

AN ESTIMATE OF THE COST OF  
ALZHEIMER'S DISEASE IN KANSAS

prepared by

Catherine Shenoy  
Research Associate

Institute for Public Policy and Business Research  
The University of Kansas  
Lawrence, Kansas 66045  
(913) 864-3123

prepared for

Kansas Department on Aging

December 1985

Anthony L. Redwood, Executive Director  
Institute for Public Policy and Business Research

Report No. 102

## EXECUTIVE SUMMARY

Alzheimer's Disease has been identified as the most prevalent form of senile dementia. With an increasing elderly population the cost of the disease is becoming increasingly burdensome. In Kansas approximately 25,000 persons over 65 suffer from Alzheimer's Disease. By the year 2000, only 14 years from now, estimates of over 35,000 are projected.

Direct costs to provide care for these individuals include all medical care costs, nursing home care costs, and social service agencies' costs. It is estimated that in Kansas over \$153 million in current dollars will be spent in one year to provide care for Alzheimer's victims. Part of these direct costs could be attributed to normal aging, but \$55 million is estimated to be attributable to Alzheimer's disease alone in Kansas.

A significant portion of Alzheimer's Disease costs are indirect costs. Relatives must stay at home to care for victims, they accompany them to doctors' visits, or they visit them in nursing homes. It is estimated that over \$166 million per year in Kansas is foregone by caregivers of Alzheimer's victims. Other indirect costs total around \$2 million.

## INTRODUCTION

The purpose of this study is to estimate the direct and indirect costs of Alzheimer's Disease in Kansas. Two types of costs are identified. The first is an actual cash outlay. This is an expenditure which would be reflected in the state's gross product. The expenditure is borne by various parties including individuals, federal, state, and local government agencies, and private insurers. Secondly, indirect costs are calculated. These costs are almost entirely borne by individuals in the State and reflect the massive burden which falls upon private individuals. Because some direct and indirect costs could be the result of normal aging, in the final part of the report, Alzheimer's victims costs are compared to average elderly costs. Finally, the cost due solely to Alzheimer's Disease is calculated. To arrive at these cost estimates the following steps are taken:

1. Estimate number of persons with Alzheimer's Disease in Kansas,
2. Determine per capita direct costs,
3. Determine per capita indirect costs,
4. Determine which costs are due solely to Alzheimer's Disease and not to normal aging.

## METHODOLOGY

Much has been written about the cost of Alzheimer's disease. The popular press has written about it and U.S. Senate hearings abound in personal testimony. However, most literature has reported anecdotal evidence rather than statistical evidence. Gross estimates of total cost in the United States have been developed by several groups. Those are summarized in Table One. Generally these figures have been guessed at by estimating the number of Alzheimer's patients in nursing homes and then applying that proportion to the total cost of nursing homes. Home care costs have been mostly guesswork because no systematic statistical study has been carried out.

The National Institute on Aging (NIA) has commissioned a pilot study titled Evaluation of Costs of Caring for Senile Demented Elderly: A Pilot Study, by Hu, Huang, and Cartwright[9]. After this study Huang and Hu prepared another report for the NIA on the Economic Costs of Senile Dementia in the United States, 1983[10]. This study utilized information that was developed in the pilot study. Average per capita costs for the senile demented in the nation were developed using time factors developed from the pilot and national cost averages. To be able to apply the techniques of the NIA study to Alzheimer's Disease in Kansas one must first determine if SDAT(senile dementia Alzheimer's type) costs in Kansas could be significantly different from national senile dementia costs. To generalize the study, prevalence rates in Kansas have to be similar to the national average, and senile dementia care costs need to be applicable to SDAT care costs. In the next section prevalence will be discussed for SDAT and senile dementia in

TABLE ONE

National Cost Estimates

| <u>Organization</u>                      | <u>Type of Estimate</u>             | <u>Cost/Year</u>             |
|--|-------------------------------------|------------------------------|
| Congressional Research Service . . . . . | Long-Term Care . . . . .            | \$30 billion                 |
| ADRDA . . . . .                          | 1982 Nursing Home Care . . . . .    | \$20,000<br>per patient      |
| ADRDA . . . . .                          | 1982 Other Patient Care . . . . .   | \$15-\$20,000<br>per patient |
| ADRDA . . . . .                          | Nursing Home Care . . . . .         | \$25-\$26 billion            |
| ADRDA . . . . .                          | Total Cost for Alzheimer's Victims. | \$34 billion                 |
|  | Total Medical Cost for Elderly      |                              |
| National Institute on Aging . . . . .    | Senile Demented . . . . .           | \$31 billion                 |

general. Then national and Kansas costs will be discussed as well as senile dementia versus SDAT costs. Finally an estimate of Kansas Alzheimer's Disease costs can be determined. To arrive at this we will:

1. Determine the number of Alzheimer's victims.
2. Determine the number in nursing homes and the number in the community.
3. Determine the numbers in the range of severity from mild to severe.
4. Determine a per capita cost for each group.
5. Determine total costs.

