Service Requirements in Dental Prepayment

predictability and adverse selection

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WITH the surge of interest in prepayment dental care plans, a concomitant interest has developed in predicting probable future demands for dental services by consumer groups under different arrangements for providing care. This interest arises from the necessity for establishing premiums which are sufficiently great to sustain a program and at the same time are low enough to attract prospective subscribers. However, data indicating the extent to which levels or character of service demands may be predicted are generally lacking.

This report is the third of a series based on data from the dental care program of Group Health Association, Inc., Washington, D.C., (*1,2*). It presents the dental care experience of a group of the association's members who were long-term participants in a fee-for-service dental care program operated experimentally so as to simulate a prepayment plan. The analysis demonstrates that even though service demands varied widely within the group, the overall service pattern was generally predictable. Evidence was found, however, that when the care program was offered to the same membership on a true prepayment basis, adverse selection, with serious implications for program costs, did apparently take place.

The Dental Care Program

Group Health Association is a nonprofit membership corporation. It was organized in 1937 in response to demands for a cooperative plan that would provide comprehensive medical and hospital care on a periodic prepayment basis. Services are provided by a professional staff, organized as a group practice, in a clinic owned and operated by the association. From the start, the program has placed special stress upon preventive services and periodic, continuing health care. Throughout the period covered by this study the membership was drawn largely from professional and white-collar workers employed by the Federal Government.

Incorporation of dental care into the association's program was first proposed by a membership committee in 1941. Consideration of the proposal was deferred, however, because of wartime personnel and equipment shortages. In 1945, a dental care committee was appointed by the board of trustees to review operations in existing dental programs and to submit a plan for incorporating dental services within the existing medical care program. In January 1949, dental services were made available to members at a clinic equipped, staffed, and operated by the association. Lack of information concerning the magnitude of service demands that might be encountered in a prepayment dental plan made it necessary to operate the dental clinic on a fee-for-service basis.

From the outset, the dental activity was looked upon as the forerunner of a plan for incorporating dental services into the association's overall prepayment program. With this in mind, members were invited to enroll in a simulated prepayment dental care plan. A

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requirement for enrollment was that the member agree to accept regular and complete dental care as prescribed by the dentists of GHA.

Initial care for each participant in this experimental study group included a thorough diagnostic examination and complete care for dental defects present at the time of the examination. Thereafter, each person was placed under a maintenance care regimen. The participants returned periodically, upon recall, for reexamination and treatment of any dental needs which had accrued since the preceding visit. Although the plan provided for recall at 6-month intervals, scheduling of appointments for reexamination was modified to meet the convenience or special needs of the patient.

In the actual program experience, the average maintenance cycle, comprising the interval of time between recalls, was about 9 months. Within such a maintenance cycle, the work performed presumably reflects the diagnostic and treatment services required to meet all dental care needs which had accrued over the period. The fee schedule first used was based on estimates of the costs involved in providing the various services. Fees were revised from time to time, as experience dictated, to assure balance between operating costs and clinic income.

In April 1956, the association announced the establishment of a prepayment dental plan under which maintenance and preventive dental care would be provided to members who would enroll in family units. Services under the program were to start August 1, 1956, but participation was delayed for enrollees until they had received dental services to meet any accrued needs. Although a sizable segment of the study group joined the new plan, the majority continued their care on a fee-for-service basis.

Method of Study

A review of records maintained by Group Health Association, conducted in the summer of 1957, provided the data for this report. The records identified, by date, the nature of all dental work done and the amount of time required by the dentist, the dental hygienist, or the X-ray technician to perform the service. The complete dental clinic record was obtained from the association's medical record file for each member of the simulated prepayment group, and details of all clinic contacts were abstracted to obtain a complete chronological account of his maintenance care experience at the clinic. Exempted from the data were records on orthodontic service.

During the 8-year period covered by this study, 1949 to 1957, a total of 1,925 persons had participated in the simulated prepayment program. However, since the study is concerned primarily with long-term maintenance patterns, the analysis is restricted to 1,194 persons whose experience in the program continued on a maintenance basis over a period of 4 full years or longer.

Three basic measures were used to reflect utilization of dental care services: clinic visits, chair time, and cost of service. The visit totals were obtained as counts of appointments kept by patients. Summations of time estimates entered upon clinic records were used as measures of chair time. Cost was considered equivalent to value of services given when priced with a mid-period fee schedule supplied by Group Health Association. Use of a single fee schedule permitted the various analyses to be made in terms of constant dollars.

