NATIONAL COOPERATIVE
HIGHWAY RESEARCH PROGRAM REPORT 209

MARKET OPPORTUNITY ANALYSIS FOR SHORT-RANGE PUBLIC TRANSPORTATION PLANNING

TRANSPORTATION SERVICES FOR THE TRANSPORTATION DISADVANTAGED

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL

NOTICE

This report is one of a series of five emanating from NCHRP Project 8-16, "Guidelines for Public Transportation Levels of Service and Evaluation," as follows:

NCHRP Report 208, "Market Opportunity Analysis for Short-Range Public Transportation Planning — Procedures for Evaluating Alternative Service Concepts."

NCHRP Report 209, "Market Opportunity Analysis for Short-Range Public Transportation Planning — Transportation Services for the Transportation Disadvantaged."

NCHRP Report 210, "Market Opportunity Analysis for Short-Range Public Transportation Planning — Economic, Energy, and Environmental Impacts."

NCHRP Report 211, "Market Opportunity Analysis for Short-Range Public Transportation Planning — Goals and Policy Development, Institutional Constraints, and Alternative Organizational Arrangements."

NCHRP Report 212, "Market Opportunity Analysis for Short-Range Public Planning — Method and Demonstration."

A full picture of the results of the project research requires all five reports. How they complement each other is shown in the diagram below and also is explained more fully in the Foreword of each report.

Please note that the current mailing (October 1979) includes only the first four of these reports. Production and mailing of the fifth will be delayed until Spring of 1980. As a member of TRB in 1979 you will automatically receive Report 212 at the time it is published without further action on your part.

We regret this inconvenience caused by circumstances beyond our control.

Policy	Marketing	Engineering
NCHRP Rpt. 211 Short-Range Transportation Goals and Policy Development for Urban Communities Institutional Issues Facing Public Transportation Organization of a Public Transportation Market-Oriented Approach	NCHRP Rpt. 209 Transportation Services for the Transportation Disadvantaged NCHRP Rpt. 212 A Market Opportunity Analysis Approach to Short-Range Public Transportation Planning Methodology and Demonstration of a Market Opportunity Analysis for Short-Range Public Transportation Planning	NCHRP Rpt. 208 Procedures for Local Selection and Cost Evaluation of Alternative Public Transportation Service Concepts NCHRP Rpt. 210 Economic, Energy, and Environmental Impacts of Public Transportation

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TRANSPORTATION SERVICES FOR THE TRANSPORTATION DISADVANTAGED

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AREAS OF INTEREST:
PLANNING
SOCIOECONOMICS
(PUBLIC TRANSIT)

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C. OCTOBER 1979

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

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The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to its parent organization, the National Academy of Sciences, a private, nonprofit institution, is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the Academy and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are responsibilities of the Academy and its Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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Notice

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FOREWORD

By Staff
Transportation
Research Board

Recent Federal legislation and regulations require that special consideration be given to facility utilization by transportation disadvantaged persons, particularly the elderly and the handicapped. To meet this need, this report is directed to: (a) transportation decision-makers such as elected officials at all levels of government; (b) policy makers having responsibility for developing guidelines in this field; and (c) those in appointed bodies, such as transportation authorities, who must attempt to implement programs for the transportation disadvantaged under existing legislation and guidelines. Although the report is not directed to transportation planners and engineers, they will find substantial material to assist in developing information for decision-makers on alternative courses of action.

Public transportation traditionally has been provided by fixed-route service financially supported through revenues from passengers. Reduced patronage, resulting primarily from increased use of the automobile plus higher operating costs, has caused growing deficits. Public concern about energy, environment, auto dependency, congestion, and the quality of urban living in general has obliged governments to underwrite these deficits in most urban areas. The rising amounts of required public monies plus the successful operation of a wide range of services directed at more specialized market segments have posed questions concerning how much financial support is appropriate, what services are required, and how these services should be provided. Public officials need this information in order to establish appropriate public policies.

Project 8-16 was initiated in order to develop a method to provide public officials with the desired information and direction for local public transportation actions. The initial 12-month period of the project was spent conducting an in-depth analysis of present procedures and practices of the urban mass transit industry. Included in this effort were research team visits to 18 urban areas within the United States. From this research process, a model (Fig. I) was developed depicting the necessary information and procedural steps required for the application of market opportunity analysis to the planning of short-range public transportation. As depicted in the model, the application of market opportunity analysis requires both direction from policy decision areas and data from an engineering data base. A full explanation of this model, its application, and potential value is presented in *NCHRP Report 212,* "Market Opportunity Analysis for Short-Range Public Transportation Planning—Method and Demonstration." Four companion reports are concerned with the application of a market-oriented public transportation planning approach. These constitute a group of reports that bear the main title "Market Opportunity Analysis for Short-Range Public Transportation Planning," and are subtitled as follows: *NCHRP Report 208,* "Procedures for Evaluating Alternative Service Concepts"; *NCHRP Report 209,* "Transportation Services for the Transportation Disadvantaged"; *NCHRP 210,* "Economic, Energy, and Environmental Impacts"; and *NCHRP Report 211,* "Goals and Policy Development, Institutional Constraints, and Alternative Organizational Arangements." Obviously, all elements

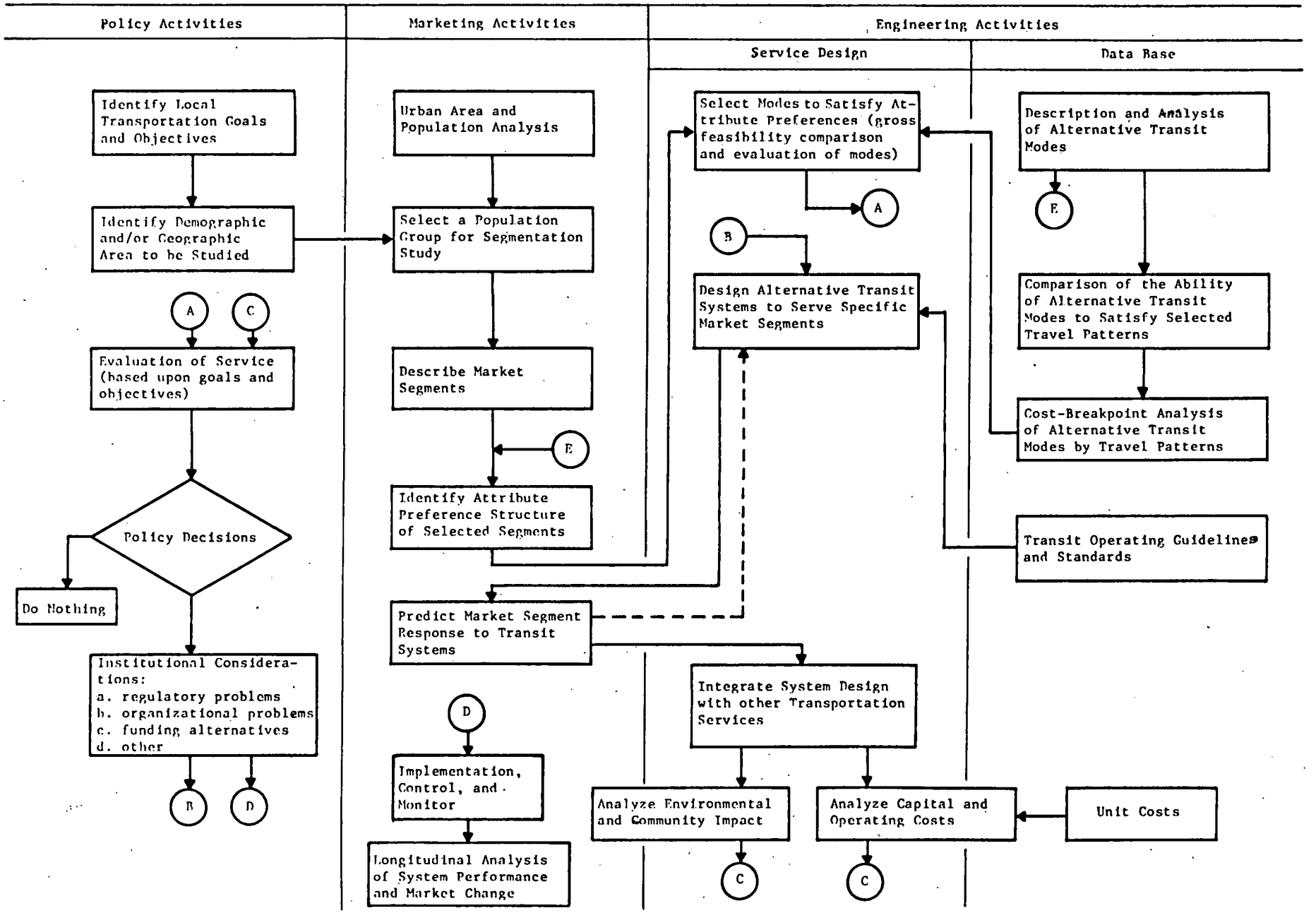


Figure 1. NCHRP Project 8-16 model—a market opportunity analysis approach to short-range public transportation planning.

of the comprehensive planning model could not be addressed in one report. Thus, each report is aimed at one specific segment of the over-all model as shown in Fig. II for this report. Together, the reports provide comprehensive guidelines for public transportation officials covering the three primary activities described in the model—policy, marketing, and engineering (Fig. III).

The present report, "Market Opportunity Analysis for Short-Range Public Transportation Planning—Transportation Services for the Transportation Disadvantaged," addresses issues arising from provision of transportation services to the transportation disadvantaged in response to recent legislation and regulations. Social and economic impacts are substantial. Recommendations are developed on the premise that existing legislation and regulations are susceptible to change. Through an elucidation of the issues and alternative courses of action, this report should help in the future selection of more efficient, economical, and socially acceptable approaches.

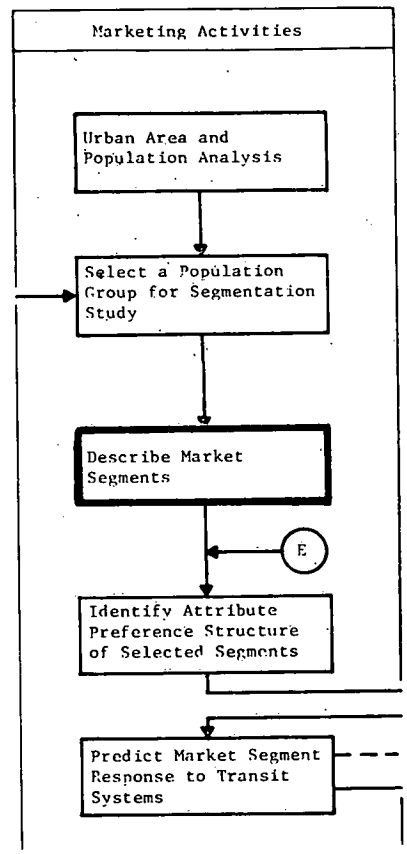


Figure II. Relationship of report to project model.

Policy	Marketing	Engineering
NCHRP Rpt. 211 Short-Range Transportation Goals and Policy Development for Urban Communities Institutional Issues Facing Public Transportation Organization of a Public Transportation Market-Oriented Approach	NCHRP Rpt. 209 Transportation Services for the Transportation Disadvantaged NCHRP Rpt. 212 A Market Opportunity Analysis Approach to Short-Range Public Transportation Planning Methodology and Demonstration of a Market Opportunity Analysis for Short-Range Public Transportation Planning	NCHRP Rpt. 208 Procedures for Local Selection and Cost Evaluation of Alternative Public Transportation Service Concepts NCHRP Rpt. 210 Economic, Energy, and Environmental Impacts of Public Transportation

Figure III. NCHRP Project 8-16 reports.

CONTENTS

PART II

ACKNOWLEDGMENTS

The research reported herein was performed under NCHRP Project 8-16 by The University of Tennessee Transportation Center. Drs. Ray A. Mundy and Kenneth W. Heathington were the principal investigators. The authors of this report are Dr. Thomas C. Hood, Associate Professor, Department of Sociology; Dr. Thomas L. Bell, Associate Professor, Department of Geography; Ms. Carol A. Sovchen, Research Assistant, Transportation Center; and Dr. Kenneth W. Heathington, Director, Transportation Center.

During the course of this research project many public transportation individuals, too numerous to mention, were interviewed or filled out questionnaires concerning their services for the transportation disadvantaged. Their assistance and cooperation are greatly appreciated.

MARKET OPPORTUNITY ANALYSIS FOR SHORT-RANGE PUBLIC TRANSPORTATION PLANNING

TRANSPORTATION SERVICES FOR THE TRANSPORTATION DISADVANTAGED

SUMMARY

This report is a part of NCHRP Project 8-16, "Guidelines for Public Transportation Levels of Service and Evaluation," which is directed toward the development of improved methodology for short-range public transportation programs in small-to-medium-sized urban areas (50,000 to 500,000 population range). The material presented is based on information gained from: (1) the many site visits to urban areas by the research team members, (2) a review of appropriate articles and reports from the literature, and (3) personal experience of actual incidents occurring in the transportation field.

The Urban Mass Transportation Administration (UMTA) and Federal Highway Administration (FHWA) joint regulations require "the urban transportation planning process to include special efforts to plan public mass transportation facilities and services that can be utilized effectively by elderly and handicapped persons." (See regulations 23 CFR Part 450 and 49 CFR Part G13.) In addition, Section 502 (C) of Public Law 93-112 established that the Architectural and Transportation Barriers Compliance Board ". . . shall determine what measures are being taken . . . to eliminate barriers from public transportation systems (including vehicles used in such systems), and to prevent their incorporation in new or expanded transportation systems." Further, Section 504 specifies that "No otherwise qualified handicapped individual in the United States . . . shall, solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance." This report examines problems addressed by the guidelines of this legislation.

Whatever the problems of providing service to the disadvantaged, communities should respond for both humane and legal reasons. Alternatives seem to be either to make an entire transit system accessible or to provide specialized service for the disadvantaged. Previous attempts to provide specialized service have proven so inefficient that some major urban areas have decided to look at systemwide accessibility. This strategy of providing systemwide accessibility is not without problems. In this report, alternative approaches are outlined that can meet the needs of the transportation disadvantaged as well as the financial requirements of urban communities.

There are basically two approaches to planning mass transportation facilities and services for the disadvantaged—an aggregate approach and a market segmentation strategy. Both of these approaches are addressed and reviewed as to their potential in meeting the needs of the transportation disadvantaged and in developing services that are efficient, effective, and economical. The aggregate approach pools the three user groups of the disadvantaged population: elderly, handicapped, and low income. However, an aggregate approach cannot respond effectively, efficiently, and economically to the needs of all market segments. A

characteristic of the aggregate approach is that it does not subdivide the mobile elderly, the handicapped, and the low income categories into more than three user groups by user needs. On the other hand, the aggregate approach represents an improvement over the approach of various human service agencies (Veterans Administration, United Cerebral Palsy, Easter Seal Society, etc.), which define user groups as limited to their own clients. The aggregate approach attempts to estimate total use made by the transportation disadvantaged. Although this is a significant advance, specific needs of the disadvantaged markets have not been described.

A market segmentation approach reviews the many market segments within the total disadvantaged population. Each of these market segments has differing needs and must be addressed by differing services. There is such a wide variety of needs within the total disadvantaged population that one cannot meet all of those needs through a single service. This report discusses seven market segments that are easily identifiable within the total disadvantaged population. This report does not intend to infer that there may not be more market segments that need to be defined within the total disadvantaged population. A true market segment is composed of individuals who desire a specified service and are willing and able to use the service.

Past efforts to serve equitably the transportation disadvantaged have been hampered by competing definitions of clientele by agencies, groups, and well-meaning individuals who provide service. Although much of this service has been provided with good intent, and some with high quality, coverage has been spotty. Little information is available on how much duplication of services has been funded because agencies have client definitions that overlap. However, a cursory review of ongoing services for the transportation disadvantaged would indicate that there is a substantial amount of duplication occurring in the provision of transportation services.

Trying to define a transportation market in terms of the particular group of disadvantaged persons (i.e., disabled veterans) to be served can result in chaos unless their needs are specifically related to characteristics of transit services. As an example, there may be many market segments within the disabled veterans group. Some disabled veterans would be able to drive an automobile, whereas others might be able to drive but could not financially afford to do so. Other disabled veterans might be ambulatory and could use regular transit services, whereas others might need door-to-door service. The most severe case, of course, would be those disabled veterans needing to be transported by ambulance services. By providing funds for transportation services for a particular grouping (i.e., disabled veterans), one attempts to aggregate several market segments that should not be placed together in the provision of transportation services.

It is unlikely that a single service can meet the needs of all market segments of the transportation disadvantaged in an efficient, effective, and economical manner. The needs of the users are too diverse. Radical vehicle modifications are necessary for only a small portion of the transportation disadvantaged, if the surveys reviewed in this report are correct. Given the small percentage who appear to fall into the severely handicapped, systemwide modification of vehicles to service this group does not appear to be logical or cost-effective. A more efficient, effective, and economical option would be to provide this disadvantaged group with user-side subsidies to buy necessary transportation services rather than to modify an entire transit system to meet their needs.

The current UMTA regulations and the supporting legislation appear to be based on an undifferentiated image of the types of uses that the transportation

disadvantaged make on the system. The stereotype tends to place all disadvantaged persons into the most severe categories. Much effort seems to be oriented toward systemwide accessibility, through modifying vehicles and creating a barrier-free environment. Equal service need not imply that the same mode must be used by all market segments. Efficient planning suggests that different services could be designed to meet different needs and that services can be coordinated to ensure total coverage and minimize duplication. To move in this direction requires understanding of two concepts: (1) the transportation disadvantaged includes a large number of individuals who have more than one claim to service. Programs must recognize that they have overlapping clientele. (2) The transportation disadvantaged make varying demands on the transportation system of the community. Services should be designed that take these differences into account.

Urban public transportation systems are facing the need to satisfy two major objectives: (1) to provide transportation that will reduce the use of the private automobile and (2) to provide transportation to the handicapped that will comply with Section 16(a) guidelines. Unfortunately, the two objectives often conflict with one another. The special equipment for loading, securing, and discharging nonambulatory users may slow down the handling process of all patrons. Public attitudes toward providing transit service for the handicapped in urban areas must be considered when cities attempt to comply with provisions of Section 16(a). The nonhandicapped may be critical of the time it takes to load and unload nonambulatory clients. Care must be taken to assure that the commitment to the nonambulatory passenger does not deprive the ambulatory or other disadvantaged groups from good service. It is questionable whether many of the nonambulatory handicapped would use the bus on a daily basis if such equipment were available. Bus usage would be a function of the severity of the handicapped. Many uncontrollable factors, such as weather conditions, curb heights, location of transit stops, and need for transfers influence usage rates of the nonambulatory handicapped. The severely handicapped who could be accommodated on conventional transit only with extensive modification to the vehicle and careful training of drivers and attendants make up a very small percentage of the disadvantaged population. It is not equitable to redesign and retrofit an entire transit system to meet the needs of relatively few individuals if the bulk of the passengers would be inconvenienced by such provision.

Reasonable accommodation of all market segments can be achieved only by providing a range of services that provides access and mobility to all. No one vehicle or type of service can have all of the characteristics needed or considered desirable by all market segments. To maintain rigidly that all market segments must be accommodated on board conventional public transportation systems is self-defeating. One acceptable way for urban areas to meet the spirit of Section 16(a) regulations is to provide a mix of public transportation services such that each provides the highest level of service possible to the appropriate market segment.

Many nonprofit human service agencies view transportation only as a supportive service necessary to meet client needs. However, some human service agencies, such as United Cerebral Palsy and the Easter Seal Society, have transportation as a primary mission. Consolidation of transportation needs is a pressing problem in the human service area, but institutional and funding barriers exist. There is a need to coordinate services at all levels of government. Some funding programs provide money only for operating agency-owned and agency-operated transportation programs. These funding programs that discourage consolidation and encourage wasteful duplication should be eliminated. The 16(b)(2) program of

UMTA helps to proliferate the number of office agencies providing transportation services. Other funding programs permit purchase of services or client reimbursement. These programs encourage consolidation and should be strengthened. Current funding programs tend to be limited to clients with particular disabilities. Funding programs for the transportation disadvantaged should recognize that the poor, the elderly, and the handicapped are overlapping categories and may be segmented based on needs, and transportation services should be provided that will most effectively meet their needs.

Currently, user-side subsidies are in limited use. The federal, state, and local transportation divisions need to educate transportation providers to the benefits of user-side subsidies. Existing transportation providers could increase their services by meeting the needs of the disadvantaged, especially to low income markets, while decreasing the need for capital expenditures. The major obstacle to the efficient use of any transportation assistant funding is the lack of knowledge, coordination, and procedure at federal, state, and local levels. Emphasis should be placed on coordination at the state and local levels. One step towards correction is for each state to publish and distribute a list of all available funds with the eligibility criteria, restrictions, and authorized costs of each fund. In addition, each state needs to provide a manual on procedures because of the complexity of funding. This will assist transportation providers in using available funds for their systems at the state and local levels.

From the review of several programs offering transportation services for the disadvantaged, it is found that costs of the service are often high when provided by special agency-owned and agency-operated programs. However, further accurate comparable data are difficult to find. Adequate record keeping is not a characteristic of many of these agencies. Although the initial support for programs often comes from the federal level, funds may be deleted after the program is underway. The more stable long-term programs at the local level are supported by local funds.

The availability of service to the transportation disadvantaged is very difficult to evaluate in communities that have not done a survey or that do not provide some communitywide demand-responsive service. The level of service provided varies markedly. One concern is the amount of waiting time for demand-responsive service. Some service requires days of advance notice. Service to the disadvantaged should be equal to that provided other persons.

The utilization of services determines the acceptability of the service to the consumer. If a system is to be considered successful, there should be a reasonable level of use. However, in many of the systems reviewed, it is questionable as to the acceptance by the disadvantaged population, if viewed from the number of users of the system.

The coordination of programs is perhaps the leading need in serving the transportation disadvantaged. Cooperation can be fostered by creating services that serve a specific market segment of the disadvantaged population. Coordination will eliminate duplication of services and gaps in the service to the disadvantaged. Coordination can be fostered by opening lines of communication among transportation providers.

This report includes 12 conclusions and recommendations. The solutions to the provision of transportation services to the disadvantaged are not easily derived. The provision of transportation services to the disadvantaged is enmeshed in a political, financial, and emotional environment. Unless a clear, concise, and rational approach can be taken to these problems, satisfactory solutions will be difficult to achieve. The following conclusions and recommendations attempt to

extract much of the political feelings and emotionalism associated with programs for the disadvantaged:

1. *Conclusion.* There are several market segments within the disadvantaged population, each requiring special services, vehicles, and varying financial support. Funding programs tend either to group all segments aggregated into one market (e.g., UMTA funding) or to group into segments that are not meaningful for transportation purposes (e.g., most human service agency funding).

Recommendation. Funding of transportation for the disadvantaged should be consolidated at all levels of government. The consolidated program should then segment the disadvantaged market and develop services to meet the needs of each segment in a cost-effective manner.

2. *Conclusion.* All market segments of the transportation disadvantaged cannot be grouped together and be adequately served by a "standard" vehicle and/or "standard" service. The needs of the several disadvantaged markets are too varied (i.e., need for door-to-door service, door-through-door service, wheelchair accommodations, ease of entry and exit for the blind, seeing eye dogs, information, etc.) to be met through a "standard" service and/or vehicle.

Recommendation. A concentrated effort must be made to match vehicle characteristics and services with the needs of the various market segments of the transportation disadvantaged rather than to attempt to provide one type of vehicle and service to all market segments.

3. *Conclusion.* It does not appear to be effective, efficient, or economical to modify and retrofit an entire fleet of vehicles comprising a public transportation system in order to serve the needs of the severely handicapped. The conclusions from studies that suggest that retrofitting of an entire public transportation system is appropriate will be greatly altered by changing some of the basic assumptions used in the studies. There has not been enough research to determine with accuracy the real needs for transportation services of the disadvantaged. Some of the studies treat the disadvantaged as one market segment. This, of course, is not true, and economies of scale for consolidation of market segments of the disadvantaged have not been determined.

Recommendation. Level of service needs of the disadvantaged must be met, but not necessarily by traditional public transportation systems' vehicles and equipment. When the needs of the severely handicapped (segments 6 and 7) are known, monies should be made available to providers (either public or private) and users so that the service needs of these groups can be met in a cost-effective manner.

4. *Conclusion.* Program funding of transportation for the disadvantaged often does not encourage or permit consolidation efforts. There is very little communication and/or coordination in local communities between agencies providing transportation services.

Recommendation. At all levels of government there should be a concerted effort to coordinate transportation programs for the disadvantaged. A brokerage transportation concept (in which demand is matched to vehicles capable of providing high levels of service in a cost-effective manner) is appropriate for providing transportation services to the various market segments of the disadvantaged. An agency at the community, regional, and/or state level should have the responsibility to ensure that this coordination occurs.

5. *Conclusion.* Human service agencies generally provide transportation services to their clientele in a particular manner because of the restrictions placed on their funding. Some restrictions may be from political/jurisdictional hindrances.

Recommendation. More flexibility must be attained in the use of funds for providing transportation services to the disadvantaged. This flexibility must provide for alternatives that will help make programs cost-effective and eliminate duplication.

