NEED AS A CRITERION FOR TRANSPORTATION PLANNING

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Transportation improvements are sometimes based on estimates of unfulfilled needs of particular groups. However, the concept of need (as distinct from that of travel demand) has not as yet been defined well. This paper analyzes various methods of computing how much transportation people need. The use of need is discussed in the context of health systems planning and other disciplines. An in-depth case study of the transportation needs of poverty groups in rural areas is discussed to illustrate methods of arriving at quantitative need estimates. Ways of defining necessary trips (by trip purpose) are discussed. The number of households needing transportation is calculated according to the transportation services available to the household and the transportation services that the household can afford. A scale of five levels of need is derived from transport service availability and affordability. Using travel behavior data collected through home interviews, the number of trips required for persons in several areas of rural poverty to meet the average U.S. travel standard is calculated. The amount of trip-making required to meet such a standard is so large that it was concluded that this means of calculating need was impractical. Another alternative, along the lines of demand and income-expenditure analyses, is proposed for future research.

Transportation is generally considered to be a service that is consumed not for its own merits but rather to achieve some secondary goal. Transportation is not an end in itself—it is a means to an end.

Ways of determining how much transportation service should be provided are relatively standardized. However, recent attention to the problems of poverty groups has shown that some persons, not by their own choice, use a great deal less transportation than others. This group (which also includes the elderly, the handicapped, the very young, suburban housewives, and others) is now known as the transportation disadvantaged. The members of this group are often thought of as using much less transportation service than they need. Therefore, according to this argument, they should be provided with more transportation. However, existing transportation planning models are not useful for specifying the additional transportation to be provided.

How much transportation does any person need? If someone needs more transportation than he now uses, should he be provided with all that he needs or with one-half of what he needs? How would increases in travel and mobility affect the lives of the transportation disadvantaged? It is important to distinguish between mobility and travel. Mobility represents the supply function of transportation services facing an individual (or group). If two people have access to the same transportation services at the same price, then they have equal mobility. Travel, on the other hand, refers to the actual behavior of an individual (or group) when he uses transportation services. An individual’s travel is generally considered to be a function of several factors, including his mobility, income, personal tastes, employment status, age, sex, the supply functions for other goods, and his demand for other goods.

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PREVIOUS ESTIMATES OF TRANSPORTATION NEEDS

Although many analysts have argued that various groups of people should be provided with more transportation than they now use, very little has been written on precisely how many trips are needed by which persons. This is not surprising, given the complexity of the concept of need. The estimation of travel demand, based partially on the characteristics of the traveler and the travel facilities, still has some shortcomings despite the large amount of previous research (1). How then are we to estimate travel behavior if we are to say that the basic travel demand features (namely, personal and system characteristics) are inappropriate and ought to be changed for certain classes of riders?

One of the few significant contributions to the literature is Wickstrom's recent article (2) that evaluates transportation systems from the user's viewpoint in terms of available opportunities. Using data from the Washington, D.C., metropolitan area, he found that (averaging subareas within the SMSA) work trips that were made from subareas accessible to 75 percent of all SMSA work places within 45 minutes by automobile accounted for 90 percent of all work trips. He concluded that "areas which can reach 75 percent of regional employment in less than 45 minutes are better than the regional average and have superior access to employment (and vice versa)." (One should note that Wickstrom's definition of accessibility is stated only in terms of time and does not include cost or other considerations.)

Wickstrom found that "the highway system does and will continue to provide a higher level of access to regional opportunities to its users than to users of the transit system, either bus or future rapid rail." Because not all persons can use the highway-automobile system, he developed a balanced transportation measure for a region based on the sum of the products of the proportion of the population in each subarea times the ratio of actual to desired opportunities reached within a certain time.

The problem with this construct is that it is based on current actual behavior of persons who travel and does not consider why persons do not travel. Thus, an area with no public transportation is able to receive a perfect score on Wickstrom's index if the time constraint can be met by the highway-automobile system. The actual availability of transportation must enter into the calculations if transportation needs are to be accurately identified.