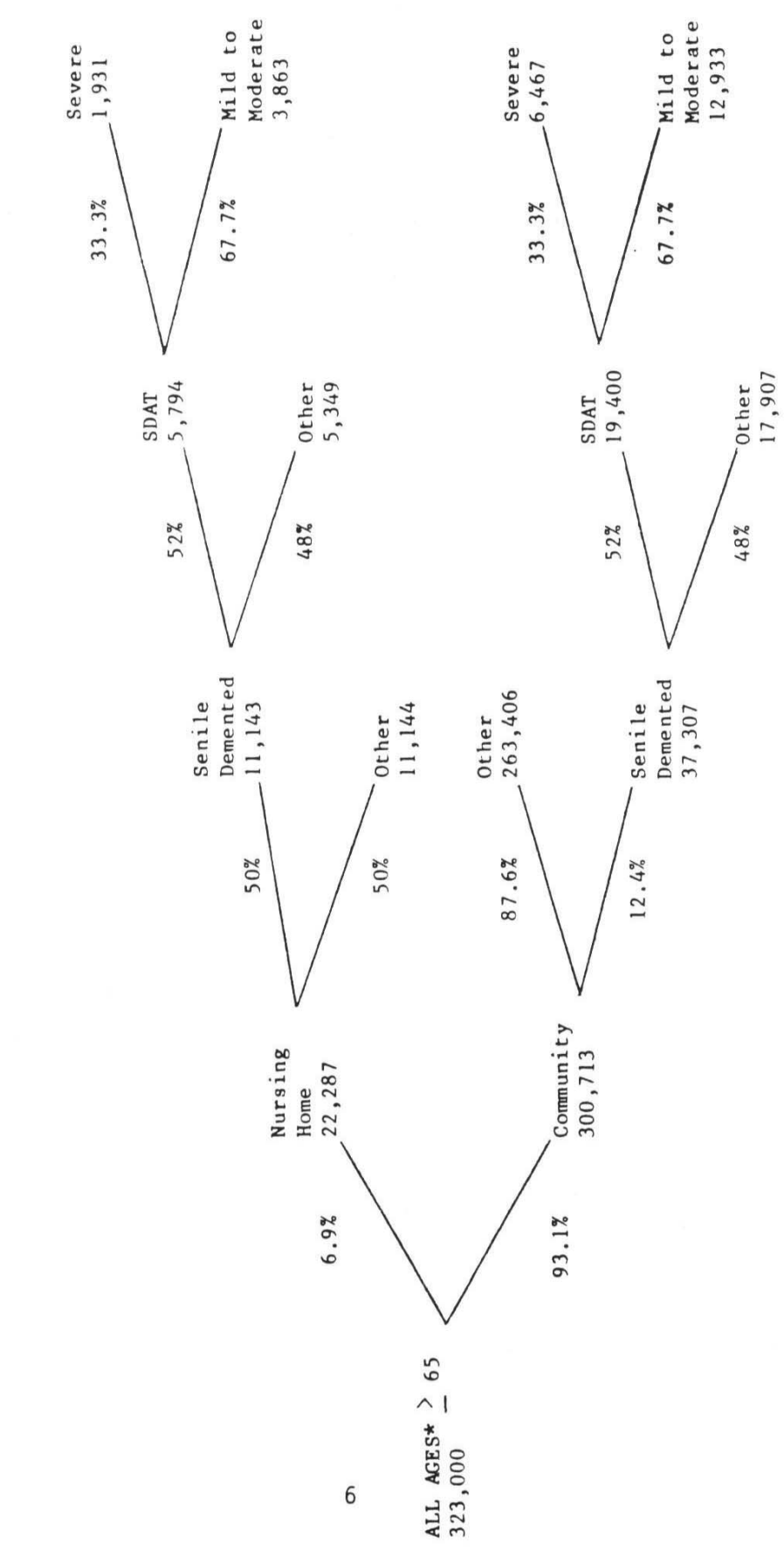
#### POPULATION CHARACTERISTICS

There is some confusion about prevalence rates. Many different percentages are tossed about. Some percentages are for senile dementia in general, while others are for Alzheimer's Disease only. There are many different causes and types of senile dementia. Only seldom are they reversible. Alzheimer's Disease is the most common, accounting for approximately 52% of all dementias. Multi-infarct dementia (MID) accounts for another 30%. In the pilot study (Hu, Huang and Cartwright) only two dementia patients not suffering from MID or SDAT were included. From conversations with geriatric nurses and physicians, it seems that although they have separate causes, the symptoms and treatment are similar for these dementias, and indeed, all other unspecified organic brain syndrome dementias.

Some statistics have been gathered for senile dementia victims in general. In a review of 17 reports in the literature Wang reported the median estimate for persons over 65 is about 5% suffer from severe dementia and another 10% suffer from mild to moderate dementia[17]. These percentages are used in Chart One. ADRDA (Alzheimer's Disease and

CHART ONE

Estimation of Kansas Population with Alzheimer's Disease (SDAT)



\*7/1/84 estimate in U.S. Census Bureau, State Population Estimates by Age and Components of Change: 1980-84. June, 1985.

