

# Analysis of Mobility and Change in a Longitudinal Sample

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**L**ONGITUDINAL studies necessarily begin with an expectation that the original sample will experience loss and change over time. As former respondents die, refuse continued cooperation, or simply move away, numbers are reduced, and what began as a representative sample becomes an ever-decreasing panel.

Apart from death and noncooperation, respondent mobility is the largest single factor affecting the size and composition of the continuing panel. Such changes are important considerations for any study which is intended to follow the same people through time and are especially pertinent for researchers in public health when a longitudinal design is required and the continuance of each case in a study may assume special importance.

However, while migration as a sociological phenomenon has received considerable attention in the literature, comparatively few studies have examined the mobility of persons within the context of a longitudinal study. This paper adds to previous efforts by examining indi-

vidual mobility in a sample representative of a large, diverse population, by comparing movers with nonmovers on a large number of variables, and by assessing the potential impact of this mobility on the sample. In reporting the details of this investigation, we hope to meet, in part, the need for practical guidance in this area and to assist investigators in disciplines other than public health.

This paper reports on the changes in a sample of adults after an interval of 3 years with particular attention to respondent mobility as a major factor affecting both loss and change in the panel. The data are drawn from a study of Alameda County, Calif., adults who were enumerated first in 1961 and contacted again in 1964. The study was conducted by the Human Population Laboratory (HPL) of the California State Department of Public Health.

## General Background

The setting for this study, Alameda County, is a largely urban-suburban area in the San Francisco Standard Metropolitan Statistical Area. In 1960 the county had a population of approximately 908,000.

The long-term research program of the Human Population Laboratory is to study the personal characteristics, behavioral patterns, and environmental factors affecting health. In 1964, to pretest a questionnaire and certain methods of collecting data for this program, the

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HPL carried out a limited field study using a sample of Alameda County residents 20 years old or over.

This sample was drawn from 412 dwelling units which in turn were part of a 2,200-household sample representative of the total county population at the time it was originally drawn and enumerated in 1961. At that time 808 persons 17 years old or over had been enumerated in these 412 dwelling units, and it was to these households and persons that the interviewers returned in 1964.

Each of the sample dwelling units was visited by an interviewer, the occupants enumerated, and a questionnaire left for each eligible person. The interviewer returned later to pick up the completed questionnaire from half the households; respondents in the remaining households returned them by mail. [This was one of a series of investigations the Human Population Laboratory conducted on techniques of data collection. Eventually the laboratory developed a strategy approach whereby the bulk of the questionnaires were secured by mail, with personal retrieval reserved for the hard-to-get members of the sample (*I*).]

Since the laboratory's research plans emphasized a longitudinal approach, the 1964 survey afforded an opportunity to examine some of the panel changes which might be encountered later. Accordingly, a detailed investigation of this sample was made to determine the number of people who had died or moved away after 3 years, to assess the practicability of pursuing missing respondents, and to examine the differences between respondents who had moved and those who had not. The results of this investigation are taken up in the sections that follow.

### **The Sample 3 Years Later**

*Respondent mobility.* Inevitably, the new survey found that in many sample households some or all of the people enumerated in 1961 were gone by 1964. To take account of these changes, everyone enumerated in 1961 was, in the course of the 1964 enumeration, classified as either a nonmover or a mover.

The nonmovers were defined as those persons who had been enumerated in a sample household in 1961 and were still there in 1964. The movers were those persons who had been enu-

merated in a sample household in 1961 but were no longer there in 1964. The people who had moved into these households in the interim were enumerated and included as respondents in the 1964 survey. This paper, however, is concerned only with the panel of persons continuing from 1961 and so specifically excludes these new respondents from consideration.

By the close of the enumeration phase we had determined that of the 808 persons enumerated in 1961, 470, or 58 percent, had not moved by 1964; 308, or 38 percent, had moved; and the status of 30, or 4 percent, was unknown. These 30 persons had in 1961 resided in households where in 1964 the members refused to be enumerated or could not be contacted. Elimination of these people from further consideration changes the proportion of nonmovers to 60 percent and that of movers to 40 percent.

