Alzheimer's Disease: The Costs to U.S. Businesses in 2002

Prepared for the Alzheimer's Association by

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Introduction

Alzheimer's disease exacts an enormous economic toll – on individuals and families who exhaust their life savings providing and paying for care, and on state and federal governments that spend billions through Medicare, Medicaid and smaller programs to help pay for health and long term care. Those costs are widely recognized. What is less well known is the cost to American businesses – a cost that occurs even though Alzheimer's is closely associated with advancing age and the vast majority of people with the disease are out of the workforce by the time it strikes.

The Alzheimer's Association commissioned this study to document the heavy burden of Alzheimer's disease on American businesses. The analysis builds on ground-breaking work we published in 1998 which provided initial estimates of cost to business. This study updates and improves the earlier calculations, utilizing studies and additional data to derive a more complete and current estimate of costs.

The results are startling. In 2002, Alzheimer's disease will cost American businesses more than $61 billion – the equivalent of the net profits of the top ten Fortune 500 companies. That is nearly twice the amount calculated just four years ago. It includes

- The cost of family caregiving – absenteeism, productivity losses, and replacement costs – as workers struggle to balance the overwhelming responsibilities for a loved one who has Alzheimer's disease with their obligations on the job ($36.5 billion)

- The business share of health and long term care expenditures for people with Alzheimer's disease ($24.6 billion.)

This is just the tip of the iceberg. These calculations are based on 4 million people – the number estimated to have Alzheimer's disease now. Within the decade, babyboomers will enter their retirement years and the numbers with Alzheimer's will begin to explode – reaching as many as 14 million by the middle of the century. The costs – to families, to government, and to business – will be unsustainable.

It does not have to happen. The Alzheimer's Association calls on the American business community to join us in an all-out effort to reverse the course of Alzheimer's disease before it overwhelms us all.

- First, by accelerating the public and private investment in research to find a way to prevent Alzheimer's disease or stop its progression in the millions of babyboomers who otherwise will get the disease. We have a narrow window of time – perhaps as little as 10 years – to find the answers soon enough to make a difference.

- Second, by adding prescription drugs and chronic care to Medicare to prevent the acute care crises and excess disability that drive up the cost of health care for people with Alzheimer's disease.

- Third, by providing the support to family caregivers, including affordable quality long term care, that will make it possible for workers to balance their responsibilities to their family and their employer.

—Alzheimers Association, June 2002

Alzheimer's Disease: The Cost to U.S. Businesses in 2002

In 1998, we published an analysis of the annual cost of Alzheimer's disease to U.S. businesses. That analysis identified over $33 billion businesses were spending each year on Alzheimer's disease. That figure and many of its components were unknown prior to our 1998 work. Perhaps more remarkable, the large majority (but not all) of that $33.2 billion was in addition to the oft-stated annual cost of Alzheimer's disease to society of $100 billion.

The 1998 report had the effect of alerting businesses and policy makers to a significant expense that was generally unrealized. It also increased the total known cost of Alzheimer's disease to society.

This document—the 2002 calculations: With the advantage of several new studies and additional data we can update and improve our calculations of the annual cost of Alzheimer's disease to U.S. businesses. This new analysis reveals that the total cost to businesses of workers who are caregivers of people with Alzheimer's disease is **$36.512 billion**. The cost to businesses of health care for people with Alzheimer's disease is **$24.634 billion**. The combined total equals **$61.146 billion**.

For comparison, the 1998 estimates: The original study found that the total cost to businesses of workers who are caregivers of people with Alzheimer's disease was **$26.024 billion**. The cost to businesses of health care and health care research for people with Alzheimer's disease was **$7.144 billion**. This combined total equaled **$33.168 billion**.

In tabular form:

Table I-1
Total Business Costs For Alzheimer's Disease (In Billions)

	1998	**2002**
Business costs for workers who are caregivers of people with Alzheimer's disease	$26.024	**$36.512**
Business costs of health care and health care research for people with Alzheimer's disease	$7.144	**$24.634**
Total business costs for Alzheimer's disease	$33.168	**$61.146**

What data and analysis allowed improvements to our estimates? As noted, the four years since the 1998 report have produced several new analyses and sources of data:

1. In 1999, the National Alliance for Caregiving and the Alzheimer's Association issued a report that specifically focuses on the caregivers of persons with Alzheimer's disease (AD). Because so many of the business-related costs of AD are associated with working caregivers of persons with AD, that report (*Who Cares? Families Caring for Persons with Alzheimer's Disease*, 1999) improves the accuracy of our estimates.

2. In 2001, The Lewin Group completed research on an analysis of *Medicare and Medicaid Costs for People with Alzheimer's Disease*. That report augments and, in some cases, supplants our 1998 analysis of health care costs.

3. During the past few years, scholars have intensified their concern with measures of productivity and turnover. We benefit from these studies in our analyses.

4. There has been a widely growing awareness of the impact of Alzheimer's disease on society – both the current effects and the profound future implications as the baby boomers age and enter the period of greater vulnerability. Such developments have the beneficial effects of spurring research – some of which we employ in our analysis. These include, for example, growing corporate awareness of eldercare issues, work and family policies, and caregiver burdens.

5. Based on recent data, we have significantly refined our analysis of federal and state corporate tax contributions.

6. We incorporate new cost data on EAPs (Employee Assistance Programs). This analysis is based on specific utilization data that allow us to more accurately reflect costs for full time workers who are caregivers of persons with AD and who have access to EAPs.

We present new estimates of the factors we analyzed in 1998 – noting differences with the original findings both in our estimates and in our data sources. We have not, however, changed the estimated *number of people* with Alzheimer's disease even though it is most probable that this number has increased in the past four years.

A preview of the findings:

I. Caregivers:

- The absenteeism of workers who are caregivers for those with Alzheimer's disease costs U.S. businesses **$10.234 billion**.

- Productivity losses to U.S. businesses associated with caregiver absenteeism equals **$18.004 billion**.

- Replacement cost of caregiver workers leaving their employment costs US businesses **$6.293 billion**.

- We estimate the cost for continuing insurance for workers on leave is $1.216 billion and that the cost of additional temporary worker replacement *fees* (premiums to temp agencies) is $0.701 billion. The combined total is **$1.917 billion**.

- The cost to businesses of additional EAP usage by employed caregivers with access to EAPs is **$63.56 million (or, $0.06356 billion)**.

SUBTOTAL: Thus the businesses cost of Alzheimer's disease *caregiving* by employed workers is estimated to be **$36.512 billion**.

II. Medical Costs:

- We estimate that businesses contribute **$24.458 billion** to the health care of people with Alzheimer's disease. This approximately twenty-four and one-half billion dollars represents slightly more than one-third (36.52%) of the total cost of health care of people with Alzheimer's disease. We emphasize that our estimates are very conservative.

- We estimate that business taxes contribute **$176.115 million** (or $0.176115 billion) toward federal funding of research on Alzheimer's disease, demonstration projects and efforts such as "safe return."

S**UBTOTAL:** Thus businesses spend **$24.634 billion** on health care treatment and on health research involving Alzheimer's disease.

TOTAL: The 2002 calculations: Our recent analysis reveals that the total cost to businesses of workers who are caregivers of people with Alzheimer's disease is **$36.512 billion**. The cost to businesses of health care for people with Alzheimer's disease is **$24.634**. This combined total equals **$61.146 billion**.

