

Characteristics of Dallas, Texas, Taxicab Patrons: Results of a 1977 Survey

MELISSA A. EISENBERG AND WILLIAM G. BARKER

This paper presents the results of a survey of taxicab riders in Dallas, Texas. Besides a socioeconomic profile of the taxi ridership, differences and similarities among certain identifiable groups are also given. For this analysis, taxicab riders are first classified into two basic groups: residents and nonresidents. Resident taxicab patrons are further divided into three categories: transportation disadvantaged, middle-income persons, and the affluent. The sex, race, income, trip purposes, and availability of alternative modes of transportation of these different groups are compared. Respondents to the questionnaire were asked whether they would have taken the trip if the fare were higher by specific amounts. The resulting sensitivity of demand to higher fares is analyzed by income and trip purpose. Finally, the paper reports the responses regarding alternative transportation modes. Significant differences are noted between residents and nonresidents.

Information about taxicab users is scarce, and recent data on Dallas taxicab ridership appear to be almost nonexistent. However, in order to develop policy proposals that would facilitate the efficient use of taxis and provide better service to consumers, a basic knowledge of the market and demand characteristics is necessary. This report presents a socioeconomic profile of taxicab ridership, identifies the major user groups based on these characteristics, and examines the important differences between these groups for Dallas, Texas, from data collected through an in-cab driver-administered survey conducted August 9, 1977. The last section of the report discusses the demand for taxis in Dallas and compares the use of cabs with that of alternative modes of transportation. Of particular interest is the apparent impact of the rental car on taxicab ridership levels.

DALLAS SURVEY

Dallas, Texas, has three taxicab firms that provide local service to residents of and visitors to the city: Yellow Cab, Terminal Cab, and State Cab. As Table 1 indicates (1), there were more than 2 million taxicab riders in Dallas in 1976. These statistics do not include, however, any of the 268 124 passengers carried in 1976 by Surtran Taxicab, which then provided service almost exclusively from the Dallas-Fort Worth Regional Airport to Dallas, Fort Worth, and surrounding communities.

Fares, service levels, and cab appearance are regulated by the city of Dallas. Almost all of the drivers are independent owner-drivers, with the exception of a small number of company drivers with

Yellow Cab. All three companies provide radio dispatching.

Survey Approach

After months of research, including an analysis of a 10 percent sample of Dallas taxicab trip sheets for May 18, 1977, the survey was conducted on August 9, 1977. An in-cab, driver-administered questionnaire was used; i.e., the taxicab driver gave the questionnaire to the passenger, who, in turn, completed the form and returned it to the driver at the end of the trip. Of the 410 questionnaires distributed, 385 (94 percent) were returned, and 296 (72 percent) were usable.

Questionnaire

The questionnaire forms were printed on both sides of heavy-stock paper; one side was to be completed by Dallas residents and the other side by Dallas visitors. Each questionnaire had questions about the location of the patron's residence so that a check could be made to make sure the appropriate form was completed. Of the 296 usable questionnaires, 184 (62 percent) were completed by residents and 112 (38 percent) by visitors. [Copies of the questionnaires are available from the North Central Texas Council of Governments.]

Distribution Procedures

As mentioned previously, taxicab drivers were asked to distribute the questionnaires, which were to be completed by patrons while they were in the cab. An attempt was made to distribute the forms in approximate proportion to the number of trips normally carried by the three firms (Yellow: 66 percent, Terminal: 26 percent, State: 8 percent). In driver meetings that were held about one week before the survey date, drivers were orally instructed about the survey procedures. They were asked to fill in the date, cab number, and trip number (corresponding to the trip number from the trip sheet) on each of the 10 forms that each driver received. Trip characteristics from the trip sheet would later be matched with the survey forms. Drivers were asked to give a survey form to each of their first 10 patrons on August 9, 1977.

RIDER PROFILE

The first analysis of the data consisted of compiling a profile of the users of Dallas taxicabs. Such terms as age, sex, race, and income were examined.