6. *Conclusion.* How funds are used for transportation services for the disadvantaged often is restricted too greatly by state and local governments.

Recommendation. State and local governments must become more knowledgeable of the inefficiencies created by undue restrictions placed on utilization of funds for providing transportation services to the disadvantaged. State departments of transportation should assume an educational role and provide seminars and short courses on effective ways of providing transportation to the disadvantaged.

7. *Conclusion.* Some human service agencies are "empire builders." They are more interested in increasing their budgets, employing more personnel, and operating more equipment than in providing a cost-effective program to their clientele.

Recommendation. Human service agencies should be permitted to purchase transportation services either by contract or with user-side subsidies. They should not be permitted to establish their own transportation systems with paid employees. This restriction should not apply to volunteer transportation programs.

8. *Conclusion.* There is much duplication in transportation services provided by private agencies (e.g., United Cerebral Palsy, Easter Seal Society) and public human service agencies. Often the private agencies, especially those that provide services to the severely handicapped, are more oriented toward a market segmentation approach than the public agencies.

Recommendation. Public agencies should take advantage of the transportation services provided by the private agencies. Duplication of services should not exist. Funds should be used, where appropriate, to assist the private agencies in providing transportation services.

9. *Conclusion.* Transportation is provided by some small-scale human service agencies primarily as a support service for meeting other client needs. Transportation's supporting role expands the scope of agency programs. This program expansion often results from the feeling that if the agency does not provide for client transportation, no one will.

Recommendation. Agencies should view transportation provision in terms of relevant demand characteristics of the segment(s) they serve. Interagency cooperation should be encouraged; similarities in the market demand characteristics of client populations should serve as the basis for cooperative transportation programs. Transportation planners also need to view the disadvantaged as differentiated segments that place different demands on the transportation system.

10. *Conclusion.* Human service agencies often argue that they can provide transportation services with their own personnel more economically than by contracting with privately owned public carriers. However, the data do not support this argument except in cases where human service agencies use volunteer labor. It is generally found that the true costs of human service agencies cannot be readily determined because of inefficient record-keeping and the omission of certain costs, such as administration and depreciation.

Recommendation. Each human service agency should be required to provide "true costs," as is required by UMTA regulations pertaining to charter services provided by public transportation systems. If the true costs are greater than the costs required by privately owned public carriers, privately owned public carriers should be used.

11. *Conclusion.* In some instances there is substantial competition between human service agencies' transportation services and privately owned public carriers. At times this has caused an adverse effect on ridership of the privately owned public carriers. This competition is similar to the competition in charter services between publicly owned and privately owned transportation systems. Section 16(b)(2) subsidies provided to nonprofit agencies for vehicle and equipment purchase have the effect of drawing some clientele away from private suppliers, such as taxi companies. This federal subsidy tends to erode the competitive basis of the free enterprise system. Free market forces tend to reduce the cost of services provided to the disadvantaged clientele. By reducing the size of the market of the private suppliers there will, of course, be a reduction in the number and capacity of private suppliers or the cost of services will be increased.

Recommendation. All subsidies, including Section 16(b)(2), for providing transportation services to the disadvantaged should be evaluated as to their impact on private, for-profit providers (e.g., taxi companies). Tax monies should not be used to offer competition to the private sector.

12. *Conclusion.* Criteria used to evaluate the transportation services for the disadvantaged vary widely.

Recommendation. The following criteria should be adopted as the standards for comparison and evaluation of programs: (1) cost of service, (2) financial support for the program, (3) availability of the service to the transportation disadvantaged market segments, (4) level of service provided, (5) utilization of the service, and (6) coordination of the program with other services (both public and private) in the transportation system.

CHAPTER ONE

USING A MARKETING APPROACH FOR THE TRANSPORTATION DISADVANTAGED

The Urban Mass Transportation Administration (UMTA) and Federal Highway Administration (FHWA) joint regulations require "the urban transportation planning process to include special efforts to plan public mass transportation facilities and services that can be utilized effectively by elderly and handicapped persons." (See regulations 23 CFR Part 450 and 49 CFR Part G13.)

In addition, Section 502(c) of Public Law 93-112 established that the Architectural and Transportation Barriers Compliance Board ". . . shall determine what measures are being taken . . . to eliminate barriers from public transportation systems (including vehicles used in such systems), and to prevent their incorporation in new or expanded transportation systems." Further, Section 504 specifies that "No otherwise qualified handicapped individual in the United States . . . shall, solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance." This report examines the problem addressed by the guidelines of this legislation.

Providing equal service to the disadvantaged poses perplexing problems to which urban officials are attempting to respond in a humane and efficient way. Service to the transportation disadvantaged is often found to be costly, poorly coordinated, and a source of vested interest for existing social service programs. By taking a marketing approach to this area of transportation planning, it is possible to offer solutions to at least some of the difficulties of providing transportation for this important segment of the urban population. The marketing approach taken here provides for equal service to all user groups in order to meet the requirements of the law.

California's concept of equivalent facilitation is an example of how different markets could receive equal service. "Equivalent facilitation" is a concept used in California's architectural barriers law to determine when a building may be excused from full accessibility. Thus, all parts of a building need not be fully accessible if, in portions that are usable by the handicapped, all facilities normally sought and used by the public are available. According to Chapter 7, Division 5 of Title 1 of the California Code, if these criteria are met, ". . . it is clearly evident that equivalent facilitation . . . is thereby secured."

Any alternative transit service, to have full accessibility, must pass the following test for equivalent facilitation.

1. *Equivalent origin/destination.* The average able-bodied user of public transportation has a choice of destinations determined primarily by the matrix of the current transit system. In a reasonably extensive system, the user may choose equally between work, shopping, entertainment, visiting friends, etc. Demand-responsive modes that restrict options may not provide such equivalency.
2. *Equivalent trip-decision time.* An equivalent alternative system must require no more advanced decision to travel than the average able-bodied user on the primary system. Thus, on a system with an average 20-minute headway, for example, the typical user needs to decide to travel a maximum of 20 minutes prior to departure plus travel time to point of entry to the system, and cannot decide to change destinations enroute.
3. *Equivalent travel time.* Average travel time between any two points should be no longer on an alternate system than it is on that used by the able-bodied population.
4. *Equivalent transfer frequency.* In a system in which, to get from any two points in the service area, one transfer is considered usual, two are considered acceptable, and three are unacceptable, the same should be true of the alternate system (*1*).
5. *Equivalent service range.* Service for the handicapped must ultimately extend over the entire service area.
6. *Equivalent fare.* The fares charged on an alternate system must be no higher than those charged to the able-bodied using the primary system, including transfer charges, reduced fare requirements notwithstanding.

PAST APPROACHES TO SERVING THE TRANSPORTATION DISADVANTAGED (*2, 3*)

Section 16(a) of the Urban Mass Transportation Act of 1964, as amended, states:

> It is . . . to be the national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services; that special efforts shall be made in the planning and design of mass transportation facilities and services so that the availability to elderly and handicapped persons of mass transportation which they can effectively utilize will be assured; and that all federal programs offering assistance in the field of mass transportation (including the programs under this Act) should contain provisions implementing this policy.

Further, a handicapped person is defined in Section 16(d) as:

> . . . any individual who, by reason of illness, injury, age, congenital malfunction, or other permanent or temporary incapacity or disability, is unable without special facilities or special planning or design to utilize mass transportation facilities as effectively as persons who are not so affected.

These definitions exemplify the approach usually taken to resolve the problem of transportation provision to the disadvantaged. Past efforts to provide transportation to the disadvantaged have focused on the social services, both government-sponsored and various voluntary nonprofit groups. Possibly, because these programs and agencies have been seen as the groups most knowledgeable in dealing with the disadvantaged, they have been given money to provide transportation for the elderly and for various types of handicapped persons, depending on the specialty of the agency. (Chapter Three details the problems created by this funding policy.) As many have noted, this funding policy results in a piecemeal approach and in a variety of vehicles and schedules. In most urban areas, no one knows completely the extent to which the transportation disadvantaged are being served by the human service agencies, by transit systems, and/or by private suppliers. What is known is what each particular agency is doing and to some extent what the programs cost. Record-keeping is a problem. Many agencies view transportation as an ancillary service, use volunteers, and often have record-keeping systems that provide very limited data. (Chapter Four provides more details on record-keeping practices).

Whatever the problems of providing service to the disadvantaged, communities must respond for both humane and legal reasons. Alternatives are either to make an entire transit system accessible or to provide specialized service for the disadvantaged. Previous attempts to provide specialized service have proven so inefficient that some major urban areas have decided to look at systemwide accessibility. This strategy fails to use sound logic. Alternate approaches are outlined that can meet the needs of the transportation disadvantaged as well as the financial requirements of urban communities.

Given available census data, one suggestion might be simply to aggregate the elderly, the handicapped, and the economically disadvantaged; plot them on a map and see what mode (properly modified to accommodate them) would meet their needs most economically. However, disadvantaged persons have unique characteristics that influence their ability to use various modes of travel. Thus, although it is possible to determine the potential over-all population of the transportation disadvantaged, it is difficult to predict how much they will use the transit system.

Two approaches to planning effective mass transportation facilities and services for the disadvantaged—the aggregate approach and the market segmentation strategy—will be discussed.

AGGREGATE APPROACH

The aggregate approach pools the three user groups of the disadvantaged population: elderly, handicapped, and low income. The aggregate approach represents an improvement over earlier service provision programs that overlap these client categories. However, no such aggregate

analysis can respond adequately and efficiently to the needs of all market segments.

The following section deals with the problem of aggregating the transportation disadvantaged for the purpose of estimating the total number of users and their trip demands for a given community or urban area. The problem is complicated by lack of existing data on the transportation disadvantaged and by the fact that the groups overlap. A step-by-step analysis illustrates the problem.

Two recent reports indicate that over 50 percent of the transportation handicapped are elderly. Crain and Courington (*4*) report that about 68 percent of the transportation handicapped in Portland, Oreg., are 65 or older (elderly). Ellis et al. (*5*) report that their survey using the nationwide Consumer Mail Panel (CMP) maintained by Market Facts, Inc., showed 52.9 percent of the transportation handicapped to be elderly. The definitions of the transportation handicapped used in these two studies are comparable. Figure 1 shows the overlap between the elderly and the handicapped. The shaded portion of the diagram represents overlap of the smaller transportation handicapped group with the larger elderly group. More than half of the transportation handicapped qualify for transportation programs designed and funded to serve the elderly. The amount of overlap found in any given urban area will vary; the exact percentage of overlap can be estimated only by a survey of that area.

The transportation handicapped also overlap with the low income population. The Portland study reports about 60 percent of the handicapped live in households with family incomes of less than $5000 (*4*). The national study reports 31.6 percent with family income of less than $6000 (*5*). Figure 2 illustrates the overlap between the handicapped and the low income categories. In this case, the community and national surveys show less convergence in estimating the magnitude of this overlapping segment. A substantial portion of the handicapped can be expected to qualify for programs designed to benefit low income individuals. Each urban area will vary in the amounts of overlap, and the exact percentages of overlap can be determined only by a survey of the service area.

The Portland study includes information on the third area of overlap—low income and elderly. Figure 3 shows overlap between these two groups. About 40 percent of the able-bodied elderly in Portland have incomes of less than $5000. This percentage applies to the elderly handicapped as well (about 45 percent of the moderately handicapped and about 39 percent of the severely handicapped) (*4*). These figures are comparable to a national estimate based on census data that approximately 39 percent of the elderly have household incomes of $5000 or less (*6*). (These figures are not to be confused with the percentage of poverty level individuals who are elderly and living in metropolitan areas. This figure was approximately 18.6 percent in 1969 (*7*).) The amounts of overlap between these two client groups will vary for each urban area. A substantial portion of the elderly qualify for services to the low income, although recent figures show a decline in numbers of the elderly who fall below the poverty level.

The entire disadvantaged group with its overlapping segments can be illustrated by Figure 4. The sizes of circles and overlaps represent the relative sizes of the various aggregates composing the total potential market. Conceived in this way, source or cause of disability for the disadvantaged may be onefold, twofold, or threefold. In order to avoid overestimating the total group in an urban area, the number of potential users in each client group must be calculated. The total potential market is calculated by adding up the number of persons in each client group. An alternative way of calculating the number of people in the potential market would be to take all of the handicapped and add to them the portions of the low income and the elderly, designated by the letters, I, IE, and E in Figure

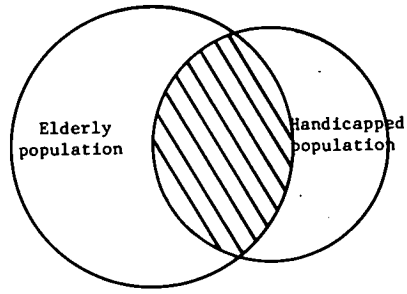


Figure 1. Overlapping segments of the transportation disadvantaged market—elderly and handicapped.

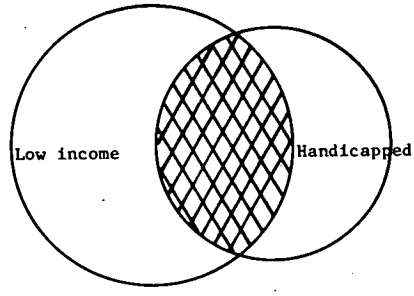


Figure 2. Overlapping segments of the transportation disadvantaged market—handicapped and low income.

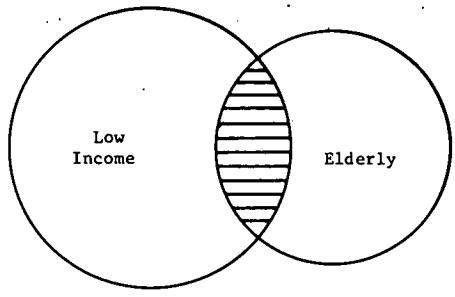


Figure 3. Overlapping segments of the transportation disadvantaged market—elderly and low income.

4. Very limited data on the number of persons in the area EHI are available. From the available data previously cited, the largest percentage of overlap appears between the handicapped and the elderly. The second largest appears between the elderly and the low income. The smallest overlap appears between the handicapped and the low income. In Portland, slightly more than 40 percent of the low-income handicapped are elderly (*4*).

National figures estimating the size of the handicapped population are difficult to obtain because several different definitions and estimates are used. Both the national and Portland surveys are studies that limit the definition to persons who would have difficulty performing various activities required in using different modes of transportation.

The Portland study estimates 5.75 percent of the 385,000 residents of Portland to be transportation handicapped (*4*). In the national survey 3.7 percent have difficulty using one or more modes of transportation (*5*). Both figures are considerably lower than general estimates of the handicapped population obtained from various other surveys. The President's Committee on Employment of the Handicapped reports from the 1970 census that 9.3 percent of all persons aged 16 to 64 and not institutionalized have had some handicap for 6 months or more (*8*). Allan (*9*) reports the results of a 1972 survey by the Social Security Administration, which show that 14.6 percent of all noninstitutionalized persons between the ages of 20 to 64 are handicapped. This aggregate figure can be broken down into 7.3 percent severely handicapped (unable to work), 3.3 percent with occupational disability (not able to do the same work as before or to work full-time), and 4.1 percent with only secondary work limitation. The 1974 Health Interview Survey of the civilian, noninstitutionalized population of the United States reports 14.1 percent of the population limited in activity. This percentage may be broken down into 3.5 percent limited, but not in major activity; 7.3 percent limited in amount or kind of major activity; and 3.3 percent unable to carry on major activity (*10*). The last two categories combined would seem to constitute the closest estimate of the transportation handicapped, but only the last category would appear to include all the activity limitations found in the national study (*5*). The fact that 51 percent of those unable to carry on major activities are elderly parallels the percentage of overlap found in the national study.

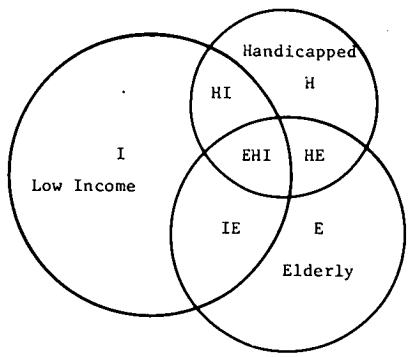


Figure 4. A conceptual view of the relative overlaps in the market for services to the transportation disadvantaged.

In summary, one can be conservative or liberal in estimating the size of the handicapped market for which special services and extreme modifications should be provided. The smaller figures based on surveys specifically oriented to transportation-relevant characteristics seem most sensible. At the present time, this figure should be under 10 percent for most urban areas and about 4 to 7 percent in many of them (*9*).

The relative sizes of the other two portions (the elderly and the low income) of the transportation disadvantaged market are somewhat easier to calculate. As of July 1, 1975, the Bureau of the Census estimated 10.5 percent of the population to be 65 or older (*11*). Although poverty may be a more complicated concept than low income, on the same date 17.6 percent of the population were below 125 percent of the poverty level figure of $2,955. Thus, the magnitude of the three groups represented in Figure 4 can be portrayed as follows: handicapped, 4 to 7 percent; elderly, 10.5 percent; low income, 17.6 percent. These estimates cannot be summed because the groups overlap.

Most urban areas will want to obtain current estimates of the number of elderly, handicapped, and low income in their communities by doing a survey. Data on disability categories from the fourth count (5 percent sample) of the 1970 Census are available, but must be drawn from the data tape. The procedure followed in estimating the size of the groups for any urban area from existing data would be to use the numbers from the census, if available, or if not, to use the national averages. For example, data for the Jacksonville, Fla., SMSA were aggregated to obtain an estimate of the potential service demand required by the disadvantaged. According to the 1970 Census, Jacksonville had a population of 528,865.

Market potential is a measure of the total number of people who are potentially available to all organizations offering a specific service within a given time period and geographic area. The market demand, D, is defined as a function of two factors: the number of people included within the market boundary, N, and the average usage rate of the service by these people that can be expected, R. Demand within a potential market in a designated time period, t can be formalized as (*12*):

$$D_t = N_t \times R_t \qquad (1)$$

In order to identify the potential number of disadvantaged, the number in each segment (the handicapped, the elderly, and the low income) must be estimated. For the purpose of working out a hypothetical example, some national estimates are applied to Jacksonville. This is a dangerous practice, if used in an actual planning situation, because estimates should be made on the basis of local surveys. A handicapped individual is identified as any person with an activity limitation caused by a chronic condition. As previously noted, the most recent national health survey estimated 14.1 percent of the general population to have an activity limitation; 32.4 percent of this group are 65 or older (*10*). Removing the elderly leaves a

percentage of 9.5. This figure still includes an undetermined percentage of low income, nonelderly handicapped. Further, all but 1.62 percent are able to carry on some or all of their major activities. The persons with an activity limitation in Jacksonville would be $0.095 \times 528{,}865 = 50{,}242$ (areas H and HI in Figure 4).

To continue the hypothetical exercise, the 1970 Census data for Jacksonville shows 89,717 individuals below the poverty level. Of this group, 13.9 percent are 65 years old or over (*13*). To eliminate overlapping in this grouping, the elderly percentage is removed. After subtracting this percentage, the low income segment of Jacksonville that is not elderly would be $0.861 \times 89{,}717 = 77{,}246$ (areas I and HI in Figure 4). This number would contain some handicapped who are also low income.

Data from the 1970 Census indicate that 39,665 persons in the Jacksonville area are 65 or older. This number would include subgroups E, HE, IE, and EHI in Figure 4. The number is about 7.5 percent of the total Jacksonville population.

Addition of the three segment totals gives the number of potential disadvantaged within Jacksonville as 167,173. The only portion of the market counted twice is that represented by HI in Figure 4. Estimation of the number of potential disadvantaged users of transportation services in Jacksonville is summarized in Table 1.

This estimating procedure may be applied to any city. The figures obtained would be an indication of the potential handicapped, poor, and elderly in a given population. A detailed research and survey application would be necessary to determine the exact size and location of any of the segments and the total population of disadvantaged.

Before potential desired service is estimated, an average usage rate of the service by the disadvantaged must be determined. Hartgen et al. (*14*) indicate the average number of one-way trips made by the disadvantaged in metropolitan areas (Table 2). (An effective marketing study would attempt to assess latent demand as well.) These data are limited to travel patterns of the disadvantaged who are working during the day. Such individuals may have different travel patterns than the nonworking disadvantaged population. Statistical data obtained on travel patterns may be inaccurate, because the independent research used was not composed of random samples from every survey (*14*).

Most female handicapped in metropolitan areas are not employed, according to the President's Committee (*12*). In Jacksonville, 71 percent of the males over 65 also were not employed (*13*). The unemployment rate for females was not available but probably is higher (*7*). In Jacksonville, 14.6 percent of the low income group are receiving social security benefits and may not be employed. Approximately 49 percent of the handicapped are male (*10*). On the basis of the foregoing data, the following employment rate estimates were established for the sample calculation: handicapped, 49 percent (all of the males); elderly, 25 percent; low income, 85 percent. To estimate users for the work trip, take only the percentage of Table 1 estimates who are thought to be employed.

To establish the potential market demand for transit service by the disadvantaged, a segmentation approach is used. Total demand in a market, D_t, is composed of the sum of the demand in each segment ($i = 1, 2 \ldots, n$) factored by the usage rate, R (*12*):

$$D_t = \sum_{i=1}^{n} N_{it} \times R_{it} \qquad (2)$$

By applying this formula to the data in Tables 1 and 2, the demand for Jacksonville is determined (see Table 3).

These figures provide an estimate of the total potential demand for transportation trips for the disadvantaged. There are limitations in this formula, however, because some overlap between market segments has not been eliminated. Also, the desired number of trips may vary for any given segment or for the total group. The geographic location and transportation services in an area could have an effect on the rate of usage by the disadvantaged. For example, a large urban area may have shopping facilities, medical clinics, and other facilities within walking distance of the potential users. Further, many elderly may prefer to use vans provided by social service agencies rather than travel in transit buses.

This formula is useful as an approximation of the number of disadvantaged persons and their potential service use. Use of service is measured by trips per week. Once this transportation demand has been calculated, an evaluation of what services should be offered can be conducted. This technique provides estimates of total trips but does not determine characteristics of the service requirements for various portions of the transportation disadvantaged market. That problem is, however, addressed in the market segmentation approach that follows.

TABLE 1

HYPOTHETICAL ESTIMATES OF TRANSPORTATION DISADVANTAGED FOR JACKSONVILLE, FLA.

	% Ratio	Population of City	Potential Users
Handicapped (excluding elderly)	9.5	528,865	50,112
Low Income (excluding elderly)	14.6	528,865	77,246
Elderly	7.5	528,865	39,665
		Total Potential Users	167,173

*Based on National data for example purposes only.

TABLE 2

ONE-WAY WEEKLY TRIPS BY THE EMPLOYED TRANSPORTATION DISADVANTAGED IN METROPOLITAN AREAS

Segment	Work	Non-work
Handicapped	8.5	7.0
Elderly	6.3	5.3
Low Income	9.0	10.2

TABLE 3

ESTIMATED DEMAND FOR WORK AND NON-WORK TRIPS AMONG DIFFERENT SEGMENTS OF THE TRANSPORTATION DISADVANTAGED IN JACKSONVILLE, FLA.

Work trips/One-way (per week)

Segment	Size	Usage Rate	Demand
Handicapped	24,639**	8.5	209,432
Low Income*	65,659**	9.0	590,931
Elderly	9,875**	6.3	62,212
	Total trips/week		862,575

Nonwork trips/One-way (per week)

Segment	Size	Usage Rate	Demand
Handicapped*	50,284	7.0	351,988
Low Income*	77,246	10.2	787,909
Elderly	39,500	5.3	209,350
	Total trips/week		1,349,247

*excluding elderly

**number estimated to be employed

MARKET SEGMENTATION APPROACH

A characteristic of the aggregate approach is that it does not subdivide the mobile elderly, handicapped, and low income into more than three user groups by user needs. However, the aggregate approach represents an improvement over the approach of various human service agencies (Veterans Administration, United Cerebral Palsy, Easter Seal Society, etc.), which define user groups as their own clients. These agencies limit provision of transportation to only their clients. Also, the aggregate analysis attempts to estimate total use made by the transportation disadvantaged. Although this is a significant advance, specific needs of different segments of the disadvantaged market have not been described.

At a panel conducted during the 1977 Transportation Research Board meetings, it was noted that increasingly larger proportions of the elderly drive (*15*). Handicapped persons also may have specially equipped automobiles. Even the very poor may find a way to travel by auto. Therefore, the transportation disadvantaged should not be considered a uniform group in their ability or disability to use conventional modes of transportation. A market segmentation analysis would refine the approach used in the analysis presented earlier (*16, 17*). (Another, less adequate, attempt to recognize the market segmentation approach is found in the opening section of Ref. 16.

