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# THE GAO REVIEW

FALL 1977

VOLUME 12 ISSUE 4

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## INDEXES TO THE GAO REVIEW

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The index to the 1977 volume is published in the back of this issue. Indexes for issues prior to 1973 are not available.

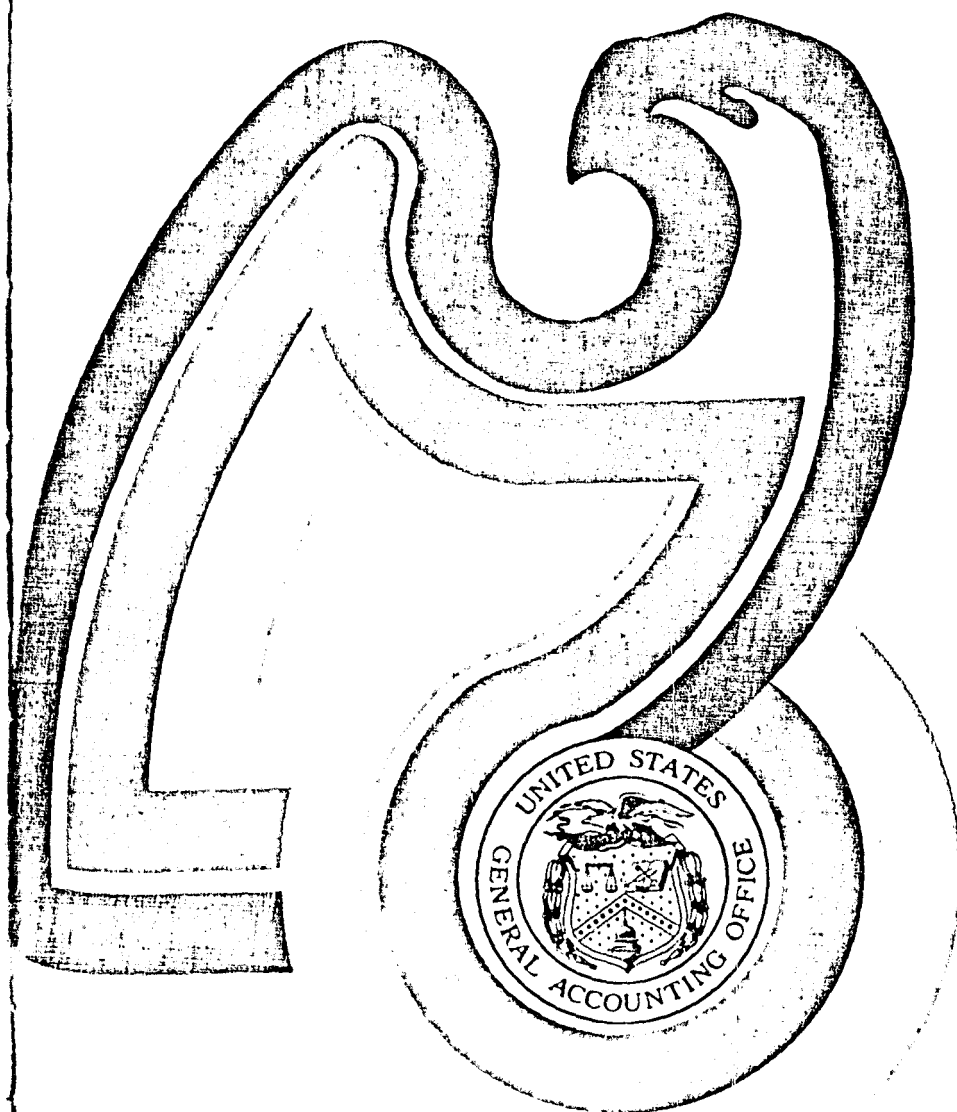
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## Multidimensional Analysis— A New World for GAO

*GAO used multidimensional analysis to estimate costs  
of alternative methods of caring for the Nation's elderly.*

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As society and therefore government services become more complex so does GAO's work. We are becoming involved in sophisticated research efforts similar to those performed by management consulting firms or university research departments. An example is the Detroit regional office's review of home services received by older people.

The Nation's elderly are increasing rapidly. In 1900, people 65 and over numbered 3 million. By 1970, they had increased over sixfold, to 20 million, and in the year 2000 they are expected to reach 30 million. The Nation will thus be faced with an ever-heavier financial burden—long-term health care and eventually in-

stitutionalization for the aged. The Congress is concerned with their plight.