After the data were transcribed, the record for each participant was analyzed to provide annual maintenance care summaries. Maintenance years were defined as successive 12-month intervals between anniversary dates of completion of the individual's initial care.

It should be noted that the amount of service provided an individual in a selected 12-month period may not have served to correct all of the defects which accrued within that year. For example, the first year count of services for an individual who was recalled, reexamined, treated, and discharged again as a completed case 8 months after completion of his initial care reflects only work performed to meet needs which accrued over two-thirds of the year. However, regardless of how well the annual summaries of service requirements may reflect accrued needs, they directly assess demands for service which were met under the program.

For purposes of the comparisons made between joiners and nonjoiners of the prepayment

plan, the data have been weighted to avoid differences which might be accounted for by variations in the distributions of the two groups by age and length of time spent in the simulated prepayment program.

The Experience in Brief

Persons who enrolled in the simulated prepayment program were about equally divided as to sex. In figure 1, it will be observed that the age distribution of the group peaks at 5–9 and again at 35–39. (Refers to age at start of maintenance experience.) This bimodal character of the distribution of the original group was further accentuated by the selection of cases for this report. In the age group under 25 years only half of those who initially entered the program had the 4 years of experience established as the criterion for inclusion in the study group. In contrast, two-thirds of the age group 25–44 years and four-fifths of the group 45 years old and older had the necessary 4 years of experience. Consequently, only a fourth of the persons included in this study were under 25 years of age, more than half were between 25 and 44, and a fifth were 45 years or older. Furthermore, only one in five of those who later were enrolled in the true prepayment plan were under 25, half were in the middle age group, and 30 percent were 45 years or older.

Figure 1. Age distribution of all participants in the simulated dental prepayment program and of the study group

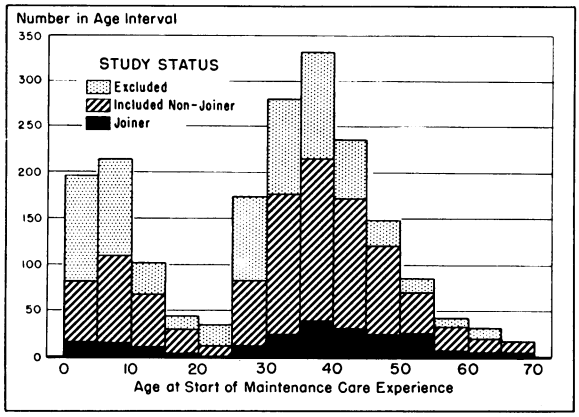
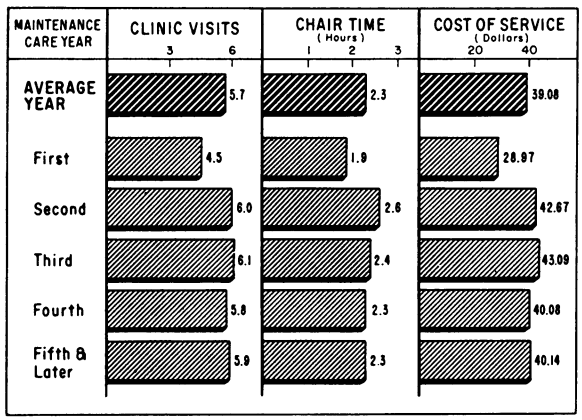


Figure 2. Clinic visits, chair time, and cost of services, per person per year, by maintenance care year



The majority of the persons included in the study were still actively participating in the program at the time of the record review. Within the preceding 9 months, 203 had been enrolled in the association's prepaid plan. The remainder had elected to continue their care on a fee-for-service basis. The data available include 8 full years of maintenance care experience for 54 individuals, 7 years for 247 individuals, 6 years for 328, 5 years for 353, and 4 years for 212. The total person-years of care was 6,742 or 5⅔ years per person in the group studied. The clinic record for the group totaled more than 38,000 visits, nearly 16,000 hours of chair time, and more than a quarter of a million dollars worth of services. Translated to averages, the utilization was equivalent to 5.7 visits, 2.3 hours of chair time, and services costing $39.08 per study participant per year.

Patterns of Service

Data for the different maintenance care years (fig. 2) confirm previous evidence that by three indexes—clinic visits, chair time, and cost of services—demands for dental services by a group under a comprehensive care program change but little from year to year once a maintenance regimen is established. Except for the low first year, the values for the average year closely reflect year-by-year utilization throughout the total experience. The low first-year cost is presumably attributable to the procedure followed in assembling the data. With the record for each individual starting at that point in time when the task of placing his mouth in optimum condition was completed, it is likely

that few if any services were required for a period of several months thereafter. Furthermore, the time of recalls might well have postponed to the following year the correction of some defects which actually developed in the late months of the first year.

