Mobility of Persons Who Need Nursing and Who Live at Home

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A survey on the mobility of persons who need nursing is used to show that, by integrating and newly processing data from previous surveys, it is possible to fill gaps in research without making new surveys. The most important results of an attempt to thus integrate and newly process data from two different surveys are discussed and interpreted. The special methodological and conceptual problems of doing empirical research on the handicapped are discussed, and the results of empirical surveys designed to overcome these problems are explained. The mobility of persons who need nursing is compared with the average mobility of the population as a whole as well as with a control group that has a similar sociodemographic structure. This method proved to be useful for determining the quantitative characteristics of the mobility deficit in the target group studied. Finally, the study is compared with other surveys, and areas in which research gaps still exist are identified.

In this paper, mobility is defined as the number and quality of times a person moves from one location to another. Mobility is triggered by out-of-home activities and thus necessarily causes a person to change his or her location. This definition is not restricted to the use of any specific modes of transportation; it includes all methods of moving between one location and another and views mobility as a derived demand (1). Transportation planning frequently limits the term mobility so that it refers only to motorized trips; however, this definition is incomplete. When studying mobility, one must include nonmotorized travel as well.

All empirical surveys of mobility depend on a broad base of data that are comparable. However, although many data exist, there are few data available that might be used for comparative purposes. One of the reasons for this is that the needed data can only be obtained in surveys. In surveys, the interviewees are partners and cause the well-known subjective biases of the surveys.

Of course, basic information for planning--such as can be obtained by qualified empirical research--is necessary for continuous service and provisory care (2). This is true in social areas as well as in matters pertaining to architecture and transportation for the integration and rehabilitation of handicapped persons (3,4). The design and implementation of surveys for this purpose must take these problems into consideration. Such a survey is described later in this paper. A detailed discussion of how to solve the methodological and conceptual problems in empirical research on the "mobility limited" (briefly discussed in the following section of this paper) can be found in a paper by Bróg and Mettler-Meibom (5).

PROBLEMS CONFRONTED IN EMPIRICAL STUDIES OF THE HANDICAPPED

Target Groups

In research on the handicapped, the definition of the target group is especially problematical since the nature of different types of handicaps is so complex. Depending on the type of research being done, several criteria can be used to define "the handicapped": (a) legal and insurance-oriented definitions, which are frequently more or less abstract; (b) the loss or gradual impairment of vital functions; and (c) the self-estimation of the handicapped person.

Experience has shown that multistep mail-back questionnaires make it possible to collect the complex data needed to study the handicapped. The first of the multistep questionnaires makes it possible to identify all persons in the surveyed households who might be handicapped. The following survey steps concentrate on the group of persons that seem to have handicaps and verify and collect data on the handicap.

Frequently, it is necessary to sort the initial data manually in order to identify persons who are handicapped. The reasons for defining a person as handicapped must be clear; they should not be arbitrary. For purposes of data analysis, the definitions should guarantee that new reflections concerning the composition of the total can be adequately realized.

Collecting Behavioral Data

A survey on mobility cannot limit itself to determining the number of trips made. Trips are not goals in themselves; they are the result of participation in desired and necessary activities, even if the activity is only "to get a breath of fresh air".

In order to study mobility and the reasons for this mobility, optimally realistic data must be collected on the actual behavior of the target persons. Although measured reality will never perfectly correspond with actual reality (no matter what measurement technique is used), empirical measurement techniques must have two basic goals: (a) to ensure that the measurement results are as realistic as possible and (b) to estimate the tendency of the bias and the reasons for this bias (6). The common approach of asking interviewees for information on their "average behavior" is especially dangerous because the resulting data are particularly unrealistic (7).

Sample Size

The number of handicapped persons (no matter how handicapped is defined) represents only a comparatively small percentage of the population. As a group, the mobility limited are not identical with the handicapped. In order to make reliable statements about the mobility limited, it is necessary to design studies so that, in addition to determining a representative proportion of as large a sample as possible for qualitative analysis, some subgroups of the total group are available. The size of the sample (8-10) is a necessary criterion for the validity of the predominantly qualitatively oriented data; the degree to which subgroups built by using a priori methods are relevant to the results of the survey cannot be predicted for such complex variables.