Related Disorders Association) has refined the estimates by age group[4]. These are presented in Table Two, but cost estimates have been figured using numbers from Chart One which are the U.S. Census Bureau provisional estimates for the Kansas population over 65 for July, 1984. Table Two and Chart One use different prevalence rates. No attempt has been made to reconcile the two. The more conservative estimate is used for estimation in this report. Totals in Table Two are approximately 17% greater than the numbers used. ADRDA feels that current figures underestimate the prevalence of Alzheimer's Disease; therefore, the conservative estimate should be viewed as minimum amounts.

The costs of caring for an Alzheimer's victim will vary depending upon the severity and living arrangements of the patient. Generally the disease starts slowly with the victim still able to provide some care for himself and still able to recognize familiar people, places and things at least part of the time. This stage has been classified as mild to moderate for cost purposes. Table Three shows the breakdown of persons with dementia by Alzheimer's and then by severity.

No single group, sex, or geographic location has been linked conclusively to the incidence of Alzheimer's Disease. Indeed, the only correlated variable that researchers have so far discovered is that of age. Hereditary risk factors have been studied more than most. An initial study in Sweden showed some a risk relationship if a first-degree relative had been affected. This study has been criticized because of the methodology used. A later study with different methodology indicated a marked increased risk only among relatives of



patients with the onset of Alzheimer's disease before age 65[8]. Environmental factors have not yet proved to be significant.

Since there seems to be no regional variation, it is appropriate to apply estimates of U.S. prevalence rates to the population of Kansas. Table Two shows prevalence rates by various age groups. The rates are then applied to the U.S. population and to the Kansas population for 1980. The same rates are also applied to the projected populations for 1990 and 2000. This table shows that, in Kansas, Alzheimer's Disease had stricken approximately 29,000 persons, with projections of 35,000 affected persons by 2000.

Nursing home population for those over 65 was determined by living arrangements in the 1980 U.S. Census[15]. Fifty percent of those in nursing homes are assumed to be demented. This is the percentage found by Redick in a National Institute on Mental Health study[16]. A dementia screening in Kansas nursing homes found a similar percentage. The same ratio of 5%, severe; 10%, moderate-mild for Alzheimer's Disease was used in nursing homes because no better estimates are available. It is a general belief, however, that there are more severe cases in nursing homes than in the community. Therefore, severely demented nursing home residents may be underestimated.

#### DIRECT COSTS

In the next section the following direct costs will be estimated:

I. General Medical costs. These costs include short-term hospital stays as opposed to long-term mental hospital or nursing home admissions. All physician's services, drug consumption, and any other

TABLE TWO

Percent of Population with Alzheimer's Disease

|                      |                 |
|----------------------|-----------------|
| Under 60 Years . . . | 0.030 percent   |
| 65-74. . . . .       | 4.000 percent   |
| 75-84. . . . .       | .13.000 percent |
| Over 85 Years. . .   | .25.000 percent |

U.S. Population With Alzheimer's Disease

|                      | 1980 Census | Projections |           |
|----------------------|-------------|-------------|-----------|
|                      |             | 1990        | 2000      |
| Total, All Ages. . . | 2,247,509   | 2,989,200   | 3,648,073 |
| Under 60 Years . . . | 60,000      | 64,909      | 69,394    |
| 65-74. . . . .       | 623,100     | 722,172     | 707,720   |
| 75-84. . . . .       | 1,004,484   | 1,336,894   | 1,586,884 |
| Over 85 Years. . . . | 559,925     | 865,225     | 1,284,075 |

1980 and Projected Kansas Population With Alzheimer's Disease by Age

|                      | 1980 Census | Projections |        |
|----------------------|-------------|-------------|--------|
|                      |             | 1990        | 2000   |
| Total, All Ages. . . | 28,821      | 32,781      | 35,467 |
| Under 60 Years . . . | 613         | 635         | 643    |
| 65-74. . . . .       | 6,936       | 7,204       | 6,588  |
| 75-84. . . . .       | 12,922      | 14,742      | 15,561 |
| Over 85 Years. . . . | 8,350       | 10,200      | 12,675 |

TABLE THREE

1980 and Projected Population With Alzheimer's Disease by Severity

Kansas Population With Alzheimer's Disease

|                              | 1980 Census | Projection |         |
|------------------------------|-------------|------------|---------|
|                              |             | 1990       | 2000    |
| Total Over 65 Years. . . . . | 306,200     | 334,300    | 335,100 |
| With Dementia. . . . .       | 45,930      | 50,145     | 50,265  |
| With Alzheimer's . . . . .   | 23,884      | 26,075     | 26,138  |
| Severe . . . . .             | 7,961       | 8,692      | 8,713   |
| Mild to Moderate . . . . .   | 15,922      | 17,384     | 17,425  |

U.S. Population with Alzheimer's Disease

|                              | 1980 Census | Projection |            |
|------------------------------|-------------|------------|------------|
|                              |             | 1990       | 2000       |
| Total Over 65 Years. . . . . | 25,544,000  | 31,799,000 | 35,036,100 |
| With Dementia. . . . .       | 3,831,600   | 4,769,850  | 5,255,415  |
| With Alzheimer's . . . . .   | 1,992,432   | 2,480,322  | 2,732,816  |
| Severe . . . . .             | 664,144     | 826,774    | 910,939    |
| Mild to Moderate . . . . .   | 1,328,288   | 1,653,548  | 1,821,877  |

medical expense is included.