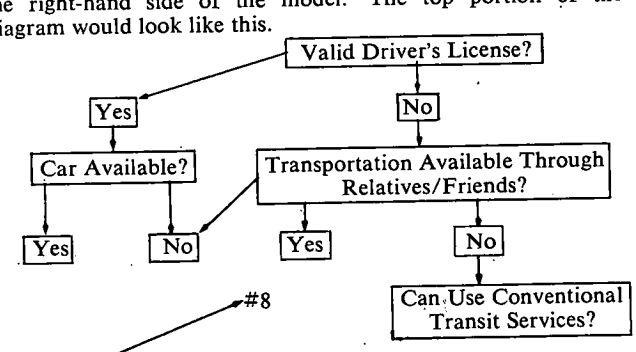
An outline of a possible market segmentation is shown in Figure 5. Seven user groups (potential market segments) emerge. These seven groups represent potential markets rather than known markets. A true market is composed of individuals who desire a specified service and are willing and able to use the service. The market segments shown here have not been determined to be willing to use the service. These potential market segments are applicable to any urban community and to all types of transportation disadvantaged. The classification of user groups is based on a number of criteria, but it does not include personal service to disadvantaged individuals provided by some family member or friend.*

Figure 5 begins with consideration of whether or not the person has a valid driver's license and an available vehicle (see alternative formulation of Fig. 5). Research is needed to determine the size of this group, which would include those handicapped persons who drive specially equipped automobiles. If a vehicle is not available, members of this group will fall into one of the other segments (horizontal arrows). If a vehicle is available for the elderly, handicapped, or low income driver, the next question to be asked is whether the person can afford to operate it. If the answer is yes, the important transportation characteristics of market segment 1 have been defined. These individuals are licensed drivers who have a vehicle available and can afford to operate it. Wachs (*15*) notes that the number of elderly persons in this category is rising.

If one cannot afford to operate a vehicle, that person falls into the same category as those who do not have a valid driver's license. Response to the question "Can the individual use conventional transit service?" may be used to identify three market segments for "yes" answers and three market segments for "no" answers. The three market segments responding affirmatively will be discussed first.

The first question to be asked if it has been ascertained that individuals can use transit is: "Is transit service available to these individuals?" If the response to availability is affirmative, persons can be further divided into those who can afford to use the service (segment 2), and those who cannot (segment 3). Segment 2 can be served by conventional transit, but segment 3 requires some subsidy in order to use this service. If the major hindrance to increased transit usage by this group is economic, the most sensible solution to provide an increased level of service to this group is through a user-side subsidy. Free-fare programs,

* If one were to account for this segment of the market, which is like group 1, one would need to add another step on the right-hand side of the model. The top portion of the diagram would look like this.



This additional market segment is added by the modification of Figure 5. The rest of the diagram would remain the same. Market segment 8, however, is not an entirely valid group since the grouping would often require another person to accompany the disadvantaged individual. Personal service of this type is likely to fluctuate markedly for both specific individuals and across an urban area.

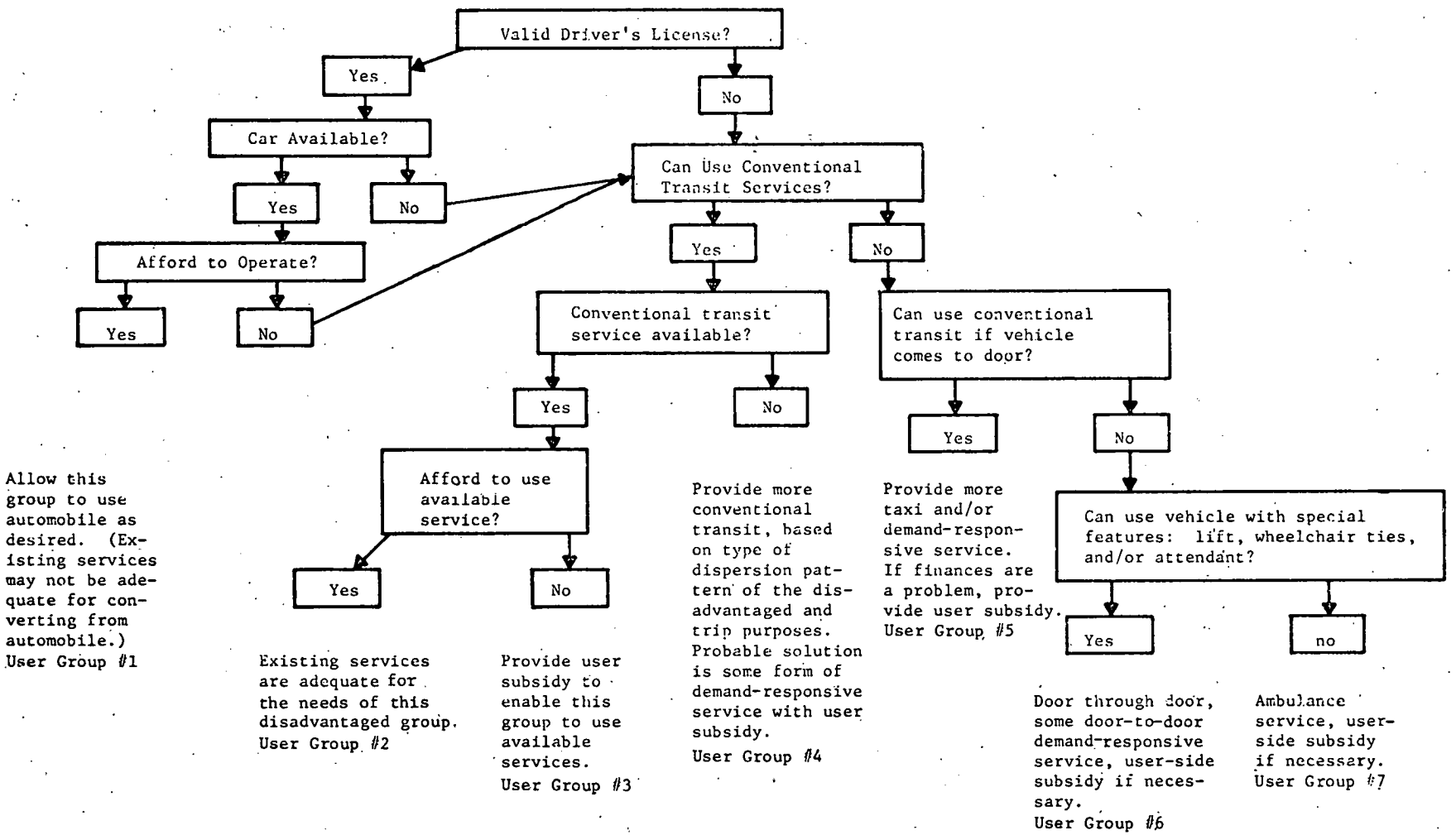


Figure 5. Possible market segments of the transportation disadvantaged (elderly, handicapped, low income).

discounted tickets, and reduced fares for low-income riders are ways of responding to the need of this market segment.

Market segment 4 comprises those individuals who can use conventional transit but who do not have the service available. Route modifications, new routes, and paratransit services may be solutions for these individuals. If they could not afford the service once it became available, they would fall into market segment 3 and the responses outlined earlier would be appropriate.

For those who cannot use conventional transit, the follow-up question should be: "Can transit be used if the vehicle comes to the door?" Affirmative answers yield market segment 5 that can be served effectively by paratransit such as taxis or dial-a-ride. Subsidies may be necessary for low-income persons in this group.

Negative responses to this question lead to a further screening question: "Can the person use a vehicle with a wheelchair lift and/or attendant?" Affirmative responses to this question define the market segment that requires modification of the vehicle beyond simple improvements such as better lighting, railings, and step heights. Segment 6 requires whatever assistance is needed to transport wheelchair bound patients. The key modifications needed are fitting the vehicle for wheelchairs and equipping it with a lift. (See Chap. Two for a discussion of vehicle characteristics needed for the wheelchair bound.)

Segment 7 is unable to use even this specially equipped vehicle. These homebound individuals probably can be served best by ambulances. This is a small segment of the disadvantaged market.

Past efforts to serve equitably the transportation disadvantaged have been hampered by competing definitions of clientele by agencies, groups, and well-meaning individuals who provide service. Although much of this service has been provided with good intent and some with high quality, coverage has been spotty. Little information is available on how much duplication of services has been funded bceause agencies have client definitions that overlap. Trying to define a transportation market in terms of the particular group of disadvantaged persons (i.e., disabled veterans) to be served can result in chaos unless those characteristics are specifically related to characteristics of transit services, as shown in Figure 5.

Special programs designed to serve the blind, the mentally retarded, or those with physical mobility limitations are often inefficient in meeting the needs of the transportation disadvantaged. Individual programs may attempt to initiate transportation services with little knowledge of how to provide services efficiently, effectively, and economically. Instead of looking at the needs of market segments 3 through 7, generally speaking, these special programs look at the transportation needs of those individuals defined as their clients. As shown in Figures 1 through 4, these client groups may overlap.

Market segment 3 can use the existing transportation system if provided with user-side subsidies. Market segment 4 requires expansion of the existing system by adding routes and/or changing schedules. User-side subsidies may be required once service is available. If new routes are not justified, some form of demand-responsive system may be appropriate. Whether or not some form of subsidy is necessary to encourage the transportation system to institute changes would depend on what the market analysis reveals about demand in this area. Market segment 5 is similar to market segment 4 in that it represents an extension of the conventional transportation system to include more door-to-door service. Whether or not subsidies will be necessary for users will be determined by what the analysis shows to be the specific needs of this market segment.

Market segments 6 and 7 are the severely handicapped. Many studies focus on vehicle characteristics and special needs of these groups. (Chapter Two will provide elaboration of vehicle and equipment specifications needed to serve these market segments.) For both of these groups, some form of subsidy may be necessary. A provider-side subsidy may be necessary to initiate the program for market segment 6, and user-side subsidies may be needed to maintain service to this group. Market segment 7 is essentially a homebound, invalid population that requires unusual service (such as an ambulance) in order to travel. This small portion of transportation disadvantaged within the community may require subsidization on both the user- and provider-sides in order to maintain service. In any case, this service should be coordinated with the other portions of the transportation system.

The portions of disadvantaged falling into each of the seven groups discussed earlier must be estimated on the basis of survey data gathered in a marketing analysis done in each urban community. A concentrated effort should be made to encourage existing programs for the transportation disadvantaged to divide their clients into the groups defined in Figure 5. Once the size and locations of these groups have been estimated, plans can be made for modifying existing services to serve the disadvantaged more adequately. Getting user groups (i.e., market segments) defined independent of cause of disability (age, economic, physical, mental) is the first step in building cooperation among diverse programs. As will be noted in subsequent chapters, coordination of efforts can prevent costly duplication of services and lead to more effective, efficient, and economical transportation for the disadvantaged.

SUMMARY

It is unlikely that a single service can meet the needs of all seven market segments efficiently, effectively, and economically; the requirements of the users are too diverse. Radical vehicle modifications are necessary for only a small portion of the transportation disadvantaged if the surveys previously cited are correct. Given the small percentage who appear to fall into segments 6 and 7, systemwide modification of vehicles to service this severely handicapped group is neither logical nor cost-effective. A more efficient, effective, and economical option should be to provide this group with user-side subsidies to buy necessary transportation services rather than to modify an entire transit system to meet their needs.

The current UMTA regulations and the supporting legislation appear based on an undifferentiated image of the types of uses that the transportation disadvantaged make of the system. The stereotype tends to place all disadvantaged persons into market segments 6 and 7. Much

effort seems oriented toward systemwide accessibility through modifying vehicles and creating a barrier-free environment. Equal service need not imply that the same mode must be used by all market groups. Efficient planning suggests that different services could be designed to meet different needs and that services can be coordinated to ensure total coverage and minimize duplication. To move in this direction requires understanding of the two concepts discussed earlier:

1. The transportation disadvantaged include a large number of individuals who have more than one claim to service. Programs must recognize that they have overlapping clientele.
2. The transportation disadvantaged make varying demands on the transportation system of the community. Planners should design services that take these differences into account.

CHAPTER TWO

SERVICE AND VEHICLE CHARACTERISTICS RELATED TO THE TRANSPORTATION DISADVANTAGED

This chapter examines the modifications that would need to be incorporated into existing mass transportation systems in order for an urban area to be in full compliance with the law that the handicapped and the elderly segments of the disadvantaged population have access to public transportation systems. The disadvantaged population is far from being a homogeneous group; they differ significantly in their mental and physical abilities to use traditional public transportation services. Each of the seven market segments identified in Chapter One differs in the demands they would place on the transit system. For example, the ambulatory elderly could use a conventional bus with no modification necessary, whereas the severely handicapped (market segments 6 and 7) could use a bus only if an attendant were assigned to provide door-through-door service, a lift, or a ramp was provided, and wheelchair tie-downs were built into the vehicle.

NEEDS OF THE DISADVANTAGED ABLE TO USE CONVENTIONAL TRANSIT

The market segments presented in Figure 5 can be divided into two major groupings—those who could use conventional transit without vehicle modification (segments 1 through 4) and those for whom the construction of present transit vehicles represents a barrier to movement (segments 5 through 7). Each of the two broad groupings will be considered in turn.

Market segments 1 through 4 vary in the degree to which mass transportation will be utilized. All of these market segments, which constitute the bulk of the traditionally defined disadvantaged, can use conventional transit facilities. Market segment 1 includes the increasingly mobile elderly who are financially and physically able to operate an automobile. Only a form of public transportation that can provide a level of service comparable to the private automobile would normally be considered by this segment. The trip generation rate of this segment is the greatest of all those considered, and their travel destinations include a diffuse array of locations. Paratransit services, such as demand-responsive systems providing door-to-door service on short notice, are probably the only forms of public transportation that will lure this substantial and growing segment out of their private automobiles.

Market segment 2 consists of those individuals that Wachs (*18*) has labeled the "traditional elderly." These individuals may never have driven an automobile or, for reasons of slight physical or mental impairment, are unable to operate an automobile. Caution is advised before assuming that this segment is completely transit dependent; ride-sharing with friends and relatives is probably utilized to a high degree. If high levels of service on public transportation were provided, the propensity of this segment to use such a system would be greater.

The third market segment differs from the previous two by inability to pay the cost of public transportation. This segment would include a significant proportion of the ambulatory, low-income residents of any urban area. The federal policy of half-fare charges to the elderly on transit systems receiving federal funds, which covers the majority of passengers carried in the United States, provides the greatest relative benefits for this market segment. The potential benefits of user-side subsidies for this segment should be explored.

Segment 4 may include a significant portion of the elderly who are living in the suburbs. Bunker et al. (*19*) cite evidence of a significant influx of the elderly to the suburbs in the most recent census period. Many of these low-density areas presently are not served by conventional transit. This market segment is relatively heavily dependent on human service agencies for transportation. Although curb-to-curb service would be sufficient to meet the needs of this market segment, more expensive door-to-door service is the type that is provided by human service agencies. Because conventional mass transit is not designed to meet the needs of a suburban low-density area in an efficient, effective, and economical manner, paratransit

modes may be the only viable service alternative. User-side subsidies have been provided to private paratransit carriers (i.e., shared-ride taxis) in suburban Oak Ridge, Tenn., to increase the mobility of this growing market segment (see App. A for further elaboration of the Oak Ridge system).

NEEDS OF THE DISADVANTAGED UNABLE TO USE CONVENTIONAL TRANSIT

It is estimated that 1.8 percent of the handicapped population in large U.S. cities are confined to wheelchairs. An additional 13.8 percent need some other form of mechanical assistance (e.g., canes, crutches, leg braces, walkers) to move about (*20*). Major modifications of existing public transit vehicles would be needed to provide for the needs of the nonambulatory and semiambulatory market segments 5 through 7.

Differences of opinion exist as to the least expensive way to meet the needs of the disadvantaged who are unable to use conventional transit. A recent study by the California Department of Transportation (Caltrans) (*21*) argues that it would be less expensive to retrofit half the buses in California to serve the needs of the severely handicapped than it would be to provide one specially equipped van for every six regular buses. Although the careful accounting framework employed to determine the bottom line figures on the alternative provision is to be commended, the conclusions of the report are contingent upon the initial assumptions of the study. It is with these premises that this research takes issue.

The disadvantaged are viewed as a relatively undifferentiated group in the Caltrans study. An argument has been developed in the previous chapter that the disadvantaged are a heterogeneous group and services must be developed to meet the needs of the various subgroups that make up this population in the most cost-effective manner. The concept of *equivalent facilitation* discussed in the Caltrans report represents an important contribution to resolving the dilemma of provision to the transportation disadvantaged. The concept has been defined precisely so that it could be readily adopted into legal statutes. However, whether the market for public transportation services is viewed as undifferentiated or segmented, the system developed to meet the needs of the disadvantaged must follow the equivalent facilitation precepts. Specifically, any system designed for the disadvantaged must meet the six criteria that were presented in Chapter One:

1. Equivalent origin/destination.
2. Equivalent trip-decision time.
3. Equivalent travel time.
4. Equivalent transfer frequency.
5. Equivalent service range.
6. Equivalent fare.

While agreeing that equal facilitation is an admirable statement of a way to fulfill the spirit of both Section 504 of the HEW Act and Section 16(a) of the 1964 UMTA Act (as amended), retrofitting an entire system must not be considered a panacea. So little is known of the travel demands of the disadvantaged that it is nearly impossible to determine whether retrofitting only one-half of a bus fleet would provide equal facilitation. What if every bus were modified to meet the needs of all disadvantaged market segments? In the next section, an argument is developed that retrofitting works best only when applied to entire transit systems. The cost estimate for such a complete retrofitting would be at least $34.6 million per year to fully accommodate the disadvantaged on all 6,200 buses in the various transportation systems that fall within the purview of Caltrans (excluding BART cars) (*21*).

Why would it take one specialized van for every six buses to meet the needs of the severely handicapped? Estimates of the magnitude of the disadvantaged population that would need such door-to-door service indicate that one 10-passenger van for every six 45-passenger buses may be an excessive ratio. The severely handicapped comprise considerably less than the 4 percent of the seating capacity provided by this one to six ratio. If only one van is needed for every 12 buses in a traditional system, the cost of maintaining such a program would be no more than $30 million per year in the State of California (*21*). Thus, if the assumptions were modified, retrofitting would be more costly than providing special services.

Clearly, the cost figures are contingent upon assumptions made about the extent of retrofitting that would be needed and the extent of demand for demand-responsive or paratransit alternatives for the severely handicapped. The segmentation approach advocated in this report tends to favor providing equal facilitation by a mix of modes, whereas the undifferentiated approach suggested in the Caltrans study supports the concept of retrofitting. More research on the travel demands of the disadvantaged is in order.

Given a market segmentation perspective, public subsidies might be used to support small buses and vans for the ambulatory and semiambulatory (segments 5 and 6) and demand-responsive vehicles with special attendants for invalids (segment 7). The attendant would assist the nonambulatory through the doors of their homes and through the doors of their destinations (*22*).

The disadvantaged who are grouped in market segment 5 need door-to-door service because the nature of their disabilities restricts both the distance they may travel to a transit stop and the time they can wait for a transit vehicle (headways). A recent report by the United Cerebral Palsy Association states that its clientele, the majority of whom would be grouped into market segments 5 and 6, should spend only a maximum of 1 to 1½ hours in transit (*23*). In addition to the long headways sometimes experienced on conventional mass transit systems, passengers often are required to transfer to another vehicle in order to complete their trip. For example, it has been estimated that 40 percent of all passengers riding the bus system in Knoxville, Tenn., have to transfer to arrive at their intended destination (*24*). Many mass transit systems were designed to funnel passengers into the downtown area and do not serve the increasingly necessary crosstown movement patterns. Transfers are inconvenient for the ambulatory, but represent a major barrier to the use of mass transit by individuals in market segments 5 and 6.

There seem to be three alternatives available to public

transportation systems that attempt to provide transportation for the disadvantaged in market segments 5, 6, and 7 and meet the regulations in Section 16(a) of the UMTA Act of 1964:

1. Modify the bus fleet to accommodate all market segments.
2. Provide demand-responsive service to those market segments which are precluded from using conventional buses.
3. Support human service agencies that provide transportation to the disadvantaged who could not use the bus system.

Each of these system alternatives will be considered in turn.

MODIFYING CONVENTIONAL BUSES TO SERVE NEEDS OF THE SEVERELY HANDICAPPED

The legal question that most transit officials are asking is whether all or just some portion of vehicles in the fleet need to be modified. If the latter course is followed, does this partial modification fulfill the transit system's obligation under Section 16(a)? In the opinion of many transit officials, modifying only part of the fleet would fulfill the obligation, but not the spirit of the requirement that "the availability to elderly and handicapped persons of mass transportation which they can effectively utilize will be assured" (*3*).

Wheelchair users would have difficulty knowing when and where to find the specially equipped buses if only a few were in service. Further, special buses would be of little use to wheelchair users who, after getting to the bus stop on time, found all available wheelchair spaces taken and had to wait for the next specially equipped bus, which might not arrive until hours later. Such long headways would violate the principles of equal facilitation set forth in the previous section.

A recent TRB report (*3*) states that "confidence in the dependability of service could be developed only if every bus could handle wheelchairs." Ambulatory passengers can be accommodated during times of peak demand as standees; however, the capacity of a bus that is modified to carry wheelchair passengers cannot be expanded. Handholds (stanchions) and wheelchair tie-downs are mandatory and serve as a constraint to the configuration allowed. Unless every bus in a system is modified to accommodate wheelchairs, the severely handicapped person will be at a great disadvantage.

An illustration of what might be encountered by the nonambulatory on a system in which only a portion of the vehicles is modified highlights the potential problems facing these individuals. Suppose a handicapped person must make a transfer to arrive at a desired destination. Even if the individual is fortunate enough to find room on a specially designated bus for the first leg of the trip, there are few mechanisms to assure that a specially equipped bus will be available when that person alights at the transfer point; and that, if such a vehicle is available, it will have room. The equivalent transfer frequency criterion of equivalent facilitation would, thus, be violated.

Despite assertions that the handicapped do not wish to be treated differently or transported separately from the able-bodied, the nonambulatory are unavoidably different from regular transit patrons. Although modification of existing equipment will enable some nonambulatory to ride who previously could not, such changes are, at best, only a partial solution. Modifying standard vehicles will do little to increase the mobility of invalids (*22*).

If an urban transit system did decide to offer the full complement of services to the handicapped, the costs would be staggering. Buses equipped with built-in hydraulic lift systems that can be lowered to curb height for onboarding and alighting passengers are substantially more expensive than conventional buses of comparable size (*22*).

Insurance rates for buses that would carry the nonambulatory may be prohibitively high. The high probability of further complications or injury to such passengers in case of an accident is a cost factor that must be considered by systems contemplating conversion of an entire transit fleet to serve the handicapped.

Transit systems may reach the point where they must determine eligibility requirements for passengers on the traditional system. For example, a requirement might be instituted stating that an individual must have the capability to board and alight the bus without assistance. At present, in many areas, regulations do not allow the bus driver to leave his seat in order to assist passengers.

A less stringent, but more expensive, alternative would be to require a wheelchair-bound passenger to be accompanied by an escort. A single fare could be charged for both the nonambulatory passenger and the escort. Greyhound Bus Lines, for example, has instituted such a policy on its interstate bus routes (*22*). If a transit system decides to designate and modify only a certain percentage of its rolling stock for use by the severely handicapped, special schedules should be developed for these vehicles so that nonambulatory users could be accommodated at a high level of service. Such modified buses should be clearly identified so that the ambulatory passengers would be alerted to possible inconvenience and delay caused by the boarding and alighting of nonambulatory passengers. The Handy-Ride system presently operating in Denver, Colo., is one example of a system that has modified a percentage of its bus fleet for use by the severely handicapped (see App. A for elaboration of the Denver system).

A hydraulic lift or equivalent device would be required to raise a wheelchair from the curb into the bus and to lower the wheelchair on arrival at the destination. Space for wheelchairs often cannot be provided simply by removing seats or using fold-up seats because of the awkward dimensions of a typical wheelchair (24 to 25 in. wide and 40 in. long). In addition, anchoring points to prevent the wheelchairs from rolling upon sudden acceleration or deceleration, as well as handholds, must be installed for the wheelchair occupants.

A typical city bus can carry between 40 and 66 ambulatory passengers with reasonable comfort. It would be difficult to adapt such vehicles to service wheelchair users. Either the doors and aisles must be widened, or the wheelchair must be collapsed and stowed in a luggage

compartment and the passenger is carried on board. Insurance regulations and labor contracts, unless modified drastically, would tend to discourage unauthorized personnel from performing the lifting of the nonambulatory, and special personnel might have to be hired to assist. The need for such attendants would escalate the cost of providing transit service in urban areas.

Modifying existing vehicles will not resolve all of the problems associated with transporting the handicapped. Rush-hour traffic, crowds, curbs, construction activity, and weather conditions make it very difficult for passengers in wheelchairs to board or alight on many city streets.

Transit systems must review thoughtfully the alternatives for meeting the Section 16(a) guidelines. The severely handicapped (market segments 5 through 7) cannot be effectively served by present conventional transit. It is not necessarily unjust to deny these market segments access to the conventional transit system, so long as equivalent levels of service are provided for their travel needs. Not all vehicles are, for example, allowed access to the government-financed Interstate Highway System. Nonmotorized vehicles are normally barred from entry for a number of reasons. The safety of the person on a nonmotorized vehicle may be jeopardized by its presence in such a fast moving traffic artery. The presence of a nonmotorized vehicle increases the probability of a severe injury accident both to its passenger and to the passengers of other vehicles that must slow down to accommodate the slower moving vehicle. Allowing nonmotorized vehicles on an Interstate destroys the rationale for building a limited-access highway in the first place—to expedite traffic flow between the major cities of the United States. To draw an exact one-to-one correspondence between the presence of a nonmotorized vehicle on an Interstate Highway System and the presence of a severely handicapped individual on a city transit system is tenuous. The analogy is meant to illustrate some problems facing the severely handicapped. They may indeed increase their risk of exposure to accident by riding on the transit system, and their presence may cause deterioration in level of service to the ambulatory.