The Sample

Records on the handicapped are available from a variety of organizations that help the handicapped medically, socially, or financially. However, for a number of reasons, the records kept by these organizations are incomplete. They also include differ-

ent categories of the handicapped, depending on the nature of the organization. This is probably so not only in the Federal Republic of Germany but in most other countries as well.

Furthermore, since such data are based on more or less voluntary registries, data on the handicapped are systematically distorted. Random samples selected from the records of such organizations are generally not representative, at least when the structure of the groups and the personal situations of the persons in the groups are not compared with handicapped persons who are not registered. Since such comparisons have rarely been made, representative samples of the handicapped have had to be drawn from the population as a whole, indirectly. (Thus, the special evaluation of currently existing data sources that is described later in this paper is certainly an exception worthy of imitation.) But, when one draws a sample of this sort from the population as a whole, one contacts most of the sample uselessly, since the great majority of the persons contacted do not belong to the special target group. In addition, since funds are usually limited, the samples will usually only be large enough to ensure that the desired representativeness can be obtained within a tolerable fluctuation range.

Survey Method

The pertinent subject literature shows a definite tendency to use personal interviews--the so-called "king's method". The more difficult the object of research, the more pronounced this tendency is. However, we feel that the exclusive use of oral methods is not sufficient for surveys that deal with the mobility limited. The personal interview is inferior to mail-back questionnaires for a variety of reasons:

1. Target persons are very difficult to get in touch with for personal interviews.
2. Psychological problems arise when persons are directly confronted with a stranger asking personal questions.
3. Personal interviews are limited with respect to time and place.

The mail-back questionnaire has considerable advantages for the person questioned:

1. The individual can decide when to fill out the questionnaire.
2. The questionnaire is anonymous and answers are thus more honest.
3. The individual has the chance to discuss the questionnaire with friends and relatives.
4. The individual can refer to his or her records to get precise information on such subjects as medical and maintenance needs.

Control Groups

Finally, a well-grounded analysis of the personal situation and behavior of the mobility limited calls for a comparison of the target group with a control group. For this purpose, control groups must be defined. The control group must have an analogous data set and (depending on the given research topic) must be determined in as differentiated a combination of potential characteristics as possible.

When studying the mobility limited, one can, for example, use suitable demographic data on all handicapped persons to depict a multidimensional matrix and select the analogous number of nonhandicapped persons for each occupied matrix cell (11). When the number of cell occupants varies, weighting can

be used for purposes of comparison. This comparison should be extended to include the other persons living in the same households (as was done in a pilot study discussed briefly later in this paper).

RESULTS FOR CONCEPTION OF EMPIRICAL SURVEYS ON THE MOBILITY LIMITED

Goal of Pilot Study

The pilot study described here attempts to determine representative data. Due to the serious methodological problems confronted in collecting such data and the considerable funds that are needed for a survey of this sort, it was of primary importance to show that a suitable concept makes it possible to collect valid data at a reasonable cost. Thus, the study was to serve as an example, not to collect all of the data that would be needed for a complete analysis of the problem.

Therefore, the research goal was limited to the determination of mobility as defined at the beginning of this paper. Both of the major prerequisites for the collection of valid, representative data for the study of the mobility limited--the reliable determination of the out-of-home activity pattern and the careful identification of the target group-- were taken into consideration. The most important problems confronted with respect to both of these requirements were mentioned in the last section of the paper and will not be discussed further here.

Estimation of Mistakes

If one looks at the factors that influence the results of empirical measurement, one can differentiate between random errors and systematic biases. Random errors are usually a result of the statistical significance of the sample; it is expensive to reduce these errors. But these random errors occur within a relatively narrow range even when a comparatively small sample is used. Thus, if the percentage of the handicapped in the population were hypothetically 5 percent, the coincidental range of fluctuation in a sample of 5000 persons is ±0.6 percent (safety factor of $z = 2$) and can only be halved if the sample is quadrupled.

This is not so for systematic biases. Systematic biases are usually caused by (a) the selection of nonrepresentative samples (e.g., as a result of using the records of various types of organizations), (b) the choice of the survey method (mailback or personal interviews), (c) the design of the survey instruments, (d) the organizational execution of the survey, (e) the manner in which the data are prepared, and (f) the type of data processing used.

Although the above bias sources--in contrast to the random errors--can be reduced by using comparatively cost-effective measures, there is little critical awareness of the systematic biases. The result is usually a one-dimensional evaluation of the validity of such surveys in view of the survey instrument. The much more important question of the validity of the results is usually ignored.