## II. Nursing Home and Long-term Mental Hospital Costs.

## III. Social Service Agency Costs.

Direct costs are those for which an actual expenditure. After the direct costs are estimated in this section, indirect costs will be imputed in the next section. Finally the total additional costs due solely to Alzheimer's Disease will be computed by comparing these costs to the average person over 65.

### General Medical Costs

Huang, Hu, and Cartwright estimated the average short-term hospital stay per demented elderly. For those in nursing homes the weighted average was 5.06 days per year in the hospital, for those in the community, 4.81. This was multiplied by the average daily hospital room rate in Kansas for a semi-private room of \$197 (Table Eight). The weighted average for Kansas for an Alzheimer's patient for a short-term hospital stay is \$951 per year (Table Four).

To estimate physicians' charges, the Maximum Allowable Payment (MAP) under Blue Cross/Blue Shield was used. A weighted average of MAP for various lengthy office visits and various length nursing home visits was used. The average office visit was found to be \$24 and the average nursing home visit was \$30.30 (Table Eight). Huang and Hu estimated physicians' services per senile demented person per year at 39.07 visits for nursing home residents and 24.15 for community residents. Table Four shows average costs for drug consumption and other medical expenses. Kansas costs for drugs and other expenses were not available

TABLE FOUR

## Estimate of General Medical Cost Per Capita Per Year for SDAT Population

|                          | Short-Stay<br>Hospital<br>Cost<br>(b) | Physician<br>Services<br>(c) | Drug<br>Consumption<br>(d) | Other<br>Medical | Total<br>(e) |
|--------------------------|---------------------------------------|------------------------------|----------------------------|------------------|--------------|
| Nursing Home Residents   |                                       |                              |                            |                  |              |
| Severe Dementia . . .    | 1,227                                 | 1,184                        | 581                        | 262              | 3,254        |
| Mild or Moderate . . .   | 883                                   | 936                          | 459                        | 188              | 2,466        |
| Weighted Average-(a) . . | 997                                   | 1,019                        | 500                        | 213              | 2,728        |
| Community Residents      |                                       |                              |                            |                  |              |
| Severe Dementia . . .    | 1,588                                 | 500                          | 405                        | 419              | 2,991        |
| Mild or Moderate . . .   | 611                                   | 290                          | 203                        | 161              | 1,265        |
| Weighted Average-(a) . . | 936                                   | 386                          | 270                        | 247              | 1,840        |
| Weighted Average-(a) . . | 951                                   | 539                          | 326                        | 239              | 2,054        |

- (a) - weighted by SDAT population  
(b) - does not include long-term mental hospitals  
(c) - does not include radiology and pathology services  
(d) - does not include over-the-counter drugs  
(e) - does not include private duty nursing

so, national averages were used. The weighted average per capita cost for general medical costs for and Alzheimer's victim in Kansas is estimated to be \$2,054 as compared to a national average of \$2,881. The difference occurs mainly because of lower hospital room rates, and secondly because of lower doctor's office charges in Kansas.

#### Nursing Home and Long-Term Mental Health Costs

The pilot study by Hu, Huang, and Cartwright found that 36% more time was spent by nurse's aides caring for a senile demented patient in a nursing home. There was not a significant time difference between the mild to moderate cases and the severe ones, however, the tasks performed for each type of patient were significantly different. In a 1977 National Nursing Home Survey about 60% of total costs were found to be labor costs[14]. Nursing costs accounted for 33% of the costs and other personnel accounted for the other 27%. In Table Five nursing home costs were adjusted to reflect the additional nursing care required. An average nursing home room charge in Kansas was determined from SRS cost data for all nursing homes in the state. These numbers are used in Table Six to determine yearly per capita nursing home costs.

Table Six shows a total of all direct medical, long-term mental hospital, and nursing home costs in Kansas. Hu, Huang, and Cartwright used NIMH and VA data to estimate an overall average long-term mental hospital stay. They found that the overall average is 1.07 days per capita in a mental hospital. With this cost, the nursing home costs, and other direct medical costs the estimate of medical and nursing home costs in Kansas per year is about \$132 million dollars for all Alzheimer's patients. The NIA study estimated the national cost at \$31

TABLE FIVE

Daily Nursing Home Care Costs

|                          | Daily<br>Rate | 1.36 Nursing<br>Adjustment<br>Factor | OH and<br>R&B<br>Costs | Other<br>Labor<br>Costs | Total   |
|--------------------------|---------------|--------------------------------------|------------------------|-------------------------|---------|
| U.S. average . . . . .   | \$55.00       | \$24.68                              | \$22.00                | \$14.85                 | \$61.53 |
| Kansas average . . . . . | \$32.79       | \$14.72                              | \$13.12                | \$ 8.85                 | \$36.69 |

Note: Kansas costs do not include any add-ons such as laundry, television, etc.

billion. Since the number of severely demented patients in nursing homes may be under estimated, and that group's medical care cost are significantly higher, all costs in Table Six are, therefore, to be considered minimums. Hu, Wang and Cartwright also used conservative estimates in physician's service requirements and mental hospital admissions.