While 40 percent represents a fairly substantial rate of movement, the data are comparable with figures previously reported (2-5). For the nation at large, Bureau of the Census reports indicate that approximately 20 percent of the population moved in the year prior to the 1960 census. Since California is known to have a mobile population, this sample would be expected to show a movement rate somewhat higher than the national average.

Clearly, then, this degree of mobility presented the possibility of a major loss in panel members. The next step was to determine what portion of this potential loss could be recovered for continued involvement in the study.

*Tracing the movers.* To determine the feasibility of tracing respondents who move, numerous techniques for locating people were tried with varying degrees of success. Ultimately a standard procedure, really the serial application of the best of these means, was developed.

Upon learning that a person was no longer at his old address, the interviewers inquired of new tenants, landlords, and neighbors for leads as a routine part of the enumeration. Following this, local telephone directories (past and current), post office forwarding addresses, State drivers' license registrations, and relevant data from old questionnaires were systematically investigated. Although these sources of information are listed in order of decreasing utility, all were consistently productive and together

accounted for nearly 80 percent of the persons successfully traced. Other less productive sources included county welfare records, death certificates, former employers, union records, and information from realtors, banks, and title companies.

*Results of the tracing.* The procedures outlined were routinely applied to each of the 308 movers. By the end of field operations these methods enabled us to locate a total of 283 persons, or 92 percent, of the original 308 movers.

As expected, some persons initially categorized as movers had actually died during the period following the 1961 enumerations and the figure above includes these people. Ultimately it was learned that 29 persons, or 9 percent of the original 308, had died in the interim.

Of the remaining 279 persons not known to have died by 1964, 254, or 91 percent, were successfully traced. A remainder of 25 persons, or 9 percent of all movers, proved untraceable.

*Dispersion of the movers.* Most of the movers located had not traveled very far from their 1961 addresses. Although Alameda County contains about a dozen cities of varying size, Oakland, the largest city, accounted for more than half the same city movers.

Location	Persons moved	Percent of movers
Total.....	254	100
Same city.....	97	38
Alameda County.....	71	28
San Francisco Bay area.....	26	10
California.....	25	10
Elsewhere in the United States.....	23	9
Outside the United States.....	12	5

As shown in the table, more than a third of the 254 persons located still lived in the same city as in 1961 and an additional 28 percent were still living in Alameda County. Another 10 percent had left the county but had remained well within the local nine-county area surrounding San Francisco Bay. In sum, after 3 years, 76 percent of the relocated movers were found no more than 50 miles from their former addresses.

*Questionnaire return.* The majority of the sample, the 470 nonmovers, was still alive and living in the same houses and so posed no special problems of relocation and contact as did the movers. The cooperation of all the non-

movers was actively solicited by interviewer and by mail, and ultimately 381, or 81 percent, completed questionnaires for the 1964 survey. This group of 381 respondents forms one of the comparison groups for the later examination of movers and nonmovers.

In contrast to the nonmovers, the participation of the located movers was handled exclusively by mail. Initially, each person was sent a questionnaire and a letter explaining the survey and soliciting his cooperation. When necessary, the letter and questionnaire were followed up with another questionnaire and letter and finally a night letter.

Of the 254 movers who were located, 242, or 95 percent, were sent questionnaires. The remaining 12 persons were unavailable because of severe illness, military service, travel abroad, or other reasons. Of those contacted, 188, or 78 percent, ultimately completed questionnaires for the new survey. These 188 persons make up the second comparison group for the examination of movers and nonmovers.

It is worth noting at this point that although differences do exist between movers and nonmovers in other respects, no significant difference exists in the important matter of questionnaire return rates. Both groups seemed equally willing to respond to the 1964 survey. This cooperation is especially interesting considering that the movers received all of their solicitation by mail only. The difficult task in a longitudinal study would seem to be in locating the movers, not in securing their cooperation.

*Status of the sample in 1964.* The 1964 status of the 808 persons originally enumerated in 1961 is shown in the following table.

Status	Number	Percent
Enumerated in 1961.....	808	100
Participated in 1964.....	569	70
Nonmovers.....	381	47
Movers.....	188	23
Lost by 1964.....	239	30
Could not be re-enumerated.....	30	4
Died.....	29	4
Could not be traced.....	25	3
Traced but not contacted.....	12	1
Contacted but did not respond.....	143	18

As the table shows, by 1964 the sample had lost 239 persons or 30 percent of its original members. The largest single source of loss was the failure of former members to respond to the second contact.