This is even more unfortunate, since the systematic bias is usually much more important than the random errors and is, moreover, included in the evaluation of mistakes in a squared form. The long-range effects of systematic bias have frequently been proved. Three examples from the pilot study illustrate the problem:

1. In surveys of persons who need nursing care (12,13), only about two-thirds of the persons who claimed to have such a need were identified, in the in-depth interviews, as actually needing nursing.

Table 1. Out-of-home mobility of persons who need nursing on average day of week by method of data measurement.

Measurement Method	Persons Who Need Nursing (%)			
	Total	Confined to Bed	Very Limited Mobility	Basically Mobile
Self-estimation of average behavior	56	17	27	73
Recall measurement	40	3	7	62
Entries in diaries	38	2	15	55

This is an important factor to consider when one uses the records of various types of organizations for the handicapped.

2. In determining the out-of-home activity patterns of those persons who needed nursing care, the different forms of data collection resulted in clearly inconsistent results (see Table 1). The mobility on the day of sampling was underestimated by more than 40 percent for average behavior.

3. In a survey on the mobility of senior citizens (over 65 years of age), the design of the questionnaire layout resulted in an underestimation of out-of-home activities by almost 20 percent.

These sources of error are so important that they clearly indicate what the main goal of pertinent methodological considerations should be, but it seems to be in the nature of applied mobility research to usually neglect these factors.

Methods of Simplification

The above discussion has shown that very large samples might offer a greater statistical significance, but they do not exclude biases per se. In view of the considerable effects of such systematic biases on the results of the surveys, research should concentrate on reducing these biases; it would then be possible to use smaller samples. However, costs are considerable even when this is done.

Another cost-effective simplification can be used in dealing with the mobility limited. Data from the mobility surveys that are available in most countries can be used. These surveys are relatively regular, and the samples are comparatively large. By studying these data sources, it is possible to identify persons suspected of being handicapped and to specifically question these persons (12,13). The necessary separation of both surveys is thus a given methodological prerequisite for valid data bases. Generally, this makes it possible to triple or quadruple the number of "lucky hits" so that a proportionally smaller sample size is sufficient. At the same time, a relatively small control sample makes it possible to identify and, when necessary, correct the bias. Finally, the mobility data for the pertinent control groups are then available so that this sample does not have to be separately drawn. How well a method of this type can be applied is shown in the pilot study discussed in the following sections of this paper.

PILOT STUDY

Foundations

In the years 1975-1977, the Representative Continuous Survey on Transportation Behavior (KONTIV) was done for the Ministry of Transport of the Federal Republic of Germany. For a period of 24 months, data were collected on all out-of-home activities of persons over 10 years of age in the representative sample households. All of the households were asked to record their activities for a stretch of 2 or 3 days. In the total, German residents and all subgroups including the handicapped and their families were studied. Although no specific questions on handicaps were asked, some persons voluntarily noted that they were handicapped in order to explain their out-of-home activity patterns. When such information was not volunteered, the entire data set of a person sometimes suggested that it was likely that he or she was handicapped.

These facts were used as a basis for a study done for the German Ministry of Youth, Family, and Health (12) to select the target group of "persons living at home who need nursing" from the KONTIV sample. The results are summarized below:

Degree of Mobility Limitation	Percentage	Accumulated Percentage
Very great	3.4	
Great	24.3	27.7
Less great	34.5	62.2
Some	24.2	86.4
None	13.6	100.0

About 86 percent of the selected group proved to be mobility limited. This does not include all mobility-limited persons--for instance, frail older persons who sometimes need help but do not need constant nursing. However, the large percentage of the mobility limited led to the conclusion that the mobility of handicapped persons who participated in out-of-home activities should be studied along with the pilot group of "persons living at home who need nursing". This approach seems to be especially adequate because, in the study mentioned above, it was possible to collect valid representative data for persons who need nursing by using several survey steps and applying a special methodological approach (12,13).

Task

It was the methodological task of the pilot study discussed here to combine both of the data sets mentioned above and to evaluate these data. For this purpose, the available data on mobility were integrated with the data base that was later selected on persons who need nursing. This special manner of evaluating data without doing a new survey was possible because both of the surveys that were used had collected data that guaranteed accuracy. However, in order to combine and integrate the data, a series of intensive and partly manual sorting and coding steps was necessary. These steps were completed by using a weighting and grossing up procedure.

