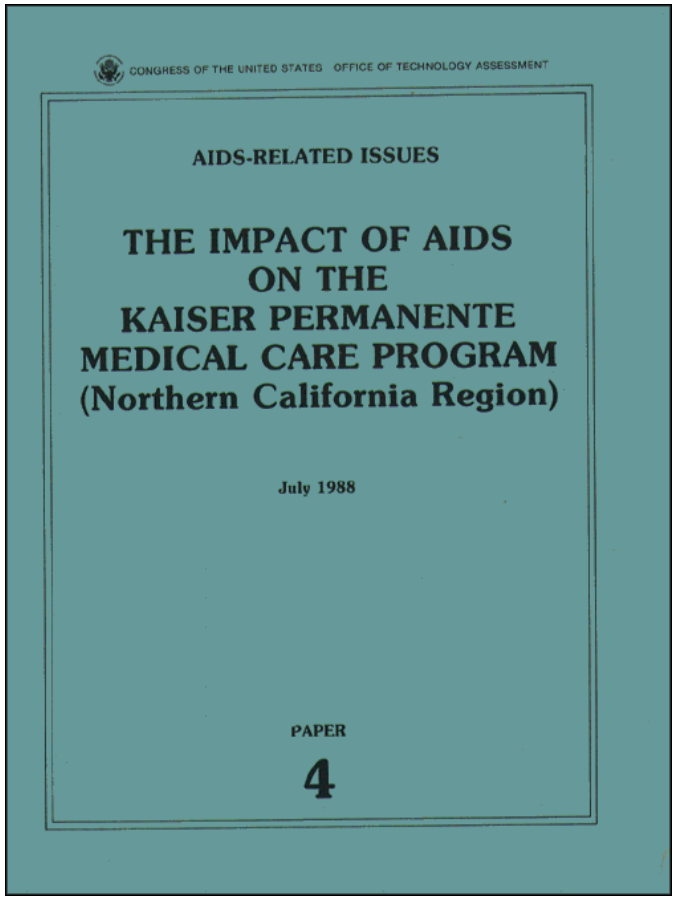
The Impact of AIDS on the Kaiser Permanente Medical Care Program (Northern California Region)

July 1988

NTIS order #PB89-116941





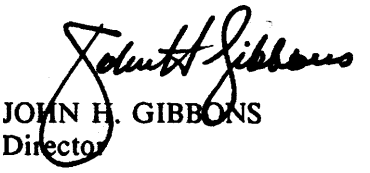
PREFACE

The impact of AIDS on the Nation's health and health care resources continues unabated. Congress has responded to the AIDS crisis with large increases in Federal funds for basic and applied research and education, and has begun to grapple with the difficult issues involved in financing AIDS-related health care. AIDS is also appearing on the agenda of an increasing number of congressional committees and raises numerous important issues that will require further congressional attention and decisions. These developments led to a recommendation by OTA's Technology Assessment Board, with encouragement from the Legislative Subcommittee of the House Appropriations Committee, that OTA provide "assistance on AIDS-related issues to the Congress on a sustained basis.

The topic of this fourth paper in OTA'S series of AIDS-related issues is the impact of the AIDS epidemic on the Kaiser Permanence Medical Care Program's (KPMCP) northern California region and was originally commissioned for OTA's assessment of *Medical Testing and Health Insurance.* Key OTA staff involved in the oversight of the project were Jill Eden, Larry Miike, and Laurie Mount.

The KPMCP is a private, nonprofit, health care program that provides prepaid medical and hospital services to more than 5 million people in 16 States and the District of Columbia. Its northern California region serves 25 percent of the area's population and is second only to the county health system as a provider of care to AIDS patients in San Francisco. This paper reviews KPMCP'S northern California region's AIDS cases between 1981 and June 1987 and presents a cost analysis of a sample of these patients.

The preceding Staff Papers in this series were: *Do Insects Transmit AIDS?* (September 1987), *AIDS and Health Insurance - An OTA Survey* (February 1988), and How *Effective is AIDS Education?* (June 1988). (See inside back cover for information on how to order these publications.) Previous OTA reports addressing AIDS-related issues include: 1) *Blood Policy and Technology* (January 1985), 2) *Review of the Public Health Service> Response to AIDS* (Technical Memorandum, February 1985), and 3) *The Costs of AIDS and Other HIV Infections: Review of the Estimates* (Staff Paper, May 1987).



JOHN H. GIBBONS
Director

THE IMPACT OF AIDS ON THE KAISER PERMANENTE MEDICAL CARE PROGRAM (Northern California Region)

by

The Kaiser Permanence Medical Care Program
(Northern California Region)

Robert A. Hiatt
Bruce Fireman
Charles P. Quesenberry, Jr.
Joseph V. Selby

Denise Durant, Steve Hayes, Matthew Kaplan,
Anthony C. Knight, William Kramer, Kathleen M. Lewis,
Greg Lieberknecht, Paul Litsky, Walt Meyers, Lewis Sandy, P. David Sawi

prepared for

Health Program
Office of Technology Assessment
United States Congress
Washington, D.C. 20510-8025

July 1988

A Paper
in OTA's Series on
AIDS-Related Issues

The views expressed in this Paper do not necessarily represent those of the Technology Assessment Board, the Technology Assessment Advisory Council, or their individual members.

LIBRARY
OFFICE OF TECHNOLOGY ASSESSMENT
CONGRESS OF THE UNITED STATES

CONTENTS

Chapter *page*

1. Summary 1

2. Introduction 3

3. Methods 5
- Construction of the AIDS Database 5
- Data Collection Methods for Measuring Resource Utilization 6
- Unit Cost Calculation 6
- Survival Methodology 10

4. Results 11
- Analysis of the AIDS Caseload 11
- Cost of Care 14

5. **Concluding Comments** 21

Appedix

A. Kaiser Permanence Medical Care Program 23

B. The Product-Limit Estimator 35

C. Centers for Disease Control (CDC) California AIDS Projections 37

D. List of Abbreviations 45

References 47

Tables

Table *Page*

3-1. AIDS Cases by Best Source of Confirmation 5
3-2. AIDS Classification Guidelines 7
3-3. Data on Resource Utilization of AIDS Patients 8
4-1. Incidence of AIDS: 1981-June 1987 11
4-2. Number of AIDS Patients by Facility of Diagnosis: 1981-June 1987 12
4-3. Distribution of Age at Diagnosis: KPNCR and General population: 1981-June 1987 12
4-4. Initial Diagnosis for AIDS Patients 13
4-5. Estimated Lifetime Hospital Utilization by Initial Diagnosis in 913 AIDS Patients 13
4-6. Estimated Lifetime Hospital Utilization by Initial Diagnosis for the Sample of 30 AIDS Patients 14
4-7. Estimated Lifetime Utilization by Service Category for the Sample of 30 AIDS Patients 15
4-8. Calculation of Product-Limit Estimates of the Distribution of Lifetime Costs of Care for AIDS: Sample of 30 AIDS Patients 16
4-9. Estimated Lifetime Costs of AIDS for the Sample of 30 AIDS Patients 16
4-10. Estimated Lifetime Costs by Initial AIDS-Related Diagnosis for the Sample of 30 AIDS Patients 17
4-11. New Cases of AIDS From 1981- 1990 18

CONTENTS (cent'd)

A-1. Percent Distribution Membership by Age and Sex 1980 and 1986 25
A-2. Number and Percentage Distribution of Group and NonGroup Members for Selected Years: 1965 to 1986 26
A-3. Registration Charges for Selected Services 30
A-4. Description of Prescription Drug Plans 30
A-5. Age-Specific Health Plan Utilization Rates, Calendar Year 1986 32
A-6. Percent of Average Hospital Occupancy, KPNCR, California, and the United States, Selected Years From 1976 to 1986 33
A-7. Largest Non-Kaiser Northern California HMOS 33

Figures

Figure *Page*

A-1. KPNCR Service Area Map 24
A-2. Kaiser Foundation Health Plan Membership Northern California Region 25
A-3. KPNCR Application for Membership-Medical Questionnaire 28
A-4. Individual Plan Programs 31

1. SUMMARY

The Kaiser Permanence Northern California Region (KPNCR) serves a total membership of more than 2 million people, 25 percent of the area's population, and is second only to the county health system as a provider of care to AIDS patients in San Francisco.

From 1981 through June 1987, a total of 940 KPNCR patients were diagnosed with AIDS. *Pneumocystis carinii* pneumonia (PCP) was the presenting diagnosis in 63 percent of the AIDS patients, while 15 percent were initially diagnosed with Kaposi's sarcoma (KS). These 940 patients represent 23.7 percent of all cases reported to the State of California during the same period for the same geographic areas. The incidence of AIDS within KPNCR increased from roughly 1.6 cases per 100,000 members before 1984 to 19.7 cases per 100,000 by June 1987. This represents a 59 percent average annual increase in the number of new cases between 1984 and 1986, the period of time for which complete annual data were available. This rate of increase is expected to decrease, but not significantly, within the next 5 years.

Information on the cost of AIDS care was available for 913 of the 940 patients. Twenty-seven of the 940 cases were excluded because the date of diagnosis was not available. The 913 AIDS patients (39 percent were still alive in June 1987) were hospitalized a total of 1,994 times and stayed 23,697 days in total.

Lifetable methods were used to obtain unbiased estimates of total lifetime hospitalizations and hospital days for all 913 cases. This approach yielded a lifetime mean of 3.5 hospitalizations (+ O. 15) and a lifetime mean of 39.3 (+ 1.27) hospital days per case. Corresponding medians were 3.0 and 32, respectively. Patients whose initial diagnosis was PCP were hospitalized for longer periods than were KS patients; the mean length of hospitalization was 12.0 versus 10.6 days.

A sample of 30 AIDS patients was selected randomly from the 596 AIDS patients who had received care in t he Kaiser Permanence San Francisco or Oakland hospitals. Each patient's total utilization of Kaiser services was reviewed, beginning one year prior to AIDS diagnosis, to derive costs for inpatient care, outpatient care, tests and procedures, and pharmacy prescriptions.

The estimated mean cost from date of diagnosis to death was $35,054 in actual dollars (standard error + $4,245). The median cost was somewhat lower at $29,929, suggesting that the distribution of costs was skewed toward the higher amounts (i.e., that a few patients with very high costs increased the mean).

Annual costs per patient were calculated for three time periods-- 1984-85, 1986, and the first half of 1987--to look for trends in the costs of AIDS care. Total costs and hospital costs changed little from the first to the second period, but fell 20 percent and 36 percent, respectively, in 1987. The drop in hospital costs may be attributable to the establishment, in March 1986 of an outpatient unit (known as the Infusion Center) to provide intravenous (IV) medication to AIDS patients at Kaiser Permanence's San Francisco hospital. In its first 18 months of operation this center saved an estimated 3,500 inpatient days.

In contrast, annual outpatient pharmacy costs climbed markedly from $386 per person during 1984-85 to $2,423 in 1986 and $4,477 in 1987. This reflects the introduction of the

drug **AZT** as an outpatient treatment for AIDS during 1986.

Total costs per AIDS patient for one year of care averaged $25,119 from 1984 through June, 1987. The product of the annual costs per case ($25,1 19) and the number alive at mid 1987 (346) gives an estimate of the total cost of care for all AIDS patients in 1987 ($8,691,174). If the incidence of AIDS and survival time increased during this time, the use of the number of cases alive at the midpoint of the year underestimates the average number alive during the year. This could also lead to an underestimate of total costs.

Limitations in KPNCR'S cost accounting and data systems make it difficult to precisely measure the overall impact of AIDS-related care on the 1988 basic rate. The ratesetting forecast for 1988 includes 14,120 patient days related to AIDS or AIDS-related complex (ARC). This represents 2.0 percent of the total adult and pediatric patient day forecast, or more than $8.6 million --a significant increase from the estimated 1987 inpatient cost of $5.7 million.

Given the relationship of AIDS inpatient costs to other services (e.g., outpatient visits and ancillary services), the impact of AIDS/ARC on the basic rate is in excess of $0.55 per member per month, exclusive of the cost of AZT.

A total of 2,501 new AIDS cases are forecast for July 1987 through 1990. Assuming mean lifetime costs of $35,054, the costs for providing care to these patients will be $87.7 million. This estimate does not consider inflation, additional costs incurred as life-extending therapies are developed, costs of care for infected patients who do not yet fulfill the diagnostic criteria for AIDS (i.e., patients with ARC or human immunodeficiency virus seropositivity), or changes in the cost of care resulting from new alternative health care arrangements.