After the first year the pattern of predictability in overall service demand levels prevails despite variations in the amounts of different types of services provided the group from year to year and wide variations in the service requirements of individuals and subgroups.

Variation by Type of Service

The impact upon total dental costs of the various types of services provided in the maintenance care program is revealed in figure 3. The average cost of examinations, prophylaxes, and X-rays, which are grouped in the diagnostic category, was $13.34, or more than a third of all expenditures per participant in the average year. The corresponding cost for plastic fillings was $10.86, and $10.02 was paid for inlays, crowns, and bridges. Services in each of these two categories represented more than a fourth of the total. The relatively minor importance of denture work in this program is reflected in cost of only $1.24 per participant. Extractions, denture repairs, periodontal treatment, sodium fluoride applications, and miscellaneous services, which are grouped in the "other" category, averaged $3.62, or about a tenth of the "all service" total.

Although there were no substantial changes from one year to another in the cost of all services given, the average amount paid for different types of services varied significantly (fig. 3). When the services in the years subsequent to the atypical first year are compared, several shifts in cost are noted. There was a tendency for diagnostic costs and costs of miscellaneous services (the "other" category) to expand somewhat and in an orderly fashion. There was also a substantial increase in the average cost of inlays, crowns, and bridges between the second and third years, but this cost was gradually reduced, returning to the second year level during the fifth and later years. A shift to lower values for plastic fillings was apparent for each year succeeding the second. This was also true for denture costs, but the

Figure 3. Annual per person costs of different types of services, by maintenance care year

(Dollars)

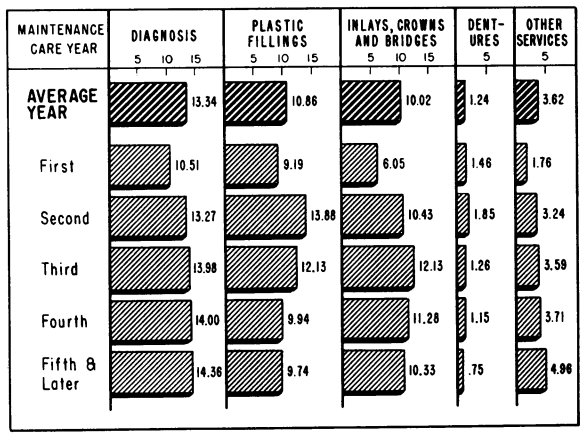
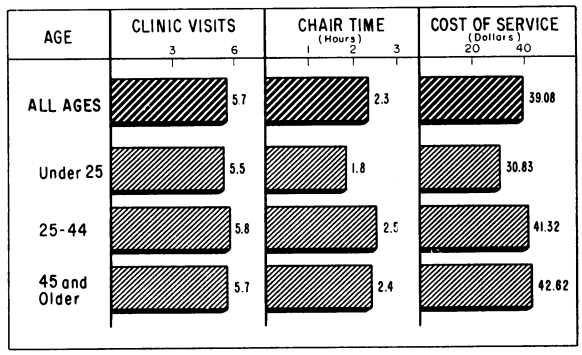


Figure 4. Clinic visits, chair time, and cost of services, per person, by age group



demand for such appliances was so small as to have relatively little impact upon the total cost for all services.

Variation by Age

It will be recalled, from data presented in figure 1, that study participants were rarely over 65 years of age and relatively few were in the 15- to 24-year age group. It has therefore seemed appropriate to refer to findings for persons under 25 years of age as summaries for children, even though data for a few young adults enter into the material. Similarly, findings for persons 45 years of age and older may be referred to as "other adults" with the understanding that they essentially pertain to older persons of working age.

The three indexes reveal only trivial differences in the overall extent to which clinic facilities were used by adults under 45 years of age

and by other adults (fig. 4). Patterns for children were substantially different, however. Although the frequency of visits by children was only slightly less than the frequency of visits by adults, the time required to diagnose and correct the defects presented and the dollar value of services provided each year were substantially less.