However, 70 percent of the original sample were recovered for full participation in the new survey. Of the 569 responses gained, two-thirds came from the stable population, the non-movers, and a third from the movers. Since only the 712 persons actually contacted could have responded, these 569 responses represent a combined mover-nonmover completion rate of 80 percent for the 1964 survey.

In a useful review of retrieval techniques, Eckland (6) reported recovery rates ranging from 88 to 100 percent for a variety of samples after intervals of up to 25 years. We have described the experiences of the Human Population Laboratory in some detail since earlier reports have not always made clear whether retrieval refers to locating a missing person or obtaining a response, or stated what fraction of the sample had moved and thus required retrieval. Knowing the number of persons who must be traced is an important point in assessing the overall results of a search or the relative utility of a given technique.

HPL experience indicates that although retrieval techniques are numerous and sometimes exotic, only a few will be consistently productive when applied to a sample of the general population. Neighbors, telephone directories, forwarding addresses, and drivers' license registrations may be prosaic sources of information, but they can produce a high rate of success in locating persons with moderate effort.

#### **Differences Between Movers and Nonmovers**

Past studies in mobility have often sought to relate movement to specific factors, such as age, family type, occupation, housing needs or satisfaction, and status seeking. Few personal characteristics of movers were examined, and these characteristics usually were not central to the study's main purpose. However, the 1964 survey was part of an intensive program to investigate the relationships between health and individual living patterns. Therefore, information was collected from each respondent on a wide range of subjects, and thus the HPL had an unusual opportunity to examine the characteristics of mobile respondents in detail.

To determine whether important differences existed between respondents who had moved during the 3-year interval and those who had

not, a detailed comparison was made between the 188 movers and the 381 nonmovers participating in the 1964 survey. This comparison was based on the responses the two groups had made to each of the more than 150 questions of the 1964 questionnaire which explored the respondent's physical health, personal habits, family life, social activities, adolescence, occupation, psychological well-being, and personal history.

*Summary of findings.* Differences between mover and nonmover respondents were found in a number of the areas represented in the questionnaire. All of the major differences are summarized below.

**AGE.** The movers were found to be a much younger group than the nonmovers.

**MARITAL STATUS.** The movers were more likely than nonmovers to be currently separated or divorced in 1964, and many more movers had been divorced at some time in the past as well.

**INCOME.** The movers had family incomes significantly below those of nonmovers.

**COMMUNITY INVOLVEMENT.** The movers were significantly less involved in community organizations than the nonmovers.

**HEALTH AND HEALTH CARE.** The movers had fewer ailments and rated themselves generally better in overall health than did nonmovers. Fewer of the movers were covered by health insurance and fewer had a family physician.

The details of these and related findings are discussed in the following sections. The differences reported were evaluated by chi-square or *t*-test and are statistically significant at or beyond the 0.05 level.

*Age.* The marked youthfulness of the movers was the most dramatic and perhaps most important difference found between the two groups. Nearly a third of the movers were under 30 years of age in 1964 while only 9 percent of the nonmovers were in that age group (table 1).

At the other end of the continuum, only 8 percent of the movers were 65 or older, compared with twice as large a proportion of the nonmovers. While the differences are greatest in the extreme age groups, they occur throughout the distributions. The 10-year difference in median age between movers and nonmovers reflects this same pattern.

A similar association of age and mobility has

**Table 1. Age distribution<sup>1</sup> of nonmovers and movers in 1964 panel, in percentages**

Age (years)	Nonmovers (N=381)	Movers (N=188)
20-29	9	32
30-39	20	23
40-49	27	19
50-59	22	13
60-64	6	5
65 and over	16	8
Median age	47.8	37.6

<sup>1</sup> Chi-square value significant at  $\leq 0.05$  level.

been noted in other studies (2, 3, 7). Certainly it is reasonable to assume that younger people—still early in job and family careers—will find many reasons and opportunities to move. Age, however, is a complex variable that at almost any value automatically implies other facts about an individual. In view of the great age difference between these two groups, and as a measure to reduce the effect of that difference on other variables, additional comparisons were made for respondents under 40 and those 40 years old and over.