MODIFYING SMALL DEMAND-RESPONSIVE VEHICLES TO SERVE THE SEVERELY HANDICAPPED

Many urban areas will undoubtedly opt for special vehicles smaller than a city bus to service the handicapped. A van requires less capital investment to provide service for the handicapped than does any other vehicle currently available. There are, however, some undesirable features of the van—high maintenance cost, relatively short service life, and an uncomfortable ride.

Vans used in special programs to serve the elderly and/or handicapped have required inordinately high maintenance of their braking and transmission systems. High maintenance cost per mile as the vehicle ages has also been a problem. Vehicles have generally been retired in three to four years because of these high operation costs.

The ride in a van is less comfortable than that in a private automobile, especially for passengers riding in seats mounted over or behind the rear axle. Adult wheelchair passengers suffer another discomfort in vans with unmodified (nonextended) roofs. They must either slouch down in their chairs or bend their neck to fit within the available floor-to-roof clearance.

A van body on a three-quarter ton chassis offers space for six full-sized adults and their wheelchairs. The front passenger seat can be used by an attendant. Most newer van models provide walk-through space between the seat and engine compartment housing, creating easy access to the vehicle's rear area. Standard size doors on vans open wide enough (5 ft) to accommodate wheelchairs with little difficulty. Such vehicles are being used with success by the Easter Seal Society program in Knoxville, Tenn., among others (see App. A for a more detailed examination of the Knoxville program).

The available usable space in vans requires that wheelchairs be stack loaded one behind another. This requires that alighting be in reverse sequence to loading. Stack-loading is a problem in transportation to schools or clinics where all passengers alight at the same destination. (However, loading and unloading patterns of regular transit systems can preclude the van for wheelchair transport.) When more than two wheelchairs are transported, securing the chairs is difficult because of the lack of usable interior space.

When more carrying capacity is required than can adequately be provided by a van or when the total long-range costs of a program are considered, the transit system might opt for a school-bus-type vehicle equipped with a lift. Such an adaptation could accommodate a greater variable number of ambulatory and wheelchair passengers.

MODIFICATIONS OF OTHER SMALL VEHICLES TO SERVE THE HANDICAPPED

If the transit system opts to serve only those market segments that are capable of using buses without modifications, it must ensure that human service agencies are providing for the needs of those who cannot use those buses. Many agencies use vans in their transportation programs, although station wagons and automobiles are also employed. These two latter vehicles, although they have been used to transport wheelchair users who can slide from their chairs on to the vehicle seat, are most effective for the ambulatory who can also ride conventional transit (market segments 1 through 4).

Many organizations use station wagons and automobiles for the transportation of small groups. Such vehicles cannot be readily adapted for wheelchair clients, although some station wagon models have rooftop racks that could be used to store folding wheelchairs. It takes a great deal of time and strength to load and unload the nonambulatory client from such a vehicle. In many agencies, station wagons and automobiles are driven by volunteers. The insurance rates for handling nonambulatory patients may effectively preclude these vehicles operated by a volunteer from being a viable mode of transportation for the severely handicapped.

The types and sizes of vehicles the agency should use are functions of the number and needs of those to be transported. Often, it is advantageous to use a variety of

modes that can provide the highest levels of service to all of the market segments that comprise the agency's clientele.

SPECIAL EQUIPMENT AND SPECIAL ADAPTATIONS TO SERVE THE SEVERELY HANDICAPPED

Some of the equipment needed to modify vehicles for use by the severely handicapped is very costly. Other modifications—such as better signing, better lighting, provision of handholds (stanchions), and lowered steps—are relatively inexpensive and should have been required on all transit vehicles years ago. Fairly simple engineering modifications would, for example, make the bus a much more attractive alternative for market segments 1 and 2.

Commonly employed devices used to expedite the boarding, alighting, and transporting of nonambulatory clients (segments 5 through 7) are considered next.

Power Lift

The greatest advantage of the power lift is the feeling of psychological independence it gives the handicapped person. If the person is physically able to operate the controls, the individual may also be able to board and alight from the vehicle without the help of an attendant. Lifts on special vehicles are, however, almost always operated by the driver. Less strength is required than in manual lifting and loading.

There are also disadvantages to power-lift equipment. The lift breaks down more often than any other piece of auxiliary equipment (*22*). Deploying the power lift does not appreciably speed up the process of loading and unloading, because the majority of time consists of securing wheelchairs and stowing the lift. Finally, there must be some type of protective molding on the lift in order to ensure that the wheelchair will not roll off accidentally while the lift is in operation.

Ramps

The most common type of ramp is the fold-down, hinged variety. Some ramps have two channels that form a guide for the wheels of the wheelchair. A problem arises when the wheelchairs do not track properly in the channels. Anything less than a 4-in. channel in the ramp may cause some wheelchairs to bind. The driver or attendant must physically push or pull the wheelchair up the ramp. Many operators have discontinued the use of ramps because of the high incidence of back injuries among drivers.

A more recent innovation is a shorter "handiramp" that can be attached to the inside of the loading door. Although the angle from ground level is very steep, the handiramp is constructed with a flight of steps in the middle of the ramp so that the attendant can stand on a horizontal surface while pulling the client onto the floorboard level of the vehicle (*23*).

Safety Tie-Downs in the Vehicle

Metal lock-down devices are commonly used for wheelchair transportation. These include "T" bars, rim pins attached to both walls and floors of the vehicle, wheel fender models, and arm-rest over-lap devices. These tie-downs are such permanent fixtures that there is no flexibility in the number of passengers that can be carried nor in the way in which passengers can be arranged in the vehicle. Permanent tie-downs of this type limit passenger configuration in the vehicle.

Rope or belt tie-downs fixed to hooks in the floor or on the side are more flexible than most of their metal lock-down counterparts. In limited test situations, the flexible tie-downs have proven to be as safe as the more permanent type (*22*). However, formalized engineering testing is lacking on all types of special equipment for the severely handicapped.

Radio Equipment

The two-way radio is an important means of communication. Such a device is often useful to agencies and transit systems having a dispatcher. A speaker system that can be heard both inside and outside the vehicle can be helpful to the client. The system can be used to announce the vehicle number upon arrival at a stop, route, destination, and other stops along the way. Such a system would be important to blind passengers.

Optional Equipment

Certain equipment can be added to standard vehicles to make them much more utilitarian for transporting the handicapped. For example, loading doors can be ordered for both sides of a van. The extra door would expedite the boarding and alighting of the handicapped on either curb of a one-way street, adding flexibility to the operation, although two ramps or lifts would be required.

Folding bucket seats and stepstools can be installed and used when an attendant is required. If these seats are collapsible, they will not disturb the seating configuration in the vehicle.

SPECIAL NEEDS THAT DIFFERENTIATE THE SEVERELY HANDICAPPED FROM OTHER DISADVANTAGED GROUPS

It has been noted that traditional curb-to-curb service would satisfy the needs of market segments 1 through 4. Further, provision of door-to-door service either by modifying existing transit vehicles or modifying small vehicles (usually vans) would serve market segments 5 and 6. The most severely handicapped (market segment 7) must have door-through-door service in any trips to be made. That is, a driver or attendant must enter the handicapped individual's home and prepare that person for the trip (e.g., placing the handicapped in a wheelchair). The staff must then escort the handicapped person from the home into the vehicle. The reverse procedure is followed on arrival at the destination (door-through-door service). The cost for this level of service is extremely high and requires much time and training to perform. Often, the only provider of such door-through-door service is the local ambulance company. Ambulance rates are expensive and would preclude individuals in market segment 7 from almost all trip purposes except essential medical travel.

The training programs necessary to teach transit drivers proper methods of providing personal attention and door-through-door service to the severely handicapped would be costly. In order to avoid labor problems among drivers who are members of a transit union, a recent TRB report (*3*) states that assignment of drivers to serve the severely handicapped would have to be on a purely voluntary basis. Drivers who do volunteer for such routes could be compensated in several ways. The responsibilities of helping the nonambulatory would be offset by the advantages of driving smaller vehicles, following more relaxed schedules, and having freedom from crowds and heavy traffic conditions throughout the day.

In order to obtain competent drivers to serve the handicapped, procedures must be comparable to those used to select drivers for the ambulatory. Personal interviews are a necessity. References and driving accident records must be examined carefully. A road test in the vehicle that will be used in transporting the handicapped should be given. If client lifting is involved, a physical examination should test the strength of the potential driver. The experience of studies in both New York and Kansas City has been that women drivers do not generally possess the upper body strength necessary to load and unload adult clients in wheelchairs using ramps or to move the client from a wheelchair to a vehicle seat (*23*). Despite the good rapport these women drivers had with clients, lack of strength would preclude many women from driving these assignments unless an attendant was on board to assist or power-lift equipment was provided.

Perhaps as important as driving record and strength is the temperamental fitness of potential drivers. These drivers must be able to cope with people and to exercise mature judgment in stressful situations. The drivers must have a genuine feeling of commitment to the clients they serve.

The potential driver should be checked out in the use of special equipment (e.g., lifts, ramps, tie-downs), so that passengers will be safe and comfortable. The driver also must be familiar with all applicable state laws and local regulations regarding transportation of the handicapped in a public conveyance. The driver must be trained to deal with emergency situations (i.e., first aid, emergency procedures).

Driver training should include instruction on how to lift and/or carry passengers in wheelchairs without causing injury to passenger or driver. Such techniques would be stressed as proper bracing and positioning and use of special safety devices, lifts, and/or ramps. The driver should know how to inform the blind clients where they are positioned and should instruct them on the functions of a seeing-eye dog. The driver must learn to communicate with clients who have verbal communication problems and must understand the importance of clients having the means of reaching the desired destination after they get off the vehicle. The ability to work effectively with coworkers (e.g., attendants) is important if goals of the system are to be achieved.

QUESTION OF WHETHER PUBLIC TRANSIT SYSTEMS SHOULD PROVIDE DOOR-TO-DOOR SERVICE

If regular bus services are used to serve the needs of both the general public and the disadvantaged, only curb-to-curb service should be provided (market segments 1 through 4). The bus system must give consideration to the needs of all riders. Attempting to serve market segments 5, 6, and 7, as indicated by law through the modification of regular transit vehicles and schedules, places regular ambulatory users at a disadvantage and would contribute to a decrease in total ridership.

A higher level of service to the handicapped could be provided if buses were modified with special equipment (e.g., lifts, tie-downs) and were manned by attendants who could help the handicapped to board and alight. Escorts might be provided to help people who have difficulties maneuvering in crowds or congested traffic conditions if the provision of high levels of door-to-door service to the disadvantaged (segments 5 and 6) were desired. However, it is not suggested that an attempt be made to integrate ambulatory with nonambulatory riders.

The option of door-to-door service is much more viable when minibuses or vans are used for the handicapped, not as part of the regular transit service. An experimental demonstration project in Lincoln, Neb., for example, found that door-to-door service was effective in overcoming the barriers to traditional transit use for the aged and handicapped (*25*). Door-to-door service eliminated the difficulties of these persons in getting to a pickup point or from an exit point to their destination. A report of the success of this demonstration project said:

> The specialized prosthetic devices combined with specifically trained drivers are effective in eliminating barriers of boarding and exiting vehicles and the inability to ride conventional vehicles or discomfort while riding (*25*).

The level of door-to-door service provided to individuals in market segments 5 and 6 should ideally be a function of expressed community goals. In lieu of explicitly stated local objectives, the federal government has established a national policy of service provision to the disadvantaged. Clearly, more marketing research needs to be conducted to determine the extent and nature of travel demands by the disadvantaged. Only with such information can services be designed with regard to efficiency, effectiveness, and economy.

SUMMARY

Urban public transportation systems are facing the need to satisfy two major objectives: (1) to provide transportation that will reduce the use of the private automobile, and (2) to provide transportation to the handicapped that will comply with Section 16(a) guidelines. Unfortunately, the two objectives often conflict with each other. The special equipment needed for loading, securing, and discharging nonambulatory users may slow down the handling process of all patrons.

Public attitudes toward providing transit service for the handicapped in urban areas must be considered when cities attempt to comply with the provisions of Section 16(a). The nonhandicapped may be critical of the time it requires to load and unload nonambulatory clients. Care must be taken to assure that the commitment to the nonambulatory passenger does not deprive the ambulatory or other dis-

advantaged groups from good service. It is questionable whether many of the nonambulatory handicapped would use the bus on a daily basis if such equipment were available; bus usage would be a function of the severity of the handicap. Many uncontrollable factors—such as weather conditions, curb heights, location of transit stops, and need for transfers—influence usage rates of the nonambulatory handicapped.

The severely handicapped, who could be accommodated on conventional transit only with extensive modifications to the vehicle and careful training of drivers and attendants, make up a very small percentage of the disadvantaged population. It is not equitable to redesign and retrofit an entire transit system to meet the needs of relatively few individuals if the bulk of passengers would be inconvenienced by such provision. Reasonable accommodation of all market segments can be achieved only by providing a range of services that provides access and mobility to all. No one vehicle or type of service can have all the characteristics needed or considered desirable by all market segments. To maintain rigidly that all market segments must be accommodated on board conventional public transportation systems is self-defeating. One acceptable way for urban areas to meet the spirit of the 16(a) regulations is to provide a mix of public transportation services such that each provides the highest level of service possible to the appropriate market segment.

CHAPTER THREE

FUNDING FOR THE TRANSPORTATION DISADVANTAGED

Providers of transportation services for the disadvantaged may be divided into nonprofit human service agencies, public transit systems, and private suppliers. Services for the transportation disadvantaged are limited in many urban areas by funds available to provide for them. This chapter examines the impact of funding policies on the availability of services to the disadvantaged. Emphasis is placed on federal funds available, but examples from selected state programs are reported and discussed. Finally, some examples of programs providing service to the disadvantaged are summarized and critiqued.

The evidence presented in the following suggests that existing special programs providing service to the transportation disadvantaged fail to meet their needs efficiently. Factors that contribute to this problem are contained within the federal funding programs. Currently, most federal assistance programs provide money for the transportation of clients of human service agencies. The federal programs often view transportation only as a means for the human service agencies to achieve other service goals. As a result, the market for services is defined in terms of client characteristics (e.g., elderly, physically disabled, mentally retarded, poor) rather than in terms of matching clients with the mode of transportation that would provide the best level of service. Funding programs that give money to specialized agencies for transporting only their clients encourage the proliferation of vehicles and services and create problems of coordination. The model presented in Figure 5 suggests that a variety of different services may be more appropriate for providing efficient transportation to the disadvantaged than making large-scale modifications to traditional transit systems.

In addition, guidelines of many federal assistance programs restrict transportation for the disadvantaged to certain geographic areas, thus preventing coordination of transportation services at local levels. Restrictions placed on eligibility criteria of recipients for specialized transportation increases this coordination problem. It appears that federal funding programs for transportation of the disadvantaged supply a greatly needed service, yet some of their regulations and guidelines tend to impede this goal.

NONPROFIT HUMAN SERVICE AGENCIES

Nonprofit human service agencies are public or private organizations established to meet the mental and/or physical needs of society's disadvantaged population. Human service agencies (e.g., private (nonprofit) agencies, hospitals, and clinics) normally limit services to those considered necessary to achieve their primary objectives.

Client transportation, if considered necessary, is usually viewed as a supportive service. The clients receive transportation only to destinations that fulfill the agency's primary objectives. Therefore, a trip's purpose and destination are often planned for each client by the human service agency. The result is that transportation provided by a human service agency does not always fulfill the total mobility needs and desires of the agency's clients. It should be noted, however, that some private, nonprofit agencies, such as United Cerebral Palsy, do consider transportation as a primary objective for their clients.

Human service agencies that provide transportation normally utilize one of two methods to serve their clients: (1) contracting for the total service at an established fee or (2) purchasing or leasing equipment and operating their own transportation service. A human service agency that operates its own transportation service is a provider service agency. Any human service agency that contracts transpor-

tation or does not provide any transportation services for their clients is a nonprovider agency. Contractual service offers the advantage of less responsibility for the human service agency. Yet, agencies have indicated that contractual cost is greater than providing their own transportation services (*23*). The established contract fee can be based on a variety of cost analyses. For example, fees can be determined by the number of miles driven within a given time period. The agency also may be prohibited from establishing a contract with certain providers of transportation. As an example, the State of Georgia limits Title XX funds of the Social Security Act to contracts between a human service agency and a public or nonprofit private provider of transportation. This policy prohibits the utilization of taxis, although they actually may be a more economical form of transportation. A primary advantage to the agency providing its own transportation system is the availability of subsidies. Agencies are often granted increased funds if they show that they will provide (or are presently providing) client transportation.

Several limitations are assosicated with client transportation provided by the human service agencies. As previously stated, not satisfying their clients' total transportation needs and wants is a major drawback. In addition, human service agencies offer transportation service to only their own clients. This means that disadvantaged individuals in a given area may not receive transportation if they are not clients of some provider service agency. Because there is often little coordination between agencies, a client of a nonprovider agency may not receive transportation, even though a provider agency exists in the area. The nonprovider agency may obtain transportation for its clients by other means, such as contracting with a private operator or reimbursing its clients for transportation costs incurred. If services were coordinated, another agency with transportation facilities and services might be able to satisfy the nonprovider agency's transportation needs. Unfortunately, an attitude of protecting their own domain exists among many human service agencies that provide transportation, resulting in duplication of services and inefficient transportation programs.

Human service agencies are established to aid clients with certain types of disabilities (i.e., welfare, vocational rehabilitation). Their client population consists of members from all segments of the disadvantaged market (Fig. 5). Thus, these agencies must provide transportation services for individuals with minimum transportation difficulties (market segments 1 through 4) as well as for individuals with greater transportation difficulties (segments 5 through 7).

Major sources of funds available for transportation services are federal programs and private organizations concerned with special groups of the population.

FEDERAL FUNDING SOURCES

Federal programs view transportation provision to the disadvantaged in two ways: (1) as the program's primary objective or (2) as necessary to accomplish the program's primary objective (supportive service).

The U.S. Department of Transportation's program administered by the Urban Mass Transportation Administration (UMTA) is the only one that identifies transportation for the elderly and the handicapped as a primary program service (*26*). Section 16(b)(2) (as amended) of the Urban Mass Transportation Act of 1964 provides for capital assistance grants and loans to private, nonprofit organizations for the purpose of assisting them in providing transportation for the disadvantaged. A specific amount of money from Section 16(b)(2) allocations has been set aside for each state by the U.S. Department of Transportation, Urban Mass Transportation Administration, and is available to state agencies. The governor of each state has been requested to select a state agency to manage the program. This money is available to nonprofit agencies only after other transportation providers (public and for-profit, private) are found unable to meet the transportation needs of the elderly and handicapped.

Section 5 of the Urban Mass Transit Act authorizes capital and operating assistance formula grants. Public transit systems receiving Section 5 funds must provide reduced fares to the elderly and handicapped in off-peak periods. The basic objective of this program is low fares for the elderly and handicapped; however, the result is that the transportation system, not the human service agencies, must bear the costs. This, in turn, reduces funds needed to provide transportation services to other markets. Determining whether other transportation providers can meet the needs of the elderly and handicapped is often judgmental and is based on restricted utilization of funds rather than on the availability of transportation providers. This program, 16(b)(2), tends to encourage the proliferation of uncoordinated services that serve limited markets.

The federal government also provides funds indirectly for transportation services through human service agencies. Most commonly, transportation is provided in conjunction with other services. Because subsidies are not allocated in a specific manner for the provided services, it is difficult to assess the actual level of funds used specifically for transportation services. Normally, human service agencies are allocated a budget that is spent until depleted.

There are a variety of restrictions concerning the use of federal funds from different programs, and these restrictions create the major limitations to user groups. Each statute with its program regulations increases coordination difficulties. In addition, eligibility criteria developed for each program create a major barrier to transportation coordination between agencies. Some programs restrict the geographic area covered. For example, the program may specify that projects be located only within low income areas. Programs may specify a state plan (e.g., Title III of the Older Americans Act) that divides states into distinct planning and service areas (*27*). Limitations may also be in the form of guidelines on how a human service agency may utilize the funds in order to provide client transportation. The combination of these criteria restrictions makes transportation coordination and efficiency difficult for the human service agencies.

Subsidies may be provided to human service agencies

from the provider-side and/or user-side. Kirby and Tolson (*28*) describe user-side subsidy programs as:

> . . . those in which certain 'target group' users are permitted to purchase transportation 'vouchers' at a price substantially below the value of the vouchers to the transportation providers. The users exchange these vouchers for transportation services, and the transportation providers then redeem the vouchers from the public agency at values agreed to in advance.

A user-side subsidy permits a human service agency to indirectly purchase client transportation from a transportation provider. An important aspect of user-side subsidies is that the transportation provider receives payment only for the passenger trips that the provider has supplied.

Provider-side subsidies allow the human service agency to provide for its own client transportation or to subcontract these services. A provider-side subsidy, user-side subsidy, or a combination may be used, depending on program restrictions.

Tables 4 through 9 illustrate federal transportation assistance programs and restrictions at both federal and selected state levels. These charts are not all-inclusive; however, they are representative of current programs available for the transportation disadvantaged. Each table examines one particular transportation program. Additional programs are discussed in Appendix B. The first section of each table addresses the program at the federal level; the following sections discuss the program at state levels. Modifications

TABLE 4

TRANSPORTATION PROVISION UNDER THE VOCATIONAL REHABILITATION ACT OF 1973

Program Name	Eligibility Criteria	Transportation Costs Allowable	Problems Anticipated
Rehabilitative Services Program [1]	Disabled individuals whose disability substantially limits their ability to secure gainful employment and there is reasonable expectation that services will result in the handicapped individual's gainful employment.	1. Grantee provision must be necessary for the achievement of the eligible client's vocational objective. 2. Grantee purchase of special equipment. 3. Client and staff reimbursement allowed. 4. No federal restrict on on purchase from providers. (State agency may develop policy limiting services.)	1. A total cost fee for services or an equitable unit cost for services must be developed for allocation among the user programs. 2. A system of client usage accountability must be established. 3. Control and operation of the vehicle must be noted in the state agency. 4. Property accountability must be maintained by the agency. 5. Purchases of capital equipment requires prior approval of the grantor agency.
*Tennessee Rehabilitative Service Act[2]	Physical and/or mental impairment which created a vocationally handicapped individual. There is reasonable expectation that individual will be able to gain employment.	1. Client and staff reimbursement allowed only while client is in training and for one week after employment. 2. User-side subsidy or provider-side subsidy token system if vendor is used. 3 Will reimburse family or neighbor for mileage.	1. Developing a unit cost for service. 2. System of client usage accountability. 3. Training clients how to use bus for transportation 4. No allocation to financial breakdown for transportation cost. 5. Will apply the program for an individual; group size is not necessary.
*Florida[1]	Have a disability which is handicap to employment. Have a reasonable expectation of working. Be declared eligible for extended evaluation or services, meet state's financial criteria.	1. Grantee purchase of service. Restrictions None	Vocational Rehabilitation does not operate or purchase vehicles through the regular program.

*Example of State Programs

Sources: [1]Transportation Systems Support Inventory
Vocational Rehabilitation Agency
Department of Health, Education and Welfare
Atlanta Region, Georgia

[2]Vocational Rehabilitation
Knoxville Area Comprehensive Rehabilitation Consortium

TABLE 5

PROGRAMS OF THE 1965 OLDER AMERICANS ACT WHICH PROVIDE FOR TRANSPORTATION SERVICES (TITLES III AND VII)

Program Name	Eligibility Criteria	Transportation Costs Allowable	Problems Anticipated
Special Programs for the Aging Older Americans[1] Act of 1965	Age Title III 60 years or older Title VII 50 years or older and their spouses. Income Title III 1. Income below Dept. of Commerce poverty threshold. 2. No means test. 3. Fee schedule allowable based on ability of contribution. Title VII--Same	Title III Project costs 1. Purchase of capital equipment. 2. Employment of services insurance. 3. Purchase of special equipment. 4. Staff reimbursement. 5. Maintenance repairs. Title VII State Agency Costs Policy is: 1. Purchase capital equipment. 2. Employment of drivers. 3. Insurance. 4. Purchase of services. 5. Staff reimbursement. 6. Maintenance repairs.	None in law or regulations.
*Tennessee Elderly American Act Title III	Title III Age: 60 and above No financial restriction.	1. Purchase vehicles. 2. Operating costs of vehicles. 3. Trips are free--no client reimbursement.	1. Can request a fee--cannot require one. 2. No financial restrictions for clients. 3. Establishing desired and necessary transportation needs of clients.
*Kentucky[1] Title VII Older American Act	Age: 60 and above Emphasis on low income and isolated individuals.	1. Grantee provision of service--special equipment allowable. 2. Grantee purchase of service. Restrictions (Title III 8 V) No direct subsidy for an overall transit system or a general reduced fare program for a public or private system.	1. Inconvenience to elderly consumer. 2. Fewer elderly persons. 3. Lessening the quality of service provided.
*Kentucky[1] Title III Older American Act of 1965	Age: 60 and above Emphasis on low income and minority persons.	1. Grantee provision of service--special equipment. 2. Grantee purchase of service. 3. Staff reimbursement.	Same as Title VII

*Example of State Programs
Sources: [1]Transportation Systems Support Inventory, Aging Agency, Department of Health, Education and Welfare, Atlanta Region, Georgia.
[2]East Tennessee Development District--Administrative and Physical Planning, Knoxville, Tennessee.

between the two levels of government are highlighted. Each program is discussed with respect to three factors: (1) eligibility criteria, which identifies the potential recipient; (2) transportation costs available, which identifies the transportation expenditures allowed by the program; and (3) problems anticipated, which identifies problems that may hinder the program's success.