A methodological note: Many of the costs of Alzheimer's disease can not be measured without additional research. For example, we know little about the cost of those with the disease who are still in the labor force, or of the costs associated with those who were obliged to leave the labor force because of the disease. In separate sections of this report we include enumerations of costs that are "not counted." These lists, in part, reflect the many unknowns about the costs of Alzheimer's. In all probability, the actual cost of the disease is far greater than we present here.

The Total Cost To The Nation

Before we begin to answer our question about the portion paid by businesses, we briefly consider the more general question: What is the total cost of Alzheimer's disease to the United States? Implicitly, we are asking, "what is the total cost of AD of which businesses pay a portion?"

We know the cost of Alzheimer's disease (AD) is staggering, but we are not exactly sure how staggering. Researchers estimate AD costs the nation *each year* from between 67.1 billion dollars (which, coincidently, is our current estimate of "just" health care costs) to twice that figure (Wimo et al., 1997). This wide range is not as capricious as it may first appear. Differing but responsible methods of accounting explain much of the variation. Do we assign economic value to the efforts of the caregivers? Do we count only the "net additional" cost of dementia for nursing home patients, or do we count the regular nursing home bill? How is co-morbidity treated? Do we consider the "lost" work time of caregivers and how do we value it? How do we treat costs paid by researcher groups or by Medicare and Medicaid? Do we add families' out-of-pocket expenses? Do we assess expenses as "willingness-to-pay" or as human capital measures.[1]

The most cited estimate for the cost of Alzheimer's disease is "at least $100 billion." This is the term used by the Alzheimer's Association. But there is unequivocal evidence to believe this figure is a very low estimate. The Lewin Group, alone, identified over $50 billion in government expenditures for health care and long term care under Medicaid and Medicare for AD (Lewin Group research reported in *Medicare and Medicaid Costs for People with Alzheimer's Disease*, Alzheimer's Association, 2001). In this report, we identify over $61 billion in costs to business, of which "only" 7.2 billion is reflected in the Lewin figures (see worksheet 3, Table III). We also know that business costs for AD are a fraction of the total cost of AD to

[1]One can also recalculate the data in Ernst and Hay's (1994) analysis or the data in Rice et al. (1993) to derive estimates on the cost per patient (adjusted to 2001 dollars) at $45,900 and $51,777, respectively. If we multiply that by the four million people with Alzheimer's Disease, the cost is between $183.6 billion and $207.1 billion.

society because they do not include, for example, most medical costs, most caregiver and family costs (e.g., lost income) and any of the economic losses to patients (e.g., housing deterioration from lack of maintenance).

Whatever the exact cost, we know that Alzheimer's is one of the most expensive diseases, exceeded only by heart disease and cancer. We also know that with a growing proportion of elderly the cost of AD will increase almost four-fold in the next few decades – perhaps much more if we consider the decrease in "free" caregiving associated with the increase in women's labor force participation (Fox, 1997; Doty et al., 1998; Fredricksen-Goldsen and Scharlach, 2001) or the trends toward flexible benefit programs that include eldercare and long term care insurance (Walter, 1996; Merrill Lynch Consumer Markets [in Scharlach et al., 1991]).

Part I:
Caregivers of Persons with Alzheimer's Disease: Costs to U.S. Businesses

To estimate the costs of AD to businesses, we determine the costs of worker-caregiver absenteeism, productivity losses, replacement costs for those who leave the workplace, and additional EAP use. We estimate these costs total $36.512 billion.

Determining the Number of Caregivers of Persons with AD Who Work

Four million Americans have Alzheimer's disease (Evans et al., 1990) and 90 percent of them have caregivers. Several studies have established the percentage of these caregivers in the work force[2] We use a compromise estimate of 64% of caregivers who are in the labor force. We use the U.S. Department of Labor finding that 81.25% of employed caregivers are working full time and 18.75% are working part time. This is consistent with the more recent Alzheimer's Association/NAC report (1999) *Who Cares? Families Caring for Persons with Alzheimer's Disease.*[3]

Caregiver Absenteeism

We estimate AD caregiver worker absenteeism costs U.S. businesses **$10.234 billion**.

Caregivers must take off work days and hours to help the persons with Alzheimer's disease for whom they care. Using the MetLife report, U.S. Department of Labor data and comparing those data with the targeted analysis in the 1999 *Who Cares? Families Caring for Persons with Alzheimer's*, we estimate that each full time employed caregiver of an AD patient is absent 12.66 days or partial days, is interrupted an average of 50 hours per year and is involved in other time losses (supervisor time, crises) totaling in all 23.82 days. (See *Worksheet on Caregiver Absenteeism* for detailed analysis.)

With adjustments for wages, full and part time benefits, and work times (see Worksheet 1), we estimate that this equals a loss of $4,976.00 per full time worker caregiver; and $2,167.27 per part time worker caregiver.

The earlier report: The comparable figures in the 1998 report were: a loss of $3,870.75 per full time worker caregiver; and $1,521.22 per part time worker caregiver.

- The cost of absenteeism for 1.869 million full time workers who are caregivers is **$9.299 billion**.
- The cost of absenteeism for 431 million part time worker caregivers is **$0.935 billion**
- Thus, the combined cost of AD caregiver absenteeism is **$10.234 billion**

The earlier report: The comparable figures in the 1998 report were: The cost of absenteeism for 1.869 million full time worker caregivers was $7.234 billion. The cost of absenteeism for 431 million part time worker caregivers was $656 million. The combined cost was $7.89 billion.

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[2](Alzheimer's Association/NAC, 1999; NAC/AARP, 1997; Doty et al., 1996; Rice et al., 1993; Scharlach et al., 1991).

[3]In presenting these findings we separate out a group of the more laborious calculations involved with absenteeism and lost productivity into a separate worksheet. Readers are urged to review this worksheet in addition to the text below.

Caregiver Absenteeism Productivity Losses

We estimate the productivity losses to U.S. businesses associated with caregiver absenteeism equals **$18.004 billion**.

When a worker is absent, the loss to the business is far greater than that worker's salary and benefits costs. Productivity losses are estimated up to two times the worker's compensation. The research literature on the relationship between absenteeism and productivity losses reveals that the ratio of productivity to compensation is between 167% to 197%. (Stoudemire et al., 1986; Greenberg et al, 1995; Hurley, 1996; Cohen et al., 1997). More recent data and analyses (Stiroh, 2001) indicate that capital spending, and especially the returns on information technology, should increase these estimates by approximately 8.4% to 14% – assuming an average 2.8% productivity growth and stable employment cost indices.

Loss ratios are supported by business surveys discussing the "inability to take needed training," rejection of opportunities and business travel, higher stress on other workers and distractions (Fredricksen-Goldsen and Scharlach, 2001; Scharlach et al., 1991). The researchers' lists do not reflect the additional specific burdens on supervisors – which has further productivity consequences. Recent trends to "lean and mean" employment staffing levels and, more important, to greater dependence on information technology, would raise the productivity implications significantly more. Hurley (1996), noting the relationship between absenteeism and productivity, uses the term "the domino effect of absenteeism on coworkers' productivity."

These productivity loss ratios, moreover, are buttressed by the findings from *Who Cares? Families Caring for Persons with Alzheimer's Disease* (1999) which reveal that 13% of worker caregivers switched to a less demanding job and 6% turned down a promotion. (Employers, presumably, suffer some economic consequences when experienced employees reduce their work or responsibilities. Similarly, employers do not usually benefit when offered promotions are refused.)