*Marital status.* Several differences in marital status appeared between the two groups, the most important being the higher frequency of separation and divorce among the movers (table 2). This difference was especially apparent among respondents over 40 among whom the proportion of movers who were divorced or separated at the time of the second survey was more than five times that of the nonmovers. Widowhood too was more common among movers over 40; 13 percent had lost a spouse by death compared with 8 percent of nonmovers over 40.

Furthermore, divorce had occurred more frequently among movers in the past as well. Of the total 1964 panel, 31 percent of the movers had been divorced at least once in their lives compared with 20 percent of the nonmovers. When the panel was divided into younger and older age groups, 21 percent of the movers and 18 percent of the nonmovers under 40 had ever been divorced. Among persons over 40, the difference is especially large; 41 percent of movers had been divorced compared to 21 percent of the nonmovers. This between-group difference among movers and nonmovers 40 years old or older is significant at the  $\leq 0.05$  level (*t* test).

A comparison of marital satisfaction scores (based on a series of questions on marital happiness and husband-wife relations) revealed that movers were less satisfied than nonmovers with their current marriages. Two-thirds of the married movers had scores indicating a relatively high degree of marital dissatisfaction, compared with only a quarter of the nonmovers so scoring. This difference is significant at the  $\leq 0.05$  level (chi-square test).

At least partly because their marriages had been less stable, movers were less likely than nonmovers to be raising children in 1964, although the majority of respondents who had ever been married in each group had also been parents at some point in their lives—85 percent of nonmovers and 77 percent of the movers. (In this context, children includes all persons between 3 and 19 years old living in the respondent's household.) The largest difference involved persons under 40: 83 percent of the nonmovers were raising children compared with only 56 percent of the movers. This between-group difference is significant at the 0.05 level (*t* test).

**Table 2. Marital status of nonmovers and movers in 1964 panel, in percentages**

Marital status	Total <sup>1</sup>		Under 40 years		40 years and over <sup>1</sup>	
	Nonmovers (N=381)	Movers (N=188)	Nonmovers (N=111)	Movers (N=103)	Nonmovers (N=270)	Movers (N=85)
Never married	3	6	9	9	1	4
Married	87	76	86	82	87	67
Separated or divorced	3	12	4	9	3	16
Widowed	6	6	1		8	13

<sup>1</sup> Chi-square values for the comparisons between nonmover and mover distributions significant at the  $\leq 0.05$  level.

All of these differences make a consistent argument for the close association of family instability and mobility. Marital unhappiness, family disruption, and the absence of children can provide both opportunity and motive for a person to move, and it is quite probable that these factors contributed importantly to the mobility noted in this study.

*Occupation and income.* Some studies have indicated an association between occupational status and mobility—that persons in professional capacities move further and more often than those in lower ranked jobs (3, 8, 9). In the 1964 survey, however, we found no significant differences in occupation between movers and nonmovers. It should be noted that this finding reflects a high proportion of local and in-State moves. The number of long-distance movers taken separately was too small for meaningful analysis.

Although the two groups were quite similar in their occupational distributions, in income the nonmovers were clearly more affluent. At the lowest income levels more than a third of the movers had family incomes under \$6,000 per year while less than a fourth of the nonmovers were at that level (table 3). Among those under 40, only 10 percent of the nonmovers had incomes under \$6,000 compared with 31 percent of the movers. At the other end of the continuum, 35 percent of the nonmovers received over \$10,000 a year compared with only 28 percent of the movers. The median income figures reflect the consistency of this pattern throughout the distributions.

The large proportion of movers over age 40 with incomes below \$6,000 may reflect a larger

number of one-income families, since movers are more likely to be divorced or widowed. Movers are also likely to lack the rewards of longer experience and job seniority of nonmovers.

*Community involvement.* Movers were clearly less involved in community group activities than nonmovers. In contrast to the 41 percent of the nonmovers who belonged to civic or cultural groups committed to community service, only 26 percent of the movers were so involved. Among persons under age 40, the following table shows 48 percent of the nonmovers belonged to civic groups as compared with 31 percent of the movers.

