, such as $25,000 per occurrence. The maximum limit of liability under umbrella insurance is usually $1 million per occurrence (Williams and Heins, 1985, p.372).

For rural transit agencies which involve volunteer drivers using their own cars, an umbrella policy is frequently deemed necessary since the family automobile insurance policies held by most volunteers exclude coverage when the automobile is used as "a public conveyance", and mileage payments and assigned pick ups in effect make it "a public conveyance" (Vaughan and Eliot, 1979, p. 466). This approach does in fact cover the potential liability claims against the volunteer and the rural transit agency itself. Fears of tort claims have been largely turned aside since the insurance crisis of the mid 1980s, but there still is a potential for such a claim especially when volunteer drivers are responsible for escorting frail individuals to and from a car. Rural transit agencies would, therefor, be well advised to couple their umbrella policies with greater efforts at risk avoidance including formal driver's training programs and careful monitoring of volunteers. Liability for any paid drivers would be covered under the more traditional employees' liability insurance and their activities would necessarily be more closely supervised and monitored.

ALTERNATIVE DESIGNS AND RELATIVE CAPACITY

As indicated above, the target area reflects the problems of declining service centers. If a basic service center can be defined as having a grocery store, a bank, and a doctor, only about 27% of the towns in the target area can be so described. For example, groceries were only purchased in 19 or the 46 towns represented by the log keepers. Similarly only 22% of the towns could be classed

as full service centers with a hospital or clinic and a range of retail stores in addition to those in the basic service center. This means that a sizable proportion of residents must travel considerable distances to maintain their quality of life. Even if groceries were available in convenience stores within five miles of their homes, 51% of the residents travel 10 or more miles to buy groceries.

Travel is clearly expected as part of the pattern of life in the area. In fact the log keepers who reported living in a town only completed 63% of their trips in their home towns. Their other town-to-town trips were generally to towns within a range of 11-24 miles away. Rural residents apparently also sought a greater variety of goods and services than were available in the towns closest to them. For these residents, 48.7% of their trips were to the town closest to them, while 51% of their trips were to another town.

On the other hand, trips within rural areas were generally shorter than the inter-town trips. The overwhelming proportion (88%) of trips which rural residents made to rural destinations were made within a five to ten mile radius of their homes. These trips were largely for social or visiting purposes. Similarly 93% of the trips of town residents to rural destinations were within a five to ten mile radius of their home towns.

An effective transportation system for such a target region, given the considerable distance between full service towns and the widely scattered population would necessarily need to meet a dual set of objectives: 1) to facilitate inter-town travel to acquire goods and services; and 2) to make possible more localized travel for visiting and other social purposes. At the same time, as indicated above, the relatively small population of the target region would mean that the number of potential riders would necessarily be small.

What is proposed, therefore, is to augment the existing many-to-one service to the nutrition center with a more flexible automobile based service. Two different types of systems have been explored: first, a type of rural jitney and second, a coordinated volunteer system. It may also be possible to incorporate elements of the two approaches into a type of hybrid.

RURAL JITNEY SERVICE. According to some rural transportation specialists, "the closest we have come so far in developing the ideal transit system is a shared taxi or jitney--an automobile (based form of) public transit, made adaptable to low-density, dispersed settlement patterns; capable of providing random access service from anywhere to anywhere approximately door to door" (Melvin Webber in Behnke, 1984). Initially this could involve one car per county traveling largely to locations within that county, although relatively short trips across county lines would

also be possible. As the map in Figure 11 indicates most small towns in the target region are within a ten mile radius of a county seat town which does offer a full range of services. Twenty-four hour call up, which is now used for the Southern Iowa Trolley and OATS, would be essential to enable optimal preplanning of routes, especially in rural areas. Additional pick-ups in town would, however, be possible on a space and time available basis.

To determine the feasibility of such an option the Systan's Macro-Analytic Regional Transportation Model (1983) (SMART) was applied. The model helps to assess capacity and the optimum number of passengers to be carried, given distance between stops and average speed of the vehicle. Among the various models included in the SMART program, that which calibrates time and distance for car pools was deemed to be most applicable to a jitney service operating many-to-many service. The model calculates carpool distances as a function of the number of stops per tour and assumes that passengers may get off at any attractor. An equation with parameters derived from numerous runs of a computer optimization model using a poissant distribution of locations of passenger origin and destinations within a defined zone estimates the average tour distance. Use of the equation allows experimentation in determining the time involved in retrieving differing numbers of passengers from zones of varying sizes.

The number of stops is associated with the number of passengers with the assumption that passengers are retrieved at different locations (their homes) and go to different locations. Distribution of origin and destination points follows a poissant distribution. It is possible to adjust the number of stops, however, if two or three passengers get off at the same place. Distance of the tour is easily associated with time by factoring in the average speed of the car. With distance associated with time it is possible to set a time constraint beyond which it would be infeasible to expect passengers to take the trip (such as 1 hour). It is then possible to determine the optimum number of passengers to carry on a given tour.

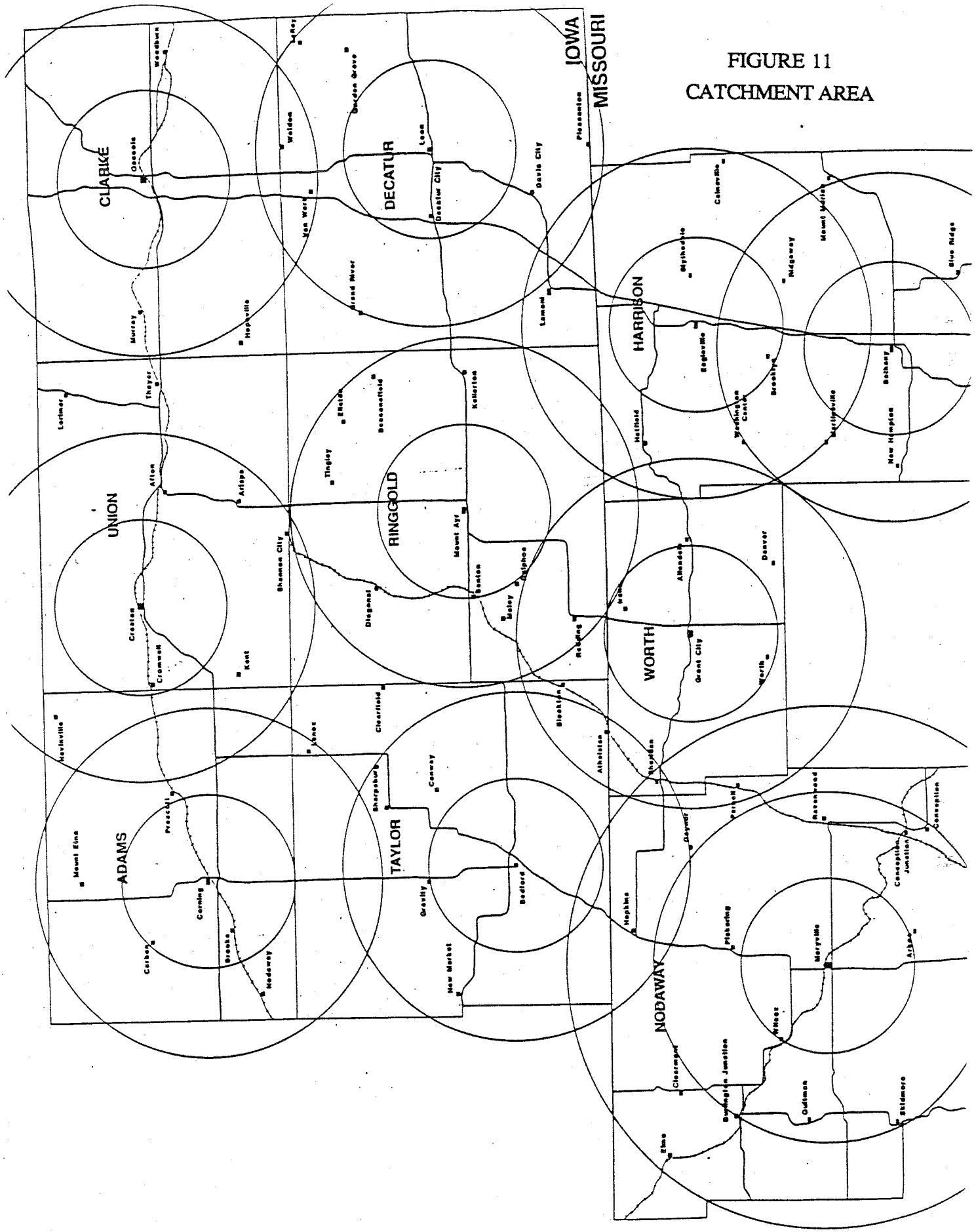
The base model is as follows:

$$De = 1.67 + .74 * N * S/4$$

where: De = estimated distance
N = number of stops per tour
S = length of side of zone

The equation is used in SMART's Dumper carpool routines and gives a close estimate for tour distances as long as the distance is between 0.0 and 1.5 times length of the side of the zone. The maximum error of a two person car pool is 10%, and the maximum relative error is significantly

FIGURE 11
CATCHMENT AREA



less than that for smaller carpools. Once the distance is calculated it is possible to determine the amount of time used in each car pool by associating distance with the appropriate figure for speed in minutes per mile.

For a system focusing on the elderly in a rural area it is essential to make several modifications in the basic model. First, it is necessary to add in a factor for dwell time at each stop to allow the driver to get out the vehicle and escort the rider to or from the point of origin or destination. The figure of 3 minutes per stop is built on an average of wait time experienced in several demand responsive systems for the elderly.

Another modification is needed to accommodate the type of service which involves pick up of all passengers in one town, travel down a highway and delivery of all passengers in another town some miles away. Hence two models will be proposed--one dealing with travel from and to a destination within a rural area and the other involving a line haul trip between two towns.

The modified formulas for travel within a rural area are therefore as follows:

$$De = 1.67+.74 * N * S/4$$

$$T = 2(Dw * N) +(De/MPM)$$

where: T = time of tour
Dw = dwell time per stop per passenger
MPM = speed of vehicle in miles per minute

For example, for passengers with origins and destinations in a rural area -- within a county 20 miles square, given a random distribution of riders and random distribution of destinations, the distance would be 9.07 miles. Substituting for N, two passengers, and figuring driving time at 55 MPH or .91 MPM on country roads, and dwell time three minutes average per stop to board or unboard, the tour would be 22 minutes. By comparison, for three passengers using the same driving speed, the tour would be 32 minutes. A fourth passenger would make the tour take 42 minutes, almost double the time. A significant part of the difference in time is in dwell time.

A modified model reflecting the type of trip which most log keepers reported, a trip between two towns, would be as follows:

$$Dt = 2 (1.67+.74 * N * St/4)$$

$$T = 2 (Dw * N) + (Dt/MPMt) + (Dr/MPMr)$$

where: Dt = estimated distance of tour in town
Dr = estimated distance over rural roads
St = size of town portion of zone
MPMt = speed in town
MPMr = speed on rural roads
Dw = dwell time for pick up and drop off of passengers
N = number of passengers
T = time of full tour

For example substituting in the equations:

St = 2 indicating a town zone of 2 miles in the towns at either end of the trip
Dr = 15 miles
MPMt = .416 or 25 mph in town
MPMr = .916 or 55 mph over rural roads
N = 2 or two passengers
Dw = 3 minutes for each stop to pick up or leave off passenger
Dt = 2(1.67+.74*2 *2/4)
Dt = 4.82
T = (2*3*2)+ (4.82/.416) = (15/.916)
T = 40.12 minutes

For three passengers the trip time would only increase to 47.73 minutes with this trip configuration, indicating the efficiency of multiple passengers on a longer haul. Adding a fourth passenger would still allow the trip to take less than one hour, 55.7 minutes.

The application of this model does demonstrate the potential capacity for a single vehicle operating a combination of intra-rural and inter-town trips. With careful scheduling a vehicle could serve up to four intercity passengers in an hour and five to six rural short distance travelers in an hour. These could be interspersed with efficient intra-town trips (2 passengers in 22 minutes, or three passengers in 31 minutes). Considering return trips for all such a system would comfortably provide for 19 to 20 passengers or 40 trips in a day (2 hours rural, 4 hour inter-town, and 2 hours in town, for example). This well surpasses the demand figures generated above.

The more traditional van with nine passengers would still be most efficient if the dwell time is

reduced to one minute per passenger by having everyone get off at the same location. For example, an inter-city trip for nine passengers on a van using the same size of zones and speeds as above would take 76.37 minutes. If, however, the nine passengers got off at nine different destinations in town, the time for such a trip would be greatly increased to 94.37 minutes. If the nine passengers were all rural in origin and destination and all travel was over rural roads, such a van trip would take 92.42 minutes. This does seem efficient, but, as indicated above, trips of over an hour are to be avoided especially for elderly passengers. Such a long trip would discourage a potential rider who would note that, for example, the same inter-town trip would take 22 minutes in a personal automobile.

Operating with a car such a system would clearly have the capacity to meet the estimated demand of the elderly, or elderly and low income, which was indicated above. By carrying 20 round trip passengers a day the system could accommodate 400 passengers a month, even if it only worked on weekdays. The maximum demand estimated for the two sample counties were 235 passengers for Decatur County and 193 for Worth County. To run efficiently, however, a system would require a dedicated car and driver for each county as well as a dedicated coordinator or dispatcher.

Such a system, with a paid driver, would be insured under the same policy as that currently covering the public vans in the respective rural transit system. For both OATS and the Southern Iowa Trolly this would mean coverage under a general comprehensive liability policy. Both rural transit operations already take advantage of the reduced insurance rates available when they bid as part of a large operation. The 88 counties in which OATS operate in Missouri are bid as a single large entity, while the western half of Iowa, including eight rural regional transit agencies are linked in a bidding pool known as WART. Since joining WART the Southern Iowa Trolly has experienced significant drops in the cost of insurance but with no reduction in coverage. Hence coverage for an additional driver would not greatly impact the current insurance policies.

VOLUNTEER DRIVER SYSTEMS. Since few systems have capital sufficient to buy automobiles or to pay the drivers to operate them, an increasing number of rural transit systems have begun using volunteer drivers to service the widely scattered elderly riders in rural areas.