#### Social Service Agency Costs

Social service agency costs were also estimated from the pilot study. The average per senile demented elderly was found to be around \$3.00 per day for non-institutionalized demented senile demented persons. This would be a total for Kansas of around \$21 million. (Table Seven).

#### INDIRECT COSTS

Indirect costs associated with Alzheimer's Disease include all home care costs, transportation costs to go to and from doctors' appointments, waiting time for these services, time and transportation costs to relatives or friends who accompany the patient to receive services or to visit the patient in a nursing home. Other indirect costs include loss of productivity, loss of value in life, and premature death. Stress, anxiety, and fatigue of family and friends are other indirect costs. Not all indirect costs can be given a meaningful dollar value. In this study only the indirect costs home care visiting, accompanying for physicians' services, and transportation will be estimated.



TABLE SIX

Estimate of Total Annual Medical and Nursing Home Care  
for SDAT in Kansas

|  | 1        | 2        | 3       | 1x3      | 2x3      |
|--|----------|----------|---------|----------|----------|
|  | Ave. US  | Ave. KS  | No. of  | Kansas   | Kansas   |
|  | Cost Per | Cost Per | Persons | Cost     | Cost     |
|  | Capita   | Capita   |         | US Ave.  | KS Ave.  |
|  | (\$)     | (\$)     |         | (\$1000) | (\$1000) |
| A. Medical Care Cost Other Than<br>Long-Term Mental Hospital<br>Services |          |          |         |          |          |
| 1. Nursing Home Residents  |          |          |         |          |          |
| a. Severe . . . . .  | 3,842    | 3,254    | 1,931   | 7,419    | 6,283    |
| b. Mild or Moderate . . . . .  | 2,860    | 2,466    | 3,863   | 11,048   | 9,526    |
| Total. . . . .   | 3,188    | 2,728    | 5,794   | 18,467   | 15,810   |
| 2. Community Residents   |          |          |         |          |          |
| a. Severe . . . . .  | 4,591    | 2,991    | 6,467   | 29,690   | 19,343   |
| b. Mild to Moderate . . . . .  | 1,917    | 1,265    | 12,933  | 24,793   | 16,360   |
| Total. . . . .   | 2,881    | 1,840    | 19,400  | 54,483   | 35,703   |
| B. Long-Term Mental Hospitals . . . . .                                  | 318      | 125      | 25,194  | 8,012    | 3,149    |
| TOTAL MEDICAL CARE COSTS (A+B)   | 6,387    | 4,693    |         | 80,961   | 54,662   |
| C. Nursing Home Care Cost  |          |          |         |          |          |
| 1. Cost of Nursing Personnel   | 9,008    | 5,373    | 5,794   | 52,192   | 31,131   |
| 2. Other Cost. . . . .   | 13,450   | 8,019    | 5,794   | 77,929   | 46,462   |
| Total. . . . .   | 22,458   | 13,392   | 5,794   | 130,122  | 77,593   |
| TOTAL MEDICAL CARE AND NURSING<br>HOME CARE COST. . . . .                | 28,845   | 18,085   | 25,194  | 211,083  | 132,255  |

Col 1-Huang and Hu NIA study.

Col 2-A. Table Four.

B. Average stay = 1.07 days x average cost of state mental hospital.

C. Costs are not adjusted by short-term hospital days because nursing homes are normally paid on a monthly basis.

1. Average Nursing personnel cost per SDAT x 17.95 = 17.95 x 365.

2. Average non-nursing cost x 365 = 26.80 x 365.

Col 3-Chart One.

### Home Care Costs

In the pilot study a large time difference was found in residential and nursing homes in caring for demented patients. The difference is due to economies of scale. In a residential home a relative devotes his or her entire time to the care of one person. In a nursing home a nurse's aide takes care of many residents at once. In the pilot study the average time at home spent caring for a demented person was 6.28 hours per day. To arrive at a cost for this time the Kansas median nurse's aide wage was used to value the services of the home caregiver. In Table Seven the cost of community home care is imputed at about \$164 million.

### Cost of Visiting Nursing Homes by Family or Friends

The 1977 National Nursing Home survey showed that an average resident received approximately two two hour visits per week. It is assumed that the average round trip is 20 miles. Transportation and visiting time are calculated in Table Nine. For transportation the current IRS rate of \$.205 per mile was used for the calculation. The hourly rate used to impute the cost of visiting is the current median wage of a nurse's aide of \$4.96 per hour. The total cost of visiting in nursing homes by families and friends in Kansas is estimated at around \$8 million.