Vocational Rehabilitation Act of 1973 (*27*)

This act provides for employment training and related transportation for eligible recipients. Transportation must be written into the state's plan in order to receive federal funds. The human service agency may purchase vehicles, provided the equipment is used for group service.

TABLE 6

TRANSPORTATION PROVISION UNDER TITLE XX OF THE SOCIAL SECURITY ACT

Program Name	Eligibility Criteria	Transportation Costs Available	Problems Anticipated
Social Security Administration[1] SS Act, Title XX	Free services to those whose income does not exceed 80 percent of state's median income.	1. Grantee provision of service allowed if approved by federal grantor. 2. Special equipment allowed. 3. Client reimbursement allowed. 4. Staff reimbursement allowed.	Cost allocation problems will result if noneligibles ride on Title XX-funded vehicles.
*Georgia[1]	Based on percentage of gross annual and monthly income per number of people in the family.	1. Grantee provision of service. 2. Grantee purchase of service. 3. Staff reimbursement. Restrictions Only contract with public or nonprofit private service providers.	1. Cost allocation. 2. At present, vehicles are fully utilized. 3. Reimbursement under Title XX has been impossible for Title XX clients to health facilities.
*Tennessee[2]	Based on income level and number of people in family.	1. Covers transportation to and from hospital in an ambulance. Only for emergency situations and to nearest hospital that has needed service. 2. Will pay client or ambulance service--cash reimbursement is used. 3. Eighty percent of fees is covered--remaining 20 percent is absorbed by transportation agency.	1. Clients need to travel to hospital and medical center for more than just emergency situations. 2. Eligibility of clients--assurance money is spent for specified group.

*Example of State Programs

Sources: [1]Transportation Systems Support Inventory
Social Service Agency (Title XX)
Department of Health, Education and Welfare
Atlanta Region, Georgia

[2]Social Security Administration
Nashville, Tennessee

Table 4 presents the eligibility criteria of the recipient, allowable transportation costs, and anticipated problems of the Rehabilitative Services Program at the federal level. For example, service is limited to the disabled who have a reasonable expectation of securing employment after vocational rehabilitation. The remaining portion of Table 4 presents the same data as they apply to selected state programs. The state programs of Tennessee and Florida are used as examples. Additional limitations placed on funds by these states are reviewed in the following.

Tennessee's eligibility criteria are written in the same manner as in the federal program. Additional limitations are not placed on client eligibility. Florida established a more stringent criterion than the federal program by including an income restriction. Tennessee and Florida reduce the quantity of allowable transportation costs at the state level. In addition, Tennessee places a time restriction on client and staff reimbursement. Tennessee's problems are similar to the problems anticipated by the federal government: (1) developing a unit cost of service; (2) developing a system of client accountability; and (3) determining a method of financial accounting for transportation costs. Florida's program has not yet reported any problems.

Special Programs for the Aging, Older Americans Act of 1965 (*29*)

Title VII of the Older Americans Act is a formula grant program to the states. The purpose is to meet the nutritional and social needs of the elderly. The ways in which

states impose limitations that are not part of the program are illustrated by program operations in Tennessee and Kentucky.

Tennessee has chosen to use the broadly defined, federal eligibility criteria. However, Kentucky has placed emphasis on low income and isolated individuals (see Table 5). Tennessee and Kentucky reduce the amount of maximum allowable transportation costs provided by the federal guidelines. In addition, Tennessee does not permit direct subsidy to a public transit system or a reduced fare program for a public or private system. Both states have experienced problems with their transportation programs. Tennessee's problem is in part due to the program's not narrowing federal eligibility criteria to suit the state's needs. Kentucky's program has decreased in quality and use of service since the initiation of federal funding and regulations.

Title XX of the Social Security Act (*27*)

Title XX is a formula grant program established to provide social services to low income residents of each state. The program provides free service to individuals whose income does not exceed 80 percent of the state's

TABLE 7

TRANSPORTATION PROVISION UNDER TITLE XIX OF THE SOCIAL SECURITY ACT (MEDICAID)

Program Name	Eligibility Criteria	Transportation Costs Allowable	Problems Anticipated
Medicaid[1] SS Act, Title XIX	Medical assistance to families with dependent children, aged, blind and disabled, must meet state's income criteria.	1. Purchase of service. 2. Staff reimbursement. Restrictions Participation limited only to providers who accept as payment in full the amounts paid in accordance with fee structure established by State agency and who have signed a provider agreement.	None since program does not authorize purchase of vehicles and provision of transportation service.
*Tennessee[2] SS Act, Title XIX, Medicaid	Medical assistance to: 1. 65 and above 2. Physically disabled adults 3. Children in special living arrangements (foster homes) 4. AFDC recipients Must meet income criteria of the state.	1. Grantee purchase of service. Restrictions 1. Transportation provider must agree to fee structure established by State agency. 2. Reimburses only provider of transportation--only ambulance service. 3. Covers emergency transportation to the nearest medical facilities that have needed services.	None
*Kentucky[1]		1. Grantee purchase of service. 2. Client and staff reimbursement allowed. Restriction Valid driver's license--commercial carrier license waived, excepting Title XIV clients.	Cost allocation--transportation is purchased on fee-for-service basis.

*Example of State Programs

Sources: [1]Transportation Systems Support Inventory
Public Health Department
Department of Health, Education and Welfare
Atlanta Region, Georgia

[2]Tennessee's Department of Public Health
Regional Medicaid Administrator
Nashville, Tennessee
Knoxville, Tennessee

TABLE 8

TRANSPORTATION PROVIDED UNDER THE DEVELOPMENTAL DISABILITY ASSISTANCE ACT OF 1975

Program Name	Eligibility Criteria	Transportation Costs Allowable	Problems Anticipated
Developmental Disabilities Assistance and Bill of Rights Act of 1975	Persons with developmental disabilities which means: 1. Mental retardation, cerebral palsy, epilepsy, or autism; 2. Dyslexia resulting from a disability in Clause (1); or 3. Originates before a person reaches age 18; 4. Has continued or can be expected to continue indefinitely; and 5. Constitutes a substantial handicap to such person's ability to function normally in society.	1. Grantee provision of service. 2. Grantee purchase of special equipment. 3. Grantee purchase of service. 4. Client and staff.	None anticipated at this time.
*North Carolina	Only persons with mental retardation, epilepsy, cerebral palsy, and autism are eligible for funding. Also, persons with dyslexia can be served if they have one or more of the above disabilities.	1. Grantee provision of service--special equipment. 2. Grantee purchase of service. 3. Client reimbursement. 4. Staff reimbursement. Restriction Transportation cannot be purchased from non-eligible provider.	
*Kentucky	A person must have a disability which is attributable to MR, CP, epilepsy, autism; a disability which is attributable to dyslexia resulting from a disability described above; has continued or can be expected to continue indefinitely and constitutes a substantial handicap to such person's ability to function normally in society.	1. Grantee provision of service--special equipment 2. Grantee purchase of service Restriction Profit-making agencies.	If noneligible source of funding was not used as matching costs, there would be no problems.

*Example of State Programs

Source: Transportation Systems Support Inventory
Disabilities Agency
Department of Health, Education and Welfare
Atlanta Region, Georgia

median income. The ways in which state operations of Title XX-funded programs differ are illustrated by a comparison of the regulations in Tennessee with those in Georgia (see Table 6).

The selected states presently have the same eligibility criteria as the federal programs. Both states specify more limitations on allowable transportation costs than do the federal program guidelines. Georgia places restrictions on contractual agreements, whereas Tennessee places restrictions on the provider of transportation services, trip destinations, and trip purposes. Both states have experienced problems of cost allocation and reimbursement because of the broad eligibility criteria of their programs.

Title XIX of the Social Security Act (Medicaid) (*30*)

Title XIX stipulates that a state plan must provide necessary transportation for its recipients to and from

TABLE 9

TRANSPORTATION PROGRAMS OF THE VETERANS ADMINISTRATION

Program Name	Eligibility Criteria	Transportation Costs Allowable	Problems Anticipated
Veterans Administration(VA) Automobiles and Adaptive Equipment for Certain Disabled Veterans and Members of the Armed Forces	WW II or later veterans with service connected loss, or permanent loss of use of one or both hands or feet, or permanent impairment of vision of both eyes to prescribed degree.	1. VA purchases automobile or other vehicle for eligible people up to the amount of $3,300 or total purchase price, whichever is less. 2. VA purchases adaptive equipment necessary for veteran to operate vehicle safely.	None
Veterans Administration Beneficiary Travel for Vocational Counseling and Rehabilitation	Veteran required to travel to or from a VA facility or other place, in connection with vocational rehabilitation or counseling required by VA.	Travel allowance based on an approved mileage rate prescribed by the Administrator.	None
Veterans Administration Beneficiary Travel for Medical Treatment	Veterans required and authorized to travel to or from a VA facility or other place, for the purpose of medical examination, treatment or care.	Travel allowance is based on an approved mileage rate prescribed by the Administrator.	None

Source: Department of Health, Education and Welfare, Transportation Authorities in Federal Human Services Programs, Atlanta, Georgia, Office of the Regional Director, March 1, 1976.

medical services. Medical assistance is provided for families with dependent children, the aged, and the disabled (see Table 7). Restrictions are placed on an individual's income level to be eligible according to states' criteria. A comparison of the organization of the Title XIX programs in Tennessee and Kentucky is used to illustrate state applications of this program.

Tennessee's program increases eligibility limitations by dividing potential recipients into four groups with an income ceiling for each group. Kentucky's program does not list eligibility criteria that differ from the federal guidelines. Considering allowable transportation costs, the federal program restricts participation only to providers who accept as full payment the amounts paid in accordance with the fee structure established by the state agency and who have signed a provider agreement. Tennessee's program includes additional restrictions on the trip's purpose and destination and on the provider of service. Kentucky is not as stringent with available funds as Tennessee. Kentucky has experienced a cost allocation problem. Tennessee programs have not experienced such problems thus far.

Assistance and Bill of Rights Act of 1975 Developmental Disabilities Program (*31*)

This Assistance and Bill of Rights Act is designed for persons with developmental disabilities. The disabilities are attributed to mental retardation, cerebral palsy, epilepsy, autism, or dyslexia (caused by one of the other disabilities) (see Table 8). The disability must have originated before an individual was 18 years old and must have continued or be expected to continue indefinitely. A developmental disability results in a substantial handicap to the individual's ability to function normally in society. The federal program permits grantee purchase and provision of service. The designated agency can purchase special equipment and client/staff reimbursement is permitted.

North Carolina and Kentucky are used to illustrate state applications of this program. The selected states, at this time, have the same eligibility criteria as the federal program. However, both add limitations to federal costs allowable by restricting the definition of an eligible transportation provider. North Carolina's program defines which agencies are to be the eligible providers. Kentucky's agencies may not deal with profit-making providers. No problems were anticipated by the federal program or experienced by North Carolina's program. Kentucky, however, has had difficulty obtaining necessary matching funds.

Veterans Administration Program (*26*)

Three Veterans Administration programs at the federal level provide for client transportation (Table 9). Specific state eligibility criteria and funding restrictions can be obtained by contacting the Veterans Administration of each state.

The Automobiles and Adaptive Equipment program for certain disabled veterans and members of the armed forces is available to veterans of World War II or later. These individuals experienced a service-connected loss of use of one or both hands or feet and/or permanent impairment of vision in both eyes to a prescribed degree. Under this program, the Veterans Administration will purchase a car or other vehicle and equipment to the amount of $3,300 or total purchase price, whichever is less.

The Beneficiary Travel for Vocational Counseling and Rehabilitation programs are available for veterans required to travel for vocational rehabilitation or counseling. The trip must be approved by the Veterans Administration. The agency reimburses clients with a travel allowance based on a mileage rate approved by the administrator.

The Beneficiary Travel for Medical Treatment programs are designed for veterans required and authorized to travel to and from a medical center for the purpose of medical care. The recipient is given a travel allowance based on an approved mileage rate.

STATE AND LOCAL FUNDING SOURCES

Most state and local revenue sources do not directly earmark funds for improved transportation of the disadvantaged. The majority of funds are designed to support public transit systems. A variety of funding sources has been developed at the state and local levels. Some states have met the needs of transit systems through legislation allowing special transit districts and tax authorities. The transit district is a specified geographic area that operates independently, often with some type of tax based support. Usually, the transit district is authorized to operate and provide broad public transit service. Some sources of state funding include sales tax, utilities tax, gasoline tax, and lottery.

California has implemented the Transportation Development Act to provide funds to meet transportation needs of the general public, including the elderly and the handicapped (*21*). Article 4.5 of the act promotes intracommunity transit service in certain urban areas. Capital spending is permitted, but only cities, counties, and transit operators can claim the funds. Also, Article 4.5 restricts area coverage, and all eligible areas must be serviced by existing transit operators. Article 8.0 of the Transportation Development Act authorizes cities and counties to contract for specialized transportation services. Areas in which Article 4.5 funds cannot be used are eligible for the Article 8.0 funds. Cities and counties may claim these monies. The local level of government provides a mixture of funding sources, though most are provided by taxes. Local funding sources include property tax, motor vehicle tax, and gasoline sales tax.

PRIVATE FUNDING SOURCES

Some private organizations fund transportation projects or provide transportation directly (*29*). Organizations that support transportation include American Red Cross, Muscular Dystrophy, United Cerebral Palsy, and Easter Seal Society. In addition, organizations designed to meet the needs of a particular group (i.e., senior citizens) contribute to transportation. The availability of private funding may be limited; yet, there is considerable potential for expanding these contributions—especially through volunteer activities (*27*). The American Red Cross in Phoenix, Ariz., which provides a demand-responsive system, reports a surprisingly low passenger-mile cost. This can be accounted for partially by the volunteer status of all van drivers (for additional information about the Phoenix program, refer to App. A).

PUBLIC MASS TRANSPORTATION PROVIDERS

Public mass transportation providers can meet the needs of market segments 1 through 4, who can use traditional service in the existing systems. As shown in Chapter Two, the public transportation providers need to make physical modifications to the buses and supply more specialized services in order to serve market segments 5 through 7 (increased disability groupings). The major fundings for providing public transportation services are from federal, state, and local programs.

PRIVATE TRANSPORTATION PROVIDERS

Private transportation providers consist of privately owned taxis, limousines, buses, vans, and ambulances. There is great potential for the improvement of transportation services for the handicapped by effective utilization of such private systems. Unfortunately, there are also major problems associated with taxis and other private systems with respect to their provision of transportation to the disadvantaged. Systems must provide shared ridership in order to be eligible for UMTA funds. Exclusive-ride taxicab services apparently cannot be funded (*28*). In addition, the high trip costs and fare charges make taxi service undesirable for the disadvantaged. Individual ride fares may average between $2.20 and $2.50 for a 3-mile ride, and this range could be much higher depending on labor rates. The indigent cannot afford such fares. Poor coordination with other public transit services and lack of public subsidies to the user may limit establishment of effective private fleets.

There are numerous benefits to the disadvantaged when private paratransit modes are integrated into conventional transit system services. One advantage may be the reduction of large capital outlays to human service agencies for purchase of vehicles and special equipment. The private systems have an existing fleet that may require only simple modifications or a few additional vehicles. Allowing the existing private fleet to serve the disadvantaged may be more economical and efficient than the establishment of a multiplicity of small fleets operated by various human service agencies throughout a community. The private paratransit systems are in the business of supplying transportation. They have the knowledge and experience necessary to operate an efficient transportation system. Drivers can be trained to assist the handicapped and elderly. Because of the limited clientele per trip, the drivers are able to provide the necessary assistance and time required by the passengers.

Unlike transportation provided by human service agencies, private systems are able to transport passengers to any desired destination. The disadvantaged would not be limited to the predetermined destinations and trip purposes established by the human service agencies. Private services could provide the disadvantaged with broader, more accessible transportation. Depending on the private system, the passengers could receive door-to-door or door-through-door service. Finally, the private systems are available to all disadvantaged individuals, whereas the human service agencies only provide transportation to their clients.

SOME EXAMPLES OF EXISTING TRANSPORTATION PROGRAMS

Providers of transportation have established various transportation programs in order to meet the needs of their disadvantaged clients. An examination of these systems, with emphasis on the transportation marketing view, may prove beneficial for the development of efficient, effective, and economical transportation for the disadvantaged.

The present system of transportation provided by human service agencies illustrates the need for precise market segment definition and interagency cooperation. Most human service agencies are geared to aiding clients defined by some disability criteria (i.e., low income, elderly). This definition of the domain of human service agencies is not necessarily good from a transportation standpoint. Some agencies may provide transportation to a clientele that is distributed throughout the transportation market segments. As an example, the Red Cross in Phoenix, Ariz., serves the "elderly," so they must provide transportation for all the disadvantaged market segments of Figure 5 (see App. A for additional information about the Phoenix program).

An ill-defined market makes regular scheduling of routes difficult, and human service agencies usually provide door-to-door service on a demand-responsive basis that is more expensive than curb-to-curb service on fixed routes and fixed schedules. Other agencies that have a more well-defined market or that are constrained from providing service to any except their own clients (i.e., Goodwill of San Antonio, Tex.) may be able to offer more regular service. If, however, the market is defined too narrowly, demand for service may be too low to achieve economies of scale in transportation operations. For most human service agencies, transportation of their clients is a means to an end, not an end in itself. Their programs of providing service to the disadvantaged could not be accomplished without mobility. Inefficient transportation provision is wasteful of the budgets allocated to these service programs.

Programs need to be developed that will coordinate transportation of the disadvantaged at state and local levels. Michigan has developed a dial-a-ride program designed to consolidate basic transportation services throughout the state. This program provides transportation for Michigan's disadvantaged. Public providers need to survey their areas in order to find what modifications are necessary for the provision of transportation for the disadvantaged. The Handy-Ride program of Denver, Colo., has discovered that many of their elderly riders were able to use the traditional services with extensive vehicle modification (for more information, refer to App. A).

High levels of service could be provided by existing private, for-profit operators if certain restrictions are relaxed. Shared-ride taxi programs offer many of the specialized services necessary for the disadvantaged. The shared-ride taxi service in Oak Ridge, Tenn., offers reduced-fare transportation for the elderly through the provision of a user-side subsidy. Currently, the majority of federal and state transportation assistance programs favor the provider-side subsidy. The user-side subsidy offers a new alternative that may reduce some of the undesired aspects of provision of transportation for the disadvantaged. User-side subsidies may, for example, decrease the duplication of transportation services while serving clients of various agencies. The severely disadvantaged market (segments 6 and 7) comprises a small percentage of the total disadvantaged population. Through the application of user-side subsidies, existing private transportation providers might be able to service these segments.

SUMMARY

Many nonprofit human service agencies view transportation only as a supportive service necessary to meet client needs. However, some human service agencies, such as United Cerebral Palsy and Easter Seal Society, have transportation as a primary mission.

Consolidation of transportation needs is a pressing problem in the human service area, but institutional and funding barriers exist. There is a need to coordinate services at all levels of government. Some funding programs provide money only for operating agency-owned and agency-operated transportation programs. These funding programs that discourage consolidation and encourage wasteful duplication should be eliminated. The 16(b)(2) Program of UMTA helps to proliferate the number of office agencies providing transportation services. Other funding programs permit purchase of services or client reimbursement. These programs encourage consolidation and should be strengthened. Current funding programs tend to be limited to clients with particular disabilities. Funding programs for the transportation disadvantaged should recognize the fact that the poor, the elderly, and the handicapped are overlapping categories and may be segmented based on needs, and transportation services should be provided that will most effectively meet their needs.

Currently, user-side subsidies are in limited use. The federal, state, and local transportation divisions need to educate transportation providers to the benefits of user-side subsidies. Existing transportation providers could increase their services by meeting the needs of the disadvantaged, especially the low income market, while decreasing the need for capital expenditures.

The major obstacle to the efficient use of any transportation assistance funding is the lack of knowledge, coordination, and procedures at federal, state, and local levels. Emphasis should be placed on coordination at the state and local levels. One step towards correction is for each state to publish and distribute a list of all available funds with the eligibility criteria, the restrictions, and the authorized costs of each fund. For example, Caltrans, the Division of Mass Transportation in California, has published a table of state and local funding sources for specialized transportation.

In addition, each state needs to provide a manual on procedures because of the complexity of funding. This will assist transportation providers in using available funds for their systems at the state and local levels.

CHAPTER FOUR

EVALUATION OF SELECTED PROGRAMS FOR THE TRANSPORTATION DISADVANTAGED

This chapter points to examples of some of the more successful programs for the transportation disadvantaged and describes aspects of programs that are successful. Data used in this chapter were collected during field visits to urban areas, from various reports, and from a mail survey to programs which various sources called successful (see App. C). Several urban areas receive special attention in this chapter. In Knoxville, Tenn., all social service agencies known to provide transportation were interviewed (*32*). Jackson, Miss., has a program that is attempting to meet most of the criteria for a successful program (*33*). Oak Ridge, Tenn., has initiated a system of user-side subsidies to a private, for-profit transportation provider. Ann Arbor, Mich., has a public transportation system that serves all but one of the market segments (*34*).

Two sets of criteria are used in evaluating the data on various programs. First, the market segmentation concept discussed in Chapter One is applied to see how adequately the urban area is serving, or planning to serve, the various markets. Second, six criteria for successful systems are suggested. These criteria should enable the evaluation of programs for the transportation disadvantaged in terms of efficiency, effectiveness, and economy of the service provided.

As data collection and evaluation progressed, the truth of a remark appearing in a recent TRB report (*2*) became evident:

> At the present time, data are not collected and program expenditures are not segregated in such a way to permit identification of the amounts being used for transportation, especially in the social service programs serving the disadvantaged.

In most urban areas no one person, agency, or group has a complete understanding of the market characteristics and cost of transportation services to the disadvantaged. This lack of understanding is partly a failure to properly segment the market for service to the disadvantaged. Once grouped in the fashion suggested in Chapter One, planning and record-keeping for these markets can begin in a more systematic fashion, less keyed to the idiosyncratic interests and definitions of various provider groups. Revis (*35*) indicated that he found no consistent record-keeping among state coordinating agencies that are responsible for transportation for the disadvantaged. This study indicates that inconsistent record-keeping is a problem of local agencies in urban areas as well.

CRITERIA FOR SUCCESSFUL SYSTEMS

Six criteria should be measured and reported by all providers of transportation to the disadvantaged. These criteria are: (1) cost of service (measured on a per passenger trip or per vehicle-mile basis); (2) financial support for the program; (3) availability of service to the transportation disadvantaged market segments; (4) level of service provided; (5) utilization of the service; and (6) coordination of the program with other services in the transportation system. If these criteria are measured, the degree to which the service is successful can be evaluated. Without adequate data collection a meaningful evaluation cannot be made.

Cost of Service

Records kept should include all expenses incurred in operating the program. Because record-keeping is often incomplete, some agencies contacted found it very difficult to calculate cost per vehicle-mile or per passenger-trip. Only 5 social service agencies of 22 in Knoxville were able to provide operating costs. Each of these used a different method of reporting (*32*), and the data are not comparable because of the different cost items that were included. Caution must be exercised when discussing tables of cost comparisons (*2*):

> . . . comparisons must still be made with considerable caution because of the variation in the character of market and service; the levels of labor costs in the region; the differences in time periods covered; and hence, the impact of inflation (varying from geographic region to region); and most important of all the way cost accounts were treated in each project.

Financial Support for the Program

Since many of the transportation disadvantaged receive service from specially funded agencies or programs, it is important to determine the likelihood that the program can continue to operate or expand its service. Two factors influence financial condition—efficiency in managing funds granted to the agency for the provision of transit service and stability of the support base for the service. The stability of external funding to the program is difficult to predict. The extent to which programs rely on federal, state, local, and/or private sources can be evaluated. It is also possible to evaluate the amount of money which programs for the transportation disadvantaged accrue.

Since programs for market segments 3, 4, 5, 6, and especially 7 will probably not be self-supporting, long-term stability of various funding sources for transportation programs to these market segments should be examined. The more localized the funding source is to the service provided, the more likely funds will continue. This hypothesis can be tested by examining the history of funding of programs

for the transportation disadvantaged. Rating the continuity of funding sources from most to least continuous would show private, local, state, and then federal (*2*). Unfortunately, the amount of funds available often runs in exactly the reverse order. Experience suggests that stable programs might look to the state and federal levels for starting new services and to local and private sources for maintaining the operation.