Most such systems currently receive subsidies in terms of reimbursements for seniors transported from the Area Agency on Aging (AOA). The AOA is in turn funded through the provisions of the Older Americans Act. Although the AOA funding does not stipulate the type of vehicle in which their clients can ride, it does provide a defined set of trip purpose priorities for

which trips should be made available. Top priority is for medical trips, followed by nutritional trips. In towns where there is no grocery delivery, grocery shopping is also a high priority. Other trips are possible after these purposes are met. The reimbursement is in the form of $.21 a mile for the full extent of the trip, but no funding is available to supplement the fleet of a service provider or to pay for a driver. This reimbursement policy has led a number of rural systems to consider volunteer driver programs as a means of supplementing their service, especially in more rural areas. The systems' vans are then available for larger group inter-town trips or for many to one trips to nutrition sites.

A series of telephone interviews with coordinators of rural volunteer systems conducted in Spring, 1990 corroborated most of the findings in the UMTA sponsored studies on volunteerism in public transportation (1984,1986). Nevertheless, by focusing totally on small rural systems the 1990 interviews were able to provide a greater consistency in findings and thereby provide greater confidence in providing recommendations for the target area.

In these volunteer driver systems the AOA reimbursement is passed along to the volunteer drivers in direct compensation for the miles for which they have transported a client. Drivers keep a trip sheet or log which is compared against the dispatcher sheet in order to verify the mileage for reimbursement. One of the systems has also begun to pay the drivers for lunch if they have to be on duty over lunch hour. The volunteer drivers use their own cars and are responsible for maintaining their own cars. Volunteers also maintain their own insurance policies, having informed their insurance companies that they are a volunteer driver. The rural transit system then carries an umbrella policy of up to $1 million which would kick in on an excess liability claim or a claim not covered by the volunteers' own policy. To date only minor claims have been placed and none of the systems contacted have had to test the operations of the umbrella policy. A paid coordinator is responsible for keeping track of volunteers and scheduling, although in some cases the coordinator is assisted by a local or county based volunteer dispatcher. Twenty-four hour advanced call in is highly encouraged, although most often emergencies can be accommodated. In most cases the coordinator's salary represent a partial addition to the budget of the organization since that individual is already paid part-time to coordinate the daily van trips to nutrition sites and/or to workshops for developmentally disabled.

The systems interviewed relied on pools of volunteers ranging from 6 to 20 per county. All volunteer drivers were over 65 years of age. Some went through a specialized training program, but all were selected after a careful review of their driving record and after a representative of the system had ridden with them in a pre-test situation. Some systems engaged another older

volunteer to keep encouraging others to join the pool. For other systems that became the responsibility of the coordinator. For all, however, the task of soliciting and retaining volunteers was a primary activity, since the larger the pool, the less often it was necessary to go back to the same individual with requests and run the risk of burn out. Those contacted agreed that it was optimum to have about six or seven volunteers for each town of 1000, one for each day of the week, although none of the systems interviewed had reached this level. For the systems contacted the volunteer to client ratios were in the range of 1:5-7. Most agreed with the finding in the 1986 UMTA study that it took one to two years to build up a sufficient pool of volunteer drivers. Although like the systems interviewed for the 1986 study, these rural system coordinators underscored the dedication and responsiveness of the volunteers, they did note that level of participation varied among the volunteers. The most willing, therefore, frequently drew the long medical trips and concern was expressed about possible burn out.

Since most systems have van service as well as volunteer service, it is somewhat difficult to distinguish the number of round trips performed by these systems. Nevertheless the average number of round trips performed monthly by volunteer drivers in the systems contacted was in a range of 60 to 208, with the mode at the lower end of the scale. Nevertheless, this capacity is sufficient to meet the estimated demand identified above, at least the demand of the elderly residents. The one-county systems contacted serve a range of 25 to 131 different people. The volunteer systems do not currently attempt to serve low income or other residents. Reimbursements are only available at the standard mileage rate for transporting the elderly.

The capacity of such a volunteer system is considerably less than the shared ride taxi alternative described above because each volunteer performs at most a limited number of trips a day. Some only serve once a week. The driver of the rural jitney, on the other hand, would be a regular employee and expected to perform trips all day according to a prearranged schedule. Nevertheless, the volunteer system does allow the flexibility of operating several vehicles at one time in different towns and of providing for lengthy individual trips to the medical center, over one-hundred miles away. Although the volunteer drivers, much like those associated with any taxi-type system, prefer the multiple quick trips associated with in town driving, they do travel all over the rural areas to retrieve passengers. On occasion, however, family members can drive the elderly person from the farm to the next town where he or she can be picked up by the volunteer driver. This does increase efficiency. Efficiency is also increased by assigning drivers to pick up passengers in their home towns and in the surrounding farms. This procedure requires additional up-front time in arranging for pools of volunteers but has the reassuring effect of being picked up by someone local, "not a stranger." The only negative associated with this is that it becomes tempting for some

regular riders to call the volunteer directly, rather than going through the system and sometimes to treat the volunteer to lunch or tip him or her. The result is to undermine a system which is to respond to the needs of all elderly residents, particularly those with medical or nutritional needs.

ANALYSIS OF RELATIVE COST OF PROPOSED ALTERNATIVES

The above analyses have focused on demand and capacity of potential system designs. Ultimately, however, the decision as to what, if any, system to pursue will depend on a consideration of the relative effectiveness of system designs in meeting the needs of elderly residents in association with the relative operation costs.

What is required is a system that can operate by minimizing costs while at the same time being responsive: first, to the primary beneficiaries, the elderly riders themselves, enabling them to meet travel needs efficiently and at low a cost; and second, to secondary beneficiaries, the population at large, by reducing the risk of involvement in automobile accidents with elderly drivers.

A traditional benefit-cost analysis was deemed inappropriate for this type of evaluation because of the requirement of assigning dollar values to all variables in the analysis. Assigning dollar values to the various qualitative characteristics of rural transportation systems would be at best contrived, and at worst misleading.

For purposes of evaluation it is helpful to compare the two forms of automobile-based systems as described above, although it is clearly possible to develop hybrid variations involving a combination of paid drivers and volunteers. In both cases it will be assumed that the automobile-based system would be augmenting an already established social service system operating vans in the area. It is, therefore, furthermore assumed that the system would already have a coordinator who would be available to assist in scheduling, although that function would be augmented by adding an extra ten to twenty hours of paid service. It would also be assumed that the system would already have the necessary umbrella insurance policy to cover either alternative. What is required therefore, is an assessment of the additional costs involved in association with a discussion of benefits to the rural elderly and the public at large.

COST FUNCTION. Elements in the cost functions are as follows: 1) start-up time in terms of time needed to arrange initial meeting, assemble volunteers or hire drivers, train volunteers or drivers, set up routes, publicize system and assuming building on a preexisting van operated system; 2) start-up costs; 3) insurance in terms of public meeting costs, publicity costs, again assuming an existing van system; 4) salaries of drivers--annual salaries of dispatchers or coordinators, in addition to existing salary for van system, reflecting extra time involved in scheduling and coordination; and 5) operational costs including maintenance costs (based on a 3000 mile a month service), the system would be responsible for maintaining the car of the full

time driver, whereas the volunteers would be responsible for maintaining their own vehicles.

MEASURES OF EFFECTIVENESS. These costs would be considered in relationship to: 1) level of potential benefit to the elderly in terms of round trips performed per month as derived from experience of existing systems and relative capacity; 2) flexibility of system in terms responsiveness to the needs of a variety of rural residents including those on farms as well as in small towns; and 3) reduction of risk of accidents involving elderly drivers, considered in terms of the relative probability of avoiding such accidents given the age of drivers.