2. INTRODUCTION'

The Kaiser Permanence Medical Care Program (K PMCP) is the largest private health care program in the United States, and the majority of its membership resides in areas with large numbers of AIDS cases. The Northern California Region of the program is second only to the county health system as a provider of care to AIDS patients in San Francisco.

In the summer of 1987, the Office of Technology Assessment contracted with the Kaiser Permanence Northern California Region (K PNCR) to report the impact of the AIDS epidemic on its program with a special focus on cost issues.

From 1981 through June 1987, a total of 940 KPNCR patients were diagnosed with AIDS. This paper looks at how these cases were identified, who they were, the services they used, and the cost of their care. In addition, background information is provided on K PNCR'S organization, membership, benefits structure, and ratesetting methods.

---

1 **This report was prepared by the Northern California Region of the Kaiser Permanence Medical Care Program and does not necessarily reflect the views, data or policies of any other region within the Kaiser Permanence Medical Care Program.**

CONSTRUCTION OF THE AIDS DATABASE

The KPNCR AIDS database was constructed from three computerized sources (described below) and contained a total of 940 patients diagnosed with AIDS between January 1981 and June 30, 1987.[2]

1) The Inpatient Utilization System (IUS) file contains data for all hospitalizations at any KPNCR hospital and includes up to 13 ICD-9-CM diagnostic codes per admiss ion. These data have been used in many epidemiologic studies and their accuracy verified for a variety of diagnoses.

The file was searched from 1981 onward for definite and probable cases of AIDS, applying an AIDS case definition based on that of the Centers for Disease Control (CDC) criteria (10, 1 1).

2) The pathology file contains biopsy reports from five major KPNCR hospital pathology departments, including San Francisco's and Oakland 's. Probable cases of AIDS were identified from biopsy diagnoses of Kaposi's sarcoma (KS), *Pneumocystis carinii* pneumonia (PCP), candidiasis, and certain non-Hodgkin's lymphomas.

3) The KPNCR hospital pharmacy file contains information on all patients on AZT treatment protocols.

Medical records of most cases identified only by the pathology file or the AZT list were reviewed to verify the diagnosis of AIDS and to identify the date of diagnosis. Medical records of many women who lacked a specific diagnosis of AIDS were also reviewed. **At** chart review, cases not fitting CDC criteria for AIDS were removed from the database.

In September 1987, the CDC expanded its criteria for the diagnosis of AIDS to include AIDS-dementia and generalized wasting. Due to time constraints, these criteria could not be applied in identifying cases in the database. Therefore, the numbers presented in this report may underestimate the total number of AIDS cases by about 5 percent (13). On the other hand, the AIDS database used in this report represents a combination of cases identified solely by computer criteria and cases confirmed either by chart review, the Confidential Case Report filed with the State, or a report from an Infection Control nurse. A few cases currently in the file therefore may not represent AIDS.

Table 3-1 shows the frequency of the best currently available source of diagnosis for the 940 cases in the AIDS database in decreasing order of certainty of the diagnosis.

On the basis of their initial AIDS-related diagnosis, an attempt was made to classify all cases as either AIDS with infection (042.0),

Table 3-1--- AIDS Cases **by Best Source of Confirmation**

Source	Number	Percent
Chart review	87	9.3%
Copy of confidential caae report	110	11.7
Infection control nume's report	93	9.9
IUS (hospitalization) file and AZT file	88	9.4
IUS file and pathology file	96	10.2
IUS file only	426	45.3
Pathology file only	35	3.7
AZT file only	5	0.5
Total	940	100%

SOURCE: Kaiser Pennanente (Northern California Region), uqxbl i shed data, Oakland, CA, 198s.

2 The prevalence of HIV seropositivity and of AIDS-related complex (ARC) among the KPNCR membership *are* unknown.

AIDS with neoplasm *(042.2),* or **AIDS with** other diagnosis (042.9). In the absence of a diagnosis of AIDS on the hospital discharge form, a presumptive diagnosis of AIDS was made in males less than 60 years of age if an AIDS-related diagnosis was noted without an alternative diagnosis to explain immune deficiency. (The medical records of all men less than 60 years of age who have a diagnosis suggestive of AIDS but not a diagnosis of AIDS itself, are to be reviewed further. Women and men over 60 years of age with 2 possible AIDS-related diagnoses were not included, but their charts are also to be reviewed to identify possible additional cases.) The decision rules, based to the extent possible on the CDC case definition, that were used to guide classification are summarized in table 3-2.

For each AIDS case, whether chart review was performed or not, the date of diagnosis was defined as the earliest date associated with a diagnosis of AIDS or a diagnosis compatible with AIDS. This date was used in the descriptive analysis of all cases and as the starting point for the calculation of AIDS-related costs in the sample.

DATA COLLECTION METHODS FOR MEASURING RESOURCE UTILIZATION

AIDS patients had voluminous medical records and although a larger sample would be desirable, time did not allow for complete data collection for more than a sample of 30 patients. For each of the 30 cases in the sample, complete inpatient, outpatient, hospice, and home health care records, beginning 1 year prior to the date of diagnosis, were reviewed by trained medical records analysts. Each service or resource was entered as a separate item and assigned a cost.

As noted, sample size was limited primarily by the time available to review medical records with the appropriate scrutiny. The sample was also restricted to patients diagnosed since January 1, 1984, in order to reflect more recent utilization patterns while also allowing enough time for the disease to run its course.

Table 3-3 provides details on the data that were collected to help measure the resource utilization of the 30 sample AIDS patients.

UNIT COST CALCULATION

Average unit costs were assigned to all the identified services provided to AIDS patients. These unit costs are "fully loaded" to include the expenses attributable directly to the delivery of a service, the "overhead" connected with the operation of the medical facility, and the indirect "overhead" connected with health plan operations. No effort was made to separate the AIDS-related costs of care from the costs of other services provided to AIDS patients. Assuming average utilization of non-AIDS-related services among the 30 sample cases, the effect on the cost estimates would be negligible. (See appendix A, table A-5, for average utilization statistics for all KPNCR members.)

Average unit cost calculation was based on the standard methodology used for KPNCR'S Medicare cost reports. Cost data were drawn primarily from 1986 sources.

Hospital Bed Unit, Per Diem

The nursing costs of AIDS patients who are hospitalized in units with non-AIDS patients cannot be readily determined. However, in an AIDS-dedicated nursing unit, such as in the San Francisco facility, nursing costs are about 40 percent greater than the costs for other medical/surgical patients. This additional cost was included in the per diem hospital bed cost. Overhead was allocated to direct costs (such as nursing and supplies), based on the standard stepdown methodology used for Medicare cost report-

Table 3-2. --AIDS Classification Guidelines

Case identified by	Classification
1. Copy of Confidential Case Report sent to the State	Included as a case; no chart review; initial diagnosis obtained from the case report
2. Infection control nursing records (without copy of confidential case report or information on initial diagnosis)	Included as case; no chart review; classified as 042.9 (AIDS, initial diagnosis unspecified)
3. Diagnosis on the IUS file:	
a. ICD-9-CM diagnosis of AIDS (279.10 - 279.19 before Sept. 1986, 042.0 - 042.9 thereafter):	
o With additional diagnosis of AIDS-related opportunistic infection	Classified as 042.0, no chart review
o With additional diagnosis of AIDS-related neoplasm	Classified as 042.2, no chart review
o With additional diagnosis of wasting or dementia	Classified as 042.9, no chart review
o With no additional AIDS-re[ated diagnoses	Classified as 042.9, no chart review
b. No ICD-9-CM diagnosis of AIDS, but male, <60 *years old,* and no other diagnosis to explain immune deficiency:	
o With AIDS-related opportunistic infection, including: --Pneumocystis carinii pneumonia, --toxoplasmosis of central nervous system --cryptococcoal meningitis --coccidiosis --CMV pneumonia, excluding neonatal --progressive multi focal leuko- --encephalopathy --candidiasis of esophagus	Classified as 042.0, chart review pending
o With AIDS-related neop(asm: --Kaposi}s sarcoma (ICD-9-CM 173.8)	Classified as 042.2, chart review pending
c. No ICD-9-CM diagnosis of AIDS, female or male >60 years	Excluded from database, chart review pending
4. AZT file or Pathology File only	Chart review done to verify diagnosis. If chart review revea(ed that AIDS was not diagnosed, the case was removed from the database

SOURCE: Kaiser Permanence (Northern California Region), unpublished materia[, Oakland, CA, 1988.

Table 3-3.--Data on Resource Utilization of AIDS Patients

Resource	Data collected
1. Inpatient services	a. Date and hour of entry, discharge, and transfer of service. b. Inptient service (e.g., intensive care, medical/surgical, hospice). c. Specialty consultation.
2. Inpatient pharmacy services	a. Utilization was estimated based on prescriptions ordered for all hospitalized AIDS patients during an 8-day period of observation in the San Francisco and Oakland facilities in October 1987.
3. Outpatient services (excluding psychiatric utilization)	a. Date of visit (or service). b. Facility type. c. Clinic type. d. Provider type. e. Procedures: diagnostic or therapeutic (e.g., lmbar puncture, Laboratory, radiology). f. Support services (e.g., social services). g. Prescriptions: quantity, strength, refills.
4. Psychiatric services	For reasons of patient confidentiality, use of psychiatry services was assessed by the staff of the psychiatry departments in Oakland and San Francisco. A list of all patients in the sample uas submitted to each department. Department staff examined charts to record the follouing: a. Date of visit. b. Visit type. c. Provider type. d. Prescriptions.
5. Outpatient pharmacy services	It Has assuned that all prescriptions and refiils indicated in the record uere actually dispensed and that refills were not prescribed unless indicated. This approach is inaccurate to the extent that clinicians fail to record refills authorized or patients fail to fill all prescriptions or refills indicated. In some instances, notation of prescriptions uas incomplete. For exampie, the quantity prescribed was often anitted. In such cases, a standard quantity uas assuned (e.g., a 10-day supply of antibiotic, orw-month supply of other medications).

SOURCE: Kaiser Permanence (Northern California Region), ~lished ~terial, Oakland, CA, 1$'~"

ing.[s] Pharmacy costs, generally a part of the allocation process, are specifically excluded and treated as a separate cost area.

Physician Visits: Clinic and Hospital

The cost of a physician's office visit was derived from The Permanence Medical Group's 1986 Unit Cost Worksheet. Overhead costs, including plant operation and local administration, were included. The emergency room is considered an outpatient clinic and assigned a visit cost along with other outpatient clinics. Inpatient physician services (such as bed rounds) were treated separately from physician clinic activity. There was no overlap between the overhead costs allocated to physician clinic v. physician hospital services.

Average visit costs were calculated by dividing total clinic costs (including nonphysician provider costs) by total physician visits. No distinction was made between the cost of AIDS visits and other visits. It was not possible to determine whether, on average, visits by AIDS patients consume more (or less) resources than visits by others.

Medications: Inpatient and Outpatient

The Pharmacy Chiefs at the San Francisco and Oakland hospitals agreed that, based on their informal observations, the drugs used to treat AIDS inpatients are more expensive, on average, than those used to treat non-AIDS inpatients who are hospitalized within the same bed unit. Since the individual inpatient pharmacy costs incurred by the sample of 30 patients were not available, a mean per diem drug cost from pharmacy medication logs for all AIDS patients hospitalized in San Francisco and Oakland in a week in October 1987 was used.

The Pharmacy Chiefs also noted that there is not a significant difference between the cost of dispensing drugs to AIDS inpatients v. other patients in the same unit. Consequently, average hospital dispensing costs (inclusive of overhead) were added to the cost of the AIDS medications.

Outpatient prescriptions were individually tallied and costed out using the current cost of the drug in the pharmacy's inventory asset file. The costs were then adjusted to reflect direct and indirect dispensing expenses.

Ancillary Services: Weighted Procedures

Average unit costs were derived for the ancillary services typically used by AIDS patients. For many services, including EEG, EKG, hospital laboratory, pathology laboratory, physical therapy, radiology, and respiratory therapy, a weighted value methodology was used to estimate unit costs. All applicable direct and indirect overhead were taken into account.

