

Social and Economic Implications of Cancer in the United States

Based on a presentation to the Expert Committee on Cancer Statistics of the World Health Organization and International Agency for Research on Cancer at Madrid, Spain, June 20-26, 1978.

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SOCIAL AND ECONOMIC IMPLICATIONS OF CANCER IN THE UNITED STATES

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INTRODUCTION

Death rates reported to the World Health Organization by member countries reveal that, for most countries in North America, Europe, and Oceania, cancer is the second leading cause of death.¹ Of all 1971 deaths among 27 selected countries, the proportion that was classified as malignant neoplasms ranged from 13 to 24 percent, with a median of 19 percent. For the leading cause of death, heart disease, the proportion ranged from 20 to 40 percent, with a median of 31 percent.² Standardized death rates for cancer in 1972 at age 45 years and over ranged from 411 to 843 per 100,000 males and from 313 to 601 per 100,000 females, with a general level of cancer mortality in these countries of 600 per 100,000 and 450 per 100,000 for males and females, respectively.¹

Cancer usually strikes those who are middle-aged and over. But even in the less developed countries of Africa, South and Middle America, and Asia, where the proportion of the population surviving to late adult life is lower and economic development has not progressed as far as in the developed nations, cancer may be the fifth or sixth leading cause of death.¹ Of all 1971 deaths in 11 selected Third World countries, the median proportion that was due to malignant neoplasms was 11 percent, compared with the 13.5-percent median for heart disease.³

It is estimated that over 1 million persons will have been diagnosed as having cancer in 1977 in the United States (including 300,000 new cases of nonmelanoma skin cancer) and that

385,000 persons will die of the disease.⁴ The social and economic implications of cancer for victims and the society at large are pain, suffering, disability, and death; millions of years of life lost; vast amounts of human and economic resources devoted to detection, diagnosis, and treatment; and billions of dollars of economic output forgone annually because of lost human resources. Goals in the fight against cancer, and other diseases as well, are prevention before the disease strikes, cure with minimum untoward effects when it occurs, and maximum quality of life if cure is not possible. Faced with limited resources and a multiplicity of diseases and other social problems demanding attention, it is essential to know and understand the magnitude of the economic and social costs of cancer and their relationship to the total burden on society.

Social Costs and Quality of Life

While it has long been recognized that there are certain noneconomic effects of illness and disease, such as pain and suffering, in recent years there has been increased interest in this aspect of disease cost. Social costs refer to psychosocial deteriorations that are brought about by disease.⁵ Persons exposed to social costs include cancer victims and their families, victims' friends and coworkers, and care givers. They number several million persons in the United States.⁵ Recent research has revealed the influence of mortality on the family and its life cycle.^{6,7} Mortality has direct consequences for the family, affecting, for example, duration of marriage

and age at widowhood. In the long run, large reductions in mortality can influence behavioral patterns. Studies of economic costs are, to a large extent, refinements of an accepted methodology, but measures and methodology for social costs remain to be developed.

Cancer, especially advanced cancer, may bring about personal catastrophes that are not reflected in the direct and indirect economic costs of cancer that have been estimated to this date. A cancer victim may suffer loss of a body part, impaired speech, disfigurement, disability, impending death, pain, and grief. The victim, and those around him or her, may be forced into economic dependence and social isolation, unwanted job changes, loss of opportunities for promotion and education, relocation of living quarters, and other undesired changes in life plans. The environment created by cancer induces anxiety, reduced self-esteem and feelings of well-being, resentment, and emotional problems that often require psychotherapy. Mental illness may develop, leading to family conflict, antisocial behavior, and suicide. The cancer victim and others may experience marked personality changes and reduced sexual function. Disrupted development and delinquency may occur among children. Cancer frequently reduces the quality of life beyond the restorative capability of current rehabilitation efforts. The combination of financial strain and psychosocial problems is especially devastating.

These social costs have been documented in numerous studies and appear to be widespread. Cancer Care, Inc. and the National Cancer Foundation, Inc. found that most families with a member suffering from advanced cancer needed help to maintain family stability. Two-thirds of the families studied reported emotional or adjustment problems on the part of family members, and one-third underwent changes in life plans such as disrupted employment.⁸ Cancer treatment has been found to cause a financial burden that creates anxiety for the families of pediatric cancer patients.⁹ Half of 70 families surveyed reported that expenses, including nonmedical costs, plus pay lost as a result of the child's disease, amounted to more than one-fourth of the weekly family income. Fortunately, quality of life for cancer patients is an

important issue and considerable attention is being given to it.¹⁰⁻¹³

Although quantifying social costs has been rather intractable process, some progress has been made. Qualitative social costs have been translated into money costs by using market values or shadow prices^a of imputed costs. It has been estimated that social costs vary quite widely by form of cancer and may greatly exceed direct and indirect economic costs if the social cost of death is included. Excluding the cost of death produces a money value for social costs that resembles direct economic costs of cancer.^{5,b} Although these estimates need refinement, they point out the importance of social costs and the misallocation of resources that may occur when only economic costs are considered.

Increased effort is needed to refine the methodology and develop the necessary data. Frequently, there is little observable difference in the effectiveness of alternative treatments for cancer (simple versus radical mastectomy, for example), at least in terms of survival and recurrence rates. In these circumstances it would be especially helpful to quantify and compare the quality of life under alternative treatments. Different alternatives involve tradeoffs between increased probability of survival, length of survival, and reduced quality of life. If quality-of-life data could be integrated with survival probabilities, then the optimal treatment alternative could be determined.¹⁴

Indicators must be developed and data collected to estimate quality of life and social costs. The state of the art is still rather primitive, but

^aShadow prices are accounting prices attached to goods and services for which there are no market prices. The shadow prices are the costs incurred in obtaining the items in question.

^bThe minimum annual social costs of cancer are estimated to be about \$2.5 billion, excluding extinction costs, and about \$138 billion if costs of extinction are included. The dollar magnitudes of these costs have undoubtedly increased since this research⁵ was published in 1975. Abt's estimates include the social costs incurred by victims, spouses, children, parents, siblings, friends, coworkers, and care givers resulting from extinction, and mental illness, family conflict, antisocial behavior, sexual loss, grief, limited consciousness, seclusion, isolation, and discrimination associated with ca-

has begun to attract attention.¹⁵⁻²⁰ Measures of the impact of sickness on a person in terms of his or her sense of well-being, as well as evaluations of well-being of family members and associates, are required. For cancer, indicators must reflect the reduced self-esteem, emotional problems, pain, and suffering caused by disfigurement, disability, social isolation, economic dependence, and impending death—in short, the reduced quality of life that often accompanies cancer.

Although direct measures of social costs and quality of life are not available, and considerable methodological research and data collection are necessary if social costs are to be adequately quantified, the situation is not completely hopeless. Different scales have been developed to assess the rehabilitation of patients by measuring functional status. The Performance Status Scale assesses mobility and ability to carry out usual roles. More comprehensive measures of functional status are the Pulfes Functional Profile and the Barthel Index.²¹ Pain and suffering can be measured by duration and severity of pain, as indicated by the potency of drugs needed for relief. Suicide, mental illness, or psychiatric care can indicate grief, worry, and emotional stress. These can be shadow priced by the costs of analgesic drugs and psychotherapy. Dollar values have also been estimated, albeit crudely, for other social costs,¹⁴ including disrupted child development and sexual limitations. If quality of life can be quantified in money terms, then the quality of life, quantity of life, and direct and indirect economic costs can be expressed in terms of a common denominator and can then be compared and combined to obtain the total cost of cancer.

Initial efforts at measuring perceptions of the quality of life are encouraging.^{16,22-26} Also of interest is the Sickness Impact Profile, which attempts to measure behavioral expressions of sickness.²⁰ Construction of quality-of-life indicators requires surveys of affected individuals, and the task will not be easy. Questions on quality of life will be difficult to answer and involve painful and emotional topics. The surveys will have to be very carefully constructed. National household interview surveys, such as those conducted by the National Center for Health Statis-

tics (Health Interview Survey) and the Health Care Financing Administration (Current Medicare Survey), cancer registries, and patient self-help groups, such as Lost Chord Clubs (laryngectomy patients), Reach to Recovery (mastectomy patients), and Ostomy Clubs, represent possible vehicles for collecting information on quality of life and social costs.

The Commission on Cancer of the American College of Surgeons has recognized the need for data on quality of life. Since January 1973, the commission has required that each hospital cancer registry evaluate patients' performance status in order for the hospital to gain approval by the American College of Surgeons.¹² As a result, the Department of Clinical Statistics at Memorial Hospital for Cancer and Allied Diseases in New York requires information on quality of life from all cancer patients. Each year, respondents provide information on employment, functional capabilities, and whether, after treatment, they have realized their employability potential and resumed normal family and community functions. Such surveys, already producing valuable information, might be expanded to obtain additional data on the patient and to begin ascertaining cancer's impact on others besides the patient.¹²

Despite these efforts, estimation of social costs remains a task for the future. The remainder of this paper focuses on economic costs: Recent estimates of economic costs, as well as some methodological aspects, are discussed, and new information on certain costs by cancer site is provided.

Economic Costs

Cancer, like other diseases, produces economic as well as social costs. Direct economic costs are those connected with prevention, diagnosis, and treatment. These include expenditures for hospital and nursing home care, physicians' and nurses' services, drugs, medical research, medical personnel training, facility construction, and other expenditures, such as those for public health education. Indirect costs are the losses in output, such as time lost from work because of mortality, morbidity, and disability. Economic costs represent forgone alternatives: Direct costs

are the value of resources that could be allocated to other uses in the absence of disease, and indirect costs are the value of idle resources and lost output.²⁷

In the next section, 1975 economic costs of neoplasms and their relationship to total costs for all illnesses are discussed, and the economic assumptions and principles used to calculate indirect costs are summarized. The section following presents costs of short-term hospital care, physicians' services, and mortality by cancer site. The last section provides a summary and conclusion; the appendix contains an explanation of methodology.

ECONOMIC COSTS IN 1975

The most recent national estimates of disease costs in the United States are for fiscal year 1975.²⁸ These calculations follow closely, with some modifications, the methodology pioneered by Rice²⁹ more than a decade ago and recently updated by Cooper and Rice.³⁰ In 1975, the total estimated cost of illness ranged from \$239 billion to \$323 billion, depending on the discount rate employed, with neoplasms (benign and malignant) accounting for \$19 billion to \$28 billion, or 8 to 9 percent of total costs. Neoplasms constitute one of the most costly disease categories, surpassed only by diseases of the circulatory system (18 to 19 percent of total costs), and by accidents, poisonings, and violence (12 to 18 percent of total costs). Costs of neoplasms are similar in magnitude to those for mental disorders and diseases of the respiratory and digestive systems.

Direct Costs

Direct costs of neoplasms totaled \$5.3 billion in fiscal 1975, representing 5.3 percent of the total direct expenditures for medical care (table 1). Hospital care expenditures of \$4.1 billion accounted for more than 78 percent of the total direct costs of neoplasms, and an estimated \$671 million, almost 13 percent of the total, was spent on physicians' services. The remaining 9 percent of direct expenditures was incurred for other professional services, drugs and drug sundries, and nursing home care. Thus by far the

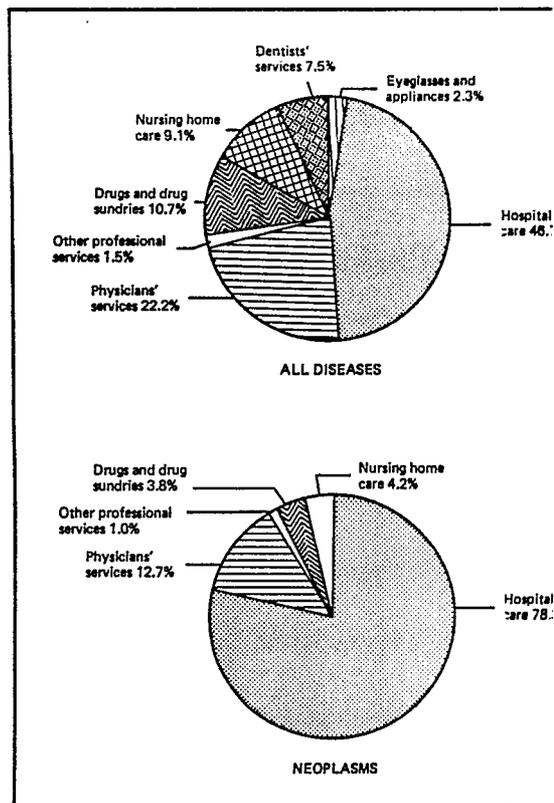


Figure 1. Percent distribution of direct expenditures for diseases and neoplasms, by type of expenditure: United States, fiscal year 1975

largest share of expenses connected with prevention, diagnosis, and treatment of neoplasms is that incurred for hospital care (figure 1). This is quite different from the distribution of direct costs for all diseases combined. While the amount spent on hospital care for all diseases is the largest component of direct costs, it accounts for only about 47 percent of the total expenditures, and significantly larger proportions were spent on other types of care for all diseases than for neoplasms. As shown in the appendix, however, the figure for physicians' services for neoplasms (\$671 million) is a serious underestimate of expenditures.

Indirect Costs

The value of current and future output forgone because of reduction or cessation of productive activity due to morbidity and mortality is

direct cost of cancer. Cancer prevents people from leading their accustomed productive lives in terms of working and keeping house. They may lose time from their activities, be forced out of their jobs, or become institutionalized. Persons dying of cancer in a given year would otherwise be expected to live into the future with an estimated life expectancy. The calculation of the loss of output resulting from mortality and morbidity involves the application of several economic assumptions and principles, which are summarized as follows:

Earnings.—The appropriate measure of output loss for individuals is earnings, and the proper measure of expected earnings is the arithmetic average or mean. In this report, output losses are based on annual mean earnings by age and sex provided by the Bureau of Labor Statistics,²⁸ adjusted for wage supplements such as employer contributions for social insurance, private pensions, and welfare funds.

Cross-sectional profiles of mean earnings by age and sex are used to estimate lifetime earnings. In applying these data, it is assumed that the future pattern of earnings for an average individual within a sex group will follow the pattern reported by the Bureau of Labor Statistics during the base year 1975. This model recognizes that the average individual may expect his or her earnings to rise with age and experience in accordance with the cross-sectional data for 1975.

The use of average earnings based on cross-sectional surveys would understate the present value of expected lifetime earnings if future economic growth patterns were not taken into account. Therefore an average annual rate of gain in productivity is projected and applied as a partial offset to the discount rate.

The discount rate.—The calculation of the present value of expected lifetime earnings raises questions about the importance of discounting and choosing the appropriate discount rate. From the economist's viewpoint, the arithmetic sum of lifetime earnings overstates the present value of an individual. Determining the present value of the future earnings stream is the correct way to measure economic value over a period of time; discounting converts a stream of earnings into its present value.

Economists agree that comparison of streams of earnings over varying timespans should employ the process of discounting, but there is no agreement on the discount rate to be used.^{31,32} The higher the discount rate, the lower the present value of a given money stream. With a high discount rate, earnings far into the future yield a relatively small present value. Conversely, lowering the discount rate increases the present value of future earnings.

Two basic concepts underlie the choice of a discount rate: opportunity cost concept and subjective time preference. Opportunity cost refers to the notion that resources should be valued according to what they could earn in alternative uses, assuming that the alternative uses are productive and resources so used today will generate a larger or more highly valued output in the future. The rate of return on corporate earnings and the government borrowing rate have been suggested as two measures of the discount rate. Time preference refers to the usual preference for a dollar now compared with a dollar in the future, a preference that cannot be measured directly.

The discount rate should be the result of a balance between opportunity cost and time preference. How to arrive at this balance is not specified, however, and the usual practice is to present a number of alternative rates. The 6-percent and 10-percent rates in this report provide a range that encompasses the rates generally in use today for costs of disease. It is usually, if not always, assumed that a single discount rate applies to all subgroups of a population. There is evidence, however, that discount rates vary significantly with age, income, sex, and race.³³ Mortality also varies according to these factors, and the effect on costs of assuming a uniform discount rate is not known. A uniform rate is a simplification required by limitations of data.

The discount rate can be adjusted for expected changes in productivity. An annual increase in productivity of 2 percent, for example, can be incorporated into the discounting calculations to obtain a net effective discount rate. Thus a 6-percent discount rate adjusted for an annual 2-percent rise in productivity will yield an effective discount rate of approximately 4 percent ($1.06/1.02 = 1.039$). A 10-percent

- discount rate similarly adjusted results in a rate of 8 percent ($1.10/1.02 = 1.078$). The present values of lifetime earnings by age and sex for discount rates of 6 and 10 percent, adjusted for an annual increase in productivity of 2 percent a year, are given in table 2 and figure 2.