Most Dallas taxi riders are of working age, although the young and the elderly are important user groups as well. Over half of all Dallas taxicab riders are between the ages of 22 and 45, and almost one-fourth are aged 46 to 64. Four out of every five riders belong to these two age categories. The age distribution of taxicab users is given in the text table that follows.

Table 1. Dallas taxicab statistics, 1976.

Company	Number of Cabs	Total Kilometers	Total Paid Kilometers	Total Trips	Total Passengers
Yellow Cab	300	15 947 860	7 192 485	958 992	1 372 180
Terminal Cab	181	3 772 665	1 649 358	404 155	626 816
State Cab	15	1 161 862	471 847	61 578	80 760
Total	496	20 882 387	9 313 690	1 424 725	2 078 756

Age	Percent
21 or under	8.3
22-45	58.8
46-64	23.6
65 +	9.2

Slightly over half of the respondents are female, and more than three-fourths of those surveyed are white. These figures closely resemble the sex and race distributions for the city of Dallas in 1977 (2). The following table displays these results.

Characteristics	Taxicab Riders (%)	1977 Area Population (%)
Sex		
Male	48.2	51.0
Female	51.8	49.0
Race		
Black	19.1	23.2
White	76.8	70.1
Other	4.1	6.7

Dallas taxicab riders are most likely to earn less than \$10 000 annually; 52.2 percent of the users who responded to the income question reported their yearly earnings at \$10 000 or under. This percentage is disproportionately high compared with the income distribution for the resident population in these categories. As will be shown later, most higher-income patrons are nonresidents, thereby further emphasizing the significance of the number of low-income riders. Results of research in other cities have also shown that low-income persons make intensive use of taxis (3,4). In addition, one out of every five resident taxicab patrons surveyed indicated that he or she was handicapped to some extent.

Kirby and others assert that nonresidents constitute a substantial taxi user group in many cities and that "the size of this segment of the market will probably vary markedly from city to city, depending on the city's importance as a tourist or business center, or as an interurban transportation interchange point" (5). In light of Dallas' importance as a regional commercial and trade center, as well as its emergence as a major convention city, it is not surprising to find that 36 percent of those surveyed were nonresidents. The survey date was chosen by Dallas officials as being "typical" with regard to convention activity.

The person most likely to be found in a Dallas taxicab is, thus, a white, female Dallas resident between the ages of 22 and 45 who has an annual income of \$5000 to \$10 000. She may have been able to use another form of transportation for that particular trip but found it more convenient to ride a cab. She probably is not handicapped.

TRIP CHARACTERISTICS

For the purpose of analysis, the day was divided into four time periods based on the results of an earlier report about trip characteristics in the city of Dallas (6). Of all taxicab trips, 81 percent are made between the hours of 4:00 a.m. and 7:00 p.m. Most are single-passenger trips, although 22 percent consist of two or more riders. The average trip length is 8.05 km (4.83 miles), and the mean fare is \$4.19. Evidence from reports in other cities indicates that there is little variation in the number of riders throughout the day, although slight peaks are exhibited during early morning, lunch hour, and late afternoon times (7). A large majority of cabs were hailed by telephone request (78 percent), but pickups constituted a substantial proportion (22 percent).

The work trip is the single most important trip purpose. Of the persons responding to the survey, 26.9 percent indicated their trip to be for this reason, and reports of taxicab use in other large cities substantiate this finding (4). The next most important trip purpose is business other than to work; 21.1 percent of taxi riders used cabs for this reason. Medical-related trips, shopping trips, and trips to the airport each account for approximately 10 percent of the ridership. Other important trip-purpose categories include trips from the airport, trips for entertainment, and trips for family or personal business. The survey results of trip distribution by purpose are displayed below.