Availability of Service to Transportation Disadvantaged Market Segments

This indicator of success can be measured by how large the service area is relative to the location of the transportation disadvantaged. Availability is measured by schedules and routes of transportation services through these areas. Obviously, one of the reasons that many systems have elected to service the transportation disadvantaged on demand is because of the lack of knowledge of the locational patterns of travel demand of disadvantaged persons. Nevertheless, systems must be designed to provide equal availability for disadvantaged and nondisadvantaged persons.

Most programs studied conceive of the market for the transportation disadvantaged in terms of market segments 5, 6, and 7. Not much attention is paid to segments 3 and 4, although some public reduced-fare or free-fare programs are available for segment 3. Of all the segments of the disadvantaged, market segment 4 (those for whom conventional transit is not available) is perhaps most frequently overlooked or lumped with other groups.

Level of Service Provided

An area that has received much attention in research on transportation for the handicapped is vehicle characteristics. An acceptable vehicle is one that is easily accessible to the client population and one that will provide a safe, dependable trip at a relatively low maintenance cost. Less attention has been given to other aspects of level of service.

In some instances, service to the transportation disadvantaged has been interpreted as a level of service within the transit system (*36*). This interpretation is close to the idea behind the market segmentation concept presented in Chapter One. The market segmentation model divides the market by specifying the constraints individuals face when trying to travel from one place to another. Levels of service determine how attractive or convenient alternative services to the automobile appear to persons in market segment 1 who have the option of selecting other modes of transit. Persons who are in segments 2 through 7 may have to take whatever transportation modes are available—whether they are satisfied with the level of service or not. The "equivalent facilitation" concept, already described, means that the level of service for the disadvantaged must be at least as good as the level of service for the nondisadvantaged. Otherwise, the provider will not be complying with Section 504 of the Rehabilitation Act of 1973.

Some levels of service particularly relevant to the transportation disadvantaged are:

1. Travel time.
2. Reliability.
3. Comfort and convenience.
4. Waiting time (headways).
5. Fares.
6. Safety.
7. Location of pickup and discharge.

These elements of level of service have differing importance to the different market segments and some (i.e., comfort and convenience) are difficult to quantify. Market segment 7 probably travels so infrequently that fares are a concern only to the extent that they are partially or fully covered by some outside source. Short waiting time may be most difficult to achieve for market segments 5 and 6. Fares are the primary concern of segment 3, because some user-side subsidy is necessary for them to use the program. In the case of this market segment, the subsidy may take various forms (e.g., reduced fares, free passes, ticket books). For market segment 2, all aspects are important, although the desires of these captive riders are sometimes ignored. For market group 1, the transit system must achieve a high level of service to lure them away from their automobiles.

Utilization of the Service

The utilization of various services by the disadvantaged is one of the important tests of the success of the transportation system. "Equivalent facilitation" can be tested by the degree to which the transportation system is used by the persons it is designed to serve. Utilization of a given service should be compared with the projected demand for that service. If usage rate is equal to or higher than projected demand, the service can be considered a success in this one area. If usage rate is lower than projected demand, level of service considerations and availability need to be investigated. Low usage rate suggests that the disadvantaged may not know about the service, may find the service inadequate to their needs, may find the service inaccessible, may have overestimated their projected use of the service, may find the level of service unsatisfactory, or may find the cost of service too high. Careful monitoring of the usage rate is necessary for complete evaluation.

Coordination of the Program with Other Services in the Transportation System

Coordination has been defined as ". . . bringing together a number of social service and other community agencies in order to cooperatively develop a transportation system that will serve all of their combined needs from a centrally operated system" (*2*). Five areas of potential coordination are identified as (*2*):

1. Interagency coordination.
2. Coordination of public systems and agencies.
3. Coordination of system purchases.
4. Coordination of service site locations.
5. Integration of system users.

Although this report does not disagree with efforts in any of the first four areas, the central concept of this report rests in restructuring the way transportation pro-

viders approach system users. One of the fundamental problems facing conventional transit systems is the lack of diverse service offerings to diverse markets (*36*). Efforts in coordination areas 1 and 2 can be strengthened by integrating system users. The reason for the development of market segments in Chapter One is to provide a starting point for interagency cooperation and coordination. An earlier comprehensive review of social service transportation provision endorses the principle of integrating system users, but offers no market groupings (*2*): "One of the more important ways to improve the operating efficiency of special transportation projects is by grouping riders into larger markets for service." The segment model presented in Chapter One responds to this recommendation.

A key coordination problem to be overcome is understanding the similarities in transportation services offered by various agencies. Recognizing similarities requires thinking beyond the particular client definition and beyond the mission of any single agency to the definition of a transportation service for a market that might include a variety of disadvantaged users. The seven market segments provide a starting point for a process of thinking that can lead to greater coordination.

Some studies have examined barriers to coordination, particularly in California. One study (*37*) in Pittsburgh, Calif., notes the following reasons for duplication of service: restrictions from funding sources; limitations on types of clients the program can serve; jurisdictional boundaries (e.g., county lines, school districts, hospital districts, city limits); lack of knowledge of costs; "turfism" (". . . when one agency captures a good and continuing source of funds and jealously guards this source for fear it would be diluted if shared"). These reasons clearly indicate the need for a new approach to services to the transportation disadvantaged. A coordinated approach will group users according to the types of demands they make on the transportation system and will plan services to meet those demands.

SELECTED DATA FROM PROGRAMS SERVING THE TRANSPORTATION DISADVANTAGED

This section applies the six criteria previously discussed to the consideration of selected programs. The presentation follows the same order as descriptions of the criteria.

Cost of Service

Table 10 compares some programs of varying sizes. The public transit system in Ann Arbor is an areawide, door-to-door, mixed-mode system serving market segments 1 through 6 in an integrated fashion. Among the cities visited it was unique in this respect. Cost of serving the handicapped, the elderly, and the economically disadvantaged (there are relatively few low income residents in the service area) are absorbed within the program. Cost per passenger-trip has remained about the same in constant dollars from $1.74 in 1973 to $1.72 in 1976. Nevertheless, the system reported a net loss, including depreciation, of $753,893 for 1976 (*34*). This concept of door-to-door service with free transfer to the fixed-route system for passengers able to do so is one approach to solving the problems of availability. Nevertheless, such door-to-door provisions for market segments 1 through 6 raise the cost of serving other patrons who are not disadvantaged. The cost of the Ann Arbor system should be watched closely. This is a completely integrated system (with the exception of market segment 7), and the system provides for coordination of services to the various market segments that many communities lack. Because Ann Arbor's cost per passenger-trip includes the whole transit system, its cost per passenger-trip is lower than most. But, its cost per vehicle-mile is the highest. This high figure, however, does include depreciation on all assets, which many programs do not consider.

The cost per passenger-trip figures is very high for San Diego's three reported programs. Chattanooga, El Cajon, and Ann Arbor report low cost per passenger-trip, but also report relatively low miles per passenger-trip. Knoxville's Easter Seal Society reports the lowest cost per vehicle-mile, followed very closely by San Antonio's Goodwill Rehabilitation program. These figures seemed extremely low in comparison to the other programs presented in the table. The director of the Easter Seal Society of Knoxville reports that program costs include all direct costs (oil, gas, maintenance, driver salaries, insurance) but exclude administrative costs and depreciation of vehicles and equipment (*38*).

A previous study (*2*) on human service transportation provision reported a range in cost per passenger-trip for selected programs of from $1.23 for the Chattanooga Department of Human Services to $9.46 for Seniors on the Move in Chicago. Table 10 shows the lowest cost per passenger-trip to be $1.06 for Chattanooga Department of Human Services, and the highest to be San Diego's United Cerebral Palsy program at $10.18. Thus, the range in cost found in the two reports appears to be about the same. The high figure for San Diego would appear to be prohibitively costly for any large-scale service. The low figure might appear misleading and raise questions as to whether all costs are being included. Follow-up on the Chattanooga Department of Human Services confirmed its continuing low cost of provision. The latest data (1977) of $0.29 per vehicle-mile, $0.61 per passenger-mile and $1.78 per one-way passenger-trip included administrative costs and depreciation. Driver's wages ($3.07 per hour) are fairly low, which may be an important cost-saving factor. There was a large degree of variability reported in costs from various programs for the handicapped.

The reader will note the discrepancy for the Chattanooga Department of Human Services program cost figures for the two reports. Even comparing the survey questionnaire data with another set of interview data, two different figures for the Knoxville Easter Seal Society program were obtained. Owens and Fisher (*32*) report $2.07 per passenger-trip, although this cost figure applies to only six of the Easter Seal Society vehicles. Accurate comparisons of costs of social service programs will take some effort. Discrepancies may be due to reporting for different years or for different vehicles. Nevertheless, given freedom of choice in how to answer an inquiry on program costs, the agency will probably answer with the lowest defensible figures. Further studies of costs should be made using probing questions for

TABLE 10

DATA ON COST OF TRANSPORTATION PROVISION FOR DISADVANTAGED FROM SELECTED PROGRAMS

City/ Agency	Vehicle Type (No.) (Seating Cap.) (Age)	Total Cost	Veh. Mi./	Pass. Trips/	Miles/ Pass. Trip	Cost/ Pass. Trip	Cost/ Vehicle Mile
Albany, NY/[7] United Cerebral Palsy	1 6 pass. S/W (1976) 1 9 pass. Van (1975) 1 8 pass. Van with wheelchair lift (1975)	$21,750/yr.	31,000/yr.	5,520/yr.	5.6	$3.94	$0.70
San Francisco, CA/[7] United Cerebral Palsy	1 14 pass. Van (1975)	$10,255/yr.	10,133/yr.	1,920/yr.	5.3	$5.34	$1.01
San Diego, CA/[7] United Cerebral Palsy	3 9 pass. Van (1975) (operational data for 4 mo. only)	$9,370/ 4 mo.	8,441/ 4 mo.	920/ 4 mo.	9.2	$10.18	$1.11
Knoxville, TN/[7] Easter Seal Society	24 14 pass. Vans (1973-4) and 1 38 pass. bus	$230,475/ yr.	734,437/yr.	96,706/ yr.	7.6	$2.38	$0.31
San Antonio, TX/[7] Goodwill Rehabilitation Handicap	9 van 9 pass. + 2 WC (1972); 1 minibus 9 pass. + 4 WC; 9 9 pass. (1977) vans	$121,319/ yr.	373,516/yr.	52,224/ yr.	7.2	$2.32	$0.32
Phoenix, AZ/[7] Dept. of Human Resources	10 15 pass. vans (1977) 3 12 pass vans (leased) 3 12 pass. vans (1973)	$159,000/ yr.	226,000/yr.	28,824/ yr.	7.8	$5.52	$0.70
Chattanooga, TN/ Dept. of Human Services	14 12 pass. vans 3 6 pass. S/W	$100,487/ yr.	228,000/yr.	49,919/ yr.	2.3	$1.06	$0.44
Ann Arbor, MI/ AATA[3]	35 10-16 pass. vans 2 with wheelchair lifts 32 45-53 pass. transit coaches 11 school buses	$4,023,628[6]/ yr.	2,287,504[6]/ yr.	1,814,600/ yr.	n.a.	$2.22[6]	$1.76[6]
Lincoln, NB/ Handibus	8 minibuses-combined seating capacity of 69 passengers 5 lifts; 5 buses with wheelchair positions	$9,437/ mo. $11,324/ yr. $113,244/ yr.	15,367/ mo. 184,401/ yr.	2,884/mo. 34,602/yr.	5.8	$3.27	$0.61
San Diego, CA/[2] Dial-A-Ride	9 Farwest Vans 12 Mercedes Minibuses	NA Subsidy: $501,100/yr.	600,000/ yr.	120,000/ yr.	5.0	$2.60 - $4.00	Minibus $2.52/hr. Van $2.60/hr.
El Cajon, CA/[2] Dial-A-Ride "El Cajon Express"	Chev. Nova Cab/ 14-20 No special equipment	$226,728/ yr.	60,118/ yr.	176,818/ yr.	3.4	$1.35	$2.55/hr.
San Diego County/[2] Dial-A-Ride	2 vans-14 seats No special equipment	NA Subsidy: $57,000/ yr.	52,000/ yr.	6,000/ yr.	50	$7.00	$2.80/hr.
Richmond, CA/[1] Dial-A-Ride	13 shortened transit coaches-18 seats	$925,000/ yr.	45,625/ yr.	365,000/ yr. 1,000/day	4.9	$3.98/ kilo	$3.89/ kilo
Rochester, NY/[5] Medical Motor Services, Inc.	7 4 door sedans 5 vans-14 seats 1 w/lift	Sedans $117,579/yr. Vans $96,201/yr.	Sedans 149,501/ yr. Vans 59,364/yr.	Sedans 21,926/yr. Vans 23,689/yr.	4.6	Sedans: $5.36 Vans $4.06	Sedans: $0.79 Vans $1.62
Santa Barbara, CA/[1] Dial-A-Ride Yellow Cab. Co.	B200 Dodge Sportsman Maxi-Wagon	n.a.	n.a.	40,150/yr.	n.a.	$1.60/ kilo	$0.43/ kilo

[1]Source: Elleen Kadesh, "Evaluation of DRT Systems in Richmond and Santa Barbara," Transportation Research, Record 608 National Academy of Sciences, Washington, D.C. pp. 42-47.

[2]Source: Supplemental Transit Studies Dial-A-Ride Guides San Diego Region, December 1976, pp. 66-71.

[3]Ann Arbor Transportation Authority, 1976 Annual Report to the Community, Ann Arbor, Michigan: AATA, 1977, and AATA 1975-1980 Transit Development Program for the Ann Arbor/Ypsilanti Urban Area, Ann Arbor, Michigan: AATA, no date.

[4]The 1975-80 plan indicates 3 additional wheelchair lift equipped vans are on order. Ridership for the 2 vans with wheelchair lifts ranges from 25-40 rides/day.

[5]Personal correspondence from Mrs. George R. Stevens, Executive Director of Medical Motor Service to Professor Frederick J. Wegmann.

[6]These data are for entire transit system for 1976, not just for transportation disadvantaged. Market groups 1 to 6 are served by the system. Total cost includes depreciation(see p. 14 of 1976 Report to Community). Cost per vehicle mile was computed by dividing total cost/vehicle miles per year.

[7]Information from mail questionnaire.

comparable time periods and should control for regional variability.

Cost per vehicle-mile can be compared with data from an earlier study of social service transportation providers (2). Table 10 shows a range from $0.31 per vehicle-mile for Knoxville Easter Seal Society to $1.76 per vehicle-mile in Ann Arbor and $1.62 for vans of the Medical Motor Service in Rochester. The previous study reported a low of $0.42 per vehicle-mile for the Tri-County program in Athens, Ohio, and a high of $2.13 for Seniors on the Move in Chicago. Again the ranges of cost per vehicle-mile are comparable. Cost per vehicle-mile varies widely from program to program. Although some variability is probably due to differences in efficiency, differences in record-keeping (especially what costs are included) account for many of the differences.

A close examination of Table 10 using rank order correlation techniques shows that there is some relationship between total cost of the program and cost per passenger-trip. The smaller the program in total dollars, the more costly the trip per passenger. One cannot generalize this relationship, but it does suggest that economies of scale in transportation provision accrue, even given the probable error introduced by various unmeasured factors in the data. The relationship between number of passenger-trips and cost per passenger-trip is strongly suggestive. A larger volume of passenger-trips is associated with lower costs per passenger-trip. The results of the correlation analysis do support the need for coordination and/or consolidation of services to the transportation disadvantaged.

Financial Support for the Program

Table 11 is an example of the type of analysis that needs to be done to compare the bases of financial support. Programs have been arranged from least to most stable in terms of their funding arrangements. The variety of support sources found in the table should be noted. Determination of how funds are assembled to provide for the transportation disadvantaged in urban areas would be useful to planners. Such research would call not only for a systematic examination of available funds but also for a comparison of the efficiency and stability of programs that draw on different funding sources. Rochester's Medical Motor Service, which has been serving that area for over 40 years, recently accepted its first federal grant. What are the long-term funding records of other cities' programs for the disadvantaged? Are federal programs late arrivals in this area? How are these funds viewed by long-term providers? Four of the eight agencies show half or more of their funding originating from private sources. What percentage of funding for transportation of the disadvantaged programs comes from private sources? These questions call for further research on available funding sources for the transportation disadvantaged.

Availability of Service for the Transportation Disadvantaged Market Segments

Table 12 presents a small amount of data on the availability of program service for the transportation disadvantaged. The best data are from San Diego where the Comprehensive Planning Organization (CPO) uses a scheme similar to Figure 5 to segment the disadvantaged market. The CPO has developed demand figures as well. These figures enabled calculation of the percentage of demand met for some of the market segments depicted in Figure 5. Ann Arbor's system provides the most complete coverage of the market segments. A number of programs throughout the country supply special service to the low income and the handicapped. Because of other demands, segment 4 is often ignored.

Most of the services given in Table 12 require calling in advance. Although a well-organized system like Ann Arbor requires less waiting time, 12- to 48-hour waits for service typically are encountered. Service areas are usually rather large, particularly for those with wheelchair mobility only. The reason for large service areas is apparent from an examination of Table 13. This table uses the San Diego data reported by the CPO to show demand of two market groups in Figure 5. The most limited mobility group next to homebound is segment 6. These persons can travel if attended and/or if vehicles are provided with wheelchair lifts and/or other special features. However, the segment accounts for less than 5 percent of the trip demand for elderly and handicapped. Since the percentage of the market is so small, and since the users are often quite dispersed, a specially equipped vehicle must cover a large area.

Another interesting figure in Table 13 is the percentage of elderly and handicapped who drive. Sixty-five percent of the market can use an automobile. Assuming that these individuals can afford to operate the car and have one available, this means that transit and social service operations will have to compete with the auto if they wish to provide service to a majority of the elderly and the handicapped. A question of program goals emerges. Should transportation services for the disadvantaged be designed to achieve the most efficiency for the community even if this means competing with the private auto? Or, should programs for the disadvantaged disregard segments 1 and 2 and seek to provide service for segments 3 through 7? This is not an easy question to answer.

Level of Service Provided

Apart from the remarks on waiting time presented in Chapter Two, little additional information was available on this important criterion. The majority of passengers use systems that have a program of fare reduction for the elderly and the handicapped. Ann Arbor uses family size and income as a basis for fare reduction; free fares during off-peak hours are used for senior citizens.

None of the systems studied had done a user satisfaction survey among handicapped, elderly, and low income riders. This would appear to be another area where more research is warranted (see earlier comments on utilization).

Utilization of the Service

The Richmond, Calif., Dial-a-Ride handles the largest number (365,000) of passenger-trips per year, as shown in Table 10. (Ann Arbor does not separate the disad-

TABLE 11

SOURCE OF FINANCIAL SUPPORT FOR THE PROGRAM

City/Program	Government: Federal Program	Government: State Program	Government: Local Program	Private Sources	Dues, Fares, Fees	Total
Phoenix, Arizona Dept. of Human Resources	90%[a,b]		10%			100%
Chattanooga, Tennessee Dept. of Human Services	80%[c]		20%			100%
Phoenix, Arizona Maricopa County Red Cross	50%[a]			50%[d]		100%
Knoxville, Tennessee Easter Seal Society	21%			66%[j]		87%[k]
Ann Arbor, Michigan Ann Arbor Transit Authority (Operating Fund)	13%[d]	13%[e]	52%[f,g]		21%	99%[h]
Rochester, New York Medical Motor Service	11%[i]			62%[d]	27%	100%
San Antonio, Texas Goodwill Handicab			100%[l]			100%
San Francisco, California United Cerebral Palsy			100%[m]			100%

a. Title III (Older Americans Act).
b. Community Services Administration.
c. Integrated grant from Office of Management and Budget.
d. United Fund, United Way or Community Chest.
e. State Transportation Fund.
f. Local property tax level (51%).
g. Regional Operating Grant and Federal Operating Assistance.
h. Remainder is from interest on investments.
i. 16(b)(2) funds UMTA for purchase of vehicle.
j. Easter Seal Society Campaign.
k. 13 percent from unspecified other sources.
l. Department of Public Welfare, State Rehabilitation Community, 14 School Districts.
m. Private contributions.

vantaged from other transit passengers.) The next largest number (176,818) of passenger-trips per year is found in the El Cajon system. Also, the El Cajon system travels 3.4 miles per passenger-trip (0.3 passengers/mile) with Richmond having 4.9 miles per passenger-trip (or 0.2 passengers/mile). However, to fully evaluate the utilization of the service, one should have an estimate of the potential demand for the service from a marketing analysis and, then, one should compare the potential demand with the actual demand. The closer the actual demand is to the potential demand, the closer that system is to meeting the total needs of the market. If one compares the utilization rate (passengers per mile of travel) with traditional bus service, one finds the utilization to be lower. On traditional bus services, the criteria of three passengers per mile is often used to justify additional routes or elimination of service.

Coordination of the Program with Other Services in the Transportation System

Accumulated evidence is that coordination on the local level is very spotty, although attempts are being made in some urban areas. Three reports on California cities give some evidence of progress in this area (*38, 39, 40*). Imperial County's Economic Opportunity Commission provides transportation for a wide variety of social service programs through route deviation and dial-a-ride systems. Because they supply transportation throughout this predominantly rural and agricultural county their coordination extends to providing service to other agencies as well. Services to several schools for the handicapped are on a subscription basis (*39*). Studies in two smaller urban areas—National City-Chula Vista (*40*) and Pittsburgh, Calif., (*37*)—reveal that eliminating duplication is not as important a problem as extending service to those not currently being transported. For example, none of the 13 agencies providing transportation had a vehicle with a lift for handicapped clients. The report on Pittsburgh offers a rather complete survey of problems in achieving coordination and recommends a demonstration project for the area.

Coordination issues are contingent on how the urban area tries to respond to the market for services to the disadvantaged. Ann Arbor and Jackson have elected to respond to a major portion of the problems through area-wide systems that serve the needs of market segments 3 through 6. Rochester's Medical Motor Service has been practicing the idea of consolidation and coordination for some time, and represents a single program meeting transportation needs of several social service agencies. The following excerpt is from a letter from the Executive Director of Medical Motor Service to Dr. F. J. Wegmann, Nov. 20, 1975:

TABLE 12

AVAILABILITY OF SERVICE TO THE TRANSPORTATION HANDICAPPED

Program	Market Served	Service Area	Types of Service	Other Information
Rochester, New York[a] Medical Motor Service	Group 5 - limited mobility low income; a few Group 6	Monroe County, & Rochester, N.Y.	Appointments: medical & handicapped training door-to-door	Coordination with other agencies; eligibility requirements prevent duplicating service; organized 1931; paid drivers since 1945.
Atlanta, Georgia[a] Cobb County Community Services	Elderly and handicapped N = 17,332 <1% of the total elderly	All of Atlanta 8-5/ five days/wk.	Both special service and regular trips 24-hr. advance notice	40% volunteer drivers
San Diego, California Overview from CPO report[b] Elderly and Handicapped only	Current programs meet Market group 2 - 69% of demand Market group 3 - 69% of demand Market group 4 - 69% of demand Market group 5 - 12% of demand Market group 6 - 1% of demand	San Diego Region (county)	Door-to-door; Door-to-door with lift; conventional fixed-routes	Excellent report includes much information: trip purposes; time of day of trips; trip length; usual mode
Ann Arbor, Michigan[a] AATA	Elderly, handicapped, low income groups 2,3,5,6 - best type program for meeting demand of group 4	Within city limits and recently out county (576 sq. miles) elderly & handicapped only	Door-to-door	Half-fare for low income households (sliding scale based on family size and income)
Portland, Oregon[a] TriMet	Elderly and handicapped (10% of all fares)	All census tracts (89.1 sq. mi.)	Available for selected agencies but no overall est.	User-side subsidies for 1,000 welfare clients

[a]Information from field visit.

[b]DeLeuw, Cather & Co. in association with Bigelow Crain Associates, Study of Improved Transit Services for Handicapped and Elderly prepared for the Comprehensive Planning Organization of the San Diego Region, San Diego, California, October 1976.

TABLE 13

ILLUSTRATION OF THE DISTRIBUTION OF HANDICAPPED AND/OR ELDERLY POPULATION BY MARKET GROUPS FOR THE SAN DIEGO REGION

Market Group From Figure 1-5	Total Desired One-Way Trips Per Day	% of Total Elderly and Handicapped Market
1	133,100[2]	67.3
2	21,200	10.7
3 & 4	9,600	4.9
5	30,400	15.4
6	3,400	1.7
7	not available	--
Total	197,700	100.0

[1]Information for this illustration derived from DeLeuw, Cather & Co. in association with Bigelow Crain Associates, Study of Improved Transit Services for Handicapped and Elderly prepared for the Comprehensive Planning Organization of the San Diego Region, October 1976 (Chapter 4).

[2]Assumes one trip/day/driver.