### Cost of Accompanying Patients to Receive Physician's Services

Other indirect costs of Alzheimer's Disease include accompanying Alzheimer's victims to doctor's offices. Hu, Huang, and Cartwright estimated that physicians services are used 24.15 times per for severely

TABLE SEVEN

Estimate of Annual Home Care Cost and Social Service Agency  
Costs for SDAT in Kansas

|  | Cost Per<br>Capita<br>(\$) | No. of<br>Persons | Kansas Cost<br>Estimate<br>(\$1,000) |
|--|----------------------------|-------------------|--------------------------------------|
| A. Community Home Care                   |                            |                   |                                      |
| a. Severe . . . . .                      | 14,297                     | 6,467             | 92,459                               |
| b. Mild to Moderate . . . . .            | 5,727                      | 12,933            | 74,067                               |
| Total . . . . .                          | -                          | 19,400            | 166,526                              |
| B. Social Service Agency . . . . .       | 1,095                      | 19,400            | 21,243                               |
| TOTAL HOME CARE AND SOCIAL SERVICE (A+B) |                            | 19,400            | 187,769                              |

- A. Nurse's aide median wage x ave. care hours as estimated in Hu, Huang, and Cartwright's pilot study.
- B. \$3 per day x (365 less short-term hospital days) as estimated in pilot study.

TABLE EIGHT

Key Prices Used for Direct Cost Estimates

|  | <u>Kansas</u><br><u>Estimate</u> | <u>Source</u>  |
|--|----------------------------------|--|
| Hospital Room Charge<br>Per Day, Semi-Private. . . . .                           | \$197.00 . . . . .               | Sample of ten hospitals polled by<br>KS Hospital Association in 1985.  |
| Physician Services<br>Per Visit  |                                  |  |
| a. Nursing Home. . . . .   | \$ 30.30                         | Weighted ave. of Blue Cross/Blue<br>Shield maximum allowable payments<br>for office and nursing home visits. |
| b. Community . . . . .   | \$ 24.00 . . . . .               |  |
| Nursing Home Care Charge<br>Per Day. . . . .                                     | \$ 32.79 . . . . .               | SRS cost data on nursing homes.  |
| Wage of Nursing Aide<br>Per Hour . . . . .                                       | \$ 4.96 . . . . .                | 1985 KS Hospital Association<br>Personnel Survey.  |
| Imputed Cost Per Hour<br>to Nursing Home Visitor. . . . .                        | \$ 4.96 . . . . .                | Median wage for nursing aide.  |
| Cost to Social Service Agencies<br>Per Day for each Demented<br>Person . . . . . | \$ 3.00 . . . . .                | Informal Hu and Huang survey.  |
|  | <u>U.S.</u><br><u>Estimate</u>   | <u>Source</u>  |
| Hospital Room Charge<br>Per Day, Semi-Private. . . . .                           | \$356.00 . . . . .               | 1982 Statistical Abstract adjusted<br>by Medical Price Index.  |
| Physician Services<br>Per Visit  |                                  |  |
| a. Nursing Home. . . . .   | \$ 20.00                         | R. Deacon's 1973 Current Medical<br>Survey report.   |
| b. Community . . . . .   | \$ 37.20 . . . . .               |  |
| Nursing Home Care Charge<br>Per Day. . . . .                                     | \$ 55.00 . . . . .               | American Association of Homes for<br>the Aging, Washington, D.C.,<br>May, 1982.                              |
| Wage of Nursing Aide<br>Per Hour . . . . .                                       | \$ 4.64 . . . . .                | National Nursing Home Association<br>median wage.  |
| Imputed Cost Per Hour<br>to Nursing Home Visitor. . . . .                        | \$ 4.64 . . . . .                | Median wage for nursing aide.  |
| Cost to Social Service Agencies<br>Per Day for each Demented<br>Person . . . . . | \$ 3.00 . . . . .                | Informal Hu and Huang survey.  |

demented, and 12.08 times for the mild to moderately demented. An average of 20 miles and 2 hours per trip was assumed. The total in Table Nine for accompanying Alzheimer's victims in the community to receive physicians' services is estimated at \$4 million. Total transportation and visiting costs in Kansas are estimated at \$12 million.

Other indirect costs of Alzheimer's Disease include loss of productivity, shorter life expectancy, stress to family and friends, and loss of productivity by the caregiver of the Alzheimer's victim. These types of estimates are highly subjective and any value given to human life is subject to debate; therefore, no estimate of these costs is made.

#### ADDITIONAL COSTS DUE SOLELY TO ALZHEIMER'S DISEASE

So far the costs that have been estimated are total costs of caring for Alzheimer's victims. These include the costs of the disease and the costs of normal aging as well. Alzheimer's victims have extra nursing home costs, higher medical care costs, greater social services costs. These added costs solely due to this disease will be estimated in this section. Table Ten displays the results of additional direct cost due to Alzheimer's Disease.