Other studies have discussed the travel needs of specific groups, potential demand, latent demand, and unmet needs (3), but none of these studies produced concrete measures of the number of trips required by specific groups of people. All in all, the previous attempts to define the need for transportation are incomplete, ambiguous, and arbitrary. Although there are many possible definitions of need, they usually depend on (a) the collective opinion of a body of experts as to the amount of travel people ought to undertake to meet some standard of living; (b) the actual amount of travel undertaken by some group whose travel behavior is taken as a norm, or (c) the target group's own perception of what it would like to have.

Well-intentioned as they are, these methods of establishing transportation needs are arbitrary in the context of actual impacts on the lives of the disadvantaged. The first criterion can be seen as a variety of professionalism, which too often ignores inputs from those actually being served. The second criterion seems to be the expression of an equalitarian principle embodying social and economic leveling. The presumption here is that everyone wants to (and should) travel as much as everyone else. These ways of defining need are flawed because either they ignore the autonomous behavior of the target groups or they make unwarranted assumptions about that behavior. The third criterion depends on the ability of the disadvantaged to imagine how they would use a service that they may never have had before. It has been found that the observed behavior of a group given a new transportation service may be quite different from behavior predicted in advance by the group itself. Therefore, each of these methods has serious flaws.

Efforts have been made in health and economics to make the concept of need workable in these disciplines. After considering what has been achieved in these fields, we will discuss a specific attempt to estimate transportation needs.
Although the use of a concept of need is widespread, very little has been done in the way of defining the concept. Two articles that work toward a definition are written in the context of medical care services, but their discussions are applicable to the provision of all social services. In the first of these (4) the population's health needs are defined as follows: "That quality of medical services which expert medical opinion believes ought to be consumed over a relevant time period in order for its members to remain or become as 'healthy' as is permitted by existing medical knowledge."

Other related concepts are defined in the article: The population's wants for health service are the quantity of services the population feels it ought to use. The population's demand for health services is a function relating the quantity of services that the population desires to consume, prices, financial resources, size, and psychological wants. A normative shortage is the amount at which needs exceed market equilibrium consumption. A market shortage is the amount by which market equilibrium consumption exceeds actual consumption. These definitions are given in Table 1 (4).

The concept of need described in the table is arbitrary because it ignores consumer behavior and it is vague about impacts of quality of life. The only connection between need and quality of life implied by this criterion is that the level of services represented by the need criterion is that which maintains a generally acceptable level of good health. The analog of good health in the field of transportation is not obvious because the consequences of varying amounts of travel are not obvious. Using travel as an analog to health status would be like using doctor visits or days in the hospital as measures of good health.

Boulding (5) describes differences between the concepts of need and demand, which we have already encountered: Need is an ideal determined by experts, whereas demand is what the consumer wants and buys. He notes that the expert-opinion criterion of need involves homeostasis—the maintenance of an organism (individual or society) in some generally acceptable state of being. He also points out that this definition leaves us with the problem of determining exactly which state of the organism is to be maintained. This is simply a restatement, in more abstract terms, of the arbitrariness to which we have already objected. Concerning the difference between demand and expert-opinion need, Boulding (5) says,

All fields of life seem to feel the necessity of working out an uneasy compromise between the concepts of demand as defined by the consumer and need as defined by the professional. . . . Undiluted consumer sovereignty, whether in economics or politics, where it takes the form of the absolute sovereignty of the voter and the sovereignty of the nation, is ultimately intolerable and leads to corruption and disaster. On the other hand, total professionalization, in the case of the doctor, the economist, the sociologist, or the political scientist, is likewise intolerable; and the revolt against paternalism, no matter how benign, is an essential aspect of the human identity. Somewhere between the proposition that the customer is always right and the proposition that the public be damned must be an uneasy Aristotelian mean . . . .