Distinctive patterns by age are much more apparent when values are distributed over categories of service (fig. 5). Even the cost of diagnostic services declined slightly with advancing age. The average cost of plastic fillings was sharply reduced from $13.43 for children to $7.87 for adults in the older age group. The cost of inlays, crowns, and bridges, which was only $1.22 for children, was about 10 times this amount for each of the adult groups. No dentures were placed for children; the cost of these appliances was $0.86 per year for young adults and reached $3.54 for those 45 years of age and older. Finally, the miscellaneous group of services expanded from a value of $2.48 per year for children to $5.08 for the older adults.

Figure 5. Annual per person costs of different types of services, by age group

(Dollars)

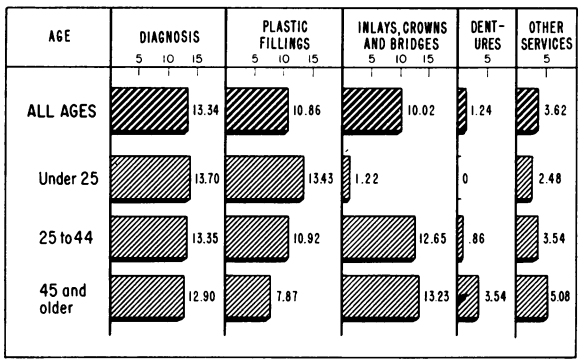
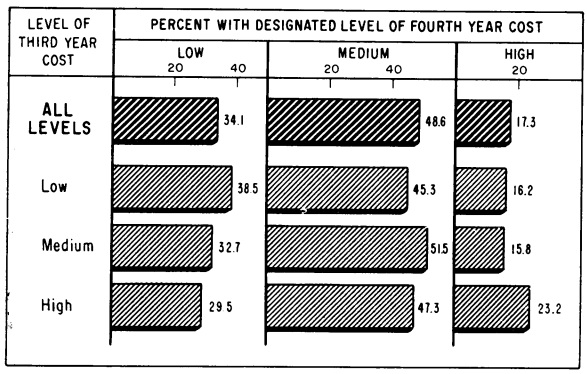


Figure 6. Distribution of persons with low, medium, and high levels of service cost in the third year, by level of cost in the fourth year



Individual Variations

Average costs of the services provided to members of the study group conceal a wide range of costs to different individuals within the group. In spite of periodic recalls and the stated requirement that needed work be completed at periodic intervals, there were numerous instances in each maintenance care year in which individuals failed to make a single clinic visit. At the other extreme, the work performed for a few individuals involved costs amounting to several hundred dollars.

In the average year, services for a third of the group cost less than $20; for nearly half, the cost was between $20 and $59; while for the remaining sixth the cost was $60 or more. For convenience of reference, the individuals classified within these cost ranges are referred to hereafter as having received services at low, medium, and high cost levels, respectively.

Predictability of Costs

The general predictability of dental service costs for the study group is a function of counterbalancing shifts from year to year in individual service demand levels and in no way reflects constancy in these levels. Not only did the cost of services vary widely between individuals in each maintenance care year, but changes in the level of cost from one year to the next characterized service patterns for a majority of the study participants. The general tendency, however, was for shifting away from the divergent and toward the cost distribution of the total group.

To illustrate, in figure 6 the 1,194 study participants are distributed so as to contrast their service costs in the third, or base, year and in the fourth year. (These are the final 2 years of experience for which data are available for all study participants). The similarity observed for the third year high, medium, and low cost groups with respect to their fourth year distributions is remarkable, considering

the changes in service costs which took place from year to year for individuals. Persons grouped at each cost level for the third year are thoroughly redistributed in the fourth in a manner closely resembling the distribution of the total group.

Even more striking is the impact of changing cost patterns upon average costs (fig. 7). Third year costs for the low, medium, and high groups had averaged $9.33, $34.85, and $124.95, respectively. However, changes in costs for individual members of each group during the fourth year so balanced the picture as to bring average costs for all three groups surprisingly close to the fourth year average of $40 for the total study group.

Evidence of Selectivity

Use of services in terms of visits, treatment time, and cost was substantially greater for those persons who subsequently joined the prepayment plan than for others in the study (fig. 8). Throughout the total span of maintenance experience, the average number of visits per year was 6.5 for those who joined the plan and 5.5 for others. Correspondingly, the chair time required was 2.8 hours in contrast with 2.2, and the value of services given per year was $47.22 as compared with $37.22. The trends with succeeding maintenance years for both groups closely paralleled the experience previously discussed for the group as a whole. In every maintenance year, the time and service demands of the joiners were greater than those of the nonjoiners.