For short-term hospital services the increased utilization was 1.34 days or \$264 per year per Alzheimer's patient (Table Ten). All long-term mental health care is for demented patients only, so the entire cost can be attributed to SDAT. Increased physicians services per demented

TABLE NINE

Estimate of Annual Indirect Cost of Transportation and Visiting

|  | Annual Cost<br>Per Capita<br>(\$) | Population | Total Cost<br>(\$1,000) |
|--|-----------------------------------|------------|-------------------------|
| Visiting in Nursing Homes. . . . .   | 1,458                             | 5,794      | 8,448                   |
| 1. Transportation (a) . . . . .  | 426                               |            |                         |
| 2. Visiting Time (b). . . . .  | 1,032                             |            |                         |
| Accompanying Patients in the Community<br>for Physician's Visits                       |                                   |            |                         |
| 1. Severely Demented. . . . .  | 323                               | 6,467      | 2,089                   |
| a) Transportation (c). . . . .   | 99                                |            |                         |
| b) Visiting Time (d) . . . . .   | 224                               |            |                         |
| 2. Mild to Moderate . . . . .  | 162                               | 12,933     | 2,095                   |
| a) Transportation (c). . . . .   | 50                                |            |                         |
| b) Visiting Time (d) . . . . .   | 112                               |            |                         |
| TOTAL TRANSPORTATION AND VISITING COSTS. .   |                                   |            | 12,632                  |
| a. Assumes average of 20 miles per round trip, 2 visits per week, and \$.205 per mile. |                                   |            |                         |
| b. Assumes average of 2 hours per visit and \$4.96 per hour.                           |                                   |            |                         |
| c. Assumes average of 20 miles per round trip.   |                                   |            |                         |
| d. Assumes 2 hours total time each trip.   |                                   |            |                         |

elderly was 8.09 visits at a cost of \$91 per capita. Additional drug consumption and other increased costs were \$180 and \$64 respectively.

The additional cost of nursing home care was computed using the pilot study's finding that 36% more care is needed for a demented patient. The additional cost per capita is estimated at \$1,424 per nursing home resident. According to the 1977 National Nursing Home Survey, it was estimated that 3.2% of the nursing home population was admitted solely because of dementia. Using these facts Table Ten shows additional nursing home costs in Kansas of \$13 million due solely to Alzheimer's Disease. Additional medical and nursing home costs total around \$34 million per year.

Some additional indirect costs are also due solely to Alzheimer's Disease. Not all SDAT patients are admitted to nursing homes because of dementia. Many have other physical problems. As shown in Table Ten, 1.7% of admissions are due entirely to Alzheimer's Disease; therefore, the entire indirect cost of visiting those persons is attributed to the disease. The estimate is around one-half million dollars per year.

The cost of accompanying patients who live in the community for extra services is also an indirect cost attributed solely to Alzheimer's Disease. This is estimated at \$1.53 million per year.

Finally the total economic cost of Alzheimer's Disease in Kansas can be computed. In Table Eleven, the direct health care costs are additional costs. Community home care and social service agency costs are due entirely to Alzheimer's Disease. The total direct cost in Kansas is \$55 million. Home care, visiting, and accompanying costs are not represented in the actual gross domestic product of the state, but

TABLE TEN

Added Annual Medical and Nursing Home Care Costs Due to SDAT

|  | Cost Per<br>Capita<br>(\$) | Population | Additional<br>KS Cost<br>(\$1,000) |
|--|----------------------------|------------|------------------------------------|
| Additional Cost of Medical Care (a)                |                            |            |                                    |
| Short-term Hospital. . . . .                       | 264                        | 25,194     | 6,651                              |
| Long-term MH Care. . . . .                         | 134                        | 25,194     | 3,376                              |
| Physicians' Services . . . . .                     | 193                        | 25,194     | 4,862                              |
| Drug Consumption . . . . .                         | 180                        | 25,194     | 4,535                              |
| Other Medical Costs. . . . .                       | 64                         | 25,194     | 1,612                              |
| Total Added Medical Costs. . . . .                 | 835                        | 25,194     | 21,036                             |
| Additional Cost of Nursing Home Care               |                            |            |                                    |
| Added nursing personnel cost (b) . . . . .         | 1,424                      | 5,794      | 8,251                              |
| Regular admission due solely to SDAT (c) . . . . . | 11,969                     | 379        | 4,535                              |
| Total Added Nursing Home Costs . . . . .           |                            |            | 12,785                             |
| Total Added KS Costs Due to SDAT . . . . .         |                            |            | 33,821                             |

- a. Table Four less Average Elderly Costs.
- b. Hu, Huang, and Cartwright estimated 36 percent more care is needed.
- c. 1977 National Nursing Home Survey (1979) estimate of 3.2 percent of nursing home admissions due to senile dementia or 1.7 percent due to SDAT.



inputed similar to the valuation of homemaking services. Total indirect costs of Alzheimer's Disease is \$168 million in Kansas. These numbers should be viewed as conservative estimates of Kansas' costs.

These costs are borne by many different parties in the state. Medical care costs could be paid by individuals, Medicare, Medicaid, or private insurers. Nursing home costs are usually paid by Medicaid or individuals. Community home care costs are entirely borne by individuals. Social service agency costs are state and local government and individual cost. Indirect costs are all paid by individuals.