We use a ratio of 175.92, which is at the lower end of published productivity loss ratios in the literature and is the same as we used in the 1998 report even though there have been productivity gains in the four year period. (For productivity loss ratios here, see the work of MIT-based economists Greenberg, Finkelstein and Berndt, "Economic consequences of illness in the workplace," *Sloan Management Review* 36 (4), 1995; and New York Federal Reserve Bank economist, Kevin J. Stiroh's "Investing in information technology: productivity payoffs for U.S. industries" in *Current Issues in Economics and Finance*, 7(6) 2001).

Using the absenteeism cost of $10.234 billion, and applying the productivity factor measure, we derive the estimated cost to U.S. businesses of lost productivity from these known employed primary AD caregivers of **$18.004 billion**.

The earlier report: In the 1998 report, the total lost productivity estimate (based on $7.89 billion in lost days' value) was estimated to be $13.22 billion.

Not counted here:

1. The research literature on absenteeism and productivity costs does not account for the detrimental effects of losses of institutional memory. We do not estimate additional costs for fear of double counting. Nevertheless, the impact is real and is probably substantial.[4]

2. We also do not estimate the value of lost career opportunities to workers who are caregivers.

[4]Although not a direct business cost, caregiver burdens affect the rest of the family (e.g., caregiver's spouses, children). However, we do not include these additional costs because they are so difficult to accurately estimate and because they might be double counted. Similarly, we do not estimate the lost time and efforts of the AD sufferer to the family – for example the loss of a loved grandparent as role model or as a child watcher.

3. Companies are increasingly offering day and night care for workers who must travel but who are caring for a dependent elderly relative (Lawlor, 1998). There is little systematic information on this benefit and we do not attempt to estimate its cost to businesses.

Replacement Costs for Caregivers Leaving the Firm

We estimate that the replacement cost of caregiver workers leaving their employment to US businesses is **$6.293 billion**.

Between one-tenth and one-fifth of caregivers leave the workforce. The NACG/AARP study (1997) finds that "20% of caregivers gave up work entirely or temporarily." Among workers caring for those with the most debilitating diseases (such as AD), 30% gave up work entirely. The 1999 report, *Who Cares? Families Caring for Persons With Alzheimer's Disease*, finds that 21% are retired (compared to 14% of "general" caregivers – that is, those not segmented by specific AD caregiving responsibilities). More directly applicable, *Who Cares? Families Caring for Persons With Alzheimer's Disease*, also finds that 7% of worker AD caregivers will retire early and that 10% will quit their jobs. The MetLife study – with reassuring consistency here – indicates that 17% of those with moderate to severe caregiving burdens leave the workforce. As is always found in studies of this topic, those with the most profound caregiving burdens are more likely to leave work. (See also the recent work of Fredricksen-Goldsen and Scharlach, 2001, which is consistent with these findings.)

To an employer, the burden of a worker's departure includes the costs of: termination, hiring a replacement worker, training a replacement worker, the vacancy cost until the job is filled, and productivity attenuation until the new hire is up to speed (Fitz-Enz, 1997). Thus, replacement costs to the firm are calculated to range from between three-quarters of the worker's yearly salary plus benefits (MetLife Study, 1997) to two years of a worker's yearly salary plus benefits (Fitz-Enz, 1997). Many HR professionals and outplacement firms assume a cost ratio of two years of a worker's annual salary and move up from there for key employees (Right Management Consultants, 2001). A recent Louis Harris and Associates survey finds the cost of losing a typical worker is $50,000 (cited in, Abbasi and Hollman, 2000) but this same analysis indicates that replacement costs are typically underestimated by two or three orders of magnitude. Abbasi and Hollman state:

> The cost of replacing a worker is often underestimated, because in addition to visible costs like those noted above [e.g. costs of termination, advertising, recruitment, candidate travel, selection, hiring, assignment, orientation, signing bonuses, and relocation], there are many "hidden" costs and consequences of turnover. They include disruption of customer relations, the vacancy cost until the job is filled, costs resulting from disruption of the work flow, and the erosion of morale and stability of those who remain. Further, there is the temporary loss of production and valuable time taken from customer relations while the new hire acquires job skills and achieves maximum efficiency. One estimate reveals that the cost of voluntary and involuntary employee turnover to American industry-the "find them, lose them, replace them" syndrome-is about $11 billion a year.
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> Abbasi and Hollman, "Turnover: The real bottom line," Public Personnel Management 29 (3), Fall, 2000

We use a ratio of 1.5 years salary plus benefits (the employer's total compensation cost). This is a mid-way estimate between the 1-year cost and the 2-year cost. We use 17% as our estimate of the number of workers who leave the labor force. Although this is probably a low estimate for AD caregivers, it is consistent with both our previous ratios (in 1998) and the more recent *Who Cares? Families Caring for Persons with Alzheimer's Disease* (1999) provides analysis for AD caregiver/workers.

Seventeen percent of the 1.869 million full time worker caregivers is 318,000 workers. Using the total compensation measure of each worker at $50,136.32 (see Worksheet 1) and the ratio of 1.50, we estimate the replacement cost is $24.712 billion *if* replacement costs occurred annually. Of course they don't; most caregivers do not enter and leave the labor force that frequently. Rather, we divide that figure by 4.5 (years) to account for the average duration of caregiving

(NACG/AARP, 1997). This shifts the replacement cost to **$5.492 billion**.

The comparable figure for part time workers who are caregivers is of course reduced by the lower salary and lower benefits rates. It is **$0.801 billion**.

The replacement costs for full time and part time workers who are caregivers leaving the workforce is **$6.293 billion**.

The earlier report: In the 1998 report we based our calculations on the same 17% of worker caregivers. Using the total compensation measure of each full time worker at $38,928.49, we estimate the replacement cost for full time workers to be $2.75 billion. The comparable figure for part time workers was $84 million. The combined replacement costs was $3.59 billion.

Not counted here:

Additional Caregiver Health Care Costs

Almost every study of caregivers finds they are far more likely than other workers to become mentally and physically ill, seek medical treatment, and use medication. The NACG/AARP 1997 study finds that 31% of caregivers with major caregiving burdens have experienced physical or mental health problems because of caregiving.

However, it is not possible to accurately estimate the additional health care costs of the worker caregivers. In most cases, the impact of greater caregiving costs would be reflected in higher insurance premiums. Where an employer is self insured, the costs are directly borne by the firm. Thus even though the costs of additional health care expenses for caregivers are clearly significant, it would be irresponsible to include these costs without additional data.

Temporary Replacement Workers, Continuing Insurance, and the Family and Medical Leave Act

We estimate the cost for continuing insurance for workers on leave is $1.216 billion and that the cost of additional temporary worker replacement *fees* (premiums to temp agencies) is $0.701 billion. The combined total is **$1.917 billion**.

Under the federal Family and Medical Leave Act (FMLA) employers are not obliged to pay the salaries of workers who take leave. However, 85% of firms covered under the FMLA and 53.6% of non-covered firms continue to pay leave, sick or vacation pay. Slightly higher proportions (87.6% and 55.7%) continue to pay disability insurance contributions (Westat, Inc. Survey of Employers, 1995). Moreover, firms incur other "replacement" costs: 37.4% hire temporary replacement workers and 9.1% hire permanent replacement workers.