Characteristics	Percent belonging to civic groups	Percent attending church regularly
Both groups:		
Nonmovers.....	41	36
Movers.....	26	22
Under 40 years:		
Nonmovers.....	48	34
Movers.....	31	22
40 years and over:		
Nonmovers.....	38	36
Movers.....	25	22

NOTE: Only selected figures are presented for comparison. Chi-square values for comparisons of total distributions of each variable are significant at the  $\leq 0.05$  level.

Although there were no important differences in religious affiliation between the groups, nonmovers attended services more regularly. Among those who were church members, 36 percent of the nonmovers attended church at least once a week, compared with 22 percent of the movers. These proportions are essentially the same in each age group.

Previous reports of organizational and church participation of migrants present no consistent pattern (10-12). Migrants are vari-

Table 3. Family income distribution in 1964 panel, in percentages <sup>1</sup>

Income group	Both groups		Under 40 years		40 years and over	
	Nonmovers (N=366)	Movers (N=180)	Nonmovers (N=108)	Movers (N=99)	Nonmovers (N=258)	Movers (N=81)
Less than \$3,000.....	8	11	4	5	10	18
\$3,000-\$5,999.....	16	26	6	26	20	26
\$6,000-\$9,999.....	40	34	56	45	33	20
\$10,000 or more.....	35	28	34	23	36	36
Median income .....	\$8,719	\$7,519	\$8,759	\$7,459	\$8,639	\$8,139

<sup>1</sup> Chi-square values significant at the  $\leq 0.05$  level.

ously found more and less active than stable persons. It should be noted that in this study, as distinguished from some cited, all respondents' moves were fairly recent and usually from one urban area to another. Considering the 1964 survey, it is entirely possible that the greater involvement of the nonmovers in rearing children also draws them into the public life of the community. Then too, people with longer residence in a community are more likely than newer arrivals to have formed associational ties.

*Health and health care.* While neither group showed a high prevalence of any specific disease or disorder, those differences in health patterns that did appear suggest that the movers, especially in the younger age group, enjoy better health than the nonmovers. Table 4 summarizes these differences.

Given a list of 19 frequent chronic conditions (asthma, arthritis, diabetes, and so forth) 56 percent of all nonmovers indicated they suffered from at least one such condition, compared with 43 percent of the movers so reporting. However, among those under 40, only 35 percent of the movers, compared with 52 percent of the nonmovers, were so affected.

Asked to rate their own health, 13 percent of all nonmovers said "fair" or "poor" compared with only 7 percent of the movers. At the same time, 19 percent of the movers said they had no health insurance coverage and 28 percent said they did not have a regular physician. Only 11 percent of the nonmovers gave like answers. These proportions are similar in each age group.

That the more youthful movers should both feel healthier and be healthier is not surprising. The differences in health care, however, probably reflect a combination of factors including income and establishment in the community as well as age and physical need.

Individual health patterns were of particular interest in this study, and the 1964 questionnaire provided detailed information on them. Given this level of detail, it is interesting to note the small number of differences found between movers and nonmovers. In appetite, energy level, sleep habits, drug use, days of restricted activity, physical impairments, visits to physicians and hospital confinements, physical exercise, and smoking and drinking habits,

no significant differences between the two groups were found. This is not to say that no other relationships between health and mobility exist but rather that in this sample and analysis only these few proved out at the appropriate significance level. However, while reports dealing specifically with the morbidity of mobile persons are very few, it might be noted that both Thompson and Ciocco (4) and Bright (13) observed no clear relation between reported illness or hospitalization and subsequent mobility.

At least two factors should be considered at this point. First, many of the differences between movers and nonmovers are interrelated. The most influential differences are in age and family stability which affect a variety of other characteristics. Knowing that many of the movers were under 30, that many were separated or divorced, and that all had moved at least once in the recent past makes the whole complex of differences found more understandable. Characteristics such as lower income, better health, marital dissatisfaction, and reduced community involvement are closely associated with being young, divorced, or mobile, and one should expect to discover those characteristics in such a group.

Second, the application of a single, convenient label to the movers should not serve to conceal the real diversity within that group. In many of the variables a recurring pattern distinguishes the younger from the older movers.