Employment.—The estimate of lifetime earnings takes into account varying work-experience rates. The assumption is that an individual will be working and productive during his or her expected lifetime in accordance with the current pattern of work-experience for his or her sex and age group. For this calculation, work-experience rates for 1975 published by the Bureau of Labor Statistics were used.²⁸ Unfortunately, 1975 was a year of high unemployment. With less than full employment, the estimated cost of illness is lower than it would be under full employment because losses due to illness cannot be isolated from losses due to unemployment. To overcome this downward bias in the estimate of illness costs, work-experience rates during a year of full employment should be used.

Household work.—Marketplace earnings underestimate the loss resulting from women's illnesses, and the value of household work must be added to earnings. Based on a time-motion study of housewives,³⁴ the relevant market wages for various services performed were multiplied by the time required for doing that service to obtain an estimate of the cost of replacing the housewife's duties with person-hours from the labor force. This takes into account the housewife's age, number of children, and age of youngest child. The value of household work was imputed for all women ever married until age 65, and beyond age 65 for women with spouses present or who were female heads of household. It was also imputed for married men with spouses present. Imputed household values plus marketplace earnings give total earnings, which were used to compute the present value of lifetime earnings.²⁸

Consumption.—In the past, it has been questioned whether the cost of morbidity and mortality due to illness is an individual's output or an individual's output minus his or her consumption.³⁵⁻³⁷ The concern of this report is with the cost of illness to society. The individ-

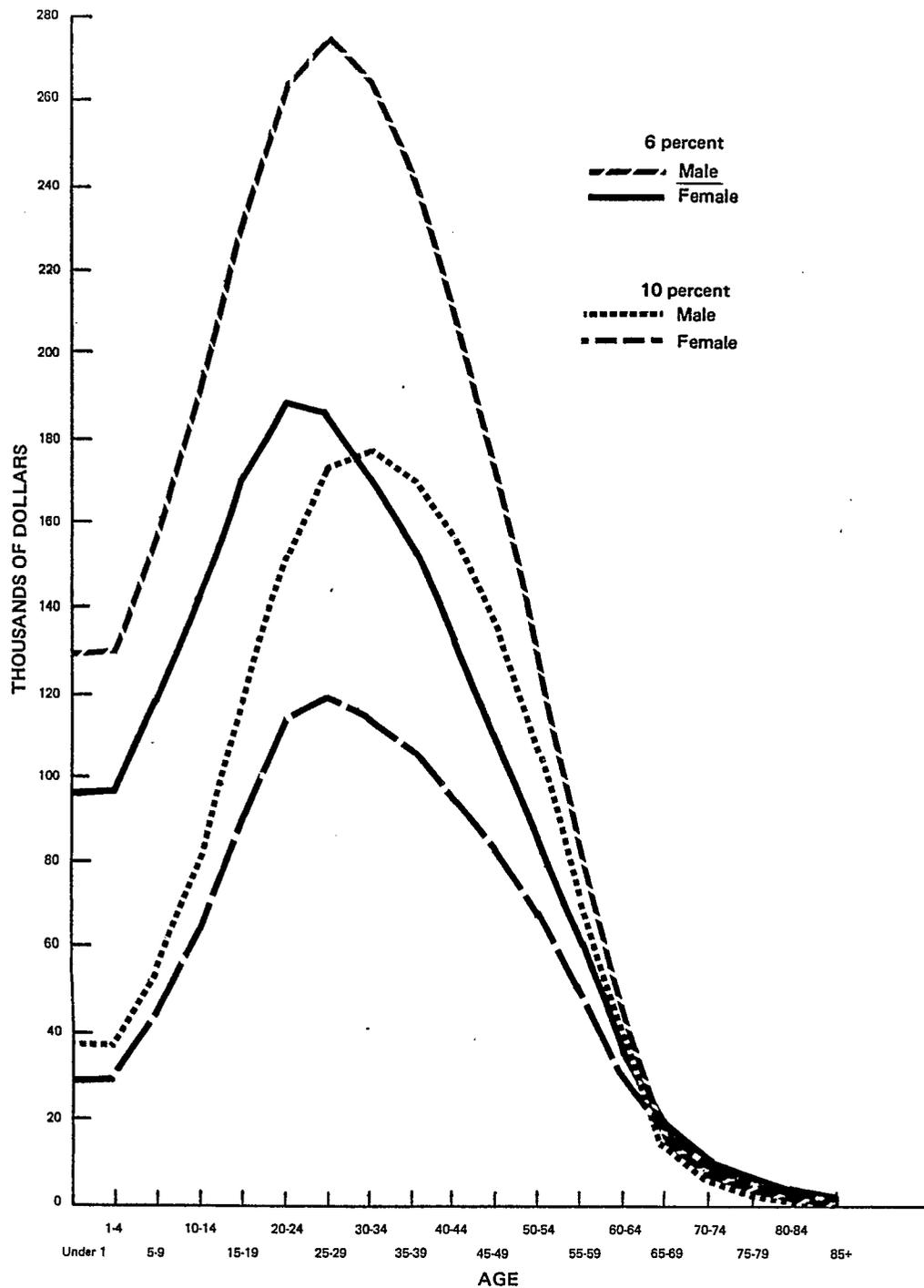
ual, not just the output he or she contributes. The excess of consumption, is valued by social economists today generally agree that consumption should not be deducted.³⁸

Life expectancy.—Lifetime earnings were calculated using modified generation tables. These tables incorporate the assumption that life expectancy changes between the years 1975 and 2050, with each cohort having a different mortality experience.²⁸

Value of human life.—One, if not the chief issue with respect to indirect costs is how to value life. The method in this report is called the *human capital* approach because an employed person is seen as producing a stream of output over the years that is valued at the individual's earnings. The main criticism of this methodology is that it excludes intangibles, only counts earnings, and undervalues some groups relative to others because earnings may not accurately reflect one's ability to produce. Thus men are more highly valued than women, white people more than black persons, and middle-aged people more than the young and elderly, with part of the difference due to racial and sexual discrimination.

An alternative approach favored by some is called the *willingness-to-pay* method, which values human life according to the amount people are willing to spend to obtain reductions in the probability of death. Objections to this method are that the value of individual lives depends on the income distribution, with the rich able to pay more than the poor, and that it is exceedingly difficult for persons to place a value on small reductions in the probability of death. One of the few attempts to apply willingness-to-pay was in a study of heart and circulatory disease.³⁹

Unfortunately, the precise nature of the relationship between values calculated by the human capital approach and those implied by the willingness-to-pay method has not been determined. Although it is not known to what extent the two values would differ if willingness to pay for small reductions in mortality risk could be calculated, lifetime earnings as estimated by the human capital method may at least be a lower bound to a person's willingness to pay for a decreased risk of death.^{40,41} In this regard it is



NOTE: An increase in productivity of 2 percent a year is projected in these calculations.

SOURCES: Present values at 6 percent are unpublished data obtained from the Public Services Laboratory, Georgetown University, Washington, D.C. Present values at 10 percent are from reference 28.

Figure 2. Present value of lifetime earnings discounted at 6 percent and 10 percent, by age and sex: United States, fiscal year 1975

interesting to note that several estimates of the value of avoiding increased risk of death do not differ greatly from the largest of the present values of lifetime earnings in table 2.⁴² This comparison is tentative, however, since the population bases are not the same in each case, and the human capital values are age specific while the willingness-to-pay estimates are not. The human capital approach is still most often used. It provides valuable information based on reliable statistics, so long as one realizes its limitations.

Findings

Number of deaths, person-years lost, and lost earnings in 1975 for all diseases and neoplasms by age and sex are shown in table 3. Twenty percent more males than females died of neoplasms, compared with 24 percent more for all diseases. But owing to the longer life expectancy among women, total person-years lost was about the same for each sex. Men, however, accounted for a much larger share of lost earnings due to lower labor force participation rates among women, lower earnings for women who do work, and still lower values imputed for women who keep house. For all diseases, mortality costs for males (71 percent) were significantly higher than for females (29 percent) (figure 3). For neoplasms, the difference was less; mortality costs for males comprised 59 percent of the total. This difference in mortality costs by sex is mostly due to a difference in age at death for females dying of neoplasms and females dying of all diseases. Forty-three percent of women whose deaths were caused by neo-

plasms were in the under-65-years age group, most productive years, while the corresponding figure for all diseases is only 28 percent.

Estimates of the total indirect costs of neoplasms and all diseases are given in table 4. A much larger proportion of indirect costs was due to mortality for neoplasms than for all diseases: 94 percent versus 60 percent, at a 6-percent discount rate (figure 4). Morbidity accounted only a small proportion of the indirect cost of neoplasms (6 percent). This disparity between neoplasms and all diseases in the distribution of indirect costs results directly from a similar parity in person-years lost due to morbidity and mortality. For neoplasms, only 2 percent of person-years lost resulted from morbidity, while 14 percent of person-years lost was due to morbidity for all diseases. That neoplasms carry a relatively greater burden from mortality compared with morbidity than do all diseases combined is further evidenced by the following statistics: Neoplasms account for 16 percent of person-years lost due to mortality from all diseases but only 2 percent of person-years lost to morbidity. Also, data from the Division of Vital Statistics of the National Center for Health Statistics show that, while malignant neoplasms account for 18 percent of all deaths, only 1 percent of all persons with limitations of activity report malignant neoplasms as the cause.

Morbidity costs for the currently employed and those unable to work each accounted about 40 percent of morbidity losses for neoplasms as well as for all diseases, with the remaining one-fifth split between females kept

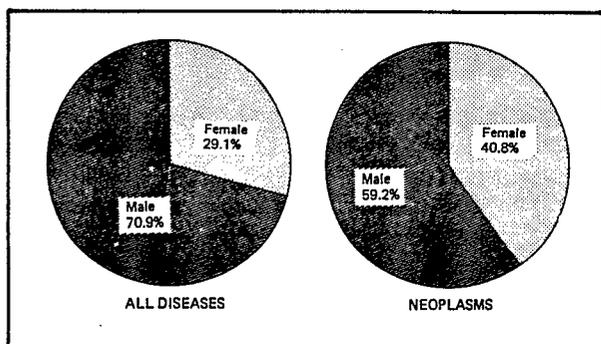


Figure 3. Percent distribution of indirect mortality costs at 6-percent discount rate for all diseases and neoplasms, by sex: United States, fiscal year 1975

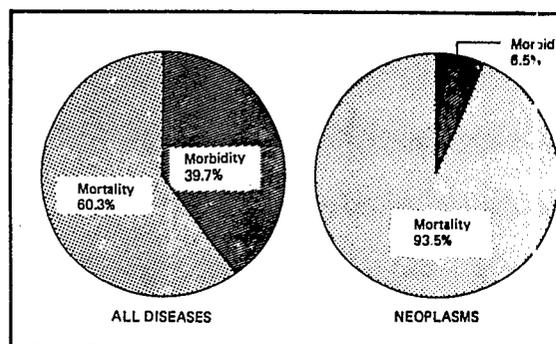


Figure 4. Percent distribution of indirect costs at 6-percent discount rate for all diseases and neoplasms, by type of United States, fiscal year 1975

house and the institutionalized population. A final point to note is that, while a change in the discount rate produces a change in the amount of mortality costs and the relative contribution of mortality and morbidity to total costs, it produces almost no change in the proportion of mortality costs attributed to men and women.

The dollar amounts and percent distribution of total economic costs in fiscal year 1975 are given in table 5 by type of cost for all diseases and neoplasms. The total cost of neoplasms was almost \$19 billion or over \$22 billion in fiscal year 1975 depending on whether mortality costs are discounted at 6 percent or 10 percent. The indirect cost of mortality was by far the largest component of economic costs of neoplasms, accounting for 71 percent of the total at a 6-percent discount rate. Morbidity contributed a very small share, only 5 percent, and direct costs made up 24 percent of the total (figure 5). In contrast, for all diseases, mortality contributed

only 36 percent, morbidity accounted for 24 percent, and direct costs were 40 percent of the total at a 6-percent discount rate.

Table 5 shows the significant impact of the discount rate on costs. The lower the discount rate, the higher the present value of future earnings lost due to mortality. Although only the indirect cost of mortality is affected by changes in the discount rate, the resulting change in mortality cost is large and produces significant shifts in the proportional distribution of costs.

Neoplasms were responsible for about 9 percent of the total costs of all diseases in fiscal year 1975. Direct costs of neoplasms were about 5 percent of all direct costs, and morbidity due to neoplasms contributed nearly 2 percent of all costs associated with morbidity. However, neoplasms represented a much larger share of costs associated with mortality—between 18 and 20 percent.

ECONOMIC COSTS OF CANCER BY SITE

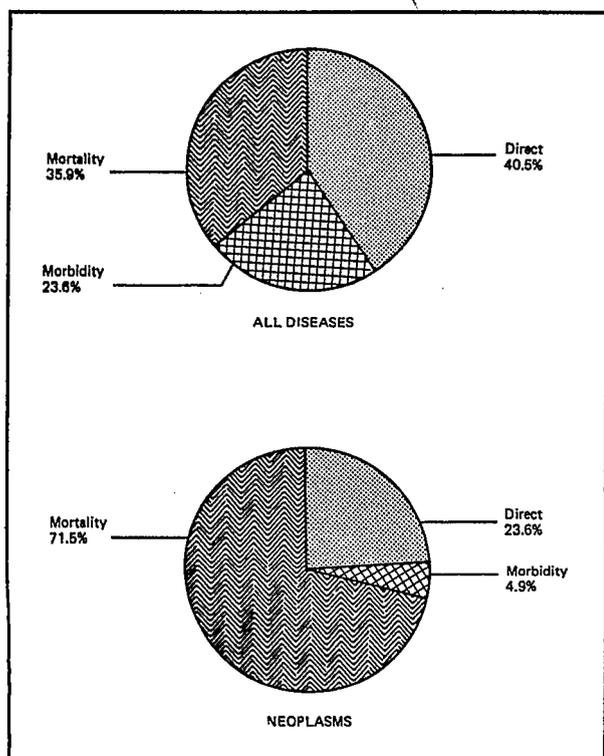


Figure 5. Percent distribution of economic costs at 6-percent discount rate for all diseases and neoplasms, by type of cost: United States, fiscal year 1975

Cancer is not a single disease, but a group of diseases. A common characteristic is the uncontrolled growth of abnormal cells, but there are great differences among various forms of cancer. Causes, appearance, and behavior are dissimilar.⁴³ Survival rates show considerable variation according to organ of origin. Cancers of the pancreas are highly fatal, with 5-year survival rates of only 1 percent. The 5-year survival rate for breast cancer, on the other hand, is around 65 percent.⁴ Trends in age-adjusted death rates also vary for different sites. In the United States, age-adjusted death rates for malignant neoplasms of the respiratory system have increased dramatically, rising from 21.6 per 100,000 white males and 4.6 per 100,000 white females in 1950 to 54.6 deaths per 100,000 white males and 13.8 per 100,000 white females in 1975. During this same period, age-adjusted death rates for cancers of the digestive organs and peritoneum decreased from 54.0 per 100,000 to 40.2 per 100,000 white males and from 41.1 per 100,000 to 26.4 per 100,000 white females.⁴⁴ Expenditures for resources in the form of hospital care and physicians' services for prevention, diagnosis, and treatment of cancer, and the number

of person-years and value of output lost due to premature mortality also vary significantly among cancer sites.

For these reasons it is important to distinguish among cancer sites, and in this section estimates of 1975 expenditures by cancer site for short-stay hospital care and physicians' services, and indirect costs of mortality are presented. Together these three categories account for 90 percent of the total economic costs of neoplasms. The two largest of the remaining cost categories, those arising from morbidity and nursing home care, account for 5 to 7 percent of total costs, but cannot be estimated by cancer site.

Short-Term Hospital Care

Table 6 presents the distribution of days of care for patients discharged from short-stay hospitals in 1975 according to cancer site, age, and sex. Patients with neoplasms spent more than 25.5 million days in short-stay hospitals in 1975. About 56 percent of these days (14.3 million) were used by persons under age 65, and 58 percent (14.9 million) were used by females. Eighty-three percent of days for benign neoplasms were used by those under age 65, and 78 percent, by females. For malignant neoplasms, the older age group accounted for slightly more days than those under age 65, while utilization by females exceeded that by males by about 7.5 percentage points.