Boulding goes on from the concept of expert-opinion need and considers the need of the poor due to financial constraints:

One's need in this sense is not merely what some wise professional person thinks one ought to have, but what one cannot afford because he is poor. In this sense also, need is thought of as something which stands in contrast with demand, and the need for a concept of need arises because of certain deficiencies in demand as a principle of allocation. The concept of need as a criticism of demand here refers to the fact that effective demand is closely related to income and to the distribution of income. Need is an equalization concept.

This concept of need leads to what Boulding calls the grants economy in which governmental agencies manipulate the marketplace to achieve a more socially desirable pattern of consumption. Within the grants economy, two usually antipathetic schools exist: one advocating grants of money to the needy (showing a reliance on demand criteria) and the other advocating grants of goods and services (showing a reliance on expert-opinion
need). The problem with both of these techniques is that, unless they are based on careful estimates of actual consumer behavior, they can produce market distortions leading to tremendous social loss. Boulding reports that the research to date on the need for medical care, for example, has produced quantitative estimates of need that are "absurdly inflated" because of their neglect of the problems of demand and price structure.

**CASE STUDY OF TRANSPORTATION NEEDS**

We have been involved in a number of research efforts (6, 7) where one of the specific objectives was to produce estimates of the need for transportation among specific groups of people. We have found that, to be useful, a definition of need must define which trips are needed and produce quantifiable estimates of the number of households and/or persons requiring additional transportation and the number of trips required.

**Identification of Necessary Trips**

Who needs to take a particular trip? This must be answered in terms of the attributes of the trip (e.g., purpose, frequency, cost, and destination) and of the person (e.g., age, family status, and employment). For example, grocery shopping (or other means of food-gathering) is an activity that is considered necessary for survival. However, it is not necessary to make one trip per day to the grocery store, whereas it is necessary for most people to make five round trips per week to work to get the money to buy the groceries. Therefore, we must first establish some overall estimate of the need (for trips as previously specified) and then subtract the amount of transportation now being obtained. The remainder will be the additional trips required. [When designing a new transportation system, the number of trips needed will figure in the calculations of trips generated by the new system, which must be added to the number of trips diverted from existing systems to arrive at a total required system capacity. Experience has shown that the diverted trips will be greater than the generated trips when new transportation systems are implemented to serve the rural poor (8).]

We have now produced what we feel to be a complete list of ways in which an overall level of need could be derived. These are as follows:

1. Optimize economic productivity by determining what level of transportation service would have the greatest effect on the regional economy through increases in employment and personal income.
2. Establish the level of transportation that you consider to be the moral right of a person through the political process.
3. Test a hypothetical range of transportation to determine at what point the benefits of providing the service outweigh the costs by the greatest amount.
4. Use what the poor have now in terms of frequency as the definition of the minimum amount of transportation required.
5. The minimum transportation required to achieve social goals is a possible alternative (experts in health, nutrition, employment and training, and other areas establish the minimum level of travel required for each).
6. Use the personal perceptions of the poor as the estimate of need.
7. Run a demonstration project to determine how people would actually behave when the system was actually there and see which of the preceding methods comes closest to predicting the actual use.

Whatever method is used, it is important to stratify trips into required and discretionary categories. Required trips are defined to be those that are highly income-elastic; that is, they will be taken almost irrespective of their price. Discretionary trips are those that will be deferred as their cost rises. We found that, in an area of rural poverty where free bus transportation was introduced, income-production trips (work, welfare, and food stamps), grocery shopping, and health trips did not increase significantly in frequency in the face of drastic trip cost reductions, whereas trips for miscellaneous purposes, community action, visiting, and other shopping increased quite markedly when free transportation was available (8).
In a sense, we require a social-worthiness criterion for trips of various purposes. It would seem that health trips would be higher on a list of priorities than would trips to the pool hall. What portion of the gap between behavior and need might warrant social support? After all, when someone receives additional income through the welfare system, he gets only a minimally adequate level, not the national average.