Target Group and Definition of Control Group

The target group of persons living at home (i.e., not in hospitals, nursing homes, or other institutions) who need care is not at all homogeneous. In order to study the mobility of the target persons and the nature of their handicaps, the target group had to be divided into the following subgroups:

1. Persons confined to bed, i.e., those persons who need nursing and spend all day, or most of the day, in bed;

2. Persons with very limited mobility, i.e., those persons who need nursing and are not confined to bed but leave their homes only as an exception to the rule; and

3. Persons who are basically mobile, i.e., per-

sons who need nursing but are generally able to leave their homes (these persons are not differentiated according to the conditions pertaining to their mobility; i.e., this group includes persons who are permanently confined to wheelchairs, but are mobile, as well as persons who need to be accompanied on their trips by other persons).

Since the target group differs considerably from the population as a whole in a number of (predominantly) sociodemographic characteristics, it was necessary to select a control group in which the sociodemographic characteristics of the persons included were similar to those of the target group. The following sociodemographic characteristics were identified as important: age, sex, marital status, occupation, size of household, and size of community. The results would have been particularly distorted had the ages of the target group and the control group not been comparable; while 66 percent of all persons who need nursing are older than 64 years of age, only 16 percent of the entire population is over 64 years of age.

Results of Mobility Survey for Control Group and Persons Living at Home Who Need Nursing

On an average weekday in the Federal Republic of Germany, about three out of four persons leave their homes; on an average, 2.5 trips/day are made. Persons who need nursing make an average number of 1.1 trips/person/day. Persons in the control group make an average of 1.8 trips/day, a number of trips roughly midway between the number made by the population as a whole and the number made by persons who need nursing care. When one considers only the total population and excludes persons who need nursing and the control group, then the average mobility increases to 2.7 trips/person/day. If one considers only those persons who made trips on the sample day--i.e., those persons who were mobile-- then the mobility of the persons who need nursing (with an average of 2.8 trips/day/mobile person) is close to the 3.1 trips for the mobile persons in the control group and the average for all mobile persons, which is 3.4 trips/person/day. These differences can be partly explained by the different trip chains (activity patterns). Persons who need nursing, as well as the control group, are apparently forced to combine their activities in one trip; they rarely make four or more trips, which would most likely force them to leave their homes several times. The out-of-home mobility of persons who were mobile on the day of sampling, by the number of trips made, is summarized below:

No. of Trips	Group (%)		
	Total Population	Control Group	Persons Who Need Nursing
1-2	46	55	63
3	7	9	16
≥4	47	36	21

It is important to determine which persons are capable of leaving their homes. When persons are able to take part in out-of-home activities, then the mobility rate is comparatively high. However, this has nothing to do with the problems encountered while making these trips. The table below summarizes out-of-home mobility for various groups by the degree to which mobility is limited:

Table 2. Travel time for all trips made on sampling day.

Category	Total Population[a]	Control Group	Persons Who Need Nursing		
			Total	Very Limited Mobility	Basically Mobile
Total travel time for all trips made on sample day (%)					
≤10 min		8	10	21	9
11-20 min		14	10	4	10
21-30 min		13	19	12	20
31-40 min		10	4	8	3
41-50 min		9	12	19	11
51-60 min		9	10	2	11
61-80 min		8	4	1	4
81-100 min		7	7	16	5
101-120 min		7	8	8	8
121-180 min		7	6	1	7
≥3 h		8	4	1	4
No response (%)		1	8	6	8
Avg travel time for all trips made on random sampling day (min)	76	75	67	51	69
Avg travel time per trip (min)	22	25	28	22	29

Note: Because of the small percentage of out-of-home activities for the group "confined to bed" (2 percent), it was not included.

[a]Disaggregate values not available.

No. of Trips	Group (%)			
	Control Group	Total Who Need Nursing	Very Limited Mobility	Basically Mobile
1-2	55	63	67	62
3	9	16	20	14
≥4	36	21	13	24

The amount of time spent traveling tells one something about the nature of the trip. The population as a whole spends an average of 22 min on a trip; the control persons need an average of 25 min to make a trip, and the persons who need nursing take an average of 28 min to make a trip (see Table 2). The control group and the group of persons who need nursing make comparatively many pedestrian trips. For the population as a whole and persons with very limited mobility who need nursing, the difference is more than 20 percent. The value of the pedestrian trips for persons who need nursing and the control group is not reduced even if one considers all of the modes used; this shows a predominantly uniform and explainable tendency for the population as a whole in relation to the control group and persons who need nursing. The target group and the control group use fewer bicycles and mofas (small motorcycles with a maximum speed of 25 km/h) and drive cars less frequently; they increasingly use public transportation or ride in cars as passengers (see Tables 3 and 4).