TABLE ELEVEN

Economic Cost of Alzheimer's Disease in Kansas

|  | Kansas<br>Economic Cost<br>(millions) | U.S.<br>Economic Cost<br>(millions) |
|--|---------------------------------------|-------------------------------------|
| A. Direct Costs  |                                       |                                     |
| 1. Health Care Costs   |                                       |                                     |
| a. Medical Care Cost . . . . .   | 21.04                                 | 2,699                               |
| b. Nursing Home Care Cost . . . . .                                      | 12.78                                 | 1,477                               |
| Subtotal . . . . .   | 33.82                                 | 4,176                               |
| 2. Social Service Agencies' Cost . . . . .                               | 21.24                                 | 1,893                               |
| TOTAL DIRECT COST. . . . .   | 55.06                                 | 6,069                               |
| B. Indirect Costs  |                                       |                                     |
| 1. Community Home Care Cost . . . . .                                    | 166.53                                | 13,884                              |
| 2. Visiting in Nursing Homes--patients<br>admitted due to SDAT . . . . . | 0.55                                  | 36                                  |
| 3. Accompanying for Extra<br>Physicians' Services . . . . .              | 1.53                                  | 140                                 |
| TOTAL INDIRECT COST. . . . .   | 168.62                                | 14,060                              |
| A. From Tables Ten and Seven   |                                       |                                     |
| B. From Tables Ten and Nine  |                                       |                                     |

## SUMMARY AND CONCLUSION

The purpose of this study was to estimate the cost of Alzheimer's Disease in Kansas. Very little information is available about relevant cost. Many assumptions were made to arrive at final cost estimates; therefore, particular attention should be paid to individual sources and underlying data. The best available information was used, but prevalence data about Alzheimer's Disease is not abundant. At least \$55 million in direct costs in Kansas were incurred. The tremendous indirect costs of \$168 million were borne by private individuals in the state. Better estimates using improved diagnostic techniques will be available in the future. Again, these estimates can be viewed as minimum levels of expenditures.

Taking these concerns into consideration, it is obvious that Alzheimer's Disease has a tremendous economic impact on the victim and their families and the state's health care system as a whole. 13% of Kansas' population is over 65 and, that population is growing older faster than the national average. An increasing burden is being placed on Kansans' financial resources.

## REFERENCES

1. Alzheimer's Disease. Joint Hearing before the Subcommittee on Health and Long-Term Care of the Select Committee on Aging and the Subcommittee on Health and the Environment of the Committee on Energy and Commerce, House of Representatives, 98th Congress, August 3, 1983.
2. Alzheimer's Disease, An Information Paper. Subcommittee on Health and Long-term Care of the Select Committee on Aging, House of Representatives, 98th Congress, 1983.
3. Alzheimer's Disease, Report of the Secretary's Task Force on Alzheimer's Disease. U.S. Department of Health and Human Services, September 1984.
4. Billington, Rachel. Alzheimer's Disease and Related Disorders, Chicago, Illinois. Personal conversation.
5. Current Population Reports, Provisional Projections of the Population of States, but Age and Sex: 1980 to 2000, U.S. Department of Commerce, Bureau of the Census. September 1984.
6. Current Population Reports, State Population Estimates by Age and Components of Change: 1980-1984, U.S. Department of Commerce, Bureau of the Census. June, 1985.
7. Deacon, R., "Current Medicare Survey Report, Supplementary Medical Insurance: Characteristics of Aged Institutionalized Enrollees, 1973," Social Security Administration, October 1977.
8. The Epidemiology of Dementia, Mortimer, James A. and Schuman, Leonard M., eds. Oxford university Press, New York, 1981.
9. Hu, Teh-Wei; Huang, Lein-Fu; and Cartwright, William S. Evaluation of Costs of Caring for Senile Demented Elderly: A Pilot Study. Forthcoming in The Gerontologist.
10. Huang, Lien-Fu; and Hu, Teh-Wei. Economic Costs of Senile Dementia in the United States, 1983, National Institute on Aging, November 30, 1984. (Revised version with Cartwright, William S. under review.)
11. Incidence of Alzheimer's Disease in the U.S., ADRDA fact sheet.
12. Kromm, David and Kromm, Young-Hie Nahon. "A Nursing Unit Designed for Alzheimer's Disease Patients at Newton Presbyterian Manor," Nursing Homes, May 6, 1985, pp. 30-1.
13. Merrill, Samuel. Alzheimer's Disease, Issue Brief. Congressional Research Service.
14. National Center of Health Statistics, National Nursing Home Survey, Series 13, #51, 1979.

15. 1980 Census of Population, Volume 1, Characteristics of the Population, Chapter C, General Social and Economic Characteristics, U.S. Department of Commerce, Bureau of the Census.
16. Redick, R. Patterns in Use of Nursing Homes by the Aged Mentally Ill, NIMH, Statistical Data 107, Washington, 1974.
17. Wang, H. S., "Neuropsychiatric Procedures for the Assessment of Alzheimer's Disease, Senile Dementia, and Related Disorders" in Clinical Aspects of Alzheimer's Disease and Senile Dementia, Nancy E. Miller and Gene D. Cohen, eds., Raven Press, 1981.