Coordination with other service agencies has built up over the years with never-ending low key public relations efforts and personal contracts. As a United Community Chest agency, we meet frequently for many reasons with the other 66 agencies, all of which are more than anxious to transfer any responsibility for client transportation to another. Many of these needs are not appropriate for our agency, but again, many are. Periodically we send information for distribution to hospital clinics and new doctors, consisting of brochures, policies and evaluation requests. It was determined in a transportation survey in 1946 that the experienced, professional drivers from Medical Motor Service were preferred by hospitals for patient transportation over Red Cross volunteers. Since then, the Red Cross refers all medical requests to us, and concentrates their efforts on transportation for other programs, veterans' hospitals and Bloodmobiles. The two cancer societies in the area have discontinued volunteer transportation service and refer all requests to Medical Motor Service. The American Cancer Society is periodically giving us an annual grant to help pay for operating one of the two cars used only for cancer patients receiving daily radiation. There are several FISH organizations in the area, but they find the number of available volunteers inadequate to meet all their requests for help and refer most medical transportation calls to us. We are housed at the Sigl Center with six other rehabilitation agencies. Each agency is autonomous but we work closely together on programs. When we moved in, we expanded to coordinate the transportation service for the two children's agencies which had been providing such service individually. There is other client transportation needed for the other agencies, but we have not had funding available for further expansion.

Interestingly, a number of private, for-profit providers using vehicles equipped with wheelchair lifts came into being in Rochester. Medical Motor Service, therefore, discontinued its service to the wheelchair bound, finding it increasingly difficult to generate sufficient demand for its service in the face of private competition.

Most cities visited are similar to Knoxville or Westport. It can be seen from Table 14 that the coordination situation in Knoxville (1970 population 174,000) is worse than the situation in Westport, a much smaller town of 28,000. In Knoxville, 11 of 20 agencies lease or own vehicles for their own use only. This single agency autonomy accounts for 27 of the 41 vehicles owned or leased by all agencies (*32*). This type of duplication and proliferation is found in many areas. The San Diego CPO concluded that there is no coordination among the agencies serving the transportation disadvantaged in that area (*17*). Westport is typical of smaller urban areas. Although there are still some coordination problems, a significant amount of transportation for the disadvantaged is provided by unreimbursed volunteers. Programs that recruit volunteers often do not consider problems of adequate insurance coverage. These programs help many of the disadvantaged, but it is difficult to determine the amount of demand they meet.

A PROPOSED PROGRAM FOR MEETING NEEDS OF THE TRANSPORTATION DISADVANTAGED

The Ann Arbor system is a good one in many respects; it accomplishes coordination and meets the needs of all market groups by changing the system of transit provision. Jackson is trying to accomplish similar goals by instituting a system of shared-ride taxis and user-side subsidies to meet the needs of senior citizens and mobile handicapped. (The system has been planned but not implemented.) At present, Allied Services of the City of Jackson operates four minibuses to provide the service. A complete cost accounting of the present services resulted in a cost per mile of $1.30, including group trips to the nutrition program, and $1.53 without these trips. The cost per trip was $2.37 for all trips on an aggregate basis, but was $4.59 for the minibus program without group riding. Tables 15, 16, and 17 give the costs of the present services. By transferring the present trip making of the minibus system users to premium taxi services, the cost per trip for the door-to-door patron of the services would be $3.25—a savings of $1.34 per trip. By developing shared-ride taxi services to serve the demand, the cost per trip would be reduced even more, depending upon the fare structure (see Table 18).

The present minibus program appears to have reduced the demand for taxi services in the Jackson area. Some taxi companies were instituting legal action against the city because of the competitive services provided by tax monies. (The taxi ordinances were revised to permit ride-sharing in Jackson in June 1977. A completely new political group (mayor and two commissioners) were placed in office in July 1977. The newly elected officials have chosen to leave the present minibus program in operation. This illustrates the need for required coordination and evaluation of programs serving the transportation disadvantaged.)

Jackson's proposed program can be judged successful by six of the criteria discussed in this chapter:

TABLE 14

COORDINATION OF AGENCY PROGRAMS IN TWO CITIES

	Knoxville (22 programs)[1]		Westport (7 programs)[2]	
	Serve Sponsoring Agency Only	Serve Needs of other Agencies	Serve Sponsoring Agency Only	Serve Needs of other Agencies
Agencies use staff owned vehicles	3			
Agencies lease or own and operate vehicles	11	2	2	1
Agencies provide money for public transportation or gas money for the client or reimburse volunteer to transport the client.	5			3

[1]One agency simply instructs clients in how to ride public transportation (Goodwill Industries). Source of Knoxville data is Dallas Owens and Chris Fisher, Transportation Services of Knoxville Social Service Agencies, Knoxville, The University of Tennessee, Transportation Center, January 1977.

[2]One agency was essentially a referral service to mobilize vehicles to transport elderly to special events and to organize carpools.

TABLE 15

EQUIVALENT UNIFORM ANNUAL COST OF MINIBUS PROGRAM (TOTAL RIDING), JACKSON, MISS.

	ITEMS	COST
A.	OPERATION[1]	
	1. Labor	$ 71,305.40
	2. Materials (fuel, oil, parts)	25,329.54
	3. Management	6,000.00
	4. Other (includes dispatcher's salary)	9,196.90
B.	INSURANCE[2]	11,901.92
C.	ALLIED SERVICES (Department of the City)	
	1. Salaries	25,802.00
	2. Office Supplies	2,971.53
	3. Postage	65.00
	4. Mapping, Printing, Copying	409.64
	5. Telephone	999.96
	6. Equipment and Machine Contract	274.00
	7. Auto Allowance	70.80
D.	FIXED PLANT AND VEHICLES	
	1. Building Rent (share)	818.18
	2. Parking Lot Rent	272.18
	3. Vehicle Depreciation[3]	19,116.00
	4. Radio Equipment Depreciation[4]	2,591.00
	5. Tags	96.25
	TOTAL	$177,220.71
	Cost/trip $2.37 Cost/mile $1.30	

1. Costs for Item A were based on first seven months in 1976; figures were adjusted to provide annual cost with consideration given to seasonal ridership variances.
2. Personal liability, property damage = $8.01 per mile; fire, theft and comprehensive = $127 per year (covers all 5 vehicles); and $1,000 deductible = $125 per year (for each vehicle).
3. Five year lifetime with no salvage value.
4. Five year lifetime with no salvage value.

Source: Kuhns, Robert, Heathington, Kenneth W. and Adams, Carolyn, Special Transportation Services for Senior Citizens in Jackson, Mississippi, Central Mississippi Planning and Development District, May 1977.

TABLE 16

EQUIVALENT UNIFORM ANNUAL COSTS OF MINIBUS PROGRAM (WITHOUT GROUP RIDING), JACKSON, MISS.

	Items	COST
A.	OPERATION[1]	
	1. Labor	$ 71,305.40
	2. Materials (fuel, oil, parts)	20,408.37
	3. Management	6,000.00
	4. Other (includes dispatcher's salary)	7,410.07
B.	INSURANCE[2]	9,589.55
C.	ALLIED SERVICES	
	1. Salaries	25,802.00
	2. Office Supplies	2,971.53
	3. Postage	65.00
	4. Mapping, Printing, Copying	409.64
	5. Telephone	999.96
	6. Equipment and Machine Contract	274.00
	7. Auto Allowance	70.80
D.	FIXED PLANT AND VEHICLES	
	1. Building Rent	818.18
	2. Parking Lot Rent	272.73
	3. Vehicle Depreciation[3]	19,116.00
	4. Radio Equipment Depreciation[4]	2,591.00
	5. Tags	96.25
	TOTAL	$168,200.48

1. Costs for Item A were based on first seven months in 1976; figures were adjusted to provide annual costs with consideration given to seasonal ridership variances.

2. Personal liability, property damage = 8.01 cents per mile; Fire, theft and comprehensive = $127 per year (covers all 5 vehicles); and $1000 deductible = $125 per year (for each vehicle).

3. 5 year lifetime with no salvage value.

4. 5 year lifetime with no salvage value.

Source: Kuhns, Robert, Heathington, Kenneth W. and Adams, Carolyn, Special Transportation Services for Senior Citizens in Jackson, Mississippi, Central Mississippi Planning and Development District, May 1977.

TABLE 17

TRIP AND MILEAGE COSTS OF THE MINIBUS PROGRAM, JACKSON, MISS.

	COST/RIDER AND COST/MILE	
1.	Total Yearly Mileage	136,590 Miles
2.	Total Yearly Costs	$117,220.71
3.	Cost/Mile	$1.30/Mile
4.	Total Yearly Trips	74,815 Trips
5.	Cost/Trip	$2.37/Trip
	COST/RIDER AND COST/MILE (Without Group Riding)	
1.	Total Yearly Mileage	111,053 Miles
2.	Total Yearly Costs	$168,200.48
3.	Cost/Mile	$1.53/Mile
4.	Total Yearly Trips	36,669 Trips
5.	Cost/Trip	$4.59/Trip

Source: Kuhns, Robert, Heathington, Kenneth W. and Adams, Carolyn. Special Transportation Services for Senior Citizens in Jackson, Mississippi, Central Mississippi Planning and Development District, May 1977.

TABLE 18

TAXICAB ALTERNATIVES AND COSTS FOR PROVIDING SENIOR CITIZENS TRANSPORTATION (EXCLUDING GROUP RIDING), JACKSON, MISS.

Alternative	Individual Costs (Per Passenger Trip)	Individual Savings (Per Passenger Trip)	Annual Costs*	Annual Savings
I. Transfer To Taxicab Service				
A. Existing Fare	$3.25	$1.34	$119,174	$ 49,137
B. Bid Price Of 90¢/$1.00	2.93	1.66	107,440	60,871
C. Bid Price Of 80¢/$1.00	2.60	1.99	95,339	72,971
II. Shared Ride Taxicab				
A. Two Passengers				
1. Regular Fare	1.63	2.96	59,771	108,540
2. 1.25 x Regular Fare	2.04	2.55	74,805	93,506
3. 1.5 x Regular Fare	2.45	2.14	89,839	78,472
4. Existing + 25¢/Passenger	1.75	2.84	64,171	104,140
B. Three Passengers				
1. Regular Fare	1.08	3.51	39,603	128,708
2. 1.25 x Regular Fare	1.35	3.24	49,503	118,808
3. 1.5 x Regular Fare	1.62	2.97	59,404	108,907
4. Existing + 25¢/Passenger	1.25	3.34	45,836	122,474
C. Four Passenger				
1. Regular Fare	.81	3.78	29,335	138,609
2. 1.25 x Regular Fare	1.02	3.57	37,402	130,908
3. 1.5 x Regular Fare	1.22	3.37	44,736	123,575
4. Existing + 25¢/Passenger	1.00	3.59	36,669	131,642

*Based on annual ridership of 36,669

Source: Kuhns, Robert, Heathington, Kenneth W. and Adams, Carolyn Special Transportation Services for Senior Citizens in Jackson, Mississippi, Central Mississippi Planning and Development District, May 1977.

1. *Cost.* Table 18 demonstrates potential low cost.

2. *Financial Support.* The program is funded as a part of the regular city budget and is stable.

3. *Availability.* The program serves market groups 3, 4, and 5 as well. Provision can easily be introduced to add low income eligibility for purchase of discounted coupons for taxi service. The program is less well adapted to the wheelchair confined (a portion of market group 6). Ambulance service is available in the city for market group 7.

4. *Level of Service.* Taxicabs are comfortable, provide door-to-door service, a direct route, and low travel time. Service is available 24 hours per day, 7 days per week. In short, the level of service is high.

5. *Utilization.* Not implemented.

6. *Coordination.* Because there is one primary provider for the service, coordination problems are minimized.

In summary, the program, if adopted in Jackson, will be among the strongest programs reviewed.

SOME EXAMPLES OF IMPROVED PROGRAMS FOR THE TRANSPORTATION DISADVANTAGED

Three programs have been selected for discussion in this section. Jackson has tried to convert from a minibus program to a program of discounted coupons and shared-ride taxis. Ann Arbor offers citywide demand-responsive service to all market segments except 7. Oak Ridge was an early adopter of the discounted coupon for taxi service to the elderly.

Jackson is trying to make a change in programs on the basis of a very complete evaluation of the cost of its present program (*33*). Tables 15 through 18 give a rather comprehensive breakdown of program costs and possible savings with the implementation of the new program. The tables are included as a means of suggesting items that a complete accounting and analysis of expenses should include. Depreciation seems to be an item often overlooked in evaluating costs of a program.

Table 19 compares the three programs and some characteristics of the areas. Ann Arbor's program is clearly the most comprehensive because it covers all market segments except 7 and applies to low income, elderly, and handicapped. Oak Ridge has limited its program to the elderly at present. Jackson includes the handicapped (i.e., legally blind). All three programs were heavily subsidized to make up the difference between low fares and cost per passenger-trip. The actual fare to be instituted in Jackson has not been determined at the time of this writing. Still, it seems likely to be no more than the $0.25 charged in Oak Ridge and Ann Arbor. Ann Arbor structures its fares on the basis of income and family size rather than on some other criteria such as age. All programs have stable support from local sources. Ann Arbor received the most federal money, but it is a total transit system. Coordination of service to market segments 1 through 6 is good in all three programs. However, Ann Arbor and Jackson have wheelchair lifts on certain vehicles. Oak Ridge does not provide vehicles with wheelchair lifts and leaves the vehicle design to the taxi companies. Market segment 7 is served by others in all three communities.

Oak Ridge has a successful user-side subsidy program. Ann Arbor is an example of a successful provider-side subsidy program. Both Oak Ridge and Ann Arbor are communities with few low income families. Such communities are capable of subsidizing programs for the disadvantaged.

TABLE 19

COMPARISON OF THREE PROGRAMS FOR THE TRANSPORTATION DISADVANTAGED ON SELECTED CHARACTERISTICS AND THE EVALUATION CRITERIA

Characteristics of Urban Areas	Oak Ridge, Tennessee	Ann Arbor, Michigan	Jackson, Mississippi (Proposed)
Land area in city[1]	82.7 square miles	21.8 square miles[2]	50.2 square miles
Total population[3]	28,900	105,000	171,000
Percent of population 65 and over (1970)[1]	4.7	5.4	8.0
Percent of low income families (1970)[1]	5.6	4.7	17.6
Service type	Discounted coupon taxi	Demand-responsive and fixed-route public	Discounted and shared-ride taxi--supplemented with group rides in vans
Evaluation Criteria			
Cost[4]		$2.22/passenger trip[5]	varies from $0.81 to $2.45/ passenger trip depending upon operational factors (see Table IV-9)
Financial support	Client pays 25¢ and anything over first $1.00. Cab company pays 10¢. City pays 65¢. Stable support.	Basic fare 25¢[6] Most of operations budget comes from local property tax. Stable support.	Similar to Oak Ridge exact payment ratios under bid and pending council action at present time. Stable support.
Availability	Serves the elderly in markets 1-5 (60 years old or older)[7] No demand figures available.	Serves all transportation disadvantaged in markets 1-6 has sliding fare scale for low income 100% accessibility[8]	Serves the elderly in markets 1-5
Level of service	High: comfortable, door-to-door, low travel time, low waiting time. No wheelchair capability.	Dependable: comfortable, 45 minute waiting time for dial-a-ride, safe, wheelchair capability, longer travel time, transfer may be required for those who are physically able.[9]	High: comfortable, door-to-door, low travel time, low waiting time. No wheelchair capability.
Coordination	Minimal since one primary provider and one type of service involved. However program coordination with suppliers of handicapped and low income.	Minimal since one primary provider. Demand-responsive services must be coordinated with fixed-route, fixed-schedule services.	Minimal since one primary provider and one type of service involved.

[1]Source: U.S. Bureau of Census, City-County Data Book, 1972, Washington, D.C.: U.S. Government Printing Office, 1972.

[2]Recently expanded to cover all of county for physically handicapped in out county areas for a total of 576 square miles. This program is subsidized by a grant from the state.

[3]Estimate for 1975 from 1977 Commercial Atlas and Marketing Guide, Chicago: Rand McNally & Company, 1977.

[4]All three systems keep good records on the cost of their operation.

[5]This is figure for entire transit system.

[6]No special fare for elderly or handicapped. Discounts are based on annual income and family size as joint criteria.

[7]Wheelchair service provided by FISH and by Anderson County Ride program.

[8]See page 5 of AATS's Annual Report to the Community 1976. System claims citywide coverage thus eliminating market segment four within city limits. Door-to-door service available throughout Ann Arbor. City currently has 12 wheelchair lift-equipped vans on the road for city and out county area.

[9]AATA's 1976 Annual Report shows the following trip times: 30 minutes within neighborhood, 40 minutes to downtown, 60 minutes across town. Dial-a-ride calls at least one hour in advance. Pickup within ten minutes of appointed time.

Jackson and Ann Arbor appear to offer the best record-keeping of the two programs. Oak Ridge relies on taxi drivers to record trip cost. Ann Arbor's trip cost is lowest, but the figure includes all trips in the system whether made by a disadvantaged person or not. Each program has merit. Ann Arbor appears to provide the highest level of service, but its service is relatively costly.

SUMMARY

In this chapter, six criteria have been established for the purpose of evaluating programs for the transportation disadvantaged.

1. Costs of the service are often high when provided by special agency owned and operated programs. Further

accurate, comparable data are difficult to find.

2. The initial financial support for programs often comes from the federal level, but funds may be deleted after the program is underway. The more stable long-term programs are supported by local funds.

3. Availability of the service to the transportation disadvantaged is very difficult to evaluate in communities that have not done a survey or that do not provide some communitywide demand-responsive service. Of the communities studied, Ann Arbor provides the most available service. Availability of the service seems to be an important area in which systems need to do further work. Service must be equally available to disadvantaged and nondisadvantaged.

4. Level of service provided varies markedly. One concern is the amount of waiting time for demand-responsive service. Some services require several days advance notice. Service to the disadvantaged must be equal to that provided to other persons.

5. Utilization of services determines the acceptability of the service to the consumer. If a system is to be considered successful, there should be a reasonable level of use.

6. Coordination of programs is perhaps the leading need in serving the transportation disadvantaged. Cooperation can be fostered by creating services that serve a specific segment of the market defined in Figure 5. Coordination will eliminate duplication of services and gaps in the service to the disadvantaged. Coordination can be fostered by opening lines of communication among transportation providers.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

1. *Conclusion.* There are several market segments within the disadvantaged population, each requiring special services, vehicles, and varying financial support. Funding programs tend either to group all segments aggregated into one market (e.g., UMTA funding) or to group into segments that are not meaningful for transportation purposes (e.g., most human service agency funding).

Recommendation. Funding of transportation for the disadvantaged should be consolidated at all levels of government. The consolidated program should then segment the disadvantaged market and develop services to meet the needs of each segment in a cost-effective manner.

2. *Conclusion.* All market segments of the transportation disadvantaged cannot be grouped together and be adequately served by a "standard" vehicle and/or "standard" service. The needs of the several disadvantaged markets are too varied (i.e., need for door-to-door service, door-through-door service, wheelchair accommodations, ease of entry and exit for the blind, seeing eye dogs, information, etc.) to be met through a "standard" service and/or vehicle.

Recommendation. A concentrated effort must be made to match vehicle characteristics and services with the needs of the various market segments of the transportation disadvantaged rather than to attempt to provide one type of vehicle and service to all market segments.

3. *Conclusion.* It does not appear to be effective, efficient, or economical to modify and retrofit an entire fleet of vehicles comprising a public transportation system in order to serve the needs of the severely handicapped. The conclusions from studies that suggest that retrofitting of an entire public transportation system is appropriate will be greatly altered by changing some of the basic assumptions used in the studies. There has not been enough research to determine with accuracy the real needs for transportation services of the disadvantaged. Some of the studies treat the disadvantaged as one market segment. This, of course, is not true, and economies of scale for consolidation of market segments of the disadvantaged have not been determined.

Recommendation. Level of service needs of the disadvantaged must be met, but not necessarily by traditional public transportation systems' vehicles and equipment. When the needs of the severely handicapped (segments 6 and 7) are known, monies should be made available to providers (either public or private) and users so that the service needs of these groups can be met in a cost-effective manner.

4. *Conclusion.* Program funding of transportation for the disadvantaged often does not encourage or permit consolidation efforts. There is very little communication and/or coordination in local communities between agencies providing transportation services.

Recommendation. At all levels of government there should be a concerted effort to coordinate transportation programs for the disadvantaged. A brokerage transportation concept (in which demand is matched to vehicles capable of providing high levels of service in a cost-effective manner) is appropriate for providing transportation services to the various market segments of the disadvantaged. An agency at the community, regional, and/or state level should have the responsibility to ensure that this coordination occurs.

5. *Conclusion.* Human service agencies generally pro-

vide transportation services to their clientele in a particular manner because of the restrictions placed on their funding. Some restrictions may be from political/jurisdictional hindrances.

Recommendation. More flexibility must be attained in the use of funds for providing transportation services to the disadvantaged. This flexibility must provide for alternatives that will help make programs cost-effective and eliminate duplication.

6. *Conclusion.* How funds are used for transportation services for the disadvantaged often are restricted too greatly by state and local governments.

Recommendation. State and local governments must become more knowledgeable of the inefficiencies created by undue restrictions placed on utilization of funds for providing transportation services to the disadvantaged. State departments of transportation should assume an educational role and provide seminars and short courses on effective ways of providing transportation to the disadvantaged.

7. *Conclusion.* Some human service agencies are "empire builders." They are more interested in increasing their budgets, employing more personnel, and operating more equipment than in providing a cost-effective program to their clientele.

Recommendation. Human service agencies should be permitted to purchase transportation services either by contract or with user-side subsidies. They should not be permitted to establish their own transportation systems with paid employees. This restriction should not apply to volunteer transportation programs.

8. *Conclusion.* There is much duplication in transportation services provided by private agencies (e.g., United Cerebral Palsy, Easter Seal Society) and public human service agencies. Often the private agencies, especially those that provide services to the severely handicapped, are more oriented toward a market segmentation approach than the public agencies.

Recommendation. Public agencies should take advantage of the transportation services provided by the private agencies. Duplication of services should not exist. Funds should be used, where appropriate, to assist the private agencies in providing transportation services.

9. *Conclusion.* Transportation is provided by some small-scale human service agencies primarily as a support service for meeting other client needs. Transportation's supporting role expands the scope of agency programs. This program expansion often results from the feeling that if the agency does not provide for client transportation, no one will.

Recommendation. Agencies should view transportation provision in terms of relevant demand characteristics of the segment(s) they serve. Interagency cooperation should be encouraged; similarities in the market demand characteristics of client populations should serve as the basis for cooperative transportation programs. Transportation planners also need to view the disadvantaged as differentiated segments that place different demands on the transportation system.

10. *Conclusion.* Human service agencies often argue that they can provide transportation services with their own personnel more economically than by contracting with privately owned public carriers. However, the data do not support this argument except in cases where human service agencies use volunteer labor. It is generally found that the true costs of human service agencies cannot be readily determined because of inefficient record-keeping and the omission of certain costs, such as administration and depreciation.

Recommendation. Each human service agency should be required to provide "true costs," as is required by UMTA regulations pertaining to charter services provided by public transportation systems. If the true costs are greater than the costs required by privately owned public carriers, privately owned public carriers should be used.

11. *Conclusion.* In some instances there is substantial competition between human service agencies' transportation services and privately owned public carriers. At times this has caused an adverse effect on ridership of the privately owned public carriers. This competition is similar to the competition in charter services between publicly owned and privately owned transportation systems. Section 16(b)(2) subsidies provided to nonprofit agencies for vehicle and equipment purchase have the effect of drawing some clientele away from private suppliers, such as taxi companies. This federal subsidy tends to erode the competitive basis of the free enterprise system. Free market forces tend to reduce the cost of services provided to the disadvantaged clientele. By reducing the size of the market of the private suppliers there will, of course, be a reduction in the number and capacity of private suppliers or the cost of services will be increased.

Recommendation. All subsidies, including Section 16 (b)(2), for providing transportation services to the disadvantaged should be evaluated as to their impact on private, for-profit providers (e.g., taxi companies). Tax monies should not be used to offer competition to the private sector.

12. *Conclusion.* Criteria used to evaluate the transportation services for the disadvantaged vary widely.

Recommendation. The following criteria should be adopted as the standards for comparison and evaluation of programs: (1) cost of service, (2) financial support for the program, (3) availability of the service to the transportation disadvantaged market segments, (4) level of service provided, (5) utilization of the service, and (6) coordination of the program with other services (both public and private) in the transportation system.

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APPENDIX A

CASE EXAMPLES

NONPROFIT HUMAN SERVICE AGENCIES

The following transportation services have developed under the existing constraints placed on funding at the federal, state, and local levels. Market segmentation is based on client disability (elderly, physically disabled) instead of on transportation needs as elicited from the market segmentation approach.

The Goodwill Handi-Trans Program in San Antonio, Texas

The Handi-Trans program (*A-1*) is a good example of an agency program that is limited by its funding and mission to serving only a particular segment of the disadvantaged population. Goodwill in the San Antonio area has shed its image of a refuse hauling and thrift store operation. The agency has developed an entire complement of services aimed specifically at vocational rehabilitation of the handicapped. As a specialized agency, Goodwill does not serve the needs of the entire transportation disadvantaged population, nor can the agency provide transportation for every purpose desired by the handicapped in Bexar County, Tex., who are involved in vocational rehabilitation programs. The vehicles used in the Handi-Trans program consist of 18 vans with seating arrangements that can accommodate nine clients with walkers and two with wheelchairs. Also, there are two buses with seating arrangements to accommodate nine wheelchair clients and four with walkers. The market segment has been limited to the handicapped requiring rehabilitation. Recently, however, the agency has received funds from Title XIX of the Social Security Act through a contract from the Texas Department of Public Welfare to provide medical transportation for the handicapped. Because the trips to rehabilitation centers are daily trips made by a well-defined population, the system is mainly a fixed-route, fixed-schedule operation. With the addition of the trips for medical purposes, the system has been modified to include a demand-responsive element as well.