Data in figure 9 suggest that the higher overall average values for the joiners of the plan extended to all areas except denture work and the miscellaneous services grouped as "other." Their diagnostic services cost $14.92 per year, plastic fillings, $13.72, and their inlays, crowns, and bridges, $14.34 per year as contrasted with corresponding services costing $12.98, $10.21, and $9.04 for nonjoiners. Conversely, the average costs for dentures and for other services were respectively $0.85 and $3.39 for plan joiners as compared with $1.32 and $3.67 for the remainder of the group. The largest share of added costs for joiners was reflected in their greater utilization of inlays, crowns, and bridges. The greater annual cost for these items alone, $5.30, represents more than half of the overall difference in cost for the two groups. Even the increased use of plastic fillings and of diagnostic services for

Figure 7. Average third and fourth year costs per person, by level of third year cost

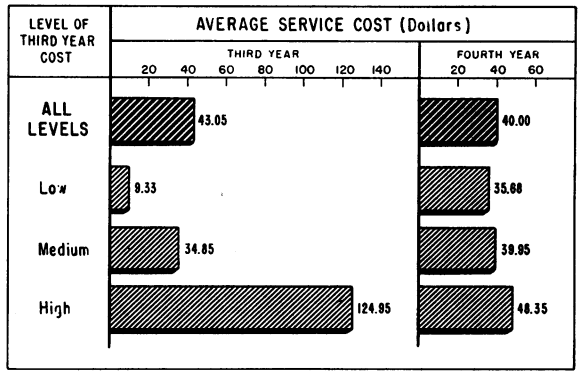


Figure 8. Clinic visits, chair time, and cost of services, per person per year, by participation in the prepayment plan

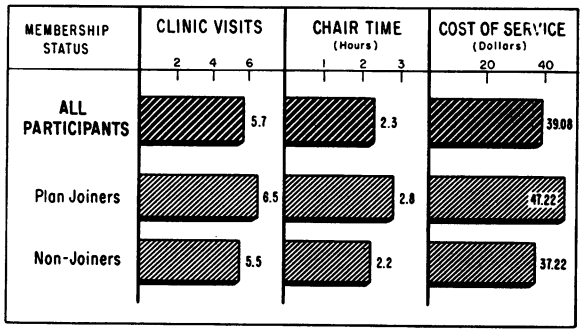
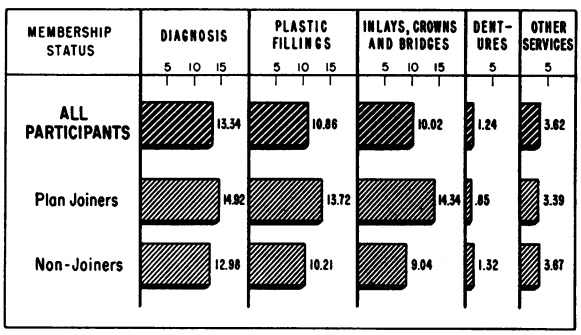


Figure 9. Annual per person costs of different types of services, by participation in the prepayment plan

(Dollars)

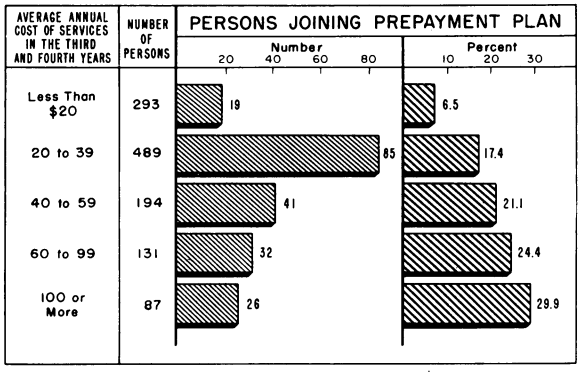


the group of joiners represents added costs ($3.51 and $1.94, respectively) which were relatively large as compared with the small savings attributable to lesser use of dentures and other services.

Selectivity in enrollment is clearly apparent when the proportions joining the prepayment plan are compared for individuals with differing average maintenance costs (fig. 10). Again looking at the third and fourth years of enrollment, the lowest percentage (6.5) of joiners was found in the subgroup whose costs for these years had averaged less than $20 annually. Conversely, the highest percentage (29.9) was among those individuals in the subgroup whose costs averaged $100 or more. The grading of individuals between those with low to those with high costs reflects expanding proportionate enrollment with each step to higher cost levels. On the other hand, it is significant to note that the greatest number of plan joiners was drawn from the group at the $20–$39 level.