It is widely acknowledged that weighted value costing of ancillary services has weaknesses. The major criticism is that the cost weights employed are only approximations of the actual relative amount of resources required to provide the various tests and therapies. In addition, important cost differences within a cost center (e. g., hematology v. chemistry laboratory tests) may be masked. This could be significant if the mix of tests provided to AIDS patients significantly differs from that given others.

3 The stepdown method allocatea the following overhead coats to inpatient beds: 1) buildings and fixtures, 2) moveable equipment, 3) employee benefits, 4) administrative and general, S) maintenance and repaira, 6) operation of plant, 7) linen and laundry, 8) housekeeping, 9 dietary, 10) cafeteria, 11) nuraing administration, 12 central supply, 13) medical records, 14) social semice, 1S) health plan administration, and 16) reeidenta' salaries and benefits.

Surgery

The cost of surgery was divided into two components: 1) professional fees attributable to the surgeon and anesthesiologist and 2) hospital operating room costs (including the recovery room and nurse anesthetists). The total average hourly cost of the professional component was drawn from the Medicare Part B Revenue Worksheet. The total average hourly cost of the operating room was derived using standard stepdown methodology. Overhead was allocated to both cost components.

Other Services

Other services covered by the health plan and used by AIDS patients were assigned unit costs. The average cost of a home health visit was derived by dividing the total fully allocated cost of the department of home health by the total number of visits. The costs of blood and blood products purchased from county blood banks were defined as the rates charged by those agencies. Ambulance services and outside claims and referrals for specialized services unavailable within the health plan were treated similarly.

SURVIVAL METHODOLOGY

'Survival" methods, also known as "lifetable" methods, were used to examine the distribution of such lifetime amounts and costs of medical service utilization. Survival methods were specifically developed to estimate the amount of time that individuals survive from a starting point to an endpoint, given data on some individuals who are observed until the endpoint and some who are not. Typically, the starting point is the time of disease diagnosis and the endpoint is the time of death. In this analysis, interest centers on the cost from diagnosis to death, rather than on the survival time from diagnosis to death.[4] The cost for care from time of diagnosis to the end of observation is a nonnegative lower bound for the lifetime cost, which cannot be known until death.

The primary advantage of survival methods for the examination of lifetime cost is that they can make use of information about patients who are still alive. The authors are unaware of any other studies that have used survival methods to estimate the cost of care for AIDS or other illnesses. Survival methods provide unbiased estimates of the lifetime costs that eventually would be attained by living AIDS cases if their future chances of death at various cost levels continue to fit the best model of the recent past. This approach is especially appropriate for the examination of lifetime health care costs in a rapidly growing epidemic if the cases who have died tend to have been short-lived and less costly, or if the patients who are still alive tend be in early and less costly stages of the disease. The estimators of mean and median lifetime amounts and costs of medical services utilized were obtained by a basic method of survival analysis known as the product-limit method (8). (A formal presentation of the product-limit method is presented in appendix B.)

Subgroup specific estimates of lifetime costs are assessed with the Iogrank test (12).

In addition to estimates of lifetime cost, estimates of mean costs per patient per year were calculated. These estimates are simple cost rates derived by: 1) summing the total costs of all patients for a given year, 2) summing the amounts of time that the patients were observed for that year, and 3) dividing the former sum by the latter sum. Thus, every patient contributes to the estimate for a given year if he is observed at all during the year, and his contribution to the overall estimate is weighted by the proportion of the year for which he is served.

4 For convenience, we use the term "cost" to present the method for analyzing both cost and amount of services utilised.

ANALYSIS OF THE AIDS CASELOAD

The 940 AIDS patients represent 23.7 percent of all cases reported to the State of California during the same period for the same geographic areas. The incidence of AIDS within the Kaiser Permanence Northern California Region (KPNCR) increased from roughly 1.6 cases per 100,000 members before 1984 to 19.7 cases per 100,000 by June 1987 (table 4-l). This represents a 59-percent average annual increase in the number of new cases between 1984 and 1986, the period of time for which complete annual data were available. This rate of increase is expected to decrease within the next 5 years. (A further discussion of future AIDS cases is presented later in this section).

By Facility

Nearly half of all AIDS patients (426/940) were diagnosed at the San Francisco facility; Oakland ranks second in AIDS caseload (table 4-2).

By Age and Sex

KPNCR AIDS patients are somewhat older than other AIDS patients from the same geographic area (table 4-3). Mean age at diagnosis for KPNCR cases was 40.0 years as compared to 38.1 years for cases reported to the State. Within KPNCR, 98.6 percent of AIDS patients were male, a proportion almost identical to that for AIDS patients in the local general population.

By Diagnosis

Pneumocyslis carinii pneumonia (PCP) was the presenting diagnosis in 63 percent of the AIDS patients (588/940), while 15 percent of the AIDS patients (143/940) were initially diagnosed with Kaposi's sarcoma (KS) (table 4-4). Other reports suggest that a higher percentage of AIDS patients in both the San Francisco area (13) and elsewhere (14) present initially with KS. This difference may be related to how the Kaiser AIDS patients were initially identified; many of the cases were found in the hospital discharge files. Because

Table 4-1--- Incidence of AIDS 1981-June 1987

	1981-1983	1984	1985	1986	Jan. - June 1987	Total
Mu'her of cases diagnosed	85	118	210	300	200	913[a]
Incidence (per 100, OOOtirs)	1.6	6.2	10.7	15.0	19.7	

[a]Twenty-seven of 940 cases were excluded due to unavai lable date of diagnosis.

SOURCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

KS, by itself, is seldom a reason for hospitalization, some AIDS patients may have been identified by their first inpatient diagnosis despite an earlier outpatient diagnosis of KS.

Hospital Utilization

The cost of AIDS care is largely a function of total inpatient days. The 913 AIDS patients[5] (39 percent were still alive in June 1987) were hospitalized a total of 1,994 times and stayed 23,697 days in total. Mean length of stay per hospitalization was 11.9 days overall. The average number of hospitalizations was 2.2, and the average number of hospital days per patient was 26.0. For AIDS patients who were still alive, total lifetime hospitalizations will ultimately be higher. Among AIDS patients who had died, there were 2.6 hospitalizations and 33.4 hospital days per patient. However, AIDS patients who had already died are not representative

5 Twenty-seven of the 940 caaes were excluded becauee the date of diagnosia was not available.

Table 4-2--- Number of AIDS Patients by Facility of Diagnosis
1981-June 1987

Facility	Number	Percent of Total[a]
San Franciaco.	426	46.3%
Oakland	170	18.1
Santa Clara	81	8.6
San Jose.	39	4.1
Sacramento	37	3.9
Vallejo.....	33	3.5
Hayward	31	3.3
San Rafael	29	3.1
Redwood City.	26	2.8
Walnut Creek	2s	2.7
So. San Franciaco..	23	2.4
So. Sacramento	11	1.2
Martinez	5	05
Richmond	4	0.4
Total	940	100.0%

percentages may not total 100 due to rounding.

SOURCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-3--- Distribution of Age at Diagnosis: KPNCR and General Population[a]
1981-June 1987

Age at diagnosis	KPNCR Number	KPNCR Percent[b]	General Population Number	General Population Percent[b]
Leaa than 14 yeara.	1	0.1%	3	0.1%
16-29 yearn	129	14.1	582	14.5
30-39 yeara.	366	40.1	1,985	49.5
40-49 yearn	270	29.6	993	24.8
50-59 years	110	12.0	343	8.6
60 years and over.	37	4.1	102	2.5
Total	913[c]	100%	4,008	100%

[a] Data are for a geographic area comparable to KPNCR'O service area and include KPNCR cases.
[b] Percentage may not total 100 due to rounding.
[c] Twenty-seven of 940 cases are excluded because the date of diagnosis waa unavailable.

SOURCE: Kaiser Perrnanente (Northern California Region), unpublished data, Oakland, CA, 1988.

of all AIDS patients in that they over-represent those who die soon after diagnosis. Thus, these results are underestimates of total lifetime hospitalizations for the average AIDS case.

Lifetable methods were used to obtain unbiased estimates of total lifetime hospitalizations and hospital days for all 913 cases (see Methods section above). These methods draw upon information for all 913 AIDS patients, living and dead, to estimate the distributions of lifetime hospitalizations and hospital days. This approach yielded a lifetime mean of 3.5 hospitalizations (+ 0.15) and a lifetime mean of 39.3 (+ 1.27) hospital days per case (table 4-5). Corresponding medians were 3.0 and 32, respectively. Patients whose initial diagnosis was PCP were hospitalized for longer periods than were KS patients; the mean length of hospitalization was 12.0 v. 10.6 days.

Table 4-4---Initial Diagnosis for AIDS Patients[a]

	Number	Percent[b]
PCP	588	62 .6%
KS	143	15.2
Other AIDS- related infect ion.....	104	11.1
Other AIDS-related neoplasm	45	4.8
Other/unspecified AIDS-related diagnosis	60	6.4
Total	940	1 00%

[a]First diagnosis appearing in any KPNCR database.
[b]Percentages may not total 100 due to rounding.

SOURCE: Kaiser Permanence (Northern Cal ifornia Region), unpublished data, Oakland, CA, 1988.

Table 4-5---Estimated Lifetime Hospital Utilization by Initiai Diagnosis in 913 AIDS Patients[atb]

Diagnosis	N r	Median	25th-75th percentile	Mean	Standard error
Hospi ta 1 i zat i orw					
PAP	588	3	2-4	3.4	0.19
KS. n	143	3	1-4	3.1	0.26
Other	182	3	1“5	4.3	0.46
Total	913	3	1-4	3.5	0.15
Hospital days					
PCP	588	32	18-56	41.0	1.64
KS.	143	28	15-47	33.0	2.64
Other	182	32	17-60	38.4	2.73
Total	913	32	17-53	39.3	1.27

[a]Lifetable estimates are for the interval from diagnosis until death.
[b]luenty-seven of 940 cases uere excluded due to wavailable date of diagnosis.

SOURCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

COST OF CARE

The preceding section presented hospital utilization data for 913 AIDS patients from their date of diagnosis through June 1987. The following cost analysis examines a sample of 30 of these patients. Their mean and median lifetime utilization and costs were estimated using survival methods.

Characteristics of the 30-Patient Sample

The sample of 30 AIDS patients was selected randomly from the 596 AIDS patients (63.4 percent) who had received care in the Kaiser Permanence San Francisco or Oakland hospitals (table 4-2).[6] Each patient's medical records were reviewed thoroughly and their total utilization of Kaiser services, beginning one year prior to AIDS diagnosis, was re - corded to derive costs for inpatient care, outpatient care, tests and procedures, and pharmacy prescriptions.

The 30 AIDS patients were representative of KPNCR'S population of 940 AIDS patients in the proportion still alive and in the health plan (43.3 percent v. 38.5 percent), and in total hospitalizations and hospital days (table 4-6). All 30 patients were men. Mean age at diagnosis was 37.6 years (range 24.7 to 54.6 years). Fourteen of these patients had an initial diagnosis of PCP (47 percent), eight had KS (27 percent) and another eight (27 percent) presented initially with other AIDS-related diagnoses.

A higher proportion of the sample was initially diagnosed with KS (27 percent) than the total group of 940 cases (15 percent). As mentioned above, many of the 940 patients were given the diagnosis associated with their first hospitalization. This practice probably misclassified some patients with the initial diagnosis of KS into other categories. The estimated mean survival time from diagnosis to death for the sample cases was 15.1

6 **The sample was also restricted to patients diagnosed since Jan. 1, 1984, in order to reflect more recent utilisation pattema while ah allowing enough time for the dinea8e to run its course.**

Table 4-6--- Estimated Lifetime Hospital Utilization by Initial Diagnosis for the Sample of 30 AIDS Patients[a]

Diagnosis	Number	Median	25th -7Sth percentile	Mean	Standard error
Hospitalizations					
PCP	14	3	1-5	3.1	0.6
KS	8	3	2.3	2.6	0.3
Other	8	4	2-6	4.2	0.9
Total	30	3	2-5	3.3	0.4
Hospital days					
PCP	14	37	20-67	41.4	8.6
KS	8	27	23-30	26.2	1.9
Other	8	30	23-47	33.0	6.2
Total	30	30	22-48	37.1	5.2

[a]Lifetable estimates are for the interval from diagnosis mti 1 death.

SOURCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1968.

months. Patients with an initial diagnosis of KS had an estimated mean survival of 19.1 months compared to 9.8 months for those with any other initial diagnosis.