Households Needing Additional Transportation

Having established which trips are needed, we can turn to the estimation of how many trips are required. There are two factors that interact to produce an unmet need for transportation service: the availability of some form of transportation and the constraints (financial, legal, and physical) on the options of the traveler. These items should also be calculated in light of the characteristics of a particular trip, namely, purpose, cost, destination (with respect to origin and other trip destinations), frequency, and other attributes. We could then say, on a trip-by-trip basis, whether or not a particular household needed additional transportation according to the procedure shown in Figure 1. This algorithm begins with the question of automobile ownership for the household. It then asks if the automobile is available for that trip (it may not be for the housewife in a one-car family), if the particular traveler in question can operate the automobile (persons that are too young, too old, or handicapped cannot operate it), and if the traveler can afford the cost of that particular trip (low-income persons may not travel in certain instances to save money for other trips). The availability and affordability questions are asked for each transportation mode to determine a residual number of persons without transportation meeting their requirements. They are those people who answer no to the last question on the list.

Estimating Procedure for the Number of Households in Need of Transportation Services

It has not been possible to date to disaggregate the trip characteristics as previously proposed. As of the present, one level of availability and affordability has been established for all trips. Four normative levels of need have also been established according to the availability of transportation and the ability of the individuals to afford it. These levels are as follows:

1. Dire need—little or no transportation available or little or no purchasing power;
2. Strong needs—restricted transportation available and restricted purchasing power;
3. Moderate needs—several transportation options available and moderate purchasing power; and
4. Slight needs—personal transportation available in good condition and moderate purchasing power.

In addition, there is an implicit fifth level that may be called "do not need additional personal transportation." Persons in this group have two cars available or one car plus another mode that they can afford to use.

Transportation Availability—We have found that individuals with no transportation resources whatsoever are so few that they are not worth mentioning (6, 7, 9). (This conclusion applies to the most rural and poorest areas of our country.) The problem becomes one of measuring how much is available, not if it is available. Obviously, a person who does not own an automobile does not have as much transportation available as one who owns an dependable automobile, who does not in turn have as much as a person who owns a dependable automobile. Degrees of availability are distinct here, if difficult to quantify. The following situations represent important measures of the lack of transportation:

1. When the family does not own a car,
2. When no taxicab service can be called to pick up a person,
3. When no bus service is available nearby,
4. When friends or neighbors cannot or will not supply transportation, and
5. When walking is not feasible.
Figure 1. Algorithm: households needing transportation.

Does this household own a vehicle?

Yes

Is it available for this trip?

Yes

Can this traveler operate it?

Yes

Can he afford to operate it?

Yes

Passenger mode available?

Yes

Afford it?

Yes

Taxi available?

Yes

Afford it?

Yes

Bus available?

Yes

Afford it?

Yes

Walking feasible?

Yes

No
When none of these situations occurs, the availability of transportation is very good; when all occur, it is extremely poor. Several levels of availability are possible between these extremes.

We have developed a ranking scale based on the availability of transportation. This scale is as follows: bus stops nearby, 1 point; taxi service available, 2 points; vehicles owned, 7 points apiece; vehicle in poor condition, subtract 1 point; and vehicle not running, subtract 6 points. (If bus service is available frequently, it could be scored on an equal basis as a taxicab. However, in many rural areas only one round trip per day is possible on existing bus systems.)

It should be noted that availability, as used in our calculations, is based on the perception of the individual and not of the analyst. It is common for the poor in rural and urban areas to be unaware of the transportation services actually available to them. We would argue that these people are in need because the ultimate effect is restriction of their travel. However, the solution to their need is relatively simple: an information and education program.