More days of care were used by persons over age 65 for malignant neoplasms of the stomach, intestine and rectum, other digestive organs, male genital organs, and urinary organs. Younger persons accounted for more days of care for malignant neoplasms of the buccal cavity and pharynx, skin, breast, female genital organs, leukemia and other lymphatic and hematopoietic tissues, and benign neoplasms. Days of care for patients with cancers of the trachea, lung, and bronchus, and of other and unspecified sites were almost evenly distributed by age. For patients under age 65, 71 percent of hospital days were for malignant neoplasms, while for those age 65 and over the figure is 93 percent. About one-third of days used by the younger patients were for malignant neoplasms of the intestine and rectum, respiratory organs, breast, and lym-

phatic and hematopoietic tissues, while the sites plus male genital organs accounted for most 50 percent of the days reported for patients age 65 and over.

Excluding neoplasms of the breast and genital systems, males accounted for more of days resulting from cancer of the buccal cavity and pharynx, stomach, respiratory system, urinary organs, and leukemia. Females used more days of care for other digestive organs, other lymphatic and hematopoietic tissues, and benign neoplasms, while there was little difference in utilization between the sexes for cancers of the intestine and rectum, skin, and other and unspecified sites.

Expenditures for short-stay hospital care shown in table 7. (See the appendix for an explanation of the methodology that resulted in a significantly higher estimate than that made by Georgetown University for short-term hospital care.²⁸) The total spent for all neoplasms in 1975 was estimated at \$4.1 billion, with 78 percent, or \$3.2 billion, spent for malignant neoplasms. Average daily charges for hospital care vary according to the site of the neoplasm and are somewhat higher for patients under age 65. Nevertheless, the primary determinant of the distribution of expenditures among sites and between the two age groups and sexes is the number of days of care. Expenditures follow closely the distribution of days of care, and the comments relating to hospital days also apply to expenditures.

Physicians' Services

Costs of physicians' services in 1975 for neoplasms are estimated at more than \$1.2 billion as shown in table 8. (See the appendix for an explanation of the methodology that resulted in significantly higher estimates than those made by Georgetown University.²⁸) Fifty-four percent of this total (\$672 million) was for inpatient hospital surgery. The remainder was almost equally divided between inpatient hospital medical care (\$274 million) and office and out visits (\$299 million). This pattern of expenditures did not prevail among all cancer sites, however. Although surgery accounted for over half the expenditures for most sites, surgery produced only 23 percent of the total costs for l

kemia. At the other extreme, 77 percent of the total costs for cancers of female genital organs was surgery connected. Relatively small amounts were spent for medical care in the hospital for some sites, such as cancers of the skin (5 percent of the total), female genital organs (12 percent), and benign neoplasms (12 percent), while 41 percent of the total spent for leukemia and almost one-third of expenditures each for digestive and respiratory organs were for medical care in the hospital. With respect to amounts spent for office and other types of visits, cancers of the female genital, digestive, and respiratory organs required relatively small expenditures (approximately 11 to 13 percent of their totals), while for benign neoplasms, leukemia, and skin cancers, 32, 36, and 42 percent of expenditures, respectively, were for office and other visits.

Benign neoplasms accounted for nearly 55 percent of the amount spent for all neoplasms for office and other visits, 22 percent of the cost of medical care in the hospital, and 43 percent of the total for surgery. Except for the residual category of "all other malignant neoplasms," inpatient hospital medical care for cancer of the digestive system, and benign neoplasms, no other site accounted for as much as 10 percent of expenditures when viewed according to type of visit. Further, there is no discernible pattern of expenditures by site according to type of visit.

Mortality

Tables 9 and 10 present data on deaths from neoplasms in 1975 by age, sex, cancer site, and color. Of almost 371,000 deaths, males accounted for 54 percent, and females, 46 percent (table 9). The majority of persons who died, 59 percent, were age 65 or over at time of death, while 35 percent were 45-64 years of age, and 6 percent were under age 45 (table 9).

Deaths due to cancers of the breast, digestive, respiratory, and genital organs constitute about 70 percent of all deaths from neoplasms among both males and females. For males, the leading causes of death were cancers of the respiratory organs (33.2 percent), digestive organs (26.1 percent), and genital organs (10.1 percent). Among females, the rank order is digestive organs (27.8 percent), breast (19.1 percent),

genital organs (13.4 percent), and respiratory organs (11.6 percent). Except for breast and genital cancer, and several sites, such as intestine and rectum, for which the numbers of male and female deaths were almost equal, there were more deaths reported for males than females for each site. Male deaths were especially predominant for neoplasms of the buccal cavity and pharynx, stomach, respiratory organs, and urinary organs, being 60 percent or more of all deaths reported for each of these sites. Except for cancers of the respiratory system and the small number of men who died of breast cancer, women tended to be older than men at age of death for most cancer sites.

Cancers of the sites just listed as the leading causes of death for males and for females were also the leading causes of death for persons ages 45-64, and 65 and over. For persons under age 45, leukemia, other lymphatic and hematopoietic tissues, and other and unspecified sites made a significant contribution to mortality of both sexes. In the 65-and-over age group, higher than average proportions of deaths were due to neoplasms of the digestive organs, urinary organs, and male genital organs. Deaths from skin cancers, leukemia, cancers of other lymphatic and hematopoietic tissues, other and unspecified sites, and benign neoplasms, on the other hand, occurred with relatively high proportions at ages under 65 years.

About 89 percent of persons dying because of neoplasms in 1975 were white (table 10). The distribution of deaths by color varied according to cancer site, with the ratio of the white population to total mortality highest for skin cancer (96 percent) and lowest for cancer of the cervix uteri (77 percent).

The number of person-years lost because of deaths from neoplasms is given in table 11 by age at death, sex, and site. The distributions of person-years lost by cancer site are similar to those for deaths for each age and sex. But there are noticeable differences in the age and sex distributions of person-years lost and the number of deaths, since more person-years are lost when a death occurs at a younger age, and women have longer life expectancy than men. Almost 60 percent of deaths from neoplasms occurred at age 65 and over, but these deaths produced

only 36 percent of person-years lost. The 35 percent of deaths occurring at ages 45-64 resulted in 47 percent of person-years lost, while deaths under age 45 years, 6 percent of the total, caused 17 percent of person-years lost.

Just as the age distribution of deaths varies according to cancer site, so does the age distribution of person-years lost. Age distributions by site are similar for males and females, but there is not a single pattern among the sites. For example, over half the person-years lost because of leukemia resulted from deaths of persons under age 45, while the majority of person-years lost due to cancers of the buccal cavity and pharynx, respiratory organs, breast, and certain female genital organs were in the 45-64-year age group, and 67 percent of years lost because of neoplasms of male genital organs occurred among persons age 65 years and over at time of death.

Although more males than females died of cancer (54.5 percent), males contributed a little less than half of all person-years lost (48.1 percent), owing mostly to the longer life expectancy among women. Still, except for breast cancer and malignant neoplasms of the intestine and rectum, person-years lost by males exceeded or were only slightly less than years lost by females. Years lost by males exceeded those lost by females by the largest amounts for cancers of the buccal cavity and pharynx and respiratory and urinary organs.

Another way of looking at the relationship of deaths, person-years lost, and age is to consider person-years lost per death (table 12). In 1975 this measure ranged from a low of 10.1 years per death associated with male genital organs to a high of 24.3 years per death for bone, connective, and other soft tissue, with an average of 16.1 years for all sites combined. The number of person-years per death also equaled or exceeded 20 years for the breast, cervix uteri, leukemia, and benign neoplasms. Years lost per female death exceeded years lost per male death for every site, the average difference being 4.1 years. Excluding breast cancers, the sex difference in years lost per death was largest for the trachea, lung, and bronchus (5.3 years) and smallest for benign neoplasms (1.2 years).

For all neoplasms, 43.5 years were lost per death at ages under 45 years, 21.5 years at ages

45-64, and 9.9 years at age 65 and over (table 12). Although years lost per death must decrease as age at death increases, there is considerable variation among sites within each age group, especially under age 65. The expected years lost for a person under age 45 dying of leukemia is almost 53 years in 1975, while the average person under age 45 who died of cancer of the trachea, lung, or bronchus lost an estimated 17.3 years. For deaths between ages 45-64, the average years lost ranged from a low of 17.3 for male genital organs to a high of 30.5 for benign neoplasms. These figures vary somewhat with age. Males and females are considered separately.

Multiplying number of deaths by present discounted values of lifetime earnings (both specified by age and sex) gives present discounted values of earnings lost due to premature mortality. These losses total \$15.9 billion at a 6 percent discount rate and average almost \$43,000 for each death due to neoplasms. Lifetime earnings are shown by age, sex, and site in table 13 at a 6-percent discount rate. The age distributions of lost earnings vary according to cancer site, depending on the age distribution of deaths for each site, but are similar for males and females.

Although almost 60 percent of all deaths from neoplasms in 1975 occurred at age 65 and over, this age group accounted for only 36 percent of person-years lost and 11 percent of lost earnings (figure 6), reflecting the lower life expectancy and earnings of the elderly. Those persons ages 45-64 years contributed 35 percent of deaths from neoplasms, 47 percent of person-years lost, and 62 percent of lost earnings. An individual age 45-64 who dies, whose earnings were relatively high, might otherwise have had a significant number of productive years remaining; this explains the high proportions of person-years and earnings for this age group. Persons under age 45 at time of death were responsible for 6 percent of deaths, 17 percent of years lost, and 27 percent of lost earnings. Individuals under age 45 have remaining many productive years at high earnings, therefore years lost due to the mortality costs are quite high relative to the number of deaths.

For all neoplasms, lost earnings are distributed approximately 60 percent among ma-

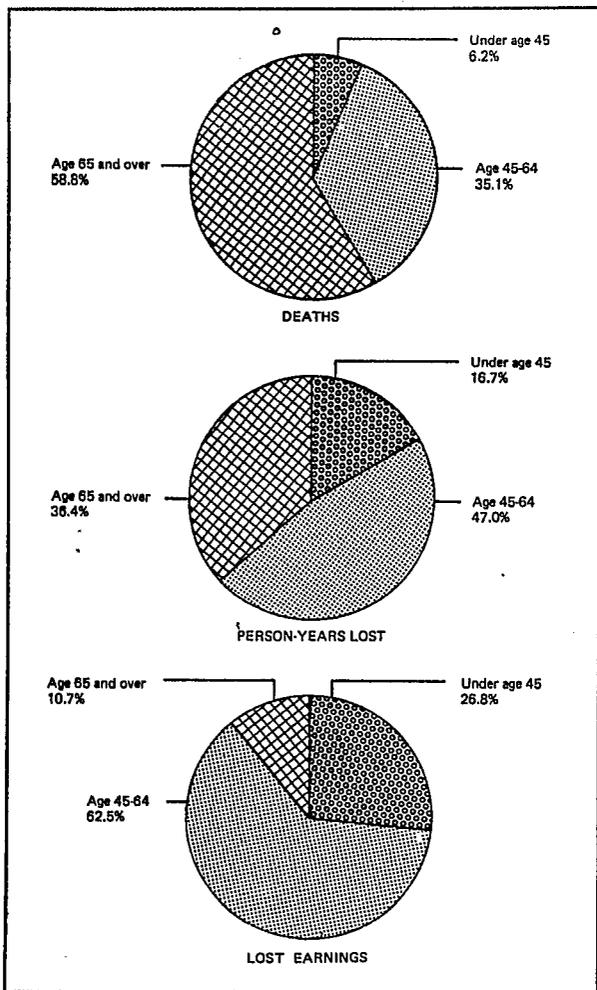


Figure 6. Percent distribution of deaths, person-years lost, and lost earnings at 6-percent discount rate for all neoplasms, by age: United States, 1975

and 40 percent among females. The male-female distribution of lost earnings varies according to site, but except for those sites specific to women, intestine and rectum, and benign neoplasms, over 60 percent of lost earnings results from deaths of males.

It must be remembered, however, that an inherent limitation of this approach to valuing life is the difference in economic reward accruing to groups distinguished by such characteristics as sex and race. The amount of earnings lost to women is less than that lost to men, even though women account for over half of all person-years lost. As seen in figure 7, 46 percent of deaths from neoplasms occurred among women, producing 52 percent of person-years lost but only 41 percent of lost earnings. This occurs because men's earnings exceed those of women at each age and also because women have longer life expectancy. Other things being equal, the latter factor serves to decrease the value, in terms of earnings, of a year lost to women compared with men since the average woman's additional years of life produce only small amounts of earnings.

The distributions of deaths, person-years lost, and lost earnings among selected cancer sites are shown figure 8. For the most part, the proportions attributed to a given cancer site are similar. Neoplasms of the respiratory organs and neoplasms of other and unspecified sites each accounted for approximately one-fourth of all deaths, person-years lost, and lost earnings. Cancers of the digestive organs were responsible for 26.8 percent of deaths, 23.2 percent of

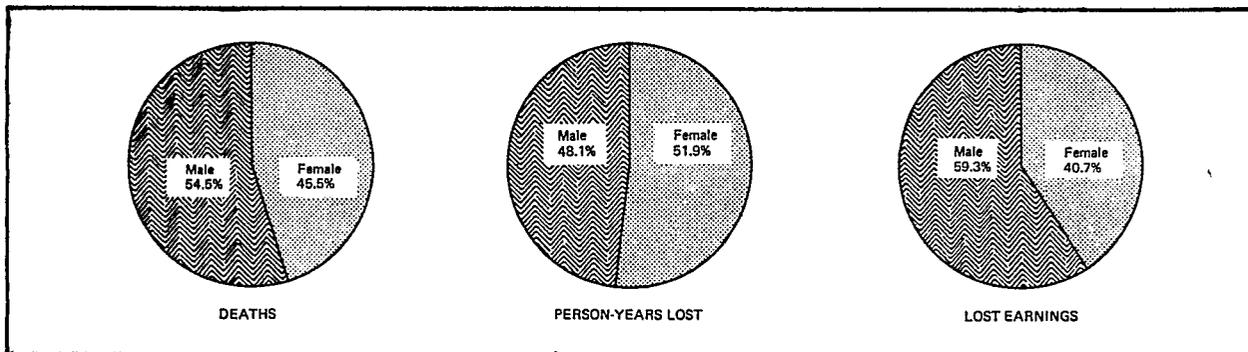


Figure 7. Percent distribution of deaths, person-years lost, and lost earnings at 6-percent discount rate for all neoplasms, by sex: United States, 1975

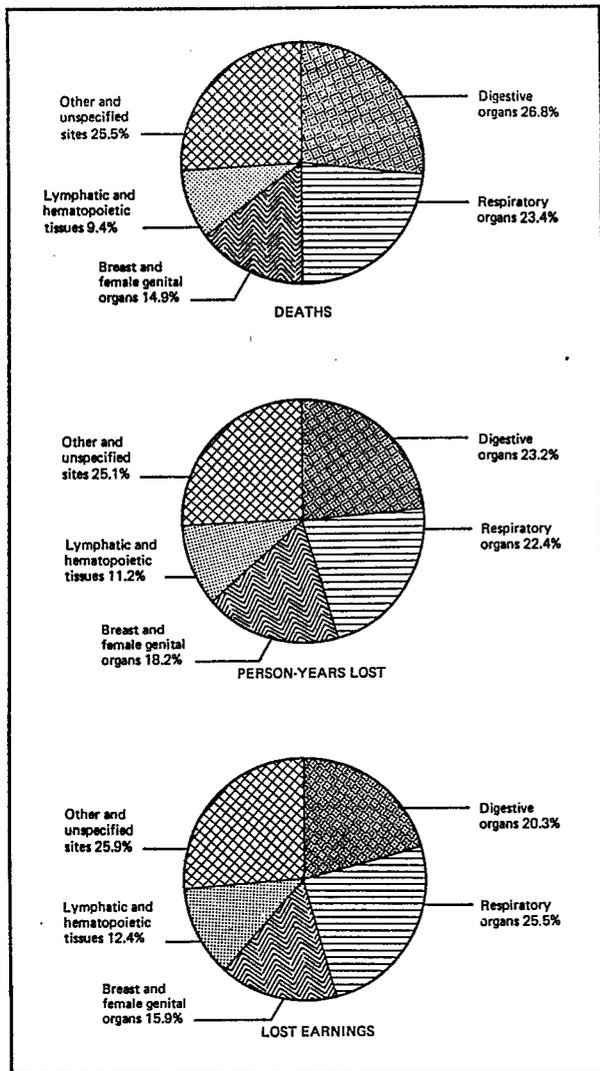


Figure 8. Percent distribution of deaths, person-years lost, and lost earnings at 6-percent discount rate for all neoplasms, by cancer site: United States, 1975

person-years lost, and 20.3 percent of lost earnings. For cancers of the breast and female genital organs, the respective percents are 14.9, 18.2, and 15.9; for lymphatic and hematopoietic tissues the figures are 9.4 percent of deaths, 11.2 percent of person-years lost, and 12.4 percent of lost earnings.