**Table 4. Selected data on health and health care of 1964 panel, in percentages<sup>1</sup>**

Characteristics	Chronic conditions	Health "fair" or "poor"	No health insurance	No regular physician
Both groups:				
Nonmovers--	56	13	11	11
Movers-----	43	7	19	28
Under 40 years:				
Nonmovers--	52	7	5	11
Movers-----	35	3	17	30
40 years and over:				
Nonmovers--	57	16	13	11
Movers-----	54	13	21	25

<sup>1</sup> Chi-square values for comparison of total distributions of each variable are significant at the  $\leq 0.05$  level.

The data on marital status, income, and community life suggest that the movers over 40 may be a distinct group with special problems of personal and social adjustment and not simply an older version of the under 40 movers. Certainly no one respondent possesses all the characteristics that delineate the movers as a group. Even their one common characteristic—residential mobility—is diverse in that some persons moved early in the period and some late; some moved repeatedly and some only once. And for some this move is part of a pattern of mobility, while for others it was one of few they will make in their lifetime.

It is just the fact of this diversity, both in the quality of mobility and in the varied kinds of people subsumed under a single name, that complicates and obscures the differences between movers and nonmovers and makes their interpretation quite speculative. Our conclusions refer not to “mobile” versus “stable” people but rather to the characteristics of respondents who moved between contacts compared with those who did not.

#### Effects of Loss on Panel Composition

Apart from its intrinsic interest, the determination of differences between movers and nonmovers provided an approach to assessing the effects of mover loss on the composition of the continuing panel. That is, how would the 1964 panel have differed from the one actually obtained if we had been unable to include the movers in the new survey? The loss of the movers, of course, would have had important effects only on those variables showing large differences between movers and nonmovers. Table 5 summarizes the effects of such a hypothetical loss on all of the panel statistics just discussed.

As the table shows, the age distribution of the panel without the movers would have been quite different. The proportion of persons under 30 would have been reduced from 16 to 9 percent, and the entire distribution would have been shifted toward the older categories, causing the median age to rise from 44.4 to 47.8 years.

Smaller changes would have occurred in marital status, chiefly in reducing the proportion of respondents currently divorced from

**Table 5. Effects of mover loss on 1964 panel, in percentages**

Characteristics	Movers included (N=569)	Movers excluded (N=381)
<b>Age (years):</b>		
20-29.....	16	9
30-39.....	21	20
40-49.....	24	27
50-59.....	19	22
0-64.....	6	6
65 and over.....	14	16
<b>Present marital status:</b>		
Never married.....	4	3
Married.....	83	87
Separated or divorced.....	6	3
Widowed.....	6	6
Ever divorced.....	24	20
<b>Family income:</b>		
Less than \$3,000.....	9	8
\$3,000-\$5,999.....	20	16
\$6,000-\$9,999.....	38	40
\$10,000 or more.....	33	35
<b>Community involvement:</b>		
Belonged to civic groups.....	37	41
Attended church regularly.....	31	36
<b>Health and health care:</b>		
One or more chronic conditions.....	52	56
Health “fair” or “poor”.....	11	13
No health insurance.....	14	11
No regular physician.....	14	11

6 to 3 percent and increasing the proportion married. The income distribution would have been displaced slightly upward, raising the median from \$8,299 to \$8,719 a year. Participation in civic and church groups would have been slightly elevated. In health matters, the general level of health would have been depressed while health care, as evidenced by insurance protection and regular use of a physician, would have increased.

It should be noted that changes in these five areas are the largest effects that would have occurred. Changes in other important descriptive variables, such as sex, race, education, occupation, and religious affiliation, would have been very slight, since these show but very small differences between movers and nonmovers. The proportion of women, for example, was exactly 54 percent among movers and nonmovers alike. Thus the sex distribution of the panel would have been unaffected by the loss of the movers.

The reason for this slight effect lies in the relative sizes of the two groups. Since the mov-



ers are a much smaller group, less than half the number of nonmovers and only a third of the total panel, they contribute much less to any combined statistic; their characteristics are diluted in the larger group.

Nevertheless, the complete loss of the movers would have been disastrous for the utility of the 1964 panel. Panel size would have been reduced by one-third, and the number of persons participating in the second survey would have represented only 47 percent of the original sample instead of the 70 percent obtained by following the movers. At the least, such a rapid attrition would have drastically restricted the analysis possible. Moreover, even though effects on the panel were still small in 1964, the loss of the movers would have magnified the rate at which the panel aged and in time would have distorted other variables as well.