**Transportation Affordability**—When a household cannot afford to travel on existing modes of transportation (including its own car), that household has unmet travel needs. We have used the following criteria to form our definition of need:

1. Income less than $2,500 per year—household cannot afford to travel by car (subtract 1 point if automobile available);
2. Income less than $3,100—household cannot afford to travel by bus (if income is $3,101 or more, add 1 point if bus available);
3. Income less than $3,800—household cannot afford to travel by taxicab (if income is $3,801 or more, add 1 point if taxicab available); and
4. Income exceeds $7,401—household has comparatively little difficulty traveling (add 1 point for such households if any transportation mode available).

These figures are for nonfarm households. The corresponding incomes for farm households are $2,500, $3,000, $3,500, and $6,500.

The somewhat arbitrary nature of these definitions is recognized. A more satisfactory procedure would be to contrast annual household income with trip cost and perform the calculations on a per trip basis. However, the proposed procedure is felt to be an adequate approximation of needs for the moment.

**Composite Levels of Need**—The points generated from information pertaining to each household according to the availability and affordability criteria are added. The levels of need previously described are defined to represent the following scores: dire needs, 0 to 1 point; strong needs, 2 to 3 points; moderate needs, 4 to 6 points; slight needs, 7 to 9 points; and no additional transportation needed, 10 points or more.

**Estimated Number of Households Needing Transportation**

The foregoing procedure was tested in five areas of rural poverty. Table 2 gives the number of households in need in each of the five study areas. Several conclusions are apparent from this table. First, in these five states few households have all the transportation they need, but the percentage not needing additional transportation is remarkably similar among states. The percentage of households in dire need of additional transportation varies substantially from state to state. North Carolina and South Carolina have the highest proportion of persons in the first need category and in the second as well. Minnesota has the lowest percentage of the rural poor population in these critical categories.

**Estimated Number of Trips Required**

An implicit objective of the research project previously described was to bring the rural poor up to some national level of transportation adequacy. Therefore, we tested the implications of the gap analysis method as the basis for an estimate of the amount of transportation required by households in need.

The number of trips by households in need, using a gap analysis, may be calculated by comparing the number of trips now taken by those households with an accepted norm.
of travel behavior. If the present travel frequency of those in the study group falls below the given norm, then the difference is the number of trips needed by the study group. The total number of trips needed per area is then the total number of households in need times the number of trips needed.

The norm of travel behavior chosen is the average number of trips made by all persons more than 5 years of age in the United States. This figure, according to the Nationwide Personal Transportation Survey of the Federal Highway Administration, is 807 trips per person per year or 67.25 trips per person per month. A trip is defined by this survey as "anytime you went from one place to another by motor vehicle or some form of public transportation."

Table 3 gives the number of trips required by households in need in each of the five study areas. As one can easily see, the number of trips required by the rural poor to bring them up to the average trip-making behavior of the entire nation is phenomenal. Our figures show that a poor person in the five study areas only travels one-sixth to one-fifth as much as the average American. The number of additional trips he should be making to be consistent with the national average is almost two per day.

Applying the numbers of trips required to the total number of persons in need produces an estimate of the number of trips required to satisfy the various levels of need in each of the five study areas. The impossibility of providing anything resembling a national standard of transportation for the rural poor should be immediately obvious from the table. If standards are to be used, they must instead focus on local areas and/or specific population groups to avoid arbitrary and unreasonable measures of need (such as that of the national average).

**DIRECTIONS FOR FUTURE RESEARCH**

The arbitrariness of a concept of need based on average travel behavior is readily apparent from the previous section. Although this may be the only viable approach at the moment, there are more promising avenues that should be explored.

Future research should focus on a concept of need that refers to transportation services that would be used (instead of those that should be used). Needs must be based on actual behavior (or estimates of actual behavior), not on some idea of what people ought to do. This forces the use of the values of the target group rather than the values of planners.