Other measures such as relative miles traveled would be difficult to approximate. The figures used in the demand model are therefore used as a surrogate. The volunteer system which would be available for long trips would involve fewer local trips; hence the total numbers would be comparable.

RELATIVE COSTS

	RURAL JITNEY	VOLUNTEER SYSTEM
Start-up time	3 months	12 months
Start-up costs	$2000	$4000
Additional Insurance	$164	$150
Salaries:		
drivers	$8000	
coordinator (additional)	$2000	$4000
Operating costs:		
paid to drivers		$7560
maintenance	$5400	

Start-up time for the rural jitney would be considerably less than the time involved in setting up volunteer systems. As reported by operators of volunteer programs and the 1986 UMTA study the typical time required to set up a volunteer system is over 20 months. The expectation here is that by augmenting an existing system some of the start up time could be saved since the availability of some volunteers might be known and the public would already be familiar with the system and hence more likely to move more quickly to support it. Nevertheless, it is much quicker to hire a driver and publicize a program than to build up a volunteer pool and organize it. No figure is included in this analysis, which is for out-of-pocket expenses in time and money, for the cost in terms of volunteer time. This is a real cost but somewhat difficult to gage comparatively. A one county volunteer system calculated this contribution as $36,000, based on minimum wage, for one

year.

Start-up costs would involve hosting public meetings, marketing the system, running training programs for drivers, etc. Again costs would be higher to set up and run a driver training program for volunteers. A professional driver could simply attend the existing program for van drivers. The figure is derived from one in the 1986 UMTA report.

The driver's salary reflects a minimum wage for a full 40 hours a week for 50 weeks a year. The current van drivers are paid at this level and the expectation would be that additional drivers would be paid at the same rate. To secure a full-time worker for a position requiring this level of dedication and responsibility, however, might well require a higher wage, especially if the hope was to attract a candidate under age 65. The Jaunt System offers $5.50 an hour for such a service.

The coordinator, currently with the system, would be required to work an additional 10 hours for to schedule for one hired driver who would be available all day. As interviews with existing volunteer systems have all confirmed the coordinator's role in scheduling volunteers and in continually updating the volunteer pool is critical and very time consuming. The 20 hours additional time is intended to reflect this.

The insurance costs reflect the supplement for one additional driver and car in a system which is already paying liability on a number of vans and drivers. The extra cost for the volunteer system reflects the costs of adding an umbrella liability policy for one county with 20 volunteer drivers. The figures are derived from actual figures associated with Iowa systems.

Operating costs for a system with a hired driver would include the actual costs of operating a vehicle per mile. The figure of $ .15 a mile was provided by an Iowa based firm which rented out vehicles and reflects the relative costs for a mid-sized 4 door sedan. The cost break out is as follows: $ .02 for insurance, $ .071 for depreciation, $ .059 for fuel, labor and maintenance. The figure given for the volunteer driver system reflects the $ .21 a mile which is paid to the volunteers in the majority of the systems interviewed. (One paid $ .22 a mile.) For both types of systems the mileage cost is figured based on an average of 3000 vehicle miles a month.

What is valuable to note is the relative similarity of the two cost streams. The additional cost of the driver for the jitney system is compensated for by the extra cost for the coordinator and the extra compensation per mile to the volunteers to help reimburse them for fuel, maintenance and insurance. The extra start-up time for the volunteer system is also a major cost. Once the system

gets going there is a continuing time involvement in meetings of volunteers and in recruiting of volunteers.

RELATIVE EFFECTIVENESS. In gaging the relative effectiveness of the two types of systems again it is difficult to determine the number of trips which would be performed by each of the two types of systems. Those rural county wide volunteer systems interviewed performed in the range of 65 to 215 round trips a month. They would potentially have considerably larger capacity if more drivers were available.

The single car jitney would have the capacity of performing 400 trips a month at peak efficiency. The actual numbers of trips to be performed is difficult to gage since there is no existing experience in operating such a system in a rural area. What is clear, however, is that greater efficiency can be achieved with the single paid driver operating in a relatively small "zone". In the target area the zone would be a county since geographically none of the counties in the target area are very large.

The relative flexibility of the systems again would need to be deduced. Both would by definition serve both rural and in-town residents. Volunteer systems currently do operate in sparsely populated rural areas. In fact, in some counties, a van operates in town and the volunteers operate in the rural areas. The flexibility provided by having several drivers is especially helpful in accommodating long trips to medical centers. Accommodating these trips in counties with a small volunteer pool becomes very difficult. Similarly the single car jitney would be unable to accommodate long individual trips, since its operation would be predicated on its availability for local trips for various discretionary purposes as well as for local doctor appointments. Another service which is uniquely suited to a volunteer service is providing escorts for feeble passengers who need assistance with shopping or trips to the doctor. The more efficient jitney service would be unable to accommodate such trips, which frequently absorb several hours.

One of the primary purposes in proposing a type of rural system other than the typical social service system is to provide an alternative mode of transportation for elderly residents. The objective is to encourage elderly reluctant drivers, especially very reluctant or less competent drivers to consider relying on an alternative means of maintaining their mobility and independence. Given the high accident per mile ratio for elderly, especially very elderly drivers and the high injury and fatality ratios discussed above, the objective seems well placed.

If a competent middle-aged driver were hired for the rural jitney service this objective would be

fully met. Volunteer systems, on the other hand, rely almost exclusively upon drivers who are over age 65. Granted these drivers are required to provide an indication of their good driving record and in some cases go through a training program. Nevertheless, they are seniors driving other elderly passengers. Regular rescreening of volunteers would help to insure continued competency of these drivers, but the pressing need for volunteers sometimes leads to short-cutting these procedures.

Hence it is difficult to gage the reduction of risk of accidents with the volunteer system, accept as the system reduces the risk from what it is with drivers over 75 (the age of most passengers) to age 65-70, the age of most of the volunteer drivers. The relative risk reduction could therefore be presented as follows. Using the figures generated in Hildebrand's study in New Brunswick, a province with considerable rural areas and open roads, much like the target area, the risk at age 75 would be four accidents per million kilometers; at age 65, 3.5 accidents per million kilometers; and at age 45, the presumed age of a middle aged driver, 1.5 accidents per million kilometers (Hildebrand, 1990, p. 24). Relative risk reduction for the jitney could, therefore, be presented as 2.5 for each elderly passenger over age 75. The comparable figure for the volunteer system would be only 0.5 for each elderly passenger over age 75.

PROPOSED SYSTEM

In summary, the comparative cost analysis is not conclusive as regards the jitney or volunteer system, but the analysis does give reason to hesitate before moving ahead with the volunteer system assuming that is the least cost approach. The relative effectiveness in terms of service characteristics again leaves some open questions since the jitney system is clearly more efficient while the volunteer system can offer greater flexibility in terms of type of service since more than one driver is available at one time. The level of exposure of the senior volunteer drivers, however, especially in systems with a limited pool of volunteers, does leave serious questions regarding the benefit of the system in terms of reducing the risk of accidents involving elderly drivers. What seems to be indicated, therefore, is a type of system which would maximize the advantages of both of these types of systems.