Table 4-7 provides selected outpatient and hospital statistics for the sample of 30 AIDS patients.

costs

Lifetime cost estimates for the sample of 30 AIDS patients are summarized in table 4-8.[7] Because the application of survival methods to cost data may be unfamiliar to the reader, the key terms in the calculation of lifetime means and medians are presented in detail. The first column presents the total cost for each case in order of ascending cost and the second column indicates whether the corresponding cost is a final lifetime cost for a case who has died, or whether it is a total as of June 30, 1987, for a case who was then still alive and in the health plan. The third column, assigns a rank (j) to the 17 cases whose total costs are final lifetime totals. For each of these ranked cost levels, the fourth column indicates the number of patients who attained higher cost levels divided by the number who reached that level. (This column estimates the conditional probability of surviving to cost more than the jth level, given attainment of that level.)

The fifth column results from multiplying the proportion in the fourth column by all the other proportions in the fourth column that are higher in the table. This product is an estimate of the proportion of all cases who would survive past cost level j and go on to attain higher cost levels, assuming they were all observed until death. The estimate of median lifetime cost is $29,929, the cost level corresponding to the highest proportion in column 5 that is less than or equal to 0.50.

A plot of the column 5 proportions against the corresponding column 1 cost levels is known as a "survival curve." The sixth and seventh columns estimate the mean lifetime cost of AIDS care by calculating the area beneath this survival curve. The $35,054 at the bottom of the last column is the area beneath the survival curve and an estimate of mean lifetime cost. The standard error for this mean is $4,245. The median cost was somewhat lower at $29,929, suggesting that the distribution of costs was skewed toward the higher amounts (i.e., that a few patients with very high costs increased the mean).

Estimates of median and mean lifetime costs by service category are presented in table 4-9. The use of inpatient services by AIDS patients was about three times as much

[7] All cost data were measured in actual dollars.

Table 4-7--- Estimated Lifetime Utilization by Service Category for the Sample of 30 AIDS Patients[a]

Service	Median	25th-75th percentile	Mean	Standard error
Outpatient				
Clinic visits	14	17-W	47.3	8.0
Prescript ions	29	10"54	29.4	4.2
Lab/procedures	69	24-121	69.1	8.6
HoSDi taL				
Hospital i zat ions	3	2-5	3.3	0.4
Hospital days.	30	22-48	37.1	5.2
Lab/procedures	102	82-210	149.7	24.1

[a] Li fetable estimates are for the interval from diagnosis mti 1 death.

SUJRCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-8. --Calculation of Product-Limit Estimates of the Distribution of Lifetime Costs of Care for AIDS: Sample of 30 AIDS Patients

(1) cost	(2) Alive & in plan	(3) Rank j	(4) Cases surviving j/cases surviving to j	(5) Estimated past proportion of al 1 cases *o survive past j	(6) Cost at j minus cost at j-1	(7) Area under survival curve to j
0			30/30	1.00		
S 2,549	Yes	..	..	..	..	..
s 3,154	Yes	..	..	..	..	..
$5,036	Yes	.-	..	..	..	..
$6,649	Yes	.-	..	..	..	..
$8,281	Yes	..	..	..	..	..
S 8,5~	Yes	..	..	..	..	..
$12,208	Yes	..	..	.-	..	..
$14,424	Yes	..	..	..	..	
$15,877	No	1	21/22	0.95	%15 ,877	%15 , 8~
$16,016	Yes	..	..	..	..	..
$16,129	No	2	19/20	0.91	$ 252	$16,118
S16, 607	No	3	..	0.86	$ 477	S16, 551
$18,623	No	4	17/18	0.81	$ 2,016	$18,283
$19,564	Yes	..	..	..	..	..
$23,164	No	5	15/16	0.76	$4,541	$21,968
$23,419	Yes	..	..	.-	..	.-
S27, 097	Yes	..	..	..	..	..
S28, 660	No	6	12/13	0.70	s 5,495	S26, 148
$28,861	No	7	1 1/12	0.64	s 202	S26, 289
S29, 735	No	8	10/1 1	0.59	s 873	S26,851
$29,898	No	9	9/1 o	0.53	s 163	S26, 947
S29, 929	No	10	8/9	0.47	s 31	$26,964
S29, W3	No	11	7/8	0.41	$ 6 4	S26, W3
$33,343	No	12	6/7	0.35	s 3,349	S28, 365
$33,749	No	13	5/6	0.29	s 406	S28, 508
S34 ,338	No	14	4/5	0.23	s 588	S28, 680
S36, 475	No	15	3/4	0.18	S 2,138	S29, 180
S58 ,386	No	16	2/3	0.12	$21,911	S33 ,027
S60, 728	Yes	..	..	..	..	..
$75,711	No	17	0/1	0.00	S1 7,325	$35,054

SCURCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-9--- Estimated Lifetime Costs of AIDS for the Sample of 30 AIDS Patients[a]

Service	Median	25th-75th percentile	Mean	Standard error
Outpatient				
Clinic visits	S 3,311	S 1,722-S 5,557	S 4,025	S 780
Prescriptions	S 1,326	s 195-S12,919	S 5,218	S1,216
Lab/procedures	S 1,113	S 674-S 2,351	S 1,226	s 174
Hospital				
Hospitalizations	S14,430	S 9,881-S22,607	S719,223	S2,W1
Pharmacy	S 3,796	S 2,594-S 6,073	$ 4,635	s 669
Lab/procedures	S 3,547	s 2,279-s 4,640	% 3,432	$ 403
All services	S29,929	S28,660-S34,338	s 35,054	S4,245

[a]Lifetable estimates are for the interval from diagnosis until death.

SWRCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

as outpatient services. For outpatient pharmacy, the mean costs substantially exceeded the median because a few longer lived patients accumulated high costs from AZT use. (The wholesale cost of AZT was $9,825 per year. AZT patients also incur extensive laboratory work.) Laboratory tests were frequently performed, but along with less common procedures (e.g., bronchoscopy, lumbar puncture), were not a major cost factor.

Patients with a primary diagnosis of PCP had higher mean lifetime costs (table 4-10) than those with other presenting diagnoses, due largely to their greater hospital utilization (table 4-7). Outpatient costs were lower for PCP (mean = $4,589 + 740) than for KS (mean = $6,376 + 1,355) or other diagnoses (mean= $7,546t 1929). Given the small size of the three diagnostic subgroups, the differences between the subgroups are suggestive, but not statistically significant.

Annual costs per patient were calculated for three time periods--1984-85, 1986, and the first half of 1987--to look for trends in the costs of AIDS care. Total costs and hospital costs changed little from the first to the second period, but fell 20 percent and 36 percent respectively in 1987. The drop in hospital costs may be attributable to the establishment, in March 1986, of an outpatient unit (known as the Infusion Center) at Kaiser Permanence's San Francisco hospital.[8]

In contrast, annual outpatient pharmacy costs climbed markedly from $386 per person during 1984-85 to $2,423 in 1986 and $4,477 in 1987. This reflects the introduction of AZT as an outpatient treatment for AIDS during 1986. As noted earlier, the wholesale cost of AZT was $9,825 per year.

Total costs per AIDS patient for a single year of care averaged $25,119 from 1984 through June, 1987. The product of the annual costs per case ($25,119) and the number alive at mid 1987 (346) gives an estimate of the total cost of care for all AIDS patients in 1987 ($8,691,174). Furthermore, if the incidence of AIDS and survival time increased during this time, the use of the number of cases alive at the midpoint of the year underestimates the average number alive during the year. This could also lead to an underestimate of total costs.

8 **The Infusion Center provides intravenous (IV) medication to patients who would otherwise need to be hospitalized. Ninety-five percent of its users are AIDS patients. Two registered nureea are dedicated to operating the Infusion Center 5 days a week. An average of16 AIDS patients are treated in the Infusion Center daily. In its firet 18 months of operation this center saved an estimated 3,500 inpatient days.**

Table 4-10--- Estimated Lifetime Costs by Initial AIDS-Related Diagnosis for the Sample of30 AIDS Patients[a]

Diagnosis	Nuher	Median	25th-75th percentile	Mean	Standard error
PAP.	14	$33,343	$23,164-S58,386	S39,785	$7,166
KS..	8	$29,~5	$28,861-$29,W3	S27,348	$2,268
Other	8	S34,338	$29,929-S36,475	S30,186	S3,796
Total	30	S29,929	S28,660-S34,338	S35,054	S4,245

[a]Lifetable estimates are for the interval from diagnosis until death.

SCURCE: Kaiser Permanence (Northern California Region), unpublished data, OakLand, CA, 1988.

Because there is no systematic way to identify Kaiser members who have been diagnosed with AIDS-related complex (ARC) or are HIV seropositive, it is not possible to estimate their costs of care. ARC cases are frequently not documented as such in any of the computerized databases and the identity of members who are HIV seropositive are protected by State confidentiality requirements. California law also prohibits mandatory testing. Clearly, these patients also contribute to KPNCR AIDS-related costs.

Impact on 1988 Rates

Limitations in KPNCR'S cost accounting and data systems make it difficult to precisely measure the overall impact of AIDS-related care on the 1988 basic rate. The ratesetting forecast for 1988 includes 14,120 patient days related to AIDS or ARC. This represents 2.0 percent of the total adult and pediatric patient day forecast, or more than $8.6 million.[9] Given the relationship of AIDS inpatient costs to other services (e.g., outpatient visits and ancillary services) that were outlined above, the impact of AIDS/ARC on the basic rate is in excess of $0.55 per member per month, exclusive of the cost of AZT. $0.55 per member per month represents approximately 0.8 percent of KPNCR'S non-Medicare dues rate for 1988. Given the current emphasis by employers and the Federal government on health care cost containment, virtually all rate increases will have a significant impact on KPNCR'S ability to attract and retain members.

The impact on the outpatient pharmacy supplemental benefit rates was calculated based on estimates of the utilization of AZT with in the member population and across drug plans. AZT coverage in the outpatient pharmacy benefit added $0.17 per member per month to the loading for the pharmacy benefit. In addition, it was assumed that providing AZT to patients who are without supplemental drug plans and unable to make full payment would result in an approximately $500,000 to $700,000 revenue shortfall. This revenue shortfall was added to the basic rate.

It is theoretically possible to continue adding to the basic rate to cover increases in AIDS costs, but employers have expressed great reluctance to pay for AIDS-related care through their premiums and are demanding experience-based rates that reflect only the costs of their own employees. At present, HMO Federal qualification prohibits experience-rating.[10] Eighty-eight percent of the total membership is affiliated with employer groups.

Forecast of AIDS Cases and costs

Table 4-11 presents the numbers of incident AIDS cases within KPNCR for 1981-1986 and projects incidence for 1987 through

9 Note that the $8.6 million is the 1988 projected coat for inpatient services only and is a significant increase from the eatimated 1987 inpatient cost of $S.7 million. These costs are consistent with those estimated using survival anaylsis methods (see Methoda section above).

10 Federal legislation to modify this requirement is currently under consideration.

Table 4-11.--New Cases of AIDS From 1981-1990

Year	Nunber of neu cases	Percentage increase i n cases
1981 -1983	85	
1984	118	
1985	210	1.78
1986.	300	1.43
1987 (est.)....	429	1.39
1988 (est.)....	582	1.35
1989 (est.)....	757	1.30
1990 (est.)... .	960	1.27

SOURCE: Kaiser Permanence (Northern California Region), unpublished data, Oakland, CA, 1988.

1990. Estimates for 1987 through 1990 assume the annual percentage increase in cases projected for California by the Centers for Disease Control (CDC) using the model presented at the Coolfont Conference in June 1986 (see appendix C). A total of 2,501 new AIDS cases are forecast for July 1987 through 1990.

Assuming mean lifetime costs of $35,054, the costs for providing care to these patients will be $87.7 million. This estimate does not consider inflation, additional costs incurred as life-extending therapies are developed, costs of care for infected patients who do not yet fulfill the diagnostic criteria for AIDS (i.e., patients with ARC or HIV seropositivity), or changes in the cost of care resulting from new alternative health care arrangements.

Comparison With Other Cost Studies

The mean lifetime cost of $35,054 differs from other published estimates. In one study, lifetime inpatient charges were estimated to be $27,571 for 85 patients who died at San Francisco General Hospital in 1984 (15). Another report cited medical costs of $46,505 per year for 45 patients in Massachusetts studied in 1984-85 (14). Other estimates have suggested that individual costs may be as high as $147,000 based only on hospital charges (4). In comparing these disparate estimates, several factors deserve attention:

1) the number of hospital days per patient,
2) the per diem cost of a hospital day,
3) whether ambulatory services are included,
4) the calendar year during which care was delivered, and
5) the statistical methods used to derive estimates.