Economic Costs

Table 14 summarizes estimated expenditures in 1975 for short-stay hospital care and physi-

cians' services, and indirect costs of mortality by cancer site. Expenditures for direct costs reflect the amount and cost per unit of medical care and indirect mortality costs reflect the number, age, and sex distribution of deaths, labor force participation, and earnings. It is estimated that in 1975 more than \$4.1 billion was spent on hospital care for neoplasms and over \$1.2 billion for physicians' services. Indirect costs of mortality were \$12.4 billion at a 10-percent discount rate, or \$15.9 billion at 6 percent.

Aside from the residual categories, cancers of the digestive and respiratory organs result in the highest economic costs. Cancers of the digestive system accounted for 16 percent of expenditures for hospital care, 9 percent for those for physicians' services, and more than one-fifth of mortality costs for neoplasms. Cancers of the respiratory system resulted in few expenditures for hospital care (10 percent of total) and physicians' services (6 percent), but were responsible for more than one-fourth of mortality costs. These figures reflect the relatively high use of medical care and the large number of deaths due to cancers of these sites. Overall there were 15 percent more deaths from cancers of the digestive organs than of the respiratory system; the latter occurred more frequently among men than women and at young ages. Consequently, the average indirect cost per cancer death was higher for the respiratory system than for the digestive system, both because more productive years were lost and because earnings are higher for men than women. This is clearly shown in tables 11 and 2, respectively.

Cancers of the breast and female genital organs and benign neoplasms resulted in lower expenditures, but these amounted to about one-third to one-half the costs of cancers of digestive and respiratory organs. The remaining cancer sites, namely cancers of the skin, male genital organs, and leukemia, accounted for relatively small amounts of cost compared with other sites. Benign neoplasms are unique in that direct costs exceeded mortality costs owing to the very low mortality for this site. Benign neoplasms accounted for 22 percent of all short-stay hospital costs and 41 percent of costs of physicians' services, but are only 2 percent of mortality costs. Although indirect costs vary by considerable

amounts for different discount rates, decreasing as the discount rate increases, the percent distributions of mortality costs among sites are similar.

SUMMARY AND CONCLUSION

This report detailed the direct and indirect economic costs resulting from the prevalence of neoplasms in 1975 in the United States. These costs include expenditures for hospital care, physicians' services, and other health care measures used in prevention, diagnosis, and treatment, and also include the value of output lost due to morbidity and premature mortality.

Neoplasms accounted for 9 percent of the total costs estimated for all illnesses. Over \$4.1 billion was spent for an estimated 25.5 million days of nonfederal short-stay hospital care. In addition, care was received by cancer patients in other types of hospitals, such as Veterans' Administration hospitals. Expenditures in these hospitals amounted to almost 15 percent of the sum for nonfederal short-stay hospitals and bring the total cost of hospital care for neoplasms to about \$4.7 billion. An additional \$1.2 billion was spent for physicians' services, with \$672 million or 54 percent of this total for surgery in the hospital and the remainder almost equally divided between medical care in the hospital (\$274 million) and office and other visits (\$299 million). Almost 371,000 persons died from neoplasms in 1975. This premature mortality resulted in an average loss of 16.1 person-years and almost \$43,000 lost per death. Total mortality costs amounted to \$15.9 billion at a 6-percent discount rate based on the human capital approach to valuing lives.

By 1977 the total direct and indirect costs for all diseases had increased to \$311 billion with mortality costs discounted at 10 percent, and \$346 billion at a 6-percent discount rate. Neoplasms accounted for about 10 percent of the total for all diseases, ranging from \$29 billion to \$35 billion. Appendix tables present data relating to economic costs of neoplasms by site for hospital care, physicians' services, and mortality in 1977.

Over the years, the cost of neoplasms has in-

creased relative to that of most other diseases. Neoplasms accounted for 1 percent of the total costs of all diseases in 1900,⁴⁵ 4 percent in 1930,⁴⁶ and 9 percent in 1975.²⁸ Direct costs of neoplasms as a percent of all direct costs almost doubled between 1900 and 1975, increasing from 2.3 percent to 4.5 percent. More than three-fourths of the total costs of neoplasms are indirect costs, and these have increased by the largest amount, from 0.9 percent of all indirect costs in 1900 to 4.3 percent in 1930 and to 11.2 percent in 1975. This increase in the cost of neoplasms relative to all other diseases results from the increasing importance of neoplasms as a cause of death. In 1900, neoplasms were the tenth leading cause of death and accounted for less than 3 percent of all deaths.⁴⁵ In 1930, deaths from neoplasms were 9 percent of all deaths and the sixth leading cause of death.⁴⁶ By 1975, only the number of deaths from diseases of the circulatory system exceeded the number due to neoplasms, and neoplasms accounted for 19 percent of all deaths.²⁸

Future levels of the costs of neoplasms depend on a number of factors including incidence, mortality, and survival rates; utilization and cost of medical care; economic variables such as employment and earnings; and the size and age distribution of the population. The net impact on the future level of costs is uncertain since some factors are working to increase costs and others, to decrease costs, and the projection of trends into the future requires considerable conjecture.

Incidence, prevalence, and mortality are three common measures of disease. Although there is no nationwide reporting of cancer incidence in the United States, surveys conducted by the National Cancer Institute in 1937, 1947, and 1969 show a rising trend in age-adjusted rates for men and a falling trend for women.⁴⁷ The changes over time differ among sites, however. For some sites, such as the stomach and uterus, cancer has decreased significantly. Equally dramatic changes, but in the opposite direction, are observed for cancers of the lung. Although much lower, time trends in mortality rates for the United States released by the National Center for Health Statistics parallel the trends in incidence rates by cancer site.⁴⁴

Other things being equal, the absolute level of direct and indirect economic costs will rise with increases in incidence and mortality as more medical care is used and output lost increases. Without any increase in incidence or mortality, the increasing size and aging of the population will tend to increase both the absolute cost of cancer, and the cost of cancer relative to the cost of diseases that occur mainly at younger ages, since cancer is mostly a disease of the middle and old aged. Under alternative assumptions about future fertility, mortality, and net immigration, the Bureau of the Census projects future population trends. Of three projections, the middle one estimates that the United States population will increase from 217 million persons in 1977 to 260 million persons in the year 2000.⁴⁸ While total population will increase by 20 percent, the population age 45 years and over will increase by 35 percent, from 67.2 million to 91.0 million people. During this period, the population will grow older as median age rises from 29.4 to 35.5 years and the proportion age 45 and over increases from 31 percent in 1977 to 35 percent in 2000.

For all cancer patients combined, there has been a small improvement in relative survival rates in the past 20 years, with the increase in survival depending on cancer site.⁴⁹ Among the 10 leading cancer sites, the greatest improvements in 5-year relative survival rates were for cancers of the bladder and prostate. Cancers of the breast and rectum also show some improvement, especially among black patients. Improvements in survival rates may have a mixed effect on costs. Indirect costs of mortality will decrease, but this trend may be offset to some extent if increases in use of medical care and indirect losses due to morbidity accompany increases in survival time.

Given the amount of illness that exists, the use and cost of medical care for prevention, diagnosis, and treatment will affect the magnitude of direct costs. Medical care prices have been rising rapidly in the United States since the Economic Stabilization Program ended in April 1974. During the period 1974-76, physicians' fees rose 25 percent, and hospital service charges for a semiprivate room increased 33 percent, as measured by annual averages of the Consumer Price Index.⁵⁰ There are many components to

medical care utilization. Hospital care, for example, includes room, board, and miscellaneous services, such as laboratory tests, medication, intensive care, and surgical facilities. Variation in use of these hospital services will be reflected in the cost of a hospital stay. For example, the average length of stay for malignant neoplasm in nonfederal short-stay hospitals has decreased slowly but steadily in recent years, declining 1.6 days from 14.1 days in 1971 to 12.7 days in 1976.⁵¹⁻⁵²

Cancer therapy has changed significantly over the years, and it is likely that changes will continue to take place. Studying a small number of selected illnesses during two time periods, Scitovsky and McCall found changes in treatment could be cost raising or cost saving.⁵³ In the years between 1951 and 1964, there was a consistent decrease in average length of hospital stay, and this was the main cost-saving change observed. Between 1951 and 1964, however, savings due to reduced length of hospital stay were outweighed by increases in costs due to increases in the number of diagnostic tests and therapeutic procedures per case, greater use of specialists, and substitution of inpatient for outpatient care. During the period 1964-71, average length of stay continued to decline, while the average number of diagnostic tests increased. Whereas in the earlier period the net effect of changes in treatment was cost raising for the illnesses studied, in the latter period, the net effect was cost raising for some conditions and cost saving for others. The reasons for cost saving vary, although shorter lengths of stay occurred for all illnesses studied. In addition there was a shift to lower-priced tests for cancer of the breast and a decline in the number of physician visits, X-rays, and laboratory tests for treating a case of duodenal ulcer. This study shows that the cost of treating an illness may increase or decrease as the method of treatment changes.

Indirect economic costs are directly related to levels of employment and earnings. Since 1970, the proportion employed of the civilian

^cChanges in treatment refers to all changes in input of medical services, including new techniques or drugs increases or decreases in the use of specialists, laboratory tests, days of hospital stay, and substitution, for example, of outpatient for inpatient care.

population age 18-65 years has consistently been near 70 percent, varying only from a low of 69.1 percent to a high of 71.2 percent.⁵⁰ Earnings of wage and salary workers, on the other hand, have been increasing steadily for at least a decade, paralleling the general inflation that has taken place in the U.S. economy. Between 1967 and 1976, median weekly earnings of wage and salary workers increased at an average annual rate of 6.8 percent.⁵⁴

Future economic costs depend on the extent of cancer illness, cancer therapies and the attendant use of medical care, medical care prices, and economic variables, such as employment and earnings. This brief description of recent trends indicates the changes that can occur, often quite rapidly. Measures that increase (greater exposure to environmental carcinogens, for example) or decrease (reduced smoking) the incidence of cancer will have a like effect on the direct and indirect costs that accompany morbidity and mortality, whereas new forms of therapy may be cost raising or cost saving. It is likely that eventual scientific breakthroughs in prevention and treatment will reduce the threat of cancer. In some cases, already existing knowledge, if implemented, would result in significant reductions in mortality. For example, mortality from lung cancer is many times higher for cigarette smokers than for lifelong nonsmokers. Ex-smokers also benefit, as mortality from lung cancer in this group decreases steadily with length of time since having stopped smoking.⁵⁵

It would be speculative, however, to anticipate future trends and the net effect of changes in several factors. A recent effort to project cancer mortality in the year 2000 by a Delphi technique⁵⁶ illustrates the uncertainty involved in projecting future trends. A panel of experts, including clinicians, cancer clinic administrators, researchers, and epidemiologist-biostatisticians, was asked to predict death rates from cancer in

the year 2000. The seven responses ranged from a 20-percent increase in current death rates to a 90-percent reduction in cancer mortality. The expert predicting the latter expected new developments in detection and therapy, a decrease in the proportion of the population that smokes, and an increase in the use of low-tar cigarettes. The expert predicting an increase in mortality believed that increases in occupational exposure to chemicals, air and water pollution, food additives, and nuclear radiation would result in higher mortality rates. The median response predicts a 6.5-percent decrease in total cancer deaths from the number that will occur if 1974 death rates apply in the year 2000, and the average of the middle five responses predicts a 16-percent decrease in cancer deaths. The panel's projections of future cancer mortality are quite varied.

Economic costs are potential benefits of reduced cancer morbidity and mortality. Direct costs represent resources that could be allocated to other uses, and indirect costs are the value of idle resources and lost output. Knowledge of the costs of specific diseases is an aid to more rational decisionmaking with respect to allocating scarce resources among competing ends.

Economic costs are, however, an incomplete measure of the burden of disease. The quality of life is very important, and it is hoped rapid progress can be made in measuring social costs of illness and disease. Further work is also needed on economic costs. The future costs of morbidity are unknown, estimates are lacking for the costs associated with incidence of disease, and alternative approaches to valuing life, such as willingness-to-pay, need refinement. Nevertheless, the methodology employed, pending improvements and refinements, is a means for estimating a large part of the burden of disease and provides consistent estimates across the spectrum of disease categories.



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Table 1. Estimated direct expenditures and percent distribution of expenditures for all diseases and neoplasms, and expenditures for neoplasms as a percent of all diseases, by type of expenditure: United States, fiscal year 1975

Type of expenditure	Expenditures for:				
	All diseases ¹		Neoplasms		Neoplasms as a percent of all diseases
	Amount in millions	Percent distribution	Amount in millions	Percent distribution	
Total.....	² \$99,373.2	100.0	\$5,278.9	100.0	5.
Hospital care.....	46,414.9	46.7	4,134.2	78.3	8.
Physicians' services.....	22,099.9	22.2	671.2	12.7	3.
Other professional services.....	1,453.5	1.5	50.1	1.0	3.
Drugs and drug sundries.....	10,604.9	10.7	202.7	3.8	1.
Nursing home care.....	9,000.0	9.1	220.7	4.2	2.
Dentists' services.....	7,500.0	7.5	...	...	...
Eyeglasses and appliances.....	2,300.0	2.3	...	...	...

¹Based on Social Security Administration's preliminary estimates for fiscal year 1975.

²Excludes unallocated expenditures for prepayment and administration, government public health activities, other health services research, and construction.

SOURCE: Paringer, L., and Berk, A.: Costs of illness and disease fiscal year 1975.²⁸

Table 2. Present value of lifetime earnings discounted at 6 percent and 10 percent, by sex and age: United States, fiscal year 1975

Age	Present value of lifetime earnings			
	6-percent discount		10-percent discount	
	Male	Female	Male	Female
Under 1 year.....	\$129,435	\$ 96,303	\$ 37,659	\$ 29,80
1-4 years.....	129,794	97,284	38,036	30,22
5-9 years.....	157,381	118,002	55,705	44,28
10-14 years.....	191,965	143,745	82,066	65,16
15-19 years.....	230,812	171,067	117,367	91,81
20-24 years.....	263,308	188,384	152,964	113,89
25-29 years.....	274,496	185,581	173,868	119,88
30-34 years.....	263,864	170,571	176,882	114,05
35-39 years.....	241,464	152,391	170,362	105,80
40-44 years.....	210,785	132,100	156,719	95,41
45-49 years.....	171,975	110,049	134,756	83,23
50-54 years.....	127,682	85,799	105,213	67,96
55-59 years.....	83,144	60,224	72,093	49,84
60-64 years.....	42,318	35,957	38,439	30,67
65-69 years.....	15,698	18,995	14,048	16,23
70-74 years.....	7,239	10,672	6,579	9,35
75-79 years.....	3,268	5,541	3,018	4,98
80-84 years.....	1,499	2,771	1,410	2,56
85 years and over.....	610	1,183	610	1,11

NOTE: An increase in productivity of 2 percent a year is projected in these calculations.

SOURCES: Present values at 6 percent are unpublished data obtained from the Public Services Laboratory, Georgetown University, Washington, D.C. Present values at 10 percent are from Paringer, L., and Berk, A.: Costs of illness and disease fiscal year 1975.²⁸

Table 3. Number and percent distribution of persons by deaths, estimated person-years lost, and sex, and cost and percent distribution by discount rate and sex, according to age: United States, fiscal year 1975

Characteristic	Age							
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
DEATHS¹								
<u>All diseases</u>								
Both sexes.....	Number in thousands				Percent distribution			
	1,936	232	463	1,241	100	12	24	64
Male.....	1,071	151	297	624	100	14	28	58
Female.....	865	81	166	617	100	9	19	71
<u>Neoplasms</u>								
Both sexes.....	366	23	131	211	100	6	36	58
Male.....	199	11	71	117	100	6	36	59
Female.....	166	12	60	94	100	7	36	57
<u>PERSON-YEARS LOST</u>								
<u>All diseases</u>								
Both sexes.....	35,005	15,479	9,248	10,278	100	44	26	29
Male.....	17,344	8,217	3,770	5,357	100	47	22	31
Female.....	17,661	7,262	5,478	4,921	100	41	31	28
<u>Neoplasms</u>								
Both sexes.....	5,545	1,013	2,552	1,981	100	18	46	36
Male.....	2,770	549	1,244	966	100	20	45	35
Female.....	2,775	464	1,308	1,004	100	17	47	36
<u>LOST EARNINGS DISCOUNTED AT 6 PERCENT</u>								
<u>All diseases</u>								
Both sexes.....	Amount in millions				Percent distribution			
	\$87,926	\$43,268	\$37,062	\$7,596	100	49	42	9
Male.....	62,328	32,093	26,499	3,736	100	51	43	6
Female.....	25,598	11,176	10,563	3,860	100	44	41	15
<u>Neoplasms</u>								
Both sexes.....	15,974	4,342	9,972	1,661	100	27	62	10
Male.....	9,454	2,537	6,082	835	100	27	64	9
Female.....	6,520	1,805	3,890	825	100	28	60	13
<u>LOST EARNINGS DISCOUNTED AT 10 PERCENT</u>								
<u>All diseases</u>								
Both sexes.....	62,527	24,984	30,763	6,781	100	40	49	11
Male.....	44,210	18,590	22,249	3,371	100	42	50	8
Female.....	18,318	6,394	8,514	3,410	100	35	46	19
<u>Neoplasms</u>								
Both sexes.....	12,549	2,816	8,257	1,476	100	22	66	12
Male.....	7,508	1,624	5,129	755	100	22	68	10
Female.....	5,041	1,192	3,128	721	100	24	62	14

¹Deaths are those for calendar year 1974.

