RISING COSTS in medical care in the United States have drawn the interested attention of economists, organized medicine through its physician members, hospital administrators, insurance underwriters, and, with some heat, that of the consumers. Surprisingly little thought, however, has been given to the cost of sickness or disability in terms of our national economy. Often, figures are given for a particular disability by the millions of work days lost or the man-loss years, which, although valuable, give little insight into the actual costs involved. Frequently, totals are cited, without supporting documentation, of the economic inroads of disease. Cancer has been alleged to cost $15.44 billion annually,\(^1\) alcoholism has been estimated to cost industry more than $1 billion each year,\(^2\) and an effort has been made to apply a similar yardstick to heart disease. Weisbrod\(^3\) has explored methods for measuring the economic impact of disease, and has quantified the losses from premature death resulting from cancer, tuberculosis, and poliomyelitis.

In 1959, in a presentation of some of the factual material on the "major killing and crippling diseases in the United States,"\(^4\) it was stated that "at least 653,000 man-years are lost each year in industry due to heart disease disabilities," and that this was "equivalent to $3,246,030,000 lost in 1957 alone in earnings by those suffering heart disease disabilities, and $448,693,000 in federal income tax revenue on these earnings in the same year." Yet, the man-years loss figure was cited from a 1949 publication,\(^5\) in which the figures quoted stemmed from the 1937 health survey made by the U. S. Public Health Service with the data adjusted to 1946-1947. The classic work of Dublin, Lotka, and Spiegelman\(^6\) similarly is based upon data from the National Health Survey, collected in the mid-1930’s, and the depressed salary levels of that period. It is believed that an effort should be made to bring these data up to date in light of contemporary wage and tax levels. As cost analysis is part of any business operation, a dollars-and-cents approach to the problem of heart disease in the working population is indicated to stimulate interest and initiate action in the areas of prevention, control, rehabilitation, and eradication of this particular group of diseases.

The purpose of this writing is to present the determined impact of heart disease upon the labor force and its ramifications within the nation's economy. To this end, the authors have chosen from a variety of sources what they consider to be the best available estimates in terms of morbidity, mortality, and costs. Every effort has been made to utilize statistics based upon reliable studies, with similarly defined population groups and identical periods of time.

Estimates of Contemporary Costs

Disability. The National Health Survey, conducted by the U. S. Public Health Service for the period July 1957 to June 1958,\(^7\) listed the population usually working* as 59,569,000

\(^*\)These are persons 17 years of age and older who reported "working" as their major activity during the 12-month period preceding the interview.
persons (table 1). This group experienced, during the same period of time, 432.7 million work-loss days per year due to illness. All persons aged 17 years and over, in the same year, lost 599.1 million days from work, for all causes. Therefore, 72.2 per cent of the total work-loss days per year for all persons 17 years and over were provided by the usually working population.

The total group— all persons—lost 71.9 million work days per year from cardiovascular conditions, (69.2 million work-loss days from chronic conditions and 2.7 million work-loss days from acute disorders). The figure for the usually working population, then, would be 72.2 per cent of this total, or 51.9 million work-loss days per year due to cardiovascular conditions. Cardiovascular disease accounted for 12 per cent of all the time lost by the usually working population.

There are no figures available in the National Health Survey findings indicating the predicted or actual number of persons in the usually working population losing time due to cardiovascular conditions. Therefore, it is not possible to determine the amount of time lost per person from cardiovascular disease. During the year July 1958 to June 1959, 7.3 million chronic circulatory conditions were estimated among the usually working population by the National Health Survey. This estimate included conditions that were responsible for work-loss days as well as those for which no work loss was reported. In addition, it was possible to have reported more than one circulatory condition per person; therefore, the 7.3 million figure is defined as conditions and not persons.

Suppose, however, that a figure were available that would indicate the number of persons involved. To determine work-loss days, and, from this, financial loss in terms of personal income lost to the worker and loss in tax return to the government, would be fraught with error, for this reason: many workers in today’s industrial culture are covered by health and accident insurance, and, in addition to these benefits, receive vacation pay as well, so that a large percentage, if not all, of the time lost would be returned to the employee in terms of income, nullifying a great portion of the economic loss. Until such time as exact figures are available for the actual population involved, and the number of fully compensable days known, an attempt at determining personal income loss and the taxes lost on this income is not possible.

Deaths Exclusive of Disability

Work Years Lost. In 1957, there were 876,793 deaths in the total population resulting from cardiovascular conditions (table 2). Of these deaths, 249,467 occurred in the age group of 20 to 64 years. If these deaths are assumed to be within the working population,
each death represents an average loss of approximately 10 years from the earning force.\(^*\)

**Earnings Lost.** The average annual earnings per employee for all industries in 1957 was $4,211.\(^{13}\) The 249,467 who died would have earned $1,050,505,537. Therefore, approximately $1.05 billion was lost per year in personal income because of deaths from cardiovascular disease, if one considers only the loss of one of the 10 from the earning force.