The number of hospital days for an AIDS patient is the largest single contributor to costs. The estimate of 37.1 mean lifetime hospital days in the sample of 30 AIDS patients (39.3 days among all KPNCR AIDS patients) is somewhat higher than that of Scitovsky et al., who reported a mean of 34.7 days per patient at San Francisco General Hospital. However, Scitovsky et al. studied only persons who had died. Using this approach, the Kaiser mean lifetime hospital days were 33.4 days per patient.

Seage et al. estimated a mean of 61,7 lifetime hospital days per patient in Massachusetts, 66 percent more than in this study. In general, data from the Northeast suggest significantly longer hospital stays per patient than San Francisco-based studies (2). This could be due to differences in the casem ix between regions. For example, a higher proportion of intravenous drug users are generally reported in the Northeast (2). Such patients are more likely to present with opportunistic infections other than with KS, a factor clearly related to increased hospital days in these data and those of others. Moreover, these patients may have less extensive personal support networks to provide alternatives to hospitalization. In New York City, about 15 percent of the AIDS patients hospitalized in municipal hospitals are homeless (3). The San Francisco Bay area may also provide more community support services than other areas (15).

The dollar value of an inpatient day also differs among these studies. Per diem, "fully loaded" medical-surgical costs in the two KPNCR hospitals studied were about $400 in 1986 dollars.[11] The San Francisco General Hospital's charges for a regular bed were $662 in 1984 dollars. Charges in the Massachusetts study were also approximately $650 per day in 1984. (See the discussion of unit cost calculation in the Methods section.)

11 **The $400 includea overhead costs such ae: capital related costs, employee benefits, administrative and general, maintenance and repairs, operation of plant, linen and laundry, housekeeping, dietary, cafeteria, nuraing administration, central aupply, medical records, social semice, health plan administration, and residents' salaries and benefits, Pharmacy costs, usually a part of the allocation process, are specifically excluded and treated aa a separate coat area.**

Ambulatory as well as inpatient utilization has been included in this study in contrast with the analyses of Scitovsky et al. and Hardy et al. Every effort was made to account for all provided services including psychiatric, hospice, and home health services, as well as "out-of-area" services furnished by non-Kaiser providers.

It is not surprising that costs may differ year to year. For example, the introduction of new medication (i. e., AZT and pentamidine) increased pharmacy costs dramatically. In contrast, hospital as well as total costs decreased in 1987, perhaps due to the opening of the Infusion Center at the San Francisco hospital in May of 1986. In its first 18 months of operation, the Infusion Center saved an estimated 3,500 inpatient days.

The use of survival analysis methods in this analysis contrasts with studies that estimate lifetime costs or utilization based only on persons who have expired. The lifetable method appropriately yielded higher cost estimates.

Finally, to be consistent with other analyses, the mean and median lifetime estimates of utilization and cost in this report extend from the date of diagnosis until death. From the date of the first AIDS symptom recorded in the medical chart (instead of diagnosis) until death, the estimated mean cost of care for AIDS patients is $37,897 and the estimated median cost is $31,796 compared to estimated mean costs of $35,054 and estimated median costs of $29,929 from time of diagnosis until death.

5. CONCLUDING COMMENTS

As of mid- 1987, the Kaiser Permante Northern California Region (K PNCR) did not have a disproportionate share of AIDS cases; its share of northern California A 1 DS cases (23.7 percent) was almost equivalent to the proportion of northern California residents enrolled in its health plan (25 percent). H o w e v e r, on a national basis, Kaiser Permanence's share of AIDS cases may exceed that of other national carriers, because it attracts such a significant proportion of its enrollment from northern California. This im - pact ma y eventua11y affect Kaiser Permanence's ability to compete, especially in instances where the buyer seeks geographical-Iy broad-based coverage alternatives, such as in the Federal Employees Health Benefits Plan or in other national or Statewide organ i-zat ions.

K PNCR believes that it is extremely vulnerable to future adverse selection for several fundamental reasons, including the following:

- As a federally qualified heal t h maintenance organization, KPNCR is required to enroll all group-sponsored applicants regardless of preexisting con-d it ions. In contrast, many indemnity insurers and self- insured employers are able to to limit coverage of preexisting cond it ions or otherwise restrict the coverage of AIDS.

- K PNCR'S conclusion that its benefit package is generally more comprehensive than its competitors' and therefore more attractive to enrollees who perceive themselves at high risk of disease.

- KPNCR research indicating that a disproportionate share of its A IDS cases are among individual or small group m e m bers. Only a few of KPNCR'S competitors are currently active in the individual or small group markets. Consequently, over time, the program may have a disproportionate number of individual and small group AIDS-related cases. This situation may be aggravated if self- insured employers are free to determine whether they will cover the costs of treating A IDS patients.

KPNCR contends that as the AIDS epidemic continues, a growing number of insurers and employers may be motivated to take action to avoid covering the high cost of treatment for A IDS patients. KPNCR believes that there are already many signs that this is occurring, including legislative contriversies over the use of human im - munodeficiency virus test results to exclude high-risk persons from coverage, the use of other tests (e. g., T-cell subset studies) to screen high-risk persons, and modifications in other insurers' marketing strategies to reduce exposure.

KPNCR believes that legislative action may be necessary to address the breakdown of health insurance coverage for AIDS and suggests that legislation not only could create a financing mechanism for AIDS patients who do not have health benefits coverage but also could assure that no single segment of the health benefits industry bears a disproportionate share of the AIDS burden. Such legislation, KPNCR believes, should provide incentives for health benefits plans to maintain or increase their enrollment of persons with AIDS rather than avoid covering them, and legislation should also encourage providers to deliver high-quality and cost-effective AIDS-related care,

BACKGROUND

The Kaiser Permanence Medical Care Program (KPMCP) is a private, nonprofit, health care program that provides prepaid medical and hospital services to more than five million people in 16 States and the District of Columbia. It also enrolls individuals and groups and accepts the risk for both the cost and volume of services.

The Kaiser Permanence Northern California Region (KPNCR) operates 14 hospitals and 26 outpatient medical offices, with 2,364 physicians and over 21,000 employees. It serves a total membership of more than 2 million people, 25 percent of the area's population. The range of resources and scope of services offered by the program qualify KPNCR as one of the largest and most comprehensive private sector health care delivery systems anywhere. A map of the service area is shown in figure A-1.

This appendix provides background information on the KPNCR organization, its membership, benefits, ratesetting, utilization patterns, and market competition.

ORGANIZATION

KPNCR consists of three entities: Kaiser Foundation Health Plan, Inc. (KFHP), The Permanence Medical Group, Inc. (TPMG), and Kaiser Foundation Hospitals (KFH). KFHP is a California nonprofit, public-benefit corporation. It is an administrative and contracting organization with functions that include enrolling members, maintaining membership records, collecting payments, and contracting with TPMG and KFH for professional and hospital services. As a federally qualified health maintenance organization (HMO), the health plan:l

- is required to provide basic health services, including physician and inpatient hospital services, rehabilitation and physical therapy, outpatient mental health services, alcohol and drug abuse treatment, laboratory and radiology, home health, and preventive health care;
- is not permitted to have deductibles for basic health services and is limited as to the amount of copayment that can be charged for these basic health services;
- is required to enroll all group sponsored applicants;
- must use community rating for non-government groups.

KPNCR is also regulated by the California State Department of Corporations under the Knox-Keene Health Care Services Plan Act of 1976. The act mandates basic benefits and copayment limitations similar to those of the Federal act but does not require community rating. California health care service plans that are not federally qualified HMOS are permitted to experience-rate. The State Act also permits non-federally qualified HMOS to establish preexisting condition clauses for group enrollment.

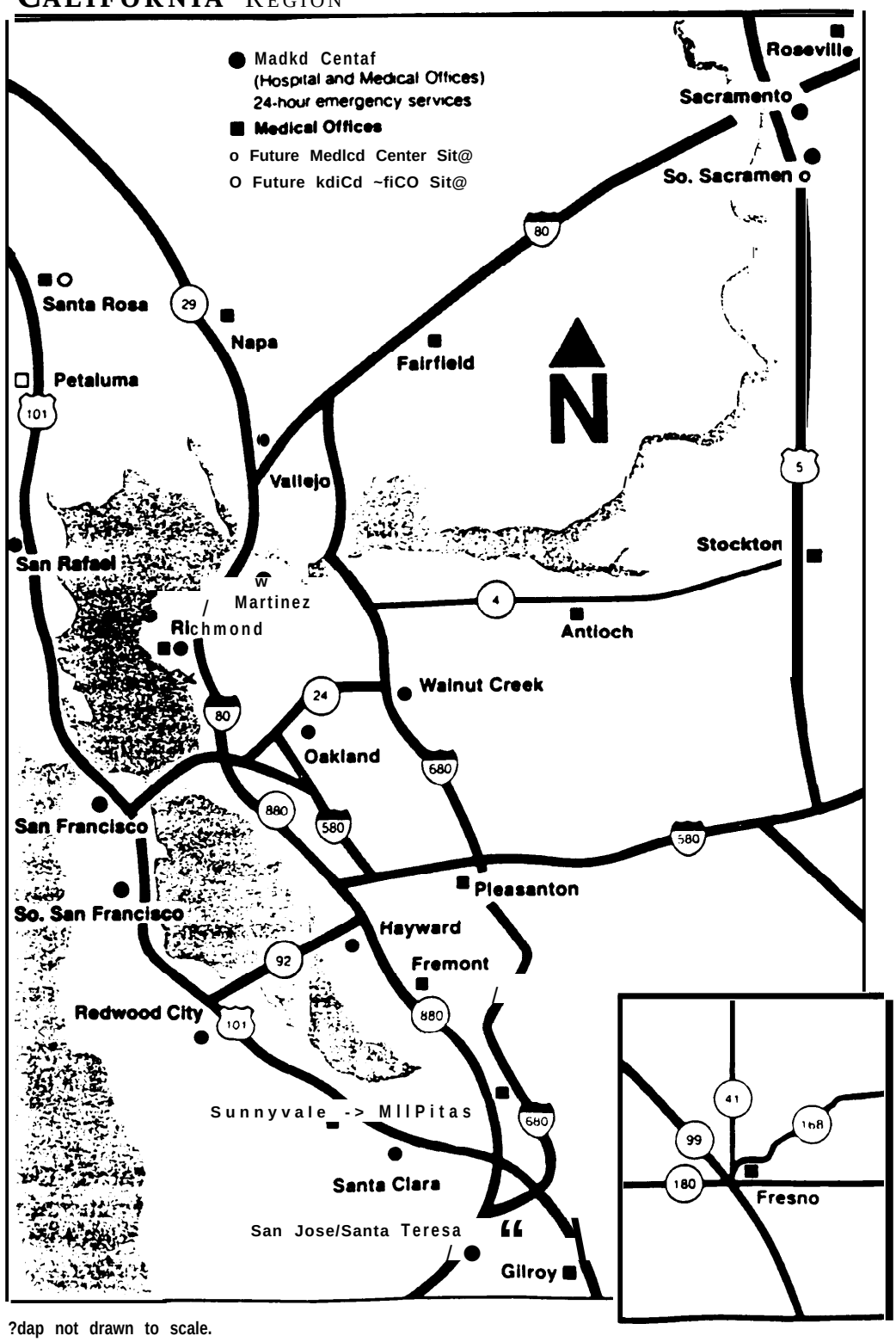
K FH is a California nonprofit, charitable corporation and is obligated through contract to provide or arrange health care facilities for KFHP members.

TPMG is a for-profit California professional corporation. It is composed of physicians, representing the major specialties in medicine, who practice at KFH facilities, where the staff and equipment necessary for diagnosis and treatment are provided. TPMG is compensated by KFHP with an annually negotiated amount per member per month; physicians are not compensated on the basis of individual services provided. The relationship between TPMG and KFHP is exclusive.

1 **Federal legicilation to liberalize aome of these requirements is currently under consideration.**

Figure A-l --- KPNCR Service Area Map

NORTHERN CALIFORNIA REGION



?dap not drawn to scale.