Purpose of Trip	Percent	Purpose of Trip	Percent
To work	26.9	Personal or family business	4.2
Business other than to work	21.2	Vacation	1.4
Doctor or dentist	10.8	Visit	1.4
Shopping	10.4	School or church	0.5
To airport	9.4	Other	3.4
From airport	5.7		
Entertainment	4.7		

IDENTIFIABLE GROUPS

Dallas taxicab riders can be classified into two basic categories: residents and nonresidents. Differences between the two groups in terms of sex, race, income, trip purposes, and availability of alternative modes of transportation are identified in the following discussion. Resident taxicab patrons are further classified into three groups: transportation disadvantaged, middle-income, and affluent.

Nonresidents

As mentioned previously, 36 percent of the respondents were nonresidents. This category includes primarily businesspersons, since 74 percent of the nonresidents indicated that business was the purpose of their trips to Dallas. Of the nonresidents responding, 93.3 percent are between the ages of 22 and 64 and one-third earn more than \$25 000 per year, although all income categories are represented (see TABLE 2).

A substantial difference between the resident and nonresident subpopulations surveyed is in the proportion of males and females. In contrast to the nonresident distribution, 64 percent of the resident taxi users are female, and 46 percent of resident women riders do not have driver's licenses. Thus, nonresident cab riders tend to be white males of a working age and are likely to belong to higher income groups. These statistics strongly suggest that important differences exist between resident and nonresident cab riders.

Residents

For purpose of analysis, resident taxicab patrons will be classified into three broad and somewhat overlapping categories based on the rider-frequency patterns exhibited by the various income groups, as well as the findings of earlier research. They are (a) the transportation disadvantaged (includes the elderly, the handicapped, those in lower income groups), (b) the middle-income riders (those earning between \$10 000 and \$15 000 annually as of August 1977), and (c) the affluent riders (those whose annual earnings are greater than \$15 000). Social

Table 2. Characteristics of resident and nonresident cab riders.

Attribute	1977 Dallas Population (%)	Taxicab Rider Survey (%)	
		Residents	Nonresidents
Age			
21 or under	40.5	9.9	5.3
22-45	33.6	53.9	68.0
46-64	18.0	22.7	25.3
65+	7.9	13.5	1.4
Race			
Black	23.2	24.0	10.2
White	20.1	71.0	87.2
Other	6.7	5.0	2.6
Sex			
Male	51.0	36.0	71.0
Female	49.0	64.0	29.0
Yearly income (\$000s)			
<5		33.1	4.0
5-10	36.0 ^a	33.8	22.7
10-15	19.0	14.6	17.3
15-25	27.0	11.5	22.7
25+	18.0	7.0	33.3
Driver's license			
Yes		54.0	94.0
No		46.0	6.0

^aThis figure also includes those with annual incomes of less than \$5000.

and economic characteristics of each category will be examined to facilitate a better understanding of the motivational differences in taxicab use among Dallas residents.

Transportation Disadvantaged

Although people aged 65 and over constitute 7.8 percent of the population in Dallas, they account for 13.5 percent of the taxicab ridership (8). Similarly, whereas 6 percent of the city's population is handicapped, 20 percent of the resident taxi-survey respondents reported some limiting physical disability. Together, the two groups accounted for 29 percent of the resident cab riders on August 9, 1977, a disproportionately high amount considering that they make up only 13 percent of the population. Thus the taxicab appears to be an important means of mobility for the elderly and particularly the handicapped.

A vast majority of older and handicapped cab patrons are female. The percentage of women in these two groups is disproportionate to the number of women in the city's population as well as in the sample population. Females constitute 74 percent and 84 percent of the handicapped and elderly taxicab patrons, respectively. The characteristics of elderly and handicapped resident taxicab users are given below.