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCES: Deaths, years lost, and lost earnings discounted at 10 percent are from Paringer, L., and Berk, A.: Costs of illness and disease fiscal year 1975.²⁸ Lost earnings discounted at 6 percent are unpublished data from the Public Services Laboratory, Georgetown University, Washington, D.C.

Table 4. Estimated indirect costs of illness by disease category, type of cost, and demographic characteristic, according to amount in millions and discount rate: United States, fiscal year 1975

Disease category, type of cost, and demographic characteristic	Indirect costs					
	10-percent discount			6-percent discount		
	Amount in millions	Percent distribution:		Amount in millions	Percent distribution:	
		By type of cost	By demographic characteristic		By type of cost	By demographic characteristic
All diseases						
Total.....	\$120,375	100.0	...	\$145,774	100.0	...
Morbidity.....	57,846	48.1	100.0	57,846	39.7	100.0
Currently employed.....	21,303	17.7	36.8	21,303	14.6	36.8
Females keeping house.....	4,384	3.6	7.6	4,384	3.0	7.6
Unable to work.....	24,410	20.3	42.2	24,410	16.7	42.2
Institutionalized.....	7,750	6.4	13.4	7,750	5.3	13.4
Mortality.....	62,529	51.9	100.0	87,925	60.3	100.0
Male.....	44,210	36.7	70.7	62,328	42.8	70.7
Female.....	18,318	15.2	29.3	25,598	17.6	29.3
Neoplasms						
Total.....	\$13,654	100.0	...	\$17,079	100.0	...
Morbidity.....	1,105	8.1	100.0	1,105	6.5	100.0
Currently employed.....	422	3.1	38.2	422	2.5	38.2
Females keeping house.....	194	1.4	17.6	194	1.1	17.6
Unable to work.....	440	3.2	39.8	440	2.6	39.8
Institutionalized.....	49	0.4	4.4	49	0.3	4.4
Mortality.....	12,549	91.9	100.0	15,974	93.5	100.0
Male.....	7,508	55.0	59.8	9,454	55.4	59.8
Female.....	5,041	36.9	40.2	6,520	38.2	40.2

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCE: Paringer, L., and Berk, A.: Costs of illness and disease fiscal year 1975.²⁸

Table 5. Estimated costs and percent distribution of all diseases and neoplasms, and neoplasms as a percent of all diseases, by type of cost, according to disease category and discount rate: United States, fiscal year 1975

Disease category and discount rate	Type of cost				
	All costs	Direct cost ¹	Indirect cost		
			Total	Morbidity	Mortality
<u>All diseases</u>					
Amount in millions					
10-percent discount	\$219,749	\$99,374	\$120,375	\$57,846	\$62,529
6-percent discount	245,145	99,374	145,771	57,846	87,925
<u>Neoplasms</u>					
10-percent discount	18,933	5,279	13,654	1,105	12,549
6-percent discount	22,358	5,279	17,079	1,105	15,974
<u>All diseases</u>					
Percent distribution					
10-percent discount	100.0	45.2	54.8	26.3	28.5
6-percent discount	100.0	40.5	59.5	23.6	35.9
<u>Neoplasms</u>					
10-percent discount	100.0	27.9	72.1	5.8	66.3
6-percent discount	100.0	23.6	76.4	4.9	71.5
<u>Neoplasms</u>					
Percent of all diseases					
10-percent discount	8.6	5.3	11.3	1.9	20.1
6-percent discount	9.1	5.3	11.7	1.9	18.2

¹Excludes unallocated expenditures for prepayment and administration, government public health activities, other health services, research, and construction.

SOURCE: Paringer, L., and Berk, A.: Costs of illness and disease fiscal year 1975.²⁸

Table 6. Days of care in short-stay hospitals for patients with neoplasms, by cancer site, sex, and age: United States, calendar year 197

Site	Total	Sex		Age	
		Male	Female	Under 65 years	65 years and over
Days of care in short-stay hospitals in thousand:					
All neoplasms.....	25,505.1	10,610.7	14,894.4	14,301.2	11,203.
Malignant neoplasms.....	20,611.6	9,520.9	11,090.7	10,212.8	10,398.
Buccal cavity and pharynx.....	394.5	265.9	*	233.6	
Stomach.....	570.0	339.4	230.6	253.8	361.
Intestine and rectum.....	2,629.1	1,310.0	1,319.1	1,001.3	1,627.
Other digestive organs.....	958.8	445.3	513.5	327.3	631.
Trachea, lung, and bronchus.....	2,366.5	1,690.5	675.9	1,252.9	1,113.
Other respiratory organs.....	291.7	237.6	*	*	
Skin.....	503.9	265.2	238.8	291.2	212.
Breast.....	2,464.7	*	2,429.1	1,536.7	928.
Cervix uteri.....	743.1	...	743.1	654.7	
Other parts of uterus.....	482.3	...	482.3	279.4	202.
Other female genital organs.....	605.9	...	605.9	345.8	260.
Male genital organs.....	1,190.1	1,190.1	...	266.3	923.
Urinary organs.....	1,113.6	787.3	326.3	406.7	706.
Other and unspecified sites.....	4,109.0	1,934.1	2,174.8	2,008.7	2,100.
Leukemia.....	683.6	371.2	312.4	378.9	304.
Other lymphatic and hematopoietic tissues.....	1,504.7	648.6	856.1	857.5	647.
Benign neoplasms and neoplasms of unspecified nature.....	4,893.5	1,089.8	3,803.7	4,088.4	805.

NOTE: Numbers may not add to totals due to rounding.

SOURCE: Hospital Discharge Survey, National Center for Health Statistics.

Table 7. Estimated hospital expenditures for patients with neoplasms discharged from short-stay hospitals, by cancer site, sex, and age: United States, calendar year 1975

Site	Total	Sex		Age	
		Male	Female	Under 65 years	65 years and over
Expenditures for short-stay hospitals in millions					
All neoplasms	\$4,131.6	\$1,761.2	\$2,370.4	\$2,477.1	\$1,654.5
Malignant neoplasms.....	3,215.7	1,542.1	1,673.6	1,699.6	1,516.1
Buccal cavity and pharynx	67.0	46.5	*	41.2	*
Stomach	93.2	56.9	36.4	43.3	49.9
Intestine and rectum	425.3	221.8	203.5	170.3	255.0
Other digestive organs	151.0	73.3	77.7	55.1	95.9
Trachea, lung, and bronchus.....	379.5	273.6	105.9	211.3	168.3
Other respiratory organs.....	47.4	39.1	*	*	*
Skin.....	84.4	45.6	38.8	53.5	30.9
Breast.....	344.3	*	339.0	219.2	125.0
Cervix uteri	124.4	...	124.4	112.2	*
Other parts of uterus.....	78.0	...	78.0	48.3	29.7
Other female genital organs.....	95.5	...	95.5	59.6	35.9
Male genital organs.....	169.4	169.4	...	42.2	127.2
Urinary organs.....	177.7	128.1	49.7	70.4	107.3
Other and unspecified sites.....	593.1	292.1	301.1	313.0	280.1
Leukemia	130.7	75.6	55.1	80.9	49.8
Other lymphatic and hematopoietic tissues	254.9	114.9	140.0	159.4	95.5
Benign neoplasms and neoplasms of unspecified nature.....	915.8	219.1	696.8	777.4	138.4

NOTE: Amounts may not add to totals due to rounding.

SOURCES: Days of care, from the Hospital Discharge Survey of the National Center for Health Statistics; Health Care Financing Administration for average per diem charges to Medicare patients; Third National Cancer Survey of the National Cancer Institute for ratio of average daily hospital payments for patients under age 65 to payments for patients age 65 and over.

Table 8. Estimated expenditures for and percent distribution of physicians' services due to neoplasms and percent distribution by type of visit by cancer site, according to type of visit: United States, calendar year 1975

Site	Type of visit											
	Total	Office and other ¹	Inpatient hospital		Total	Office and other ¹	Inpatient hospital		Total	Office and other ¹	Inpatient hospital	
			Medical	Surgical			Medical	Surgical			Medical	Surgical
	Expenditures in millions				Percent distribution by site				Percent distribution by type of visit			
All neoplasms.....	\$1,245.6	\$299.2	\$274.1	\$672.3	100.0	100.0	100.0	100.0	100.0	24.0	22.0	54.0
Digestive organs.....	114.1	14.0	36.2	63.9	9.2	4.7	13.2	9.5	100.0	12.3	31.7	56.0
Respiratory organs.....	78.0	10.0	25.5	42.4	6.3	3.4	9.3	6.3	100.0	12.9	32.7	54.7
Skin.....	46.1	19.4	2.5	24.2	3.7	6.5	0.9	3.6	100.0	42.1	5.4	52.1
Breast.....	84.3	15.4	17.8	51.1	6.8	5.1	6.5	7.6	100.0	18.3	21.1	60.6
Female genital organs.....	73.9	8.0	8.8	57.1	5.9	2.7	3.2	8.5	100.0	10.8	11.9	77.5
Male genital organs.....	51.2	10.2	14.8	26.2	4.1	3.4	5.4	3.9	100.0	19.9	28.9	51.2
Leukemia.....	23.9	8.6	9.9	5.4	1.9	2.9	3.6	0.8	100.0	36.0	41.4	22.6
All other malignant neoplasms.....	259.1	50.0	97.5	111.6	20.8	16.7	35.6	16.6	100.0	19.3	37.6	43.1
Benign neoplasms and neoplasms of unspecified sites.....	514.9	163.4	61.1	290.4	41.3	54.6	22.3	43.2	100.0	31.7	11.9	56.4

¹Other includes home, telephone, nursing home, and other.

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCES: Health Care Financing Administration for total expenditures for physicians' services; National Disease Therapeutic Index for physicians' visits by site; James R. Cantwell, ed.: *Profiles of Medical Practice*, American Medical Association, Chicago, 1976, for average fees; and Hospital Discharge Survey, National Center for Health Statistics, for number of short-stay hospital discharges with surgery by site.

Table 9. Number of deaths from neoplasms, by cancer site, sex, and age: United States, calendar year 1975

Site	Both sexes				Male				Female			
	All ages ¹	Under 45 years	45-64 years	65 years and over	All ages ¹	Under 45 years	45-64 years	65 years and over	All ages ¹	Under 45 years	45-64 years	65 years and over
	Deaths in thousands											
All neoplasms.....	370.6	22.8	130.0	217.8	201.9	11.1	70.2	120.6	168.8	11.7	59.8	97.3
Malignant neoplasms.....	365.7	22.0	128.4	215.3	199.4	10.7	69.4	119.4	166.2	11.3	59.0	95.9
Buccal cavity and pharynx.....	8.1	0.3	3.8	4.0	5.7	0.2	2.7	2.8	2.4	0.1	1.1	1.3
Stomach.....	15.0	0.5	4.3	10.3	9.0	0.3	2.8	5.9	6.0	0.2	1.5	4.4
Intestine and rectum.....	50.1	1.4	13.7	35.0	24.2	0.7	7.1	16.4	25.9	0.7	6.6	18.6
Other digestive organs.....	34.6	0.9	11.6	22.0	19.6	0.6	7.4	11.7	15.0	0.3	4.3	10.3
Trachea, lung, and bronchus.....	82.0	2.7	36.5	42.9	63.4	1.7	27.4	34.3	18.6	0.9	9.1	8.6
Other respiratory organs.....	4.6	0.2	2.0	2.4	3.7	0.2	1.6	1.9	1.0	0.1	0.4	0.5
Bone, connective, and other soft tissue.....	3.2	0.8	1.0	1.4	1.7	0.5	0.5	0.7	1.5	0.4	0.5	0.7
Skin.....	5.3	0.9	1.9	2.5	3.1	0.5	1.2	1.3	2.2	0.4	0.7	1.1
Breast.....	32.4	2.7	14.5	15.2	0.3	0.0	0.1	0.2	32.2	2.7	14.4	15.0
Cervix uteri.....	5.6	0.9	2.5	2.2	...	...	...	...	5.6	0.9	2.5	2.2
Other parts of uterus.....	5.6	0.2	1.8	3.7	...	...	...	...	5.6	0.2	1.8	3.7
Other female genital organs.....	11.4	0.7	5.0	5.8	...	...	...	...	11.4	0.7	5.0	5.8
Male genital organs.....	20.4	0.6	2.6	17.3	20.4	0.6	2.6	17.3	...	...	...	...
Urinary organs.....	16.5	0.5	4.6	11.4	11.0	0.3	3.2	7.5	5.5	0.2	1.3	4.0
Other and unspecified sites.....	36.1	3.5	12.7	19.9	18.3	1.9	7.0	9.4	17.8	1.6	5.7	10.4
Leukemia.....	14.8	3.0	3.5	8.2	8.4	1.7	2.1	4.6	6.4	1.3	1.4	3.6
Other lymphatic and hematopoietic tissues.....	20.0	2.3	6.5	11.2	10.8	1.4	3.8	5.6	9.2	0.8	2.7	5.6
Benign neoplasms and neoplasms of unspecified nature.....	4.9	0.8	1.6	2.5	2.4	0.4	0.9	1.2	2.5	0.4	0.8	1.3

¹Totals include persons of unknown ages.

NOTE: Numbers may not add to totals due to rounding.

SOURCE: Division of Vital Statistics, National Center for Health Statistics.

Table 10. Number and percent distribution of deaths from neoplasms by cancer site, according to color: United States, calendar year 1975

Site	Color								
	Total	White	All other	Total	White	All other	Total	White	All other
	Deaths in thousands			Percent distribution by site			Percent distribution by color		
All neoplasms.....	370.6	329.9	40.8	100.0	100.0	100.0	100.0	89.0	11.0
Malignant neoplasms	365.7	325.5	40.2	98.7	98.7	98.5	100.0	89.0	11.0
Buccal cavity and pharynx.....	8.1	7.1	1.1	2.2	2.1	2.6	100.0	86.6	13.4
Stomach.....	15.0	12.6	2.4	4.0	3.8	5.8	100.0	84.0	16.0
Intestine and rectum.....	50.1	45.7	4.4	13.5	13.8	10.7	100.0	91.2	8.8
Other digestive organs.....	34.6	29.8	4.8	9.3	9.0	11.8	100.0	86.1	13.9
Trachea, lung, and bronchus.....	82.0	73.3	8.8	22.1	22.2	21.5	100.0	89.3	10.7
Other respiratory organs.....	4.6	4.0	0.6	1.3	1.2	1.5	100.0	87.0	13.0
Bone, connective, and other soft tissue.....	3.2	2.8	0.4	0.9	0.9	0.9	100.0	87.5	12.5
Skin.....	5.3	5.1	0.2	1.4	1.5	0.4	100.0	96.2	3.8
Breast.....	32.4	29.6	2.9	8.8	9.0	7.0	100.0	91.1	8.9
Cervix uteri.....	5.6	4.3	1.3	1.5	1.3	3.1	100.0	76.8	23.2
Other parts of uterus.....	5.6	4.9	0.8	1.5	1.5	1.8	100.0	86.0	14.0
Other female genital organs.....	11.4	10.6	0.9	3.1	3.2	2.1	100.0	92.2	7.8
Male genital organs.....	20.4	17.2	3.2	5.5	5.2	7.8	100.0	84.3	15.7
Urinary organs.....	16.5	15.2	1.3	4.5	4.6	3.2	100.0	92.1	7.9
Other and unspecified sites.....	36.1	31.9	4.2	9.7	9.7	10.4	100.0	88.4	11.6
Leukemia.....	14.8	13.5	1.2	4.0	4.1	3.0	100.0	91.8	8.2
Other lymphatic and hematopoietic tissues.....	20.0	18.1	1.9	5.4	5.5	4.6	100.0	90.5	9.5
Benign neoplasms and neoplasms of unspecified nature.....	4.9	4.3	0.6	1.3	1.3	1.5	100.0	87.8	12.2

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCE: Division of Vital Statistics, National Center for Health Statistics.