In Table 2 and subsequent Tables 3, 4, 6, and 7, weightings for all trips made by target persons are as follows:

Category	Trips Weighted
Total population	270.00
Control group	23.370
Persons who need nursing	
Total	3.674
Confined to bed	11
Very limited mobility	435
Basically mobile	3.228

Table 3. Mode of transportation used on sampling day.

	Total Population[a] (%)	Control Group (%)	Persons Who Need Nursing (%)		
Mode			Total	Very Limited Mobility	Basically Mobile
Walking	33.7	47.9	47.1	56.2	45.7
Bicycle or mofa	9.8	7.3	3.2	-	3.6
Moped or motorcycle	0.8	0.2	-	-	-
Car driver	37.1	20.0	13.3	11.1	13.7
Car passenger	10.8	9.7	18.6	10.0	19.8
Taxi	0.2	0.2	2.1	0.2	2.4
Bus	7.4	11.4	14.8	22.1	13.8
Streetcar	2.3	3.1	1.5	-	1.6
Rapid train	0.9	0.5	0.6	-	0.7
Subway	0.7	1.1	0.3	0.3	0.3
Train	1.7	1.6	1.0	-	1.1
Other	0.1	-	-	-	-
No response	0.0	0.1	3.0	0.9	3.3

Note: Because of the small percentage of out-of-home activities for the group "confined to bed" (2 percent), it was not included.

[a]Disaggregate values not available.

Table 4. "Classic" and "extended" modal split.

	Total Population[a] (%)	Control Group (%)	Persons Who Need Nursing (%)		
Modal Split			Total	Very Limited Mobility	Basically Mobile
Classic					
Individual transportation	81	72	66	50	68
Public transportation	19	28	34	50	32
Extended					
Walking, bicycle, or mofa	40	48	45	56	44
Individual transportation	49	37	36	22	38
Public transportation	11	15	19	22	18

Note: Because of the small percentage of out-of-home activities for the group "confined to bed" (2 percent), it was not included.

[a]Disaggregate values not available.

Table 5. Average number of trips for each mode used.

	Avg No. of Trips per Day		
Mode	All Persons in Population	All Persons in Control Group	All Persons Who Need Nursing
Walking	0.80	0.83	0.48
Public transportation	0.30	0.31	0.20
Taxi	0.00[a]	0.00[a]	0.02
Car driver	0.88	0.35	0.14
Car passenger	0.26	0.17	0.19
Other (e.g., bicycle)	0.25	0.13	0.03
Total	2.49	1.79	1.06

[a]Less than 0.01 trips/day.

Table 6. Type of activity engaged in at trip destination.

	Total Population[a] (%)	Control Group (%)	Persons Who Need Nursing (%)		
Trip Activity			Total	Very Limited Mobility	Basically Mobile
To work	25	10	8	4	9
While at work	5	2	2	-	3
To school	8	2	3	-	3
While at school	0	0	-	-	-
Shopping, visits to doctor, etc.	28	47	39	56	37
Recreation	32	38	47	39	48
Service (escorting)	2	1	0	1	0

Note: Because of the small percentage of out-of-home activities for the group "confined to bed" (2 percent), it was not included.

[a]Disaggregate values not available.

Table 7. Number of trips made on various days of the week.

	Total Population[a] (%)	Control Group (%)	Persons Who Need Nursing (%)		
Day			Total	Very Limited Mobility	Basically Mobile
Monday-Friday	78	73	65	58	65
Saturday and Sunday	22	27	35	42	35

Note: Because of the small percentage of out-of-home activities for the group "confined to bed" (2 percent), it was not included.

[a]Disaggregate values not available.