Relying on a paid driver jitney service for the back bone of the system would provide regular reliable service most efficiently. This system would operate in towns as well as in rural areas. However, it would be supplemented by volunteers in towns without taxis. All longer individualized trips to medical centers outside the county limit and for trips by those requiring escort service would also be the province of the volunteer service. The jitney would certainly perform inter-town trips within the county for groups of two or three passengers, but for larger groups the existing van would clearly be more efficient. The van would also be most appropriate for group excursions to shopping centers outside the region.

One additional function which is not frequently addressed within the region is the interface with the intercity bus and AMTRAK. Given the location of the remaining bus stops along the interstate highway at the periphery of the region and the current small numbers of passengers taking the bus, the role of linking with the bus would fall to volunteers in the counties not crossed by the interstate. The jitney would certainly be able to serve and even help market a linkage service in counties which are bordered by the interstates. Parallel roles would lie possible to provide trips to the AMTRAK stations.

FUNDING

As indicated above, any net addition to a rural transportation system would require incremental costs for the host system. Most rural transit or paratransit systems are heavily subsidized by a number of federal, state and local programs. The capital equipment including vans and minibuses are largely subsidized through section 16B2 funds while operating funds come from a variety of sources including Section 18, the most flexible of federal programs. Section 18 is a formula based

grant program for assisting with transportation of the "general public" in "other than urban areas." Funding can be used for assistance with capital, operating, or local administration costs. Although the program requires a 50% local match from other than UMTA funds, it has been possible to make up this 50% match through social service contracts, since the passage of the Leahy Amendment in 1985 ("Section 18 A Decade Later," Apr. 1988, p. 9, 10). Cross subsidy and additional funding comes through programs which provide for the transportation of particular client groups such as the elderly, low income or handicapped. For example, Title XX provides funding for transportation of social service clients, Title IX for Medicaid clients, Head Start funding for low income children, and Title III for transportation of the elderly through the Agency on Aging. A break out of the distribution of funding for rural public transit systems in Iowa in 1988 was as follows: 33% from local taxes, 27% from contracts for carrying specific client groups, 24% directly from the federal government and the remaining 12% from state and other sources, including personal contributions ("Rural Public Bus Systems Thrive In Iowa", Des Moines Register, April, 28, 1988).

Some states provide considerable additional funding for transportation of specific client groups. For example, Pennsylvania supports transportation for senior citizens with its lottery (Shultz, 1988). New York state has a $2 million state program to provide for operating assistance (Stommes, 1989, p. 51). Other states, like Iowa, contribute to operation of rural systems through oil overcharge funds. Local matching funds are required for most of these programs. For some rural public transit agencies the availability of this match money has been a limiting factor in the amount of subsidy which they could receive (Wilson, 1985, p. 107).

None of these rural systems are self supporting. Even OATS, a private non-profit system which involves volunteers in raising money from local communities, receives considerable federal funding for new vehicles and operating costs (The (OATS) Wheel, April, 1990). Fortunately federal assistance for rural transit has remained at a fairly stable level. In fact, Section 18 funds were slightly increased in 1989, but there still is very little funding to cover service expansion (Rucker, 1988, p. 6). The social service subsidies provide much needed supplemental funding based on mileage over which clients are transported. These funds are flexible in terms of transportation mode but they introduce substantial requirements in terms of reporting procedures and service priorities. For example, AOA funding prescribes priorities in terms of trip purposes: medical first, nutrition, second, etc. In order to receive mileage reimbursement these priorities must be respected. The result is that because of limited capacity, purposes with lower priorities, such as visits to friends are sometimes not able to be accommodated, even though making such visits may be very important to an elderly person's mental health.

With limitations in terms of capacity and the requirements associated with service priorities, most rural systems are inclined to invest available capital funds in vans or minibuses which can transport reasonably large numbers of individuals efficiently. Well-built vans also can accomplish many miles without an undue amount of maintenance. For between $24,000 and $36,000, an agency can purchase a minibus with sufficient capacity to take up to 17 passengers to a nutrition site. The same vehicle, would however, be most inefficient in taking one or two people visiting and shopping since it has an operating cost of $ .19 - .24 a mile, not including depreciation.

An automobile, on the other hand, would be ideally suited to more individualized trips and could be operated with parallel operating costs (including fuel, maintenance and insurance but not depreciation) of only $ .08 a mile. By extension, the automobile would be most appropriate for taking one or two people to medical appointments at a distance from town, reserving the minibus or van for a larger number of people going to the same destination or at least in the same direction. Unfortunately few systems are able to justify purchasing an automobile with public funds for such purposes. Hence volunteer programs insist that drivers supply their own cars. An enterprising system might be able to request a donation of a car from a civic-minded automobile dealership and then only need to continue to use federal funding from the AOA to help defray operating costs. Such a move would have the benefit of providing for a more flexible system and at the same time of building civic pride in the system.

Interest in flexible transportation is apparent in the use of taxis where available. In small towns where privately operating taxi systems are available, they can and frequently are used to provide shared ride service, especially in towns (Gilbert, 1977, p. 32, 40, Gallagher, 1978, p. 82-83). A user-side subsidy program such as that pioneered by the TRIP system in West Virginia (Curry, 1982), and Danville Illinois (Gallagher, 1978 p. 83) and currently used effectively in some sections of California enables the social service agencies to contribute to the cost of transporting clients by contracting with existing services like taxi companies (Stommes,1989, p. 43 and Gilbert, 1977, p. 40). In some systems clients of a social service agency or elderly individuals are provided with coupons which they turn in to the taxi as compensation for the trip. The cab operator can then turn these coupons in for reimbursement. Usually the prospective passengers pay a nominal fee for the coupon books, which then function much like food stamps. The TRIP program in West Virginia, for example, initially sold trip books of coupons worth $8.00 for $1 (Curry, 1982, p. 26). These coupons could be used on any available service. The TRIP system as a whole attracted an unexpectedly low number of riders, but the proportion of trips by elderly using taxis increased markedly. Over-all taxi trips increased from 20% to 40% of all trip making

(Curry, 1982, p. 67). Similarly, when a user-side subsidized shared-ride taxi program was introduced in Kingston, North Carolina, ridership of an existing taxi company increased 13.3% (Charles River Associates, 1980, p.6-7). For most rural areas, however, there are no existing taxi companies. The target area has four towns with small taxi companies that could be better integrated into an overall system.

The concept of a combination of contributions and user-side subsidies is well established in connection with service on the demand-responsive vans and in volunteer-operated automobiles. Since federally assisted systems are not permitted to charge a stated fare for service, most systems have a contribution box on the van or have passengers hand an envelop to the volunteer driver of a car. Unfortunately, these subtle approaches have generated very little revenue to help defray costs. For systems to be able to add more flexible service the passengers will need to contribute an increased share of the costs, especially when they are able to pay.