Our task is to determine the business costs resulting from the worker-caregivers who take leaves of absence plus the temp agency *fees* for those who are "temporarily replaced."

Fredriksen-Goldsen and Scharlach (2001), noting the work of Brody (1995) report that "26% of the employed caregivers were considering leaving their positions due to their caregiving duties or had already reduced the number of hours they worked." The report, *Who Cares? Families Caring for Persons with Alzheimer's Disease* (1999) states that 10% of the worker caregivers for persons with AD take leaves of absence. The NACG/AARP study finds that 11% of worker caregivers took leaves of absence (22% for general caregivers, about half of that for caregivers of people with severe difficulties, such as Alzheimer's disease). We use the lower of the two figures in our calculations, 10%.

Based on *only full time* employees who are caregivers, and based on the 10% estimate of those taking leaves of absence translates to 186,690 worker caregivers. The estimate for the proportion of benefits (46.71% of benefits, or $6,513.39)[5] covered for those workers is **$1.216 billion** (see Employer Costs for Employee Compensation Summary USDL: 01-194; June 29, 2001 and Table 19, Employer compensation costs per employee hours worked, all private industry, 1986-96, *Report on the American Workforce*, U.S. Department of Labor, 1997).

We must add the costs for *temporary* replacement workers' additional, or premium fees for firms that use the estimated 69,901 replacement workers (based on only full time workers). These additional, temporary replacement *fees* (the twenty percent in temp agency fees) totals $0.701 billion.

To determine that figure, we calculate that 37.4% of firms using temps translates to 69,901workers. One-fifth (20% temp agency fee) of their compensation is **$0.701 billion**. Note that we do not include the salaries of these workers, just the additional charges (fees) from temporary agencies. [6]

The combined cost for replacement workers and insurance is **$1.917 billion**.

The earlier report: In the 1998 report, we calculated that 11% of full time worker caregivers were on leave (rather than 10% as above) which translated to 205,590 worker caregivers. The estimate for the cost of benefits (41% of benefits, or $3,501) for those workers was $719 million. Adding the costs for *temporary* replacement workers premium costs (@ 20%) for firms that used the estimated 76,891 replacement workers (based on only full time workers) generated $598.7 million. The combined cost for replacement workers and insurance was $1.318 billion.

Costs of Additional Use of Employee Assistance Programs (EAPs) by AD Caregivers

We estimate that the cost to businesses of additional EAP usage by full time employed caregivers with access to EAPs is **$63.56 million (or, $0.06356 billion)**.

As one might expect, studies find AD caregivers are two-to-three times more likely than other employees to use Employee Assistance Programs (Scharlach et al., 199l and *Who Cares? Families Caring for Persons with Alzheimer's Disease*, 1999). To estimate the additional cost of EAPs generated by AD caregivers who are employed in firms with EAPs, we must be able to: estimate the number of employees covered by EAPs, estimate the average use by most employees, the special use by employees who are caregivers of persons with AD, and the average cost per user. Fortunately, we have reasonably good estimates for these figures (see Worksheet on EAP Usage by Caregivers for a full analysis).

Based on Bray et al. (1996), Cook (1997) and Zarkin et al. (1999) we estimate that 39% of workers have EAP coverage, that average usage rates are 9.25%, and that average cost per worker is $35.42 in current dollars. Then, we calculate the number of full time workers who are caregivers of persons with AD and who have access to EAPs. We take this figure and estimate their average usage rate (number of users, not frequency of use by each user) to estimate the total cost of EAPs by full time working caregivers of persons with AD to be $63.56 million.

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[5]Employers, for example, do not typically pay for "paid leave benefits" (which averaged $1.51 of 6.08) or portions of {legally required benefits" (which averaged $1.73 of $6.08) for employees on leaves of absence.

[6]10%of full time workers who are caregivers (1.869 million) is 186,900 workers. But only 37.4% of firms use temps in this context. 37.4% of 186,900 is 69,901.

The earlier report: In the 1998 report, we estimated that 26% of employees were covered by EAPs and that average cost per employee was $28. With average utilization rates of 9.25% this translated to $302.68 per user. We wrote: "Most of the cost [of EAPs] is variable because EAPs are often subcontracted out on a per case basis or because the company absorbs much of the capital costs as general operations or insurance. We estimated the average usage cost conservatively at one-third the general cost; .33 of $302.68 = $99.88. Based on 26% of full time employed caregivers with EAPs (598,000), and using only average utilization rates (9.25%) = 55,315 caregivers who are estimated to use EAPs." Absent any specific data on frequency, we assumed only one visit at a marginal cost of $99.88. This equaled $5.525 million — the marginal cost of EAP usage by caregivers with EAP access.

In Sum for Part One: We estimated the costs of AD to businesses via losses and expenses resulting from worker-caregivers absenteeism, replacement, productivity declines, and additional EAP use. While many losses and expenses could not be calculated, and while we used conservative estimates, our data indicate these business costs total $36.512 billion.

Part Two:
Businesses' Costs of Health Care Associated with Alzheimer's Disease

We estimate that businesses contribute **$24.458 billion** to the health care of people with Alzheimer's disease. The approximately twenty-four and one-half billion dollars represents slightly more than one-third (36.52%) of the total cost of health care of people with Alzheimer's disease. We emphasize that our estimates are very conservative.

We estimate that business taxes contribute **$176.115 million** (or $0.176115 billion) toward research in Alzheimer's disease.

Combined: Thus businesses spend **$24.634 billion** on health care treatment and on health research involving Alzheimer's disease.

Medical Care of People with Alzheimer's Disease

The cost of medical and nursing home care associated with Alzheimer's disease has been studied by many scholars (e.g., Hay and Ernst, 1987; Rice et al., 1993; Ernst and Hay; 1994; White-Means and Chollet,1996; Wimo et al, 1997; Fox, 1997; Eppig and Pisal, 1997; and Ernst and Hay, 1997.) Our previous report (Koppel, 1998) added to this literature. Most recently, and directly focused for our purposes, the Alzheimer's Association commissioned the Lewin Group (2001) to analyze the Medicare and Medicaid costs of Alzheimer's disease. While that report was limited in several of its examinations (e.g., it only looked at Medicaid expenses for nursing facilities), it is one of the most comprehensive guides to these costs.

The *business costs* of AD medical expenses are far less studied than family or general medical costs because most of the people with Alzheimer's disease are usually out of the labor force and thus assumed not directly relevant to businesses. That assumption is faulty. Businesses pay a noteworthy proportion of taxes and of insurance premiums. Moreover, 42% of new retirees are covered by company insurance, a figure that drops to 34% among older retirees. Although the proportion enjoying retiree insurance has declined steadily in the past several years it still reflects a significant cost (Scanlon, 1998).

Medicare and Medicaid are the largest payers of health care costs for people with Alzheimer's disease and the business contributions to those programs (through payroll and corporate taxes) constitutes the largest proportion of the business costs for Alzheimer care. Most people with Alzheimer's are over age 65 and have Medicare as their primary health insurance. Because Medicare does not cover their long term care needs, nearly half also become eligible for Medicaid as they exhaust their own resources. While the Lewin Group analysis provides the best information to date on the actual cost to Medicare and Medicaid of beneficiaries with Alzheimer's, these figures are probably significantly understated for two reasons. First, it is based on Medicare data that does not always identify a beneficiary as having Alzheimer's disease because their immediate need for medical treatment is a coexisting medical condition (e.g. congestive heart failure, diabetes) that may have been exacerbated by the dementia, or for a medical crisis brought on by their cognitive impairment (e.g. malnutrition, medication mismanagement, pneumonia, a fracture, or an unrecognized infection.) Second, the Medicaid data reported in the analysis includes only the cost of nursing home care. While that is the largest source of Medicaid payment for persons with Alzheimer's disease, once they have spent down to Medicaid, that program may also pay other health benefits not covered by Medicare including prescription drugs and home care, as well as Medicare co-pays and deductibles.