Characteristic	Elderly (%)	Handicapped (%)
Sex		
Male	16.0	26.0
Female	84.0	74.0
Income (\$000s)		
<5	50.0	45.8
5-10	27.8	33.3
10-15	11.0	0.0
15-25	5.6	16.7
25 +	5.6	4.2
Monthly use of cabs		
Once or less	10.5	14.8
2-3 times	42.1	37.1
4-10 times	26.3	29.6
More than 10 times	21.1	18.5

More than three-fourths of the elderly do not own automobiles or possess driver's licenses (77.8 percent), and 83.3 percent could not have driven

themselves. Most of those over 65 years of age could have used another form of transportation, however; 71.4 percent said they could have obtained a ride in another automobile, and 60 percent could have ridden a public bus. On the other hand, the handicapped riders surveyed have greater access to private automobiles than do the elderly. Half of the handicapped respondents reported that someone in their household owned a car, although 63 percent of these respondents do not have driver's licenses. Of the handicapped respondents, 77 percent could not have driven themselves, 64 percent could have been a passenger in another automobile, and half would have been able to take a bus.

Another type of transportation disadvantaged, the low-income group, in Dallas consists predominantly of younger adults and females. Most taxi riders who earn less than \$10 000 per year are 22-45 years of age, and approximately two-thirds are women. Of all resident taxi riders surveyed who had annual incomes under \$10 000, approximately 29 percent are black and almost all of the remaining low-income patrons are white.

Taxicab patronage among the transportation disadvantaged is characterized by a moderate rate of rider frequency. Of all those whose annual incomes are \$5000 or less, over one-half reported using cabs four or more times per month, and 45.4 percent of those earning between \$5000 and \$10 000 ride taxis this often. Rider frequency is greater for those in the lower-income bracket, and substantial differences are exhibited in three of the frequency categories. Rider frequencies, automobile ownership, and possession of driver's permits for lower-income residents are shown below.

Characteristic	Annual Income (%)	
	Less Than \$5000	\$5000-\$10 000
Monthly use of cabs		
Once or less	16.3	34.1
2-3 times	30.2	20.5
4-10 times	20.9	22.7
More than 10 times	32.6	22.7
Own car		
Yes	41.5	61.4
No	58.5	38.6
Driver's license		
Yes	32.6	58.1
No	67.4	41.9

Of the low-income resident cab patrons surveyed, there is a large group of frequent riders who use taxis primarily to travel to work. Many of these people could not have driven themselves, ridden in another car, or taken a bus; many are from households that have no car. Over half are female. Kirby and others attribute the widespread use of taxicabs among low-income persons to "the lack of any cheaper nonautomobile alternative with comparable flexibility," since some demand cannot be accommodated by means of the fixed schedules inherent to public transit (5).

The transportation disadvantaged (elderly, handicapped, and low-income) are an important class of taxicab users in the city of Dallas, accounting for approximately 70 percent of the resident ridership. The group is characterized by a low incidence of automobile ownership; a disproportionately large number of females, elderly, and handicapped persons; low annual incomes; and a moderate rate of rider frequency. A substantial number of these people are dependent on the taxicab for certain essential trips, particularly for medical and work trips, and many have no alternative mode of transportation. More than three-fourths of those considered to be

transportation disadvantaged rated the taxicab service in the city of Dallas as either good or excellent.

Middle-Income Taxi Riders

The number of middle-income taxicab riders in the survey (14.6 percent) is closely proportional to their number in the population in Dallas (19.0 percent). Middle-income residents use cabs more regularly than those in other income brackets; almost three out of every five ride taxis four or more times per month. Nearly three fourths of the people in this income group are age 22 to 45. Except for the very affluent, fewer women are found in this group than in any other, and more whites belong to it than to the other income categories. Social and economic measures of the middle-income taxicab ridership are displayed below.

<u>Characteristic</u>	<u>Percent</u>
Age	
21 or under	0.0
22-45	73.7
46-64	15.8
65 +	10.5
Sex	
Male	42.1
Female	57.9
Race	
White	94.7
Black	5.3
Other	0.0
Monthly cab use	
Once or less	21.0
2-3 times	21.0
4-10 times	32.2
More than 10 times	36.9
Own car	
Yes	63.2
No	36.8
Driver's license	
Yes	68.4
No	31.6

A large number of middle-income respondents indicated that their residences were in North Dallas, and many reported living in the Park Cities. During the past few years, thousands of apartment communities have been established in these areas, thus increasing the population density and the traffic congestion. Many of the new complexes cater to young adults and, from the data, it seems reasonable to believe that a large number of the middle-income patrons reside in the new areas. Approximately two-thirds of these respondents possess driver's licenses and own automobiles, although this same number said that they could not have driven themselves for the trip. Half would have been able to ride a public bus and 38.5 percent could have been a passenger in another car.