This evidence of selection is really only presumptive evidence that the subsequent annual per person costs of providing service to the group electing the prepayment plan actually would be greater than the annual per person cost had been for the total group participating in the simulated plan. It is significant, however, that since the time the data were collected for this study the actual costs of services to the prepayment group have been substantially greater than had been anticipated on the basis of experience with the simulated plan. As a result, compensatory changes in the administrative policies and program charges of Group Health Association's dental plan have been necessary.

Figure 10. Plan joiners, by average annual costs for a 2-year period



Summary

This study of services provided in the Group Health Association's dental clinic summarizes the maintenance care experience for 1,194 individuals during the first 8 years of operation of the association's simulated prepayment dental program. The analysis is restricted to data for those individuals whose continuous participation extended over at least 4 full years. The total experience included was equivalent to 6,742 person-years of participation and averaged 5.6 years per person. Among the group studied there were 203 persons who recently had elected to convert their dental care to a prepaid basis.

Of considerable significance in the findings is the further evidence of constancy in overall demand for dental service by a group once a maintenance regimen is established, despite wide variations in the demands of individuals and subgroups. Also of interest are the distinct time trends in broad categories of care. The demand for plastic fillings, for inlays, crowns, and bridges, and for dentures declined with succeeding years of maintenance care, whereas diagnostic and other service demands increased somewhat.

Average demands for service were much lower for children than for adults. Although a sharp downward trend with age was apparent for plastic fillings, the cost of inlays, crowns, and bridges was much higher for both adult groups than for children. Similarly, the cost of dentures and other services increased regularly with increase in age.

Although costs of services to individuals in the study group varied widely in a given year, the data indicate a marked subsequent tendency for the average costs to low, medium, and high users of service to approach a norm. Thus it would be anticipated that over an extended period of time the range of differences in cost between high and low use groups would diminish substantially.

Three measures of utilization showed con-

sistently higher values for persons who had joined the prepayment plan than for nonjoiners. The joiners made one full visit more per year, utilized a half hour more chair time, and received services costing $10 more. Their pattern of service included substantially higher costs for diagnostic services and plastic fillings and for inlays, crowns, and bridges. Given this evidence it is not surprising that the costs of operating the prepayment plan greatly exceeded original expectations.

REFERENCES:

(*1*) Pelton, W. J., and Pennell, E. H.: Predictability of dental care needs in adults. J. Am. Dent. A. 52: 703–708, June 1956.

(*2*) Pelton, W. J., et al.: Comprehensive dental care in a group practice. PHS Pub. No. 395. Washington, D.C., U.S. Government Printing Office, 1954.

Current Morbidity Studies

The eighth annual listing of "Sources of Morbidity Data" has recently been released by the Clearinghouse on Current Morbidity Statistics Projects. The clearinghouse was first proposed in 1951 by the Public Health Conference on Records and Statistics. The Division of Public Health Methods, Office of the Surgeon General, Public Health Service, then developed a plan for such a clearinghouse, which was approved by the conference in 1952. Later the support of the Association of State and Territorial Health Officers and the American Medical Association was received.

The clearinghouse was organized to collect and disseminate information concerning studies and surveys of morbidity. It was given two objectives:

1. To provide a systematic method of telling workers in the public health and medical fields where specific data on human morbidity may be obtained.

2. To afford a convenient means whereby those who are planning studies or surveys involving the measurement of illness, disease, injuries, or impairments may get in touch with others who have undertaken similar tasks.

The contributors to the listings submit the information for a project on a morbidity statistics project notice form, which the clearinghouse supplies. Since its inception, a total of 1,015 studies on sickness and disease have been reported. In the current listing, 105 new projects are described. Most States are represented, although there is a concentration of studies in California, Michigan, Pennsylvania, and New York. The majority of the studies reported are conducted by universities.

Included are such projects as:

- A study of the "causes of health" among residents of Philadelphia.
- A longitudinal study of coronary heart disease among employees of the Western Electric Company in Chicago.
- A long-range citywide health survey in Baltimore similar in some respects to the U.S. National Health Survey.
- A study of mental health problems among reservation and nonreservation Potawatomi Indians.
- A study of the development of peptic ulcers among the 1958 and 1959 freshman classes at Yale University.

"Sources of Morbidity Data, Listing Number 8" (PHS Publication No. 802) will be sent without charge to research workers or persons planning public health programs. Tearsheets of the description of each study are kept on hand for persons who are interested in a particular project or in all projects in a particular field. Write to the Clearinghouse on Morbidity Projects, % Division of Public Health Methods, Public Health Service, Washington 25, D.C.