Medicare spending for persons with Alzheimer's disease may also be underreported because of fiscal intermediary and medical carrier policies that exclude

coverage of certain medically necessary benefits if there is a diagnosis of Alzheimer's disease. The Center for Medicare and Medicaid Services (formerly the Health Care Financing Administration) has just issued a memorandum to intermediaries and carriers making clear that such exclusionary policies are not permitted under the law. That clarification should result in more ready access to Medicare benefits and to more accurate reporting of those expenditures for beneficiaries with Alzheimer's disease.

Current Estimates: In Table I (below), we display the summary findings of health care spending estimates for Alzheimer's disease. Note that this table does not reflect the business portion, but rather our estimates of total major medical costs. The table also reflects estimates of the distribution by payer and by major categories of health care providers. The full explanation of how these figures are derived is found in Worksheet 2 of this document.

Table I
Summary of Health Care Spending Estimates for Those with Any Diagnosis of Alzheimer's Disease: by Payer and by Major Categories of Health Care Providers. Inflation adjusted to 2001[7] (In Millions of Dollars)

Major Payer Categories	Hospitals	Nursing Homes	Home Care Agencies	Total in 2001 dollars
Medicare	$25,507.816	$5,743.958	$1,902.386	**$33,154.16**
Medicaid	$497.75	$18,928	$184.756	**$19,610.51**
Own Money/ Family Based	$83.683	$10,974.595	$98.898	**$11,157.08**
Private Insurance	$825.97	$1,773.66	$54.34	**$2,653.97**
Other Government	—	—	—	**$380.38**
Total				**$66,956.10**

[7]The disaggregated data for payer categories and type of payments are based on several analyses and assumptions outlined in Worksheet 2 (see Appendix). While all these estimates are conservative, we emphasize that the middle cell estimates (non-bolded in Table I) are based on weighted means from several calculations outlined in Worksheet 2. The total column figures are probably more stable measures of the costs of Alzheimer's disease.

In our 1998 report, we calculaed many of the costs of medical treatment of AD along with the payments, payers, and multiple diagnoses that included AD and dementia. Then we added information on insurance costs and on state and federal business tax rates to determine business burdens for health care. We provided updated and, we believe, more accurate data in this report but we do not reproduce those original spreadsheets. Readers who wish to review the original spreadsheets are referred to the earlier report, *Alzheimer's Cost to U.S. Business.* Washington, D.C.: Alzheimer's Association, 1998. In the current analysis, we again use those calculations to estimate ratios for many of the costs, but we are able to augment or adjust them with the Lewin Group's more recent figures and analyses.

Federal Spending on Alzheimer's Disease Research

In addition to direct health care costs, the Federal government spends **$597** million ($0.597 billion) on Alzheimer's disease research, demonstration projects and on such efforts as "safe return." (Specifically, research is $585 million, demonstration projects are $11 million, and "safe return" is $1 million.) Most of this funding is through the National Institutes of Health, although a noteworthy amount is through other agencies, including, for example, the National Institute of Aging.

A Health Care Estimate: Combining the two health care-related costs – **$66.9561** billion (health care costs) plus **$0.597** billion (research-related programs) – totals to **$67.5531** billion. This figure is not the business portion, but an estimate of most AD health care costs. Determining the business portion – the amount paid by U.S. businesses – is our next task.

The Business Share of Health Care Costs

Businesses do not pay the total cost of AD health care. Similarly, businesses pay only a portion of the total federal *research* costs – specifically, the taxes that they contribute to the federal treasury. Depending on the category, the tax rate or insurance premium, or the direct contribution varies widely from 50% (for Medicare) to 11.9% (for certain forms of private home care). In Table II, we display the total costs of AD by category (Column one) and the estimates of the business proportion (Column two). The tax rate or insurance cost is listed in the third column.

Table II
Summary of Estimated Medical Costs and of Medical Costs Paid by Businesses for Alzheimer's Disease (In Millions of Dollars)

Payer Category	Total	Business Cost	Tax Rate[8] or Insurance %
Medicare	$33,154.16	$16,577.07	50.0%
Medicaid (State Portion)	43.44% = state portion of total of $19,610.51 = $8,518.80	$3,998.72	46.94% of state portion
Medicaid (Federal Portion)	56.56% = Fed portion of total of $19,610.51 = $11,091.70	$3,272.05	29.5% Fed portion
Private insurance: Hospital	$825.97	$280.83	34.0%
Private insurance: Nursing home	$1,773.66	$211.07	11.9%
Private insurance: Home Health	$54.34	$6.47	11.9%
All Private Insurance (3 above categories)	[$2,653.97][9]	[$498.37]	18.78%[10]
Other Govt (Fed)	$380.38	$112.21	29.5%
Own $ & Family $	$11,157.08	$0	$0
Total	**$66,956.11**	**$24,458.42**	**36.52%**

[8]In Worksheet 3 we display the tax and revenue calculations used to derive business tax rates.

[9]We do not double count the three private insurance sums. Also, the three private costs (private hospital insurance, private nursing home insurance and private home health) are subject to rounding error when contrasted to the group total in Table I.

[10]Calculation is based on deriving percentage from sub-totals of business share of private hospital insurance, private nursing home insurance and private home health (total of three = $498.37) as a percentage of general cost total (which is $2,635.97) rather than using weighted totals to determine the percentage.

We estimate that businesses contribute **$24.458 billion** to the health care of people with Alzheimer's disease. The $24.458 billion represents slightly more than one-third (36.52%) of the total cost of health care of people with Alzheimer's disease. We estimate the total cost of AD health care to be at least **$66.956 billion**. These estimates are conservative.

Federal Spending on Alzheimer's Disease Research, Demonstration Projects, Etc.

Previously, we noted that the Federal government spends **$597** million on Alzheimer's disease research, demonstration projects and such efforts as "safe return." We estimate that businesses, via combined forms of taxes, pay 29.5% of that figure, which equals **$176.115 million ($0.1761 billion)**. In tabular form:

Table III
Business Spending on Federal Research, Demonstration Projects, Etc.

Federal Research, Demonstration Projects, etc. for Alzheimer's Disease	Business Tax Rate (Total, all sources)	Percent contributed from taxes on businesses
$597 million	29.5%	**$66,956.11 ($0.1761 billion)**

The Combined Health Care Bill to Business:
Businesses spend **$24.458 billion** on health care costs plus **$0.1761 billion** on research and demonstration projects. Combined, these costs total **$24.6341 billion** on health care treatment and on health research involving Alzheimer's disease.

This $24.6341 billion represents approximately 37% of the health care and health research expenses of Alzheimer's disease, which we estimate to cost over $67 billion dollars (or $66.956 billion plus $597 million [$0.597 billion] = $67.553 billion].