MEMBERSHIP

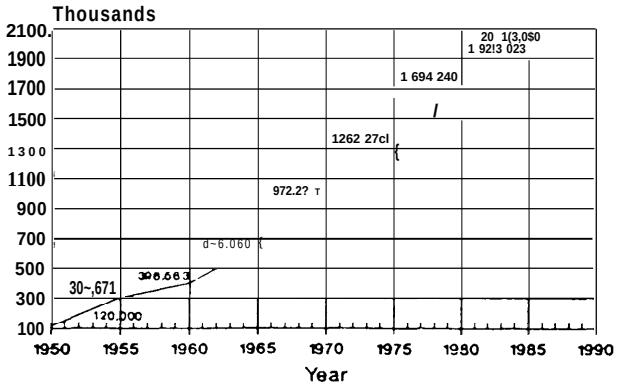
Growth within KPNCR has been steady, with the addition of both medical centers and freestanding medical offices paralleling increases in membership. As of the end of 1986, membership totaled 2,016,990 (figure A-2). Table A-1 details KPNCR membership by age and sex for the years 1980 and 1986.

The majority of KPNCR members are group members. In 1986, 88 percent of members were affiliated through employer groups, and 12 percent were enrolled as individual members. The breakdown of group versus individual membership has remained relatively stable since 1975 (table A-2).

Elements of a Group

In order to qualify for health plan group membership, potential subscribers must meet one of three conditions. They must be employees of one common carrier, working partners and their employees, or eligible for coverage through Health and Welfare Trust Funds established through collective bargaining arrangements. (Association plan enrollment is also available on a medical review basis to organizations that do not meet the criteria for group health plan coverage.)

Figure A-2.-Kaiser Foundation Health Plan Membership Northern California Region



SOURCE: Kaiser Permanente (Northern California Region), "Facts 1987," internal document, Oakland, CA, 1987

Table A-1.--Percent Distribution of Membership by Age and Sex[a]~[b] 1980 and 1986

Age	1980	1986
Uales		
Under 65	11 .8%	11 .1%
0-14	5.0	4.2
15-19	20.3	20.3
20-44	9.3	9.8
45-64	46.4	45.4
Over 65	2.6	3.5
Total	49. O%	48.8%
Fetnales		
Under 65	48.1%	47.3%
0"14	11.3	10.6
15-19	4.9	4.1
20-44	22.3	22.2
45-64	9.6	10.3
Over 65	2.9	3.9
Total	50.9%	51. 2%
Mates and fefna[es		
Under 65	94. 5%	92 .6%
0-14	23.1	21.7
15-19	9.8	8.3
20-44	42.6	42.5
45"64	19.0	20.1
Over 65	5.5	7.4
Total	100. O%	100. o%

[a]The percentage reflect average health plan membership.
[b]Percentages may total 100 due to rounding.

SOURCE: Kaiser Permanence (Northern California Region), "Annual Statistical Review," unpublished internal document, Oakiand, CA, 1980 and 1986.

There are several other conditions that apply to group membership:

- Groups must be composed of five subscribers or of one subscriber in a group of 25 or more eligible employees that offers dual or multiple choice of health plans to employees;[2]
- At least half of the monthly subscriber premium rate must be contributed by the employer. This makes the employer a participant in providing health care and creates an incentive for the employer to include only eligible employees in the group;
- Employees must work a minimum of 20 hours per week or be permanent part-time employees. This is also an incentive for the employer to include only eligible employees in the group;
- All new groups with 50 or more potential subscribers must have dual choice arrangements. This corresponds with KPNCR'S principle of voluntary enrollment; and
- A majority of the eligible subscribers of a group must be covered by Workers' Compensation. This increases the likelihood that work-related injuries and illness will be covered under Worker's Compensation rather than under the KPNCR benefits.

2 A "subscriber" is the head of the family unit andin whose name membership is obtained. This isin contr~t to a "member," defined as any individual who is entitled to KPNCR services.

Table A-2--- Number and Percentage Distribution of Group and NonGroup Members for Selected Years: 196!5 to 1986[a]

Northern Cal i fornia (as of Dec. 31)	Number of members (in thousands Group mmbership	Nongroup meniwship	Total	Percent distribution Group	Nongroup
1965	531.8	114.1	645.9	82%	18%
1970	844.9	127.4	-972.3	87	13
1975	1123.5	128.8	1252.3	90	10
1980	1521.6	172.8	1694.3	90	10
1985	1751.1	224.8	1976.0	89	11
1986	1784.7	232.8	2017.0	88	12

[a]Data include membem of families who contract individually with the health plan either by direct enrollment or by convemion from a health plan group.

SOURCE: Kaiaer Permanence (Northern California Region), "Annual Statistics Review," unpublished internal document, Oakland, CA, 1986.

Elements of Individual Membership

The Federal HMO Act and California's Knox -Keene Act require HMOS to offer members who are leaving their employer - sponsored groups an option to convert to an individual (or "direct-pay") plan. KPNCR is one of a few northern California HMO/PPO health carriers that offer health plans to individuals who are not converting from their carrier's group plan. Only 5 of 19 competing health plans allow non-conversion individual enrollment.

Eligibility

There are two types of direct-pay members. "Conversions" are individuals who leave an existing group and want to retain their program membership. "Direct enrollments" initiate membership with KPNCR independent of prior group membership.

Conversions face no medical restrictions upon applying for direct- pay membership. However, they are required to choose KPNCR'S conversion coverage within a specified time after their group enrollment ends. Fifty-seven percent of direct-pay members are conversions.

Direct enrollment applicants must complete an application and a medical history form (figure A-3). Applicants indicating a history of health care problems are either rejected outright or asked to have a physical examination by TPMG physicians. All applicants over 46 years of age also must undergo a physical examination. The criteria used to determine an individual applicant's eligibility are applied uniformly, regardless of age, occupation, or sex, and are typical of general health insurance practices. Overall, approximately 20 percent of direct enrollment applicants are rejected. (This percentage has remained constant over time.)

BENEFITS[3]

Group Members

Basic benefits for group coverage include physician office visits, hospital services, X-rays, laboratory tests, immunizations, and eye exams. In addition, limited coverage for extended care in a skilled nursing facility; neuromuscular rehabilitation; physical, speech, and occupational therapies; hemodialysis; organ transplants; bone marrow transplants; home health services, alcoholism, drug abuse, or addiction treatment; and mental health care are included in the plan.

KPNCR offers several benefit packages for groups. Basic benefit packages generally differ in two ways: 1) registration charge (i.e., outpatient visit fee) and 2) selection of supplemental benefits.4

The office visit registration charge for medical services ranges from no charge to $20. The registration charges applied to specific services and the designated ranges of these charges are summarized in table A-3.

Supplemental benefits are optional and go beyond the HMO benefits required by Federal and State statutes. Supplemental benefits can either be the extension of a basic benefit or the incorporation of a new benefit, such as an outpatient prescription drug

3 This section provides an overview of KPNCR'S basic non-Medicare benefito and should not be interpreted aa a definitive list of contractual benefits.

A Employem determine which supplemental benefits are offered to employees.

Figure A-3--- KPNCR Application for Membership-Medical Questionnaire

● .. Iuusm
m . PtmwaJum

IGisor *Foundation Health* Plan, Inc.
Northorn Califorrm Ragion
Mding Addrc~: P.O. Rox 129=
Oakland, Callfornm 94604

Do NOT WRITE IN THIS SPACE

Medical No, _____

SU 8SC R I aE R

APPLICATION FOR MEMBERSHIP - MEDICAL QUESTIONNAIRE

INSTRUCTIONS: Us. ink or typevvritor 10 complcre questionnsir~ and use a SEPARATE questionnnmre for each member of your famllv who is #pplY-ing for member$hlp. ALL QUESTIONS MUST BE ANSWERED. ALL QUESTIONNAIRES MUST BE SIGNED. INCLUDE A CHECK FOR THE NONREFUNDABLE PROCESSING FEE. 00 NOT SENO CASH.

ANY MISREPRESENTATION OF THE PRESENCE OF PRE-EXISTING IMPAIRMENT OR DISEASE WLL VOtO YOUR COVERAGE.

I hereby apply for membership in the Kaiser Foundation Health Plan, based on the following:

1 (N~aMc, -cl.. , i MI IHI-F LAST HOME PHONE WC) Q K, Puc3NF.

3, ADDRESS (N UM13E R & STREET) 4 AGE 5. 81 RTFIDATE

6, C ITV STATE ZIP 7, MAR IT AL STATUS U SINGLE C MARRIED

8. SEX z MALE ~ FEMALE 19 Height without shoes _____ ft., _____ Inches 10. Weight, undressed _____ 'bs.

11 NAME OF EM PLOVE R OCCUPATION (Dlm%o dmcrlbo what You do)

12, 1~ Yes '~ N o Were you previously a member of the Kaiser Foundation Health Plan?
If Yes, give group number or name _____
and Medical Record Number If known _____
When did your former membership begin _____ and end _____

13, c Yes ~ No Have you ever been treated or examined at a Kaiser Permanence Medical Center?
If Yes, I lst locatlon and date of last exam or treatment: _____
If seen using a different name or maiden name, give name: _____

14 c Yes C No Have you ever been re)ected for medical Insurance Includlng Kaiser Foundation Health Plan, or been offered Insurance at a higher (rated up) prem turn ~
If Yes, please explaln _____

15, C Yes ~ No Were you ever rejected from military service or discharged from mll!tary service for medical or psychological reasons 7
If Yes, please explaln _____

16, z *'{es ~ No* Do vou regularly drink alcoholz ~ Beer C Wine C Hard Llcwor
If Yes, how much) _____

~ Yes G No Do you smoke? If so, how much per dav? _____ How long have you smoked? _____

_____+ IF YOU QUIT, how many Years dld vou smoke? _____ How long since you've qultz _____

17 Date of last physical examination. _____ Please check the examlnat!on received: o routine examination
D OB-GYN (Obstetrics.Gynecology)
G Other (please specify) _____
Name and address of examining physician: _____

18. ~ Yes O No Have you ever been advised to have surgery which you have not yet undergone?
If yes, give details. _____

19. How many times have vou vlslted a physician in the last year? _____ Please llst reasons for vlslts (symptoms, complalrm, etc.) _____

CIUESTIONS TO BE ANSWERED FOR ALL FEMALE APPLICANTS OVER THE AGE OF 13.

20 Date of your last menstrual period. ____/____/____ (MO / DAY / VEAR) 21. c Yes ~ No Are vou now pregnant 7

98005 (REV. 4-87)

(OVER)

Figure A-3.--KPNCR Application for Membership-Medical Questionnaire (Cent'd)

22 **Have you ever been hospitalized, diagnosed or treated for any of the tollowlng' Please Place a check (0 m the Yes or No column EVEF?Y ITEM MUST BE CHECKED. IF YES, EXPIAIN BELOW IN NUMBER**

Yes	No		Yea	No	
❑	❑	**Alcoholism**	❑	**0**	**Heart** attack or other hearf trouble
❑	❑	**Serious anemia or other blood dmeases**	❑	0	Heart murmur
❑	❑	**Arthrltls, gout, Or painful joints**	❑	0	Hypertension or h!gh blood pressure
❑	❑	Asthma , wheezing	❑	c1	Herma (rupture) ~ Yes ~ No Surgically **repa[red**
❑	❑	Chronic cough emphysema or other chronic lung dweases	❑	❑	**immunological deflclency, such as Acqumct Immune Dehclency Syndrome (AIDS), Aids-related complex (ARC)**
❑	❑	Back ache or back m)ury	❑	❑	**Ulcers of** stomach or duodenum
❑	❑	Serious **bodily Injury or dmabdlty**	❑	❑	Venereal Disease
❑	❑	**Cancer,** leukemia or tumors	❑	❑	Persstent Indtgestlon or peptic symptoms
❑	❑	Convulsions, seizures or epdepsy	❑	❑	Kidney condmon, kidney **StOfleS**
❑	❑	Diabetes or sugar In urine Medicafron " ~ Oral ~ Injection	❑	❑	Loss of urine control, bladder problems, or dlfflcult **unnatlon**
❑	❑	Dtarrhea or colms (chrome) Rectal bleeding or other rectal adment	❑	❑	prostate problems
❑	❑	Ear problems or loss of haanng	❑	❑	Liver conditions ~ Clrrhosm~ Jaundice ~ Hepatttls
❑	❑	Tubes **now present** In ears for otltfs meda	❑	❑	Paralysls Strokes
❑	❑	Eye condmon (cataract, Irltm, etc)	❑	❑	**serious skin disease, melanoma,** psonasls
❑	❑	Glaucoma	❑	❑	Female organ abnormality
❑	❑	Gallbladder stones ~ Yes ~ No Surgically removed	❑	❑	Irregular vaginal bleeding
❑	❑	Goiter or thyroid condltlon	❑	❑	Mental ! ernouonal disorders
❑	❑	Hay fever or allergles	❑	❑	Psychlatnc counsehng
❑	❑	Currently on allergy mpctlons	❑	❑	Drug addctlon or abuse (Please sp6clfy) _____
❑	❑	Headaches ~dlsabling) or mlgrame			

23. ❑ Yes ~ No Have you ever been treated or are you being treated for **any other condltlon not hsted above? Please describe:**

24 ~ Yes ~ No Do you have or have you **had unexplained and ~ or undiagnosed symptoms** such **as** wefght loss, swollen glands, fever, skin lestons, rash or rectal problems? If yes, please explaln: _____

25 ~ Yes ~ No Are you currently taking medications for any of the conditions noted in Items 22 or 23? If Yes, list medlclnes:

~ Yes ~ No Are you currently or regularly taking any other medlcat!ons or drugs? If Yes, please list: _____

26 ~ Yes ~ No Are any of the above condlt!ons now present? If Yes, which condltlon(s)? _____

27 If Yes IS checked for any condition m Items 22 through 26, gwe details below:

CONDIItON	HOSPITA1. NAME (If hospltailzed)	AITENDING PHW51CMN	PHYSICIAN'S ADDRESS	Imto of Last TREATMENT

1

(IF ADDITIONAL SPACE IS NEEDED PLEASE ATTACH AN EXTRA SHEET.)