It is reassuring that many rural residents in the target area would be willing to pay at least part of the costs of a service which would meet their travel needs. Those who returned the trip logs were asked how much if anything that they would be willing to pay for a trip to the doctor, grocery, or to eat out, a surrogate for a recreational trip. The responses varied considerably by purpose. For example, 50.7% of them indicated a willingness to pay over $2.00 for a trip to the doctor and 28.8% would be willing to pay over $4.00. The average respondent would pay $1.00 to $2.00 for a trip to the grocery, but 9.3% of them would pay between $4.00 and $5.00 for such a trip. Less respondents would be inclined to pay for a discretionary trip to go out to eat, but nevertheless, 4% said that they would pay in the range of $1.00 to $2.00 and 9% said that they would pay $4.00 or more. These findings about willingness to pay are consistent with those of other systems which do charge for services associated with individualized or small group trips. Jaunt, an integrated rural transportation system operating out of Charlotte, North Carolina, requests that users pay $5.50 an hour to travel by car to a number of locations in the area, regardless of purpose (Wilson, 1985, p. 114). OATS charges full costs to riders for recreational trips and always has a full van. Even for demand responsive van service within a small town in Iowa residents were willing to pay $3.00 for a ticket entitling them to six trips. This is not to suggest that individuals be denied a trip because they cannot pay. Such a consideration could be accommodated if the coupon book approach to payment for trips were adopted. Books could be sold on a sliding scale, much like food stamps. Regardless, there should be a clear indication regarding the level of expected donations. The best time to introduce this concept is when the new service is introduced. The expectation gained from surveys and telephone interviews is that elderly residents would be willing to contribute to a system that would enable them to maintain their

independence.

An alternative approach would involve selling subscriptions which would entitle purchasers to a specified number of trips. This concept has been tried effectively in Des Moines, Iowa with C-Pals, a completely privately funded automobile-based system, whereby members receive unlimited trips in and around Des Moines for $100.00 a month. These subscriptions are frequently paid by younger residents to insure their parents of continued mobility without relying on driving their own car. This cost level and the concept of unlimited trips would be unrealistic for a rural system in an area with a sizable proportion of low income residents. A modification would, however, be possible, for example offering three round trips a week for rural residents for $10.00. Subscriptions would aid in scheduling and provide a regularized funding base, but the system would also need to accommodate the need for individual trips by non-subscribers, on a 24 hour call-in basis in order to serve the needs of all residents. This type of system would still need partial subsidies, but by being less dependent upon subsidies it would be able to provide rural residents with the opportunity for a more responsive flexible system and at the same time invite them to take a greater stake in the system and its continued success.

MARKETING

The automobile-based system described above, including the interface of a rural jitney service and a volunteer driver program, seems to respond to the needs which a sample of rural elderly identified in the surveys connected with the study. Yet without convincing, yet positive, encouragement the rural elderly will be reluctant to try the new system. Without riders any system is doomed to failure.

Since this new type of system is designed to appeal to a broader array of seniors than those currently using the available rural transit system, the nature of the appeal to these potential riders is critical. Typically, most independently minded rural elderly turn away from anything which looks or sounds like it is associated with government programming. Even though this new system would use unmarked cars, the incredulity to the seniors would need to be addressed.

Marketing studies seem to agree that standard media-based approaches do not appeal to elderly residents who are far more apt to follow the advice of a friend than some slick TV ads. In a comprehensive analysis of consumer socialization, one marketing professional determined that "the process by which consumers develop patterns of behaviors and cognitions" changes distinctly with life cycles (Moschis, 1987, p.81). According to Moschis most older people have about 15 friends who provide companionship, support and information. In fact these friends not only provide

sources of information but they also sift and validate information coming from other sources. Older people do watch a considerable amount of television, but they focus on TV advertising only after they have heard about a product or service from a friend. Generally TV spots are too brief to provide an initial appeal to the elderly, but they can reinforce an idea suggested by a friend. The elderly are typically avid readers of newspapers and will have time to focus more fully on information on a service described in the paper. However, to translate knowledge into action would again take a recommendation from a friend (Moschis, 1987, pp. 119, 157-158, 203).

With these ideas in mind it is possible to develop strategies which can effectively market the transportation system to a group which can be classed at best as "reluctant consumers". A key issue in developing this strategy will be to develop an appealing image for the system. As indicated earlier over 80% of the senior residents who participated in the telephone survey were familiar with the existence of the current rural systems in the area, the Southern Iowa Trolley and OATS, respectively. However, only a very small proportion associated their own transportation needs with these systems. They indicated that they drove or that they had friends who could help them. The implication was that they perceived these systems as available for those who had no other way to travel. If the augmented systems are to have broader appeal they will need to change this image.

As discussed above, the automobile-based systems would have a number of elements which could be stressed in developing this expanded image. Flexibility and availability are two key aspects. In addition, since the elderly place primary importance on the value of "the personal touch" (Pitts, and Woodside, 1984, pp. 214-215), the automobile-based system would have natural appeal. This could be further enhanced by emphasizing the service qualities expected from a familiar, caring driver. Where volunteer programs have been successful invariably the relationship with the drivers is highlighted. This close association with the driver was also clearly evident in interviews with current users of the rural transit systems in the target area. On the other hand, if the system is to appeal broadly to a variety of elderly residents, its image will also need to include aura of professionalism. A clubish transportation group, while very reassuring to those involved, appears exclusive to those not regularly involved. This is, unfortunately the image that some residents have of the existing van systems. With the smaller number of passengers involved in trips using an automobile based system this image is less likely to develop.

To be effective in marketing this new image to the rural seniors will, however, require using a word of mouth approach rather than relying on media presentations. One approach, similar to that used in community development, would seek to generate considerable local enthusiasm about the

augmented systems by appealing to community leaders who would then independently share information with potential users. If carefully set up, a public meeting involving these key community leaders would result in forming a type of coalition advisory group which would not only distribute information but would also begin the process of identifying the necessary volunteer drivers ("Public Transportation Coalition Building," 1989). The process would need to be replicated in most of the larger towns in the target region. This approach would have the advantage of enabling the communities themselves to "own the system" (Robinson and Lovelock, 1981 p. 43). Another approach, which could operate in tandem with that just described, would be to identify organizations and groups which involve elderly residents and appeal to them to personally contact members. This approach would involve contact with church groups, garden clubs, bridge clubs, fire department auxiliaries, etc. This approach would build on the idea that elderly residents rely on friendship groups for presentation and validation of ideas. In fact, this later approach to information dissemination is similar to that already used by OATS. Volunteers in each town serve as contacts for OATS and they frequently take a proactive role in encouraging friends and neighbors to consider riding with OATS (The (OATS) Wheel, April, 1990).

These marketing approaches will take considerable time and effort, but the potential for success is certainly far greater than simply distributing fliers and staging a ribbon cutting on the television evening news. The lack of success of the UMTA funded experiment in marketing the Cart System in Idaho Falls helps to confirm this perspective. There the system focused on repainting vehicles and placing newspaper notices in an effort to broaden its image. No ridership increase was reported (Cutler, 1986). If a system, like the one proposed, is initially marketed aggressively it will ultimately, begin to sell itself as early riders share information with their friendship groups.

CONCLUSION

The elderly residents of the rural Midwest are fully dependent upon a means of transportation not only to secure essential goods and services but also to assure the continued level of social interaction essential to maintaining their psychological well being. Through the years the automobile has been an essential ingredient in maintaining their quality of life. As small towns have declined and medical facilities have concentrated in larger centers this dependence has increased markedly. Much as the automobile represents an initial step toward independence for teenagers, to the elderly it represents the assurance of continued independence which has long been the hallmark of rural America.