One reason, already mentioned in the quotes from Boulding, for the evaluation of a concept of need in contrast to demand is the feeling that the use of demand disenfranchises those who cannot afford the market price of the commodity in question. This feeling is completely erroneous. This form of disenfranchisement is a result of the way in which demand is used, not the result of the concept itself. The economist's concept of demand is simply a description of consumption behavior under a variety of conditions. It has no normative aspect; it is purely descriptive. This concept leads to economic disenfranchisement of the poor only when it is coupled with the idea that all transactions must occur in a free, competitive market. That idea is strongly normative (it is certainly far from descriptive of most real markets) and is responsible for producing a situation in which the economic votes of the poor are largely ignored because they cannot meet the market price.

Of course, it is not at all necessary to use the norm of a free market in conjunction with the descriptive concept of demand. It is perfectly acceptable to ask how people would behave if the price of transportation were X without addressing the question of how the price X would come about. In fact the approach that we now recommend to determine the transportation needs of the disadvantaged is to estimate the impacts that would actually occur under various hypothetical supplies of transportation, without asking how these supplies might come about (except that we would limit our hypotheses by technological feasibility). Some examples are as follows:

1. What would happen if free door-to-door transportation to work were provided to the disadvantaged?
2. What would happen if they could use the existing public transportation services at zero cost?
Table 1. Concepts of demand and need.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Related Phenomenon</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for medical services</td>
<td>Biological and psychological health states as perceived by expert medical opinion.</td>
<td>Unique quantity comparable to total quantity of medical services wanted and to the quantity demanded, given determinants of demand.</td>
</tr>
<tr>
<td>Wants for medical services</td>
<td>Biological and psychological health states as individuals perceive them and as related to cultural, educational, and social status.</td>
<td>Unique quantity comparable to total quantity of medical services wanted and to the quantity demanded, given determinants of demand.</td>
</tr>
<tr>
<td>Demand for medical services</td>
<td>Market behavior as related to consumer wants, prices of medical services, prices of other goods, and financial resources.</td>
<td>As a concept refers to no unique quantity of services, but rather refers to a functional market behavioral relation between quantities of medical services that will be demanded, given levels of the determinants of demand.</td>
</tr>
<tr>
<td>Quantity of medical services</td>
<td>Consumption of medical services given values of determinants of demand.</td>
<td>A unique quantity of medical services comparable to both quantity needed and quantity wanted.</td>
</tr>
<tr>
<td>Market shortage of medical services</td>
<td>Excess demand: at existing prices, quantity demanded exceeds quantity supplied.</td>
<td>A unique quantity of medical services comparable to quantity needed, a normative shortage, etc.</td>
</tr>
<tr>
<td>Total shortage of medical services</td>
<td>Extent to which quantity of medical services needed exceeds quantity of medical services demanded at existing prices.</td>
<td>A unique quantity equal to the sum of market and normative shortages at a given price.</td>
</tr>
</tbody>
</table>

Table 2. Level of need of households requiring additional transportation.

<table>
<thead>
<tr>
<th>Transportation Need</th>
<th>Arizona Number of Households</th>
<th>Arizona Percent of National Standard</th>
<th>Minnesota Number of Households</th>
<th>Minnesota Percent of National Standard</th>
<th>Missouri Number of Households</th>
<th>Missouri Percent of National Standard</th>
<th>North Carolina Number of Households</th>
<th>North Carolina Percent of National Standard</th>
<th>South Carolina Number of Households</th>
<th>South Carolina Percent of National Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,552</td>
<td>28%</td>
<td>1,500</td>
<td>17%</td>
<td>4,470</td>
<td>27%</td>
<td>4,680</td>
<td>44%</td>
<td>13,000</td>
<td>41%</td>
</tr>
<tr>
<td>Dire</td>
<td>269</td>
<td>5%</td>
<td>0</td>
<td>0%</td>
<td>1,636</td>
<td>10%</td>
<td>1,008</td>
<td>10%</td>
<td>1,868</td>
<td>6%</td>
</tr>
<tr>
<td>Strong</td>
<td>911</td>
<td>17%</td>
<td>4,210</td>
<td>48%</td>
<td>4,070</td>
<td>25%</td>
<td>1,652</td>
<td>16%</td>
<td>8,450</td>
<td>27%</td>
</tr>
<tr>
<td>Moderate</td>
<td>2,268</td>
<td>42%</td>
<td>2,425</td>
<td>28%</td>
<td>4,470</td>
<td>27%</td>
<td>2,620</td>
<td>27%</td>
<td>7,360</td>
<td>23%</td>
</tr>
<tr>
<td>Slight</td>
<td>5,000</td>
<td>92%</td>
<td>8,135</td>
<td>93%</td>
<td>14,646</td>
<td>89%</td>
<td>10,160</td>
<td>97%</td>
<td>30,698</td>
<td>97%</td>
</tr>
<tr>
<td>Total households in need</td>
<td>435</td>
<td>8%</td>
<td>612</td>
<td>7%</td>
<td>1,910</td>
<td>11%</td>
<td>314</td>
<td>3%</td>
<td>949</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Percentages based on estimated rural poor population in each study area.