Tflls medcal questtonna(re must be updated to include any mndmon or disease wh!ch occurs afer the date of submms}or of :hls appkanon and pr,or to Kaiser Foundation +eaw Plan s aueptance Failure to provule trus mformabon !o Kamer FourMat(on Health Plan WIII consf!tufe a nwsreoresertauon of the presence of a pre-exmong conclmon or o,sease 31cj ~ay ,old four coverage Acceptance of the nonrefundable pfocassmg fee **by Kaiser** Foundation Health **Plan does not constitute ac~tenw of your application ● s s Haetth Pkn member. The Health Plan reserves** the **rfght to reject ● ny ● *pplicant* ● nd ie not otsllgated to dlscloae the reason for relactlon**

1 hereby cemty that the toregomg answers are true ● nd cgmpbte and to the beat of my knowlecfge my heatth IS amurate~y represented **(n the tive Stalefnerw. I understand that** Heatth **Plan may require me to have a phywcal exammaoon, and I authorize the rebasa of any mtormahon from such exammatron to** Health **Plan for use m UJnstcianng my apphcauon I also understand and agree Us* whenevw ~ m ftm dnmtatraison of fha Setwce Agreement. Katser Permanence phyaoans may dmcas.s wrth Health Ran medc.al mformaoon related to thw agpiicaoon.**

I a- for Heatm Plan membership and agree that I shail atsda by the pmwsmns of the %r-wce Agreement and Heatfh Ptan regubatrons I understand **that the Servtca Agraarmemt provldas that *I cfalms, Incfuding madxxi malpracaw dams, wkh anee because I or someone wrth a relauonshlp to me, behave** mat some **conduct In, or ansmg from, w rgianonstvp with K&ser Foundaficm ~ Ptan, Inc ,** KZSSW **Foundatmn Hmptals or The** Permanence Madlcal Group, Inc-, as a marnoer w ss a Potwnf. tiaa ~used **any ham are subfect ?0 CWdng afO@dtiOn,**

(In ma event me appkant IS **a mmor, or m 1~, the ap@calWs name should be entered on rhe** "Signature of N@c.ant" Ins, **and the parent or guardm should sign where ind~ted)**

IMPORTANT: ALL QUESTIONS MUST **BE ANSWERED, APPLICATION WILL BE RHt,JRNED IF ANY QIJESTION IS NOT ANSWERED.**

SIGNATURE of APPLICANT OAT-E

SiGNAIIJRE OF PARENT OR GUAROIAN **DATE**

9SCOS IREW 4 8~ REVERSE

Table A-3---Registration Charges for Selected Services

Service	Range of charges
Outpatient physician visits including eye exams	No charge to S5
Xrays and laboratory Mork.....	No charge to S5
Inhalation, occupational, or physical therapies	No charge to S5
Physician house calls	No charge to S5
Mental health visits	No charge to S20

SOURCE: Kaiser Permanence (Northern California *Region),* unpublished data, Oakland, CA, 1988.

benefitor hearing aid coverage. The supplemental benefits available to most groups are: 1) outpatient prescription drugs and certain accessories (e.g., syringes), 2) eye glass and contact lens coverage, 3) hearing aid coverage, 4) durable medical equipment, and 5) dependent coverage options.

Seventy-six percent of KPNCR's enrolled members have a drug benefit. Table A-4 details the types of available pharmacy coverage, member charges per prescription, average monthly cost, and member participation rate.

Table A-4.--Description of Prescription Drug Plans

Drug plan code	Hedxr pays	Average monthly subscriber cost[a]	Particip tion rate[1?]
1	Blue Book[c] ($1 minimun)	$3.26	7.2%
2	$1 charge per prescription for (whichever is greater): 34 days' supply (or one cycle of a contraceptive drug) or manufacturer's smallest package	9.20	60.4
4	$1 charge per prescription for (whichever is greater): Other than contraceptives: 100 days' supply or manufacturer's smallest package Contraceptives: one cyc'le or manufacturer's sma([est package	9.08	1.4
5	$3 charge per prescription for items as described in Plan Two	5.70	8.3
6	S2 charge ~r prescription for items as described in Plan Two	N/A	12.7
7	No charge for 100 day's supply or manufacturer's smallest package. Reasonable rates for purchase of excess of both of the above llmltatlons.	12.7	19.9
8	NO charge for 100 days' SUPP1[or manufacturer's s~llest package, whichever is greater	N/A	0.1

~Addition represents incremental cost of drug option to self oniy subscriber, first quarter 1988.
Percent of a~l mmbers participating in a drug p(an, first quarter 1987.
~The price for which a wholesaler wou(d sell the product to a retailer.
Only offered to Federal enployees.
'Only offered to Medi-Cal menixrs under pilot project.

SWRCE: Kaiser Permanence (Northern California Region), internal marketing docunent, Oakland, CA, 1988.

Direct-Pay Members

Direct-pay members are offered the same basic benefits as group members. Two plans are available; however, direct-pay members converting from group coverage are limited to Plan I. The primary difference between the two plans is the outpatient office visit registration charge. Plan I registration charges are $5 per visit for most office visits, versus $15 per visit in Plan II. Neither plan offers an outpatient prescription drug benefit (except for members with part A and part B Medicare coverage).

Figure A-4 provides a comparison between Plan I and Plan H.

RATESETTING

KPNCR groups are community-rated. All groups with the same benefits and contract renewal date have rates that reflect the same comm unity rate standards. Variations in prepaid rates from group to group reflect differences in benefits, contract renewal dates, and length of contract.

The method for calculating the base community rate (i. e., excluding supplemental benefits and administrative charges) for any year involves the following steps:

1. The total expenses (i. e., revenue requirement) for providing care is forecasted;

2. Revenue from all sources, including basic dues for contracts prior to renewing in the current year, is forecasted. In addition to basic dues before renewal, other revenue sources inc lude Medicare, nonmember revenue, interest income, etc;

3. The shortfall between items 1 and 2 is divided by member-months for all groups after renewing their contracts for the current year. This is the per-

Figure A-4--- Individual Plan Programs

The fO((wing ● re the COSts ard benef i ts of the tw Ka ıser f-t im !ieai th P(an Irdivi*(Plan progr~ wai (able in 1987:

8enef i ts	Plan 1	Plan [1
In the hapita(		
A(I ~ysician srd surgeon services	Ilo charge	No charge
Intensive care/Cardi „Care	No charge	NO charge
Room ad board	No charge	NO charge
Laboratory ad x- ra,	$3 per test or X-ray	$S oer test or X-ray
physical therapy	No charge	No charge
Other necessary services and s~[ies (irxluding special rsmsing)	No charge	No charge
In the ~tor~s Office		
(KO OgS limit for q of t~ ~i~~)		
Office viaits (irtc[udes routine fityxica(● xma, wet [-baby check-~, arsi Ob/Gy7t a~int~ts)	$5 per VISI t	$15 per visit
Nearing and vision ● xaminations	$5 per visit	S15 per visit
Physical therapy visits	$S per visit	$15 per visit
Al lergy teats and injection visits	$3 per visit	S 3 per visit
Administered medicati~, injections ● tlergy testing end treatment inter i a (s	No charge	No charge
Laboratory a-d X- ra,	$3 per test or X-ray	$5 wr tes~ or X-ray
Maternity Care		
Physicim and rnrsamedical office visits	$5 per VISI t	S15 per visl t
Ilospita(services	No charge	No charge
Caasarem delivery	No charge	No charge
Cca@icatl~ of pregnMcy	No charge	No charge
Pmsacriptiat Drq -fits		
Adini Sterd bhi(e in the hosDital or in the &torts office "	Mo charge	MO charge
Obtained at Plui #tamnacies	Not coverea	Mot covered
~i- Sefwice		
Authoriz4 by a Plan ~ysici~	No charge	No charge
Merita(Hesltilc.oM		
Office visits. W to 20 visits per ca(edsr year	$20 per visit	S20 per visit
Groq therapy	$10 per visit	S1O per visit
I@apitalization - up to 4s d e,s of frpatiertt care per ca(endar year	No charge	Mo charge
A k d s o l i g a a j o ~ ~		
Offica visits	$5 per visit	S15 per visit
b$pita(ization - Limited to the mxwa(of toxic sbt~e(s) fra the syatm	No charge	NO charge

Thts is intardet] omly as a general descrip[i~ of the p(anis benefits. It is not a contract. For aditione[infoimatl~ on these and other bmeflts, please refer to this P(mCs 'Oiscloaure Form/Evi~e of Coverage~ or call a Service Representative at a Hea(th Plan Office.

	1987 Hcnth(y Charge	
	P(an 1	Plan 1[
S*criber Only	S 65.73	S60.17
S@acriber$nd~D~,	130.46	119.34
Subscriber ad fuo or More Dqen&t-tts	178.05	161.81

SCURCE: Kaiser peMS$nmte (Norther„Caofo„a Rq,m), ~rket,pg ~rwbure Oakland, CA, 1987.

member-per-month (PMPM) increased revenue requirement for all contracts renewing in the current year;

4. The PMPM is converted into three step rates: subscriber only, subscriber plus one dependent, and subscriber plus two or more dependents. These rates, graduated by quarter, are applied to all groups as they renew in the current year.

Under community rating, KPNCR is at risk for the accuracy of its forecasts and for unexpected fluctuations in costs.

Revenues in excess of expenses and capital generation requirements are used to moderate rate increases in the future.

UTILIZATION PATTERNS

Table A-5 provides age-specific health plan utilization rates for 1986. KPNCR hospitals have experienced higher average occupancy rates than California hospitals as a whole. From 1976 through 1982, KPNCR hospitals followed the national patterns for average occupancy. However, in 1984 KPNCR hospitals did not experience the

Table A-5.--Age-Specific Health Plan Utililization Rates, Calendar Year 1986

Age grotp (male and femle)	Hospital days per 1,000 per year	Discharges per 1,000 per year	Average 1 ength of stay	Doctor off ice visits per 1,000 per year
0-M	235	54	4.4	3,359
0-14	92	25	3.7	3,710
0-4	177	44	4.0	6,3W
5-9	44	14	3.1	2,660
10” 14	58	17	3.5	2,182
15-19	136	37	3.7	2,320
20-44	235	62	3.8	3,098
20-24	220	68	3.3	2,873
25-29	289	86	3.4	3,340
30-34	248	67	3.7	3,241
35-39	208	48	4.3	2,941
40”44	207	42	4.9	3,087
45”64	433	76	5.7	3,962
45”49	261	49	5.3	3,250
50”54	352	65	5.5	3,814
55-59	481	84	5.7	4,073
60-64	698	115	6.1	4,930
45+	1,337	195	6.9	6,363
65-69	949	149	6.4	5,516
70-74	1,296	189	6.8	6,650
75-79	1,649	233	7.1	7,430
00-84	2,213	296	7.5	8,000
85+	2,928	395	7.4	6,298
Total	317	64	4.9	3,581

SOURCE: Kaiser Permanence (Northern Californi aRegion), “Annual Statistical Review,” unpublished internal document, Oakland, CA,1980 and 1986.

dramatic drop in occupancy that occurred throughout the State and country (table A-6).