The taxi trip purpose most often cited by this group was to work, and the next most frequent reason for using taxis was business other than to work. One-fourth of all business trips are made by people in this group, a disproportionately large amount relative to their percentage in the survey sample.

Intensive use of taxicabs is made by females in this income group. Although they constitute a little over half of the middle-income ridership, females account for nearly three-fourths of the most frequent taxi users. Almost half (45.4 percent) of the females in this group were traveling to work.

Frequent ridership, particularly by females, characterizes taxicab patronage among middle-income persons. These people are relatively young and use

the cab primarily for the journey to work, although business trips constitute a substantial proportion of all rides undertaken by people in this group.

Affluent Riders

Cab users who earn over \$15 000 per year constitute 18.5 percent of the resident taxi ridership. Several other reports have found disproportionately large numbers of affluent taxi riders, although, as previously discussed, most of the affluent Dallas users are not residents. The group of upper-income resident cab patrons is characterized by lower rates of rider frequencies than those exhibited in other groups. One-third of those who earn over \$15 000 annually use taxis four or more times monthly, and 37.5 percent said they ride cabs less than once a month.

Although nearly three out of every four riders in the \$15 000-\$25 000 income category are female, this pattern is dramatically reversed in the \$25 000 and over bracket, in which 88.9 percent of the riders are male. Only among the very wealthy do males constitute a larger percentage of the taxicab patronage. Almost 71 percent of the affluent riders are age 22 to 45, and more than four-fifths are white. The spatial distribution of affluent riders resembles their distribution in the city; more than 50 percent live in North Dallas.

As expected, the overwhelming majority of cab riders who earn over \$15 000 annually belong to a household in which some member owns an automobile, and more than 83 percent of them possess driver's licenses. However, almost half of those in the \$15 000-\$25 000 income bracket and two-thirds of those who earn more than \$25 000 reported that they would have been unable to drive themselves on that particular trip, and even more could not have obtained a ride in another car. Several upper-income passengers indicated that they would have been unable to use a bus for the survey trip.

In light of the high incidence of automobile ownership, it is surprising to find so many of this group unable to have driven themselves for the trip during which the survey was administered. Kirby asserts that extensive taxicab use is made by professionals and managerial workers for business meetings, lunches, and other daytime appointments (5). It is often faster, easier, and cheaper to use a taxicab than to deal with traffic congestion, parking shortages, and parking costs. Earlier reports have documented the widespread use of cabs by professionals and managerial workers, and one-fourth of the affluent resident taxi patrons surveyed gave business other than to work as their purpose. Beimbom found that 26.7 percent of the taxicab ridership in Chicago is composed of professionals, technicians, and managerial workers (9). The figure was 48.3 percent for New York in 1969 (3). Low rider frequency for this group suggests the use of taxis for irregular or unexpected trips.

EFFECT OF HIGHER FARES ON DEMAND

Included on the Dallas questionnaire was an item that asked respondents whether they would have used a taxi for that particular trip had the fare been increased \$0.50, \$1.00, or \$2.00. Below are the results for taxi riders who responded to this question.