**Federal Income Tax Lost.** It was found that taxable income is 57 per cent of the gross income, and that the effective tax rate is 23.1 per cent of the taxable income (if one takes into account all earning groups).\(^{14}\)

Therefore, 57 per cent of a gross income of $1.05 billion is $598.5 million taxable income. In turn, 23.1 per cent of this amount is $137.3 million. This figure of $137.3 million represents the amount lost in federal income tax revenue because of the deaths resulting from cardiovascular disease.

**Cardiovascular Disability Costs to Industry**

As noted previously, 51.9 million work-loss days were sustained by the *usually working population* because of cardiovascular conditions (table 3). If one assumes the average number of working days per month to be 22, there are 264 working days per year, including vacation days which, in most instances, are paid, and thus equivalent to the usual work days. If the average annual income is $4,211 as cited previously, the average income per day is $16. Multiplying this $16 by 51.9 million work-loss days, one finds a total of $830.4 million in unearned wages each year because of cardiovascular disability.

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**Table 2**

*Losses from Cardiovascular Deaths in 1957*

<table>
<thead>
<tr>
<th>Description</th>
<th>Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths in total population, due to cardiovascular conditions</td>
<td>876,793</td>
</tr>
<tr>
<td>Deaths in working population, aged 20 to 64 years</td>
<td>249,467</td>
</tr>
<tr>
<td>Average annual earnings per employee for all industries</td>
<td>$4,211</td>
</tr>
<tr>
<td>Anticipated total annual income for those in working population dying from cardiovascular conditions, or personal income lost, rounded off</td>
<td>$1,050,500,000</td>
</tr>
<tr>
<td>Taxable income (federal)</td>
<td>57% of gross income</td>
</tr>
<tr>
<td>Effective tax rate (federal)</td>
<td>23.1% of taxable income</td>
</tr>
<tr>
<td>Total federal income tax revenue lost, based upon total income of $1.05 billion</td>
<td>$137,300,000</td>
</tr>
</tbody>
</table>

**Table 3**

*Cardiovascular Disability Costs to Industry in 1957*

<table>
<thead>
<tr>
<th>Description</th>
<th>Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time lost per year by usually working population, due to cardiovascular conditions</td>
<td>51,900,000 work days</td>
</tr>
<tr>
<td>Number of working days per year</td>
<td>264 working days</td>
</tr>
<tr>
<td>Average annual earnings per employee for all industries</td>
<td>$4,211</td>
</tr>
<tr>
<td>Average income per day</td>
<td>$16</td>
</tr>
<tr>
<td>Total wages lost per year because of cardiovascular conditions ($16 × 51.9 million)</td>
<td>$830,400,000</td>
</tr>
<tr>
<td>Cost to industry of lowered productivity ($830.4 million × 2) caused by cardiovascular conditions</td>
<td>$1,660,800,000</td>
</tr>
<tr>
<td>Benefit payments for illness-absenteeism in American industry per year</td>
<td>$10,000,000,000</td>
</tr>
<tr>
<td>Portion of total work days lost per year for usually working population, due to cardiovascular conditions</td>
<td>12.0%</td>
</tr>
<tr>
<td>Benefit payments for cardiovascular illness-absenteeism in American industry per year ($10 billion × 12.0%)</td>
<td>$1,200,000,000</td>
</tr>
<tr>
<td>Cost to industry of one employee death or replacement</td>
<td>$500</td>
</tr>
<tr>
<td>Deaths in working population, aged 20 to 64 years</td>
<td>249,467</td>
</tr>
<tr>
<td>Total cost to industry of workers lost through cardiovascular deaths (249,467 × $500)</td>
<td>$124,700,000</td>
</tr>
</tbody>
</table>

---

\(^*\)See Addendum.
Newman, in considering absentee costs, has stated, "... for every dollar our employees fail to take home, it costs us one or two dollars extra." Using the single dollar value, or doubling the amount not earned in wages—$830.4 million × 2—one finds that $1.66 billion is the cost to industry for lowered productivity caused by absenteeism due to cardiovascular disease.

The benefit payments for illness-absenteeism, excluding production costs, amount to considerably over $10 billion per year for American industry as a whole. As previously indicated (table 1) cardiovascular conditions account for 12 per cent of all time lost. Twelve per cent of $10 billion amounts to $1.2 billion, the amount paid by industry in the form of cash benefits for cardiovascular conditions.