The earlier report: In 1998 we estimated businesses pay in taxes and insurance costs from between $8 billion and $6 billion for the treatment of people with Alzheimer's disease. This represented almost 40% of the medical treatment We also estimated that businesses pay $54.126 million for research involving Alzheimer's disease. The total was $7.144 billion

What else is not counted:

The elderly in the workforce: Eighteen percent of males over 65 years of age are in the labor force. Eight percent of females over 65 years of age are in the labor force. While those with AD are far more likely than most to stop working, the numbers and costs of AD from labor force participants are undoubtedly substantial. Unfortunately, we have no accurate data on this population and do not offer estimates of the cost to businesses.

People who are under 65, with AD, and in the workforce: Ernst and Hay (1994) write that they estimate there are 266,000 people with AD between 45 and 64 who were newly diagnosed in 1991. As with those older than 65, people with AD are much more likely to withdraw from the labor force than are others. Nevertheless, the cost in health care, productivity loss, and emotional strain is undoubtedly many billions of dollars – much of them borne by business. Unfortunately, again, we have no accurate data on this question and do not estimate the costs.

Cross subsidization: The cost of Alzheimer's disease is sufficiently vast that it often puts pressure on medical services and institutions. While modern accounting methods seek to accurately depict actual expenses, the cost of AD is inevitably felt across many budgets categories. Similarly, general charitable contributions to medical institutions are partially absorbed by the treatment of those with Alzheimer's disease.

In Sum for Part Two: We estimate that businesses contribute **$24.458 billion** to the health care of people with Alzheimer's disease. The approximately twenty-four and one-half billion dollars represents slightly more than one-third (36.52%) of the total cost of health care of people with Alzheimer's disease.

We estimate that business taxes contribute **$176.115 million** (or $0.176115 billion) toward research in Alzheimer's disease.

Combined: Thus businesses spend **$24.634 billion** on health care treatment and on health research involving Alzheimer's disease. This $24.634 billion represents approximately 37% of the health care and health research expenses of Alzheimer's disease, which we estimate to cost over $67 billion dollars.

Summary

We find that business costs for workers who are caregivers of people with Alzheimer's disease is **$36.512**. We find that business costs of health care and health care research for people with Alzheimer's disease is **$24.634**. The combined total cost to businesses of worker/caregivers and of health care is **$61.146 billion**.

If one were to use the conventional estimate of Alzheimer's disease's cost to the nation – at $100 billion – this research indicates that *businesses are paying more than two-thirds of that cost*. We reject that estimate – not because we doubt the estimate of business costs – but because we are rather certain that the total cost of Alzheimer's to society is far greater than $100 billion. As we have repeatedly shown, if we could measure all of the relevant factors, the actual cost of Alzheimer's disease to businesses would be shown to be considerably greater than that estimated here. Similarly, we suggest that a rigorous analysis of Alzheimer's diseases' cost *to society* would reveal that our estimates are significantly underreporting the true economic burden.

Nest Steps: From an economic perspective, Alzheimer's disease receives a fraction of the attention it deserves. The costs to businesses and to society are extraordinary, and are growing in proportion to the aging baby boomers. The increasing loss of "free" caregiving and greater difficulties in securing any caregivers will increase these costs and exacerbate the strains on families, facilities and society. From a human perspective, the toll of Alzheimer's disease is incalculable and terrible. Investment in research on this disease appears both prudent and humane.

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Worksheet 1: Lost Days

Full Time: For full time workers who are also caregivers, we use the median wage and salary earnings for workers age 45-55[1]. This age category best reflects the age of Alzheimer's disease caregivers (See *Who Cares? Families Caring for Persons with Alzheimer's Disease* 1999). The average age of caregivers is 49 years.... nearly half of the AD caregivers are 50 years or older.... According to recent United States Department of Labor data (July 19, 2001)[2] the median weekly earnings for full time wage and salary workers for this age group was $696.00.

To calculate the cost of benefits, we use BLS data on "Employer costs per hour worked for components of compensation, and relative standard errors, by major industry and occupational categories, March 2001." As a percent of total compensation (which averaged $22.15 per hour), benefits represented 27% (which averaged $6.08/hr)[3]. As a percent of wages and salaries (which averaged $16.08/hr), the total benefits (listed below) is 37.81%.

> Note: A breakdown of the benfits costs, based on the average wage and salary of $16.08/hr, or total compensation of $22.15/hr, is listed by the BLS as "Legally required benefits averaged $1.73 per hour (7.8 percent of total compensation), representing the largest non-wage employer cost. Employer costs for paid leave benefits averaged $1.51 (6.8 percent), insurance benefits averaged $1.46 (6.6 percent), and retirement and savings benefits averaged 78 cents (3.5 percent) per hour worked." [Source: Employer Costs for Employee Compensation Summary USDL: 01-194; June 29, 2001]

Because the most accurate figure for our calculation – one that reflects the age grouping of caregivers – is based on the usual weekly wage and salary figure without benefits (that is, the $696.00 noted above), we must calculate the benefit addition. This equals $268.16 on a weekly basis.

On an annual basis, thus, the average cost to employers for these workers (not what employees receive) is $36,192 plus $13,944.32 = $50,136.32. Divided by 240 workdays, this equals **$208.90**[4]

Part Time Workers: For part time workers who are also caregivers, we take two-thirds of the basic compensation ($36,192 X .666 = $24,103.87) and we estimate the benefits ratio at considerably less than the full time benefit ratio because part time workers generally receive fewer benefits than do full time workers. That is, we take only 62.34% of the benefit ratio because part time workers typically do not receive "paid leave" (deduct $1.51 of $6.08), "retirement and savings"(deduct $0.78 of $6.08), or "other benefits" (deduct $0.03 of $6.08). Thus, the average benefits must first be calculated on the lower pay rate and, then, with a lower ratio. The lower, part time pay rate, when computed for an annual basis, is $24,108.87, and the lower benefits rate (which on an hourly basis is $3.79 compared to $6.08) is $8,691.50. Thus, the part time workers cost employers $24,103.87 plus $8,691.5 = $32,795.35[5]. We use the same 240 workdays to arrive at a per day figure of **$136.65**. Again, this is the cost to the employer, not what the worker receives.

These figures – for both full time and part time workers – do not reflect bonuses or stock options, which in some industries are significant portions of the total compensation package. Also, they do not reflect other costs to employers that are real costs, such as processing by the HR department, subsidized costs like parking garages, cafeterias, co-worker training, training, OJT, etc.

Lost days:

The best estimate of absenteeism associated with caregiving is from the *MetLife Study of Employer Costs for Working Caregivers* (1997) and from the *Who Cares?, Families Caring for Persons with Alzheimer's Disease*, (1999).

This study breaks down the lost time as follows:

1. Lost days: 6 days (minimum) = 6 days/yr;
2. Partial lost days = 1 hr/wk = 6.66 days at 7.5 hrs/day per year;
3. Supervisor time = 1 hr/mo = 1.5 days/year;
4. Workday interruption: 50 hrs/yr = 6.66 (at 7.5 hrs/day);
5. Crises: 3 days/yr.

The total is 23.82 days per year.