The percentage of walking trips made in relation to the daily average number of trips is also noteworthy. Whereas the population as a whole makes only about one-third of its trips on foot, the control group and the group of persons who need nursing make almost half of their trips on foot (see Table 5). However, since the population as a whole is generally more mobile, the absolute number of its walking trips (0.8) is higher than that of persons who need nursing (0.5). Thus, it is particularly striking that the control group makes even more walking trips in absolute numbers than the population as a whole, although the former group is less mobile than the latter. The 0.2 trips/day by public transportation made by persons who need nursing is also less than the number of such trips for the control group and the population as a whole (Table 5).

However, besides increased travel as car passengers by persons who need nursing, there is more use made of taxis (Table 3), a sign that at least some of the barriers are broken down by spending (or being forced to spend) more money. Persons who need nursing find it particularly difficult to travel by streetcar, since the stops are spread out and it is difficult for them to get into and out of the vehicle.

If one analyzes the reasons why persons make trips, it is obvious that persons who need nursing,

as well as the persons in the control group, make relatively few work or educational trips. This is related to their socioeconomic structure. Most of the out-of-home activities of persons who need nursing revolve about recreation, shopping, and making visits to the doctor (see Table 6). Here, too, it makes sense to compare the average number of trips per activity with the control group. The average number of work trips for persons who need nursing is only half as large as the number for the control group. Even the number of recreational trips is considerably less for persons who need nursing than for the control group.

The given mobility deficit can be analyzed even more precisely when one differentiates between trips made on different days of the week. On each of the first four days of the week (Monday through Thursday), persons who need nursing make 10 percent of their trips--i.e., a total of 40 percent of their trips. Thus, these persons make more than half of their trips on "three-day weekends", a considerably larger percentage than that for the control group and the population as a whole (see Table 7). This can be explained by the fact that persons who need

Table 8. Out-of-home mobility of all target persons on day of random sampling by number of trips made.

Mobility of Persons Interviewed	Total Population (%)	Control Group (%)	Persons Who Need Nursing (%)			
			Total	Confined to Bed[a]	Very Limited Mobility	Basically Mobile
No out-of-home activities on sampling day	27	42	62	98	85	45
No. of out-of-home activities on sampling day (trips)	73	58	38	2	15	55
1	1	1	1	-	*	2
2	33	32	23	2	10	32
3	5	5	6	-	3	8
4	19	12	5	-	2	7
5	4	3	1	-	-	1
6	7	4	2	-	0	4
≥7	4	2	1	-	0	1
Avg no. of trips per day						
All persons	2.49	1.79	1.06	0.04	0.39	1.53
Mobile persons	3.43	3.06	2.77	2.00	2.56	2.80

Note: Random sampling days for target persons weighted as follows: Total population, 108.00; control group, 13.045; total persons who need nursing, 3.451; persons confined to bed, 209; persons with very limited mobility, 1.130; and persons who are basically mobile, 2.112.

[a] Because of the small percentage of this group's out-of-home activities (2 percent), it was not included.

nursing find it easier to get the needed escorts to make their trips on weekends than during the week. These results are reinforced by the analysis of the various target-group subgroups listed earlier in this paper. As expected, there were considerable differences among the subgroups in the number of trips made and the reasons for traveling.

COMPARISON WITH OTHER SURVEYS

Surveys on the mobility of specific target groups (or for the population as a whole) call for specific survey requirements that cannot usually be (totally) fulfilled. Therefore, the previous sections of this paper have attempted to pinpoint some of the most problematical aspects of such surveys: for example, the type of sample (drawing a random sample from the population rather than using the records of various organizations for the handicapped), the research concept (multistage survey), the survey method (mail-back questionnaires or personal interviews), the definition of the target group and its subgroups, and the collection of data on actual behavior (use of diaries to determine behavior on the sampling day instead of directly questioning persons on their "average behavior").

However, this does not suffice to explain the mobility of persons who need nursing and who live at home. Quantitative data do not give one any information about the personal situations of the persons questioned, the circumstances under which trips were made and, most important of all, the mobility deficit. The method described in the previous section of this paper comparing the target group with a comparable control group does explain mobility. Due to the given situation, this was, in fact, the only solution to the problem. Thus, the difference between the mobility of persons who need nursing and that of the control group can be assumed to depict the average extent of the mobility deficit for persons who need nursing. Since the possible mobility deficit of the control group was unknown, it was not taken into consideration. The great importance of empirical know-how and its incorporation in surveys is shown in surveys that measured mobility by using the self-evaluations of interviewees. When this method was used, the persons questioned tended to exaggerate their own mobility. Persons who needed nursing, for instance, estimated their own mobility to be as high as it was actually proved to be for the control group (see Tables 1 and 8). But a comparison of the self-estimated mobility of persons who need nursing with the mobility recorded in the diaries suggests that the estimated values reflect wishful thinking and not actual mobility. Thus, it proved to be especially useful to use the control group as a comparison with the group of persons who need nursing in order to estimate the mobility deficit.