Table 11. Person-years lost due to neoplasms, by cancer site, sex, and age: United States, calendar year 1975

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
Person-years lost in thousands												
All neoplasms.....	5,954.4	992.9	2,796.6	2,164.9	2,864.9	458.5	1,324.8	1,081.6	3,089.5	534.4	1,471.8	1,083.3
Malignant neoplasms.....	5,839.5	952.7	2,746.8	2,139.8	2,809.6	438.3	1,300.0	1,071.2	3,029.9	514.4	1,446.8	1,068.8
Buccal cavity and pharynx.....	130.4	12.1	77.8	40.5	85.3	7.5	51.6	26.2	45.1	4.6	28.2	14.3
Stomach.....	201.3	16.8	87.8	96.7	112.4	8.9	52.3	51.2	88.9	7.9	35.5	45.5
Intestine and rectum.....	682.7	53.6	289.1	340.1	299.6	26.0	131.5	142.2	383.1	27.6	157.6	197.9
Other digestive organs.....	493.4	35.9	235.9	221.4	266.3	21.3	137.4	107.5	227.1	14.6	98.5	113.9
Trachea, lung, and bronchus.....	1,261.4	92.3	736.4	432.6	898.5	57.1	513.3	328.0	362.9	35.2	223.1	104.6
Other respiratory organs.....	72.0	8.2	40.4	23.3	53.3	5.8	29.6	17.8	18.7	2.4	10.8	5.5
Bone, connective, and other soft tissue.....	78.0	42.8	21.2	14.1	38.3	22.1	10.1	6.2	39.7	20.7	11.1	7.9
Skin.....	101.9	36.7	41.8	23.5	56.0	20.3	24.3	11.5	45.9	16.4	17.5	12.0
Breast.....	648.8	109.3	365.5	174.1	3.7	0.5	1.8	1.4	645.1	108.8	383.7	172.7
Cervix uteri.....	124.7	35.8	63.4	25.5	...	...	...	...	124.7	35.8	63.4	25.5
Other parts of uterus.....	90.6	6.8	41.9	41.9	...	...	...	...	90.6	6.8	41.9	41.9
Other female genital organs.....	220.3	28.9	123.4	68.0	...	...	...	...	220.3	28.9	123.4	68.0
Male genital organs.....	207.1	23.7	44.1	139.3	207.1	23.7	44.1	139.3	...	...	...	...
Urinary organs.....	220.6	21.5	92.4	106.7	136.2	11.3	60.2	64.7	84.4	10.2	32.2	42.0
Other and unspecified sites.....	641.0	166.1	273.2	201.7	304.9	85.6	133.1	86.3	336.1	80.5	140.1	115.4
Leukemia.....	312.7	161.1	74.9	76.7	164.6	86.7	39.2	38.7	148.1	74.4	35.7	38.0
Other lymphatic and hematopoietic tissues.....	352.6	101.1	137.6	113.8	183.3	61.5	71.5	50.3	169.3	39.6	66.1	63.5
Benign neoplasms and neoplasms of unspecified nature.....	114.9	40.2	49.7	25.0	53.3	20.2	24.8	10.3	59.6	20.0	24.9	14.7

NOTE: Numbers may not add to totals due to rounding.

SOURCE: Number of deaths and current life tables for 1975 from the Division of Vital Statistics, National Center for Health Statistics.

Table 12. Person-years lost per death due to neoplasms, by cancer site, sex, and age: United States, calendar year 1975

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
Person-years lost per death												
All neoplasms.....	16.1	43.5	21.5	9.9	14.2	41.3	18.9	9.0	18.3	45.6	24.6	11.1
Malignant neoplasms.....	16.0	43.3	21.4	9.9	14.1	41.1	18.7	9.0	18.2	45.4	24.5	11.1
Buccal cavity and pharynx.....	16.0	38.5	20.6	10.0	15.0	35.9	19.1	9.4	18.4	43.8	24.4	11.3
Stomach.....	13.4	37.2	20.5	9.4	12.6	34.1	18.6	8.7	14.8	41.4	24.1	10.4
Intestine and rectum.....	13.6	38.3	21.1	9.7	12.4	35.8	18.6	8.7	14.8	40.9	23.9	10.6
Other digestive organs.....	14.3	38.4	20.3	10.1	13.6	35.9	18.7	9.2	15.2	42.7	23.0	11.0
Trachea, lung, and bronchus.....	15.4	34.8	20.2	10.1	14.2	32.7	18.7	9.6	19.5	39.0	24.6	12.1
Other respiratory organs.....	15.5	38.9	19.9	9.7	14.6	36.7	18.7	9.3	19.1	45.3	24.4	11.3
Bone, connective, and other soft tissue.....	24.3	51.4	21.9	10.0	23.0	47.5	19.6	9.1	25.7	56.3	24.4	11.0
Skin.....	19.3	40.6	21.9	9.5	18.2	37.9	20.0	8.7	20.9	44.7	25.3	10.5
Breast.....	20.0	40.2	25.1	11.5	13.4	35.7	18.2	8.5	20.1	40.3	25.2	11.5
Cervix uteri.....	22.5	41.3	25.6	11.5	...	...	...	...	22.5	41.3	25.6	11.5
Other parts of uterus.....	16.2	42.0	23.7	11.4	...	...	...	...	16.2	42.0	23.7	11.4
Other female genital organs.....	19.3	42.6	24.9	11.7	...	...	...	...	19.3	42.6	24.9	11.7
Male genital organs.....	10.1	42.6	17.3	8.0	10.1	42.6	17.3	8.0	...	...	...	...
Urinary organs.....	13.3	43.3	20.1	9.3	12.4	38.7	18.5	8.7	15.3	50.0	24.0	10.6
Other and unspecified sites.....	17.8	47.4	21.5	10.1	16.6	44.5	19.1	9.1	18.9	50.9	24.4	11.1
Leukemia.....	21.2	52.9	21.3	9.4	19.6	49.7	19.0	8.5	23.2	57.0	24.7	10.5
Other lymphatic and hematopoietic tissues.....	17.7	44.7	21.2	10.2	17.0	42.7	19.0	9.0	18.4	48.2	24.2	11.3
Benign neoplasms and neoplasms of unspecified nature.....	23.2	49.5	30.5	10.0	22.6	47.8	29.1	8.8	23.8	51.4	32.0	11.0

SOURCE: Number of deaths and current life tables for 1975 from the Division of Vital Statistics, National Center for Health Statistics.

Table 13. Present discounted value of lost earnings due to neoplasms at 6-percent discount rate, by cancer site, sex, and age: United States, calendar year 1975

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
	Lost earnings in millions											
All neoplasms.....	\$15,868.7	\$4,252.0	\$9,914.5	\$1,702.2	\$9,406.8	\$2,511.9	\$6,035.7	\$859.2	\$6,461.9	\$1,740.1	\$3,878.8	\$843.0
Malignant neoplasms	15,529.8	4,103.0	9,743.9	1,682.9	9,203.8	2,420.7	5,931.9	851.1	6,326.0	1,682.3	3,812.0	831.8
Buccal cavity and pharynx.....	408.4	63.0	311.0	34.4	312.9	47.2	242.7	22.9	95.5	15.8	68.3	11.5
Stomach.....	486.8	88.7	327.5	70.6	334.7	60.1	236.1	38.5	152.1	28.6	91.4	32.1
Intestine and rectum.....	1,510.3	269.4	990.1	250.8	868.1	170.2	590.8	107.1	642.2	99.2	399.3	143.7
Other digestive organs.....	1,228.7	185.0	869.6	174.2	845.5	134.5	623.9	87.2	383.2	50.5	245.7	87.0
Trachea, lung, and bronchus.....	3,826.1	516.9	2,929.5	379.6	3,020.3	389.5	2,341.9	288.9	805.8	127.4	587.6	90.7
Other respiratory organs.....	226.3	43.9	162.9	19.5	185.9	36.1	134.7	15.1	40.4	7.8	28.2	4.4
Bone, connective, and other soft tissue.....	254.5	165.2	78.2	11.1	162.1	107.7	49.4	5.0	92.4	57.5	28.8	6.1
Skin.....	376.5	189.3	169.8	17.4	261.2	130.8	121.7	8.7	115.3	58.5	48.1	8.7
Breast.....	1,536.6	398.4	996.7	141.5	12.6	3.2	8.3	1.1	1,524.0	395.2	988.4	140.4
Cervix uteri.....	327.0	130.2	176.0	20.8	...	...	...	...	327.0	130.2	176.0	20.8
Other parts of uterus.....	163.0	24.4	105.0	33.6	...	...	...	...	163.0	24.4	105.0	33.6
Other female genital organs.....	488.9	101.2	331.0	56.6	...	...	...	...	488.9	101.2	331.0	56.6
Male genital organs.....	402.3	140.2	172.9	89.2	402.3	140.2	172.9	89.2	...	...	...	...
Urinary organs.....	521.9	91.9	351.5	78.5	380.5	62.9	269.4	48.2	141.4	29.0	82.1	30.3
Other and unspecified sites.....	1,807.2	657.4	989.8	160.0	1,118.7	424.2	623.4	71.1	688.5	233.2	366.4	88.9
Leukemia.....	897.6	565.6	277.6	54.6	583.4	373.1	182.7	27.7	314.2	192.5	94.9	26.9
Other lymphatic and hematopoietic tissues.....	1,067.6	472.3	504.8	90.5	715.5	341.0	334.0	40.5	352.1	131.3	170.8	50.0
Benign neoplasms and neoplasms of unspecified nature.....	338.9	148.9	170.6	19.3	203.0	91.1	103.8	8.1	135.9	57.8	66.8	11.2

NOTE: Numbers may not add to totals due to rounding.

SOURCES: Number of deaths from the Division of Vital Statistics, National Center for Health Statistics, and present values of lifetime earnings from the Public Services Laboratory, Georgetown University, Washington, D.C.

Table 14. Estimated amount and percent distribution of expenditures for short-stay hospital care and physicians' services due to neoplasms and indirect costs of mortality at 6- and 10-percent discount rates, by cancer site: United States, calendar year 1975

Site	Expenditures for:		Indirect costs of mortality	
	Short-stay hospital care	Physicians' services	6-percent discount	10-percent discount
	Amount in millions			
All neoplasms.....	\$4,131.6	\$1,245.6	\$15,868.7	\$12,448.0
Digestive organs	669.5	114.1	3,225.8	2,641.8
Respiratory organs.....	426.9	78.0	4,052.4	3,344.8
Skin	84.4	46.1	376.5	282.7
Breast.....	344.3	84.3	1,536.6	1,199.7
Female genital organs.....	297.9	73.9	978.9	763.7
Male genital organs.....	169.4	51.2	402.3	319.7
Leukemia.....	130.7	23.9	897.6	595.0
All other malignant neoplasms.....	1,092.7	259.1	4,059.6	3,089.0
Benign and unspecified neoplasms	915.8	514.9	338.9	213.7
	Percent distribution			
All neoplasms.....	100.0	100.0	100.0	100.0
Digestive organs	16.2	9.2	20.3	21.7
Respiratory organs.....	10.3	6.3	25.5	26.9
Skin	2.0	3.7	2.4	2.3
Breast.....	8.3	6.8	9.7	9.6
Female genital organs.....	7.2	5.9	6.2	6.1
Male genital organs.....	4.1	4.1	2.5	2.6
Leukemia.....	3.2	1.9	5.7	4.8
All other malignant neoplasms.....	26.4	20.8	25.6	24.8
Benign and unspecified neoplasms	22.2	41.3	2.1	1.7

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCES: Table 7 for expenditures for short-stay hospital care; table 8 for expenditures for physicians' services; table 13 for indirect costs of mortality at 6 percent; same sources as in table 13 for indirect costs of mortality at 10 percent.

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APPENDIX

METHODOLOGY AND ECONOMIC COSTS, 1977

Direct Costs

The methodology and data used to estimate economic costs of disease have been explained in detail by Rice,²⁹ Cooper and Rice,³⁰ and Paringer and Berk.²⁸ National health expenditures, by type of expenditure, have been published annually by the Social Security Administration and will be released by the Health Care Financing Administration in the future. Total expenditures for hospital care, physicians' services, and the other direct costs of illness are distributed by diagnosis according to utilization and costs, using consistent data sources for each diagnosis. Expenditures in community hospitals, for example, are allocated to a diagnosis in proportion to the number of days of care attributable to the diagnosis weighted by the expense per patient day. Similar procedures are applied to the other categories of direct costs to distribute the total among diagnoses. In each case, utilization, weighted by unit cost where possible, determines the share of total expenses assigned to each diagnosis.

The cancer sites discussed in this report and their ICDA-8 codes (*Eighth Revision International Classification of Diseases, Adapted for Use in the United States*)⁵⁷ are as follows:

<i>Site</i>	<i>ICDA Code</i>
Buccal cavity and pharynx	140-149
Digestive organs and peritoneum:	
Stomach	151
Intestine and rectum	152-154
Other	150, 155-159

NOTE: A list of references follows the text.

Respiratory system:

Trachea, lung, and bronchus	162
Other	160-161, 163
Bone, connective, and other soft tissue	170-171
Breast	174
Genital organs, female:	
Cervix uteri	180
Other parts of uterus	181-182
Other	183-184
Genital organs, male	185-187
Urinary organs	188-189
Skin	172-173
Other and unspecified sites	190-199
Lymphatic and hematopoietic tissues:	
Leukemia	204-207
Other	200-203, 208-209
Benign neoplasms and neoplasms of unspecified nature	210-228, 230-239

Hospital care by cancer site.—Expenditures in short-stay hospitals are estimated by multiplying the number of days of care, as estimated by the Hospital Discharge Survey of the National Center for Health Statistics, by the average cost per day. For the population age 65 years and over, average per diem charges to a large sample of Medicare patients⁵⁸ are used as the average cost per day. For those under age 65, an estimate of average costs is obtained by adjusting average Medicare charges by the ratio of average daily payment for patients under age 65 at time of diagnosis to average daily payment for patients age 65 and over observed in the Third National Cancer Survey of the National Cancer Institute.⁵⁹ This procedure is repeated for each cancer site.

Expenditures in nonfederal short-stay hospitals for all neoplasms obtained by this method are about 13 percent higher than the share of hospital expenditures in table 1 attributed to short-stay hospitals. Of the \$4.1 billion shown for hospital care in table 1, only \$3.6 billion was spent in short-stay hospitals; the remainder is the cost of care in other types of hospitals, such as those of the Veterans' Administration. Most of this difference between expenditures in short-stay hospitals in tables 1 and 7 can be explained, however. Since the computation of the estimates in table 1, the Health Care Financing Administration has revised upward by 4 percent its estimate of national health expenditures for hospital care in fiscal year 1975, the figure used to obtain expenditures in table 1. Further, estimates in this section are for calendar year 1975 rather than fiscal 1975. Hospital care expenditures increased 15 percent between fiscal 1975 and fiscal 1976.⁶⁰ If this increase were uniform over time, expenditures in calendar 1975 would be 7 to 8 percent greater than in fiscal 1975. Thus, all but 1 to 2 percent of the difference in the two estimates can be explained. The two estimating procedures yield quite consistent results.

Physicians' services by cancer site.—In previous studies, the magnitude of expenditures for physicians' services by diagnosis were determined by distributing the Social Security Administration's estimate of national expenditures⁶⁰ according to the proportion of physician visits reported for each diagnosis by the National Disease and Therapeutic Index.^d This assumes every visit has the same cost; office and hospital visits are given equal weight, for example. Further, national expenditures for physicians' services include payments for surgery, which are also allocated to diagnoses according to the relative number of physician visits. This method understates expenditures for physicians' services related to neoplasms because the estimate does not reflect that neoplasms account for a higher proportion of all hospital visits than of total vis-

^dThe National Disease and Therapeutic Index is a product of Medical Business Services, a division of IMS America, Ltd., Ambler, Pennsylvania.

its, or that hospital visits are somewhat more expensive than office visits. Also, the proportion of short-term hospital surgery discharges with a diagnosis classified as neoplasms is significantly higher than the proportion of physician visits reported for neoplasms. Equal weighting of the cost of hospital versus office visits and of the relative shares among diagnoses of surgical and nonsurgical expenditures results in an underestimate of expenditures for physicians' services related to neoplasms.

For this report, expenditures for physicians' services have been estimated by the following method. Total expenditures for physicians' services in calendar year 1975⁶¹ were separated into those resulting from in-hospital surgery and other expenditures. The proportions used were those observed for the year 1970 in a survey of utilization and expenditures conducted by the Center for Health Administration Studies at the University of Chicago and the National Opinion Research Center.⁶² This survey found that 24 percent of expenditures were for surgery in the hospital.