As part of this concern, a congressional committee asked GAO to analyze the cost of alternative types of care for the elderly. This complex project required determining degrees of impairment and estimating the cost of services provided by family and friends. To do this required looking at human functions and simultaneously evaluating services affecting these functions. This process we call multidimensional analysis.

Cleveland, Ohio, was selected because the Detroit regional office has developed one of the country's largest data bases on

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## MULTIDIMENSIONAL ANALYSIS

the elderly. Our objective was to determine the point at which services provided to keep older people in their homes become more costly than institutionalization.

## The Data Base

The data base had been developed for another Detroit regional office review ("The Well-Being of Older People in Cleveland, Ohio," HRD-77-70, Apr. 19, 1977). That review combined information from two major sources. The first comprised interviews of 1,609 older people in the city of Cleveland. These people were interviewed twice—once in the summer of 1975 and again a year later using the "Multidimensional Functional Assessment Questionnaire," developed by the Duke University center on aging. The interviews were conducted by interviewers from Case Western Reserve University and supported by the Cleveland Foundation, a local philanthropic organization. Over 300 pieces of information were gathered on each person.

The second source of data used in the earlier review was 118 agencies that provided a wide range of services to older people. These agencies supplied information on the types and frequency of services they provided to each person in the sample. The data from both sources had been computerized to allow multiple comparisons.

The 1,609 people were rated in each of 5 dimensions, as shown

on the questionnaire: social and economic status, mental and physical health, and ability to do daily tasks. Using the five ratings, each person was then categorized into one of seven impairment levels—unimpaired or slightly, mildly, moderately, generally, greatly or extremely impaired.

Note: at the beginning of our review, we had available data on 7 impairment levels consisting of 5 dimensions based on 300 characteristics of older people. Analysis of such complex multidimensional data could only be handled with innovative computer programs and statistical techniques. With the help of the Financial and General Management Studies Division and our consultants, we were able to advance the state of the art of data analysis.

## Service Packages

We began by developing, for each impairment level, service packages consisting of combinations of the 28 services available in Cleveland. These packages could only be developed through multidimensional analysis. We had to look at impairment levels based on 5 dimensions consisting of 300 characteristics and apply information on 28 services to each impairment level. We did this with computer cross-tabulations and added the following elements to our analysis:

1. Percent of the people receiving each service.



2. Percent receiving each service from family and friends.
3. Percent receiving each service from an agency.
4. The average monthly frequency of use of each service.

#### Cost Data

To develop cost data for each service, we interviewed representatives of 25 local agencies serving the elderly. We interviewed officials in Chicago, Illinois, to collect cost data on services provided by eight other agencies there. We also received data collected by Duke University on service costs in Durham, North Carolina. The average costs developed for each service in Cleveland were similar to the costs in Chicago and Durham; therefore, the results of our review could be projected nationally.

#### Service Package Costs

To complete our multidimensional analysis, we needed to develop new methods for calculating service package costs. We then added four more elements to our analysis:

1. Cost per unit of service.
2. Monthly use of services for each impairment level.
3. Percent of persons in each impairment level receiving each service from family and friend.
4. Percent of persons in each

impairment level receiving each service from an agency

Using these four elements, we calculated an agency cost and a cost to family and friends for each service at each impairment level, in terms of monthly cost per 1,000 people. These two costs were then added to get total cost for each service. The costs of all services were then totaled to determine agency cost, cost to family and friends, and total costs, for the service packages of each impairment level. These service package costs were then plotted to give us our home services curve. (See graph 1.)

Older people requiring long-term care and unable to get it from family and friends or a private nurse have no alternative but to enter an institution. There they receive a complete package of services. The average cost of these services in intermediate-care and skilled-nursing facilities was \$458 a patient per month.

#### Comparison

To compare the cost of home services to the cost of long-term institutional care we put the costs on the same basis and plotted them on the same set of axes. (See graph 2.) Our comparison indicates that home services cost more than institutionalization at the higher impairment levels. The break-even point falls within the greatly impaired level. About 14 percent of uninstitutionalized older people are past the break-even point.