When a survey strictly adheres to the principles mentioned above, the mobility of persons who need nursing can be determined. In summary, one can say that, in relation to their out-of-home activities, persons who need nursing are a heterogeneous group: The number of their daily trips varies. Persons with radically limited mobility make 20 percent as many trips as the control group, whereas persons who need nursing and are basically mobile make 90 percent as many trips as the control group.

The main reasons for leaving the house are recreational (e.g., taking walks) and for shopping and visiting the doctor. When vehicles are used, the persons who need nursing prefer to ride as passengers in cars: They travel as passengers in cars 100 percent more frequently than the control group. The bus is also a preferred mode. Persons who need nursing use taxis 10 times more frequently than the control group. Transportation planners should realize that persons with very limited mobility do not (cannot) use rail transportation, with the exception of the subway.

FURTHER CONSIDERATIONS

Experience has shown that the realization of adequate research concepts depends, to a large extent, on whether the interested parties--i.e., the handicapped themselves, persons and organizations representing the concerns of the handicapped, and researchers--succeed in making clear the needs of the handicapped to those persons responsible for making political and/or administrative decisions. This is especially true since valid concepts to solve conceptual and methodological problems are already available but are not yet used to the extent that would be desirable. In the long run, further basic (methodological) research will be necessary to stimulate applied research. It should be possible to change the present climate of opinion for the better since the present high costs for research could ultimately be lowered by using increasingly efficient measures. The declaration of 1981 as the United Nations Year of the Handicapped will certainly give a new impetus to these efforts. One aspect of the problem discussed in this paper--the potential increase in the mobility of mobil-

ity-limited (handicapped) persons--was already a topic at the 1980 European Transportation Minister's Conference.

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Comparison of Two Brokerages: Lessons to Be Learned from Houston and Pittsburgh

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An examination is presented of two similar transportation systems that were designed to test two assumptions: (a) that transportation services can be provided to the elderly and the handicapped more effectively and efficiently when coordinated by a single agency than when provided by conventional, fragmented systems and (b) that specialized or paratransit services are the most appropriate way to meet the transportation needs of elderly and handicapped clients. The two communities involved are Houston, Texas, and Pittsburgh, Pennsylvania. Each community developed a brokerage system to deliver services to elderly and handicapped clients in its service area. The experiences of both systems with regard to costs, fares, ridership patterns, operational experiences, and goals and objectives are discussed. An examination of the important differences and similarities in the two systems and an evaluation of the important and transferable findings that follow from that examination are provided.

There are two complementary trends developing in the U.S. transportation planning community. The first is the serious consideration of coordinated approaches to the delivery of transportation services to elderly and handicapped travelers, particularly those who are clients of human- and social-service agencies. A related trend is the growing belief that it is more effective to provide accessible transportation services to the handicapped, not through physical modifications to existing transit fixed-route coaches but through the provision of specialized and responsive paratransit services.

These trends have been recognized by Congress but in different ways. Some federal agencies, like the Administration on Aging, have specific congressional requirements that mandate coordination of all services provided. On the other hand, the U.S. Department of Transportation (DOT) currently mandates that transit systems must make their programs accessible to the handicapped by providing wheelchair lifts on fixed-route services rather than by providing paratransit services.

Two major regional transit authorities in very different parts of the country have taken remarkably similar actions to test two assumptions that have grown out of these complementary trends. The first assumption being tested is that coordinated approaches to transportation delivery are more efficient and effective than ad hoc, fragmented transportation services. The second assumption is that specialized services rather than accessible, fixed-route services are the most appropriate way to meet the needs of the elderly and the handicapped of a community. Both the Port Authority of Allegheny County (PAT) in Pittsburgh, Pennsylvania, and the Metropolitan Transit Authority (MTA) of Houston, Texas, have developed innovative and comprehensive ways of meeting the objectives embodied in these assumptions.

Of the two efforts, the Pittsburgh experience is by far the better known. The coordinated effort in