Most elderly rural residents have never considered an alternate mode of transportation, and for most trips there has been no alternative. Hence many continue to drive even after the aging process has made it difficult to operate a car safely and effectively. Increased reliance on a friend or younger family member provides an alternative, but for many independently-oriented rural residents, this represents an intrusion on someone else's time, something to be avoided except in cases of necessity. Hence medical and grocery trips can frequently be accomplished, while social visits become impossible.

The existing rural transit systems similarly provide for basic food and medical trips, for a specific segment of the very elderly population, but not discretionary trips for the independently minded older residents. In the few towns where demand-responsive transportation is available it is heavily used, indicating the interest in such a system.

The current study has documented both an interest in a more flexible transportation system and the need, both in geographic and in personal terms. Census reports note a substantial elderly population in the target area, over 25% in some counties, and a high proportion of low income residents as well. Ten percent of the survey respondents indicated a disability that made it difficult for them to drive and 13% of the respondents indicated that, although they could drive, they drove only rarely and relied on a friend whenever possible. Others, about 23% of the respondents, indicated multiple concerns about driving but they still drove because there was no other alternative. Distances between towns in the target rural area were about ten to fifteen miles, but within the nine county target area there were only nine full service towns, defined as including a medical clinic as well as a grocery store, a bank and a variety of stores. The scatteration of population makes traditional fixed-route transportation inerfective especially for many-to-many service.

This study indicates that the appropriate response to the needs of the rural elderly would build on the flexibility which the automobile offers by providing an automobile-based system. Both a rural jitney service with a paid driver and a volunteer driver program were assessed in terms of: responsiveness to the the residents, furtherance of the objective of reducing exposure to accidents involving elderly drivers, and efficiency of start up and operation. In the assessment it was assumed that such a system would augment the current many-to-one service which is serving the nutrition sites and essential medical needs in the area. Minimizing costs was a major factor in the analysis. Hence the type of shared ride jitney system examined had only one car and one driver per county.

As was indicated above, the most effective system would be a hybrid involving one paid driver and augmented by volunteers. This would provide stability and reliability along with rapid a start up and would, at the same time, provide for the additional flexibility of multiple trips in town and the flexibility of longer trips outside the county. At the same time this would reduce some of the pressure on the coordinators to maintain a large volunteer pool.

Expressed need does not, of course, translate directly into demand, especially in the population described. When demand models derived from the experience of numerous rural demand-responsive systems were applied the results indicated a relatively small potential ridership. This is in keeping with the small population base in the target area. The single paid driver and one car could clearly supply the required number of trips. Given the types of trips needed and the limited amount of peaking anticipated for a retired group this amount of service should be sufficient at least initially. The expectation is that the elderly who currently use the van systems for trips to nutrition sites would continue to do so, thereby eliminating one key period of peaking.

The automobile-based system would appeal to two groups of elderly: first, the current transportation dependent group who would use the cars for relatively short distance social and shopping trips and longer distance medical trips; and second, those who could be considered choice riders--elderly residents who have access to a personal auto but are concerned about driving and would welcome a flexible alternative.

The second group might well include some residents with higher incomes. The physical deterioration that comes with age affects all regardless of income. As indicated above log keepers with a wide range of income levels expressed concerns about driving and the accident figures for the very elderly certainly reflect people with all income levels. However, elderly individuals, who

are not accustomed to relating to social service agencies, are frequently most reluctant to ride in a social service van. They will typically insist on driving even when they are not confident behind the wheel. A rural jitney would, however, potentially appeal to them by providing more personalized service.

Fortunately, the majority of survey respondents indicated a willingness to contribute toward a flexible transportation system. They were asked what they would pay for trips for different purposes and responses ranged from two to four dollars a trip. In some existing systems the requests for contributions are considerably higher than that for discretionary trips. Other systems have introduced a sliding scale policy to accommodate different income levels and to permit user-side subsidies where applicable. Coupon books or tickets could accommodate this need, much as have food stamps, and these could be discretely handed to either the volunteer or paid driver. Those who are able to pay can, in fact, indirectly provide a cross subsidy to others and play a part in maintaining the system. Although the system would be initially beamed at the elderly, it would be possible to expand to the general public if there were additional capacity.

No innovation of this type can be effective, however, in attracting elderly riders without a sensitive pro-active marketing program. In the past innovations, including some rural connection systems, have been unable to attract riders because they relied primarily on media events and news reports to announce the system. While that type of approach would be effective in wooing a younger set of clients, it is not appealing to the elderly who get information from a fairly narrow set of friends and associates and even rely on them for validation of television or newspaper advertising. Hence a multi-staged information sharing program is essential if the system is to be successful in attracting riders. Plans for such a marketing system must be developed at the same time as the system is being developed. In the case of OATS the network of volunteers associated with the system is largely responsible for informal marketing and has been very successful in their efforts. Here again, however, if the system is to appeal to a broad range of seniors, information sharing would need to involve a broad range of residents over 65.

The concept developed through this study is not unique. In fact, a variety of counties in Iowa and in other sections of the Midwest have initiated volunteer driver programs. Limitations imposed by the number and availability of volunteers and dependence on AOA subsidies, however, have largely restricted service to high priority trips for medical or nutritional purposes. The proposed concept would move beyond this level to a service that would be able to meet the purposes which the elderly themselves deem as high priority, visiting and discretionary shopping, including trips to the beauty parlor. Applicability to the target region is apparent although implementation would

depend on securing up-front costs and potentially attracting contributions locally. Broader application to other sections of the rural mid-west is also apparent, especially to areas with an array of small towns and higher order towns within a reasonable driving distance. The existence of a rural public transit system would also be a major advantage since start up costs would be greatly reduced and costs for administration, coordination, maintenance, and insurance would be incremental. A demonstration involving both a pilot system and a pilot marketing program is essential to testing these concepts in action. Nevertheless, the proposed system has potential appeal to the future elderly, in addition to enabling the current elderly to maintain an adequate quality of life in the rural Midwest.

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APPENDICES

TRANSPORTATION NEEDS IN RURAL AREAS

During the next few weeks members of an Iowa State University research team will be telephoning area residents to discuss their transportation needs. The team in concerned about travel opportunities in rural areas and small towns in view of greatly reduced bus service, rising gasoline prices, and the reduction of goods or services available in many small towns. In considering various approaches to providing transportation, it is important to to know where residents currently buy groceries, the doctor or even where they go for recreation.

Among those telephoned initially a smaller group will be asked to participate in keeping trip logs for a week to keep track of the type and direction of those trips. All responses will be kept strictly confidential and reported only as totals. Information gained from the study will assist in developing alternative approaches to meeting transportation needs in our area.

The study is sponsored by the Midwest Transportation Center and the Design Research Institute of Iowa State University.

News story distributed to media in southwest Iowa and northwest Missouri prior to the telephone screen.

TELEPHONE SCREEN

Hello Mr./Mrs._____. My name is _____. I am calling as a part of a study being conducted by the Mid-West Transportation Center of Iowa State University. We are concerned about future travel in rural areas and are considering various ways of providing trips to necessary goods and services. Would you be willing to answer a few questions for me? All of your answers will be kept confidential and we will report them only as totals.

1. Do you live in a town?
   No ----- If No: Ask A, B, and C:

   A. Do you live on a farm? No Yes

   B. What is the name of the closest town? _____.

   C. How many mile is it to that town? _____ miles.

   Yes ---- If Yes: What town is that? _____.