Note that caregivers of Alzheimer's disease are more burdened than the MetLife data reflect. In fact, the more targeted analysis in *Who Cares? Families Caring for Persons with Alzheimer's Disease* (1999), which focused just on AD caregivers, suggests that these figures underestimate the work impact of this population. For example, Who Cares reveals that: AD caregivers are more likely to turn down a promotion (6% vs. 2%) than other caregivers; are more likely to have to leave early, go in late or take time off during the day (57% for AD caregivers vs. 47% for non-AD caregivers). Nevertheless, to err on the conservative side, and to be consistent with the 1998 analysis, we use the 23.82 days per year figure. Moreover, we do not adjust the wage data to reflect higher supervisor earning (that is, the time that supervisors' work is affected).

Estimates for full time and part time workers who are caregivers:

The lost days of full time worker who are caregivers is 23.82 X $208.90 = **$4,976.00**[6]

For part time workers, we use the lower compensation and benefit figure of $136.65/day. (Note that we have already based our income calculations on a .666 reduction in earnings but we further reduce the no. of hours of lost time by .666, which equals 15.86). Thus. $136.65 X 15.86 days is **$2,167.27.**

Costs:

For number of workers who are caregivers, see main body of text.

- Absenteeism costs of full time employed caregivers is $4,976.00 X 1,868,750 workers = $9.299 billion (Specifically: $9,298,900,000).
- Absenteeism cost of part time employed caregivers is $2,167.27 X 431,250 workers = $.935 billion (Specifically: $934,635,188).
- Combined, the two costs total: **$10.234 billion**[7]**.**

1. In the 1998 report we used a similar figure but one based on 35 to 44 year olds. The age range we use here better reflects the age of caregivers of people with AD (Alzheimer's Disease). Note that in the 1998 report the comparison figures were explained as: In 1996 this [median earnings figure] was $559. Adjusted to 1998, this is $584.41. Annualized this equals $30,389.14. This figure is in line with the Met Life study that used weekly medians of $701 for men and $468 for women.

2. USDL 01-228; Thursday, July 19, 2001; Usual Weekly Earnings of Wage and Salary Workers: Second Quarter 2001.Table 2. Median usual weekly earnings of full-time wage and salary workers by age, race, Hispanic origin, and sex, second quarter 2001 averages, not seasonally adjusted

3. Previously, we used a benefit ratio of 28.1% for full time workers (Table 19, Employer compensation costs per employee hours worked, all private industry. Data for 1996. *Report on the American Workforce*. U.S. Department of Labor, 1997). This ratio is superior because it reflects all workers–including those who work for state, county and federal governments (which is a better reflection of the entire workforce). See BLS Appendix table. Employer costs per hour worked for components of compensation, and relative standard errors, by major industry and occupational categories, March 2001

4. In 1998 report, the comparable figure was noted as: To calculate the per day cost, we use the $30,389.14 plus 28.1% = $38,928.49 divided by 240 work days. This is **$162.20/day**

5. Previously, we used the following for part time workers who are also caregivers: we take two-thirds of the basic compensation ($30,389.14 X .66 = $20,056.83) and we estimate the benefit ratio at 15.8%. (Table 19, Employer compensation costs per employee hours worked, all private industry. Data for 1996. Report on the American Workforce. U.S. Department of Labor, 1997 [This estimate removes: paid leave, supplemental pay, and retirement/savings.]) The lower salary of $20,056.83 plus 15.8% = $23,225.81. To figure the per day cost, we use the $23,225.81 and the same 240 days = **$96.77/day**. (Later, we shall also reduce the number of absent days for part time employees.)

6. In the 1998 analysis, the data were: The lost days of full time worker who are caregivers is 23.82 X $162.50 = **$3,870.75** For part time workers, we use the lower compensation and benefit figure of $96.77/day, and we estimate only two-thirds as many days are lost (23.82 X .66 = 15.72 days). Thus, $96.77 X 15.72 days is **$1521.22**

7. In the 1998 analysis, the data were: Absenteeism costs of full time employed caregivers is $3,870.75 X 1,868,750 workers = $7.233 billion.

   Absenteeism cost of part time employed caregivers is $1,521.22 X 431,250 workers = $656 million.
   Combined, the two costs total: **$7.885 billion**

Worksheet 2: Deriving Estimates for Spending for Any Treatment of Those with Any Diagnosis of Alzheimer's Disease: by Payer and by Type of Provider (Major Categories)

The calculations to derive spending on AD health care expenses are displayed in Table I-WS. In Table I-WS, the rows noted as "*new*" display the revised estimates based on the Lewin Group's data or the ratio of their Medicaid Nursing home costs to our "original" findings. That is, we base the ratio on Lewin's estimate of $18,200 billion for Medicaid nursing home costs to our 1998 midpoint estimate of $8.711 billion for this same category – recognizing that some of the difference is also generated by inflation. That ratio is 2.09:1.

We do not use the higher Medicare ratio of $31,879 billion (total Medicare costs) to our 1998 midpoint estimate of Medicare spending of $7.564 billion. That ratio is 4.21:1 which would have produced much higher estimates of costs. Our method is also conservative because Medicaid nursing home reimbursement is not considered a full reflection of all nursing home costs.

Note that we do not increase our estimates by the *medical* inflation ratios or by the standard CPS ratios for the time since 1998 because we regard the Lewin-derived ratio to implicitly include the actual cost increase in their year 2000 estimates. We do, however, adjust them by 4% for the most recent year – that is an estimate of medical inflation for 2000 to 2001. Given the recent data on medical costs and expected, immediate premium increases, the 4% adjustment must be regarded as conservative.

More help on reading the table: In each cell the in the "*original*" row, the first number is based on 1998 estimate 1, the second number is based on 1998 estimate 2. (See the 1998 report worksheets for a discussion of the two estimation methods). In the rows noted as "*new*" we present the revised estimates based on the Lewin Group's data or the ratio of their nursing home figure to our "original" finding. We also include footnotes to this worksheet table that further explain the calculations.

Table I-WS: Spending for Any Treatment of Those with Any Diagnosis of Alzheimer's Disease: by Payer and by Type of Provider (Major Categories) (In Millions of Dollars).

Major Payer Categories	Hospitals	Nursing Homes	Home Care Agencies	Old Totals	New Totals	Totals: adj to 2001
Original estim. Medicare	$4,750-$6,889 ($5,819.5)	$1,243-$1,378 ($1,310.5)	$307-$561 ($434)	$6,435-$8,693 ($7,564)	NA	
New Medicare: based on Lewin & our cost ratios for categories[11]	76.937% of total of $33,154.16 = $25,507.816	17.325% of total of $33,154.16 = $5,743.958	5.738% of total of $33,154.16 = $1,902.386	NA	**$31,879** Direct Report	**$33,154.16**
Original estim. Medicaid (mid point)	$229-$229 ($229)	$7,471-$9,951 ($8,711)	$74-$96 ($85)	$7,796-$10,253 ($9,024.5)	NA	
New Medicaid: based on Lewin & our cost ratios for categories[12]	$478.61 infl adj = $497.75	**$18,200** Lewin direct report; infl adj = **$18,928**	$177.65 infl adj = $184.756	NA	**$18,856.26**	**$19,610.51**
Original estim: Own$/Family (mid point)	$42-$33 ($38.5)	$3,679-$6,419 ($5,049)	$8-$83 ($45.5)	$3,729-$6,535	NA	
New: Own $ & Family $. Based on 2.09 ratio[13]	$80.465 infl adj = $83.683	$10,552.41 infl adj = $10, 974.505	$95.095 infl adj = $98.898		**$10,727.97**	**$11,157.08**
Original estim. Private Ins. (mid point)	$367-$393 ($380)	$548-$1,084 ($816)	$22-$28 ($25)	$969-$1,473	NA	
New: private Ins. Based on 2.09 ration[13]	$794.2 infl adj = $825.97	$1,705.44 infl adj = $1,773.66	$52.25 infl adj = $54.34	NA	**$2,551.89**	**$2,653.97**
Other Government				$174-$176 ($175)		
New: Other Gov't. Based on ratio of 2.09[13]				$365.75 infl adj = $380.38	**$365.75**	**$380.38**
Old Totals	$7,574-$5,564	$16,273-$16,936	$516-$681	$24,528-$23,017	NA	
New totals	—	—	—	NA	**$64,380.87**	**$66,956.10**

[11]Lewin reports $31,879 million for Medicare for AD. We adjust that 4% for medical inflation, and then use the cost ratios from the 1998 report to allocated expenses for hospitals, nursing homes and home health care.