Table 3. Calculations of required trips.

<table>
<thead>
<tr>
<th>State</th>
<th>Trips per Household per Month</th>
<th>Persons per Household</th>
<th>Trips per Person per Month</th>
<th>Additional Trips Required to Meet National Standard</th>
<th>Percentage of National Standard Now Obtained</th>
<th>Number of Trips per Month Required by Persons of Dire Need to Meet Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>52.1</td>
<td>4.58</td>
<td>11.4</td>
<td>55.9</td>
<td>17.0</td>
<td>389,662</td>
</tr>
<tr>
<td>Minnesota</td>
<td>26.4</td>
<td>2.61</td>
<td>9.4</td>
<td>57.9</td>
<td>14.0</td>
<td>244,050</td>
</tr>
<tr>
<td>Missouri</td>
<td>43.9</td>
<td>3.64</td>
<td>12.1</td>
<td>55.2</td>
<td>16.0</td>
<td>888,157</td>
</tr>
<tr>
<td>North Carolina</td>
<td>31.8</td>
<td>3.02</td>
<td>10.5</td>
<td>56.7</td>
<td>15.6</td>
<td>801,356</td>
</tr>
<tr>
<td>South Carolina</td>
<td>48.9</td>
<td>4.62</td>
<td>10.1</td>
<td>57.1</td>
<td>15.0</td>
<td>3,577,800</td>
</tr>
</tbody>
</table>

*Trips reported by respondents to survey (B) adjusted for comparison with national figures.

*Compared to national standards of 67.25 trips per month per person, according to FHWA's Nationwide Personal Transportation Survey.
3. In the case of the handicapped, what would happen if they were given transportation?

4. What would happen if the cost were nonzero in the three preceding cases?

You can see that our approach is one that asks why these groups travel less and seeks the answer by estimating how they would travel if one thing at a time were changed. This is what economists do when they conduct demand analyses. There are also some interesting parallels with marketing research, which is also trying to describe consumption behavior, but marketing researchers usually feel constrained to operate within the limits of the currently existing type of market. They usually do not consider situations that would require manipulation of the market to achieve socially desirable results. (A companion effort should ask the following types of questions: Must the transportation system be self-supporting through fares, or can permanent subsidies be accepted? Can transportation stamps be used, or should a cash grant be used instead? Can other social service agencies, like Social Security, be induced to subsidize increased travel for their clients?)

The use to which transportation is put is closely tied to the price that will be paid. That is, the answer to "how much transportation would be used at a given price?" is related to the answer to "for what purposes would transportation be used at a given price?" We want to know what the demand for transportation is among the disadvantaged, as a function of trip purpose as well as the usual variables in demand analysis. [The implication of the finding that demand elasticities for travel evidently vary substantially according to trip purpose is that increased mobility can substantially change the lives of the transportation disadvantaged through a significant increase in (a) the variety of activities in which they participate and (b) their frequency of participation.] Then we can attempt to quantify the impacts of increased use of transportation services.

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REFERENCES