2. In what town do you usually buy groceries? _____.

3. In what town do you usually do your banking? _____.

4. In what town do you usually go to the doctor? _____.

5. In what town do you usually go out to eat a meal? _____.

6. Have you heard of the Southern Iowa Trolley or (OATS)?

   No ----- Go to Q7.

   Yes ---- If yes: Does anyone in your family use that service? No Yes

7. We are especially interested in travel of older Iowans. Are any people in your household 55 or older?

   No ----- Go to "Thank You" Statement.

   Yes ---- If Yes, ask A, B, and C.:

   A. How many people in your household are 75 or older? ____

   B. How many people in your household are 65 to 74? ____

   C. How many people in your household are 55 to 64? ____

IOWA STATE UNIVERSITY

Design Research Institute
College of Design
Ames, Iowa 50011

Telephone: 515-294-7427

June 23, 1989

Dear Transportation Study Participant,

Thank you so much for visiting with us on the telephone and agreeing to help us with our travel study. As the caller explained we are conducting this study for the Midwest Transportation Center. We are concerned about travel patterns of people who live in rural areas and small towns now that the price of gasoline is increasing and the number of stores and services available in some small towns is declining.

Our hope is make some suggestions as to various types of transportation which might be of help in rural areas. The elimination of bus service, for example, has made it difficult for some people to take longer trips to visit friends and relatives. We are considering trying to find other ways of meeting travel needs in the future. To do this we need to know where people do travel now.

Please take a few minutes to answer the brief questionnaire included in the booklet and then turn to the trip log. On the log you will find a place to write down each of the trips that you make outside your home during **A ONE WEEK PERIOD**. The log is set up to begin on **MONDAY**. However, if you receive your log later please begin with the appropriate day. There are examples given in the log to show you how to fill it in. Please note that each trip is one way. For example, you go to the store. Then you come home. This will make it possible for you to indicate trips to more than one town while you are out. As we indicated we shall call you during the week to see if you have questions and to record the results from your log. Please fill in a separate log for each person in your household over age 55. Be assured that all information will be regarded as confidential and only reported as totals for all participants.

At the end of the week. Please fold up the booklet, tape it shut and drop it in the mail. Postage has been provided.

Thank you for your help. If you have problems, feel free to call me at 515-294-7427.

Sincerely yours

Mary Kihl
Principal Investigator

MK:vm

8. Now I would like to ask whether your household would be willing to participate in the second part of our travel study. You would be sent forms to keep track of the trips that those aged 55 or older make in a one-week period. We will telephone twice during the week to get the results. We do need your help to plan to meet the travel needs of future residents. May we send you the second part of the study?

   No ----- Go to "Thank You" Statement.

   Yes ---- That's great! I'll send separate forms for each person in your house over age 55. Am I correct that that is _____ questionnaires? What address should I use?

   _____

   _____

   _____

Thank you for your time. Good-bye.

SMALL TOWNS AND RURAL AREA TRANSPORTATION STUDY

Thank you for agreeing to keep a travel log for us. We talked about this in a recent phone call to your household. This study is being conducted by the Mid-West Transportation Center of Iowa State University. We are concerned about future travel in rural areas and are considering various ways of providing for trips to necessary goods and services. To do this we need to know where people currently shop or go for other services.

Please keep track of the trips you make during the next week starting on _____. Please note the day you went out, where you went, and the purpose(s) for each trip. You are one of only a small number of residents in your area selected at random to participate in the survey, so your response is essential to the success of the project.

Please be assured that all information will be kept confidential and only reported as totals for all those participating in the survey. The numbers on the questionnaire are simply to help us with follow-up telephone calls. We plan to call you twice during the week to answer questions and get your report.

First, we need some background information.

1. Do you have a drivers license? Yes ____ No ____
   If no, did you ever have a drivers license? Yes ____ No ____

2. Do you have any concerns about:

driving at night?	Y____	N____
driving over long distance?	Y____	N____
driving in the winter?	Y____	N____
driving in crowded areas?	Y____	N____

3. Do you have any disability that makes it difficult for you

to drive?	Y____	N____
to travel?	Y____	N____

4. What is your age group?

55-64	____
65-74	____
75+	____

5. If the gas price rises to over $1.50 a gallon, will that make a difference in the length and number of trips you make?
   _____ No, I will still make the same type and number of trips.
   _____ Yes, I will probably make shorter trips.
   _____ Yes, I will travel less often.
   _____ Yes, I will make shorter trips and travel less often.

6. What alternative types of transportation would you use if they were available?

_____ a bus. For what purpose?_____
_____ a public van. For what purpose?_____
_____ a taxi. For what purpose?_____
_____ a shared ride program. For what purpose?_____
_____ ride with a neighbor or friend. For what purpose?_____
_____ none of the above

7. Have you ridden on a Greyhound or Jefferson bus in the last year?

Y_____
N_____

8a. If you had to use transportation other than your own car, what would you pay for a trip from your home to the grocery store and back?

_____ nothing
_____ $0.0 - .50
_____ $.51 - 1.00
_____ $1.01 - 2.00
_____ $2.01 - 3.00
_____ $3.01 - 4.00
_____ $4.01 - 5.00

b. What would you pay for a trip to the doctor and back?

_____ nothing
_____ $0.0 - .50
_____ $.51 - 1.00
_____ $1.01 - 2.00
_____ $2.01 - 3.00
_____ $3.01 - 4.00
_____ $4.01 - 5.00

c. What would you pay for a trip to go out to eat and back?

_____ nothing
_____ $0.0 - .50
_____ $.51 - 1.00
_____ $1.01 - 2.00
_____ $2.01 - 3.00
_____ $3.01 - 4.00
_____ $4.01 - 5.00

9. What is the range of the annual income for this household?

_____ under 5,000
_____ 5,000 - 10,000
_____ 10,001 - 20,000
_____ 20,001 - 30,000
_____ 30,001 - 40,000
_____ 40,001 - 50,000
_____ over 50,001

Please fill in the attached trip log, keeping track of your trips for one week. Then tape the booklet closed and return it to us. The address is printed on the outside of the survey and postage is attached.

Thank you for your help.

DAILY TRIP LOG

	Trip Start	Trip End	Main Purpose	Other Purpose	Vehicle Used	Did you drive? yes/no
Example:	home	Creston	groceries	doctor	my car	yes
MONDAY						
Morning						
Afternoon						
Night						
TUESDAY						
Morning						
Afternoon						
Night						

Senior Riders Survey

Where do you live?_____(town name)_

Is your home in town _____
or in a rural area _____
If in a rural area, how far from town?_____(how many miles)

How often do you ride the Trolley?
daily__, more than once a week___ weekly___ monthly____

Do you ride the trolley to go to other places besides the senior center? yes___ no___

For what other purposes?
doctor _____
groceries_____
other shopping_____
personal business_____
other _____

Do you have a driver's license? yes___ no ____
Did you ever have one? yes__ no___

How do you travel when the trolley isn't available, for example, to visit friends or go shopping?

my car___family car___friend's or neighbor's car____don't go_
other_____

Have you taken a bus (Greyhound) in the last year?
yes____ no_____

What are the best things about the trolley service?

Are there suggestions for improvement?

What would you say are the major transportation problems for senior residents of small towns and rural areas?

What is your age group?
under 65____ 65-75____ over 75_____