<u>Increase in Cost</u>	<u>Percentage Willing to Pay</u>		
	<u>Residents</u>	<u>Nonresidents</u>	<u>All Patrons</u>
\$0.50	94.8	92.9	94.3
\$1.00	84.3	88.2	85.5
\$2.00	76.1	86.2	79.8

The sensitivity in demand to higher fares can also be estimated by income and trip purpose, as shown in Figures 1 and 2. For residents, an increase of \$0.50 beyond the original fare would bring about the greatest decrease in demand among those earning \$15 000 to \$25 000 and those using cabs for shopping. In most cases, fare increases up

to \$1.00 bring about the greatest reduction in demand for taxi service for categories of income and trip purpose. However, cost does not affect behavior among the affluent until a \$2.00 increase is reached, and demand from people using taxis for medical purposes is not responsive to cost increases beyond \$1.00. Results of the analysis also show that the percentage of people willing to pay a higher fare generally increases as the original fare becomes greater.

Figure 1. Demand for taxicabs at higher fare by income (residents).

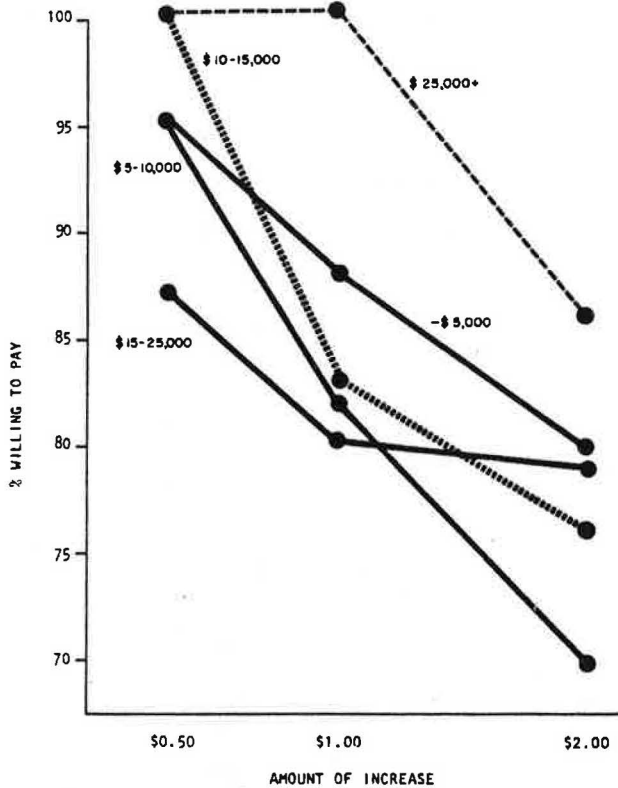
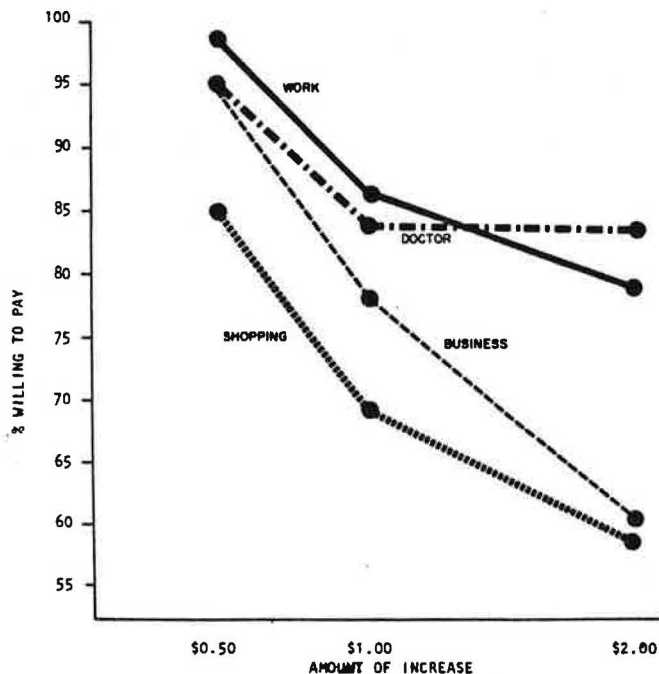


Figure 2. Effect of higher fare on taxicab demand by selected trip purposes (residents).