Next, nonsurgery expenditures for all diseases were split into those for inpatient medical care and those for office and other types of visits, taking into account both the number of visits and differences in average fees for each type.⁶³ Total expenditures for each place of visit were then distributed among cancer sites according to proportion of visits reported for each site. Finally, expenditures for in-hospital surgery were allocated by site according to the proportion of all short-stay hospital discharges with surgery reported for each site by the Hospital Discharge Survey of the National Center for Health Statistics. This assumes equal charges for in-hospital surgery for every site and probably introduces some bias to the allocation of expenditures for surgery among sites.

By this method, the cost of physicians' services for neoplasms was estimated at \$1.25 billion (table 14), a cost 85 percent and \$574 million higher than the figure in table 1. Ten percent of the increase (\$60 million) is due to using calendar 1975 rather than fiscal 1975 expenditures; 3 percent (\$18 million) results from introducing the place and relative cost of visits; and 87 percent (\$497 million) occurs because expenditures

for surgery were distributed according to the number of hospital discharges with surgery as opposed to the number of physicians' visits.

It is likely that even this revised estimate understates expenditures for neoplasms-related physicians' services because the amount of surgery performed since 1970 has increased more than the number of physician visits. Between 1971 and 1975, there was a 5.7-percent increase in physician visits and a 22-percent increase in the number of short-stay hospital discharges with surgery.⁶⁴⁻⁶⁷ Consequently, expenditures for surgery probably account for more than one-quarter of all expenditures for physicians' services in 1975, so the share of expenditures allocated to neoplasms, which is surgery-intensive compared with all other diseases, is underestimated. Neoplasms lose 8 cents for every dollar of expenditures in 1975 that has incorrectly been attributed to nonsurgical visits because the revised estimating procedure awards 11 percent of surgical and 3 percent of nonsurgical expenditures to neoplasms. It is unfortunate that an up-to-date figure for the distribution of expenditures for surgery and nonsurgery visits is not available.

Further considerations.—Other aspects of the methodology for estimating direct costs should be pointed out. The existence of multiple diseases causes some difficulty in distributing expenditures by diagnosis. Hospital days, for example, are allocated according to the primary diagnosis, but other accompanying conditions influence the length and cost of hospital stays. The bias introduced by assigning the total cost of a hospital episode to the illness indicated by the first-listed diagnosis, when a portion of the cost is due to the presence of other conditions, has not yet been investigated.

Furthermore, the methodology does not account for all economic costs incurred because of cancer. Excluded are transportation costs of persons receiving care and visiting patients; costs of extra household help for the patient and the family; expenditures for retraining or reeducation, special diets, and special housing facilities; free or reduced fee care provided as charity by hospitals and other institutions, physicians, the family, and friends; subsidies provided to cancer patients in the form of fixed hospital rates, with

less ill patients sharing costs of those more ill who use more nursing time and ancillary services; free care provided by institutions and medical personnel as part of their teaching or research function; and losses in the form of reduced capital gains due to forced sale of assets. Inclusion of these costs would provide more complete estimates of cancer costs, but at the present time their magnitude is unknown. A recent study estimated some of the non-health-sector costs that can be identified. Although not a complete evaluation, it found that non-health-sector costs add at least 12 percent to the total cost of all illnesses.⁶⁸ Unfortunately, costs were not estimated by disease category, and it is not known what proportion of non-health-sector costs is due to neoplasms.

Finally, some extensions of the usual treatment of direct economic costs, which could provide additional insight into disease costs, are as follows: (a) costs distributed by stage or extent of disease at initial diagnosis (e.g., localized or not), by method of treatment (e.g., surgery, radiotherapy, and chemotherapy), or by provider characteristics, such as physician's experience in treating cancer, available hospital services, and whether the institution specializes in cancer care; (b) costs distributed over diagnosis, treatment, and rehabilitation; (c) costs arising from disease complications and treatment side effects; (d) costs per person with cancer, including lifetime costs of the disease. Estimates of these omissions and extensions have not yet appeared in the literature, and at least some of the required data have not been readily available. However, a study investigating some of these aspects of direct costs is now underway in the United States.⁶⁹

Indirect Costs

Indirect economic costs result from morbidity and mortality. Morbidity losses are estimated separately for those who are currently employed, housekeepers, persons unable to work because of ill health, and the institutionalized population. Days lost from work among the currently employed are converted to years lost by age and sex and multiplied by age and sex-specific estimates of average annual earnings to

obtain lost earnings for this group. Days of bed-disability suffered by women who usually keep house are also converted to years and multiplied by age-specific values of housewives' services to obtain morbidity costs for this group. The number of persons unable to work by age and sex is multiplied by employment rates and average annual earnings and by housekeeping rates and housekeeping values to determine indirect morbidity costs among members of this group. A similar procedure is applied to the institutionalized population to estimate morbidity costs by institution. These separate components of morbidity costs are aggregated to obtain a total cost figure.

Mortality costs by cancer site.—To obtain indirect costs of mortality by cancer site, the numbers of deaths for each site in 1975 by age and sex are multiplied by the present value of lifetime earnings, also by age and sex. The number of person-years lost due to premature mortality is the product of number of deaths and life expectancy at the midyear of the age group. This method accounts for life expectancy, labor force participation and housekeeping rates, earnings and imputed values of housekeeping services, and discount rate for each age and sex group. Estimates for 1975 include imputed housekeeping values for women and men in the labor force who have household responsibilities in the present value of future earnings.

For these calculations, present values of lifetime earnings were those developed by Selma Mushkin at the Public Services Laboratory, Georgetown University,²⁸ and mortality data were provided by the Division of Vital Statistics, National Center for Health Statistics (NCHS). Two different life tables are employed in this report. All lifetime earnings data and estimated person-years lost in table 3 are based on modified generation life tables developed at the Public Services Laboratory at Georgetown University. Person-years lost by cancer site in table 11 are based on a current life table for 1975 provided by the Division of Vital Statistics, NCHS. A full explanation of the methodology and data used to compute indirect cost can be found elsewhere.^{28,30}

Measures of indirect costs.—This methodology provides an estimate of the economic bur-

den, discounted to 1975, resulting from the prevalence of disease in 1975. Included are costs of resources used during the year for prevention, diagnosis, and treatment; output lost during the year because of morbidity; and output lost due to deaths in 1975. Because a death in 1975 means lost output in future years, the present discounted value of the future losses is also counted.

It is important to note that, unlike the estimates for mortality, those for morbidity do not include the present discounted value of future losses resulting from disease in 1975 that may cause decreased productivity and lost earnings in future years. Other effects of disease besides death may decrease future output—for example, the lost output of a professional singer after a laryngectomy. This decreased output should be included in cost estimates. Unfortunately, the data for this component are lacking, and the extent of the underestimate because of its omission is not known. It must be emphasized that the omission is the present cost of future losses resulting from morbidity in 1975, and not the present cost of future morbidity that may arise from disease that has its onset in 1975. The latter is not relevant to the cost measures in this report, but it is important in the context of the cost of disease from onset until cure or death.

In addition to the costs associated with the prevalence of disease in 1975, one might be interested in the cost of disease from onset until cure or death. This requires knowing the incidence of disease in 1975 and the likely course of the disease, including treatments required, morbidity, and mortality. For any new case in 1975, both direct and indirect costs may occur in 1975 and subsequent years. Because of illness beginning in 1975, a person may require treatment for a number of years, lose time from work during this period, and eventually die of the disease. The total cost is the sum of the present discounted values of all direct costs and earnings lost because of morbidity and death. This value is the best measure of the savings, or benefits, of preventing a new case of the disease.

A third cost that may be of interest is the economic burden of disease that is actually borne in 1975. This consists of direct costs in 1975, indirect costs of morbidity and mortality

incurred in 1975, and the value of output lost in 1975 because of morbidity and mortality in previous years, but excludes present discounted values of future losses of earnings due to morbidity and mortality in 1975.

Each of these three measures of costs of disease provides different information, and which one is most appropriate depends on the question being asked. Usually, the cost of disease prevalence is estimated. The cost of disease incidence is more difficult to estimate, requiring projections of treatment and disability over the course of the disease, time between onset and death,

whether death is related to the disease being studied, and the impact of disability and death on earnings. The third cost measure is rarely estimated, but was calculated for cardiovascular diseases and cancer in 1962.⁷⁰

Economic Costs of Cancer by Site in 1977

Tables I-X present data relating to economic costs of cancer by site for hospital care, physicians' services, and mortality in 1977.

Table I. Days of care for patients with neoplasms discharged from short-stay hospitals, by cancer site, sex, and age: United States, calendar year 1977

Site	Total	Sex		Age	
		Male	Female	Under 65 years	65 years and over
Days of care in short-stay hospitals in thousands					
All neoplasms.....	25,819.6	10,750.5	15,069.0	14,001.1	11,318.5
Malignant neoplasms.....	21,011.8	9,748.8	11,263.0	10,113.7	10,398.1
Buccal cavity and pharynx.....	490.5	332.2	158.3	261.4	229.2
Stomach.....	460.3	235.6	224.7	195.5	264.8
Intestine and rectum.....	2,870.3	1,322.3	1,548.0	1,012.5	1,357.7
Other digestive organs.....	872.6	459.6	412.9	320.8	351.8
Trachea, lung, and bronchus.....	2,464.7	1,713.9	750.8	1,235.8	1,228.9
Other respiratory organs.....	304.5	246.1	58.4	147.5	156.9
Skin.....	550.2	288.4	261.9	286.3	264.0
Breast.....	2,456.5	43.8	2,412.7	1,393.4	1,063.1
Cervix uteri.....	620.1	...	620.1	493.7	126.4
Other parts of uterus.....	497.3	...	497.3	237.3	260.0
Other female genital organs.....	714.2	...	714.2	374.1	340.0
Male genital organs.....	1,299.4	1,299.4	...	374.7	924.7
Urinary organs.....	1,349.8	877.0	472.8	536.8	812.9
Other and unspecified sites.....	3,921.9	1,872.3	2,049.6	2,010.2	1,911.7
Leukemia.....	615.5	317.8	297.6	379.9	235.6
Other lymphatic and hematopoietic tissues.....	1,524.3	740.3	784.0	853.8	670.5
Benign neoplasms and neoplasms of unspecified nature.....	4,807.8	1,001.8	3,806.0	3,887.5	920.3

NOTE: Numbers may not add to totals due to rounding.

SOURCE: Hospital Discharge Survey, National Center for Health Statistics.

Table II. Estimated hospital expenditures for patients with neoplasms discharged from short-stay hospitals, by cancer site, sex, and age: United States, calendar year 1977

Site	Total	Sex		Age	
		Male	Female	Under 65 years	65 years and over
Expenditures for short-stay hospitals in millions					
All neoplasms.....	\$5,768.1	\$2,470.7	\$3,297.4	\$3,322.1	\$2,446.0
Malignant neoplasms.....	4,618.7	2,220.5	2,398.2	2,375.1	2,243.6
Buccal cavity and pharynx.....	112.5	77.2	35.4	62.7	49.8
Stomach.....	106.2	57.4	48.7	47.3	58.9
Intestine and rectum.....	653.9	311.5	342.4	241.8	412.1
Other digestive organs.....	195.9	107.7	88.1	76.7	119.1
Trachea, lung, and bronchus.....	557.2	388.8	168.4	295.0	262.1
Other respiratory organs.....	75.6	61.6	14.0	38.0	37.6
Skin.....	125.5	69.5	56.0	73.0	52.5
Breast.....	479.6	9.4	470.1	278.6	201.0
Cervix uteri.....	142.8	...	142.8	118.6	24.3
Other parts of uterus.....	111.9	...	111.9	58.0	53.9
Other female genital organs.....	158.0	...	158.0	91.5	66.5
Male genital organs.....	256.8	256.8	...	81.6	175.1
Urinary organs.....	304.1	201.9	102.2	130.8	173.3
Other and unspecified sites.....	819.5	407.0	412.5	451.3	368.2
Leukemia.....	164.2	90.4	73.8	111.4	52.8
Other lymphatic and hematopoietic tissues.....	355.1	181.4	173.7	218.7	136.4
Benign neoplasms and neoplasms of unspecified nature.....	1,149.4	250.2	899.2	947.0	202.4

NOTE: Numbers may not add to totals due to rounding.

SOURCES: Expenditures are estimated by the product of days of care, from the Hospital Discharge Survey of the National Center for Health Statistics, and average per diem charges. Charges are estimated using average per diem charges to Medicare patients from the Health Care Financing Administration and average daily hospital payments from the Third National Cancer Survey of the National Cancer Institute.

Table III. Estimated expenditures for and percent distribution of physicians' services due to neoplasms by cancer site, according to type of visit: United States, calendar year 1977

Site	Type of visit												
	Total	Office and other ¹	Inpatient hospital		Total	Office and other ¹	Inpatient hospital		Total	Office and other ¹	Inpatient hospital		
			Medical	Surgical			Medical	Surgical			Medical	Surgical	
Expenditures in millions													
All neoplasms.....	\$1,560.7	\$374.9	\$343.4	\$842.4	100.0	100.0	100.0	100.0	100.0	24.0	22.0	54.0	
Percent distribution by site													
Digestive organs.....	143.0	17.5	45.4	80.1	9.2	4.7	13.2	9.5	100.0	12.3	31.7	56.0	
Respiratory organs.....	97.7	12.5	32.0	53.1	6.3	3.4	9.3	6.3	100.0	12.9	32.7	54.4	
Skin.....	57.8	24.3	3.1	30.3	3.7	6.5	0.9	3.6	100.0	42.1	5.4	52.5	
Breast.....	105.6	19.3	22.3	64.0	6.8	5.1	6.5	7.6	100.0	18.3	21.1	60.6	
Female genital organs.....	92.6	10.0	11.0	71.5	5.9	2.7	3.2	8.5	100.0	10.8	11.9	77.3	
Male genital organs.....	64.2	12.8	18.5	32.8	4.1	3.4	5.4	3.9	100.0	19.9	28.9	51.2	
Leukemia.....	29.9	10.8	12.4	6.8	1.9	2.9	3.6	0.8	100.0	36.0	41.4	22.6	
All other malignant neoplasms.....	324.7	62.7	122.2	139.8	20.8	16.7	35.6	16.6	100.0	19.3	37.6	43.1	
Benign neoplasms and neoplasms of unspecified sites.....	645.2	204.7	76.6	363.9	41.3	54.6	22.3	43.2	100.0	31.7	11.9	56.4	

¹Other includes home, telephone, nursing home, and other.

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCES: Health Care Financing Administration for total expenditures for physicians' services; National Disease Therapeutic Index for physicians' visits by site; James R. Cantwell, ed.: *Profiles of Medical Practice*, American Medical Association, Chicago, for average fees; and Hospital Discharge Survey, National Center for Health Statistics, for number of short-stay hospital discharges with surgery by site.

Table IV. Number of deaths from neoplasms, by cancer site, sex, and age: United States, calendar year 1977

Site	Both sexes				Male				Female			
	All ages ¹	Under 45 years	45-64 years	65 years and over	All ages ¹	Under 45 years	45-64 years	65 years and over	All ages ¹	Under 45 years	45-64 years	65 years and over
	Deaths in thousands											
All neoplasms	391.6	22.7	133.9	235.0	212.8	11.2	72.3	129.3	178.8	11.5	61.7	105.7
Malignant neoplasms	386.7	21.9	132.5	232.2	210.5	10.8	71.6	128.1	176.2	11.1	60.9	104.2
Buccal cavity and pharynx	8.5	0.3	3.9	4.3	5.9	0.2	2.8	2.9	2.5	0.1	1.1	1.4
Stomach	14.4	0.5	4.0	9.9	8.7	0.3	2.7	5.7	5.8	0.2	1.3	4.2
Intestine and rectum	52.3	1.4	13.9	36.9	25.3	0.8	7.3	17.2	26.9	0.7	6.6	19.7
Other digestive organs	36.2	1.0	12.0	23.2	20.4	0.6	7.6	12.1	15.9	0.4	4.4	11.1
Trachea, lung, and bronchus	90.5	2.7	38.8	49.0	68.5	1.7	28.5	38.3	22.0	1.0	10.4	10.7
Other respiratory organs	4.7	0.2	2.0	2.5	3.7	0.1	1.6	2.0	1.0	0.1	0.4	0.5
Skin	5.9	0.9	2.2	2.8	3.5	0.6	1.4	1.5	2.4	0.4	0.8	1.3
Breast	34.8	2.7	15.3	16.8	0.3	0.1	0.1	0.2	34.5	2.7	15.2	16.6
Cervix uteri	5.2	0.8	2.2	2.2	...	...	...	...	5.2	0.8	2.2	2.2
Other parts of uterus	5.8	0.2	1.8	3.8	...	...	...	...	5.8	0.2	1.8	3.8
Other female genital organs	11.6	0.6	4.9	6.1	...	...	...	...	11.6	0.6	4.9	6.1
Male genital organs	21.7	0.6	2.7	18.4	21.7	0.6	2.7	18.4	...	...	...	...
Urinary organs	17.4	0.5	4.7	12.2	11.4	0.3	3.3	7.9	5.9	0.2	1.4	4.3
Other and unspecified sites	41.4	4.4	13.9	23.0	21.4	2.5	7.7	11.1	20.0	1.9	6.2	12.0
Leukemia	15.3	3.0	3.6	8.8	8.6	1.7	2.1	4.7	6.7	1.3	1.4	4.0
Other lymphatic and hematopoietic tissues	21.1	2.1	6.6	12.4	11.1	1.4	3.7	6.0	10.0	0.8	2.9	6.3
Benign neoplasms and neoplasms of unspecified nature	4.9	0.7	1.4	2.8	2.3	0.4	0.7	1.3	2.6	0.4	0.7	1.5

¹Totals include persons of unknown ages.