[12]Based on ration of $18.200 billion (From Lewin's report for Medicaid nursing home costs) to our 1998 midpoint estimate of $8.711 billion (=2.09). We do not use the higher ratio of 31.879 billion (total Medicare costs) to our 1998 midpoint estimate of $7.564 billion (=4.21)

[13]We adjust our 1998 figures by a 2.09 ratio to reflect Lewin's estimate of 2000 expenses.

Worksheet Table II-WS (From 1998: Presented for Comparison to Current Data)
Estimated Costs to Businesses for Alzheimer's Disease: by Payer and by Type of Provider

(In Millions of Dollars)
(In rows two and three the first number is based on estimate 1, the second number is based on estimate 2.)

Payer Category	Total	Business Cost	Tax Rate or Insurance
Medicare	$8,693-$6,435	$4,346-$3,218	50.0
Medicaid Federal %	$5,127-$3,898	$1,666-$1,267	32.5
Medicaid State %	$5,127-$3,898	$1,767-$1,343	34.5
Private Insurance: Hospital	$367-$393	$125-$134	34.0
Private Insurance: Nursing Home	$1,084-$548	$129-$65	11.9
Private Insurance: Home Health	$22-$28	$3-$3	11.9
All Private Insurance (3 above categories)	$1,473-$969	$256-$202	17.4-20.9
Other Govt (Fed)	$174-$176	$57-$57	32.5
Total	**$20,594-$15,377**	**$8,093-$6,087**	

Worksheet Table III-WS (From 1998: Presented for Comparison to Current Data)
Business Contribution to Federal Research on Alzheimer's Disease

Federal Research, Demonstration Projects, etc.	$349.2 million	$54.126 million ($0.054126 billion)	15.5%

Worksheet 3: Taxes and Revenues

Federal and State Contributions to Medicaid

Contribution to Medicaid (From Medicaid section of www.hcfa.gov October 31, 2001)
Federal 56.56%
State 43.44%

Proportion of Taxes From Businesses: Federal and State (average)

Introductory Comment: Sales taxes are paid by business on the goods they purchase in the course of doing business. (Individuals also pay these types of taxes on their purchases.) Property taxes are paid by both businesses and individuals. Income taxes on pass-thru entities (partnerships, s-corporations and limited liability companies) are paid by shareholders/owners as individuals. This accounts for an increasing share of business activity.

For Federal Tax Revenues:

Corporate	11.2%
.5 Insurance FICA	14.15
Self employment Ins. Contributions	1.7
Unemployment Ins.	0.3
Railroad Retirement	0.2
.75 excise taxes	1.95
Total	29.5%

Source for Federal ratio: Table 1 Summary of Internal Revenue Collections, by Type of Tax, Fiscal Years 1999 and 2000. Data above based for 2000. Internal Revenue Service Data Book 2000. Washington, DC: IRS 2001

For State Tax Revenues:

Total revenues in billions: Total (all states but not DC): $499.510

Business share (in billions)

.5 Property	$5.65
.5 General sales and gross receipts	124.27
.5 Selected sales taxes	37.07
License taxes (excl hunting and fishing)	29.33
Corp net income taxes	30.69
Documentary and stock transfer	4.09
Severance	3.13
Other	0.23
Business Total.....	$234.46

To calculate ratio: $234.46/$499.510 = 46.94%

Source: http://www.census.gov/govs/statetax/99tax.txt (October 31, 2001) State Government Tax Collections 1999.

Calculation of Medicaid proportions from Federal and State Business Taxes

(Based on Total of $19,610.51: Inflation adjusted data from Lewin's Calculations Plus Estimates for Hospitals and Home Health Care)

Proportion Contributed to Medicaid	Total from Federal and State Sources	Business Tax Rate	Net Contribution
Federal Contribution to Medicaid = 56.56%	$11,091.70 from fed	29.5% from business	$3,272.051
State Contribution to Medicaid = 43.44%	$8,518.80 from state	46.94% from business	$3,998.725
Total			**$7,270.801**

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Dr. Ross Koppel is the president of the Social Research Corporation (Wyncote, PA), a research group that focuses on workforce and economic analysis. Professor Koppel also teaches research methods in the Sociology Department of the University of Pennsylvania. At the University of Pennsylvania, Koppel is the principal investigator of the study of medication errors associated with hospital workplace organization and stress. The five-year study is funded by the Agency for Healthcare Research and Quality (AHRQ).

In 1998, Ross Koppel received the William Foote Whyte Award for Distinguished Career in the Practice of Sociology given by the American Sociological Association, Section on Sociological Practice. Dr. Koppel is also the recipient of the 2002 Sociological Practice Award from the Society for Applied Sociology. This award is given to an individual who has demonstrated how sociological practice can advance and improve society. He is the only person to have won both awards.

Professor Koppel has developed, administered and analyzed over one hundred and fifty surveys on topics ranging from energy use to bureaucratic efficiency. He has conducted research on a very wide variety of topics, including labor force processes, the impact of technology on jobs and skills, breast cancer screening, minimum wage policy, Alzheimer's disease costs, perceptions of time, utility company policy, discrimination in the workplace, research and evaluation policy, ethics of social research, education policy, leisure industries, social ecology, employment in the arts, wage and earning determination, the role of food in the local economy, drug abuse, and statistical analysis in social research.

In addition to Koppel's role in the medication error study, he is currently directing studies of work futures for state governments, responses to utility de-regulation, evaluation of literacy campaigns and day care improvement programs, and continuing research on the costs of Alzheimer's disease. From 1998 to 2001, Dr. Koppel was the research director of the New Jersey Breast and Cervical Cancer Control Initiative, funded by the CDC. Previously, Koppel directed a survey research study for the U.S. Customs Service/Wharton Econometric Forecasting Associates (WEFA) study on the cost of drug abuse to the nation. He also directed a study of drug and alcohol use in the workplace.

Ross Koppel has worked on studies for the U.S. Congress' Office of Technology Assessment (OTA, 1987) on the impact of technology on jobs, skill needs and international competition. Koppel served twice on the White House Conference on the Future of Small Business and Entrepreneurship

Ross Koppel has authored or co-authored over ninety academic papers, several monographs and several books and book chapters.

Ross Koppel received his Ph.D. in Sociology from Temple University where he was a National Institute of Mental Health Fellow, recipient of a National Science Foundation grant, Chair of the Faculty-Student Committee on Governance, and President of the Graduate Sociology Association.

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