An examination of the correlation matrix of the variables in this analysis reveals no single factor that accounts for a large proportion of the variance in willingness to pay higher cab fares. From Figure 2, it can be seen that the number of trips taken by residents for business and shopping would be the most severely reduced by fare increases, while trips to work and to the doctor would decrease the least. For visitors, convenience is a primary impetus for taxicab use, and the benefits of the taxi are seen to outweigh the costs even at high price levels. Residents, on the other hand, are more aware of transportation alternatives and, when fares become high, it is likely that they are diverted to other modes.

ALTERNATIVES TO THE TAXI

In recent years, the rental car has gained in importance as an alternative to the taxicab. In order to examine the impact of higher taxi fares on other forms of transportation, survey respondents were asked to indicate their alternative transportation mode had they been unwilling to pay higher prices for their trips. Again, because substantial differences are expected to exist between residents and nonresidents, the two groups will be examined separately.

The most frequently cited alternative among resident taxicab riders is the bus. Of those refusing to pay a higher cab fare, 41.5 percent said they would use public transit; 37.7 percent would use a personal car. Less than 4 percent of these people would rent an automobile, and 5.7 percent could walk instead of ride. Only 3.8 percent of those refusing to pay more would forgo the trip entirely. Most of the demand diverted to public transit would consist of people who have low annual incomes and the proportion of those who indicate the bus as their alternative tends to decrease with increasing income. A positive relationship exists between the number of those specifying private cars as their option to the cab and income; as annual income increases, so does the percentage of those diverting to personal automobiles. Slightly over one-fourth of the car owners unwilling to pay more for their trip would choose to ride a bus, but most would prefer to drive. A majority of the taxicab trips for work and medical purposes would be undertaken by car; however, most business and shopping trips would be made by bus. In summation, among residents unwilling to pay higher cab fares, the automobile would be the preferred alternative among upper-income persons, car owners, and people traveling to work and to the doctor. Public transit would be used by lower-income groups, those without automobiles, and people traveling for business purposes. The rental car is unimportant to residents as an alternative to the taxicab because the cost, even to frequent riders, would be unreasonable compared with other options.

To nonresidents, however, the rental car is an extremely feasible alternative, preferable even to public transit in many cases. Half of those surveyed would rent an automobile if they were unwilling to incur higher taxicab fares; the next

most popular choice (27.8 percent) is the bus. The private automobile and walking each received an 11.1 percent response as the alternative mode to the taxicab for nonresidents. It is often easier for one unfamiliar with the city to determine where it is he or she must go and the best route to take by car rather than try to figure out which bus comes closest to the destination, as well as how to catch it. Flexibility and ease outweigh costs and make the rental car a feasible alternative to the taxicab among nonresidents. High taxicab fares are no doubt beneficial to the rental-car business.

SUMMARY OF FINDINGS

Taxicabs are an important component of the transportation system in Dallas to residents as well as nonresidents. Taxicabs are used by people from all social and economic backgrounds, although particularly intensive use is found among females, the elderly and the handicapped, people of middle incomes, and visitors to the city.

Cabs are used out of convenience as well as necessity. Examining the possible changes in taxicab use with respect to fare reveals that cost is least prohibitive to the very affluent and to those going to work and to the doctor. Rider frequency appears to be more closely related to trip purpose and the availability of alternative transportation than to earnings.

POSTSCRIPT

Since this survey was taken in August 1977, several changes have occurred in the Dallas, Texas, taxicab scene. First, the Dallas-Fort Worth regional Airport was opened to all taxicab companies in January 1979. Before this, only Surtran taxicabs had been allowed to pick up at the airport and all others could drop off only. Now, all registered cabs may pick up and drop off both at the airport and in town.

A rate increase was instituted in the spring of 1979. This increased the Dallas taxicab fare for a 5-mile trip by about 30 percent. One of the reasons this fare increase was instituted was to attract additional taxicabs into service. As of December 1979, the number of licensed cabs in Dallas was 780, which is up considerably from the time of this survey.

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