NOTE: Numbers may not add to totals due to rounding.

SOURCE: Division of Vital Statistics, National Center for Health Statistics.

Table V. Person-years lost due to neoplasms, by cancer site, sex, and age: United States, calendar year 1977

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
	Person-years lost in thousands											
All neoplasms	6,289.1	993.2	2,903.2	2,392.7	3,018.2	467.2	1,373.9	1,177.1	3,270.9	526.0	1,529.3	1,215.6
Malignant neoplasms	6,192.3	955.7	2,871.9	2,364.7	2,976.0	449.7	1,360.7	1,165.7	3,216.3	506.0	1,511.2	1,199.1
Buccal cavity and pharynx	136.4	12.6	80.0	43.7	90.0	8.5	53.7	27.8	46.4	4.2	26.3	15.9
Stomach	197.3	18.3	83.5	95.6	111.6	10.2	51.4	50.0	85.7	8.1	32.1	45.6
Intestine and rectum	720.0	55.9	296.8	367.4	317.6	27.6	137.7	152.3	402.3	28.2	159.1	215.0
Other digestive organs	527.5	38.8	249.7	239.0	279.6	23.2	144.6	111.8	247.9	15.7	105.0	27.2
Trachea, lung, and bronchus	1,400.6	96.3	799.2	505.0	970.1	56.7	542.3	371.0	430.5	39.6	256.9	34.0
Other respiratory organs	72.6	7.1	40.9	24.6	53.9	4.8	30.5	18.6	18.7	2.3	10.5	5.9
Skin	114.3	38.0	48.6	27.7	63.0	21.5	27.6	13.9	51.3	16.5	20.9	13.8
Breast	697.5	110.7	388.5	198.3	4.0	0.5	2.1	1.4	693.6	110.2	386.4	196.9
Cervix uteri	115.8	33.6	55.9	26.3	...	...	...	...	115.8	33.6	55.9	26.3
Other parts of uterus	95.3	7.5	43.8	44.0	...	...	...	...	95.3	7.5	43.8	44.0
Other female genital organs	220.8	25.2	121.8	73.8	...	...	...	...	220.8	25.2	121.8	73.8
Male genital organs	222.8	24.4	47.6	150.8	222.8	24.4	47.6	150.8	...	...	...	...
Urinary organs	232.7	20.1	96.0	116.6	142.1	10.9	62.0	69.2	90.6	9.2	34.1	47.4
Other and unspecified sites	753.5	212.8	301.9	238.8	367.3	115.4	149.6	102.3	386.3	97.4	152.3	36.5
Leukemia	319.4	158.1	76.5	84.8	169.2	87.1	41.1	41.1	150.1	71.0	35.5	43.7
Other lymphatic and hematopoietic tissues	365.7	96.2	141.1	128.4	184.7	58.9	70.5	55.3	180.9	37.3	70.6	73.1
Benign neoplasms and neoplasms of unspecified nature	96.8	37.5	31.4	27.9	42.2	17.5	13.3	11.4	54.6	19.9	18.1	16.5

NOTE: Numbers may not add to totals due to rounding.

SOURCE: Number of deaths and current life tables for 1977 from the Division of Vital Statistics, National Center for Health Statistics.

Table VI. Person-years lost per death due to neoplasms, by cancer site, sex, and age: United States, calendar year 1977

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-65 years	65 years and over
	Person-years lost per death											
All neoplasms	16.1	43.8	21.7	10.2	14.2	41.8	19.0	9.1	18.3	45.9	24.8	11.5
Malignant neoplasms	16.0	43.6	21.7	10.2	14.1	41.6	19.0	9.1	18.3	45.6	24.8	11.5
Buccal cavity and pharynx	16.1	38.9	20.8	10.2	15.2	36.7	19.4	9.5	18.4	44.3	24.4	11.7
Stomach	13.7	37.5	20.7	9.6	12.8	34.4	18.9	8.8	14.9	42.3	24.4	10.7
Intestine and rectum	13.8	38.9	21.3	10.0	12.5	36.2	18.7	8.8	14.9	41.9	24.1	10.9
Other digestive organs	14.6	39.0	20.8	10.3	13.7	36.5	19.0	9.2	15.6	43.4	24.0	11.4
Trachea, lung, and bronchus	15.5	35.7	20.6	10.3	14.2	33.3	19.0	9.7	19.5	39.7	24.8	12.6
Other respiratory organs	15.5	40.4	20.2	9.9	14.6	38.2	19.0	9.5	19.2	45.8	24.7	11.9
Skin	19.3	40.7	22.2	9.9	18.1	38.2	20.2	9.0	21.0	44.4	25.7	11.0
Breast	20.1	40.9	25.4	11.8	14.1	35.8	19.2	8.8	20.1	40.1	25.4	11.9
Cervix uteri	22.4	42.1	25.7	12.0	...	...	...	...	22.4	42.1	25.7	12.0
Other parts of uterus	16.5	42.8	23.9	11.7	...	...	...	...	16.5	42.8	23.9	11.7
Other female genital organs	19.0	43.2	24.8	12.1	...	...	...	...	19.0	43.2	24.8	12.1
Male genital organs	10.3	43.8	17.4	8.2	10.3	43.8	17.4	8.2	...	...	...	...
Urinary organs	13.4	42.2	20.5	9.5	12.4	38.1	18.9	8.8	15.3	48.4	24.1	10.9
Other and unspecified sites	18.2	48.2	21.7	10.4	17.2	45.6	19.3	9.2	19.3	51.7	24.7	11.4
Leukemia	20.8	52.6	21.5	9.7	19.7	50.1	19.3	8.7	22.4	56.1	24.8	10.9
Other lymphatic and hemato- poietic tissues	17.3	45.0	21.5	10.4	16.7	43.0	19.2	9.2	18.1	48.7	24.5	11.5
Benign neoplasms and neoplasms of unspecified nature	19.7	50.2	22.3	10.1	18.0	46.6	19.4	8.9	21.1	53.7	25.0	11.1

SOURCE: Number of deaths and current life tables for 1977 from the Division of Vital Statistics, National Center for Health Statistics.

Table VII. Present value of lifetime earnings discounted at 6 percent and 10 percent, by sex and age: United States, calendar year 1977

Age	Present value of lifetime earnings			
	6-percent discount		10-percent discount	
	Male	Female	Male	Female
Under 1 year	\$156,162	\$125,805	\$ 43,621	\$ 38,161
1-4 years	172,559	138,911	52,879	46,224
5-9 years	205,657	165,449	74,452	65,041
10-14 years	249,731	200,775	108,802	94,988
15-19 years	297,371	233,629	152,448	128,201
20-24 years	334,607	247,995	193,287	148,820
25-29 years	348,597	240,432	218,615	151,167
30-34 years	337,837	221,321	225,129	143,156
35-39 years	307,183	199,812	215,071	133,116
40-44 years	264,928	176,640	194,195	121,533
45-49 years	216,456	151,776	166,537	107,929
50-54 years	162,995	125,961	131,699	92,658
55-59 years	106,218	99,109	89,865	75,127
60-64 years	53,834	73,306	46,749	56,754
65-69 years	22,741	52,651	19,542	41,519
70-74 years	11,621	37,908	10,123	30,731
75-79 years	5,967	27,097	5,270	22,713
80-84 years	3,213	19,708	2,897	17,352
85 years and over	1,000	6,049	955	5,775

NOTE: An increase in productivity of 2 percent a year is projected in these calculations.

SOURCE: Division of Analysis, National Center for Health Statistics.

Table VIII. Present discounted value of lost earnings due to neoplasms at 6-percent discount rate, by cancer site, sex, and age United States, calendar year 1977

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
Lost earnings in millions												
All neoplasms.....	\$24,297.0	\$5,510.3	\$14,104.6	\$4,682.6	\$12,420.8	\$3,238.6	\$7,765.3	\$1,416.9	\$11,876.5	\$2,271.5	\$6,339.4	\$3,265.
Malignant neoplasms.....	23,909.8	5,332.4	13,952.0	4,625.9	12,225.1	3,133.4	7,688.0	1,403.6	11,686.0	2,198.7	6,264.0	3,222.
Buccal cavity and pharynx.....	585.6	85.1	421.2	79.3	415.7	66.5	312.9	36.2	169.9	18.6	108.2	43.
Stomach.....	717.6	124.6	419.2	173.7	431.0	86.6	287.3	57.2	286.5	38.0	131.9	116.
Intestine and rectum.....	2,501.7	359.0	1,409.1	733.6	1,161.8	226.8	759.6	175.4	1,340.0	132.2	649.5	558.
Other digestive organs.....	1,971.9	250.4	1,242.8	478.8	1,133.4	180.7	814.9	137.8	838.5	69.6	427.9	341.
Trachea, lung, and bronchus.....	5,672.5	689.2	4,137.3	866.1	4,041.4	482.2	3,072.3	486.9	1,631.1	184.9	1,065.0	379.
Other respiratory organs.....	303.5	48.1	215.6	32.8	233.8	37.7	172.3	23.8	66.8	10.4	43.3	16.
Skin.....	560.8	250.0	258.7	52.1	380.4	173.6	170.3	16.5	200.3	76.4	88.4	35.
Breast.....	2,702.3	527.3	1,635.5	539.5	173.3	3.7	12.0	1.6	2,685.0	523.6	1,823.5	637.
Cervix uteri.....	468.1	159.3	236.0	72.8	...	...	...	...	468.1	159.3	236.0	72.
Other parts of uterus.....	332.7	35.1	177.9	119.7	...	...	...	...	332.7	35.1	177.9	119.
Other female genital organs.....	826.1	116.3	505.6	204.3	...	...	...	...	826.1	116.3	505.6	204.
Male genital organs.....	559.4	179.6	228.2	150.6	559.4	179.6	228.2	150.6	...	...	...	...
Urinary organs.....	804.6	116.1	487.1	201.4	506.5	79.8	348.2	78.5	298.1	36.3	139.0	122.
Other and unspecified sites.....	3,084.0	1,095.0	1,498.2	490.8	1,712.8	719.0	867.5	126.3	1,371.1	375.9	630.7	364.
Leukemia.....	1,261.6	738.8	384.6	158.4	765.3	461.8	237.8	45.6	516.6	257.0	146.8	112.
Other lymphatic and hemato- poietic tissues.....	1,538.5	578.5	695.0	265.0	887.3	415.4	404.7	67.2	651.2	163.1	290.3	197.
Benign neoplasms and neoplasms of unspecified nature.....	387.2	177.9	152.6	56.7	195.7	105.2	77.3	13.3	191.5	72.8	75.4	43.

Table IX. Present discounted value of lost earnings due to neoplasms at 10-percent discount rate, by cancer site, sex, and age United States, calendar year 1977

Site	Both sexes				Male				Female			
	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over	All ages	Under 45 years	45-64 years	65 years and over
Lost earnings in millions												
All neoplasms.....	\$18,543.1	\$3,508.4	\$11,129.4	\$3,905.2	\$9,689.3	\$2,064.9	\$6,394.2	\$1,230.1	\$8,853.9	\$1,443.6	\$4,735.3	\$2,675.
Malignant neoplasms.....	18,271.2	3,403.2	11,009.9	3,858.0	9,551.6	2,002.0	6,330.9	1,218.6	8,719.7	1,401.3	4,679.1	2,639.
Buccal cavity and pharynx.....	461.8	57.3	337.9	66.6	333.5	45.3	256.8	31.4	128.2	12.0	81.1	35.
Stomach.....	567.7	86.0	335.6	146.1	347.4	60.8	236.9	49.7	220.3	25.2	98.7	96.
Intestine and rectum.....	1,971.5	243.3	1,115.3	612.8	935.9	155.7	627.7	152.4	1,035.6	87.6	487.6	460.
Other digestive organs.....	1,561.7	169.1	993.3	399.3	915.1	123.7	671.8	119.6	646.5	45.4	321.4	279.
Trachea, lung, and bronchus.....	4,524.2	489.6	3,325.3	729.3	3,295.1	343.5	2,529.7	421.9	1,229.2	126.1	795.7	307.
Other respiratory organs.....	239.8	31.8	174.3	33.7	187.8	25.2	141.9	20.6	52.1	6.6	32.4	13.
Skin.....	413.5	166.1	203.8	43.6	269.0	116.4	138.3	14.3	144.5	49.6	65.5	29.
Breast.....	2,010.7	353.0	1,217.5	440.2	13.8	2.5	9.9	1.4	1,996.9	350.5	1,207.6	438.
Cervix uteri.....	340.3	105.8	175.3	59.3	...	...	...	...	340.3	105.8	175.3	59.
Other parts of uterus.....	254.7	23.1	133.7	97.9	...	...	...	...	254.7	23.1	133.7	97.
Other female genital organs.....	620.1	76.1	377.6	166.4	...	...	...	...	620.1	76.1	377.6	166.
Male genital organs.....	435.5	112.0	192.0	131.4	435.5	112.0	192.0	131.4	...	...	...	...
Urinary organs.....	636.8	75.9	391.2	169.6	408.8	53.7	266.9	68.3	228.0	22.3	104.4	101.
Other and unspecified sites.....	2,248.7	657.3	1,182.9	408.5	1,255.1	433.8	711.7	109.6	993.7	223.6	471.2	298.
Leukemia.....	851.5	414.2	304.5	132.8	503.3	268.8	194.9	39.7	348.2	145.4	109.6	93.
Other lymphatic and hemato- poietic tissues.....	1,132.7	362.6	549.7	220.5	651.3	260.6	332.4	58.3	481.4	102.0	217.3	162.
Benign neoplasms and neoplasms of unspecified nature.....	271.9	105.2	119.5	47.2	137.7	62.9	63.3	11.5	134.2	42.3	56.2	35.

NOTE: Numbers may not add to totals due to rounding.

Table X. Estimated amount and percent distribution of expenditures for short-stay hospital care and physicians' services due to neoplasms and indirect costs of mortality at 6- and 10-percent discount rates, by cancer site: United States, calendar year 1977

Site	Expenditures for:		Indirect costs of mortality	
	Short-stay hospital care	Physicians' services	6-percent discount	10-percent discount
	Amount in millions			
All neoplasms.....	\$5,768.1	\$1,560.7	\$24,297.0	\$18,543.1
Digestive organs	956.0	143.0	5,191.2	4,100.9
Respiratory organs.....	632.8	97.7	5,976.0	4,764.0
Skin	125.5	57.8	560.8	413.5
Breast.....	479.6	105.6	2,702.3	2,010.7
Female genital organs.....	412.7	92.6	1,626.9	1,215.1
Male genital organs.....	256.8	64.2	558.4	435.5
Leukemia	164.2	29.9	1,281.5	851.5
All other malignant neoplasms.....	1,591.2	324.7	6,012.7	4,480.0
Benign and unspecified neoplasms	1,149.4	645.2	387.2	271.9
	Percent distribution			
All neoplasms.....	100.0	100.0	100.0	100.0
Digestive organs	16.6	9.2	21.4	22.1
Respiratory organs.....	11.0	6.3	24.6	25.7
Skin	2.2	3.7	2.3	2.2
Breast.....	8.3	6.8	11.1	10.8
Female genital organs.....	7.2	5.9	6.7	6.6
Male genital organs.....	4.5	4.1	2.3	2.3
Leukemia	2.8	1.9	5.3	4.6
All other malignant neoplasms.....	27.6	20.8	24.7	24.2
Benign and unspecified neoplasms	19.9	41.3	1.6	1.5

NOTE: Numbers and percents may not add to totals due to rounding.



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