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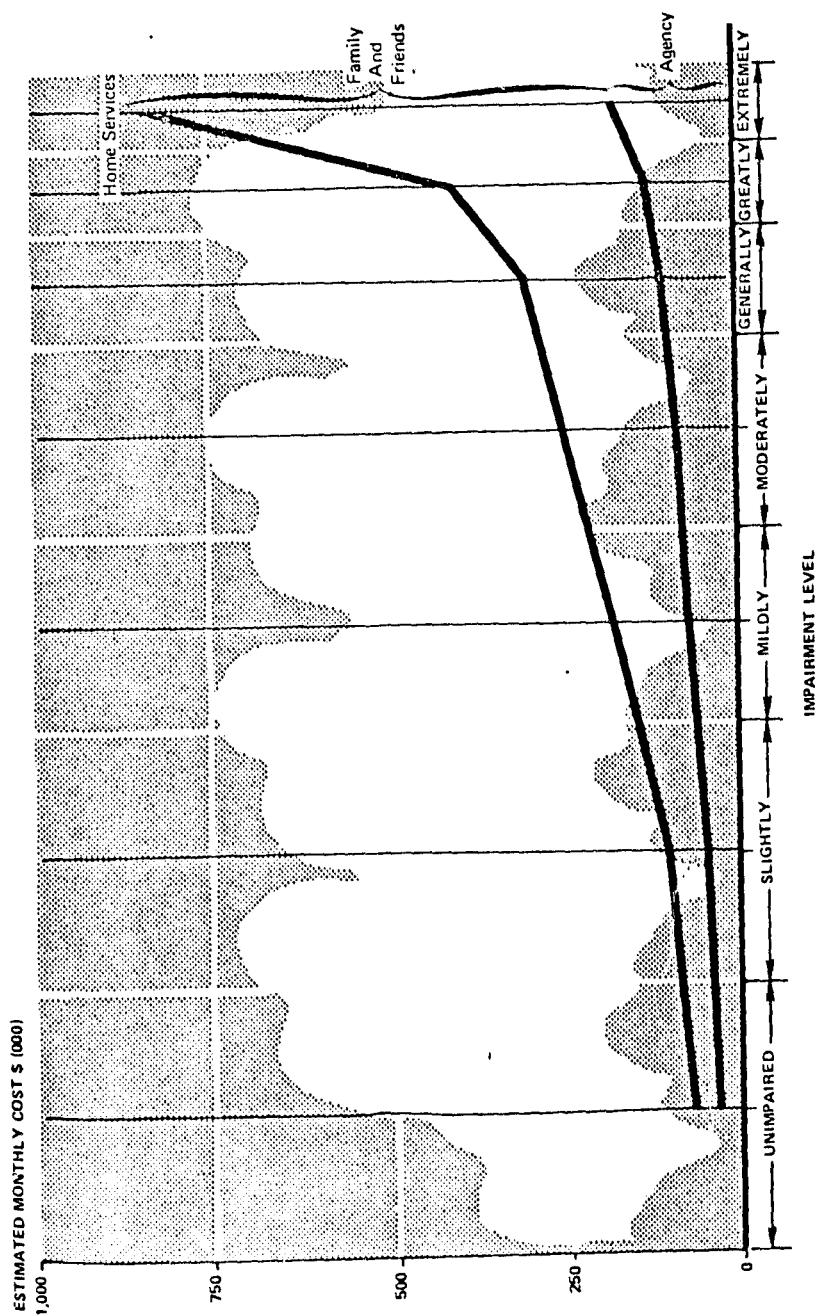
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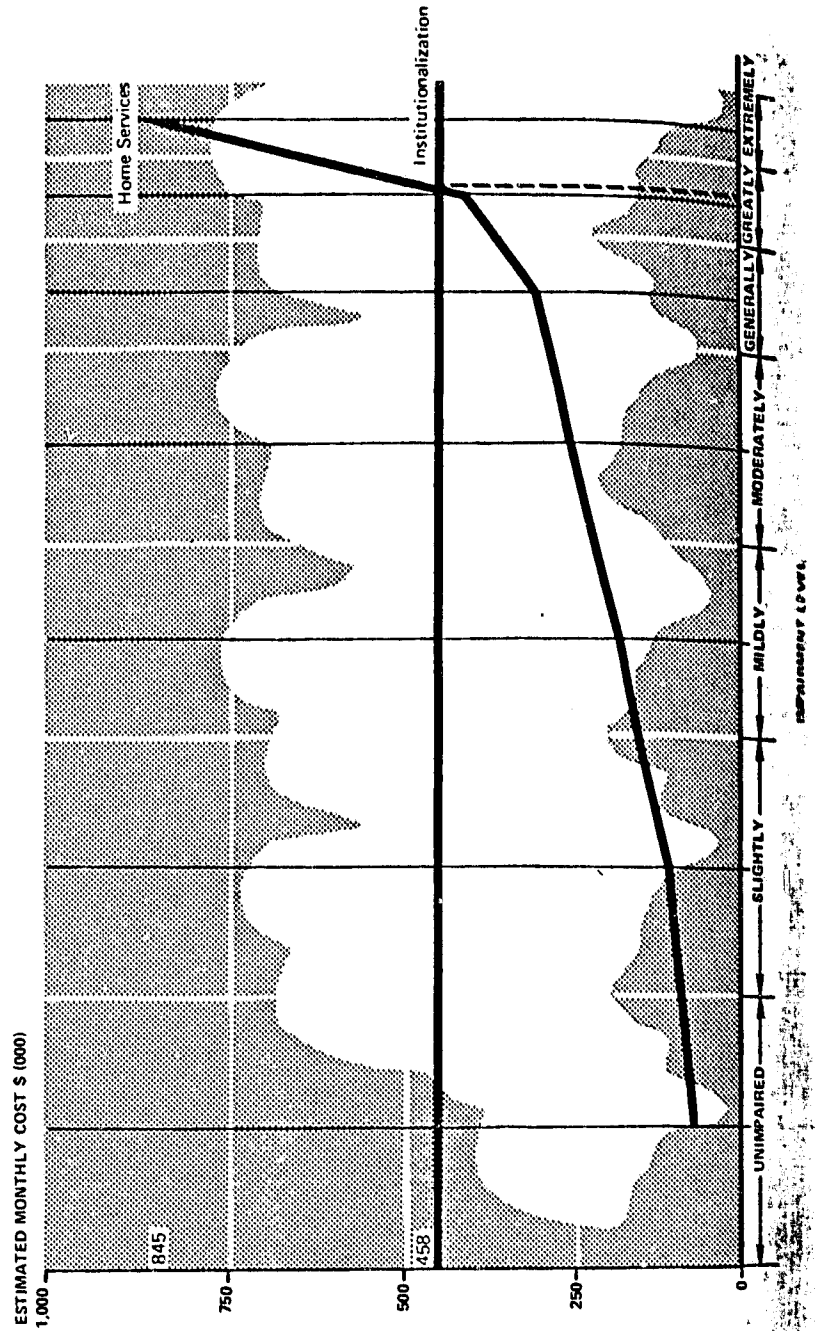
MULTIDIMENSIONAL ANALYSIS