The clear implication then is that certain hazards exist in the followup of samples that have lost sizable numbers through mobility. If the mobile persons have special characteristics that make them unrepresentative of the remainder of the sample, their loss may distort variables important in the research design and suggest interpretations that otherwise would not be made. The 1964 panel, without the movers, would have contained higher proportions of older, settled, more affluent people; lower proportions of young, healthy people just beginning jobs and family life; and lower proportions of persons unhappily married, separated, or divorced. Both death and divorce rates would therefore have been distorted, as would the occurrence of various diseases and certain types of mental and social problems. Further, one cannot be certain what cumulative effects present distortions would have on other variables in the future.

Certainly the purpose of a panel is to study changes in people over time. The foregoing makes it clear that this can be done accurately only by retaining as much of the original sample as methodology will permit.

### **Conclusions**

The implications of these findings for longitudinal studies are several. First, in a largely urban area, such as Alameda County, one can

expect a considerable movement of people from any given set of addresses over time. In the Human Population Laboratory sample, after 3 years, approximately 40 percent of the original sample had moved. Thus, the rate at which a sample may disperse can be quite high.

Contact with many of those who move can be renewed, however. First, most of the movers did not go far; 66 percent remained within the county and three-quarters were still living in the bay area. Second, an intensive relocation program requiring little fieldwork beyond that normally required for the enumeration process enabled us to determine the whereabouts of 91 percent of the missing respondents not known to have died. Third, cooperation from these relocated movers was encouraging—78 percent of those contacted ultimately returned questionnaires with only mail and night letter solicitation.

An important aspect of this study was the assessment of the contribution of mobile respondents to the composition of the panel. In this study, respondents who had moved between contacts were found to be decidedly younger people, more often separated or divorced, less often rearing children, and with incomes below those of nonmovers. They were less involved in civic affairs and while their general health seemed good, fewer were covered by health insurance or had a regular physician.

While the loss of these persons would have had only a small immediate effect on panel composition, the long-term effects are uncertain. Whether differences in future followups would be of similar size and direction is unknown. As the panel ages, its mobility patterns may well change. In any event, such a loss would have drastically reduced the size of the panel and virtually destroyed its usefulness for research.

Mobility is clearly an increasingly important fact of American life, but not one that should deter the undertaking of longitudinal studies. There are enough examples of successful methodology to dispel any question of feasibility. What is needed are more detailed reports of field experiences to sharpen our methods and new examinations of mobility and mobile persons to better understand their effects within the community.

Studies of the habitually mobile—the restless people for whom frequent moves are a life pattern—and of the effects of changing mobility patterns as a sample ages could be most useful. Our experience suggests that movers are diverse, that indeed people are not always moving “just before or behind the stork”—that the older, over 40 movers, for example, may be a special group handicapped by problems of personal and social adjustment. The movement of such persons would pose special problems not only for longitudinal research design but for various health and social planning agencies as well. Research on mobility may not only improve longitudinal research methodology but could contribute as well to a better understanding of important changes within the society.

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#### Tearsheet Requests

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## Grants for Nurse Training Improvement

Nonprofit agencies, organizations, and institutions, as well as hospitals and collegiate schools of nursing, are now eligible to apply for Special Project Grants for Improvement of Nurse Training. This program, authorized by Title II (Nurse Training) of the Health Manpower Act of 1968, is administered by the Division of Nursing, a component of the Bureau of Health Professions Education and Manpower Training, National Institutes of Health.

The special project grants program expands those formerly authorized by the Nurse Training Act. Its purpose is the same, but it offers support to more categories of grantees and for more kinds of undertakings.

Special project grants may be used for planning and establishing new nursing programs or modifying existing ones; attaining accreditation as a nursing education institution; conducting research in nursing education; and for other approaches which agencies, institutions, and organizations may design and utilize to increase the supply of well-prepared nurse practitioners. Projects for which support is requested may range in duration from 1 to 5 years.

For further information, or to request consultation concerning the nursing provisions of the Health Manpower Act, write the Division of Nursing, 9000 Rockville Pike, Bethesda, Md. 20014.