The sources of funding available for the transportation component of Goodwill's rehabilitation services include fares charged to clients through third party arrangements, money from the Texas Department of Public Welfare and the Texas Rehabilitation Commission, and contractual arrangements with 14 local school districts.

The American Red Cross of Phoenix, Ariz.

As opposed to the Goodwill transportation program in San Antonio, the Red Cross program in Phoenix has a much less precisely defined market segment to serve and is allowed to provide transportation for more trip purposes (information based on responses to a questionnaire survey of social service providers, March 1977). The expressed objective of the transportation program is to provide transportation volunteer status of all the van drivers and the fact that the agency bears none of the insurance cost. Interestingly, the agency received a few vehicles under the provision of 16(b)(2) funds, but has opted not to apply for additional capital assistance from the program. The executive director of the Phoenix agency stated that the extensive reporting requirements and the 5-year vehicle retention requirement precludes the agency from further participation. Currently, vehicles are sold and purchased every 18 months to 2 years.

The Volunteer Chapter of the Easter Seal Society for Crippled Children and Adults of Tennessee, Inc., Knoxville, Tenn.

The Easter Seal Society program in Knoxville (*A-2*)

represents a type of transportation provision to the disadvantaged that falls between the market segmentation continuum described in the two previous examples. The Goodwill program in San Antonio has a precisely defined, narrowly specialized market segment to serve. The Red Cross program in Phoenix is restricted only by the age of the clients to be transported and the priorities of federal, state, and local funding as to which trip purposes are deemed most essential. Transportation may, for example, be provided to health care centers but not to visit a friend. Although it could be argued that all trip purposes of the transportation disadvantaged are important to their mental and physical well being, the exigencies of funded transportation programs provided by social service agencies usually limit the programs to specific trip purposes.

The Easter Seal Society program in Knoxville is available on demand to the segment of the handicapped and the elderly population that cannot use conventional public transportation. The potential population that might seek transportation services from this agency is broader than that of the Goodwill program in San Antonio, but more precisely defined than that of the Red Cross program in Phoenix. Defining the market segment to be served in terms of the mobility limitations of the clients assures that the service is not duplicating the efforts of conventional transit.

The Easter Seal Society program in Knoxville and the surrounding 31 counties of East Tennessee is extensive; the 1975 budget for transportation was $230,475. There are some efficiencies of operation that accrue because of the scale of the endeavor. The specially equipped vehicles of the Easter Seal Society are used to transport crippled children to schools and crippled adults to vocational rehabilitation centers through contractual arrangements. These vehicles are placed on a demand-responsive basis after the fixed-route clientele has been serviced.

MASS TRANSPORTATION SYSTEMS

Michigan Dial-A-Ride Transportation Program

The Michigan Dial-A-Ride Transportation (DART) program (*A-3*) is a concept of the Michigan Department of State Highways and Transportation (DOT), which is designed to provide basic transportation services throughout the state. The Michigan DOT has supported installation and operation of dial-a-ride systems in 28 areas throughout the state with populations of less than 50,000.

For the first year, the state contracts with the community agency (a city, county, or authority) to operate the system with 100 percent state funding, less $1,000 as the local contribution. At the end of the first year, the equipment is sold to the community for $1.00 per vehicle if the system is continued. The state will continue, after the first year, to provide operating subsidies up to 33 percent of the total operating costs. It also will provide matching funds for any capital grant request to UMTA.

The average number of vehicles used is about one per 5,000 population. Generally, raised roof van conversions are used. The fares charged are approximately $0.50 per ride with half fares for senior citizens and handicapped individuals. The average cost per passenger is $1.32 and the average revenue is $0.31, resulting in a required subsidy of $1.01 per passenger.

Of the communities that have initiated these state-funded systems, 11 communities have approved a local property tax to subsidize continuance of the service and 7 communities have arranged for a local contribution to the system costs using existing revenues. None of the state-sponsored DART systems have been discontinued. The remaining communities have not yet completed their demonstration year.

From the state DART experience, the Michigan DOT has expanded into paratransit programs for the elderly and the handicapped in 34 rural counties and 11 metropolitan areas. These paratransit programs include commuter or supplemental bus service in conjunction with metropolitan line-haul service, a Section 16(b)(2) program in 28 rural areas, and a three-county Section 147 program in the eastern Upper Peninsula. The Michigan program is an innovative response to a need for a consolidated transportation program for the disadvantaged throughout the state.

Handy-Ride Program of Denver, Colo.

The Handy-Ride program (*A-4*) represents yet another attempt by a municipality working through a regional transportation authority (Regional Transportation District of Metropolitan Denver) to provide an areawide program of transportation to the elderly and the handicapped populations who cannot use conventional mass transit. In 1974, the Regional Transportation District (RTD) authorized the lease of 12 buses specially equipped for the wheelchair confined population.

To qualify for service, applicants had to show need for regular trip making. Of the 1,164 applicants from the greater Denver area, 50 percent were 65 or older. The remaining 50 percent were handicapped. Of the handicapped, 22 percent (11 percent of the total qualified applicants) were confined to wheelchairs.

With only 12 buses, it was not possible to serve all the qualified applicants. Priorities were established to give preference to the handicapped over the elderly, to the handicapped in wheelchairs over other handicapped persons, and to work or school trips over other trips. Least priority was given to those whose disabilities did not significantly interfere with their use of public transportation. Included in this category were, for example, the mentally retarded and those with epilepsy.

One of the early observations about the Handy-Ride program was that many of the elderly could be served with regular equipment. They did not need the wheelchair lift or other special features of the Handy-Ride buses. Acting on this observation, some special services for the ambulatory were initiated. Six special midday shopping bus tours originate at various high-rise apartment complexes, take elderly patrons to nearby shopping centers, and return approximately two hours later. Each trip runs once a week. Support for this service was enthusiastic at first, but ridership has since declined.

The Special Transit Needs Program at RTD consists of three parts: (1) the Handy-Ride program, which provides

transportation services and facilities for the handicapped; (2) another (which grew out of the Handy-Ride program) that provides midday shopping services for the elderly; and (3) the retrofitting program, which involves modifications to existing rolling stock to meet the needs of the elderly and the ambulatory handicapped.

Cost figures have been developed to include all related expenses. They are tentative, however, in that they incorporate only preliminary patronage data. The cost per Handy-Ride passenger at the beginning of the service in February 1975 was $29.44. By May of that year, cost had been reduced to $11.70. Cost per passenger for the elderly shopper service has remained at $0.83. The expenses for Handy-Ride include depreciation of vehicles, overhead, salaries of the dispatcher and drivers, and insurance in addition to the most commonly recorded out-of-pocket expenses.

Shared-Ride Taxi Service, Oak Ridge, Tenn.

Oak Ridge, Tenn., has recently instituted a shared-ride taxi program (*A-5*) for the community's elderly population. The city was dissuaded from purchasing its own fleet of vans to service the demands of the elderly by a benefit-cost analysis of alternative systems. It was found that high levels of service could be provided by the existing taxicab operators if the regulatory and legal restrictions to shared-ride operations were relaxed. The elderly residents who are eligible to receive reduced rates on the demand-responsive, shared-ride taxi systems were identified and issued appropriate certification cards. Holders of these cards are allowed to purchase tickets for a taxi ride worth $1.00 for only $0.25. If the elderly individuals desire to travel to a zone that costs more than $1.00, they pay the fare in excess of $1.00. The tickets are turned in by the taxicab operators, and the city reimburses the cab companies $0.90 for each ticket returned. On those rides with fares less than $0.90, taxi operators make a small profit, whereas on those over $0.90 they sustain a small loss. The provision of such a user-side subsidy saves the city of Oak Ridge several thousand dollars annually that would have been allocated for the purchase and maintenance of a city-owned system. The city does not have to deal with problems of insurance, labor agreements, or maintenance because the system is privately operated. The user-side subsidy costs approximately $15,000 annually, whereas a city-owned van system that would provide a comparable level of service to the elderly was estimated to cost a minimum of $50,000 annually. Clearly, more public agencies and public programs should consider the savings that could accrue by subcontracting transportation provision to the private sector using a user-side subsidy mechanism of reimbursement.

Handicabs, Inc. of Milwaukee, Wis.

Handicabs, Inc. is an example of a private door-through-door service provider located in Milwaukee, Wis., (*A-6*). The service is equipped with 120 small buses and vans. All vehicles have special loading doors and ramps. Approximately 50 percent of each bus provides regular seating, and the remainder provides space for persons in wheelchairs and individuals who must be transported in prone position. The system's design is appropriate for the severely disabled.

The majority of the provided service is transportation of handicapped children to and from local schools. Ten vans are used for demand-responsive service which handles 35 to 40 calls per hour.

The rates charged are a $3.00 minimum for the first 30 blocks and an additional $3.00 for each additional 30 blocks. The rate is $7.00 minimum for a round trip to a nursing home or airport. Medicaid sponsors the majority of passenger trips made for medical purposes through a user-side subsidy. Handicabs provides physical assistance door-through-door for the passenger.

This service is too expensive to be used by the regularly employed handicapped individual, and a taxi would provide a less expensive alternative for most trip purposes of the disadvantaged. The service does, however, present an alternative to the costly ambulance rates that the severely handicapped would otherwise face.

Yellow Cab's Dial-A-Ride Program of Santa Barbara, Calif.

Santa Barbara's dial-a-ride operation was privately owned and operated (*A-7*). The system was initiated in 1973 and was operated as a service of the Yellow Cab Company, the only taxi firm in Santa Barbara.

Vans, rather than taxis, were used for Santa Barbara's dial-a-ride operation. It was feared that if taxis were used at the cheaper dial-a-ride fares, too many taxi customers would switch to dial-a-ride. There were originally two vans in service, but, when ridership dropped, one van was taken out of service.

The majority of Santa Barbara's dial-a-ride users were elderly. The hoped-for patronage of 500 per day never materialized. During the first year of the system's operation (Sept. 1973 through Sept. 1974), there were some days when ridership reached 120. The greatest number of trips were medical visits. The main work destination was a rehabilitation center. School trips made by dial-a-ride were limited to mentally retarded children.

Most of the Santa Barbara dial-a-ride users were very appreciative of the service. For most of the passengers, the choice was between taxi or dial-a-ride. As long as the dial-a-ride fare remained less than $2.00, it was still cheaper than a taxi for most trips within the city. At a fare that almost covered the cost of the service (a fare of $1.50 and a cost per trip of $1.60), between 70 and 90 percent of the weekly ridership would still have used the system according to a survey of market response. Santa Barbara's dial-a-ride system received no outside subsidies. The cost of operation depended wholly on fare-box revenues and a cross-subsidy from the Yellow Cab Company. Package delivery and night charter brought in additional revenue.

During the first year of the dial-a-ride operation, the city effected a form of competition to the Yellow Cab operation. The Metropolitan Transit District placed eight minibuses in service and the Yellow Cab revenues declined, forcing the company to raise its fares. The fare increase led to a reduction in ridership that eventually sounded the death knell for the privately operated service.

Santa Barbara's dial-a-ride system was a deficit operation. The operation usually managed to break even by means of fare increases. When finally abandoned, the system had an annual net operating deficit of $3,000 and a deficit per passenger-trip of $0.60 to $0.65 at a patronage level of 20 passengers per day. These deficits are surprisingly low when compared to larger public and social service transportation programs.

The experiences of more private, for-profit transportation programs for the transportation disadvantaged are needed before any definitive statements can be made about this type of provision.

REFERENCES

A-1. Private Communication, Robert Blaze, Executive Director, Goodwill Industries of San Antonio, July 1976.

A-2. Private Communication, Spencer Davis, Executive Director, Volunteer Chapter of the Easter Seal Society, Knoxville, July 1976.

A-3. VOGT, SAGE and PFLUM, *Transportation Needs of Handicapped Persons in the Five County Area.* Northeast Ohio Areawide Coordinating Agency (1976).

A-4. WILLIAMSON, B., and OSTERHOUDT, S., "Special Transit Needs Program in the Denver Metropolitan Area." *Transportation Research Record 608* (1976) pp. 70-75.

A-5. KIRBY, R. F., and TOLSON, F. L., *Improving the Mobility of the Elderly and Handicapped Through User-Side Subsidies.* The Urban Institute (Jan. 1977) p. 15.

A-6. SCHNELL, J. B., "Public Transportation and Transportation Needs of the Elderly and Handicapped." *Transportation Research Record 561* (1974) pp. 1-10.

A-7. KADESH, E., "Evaluation of DRT Systems in Richmond and Santa Barbara." *Transportation Research Record 608* (1976) pp. 42-47.

APPENDIX B

ADDITIONAL FUNDS

In addition to the federal programs mentioned in Chapter Three, which supply the bulk of funding for social service programs (e.g., Titles III and VII of the Older Americans Act; Titles XIX and XX of the Social Security Act; Sections 3, 5, and 16(b)(2) of the Urban Mass Transportation Act), other funding is available. These funds are allocated to the states and may be used by human service agencies, public and private for-profit corporations. Provider- and user-side subsidies are included in these programs.

EMERGENCY MEDICAL SERVICES SYSTEMS (EMSS) ACT OF 1973 (*B-1*)

- State Comprehensive Health Planning Agency Appropriate Areawide Planning
- Agency A-95 Clearinghouse Review
- State Government EMS Focal Point

Transportation Services Available

- *Section 1203(a).* Grants or contracts with eligible agencies for the establishment and initial operation of emergency medical services systems.
- *Section 1204(b).* Grants or contracts with eligible agencies for the expansion and improvement of emergency medical systems. Renovation and leasing of equipment and facilities.
- *Section 1206(b)(4)(c)(iv).* For each section, application must include a presentation of appropriate transportation.

Transportation Costs Allowable

- For vocational rehabilitation agencies: costs of travel and subsistence during travel or daily payments in lieu of subsistence may be paid by the agency.
- For migratory workers (Section 304(c)): the transportation costs of such handicapped individuals and their family members when necessary for the individual's rehabilitation.
- In certain training and research grants: student travel costs may be covered.
- Technical assistance in Section 304(e): will be provided directly or by contract with state vocational rehabilitation agencies, experts, consultants, or groups to public and nonprofit agencies. The purpose is for the planning or the removal of architectural and transportation barriers.

EQUAL OPPORTUNITIES ACT (*B-1*)

- P.L. 93-644, Section 602(d), Section 622(a)

Transportation Services Available

- The act requires that the Head Start grantees establish an agreement or contract with the agency or project utilizing the Head Start transportation system. A scheduled use of vehicles must be reflected in provider agreements. Vehicles for the transporta-

tion of children must be available to the Head Start centers at the appointed hours. This vehicle would have priority over all other purposes. When Head Start vehicles are used for non-school trips, certain conditions must be approved by the Head Start regional office.
- The Head Start grantee must prepare periodic reports concerning the services provided to client families and children, including transportation services.

Transportation Costs Allowable

- The using agency must pay its pro-rata share of operation and vehicle maintenance costs including insurance.

HEALTH RESOURCES ADMINISTRATION (*B-2*)

- P.L. 91-515

Transportation Services Available

- Transportation services include transportation to medical care for patients with heart, cancer, kidney, and other related diseases.

Transportation Costs Allowable

- Transportation is an allowable cost in the HRA grants where it is specifically related to the program's objectives in providing the services previously noted.

U.S. OFFICE OF EDUCATION (*B-1*)

- Adult Education Act

Transportation Services Available

- Financial assistance toward transportation costs for adult education programs.

Transportation Costs Allowable

- The Annual Program Plan appropriates transportation costs to the extent necessary for adult education programs. These costs must be in accordance with individual state laws where applicable.

COMMUNITY SERVICES ACT OF 1974 (AMENDED) (*B-2*)

- Community Services Administration (CSA) of the Office of Economic Opportunity Title II, Section 212, 221

Transportation Services Available

- Financial assistance for a limited purpose project to a public or private nonprofit agency, which is capable of providing the needed service.
- The project must serve the low-income population of all ages, in urban and rural areas.

Transportation Costs Allowable

- Providing transportation for Community Action Agency's program and other social service agencies without outreach service methods:
  —To pay outreach workers to transport the indigent (mileage).
  —To provide surplus government vehicles and gasoline for vehicles to outreach staff.
  —To operate a free bus service for the indigent.
- Restrictions:
  —Local community groups must consist of a 51 percent low-income population and the grant must be used to serve low-income residents.
  —Before capital equipment purchases, all existing available resources must be surveyed. This consists of local equipment or state or federal surplus equipment that may be leased, borrowed, or rented.
  —Equipment purchases over $500 must be approved by the CSA regional office property administrator and bids must be secured from at least five sources before purchase.

TITLE I: HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1974 (*B-2*)

- Department of Housing and Urban Development

Transportation Services Available

- The program's primary goal is to develop viable urban communities. This is provided by decent housing, suitable living environment, and expanded economic opportunities especially for the low- and moderate-income population. The development of transportation services, especially where it is documented that the lack of such service has inhibited the mobility and accessibility of the elderly, should be considered a priority effort in the utilization of community development funds.

Transportation Costs Allowable

- The program funds transportation and escort services. Capital assistance and operating assistance will be provided if unavailable from other federal sources. Payment of the nonfederal share required in connection with a federal grant-in-aid program can be included in the Community Development Program.

COMPREHENSIVE EMPLOYMENT AND TRAINING ACT OF 1973 (*B-1*)

- Department of Labor

Transportation Services Available and Costs Allowable

- *Title III.* "Chronically unemployed" older workers, 55 and above or those of the same age with a poverty level income (CSA standards), may be

allowed reimbursement for transportation costs if in connection with work duties or training. If public or other transportation is inadequate, individuals or groups may be provided with transportation. No federal money may be used for the purchase of vehicles.

- *Title I: Section 95.35(d)(5)(i)(g) Subpart C.* This provides assistance to individuals in overcoming personal or environmental handicaps which prevent their employment.
- *Title II.* Eligible applicants, subgrantees, and employing agencies may use granted funds to purchase necessary training and supportive services, including transportation, from public or private agencies. Contracts cannot be established with private, for-profit organizations for the employment of participants.

REFERENCES

B-1. VOGT, SAGE and PFLUM, *Transportation Needs of Handicapped Persons in the Five County Area.* Northeast Ohio Areawide Coordination Agency (1976) p. E-11.

B-2. *Planning Handbook: Transportation for the Elderly.* Institute of Public Administration, U.S. Department of Health, Education and Welfare (Nov. 1975).

APPENDIX C

SOCIAL SERVICE TRANSPORTATION SURVEY

This appendix contains a listing of the agencies to which the social service transportation survey questionnaire was sent (see Fig. C-1); also included in this appendix is an example of the questionnaire (see Fig. C-2).

John Leonard Lovdahl
Handicabs, Inc.
7741 W. National Avenue
Milwaukee, WI 53214

Easter Seal Society for Crippled
Children & Adults of Milwaukee
County, Inc.
5225 W. Burleigh Street
Milwaukee, WI 53210

United Cerebral Palsy of S.E. Wisconsin, Inc.
1339 N. Milwaukee
Milwaukee, WI 53202

United Cerebral Palsy Association
of the Capitol District, Inc.
S. Manning Blvd.
Albany, NY 12208

Easter Seal Society
State Office
1211 Spring Street, N.W.
Atlanta, GA 30309

United Cerebral Palsy of Greater
Atlanta, Inc.
455 E. Paces Ferry Road, N.E.
Atlanta, GA 30305

Easter Seal Society of San Francisco
6221 Geary Blvd.
San Francisco, CA 94121

United Cerebral Palsy Association of
San Francisco
1511 Clement Street
San Francisco, CA 94118

Easter Seal Society for Crippled Children
and Adults of Colorado, Inc.
609 W. Littleton Blvd.
Denver, Colorado 80202

United Cerebral Palsy Center
2727 Columbine
Denver, Colorado 80205

Easter Seal Society for Crippled
Children and Adults
8001 Frost Street
San Diego, CA 92123

United Cerebral Palsy Association
of San Diego County
7947 Birmingham Drive
San Diego, CA 92123

Easter Seal Society of Bexar County
2818 S. Pine
San Antonio, TX 78223

United Cerebral Palsy Association
of the Alamo Area
2336 Jackson-Keller
San Antonio, TX 78230

Mr. Ed Kenricks
Red Cross Motor Service
American Red Cross
1510 E. Glower
Phoenix, AZ 85014

Mr. Marvin Bowles
Assistant Director
LEAP Department
City of Phoenix
302 W. Washington
Phoenix, AZ 85003

Die Die Rucker
Social Services
Multinomah County Planning Comm.
2115 Southeast Morrison
Portland, OR 97214

Mr. Stan Fischler
Social Service Umbrella Agency
Tri County Comm. Council
718 West Burnside Street
Portland, OR 97204

Ms. Susan Laudeman
Easter Seal Society
Trans. Coordinator
3939 Veteran's Memorial Blvd.
Metairie, LA 70002

Mr. Bob Blaze
Director
Goodwill Rehabilitation Service
P.O. Box 21340
San Antonio, TX 78221

United Cerebral Palsy of New York City, Inc.
122 E. 23rd Street
New York, NY 10010

Figure C-1. Agencies to which questionnaires sent.

1. Agency: _____
2. Address: _____
3. City: _____
4. Telephone: _____
5. Geographic Service Area of Agency: _____
6. Name of person completing form: _____
7. Title: _____ Date: _____
8. Name of Transportation Program or System: _____
9. Program or System Description:

(a) Please complete the table below for each type of vehicle you operate (van, bus, auto, taxi, volunteer car, etc.)

Vehicle Type	Number of Vehicles	Seating Capacity of Each	Number with Volunteer Drivers	Weekly Vehicle Trips/Weekly Ridership	Clientele Served	Hours and Days Operation	Method of Operation (Fixed Route, Demand Response, etc.)	Fare Charged Rider

(b) Are any of the vehicles equipped with wheelchair lifts or tie-downs? Yes___ No___ If yes, please identify.

(c) What is the geographic service area for the transportation system? _____

(d) What was the total number of vehicle miles traveled in the past year? _____

(e) What are the trip purposes and major destination points served by the system? _____

(f) Are vehicles restricted to providing service only to certain persons, areas, or during certain hours or days? Yes___ No___ If yes, please attach an explanation.

(g) Indicate the source of funds that provide the money to operate the service and the yearly amount obtained from each source.

Fares _____

(h) Indicate the costs of providing the service:

Vehicle costs

If vehicles are leased:

What is the lease rate (by type)? _____

If subleased, what is the rate (by type)? _____

Does lease rate cover maintenance, insurance? Yes___ No___ If no, please attach a cost list for these items.

If vehicles are owned:

What is their age? _____

What are the monthly payments and interest on loans for payments, if any? _____

What were the maintenance costs for the past year (or six months)? _____

What were the gasoline costs? _____

What were the costs for insurance premiums? _____

If the vehicle is paid for, is depreciation counted as an expense? Yes___ no___

If vehicles were modified and/or specially equipped, what was this modification cost (per vehicle)? _____

Driver Costs

If drivers were salaried, what was their wage? _____

If volunteer drivers were used, were they reimbursed? Yes___ No___ If yes, how much? _____

If the staff were used as drivers, how much driving time was devoted by the staff? _____

What is the hourly pay or salary of the staff (if available)? _____

10. Does your agency pay or contract with others to provide transportation services to your clients? Yes_____ No___ If yes, attach an explanation indicating name of provider, method of payment, annual expenditure and describable service provided.

11. Does your agency provide financial assistance to clients for their use in obtaining transportation service? Yes___ No___ If yes, attach an explanation indicating amount and eligibility requirements.

12. Please indicate the number of different clients and the average number of times you see each client each month:

	Clients/Month	Times/Month
Handicapped (physically or mentally)		
Persons 60 and over (not handicapped)		
Wheelchairs		
Others		

Figure C-2. Example questionnaire.

THE TRANSPORTATION RESEARCH BOARD is an agency of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 150 committees and task forces composed of more than 1,800 administrators, engineers, social scientists, and educators who serve without compensation. The program is supported by state transportation and highway departments, the U.S. Department of Transportation, and other organizations interested in the development of transportation.

The Transportation Research Board operates within the Commission on Sociotechnical Systems of the National Research Council. The Council was organized in 1916 at the request of President Woodrow Wilson as an agency of the National Academy of Sciences to enable the broad community of scientists and engineers to associate their efforts with those of the Academy membership. Members of the Council are appointed by the president of the Academy and are drawn from academic, industrial, and governmental organizations throughout the United States.

The National Academy of Sciences was established by a congressional act of incorporation signed by President Abraham Lincoln on March 3, 1863, to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance. It is a private, honorary organization of more than 1,000 scientists elected on the basis of outstanding contributions to knowledge and is supported by private and public funds. Under the terms of its congressional charter, the Academy is called upon to act as an official—yet independent—advisor to the federal government in any matter of science and technology, although it is not a government agency and its activities are not limited to those on behalf of the government.

To share in the tasks of furthering science and engineering and of advising the federal government, the National Academy of Engineering was established on December 5, 1964, under the authority of the act of incorporation of the National Academy of Sciences. Its advisory activities are closely coordinated with those of the National Academy of Sciences, but it is independent and autonomous in its organization and election of members.

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