GRAPH 1  
ESTIMATED MONTHLY COST AND SOURCES OF HOME SERVICES BY AGENCY AND FAMILY AND FRIEND AT EACH IMPAIRMENT  
LEVEL PER 1,000 OLDER PEOPLE





GRAPH 2  
COMPARISON OF ESTIMATED MONTHLY COST OF HOME SERVICES AND INSTITUTIONALIZATION AT EACH IMPAIRMENT  
LEVEL PER 1,000 OLDER PEOPLE



Results

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MULTIDIMENSIONAL ANALYSIS

Results

Our analysis gives the Congress a new picture of home care. We were able to estimate the importance of family and friends in providing services to the elderly and to project the cost of legislation that changed their role. Specifically, our analyses of the relationships between levels of impairment, the services received at each level, and how the services were delivered showed:

- Agencies are currently spending less per person for home services than is spent for institutional care.
- Care provided to the greatly and extremely impaired living at home is similar to care provided in institutions.
- Family and friends provide over half the services received by older people at all

impairment levels and over 70 percent of the services received by the greatly impaired or worse.

Summary

GAO has come a long way in blending the basic research techniques of academia with proven GAO audit techniques. The result has been an approach we call multidimensional analysis. Using multiple dimensions allowed us to expand our analytical horizons—to open a world of auditing beyond two dimensions in a world that is no longer flat.

EDITOR'S NOTE: The GAO report prepared on the analysis referred to in this article was addressed to the Congress and is entitled "Analysis of Certain Aspects of Home Health Benefits."

GAO A Valuable Resource

The GAO is the investigative arm of Congress and a valuable resource in assuring the legality and propriety of governmental expenditures and the effectiveness of governmental programs.

*House Committee on  
Government Operations*  
Report No. 95-492  
July 12, 1977

**END**