Recent studies on the cost of an employee-death or turnover indicate an average figure of $500 per person loss or separatee. Using the total of 249,467 deaths, multiplied by $500, one gets $124.7 million as the cost to industry of replacements for those lost through cardiovascular deaths.

Recapitulation
Heart disease in the working population of the United States for the year July 1957 to June 1958 resulted in an estimated national cost of $4.173 billion (equivalent to 5.8 per cent of the national budget for the same year), excluding the cost of medical care. This total cost is itemized in table 4.

Discussion
Other factors, of course, exist which, if included, would increase the national cost. These are state income taxes, local taxes, medical-care expenses, and such difficult-to-measure entities as lowered buying power, with its resultant diminished retail and wholesale business.

No presentation of this nature is made without the authors' being aware of some of the balancing factors. Reference is made to the financial gain of pharmaceutical companies, pharmacists, physicians, hospital equipment suppliers, and all others in a position to

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*Absentee cost is based upon:
1. The need for extra people on the payroll to take the place of those absent.
2. Idle machinery and unused investment, when workers unexpectedly fail to come to work.
3. Disrupted production schedules with inconvenienced customers.
4. High inventory caused by delay in shipment.
5. Spoilage resulting from substitute workers having to do jobs for which they were not trained.
6. Overtime premiums paid to make up for lost time.

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Actual cost is $5,590.

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*Actually, for certain jobs, the cost is much higher. End has pointed out that the cost of replacing an engineer is $5,590.
offer services for remuneration to cardiovascular patients. In addition, there is the gain to the economy through the employment of persons replacing the disabled and those who have died.

A philosophic point can be raised, also, of the worth of using an "average" wage. There are great differences in lifetime incomes between the college graduate and postgraduate group, and the inadequately educated segment of the population. Do all get heart disease at the same age, with the same prognosis, and with the same degree of disability? How much more cardiovascular illness is caused by the stress of low income? Or does the stress of corporate life balance this? There are many elements that could enter into a discussion of the weighting of factors, but it was not the intent to place all minutiae on the pans of the balances.

There are specific statistical studies indicated by this kind of data assembly. First, there should be a determination of the impact of disease on the working population in terms of the actual (or estimated) number of persons in the work force, with time lost from cardiovascular conditions, i.e., in whom the heart disease is the primary cause of the time loss, and not one of several disabling disorders.

Secondly, there should be a determination of the national average of sick benefits paid under various insurance coverage plans in terms of the number of days for which benefits were paid, and the amount of money involved.

Lastly, there should be data available of the average amount of paid and nonpaid vacation time taken by the usually working population, in numbers of days. With these additional figures, it might be possible to determine the impact of disability on personal income, if any.

**Summary and Conclusions**

An effort has been made to demonstrate the impact of the disability of a specific group of disease states on the national economy. It is believed that the presentation of this information can stimulate increased interest in the prevention, control, and eradication of heart disease, and the rehabilitation of its victims.

The cost of heart disease to the nation's economy, as adjudged by a review of the 1957-1958 data, totals $4,173,300,000. The annual cost of heart disease in the United States—one-seventeenth of the national budget—should motivate greater research, epidemiology, preventive, control, and rehabilitation activities in this vast area of human wastage.

A plea is made for comparable cost mensuration of this country's other leading chronic diseases.

**References**

Addendum

Determination of Average Time Loss from Earning Force for Cardiovascular Death

Deaths in 1957

<table>
<thead>
<tr>
<th>Age</th>
<th>Average age</th>
<th>Number</th>
<th>Years remaining in work life</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>22</td>
<td>1,366</td>
<td>42*</td>
</tr>
<tr>
<td>25-29</td>
<td>27</td>
<td>2,174</td>
<td>37</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>4,353</td>
<td>32</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>8,605</td>
<td>27</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>16,082</td>
<td>22</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>27,253</td>
<td>17</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>42,448</td>
<td>12</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>60,560</td>
<td>7</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>86,626</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>249,467</td>
<td></td>
</tr>
</tbody>
</table>

The aggregate of multiplying items in columns 3 and 4 (2,433,094) divided by 249,467, will give the average loss for each person from the work life of 9.75 years, or approximately 10 years.

*Average age of 22 selected from age group 20-24.

Age 64 represents terminal work age; hence, for each person aged 22, 42 years would remain in his work life, were he to have lived to that age. Weisbrod, in his computation of the present values of net future earnings, shows money earnings for persons up to age 75, but in light of contemporary industrial personnel practices of compulsory retirement, the more realistic mid-60 figure is used here.
The High Cost of Heart Disease
JEAN SPENCER FELTON and ROBERT COLE

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