MARKET COMPETITION

Many of KFHP's competitors in northern California are also nonprofit organizations, although in recent years a growing number of for-profit competing plans have either entered the northern California market or converted from nonprofit status. Table A-7 shows the profit status and other key data for a selection of competing HMOS.

1 Although KPNCR hospitals are open **to all membere of the community, they primarily serve KPNCR members.**

Table A-6--- Percent of Average Hospital Occupancy, KPNCR, California, and the United States, Selected Years From 1976 to 1986

	1976	1978	1980	1982	1984	1986
KPNCR	75 .8%	5 .8%	77.9%	76. 5%	77.3%	68 .6%[a]
Ca(i forni a[b]	65.6	66.3	68.7	68.5	64.1	65.4
United States[b]	74.6	73.6	7S.6	75.3	69.0	N/A

[a] ~he lower occupancy rate reflects a reduction of elective admissions during a 7 week strike by hospital employees during 1986.
[b] Includea Kainer Permanence facilities.

SOURCES: American Hospital Association, HosDital Statistics (Chicago, IL: AHA, 1!371- 198 S). State of California, Office of Statewide Health Planning and Development, "Quarterly FinanciaI and Utilization Report, 4th Quarter, 1986," Sacramento, CA, April 15, 1987.

Table A-7. --Largest Non-Kaiser Northern California HMOS

	Enrol lment 3/87	Profit status	Qua 1 i f i cation status	P [an age	Headquarter city
Foundation Heal th Plan	165,456	P	FQ	9	Scramento
Take Care	15,000	NP	FQ	8	Cakland
L i f eguard	105,000	NP	FQ	8	San Jose
Bay Pacific	84,051	P	FQ	8	San Bruno
HEALS	60,000	NP	FQ	5	Emeryvi 1 le
Max{care (N. Ca	59,100	P	FQ	13	Bur 1 i ngame
Health Plan of America	46,200	NP	FQ	6	Orange
Hea(th Plan of the Redwoods	32,100	NP	FQ	7	Santa Rosa
Institute for Preventive Medicine (1PM)	24,225	P	FQ	8	Va 11 ejo
Chi ldren's Hospital	21,000	NP	NFQ	11	San Francisco
French Hospital	17,500	NP	FQ	136	San Francisco
Healthcare..	17,425	NP	FQ	11	Sacramento
Sums Health Plan	17,000	P	FQ	2	Fresno
Contra Costa Health Plan	10,809	NP	FQ	13	Martinez
ValuCare....	10,200	P	FQ	1	Fresno

Abbreviations: P =forprofit, NP = nonprofit; FQ= federally qualified; NFQ =not federally qualified.

SOURCE: Intemtudy, The InterStudy Ed~e, Excelsior, MN, Summer 1987.

Appendix B: THE PRODUCT-LIMIT ESTIMATOR

The product-limit estimator for the distribution of lifetime cost, S(c) is given by:

$$\hat{S}(c) = \prod_{j<c} P_j,$$

where

- c is a level of lifetime *cost* attained by a case who died.
- j is a ranking from 1 *to J* for the J levels of lifetime cost attained by cases who died.
- P_j is the proportion of cases surviving to attain higher cost levels among all cases observed to attain the jth cost level.
- $\prod_{j<c}$ is the product calculated over all j less than c.
- $\hat{S}(c)$ is the estimated proportion of all cases whose lifetime cost will be more than c.

The product-lirnit estimate of median lifetime cost is the cost level c for which S(c) - 0.5; the estimate of mean lifetime cost is the area beneath a plot of S(c); namely,

$$\hat{\mu} = \sum_j \hat{S}(c_j)\,(c_j - c_{j-1})$$

Ninety-five percent confidence limits are presented for this mean lifetime cost, using the variance estimator

$$\mathrm{Var}(\hat{\mu}) = \sum_c (A_c^2 \hat{\mu}\%)/[n_c(n_c - d_c)],$$

where

- d_c is the number of cases who die at cost level c, and
- n_c is the number of cases who attain a cost of c or more, and

$$A_c = \sum_{j>c} \hat{S}(C_j)\,(C_j - C_{j-1})$$

Appendix C: CENTERS FOR DISEASE CONTROL (CDC) CALIFORNIA AIDS PROJECTIONS

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY GEORGE DEUKMEJIAN, Gov

DEPARTMENT OF HEALTH SERVICES
714/74 P Street
SACRAMENTO, CA 9s814

January 12,1987

To: Readers of the AIDS Monthly Field Activities Report
Subject : Centers for Disease Control (CDC) California AIDS **Projections**

An addendum has been attached to AIDS Monthly Activities Report. At our request, CDC has run AIDS case projections for California through 1991. These projections are based on the same empirical model used to generate the national projections presented at the Coolfont, Virginia planning conference in June of last year. The model is based on past reporting trends, and does not take into consideration the effects of behavioral modification or potential clinical or pharmaceutical interventions. The California analysis is based on California AIDS cases reported to the CDC as of December 29, 1986.

Please note the difference between the projected cases for 1986 (3250) and actual number of cases reported as of 12/29/86 (2129). Because of an approximate two month reporting lag, there is a sizable difference between these two numbers. It is expected that the final reported total for 1986 will be somewhat higher than the current 2129 cases. At the end of 1985 we reported a total of 1595 cases for the year. One year later, the total cases for the same one year period (1985) has grown to 2135. We expect that when all of the cases for 1986 are tabulated we can expect to see at least as large an increase as last year.

The model suggests a cumulative total of nearly 50,000 cases of AIDS will be diagnosed in California by the end of 1991, with approximately 34,000 deaths. Additionally, the model projects a larger proportion of cases will be reported from outside the San Francisco and Los Angeles standard metropolitan statistical areas (SMSA's). If present trends continue, it is expected that these areas will report 31% of California AIDS cases during 1991.

If you have questions concerning the technical basis of these projections please contact Michael Hughes at (916)445-0553.

Donald O. Lyman

Donald O. **Lyman, M.D.**, Chief
Office **of AIDS**

1) Public Health Service Plan for the Prevention and Control of AIDS and the AIDS virus: Report of the Coolfont Planning Conference **June** 4-6,1986. (Copies available Upon request).

2. **Statistical Report** No.86-1: An Empirical Model for Projecting Trends in AIDS Cases, w. Meade Morgan, Ph.D., AIDS Program, Center for Infectious Diseases, Centers for Disease Control, Atlanta, Gerogia 30333.

ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS)
MONTHLY FIELD ACTIVITIES REPORT
January 1981 - December 31, 1986

Department **of** Health Services
Office of AIDS
P.O. *BOX* 160146
Sacramento, CA 95816-0146

California Cases by residence at onset of illness from January 1981 to December 31, 1986 (includes 13 cases reported prior to January 1981)

1. CASES AND DEATHS REPORTED THIS MONTH

PRIMARY DISEASE	**CASES**	**DEATHS**
KS without PCP	24	34
PCP without ks	106	85
Both KS and PCP	8	7
01 without XS or PCP	37	24
TOTALS *THIS MCNTH*	175	150

2. **RISK** GROUP SUMMARY OF CASES REPORTED THIS MONTH

	NUMBER OF CASES			
	MALE	FEMALE	TOTAL CASES	% OF TOTAL
Homosexual	150	**0**	150	85.71
Bisexual	19	**0**	19	10.86
Intravenous (IV) Drug Use~	4	1	5	2.86
Hemophiliac	**0**	**0**	0	0.co
Heterosexual Contact	4	2	6	3.43
Transfusion	3	1	4	2.29
Parent at Risk	**0**	**0**	**0**	0.00
None/Apparent/Unknown	**-64**	93*	-9*	-5.14
TOTAL	174	1	175	100.00

● *NOTE Negative Values* indicate a change in risk.

3. PRIMARY DISEASE	CASES	% of TOTAL	DEATHS	% DEAD
ks without PCP	1636	24.08	677	41.38
PCP without KS	3797	55.88	1860	48.99
Both XS and PCP	357	5•25	242	67.79
01 without KS Or PCP	1005	14.79	537	53.43
TOTAL TO DATE	6795	100.00	3316	48.80

ks kaposics sarcoma
PCP = Pneumocystis carinii pneumonia
ox = other opportunistic infections

4. AGE	CASES	% OF TOTAL
Under S	21	0.31
05 - 13	6	0.09
14 - 19	15	0.22
20 - 29	1063	15.64
30 - 39	3148	46.33
40 - 49	1660	24.43
Over SO	858	12.63
unknown	24	0.35
TOTAL	6795	100.00

5. RACE/ETHNICITY	CAszs	% OF TOTAL
White, not Hispanic	5390	79.32
Black, not Hispanic	606	8.92
Hispanic	673	9.90
Haitian	6	0.09
Asian or Pacific Is.	71	1.04
American Indian/Alaskan	7′	0.10
Other	1	0.01
Unknowl	41	0.60
TOTAL	6795	100.00

6. RISK GROUPS

	NUMBeR OF CASES			
	MALE	*FEMALE*	**TOTAL CASES**	* **O F** TOTAL
Homosexual	**5s07**	0	**5507**	**81.04**
Bisexual	**721**	**0**	**72%**	**10.61**
Intravenous (IV) Drug User	**127**	28	**155**	**2.28**
Hemophiliac	**47**	8	**55**	**0.01**
Heterosexual Contact	**33**	25	**58**	**0.85**
Transfusion	**100**	36	**136**	**2.00**
Parent at Risk	**4**	7	**11**	**0.16**
None/Apparent/Unknown	**13s**	17	**152**	**2.24**
TOTAL	**6674**	**121**	**6795**	**100.00**

7. FATALITY RATES BY TI~ **OF** DIAGNOSIS

	CASES	DEATHs	RATE
Before 1981	**13**	10	76.92
1981 Jan-June	19	18	94.74
Jul-Dec	**40**	**33**	82.50
1982 Jan-June	78	59	75.64
Jul-Dec	135	**102**	75.56
1983 Jan-June	284	211	**74.30**
Jul-Dec	389	294	**75.58**
1984 Jan-June	537	376	70.02
Jul-Dec	713	478	67.04
1985 Jan-June	989	575	58.14
Jul-Dec	~146	528	46.07
1986 Jan-Jun	**1411**	**459**	32.53
Jul-Dec	1041	173	16.67
TOTAL	679S	3316	48.00

AIDS CASES BY COUNTY OF RESIDENCE AT ONSET OF ILLNESS

January **1981 -** December *31, 1986*

	CASES	DEATHS
San Francisco	2471	1302
Los Angeles	2430	1108
San Diego	358	184
Alameda (e%. Berkeley)	283	115
Orange	245	127
Santa Clara	133	53
San Mateo	109	49
Riverside	107	70
Sunoma	95	49
Contra Costa	92	3s
Sacramento	72	28
Marin	63	31
Sam Bernardino	49	20
Santa Barbara	39	14
M0fiterey	31	16
Ventura	25	11
Fresco	24	13
San Joaquin	18	11
Santa Cruz.	18	10
SOIWIO.	17	6
Berkeley	14	6
Kern	14	3
IZendocino	13	7
San Luis Obispo	13	8
Nepal	11	5
El Dorado.	7	5
Lake	5	5
Shasta	4	2
Stanislaus	4	3
Yuba	4	2
Butte	3	2
Imperial	3	3
Herced	3	2
Placer.	3	2
Siskiyou	3	2
Yolo	2	0
Glenn	1	1
Humbolt/Del North	z	1
Znyo	1	0
K @	1	1
Hadera	1	1
Plumas	z	1
San Benito	1	0
Sutter	1	1
Trinity	1	1
Tulare	1	0
TOTAL	6795	3316

Table 1
Reported cases of AIDS 'DS-RelaCed Deaths among
Residents of Wifomia - **~ecembez** 29, 1986

REPORTED:

Year	cases Diagnosed	Deaths
1981 & before	67	21
1982	202	66
1983	639	2s3
1984	1219	608
1985	2136	1136
1906	2129	1122

PROJECTED:

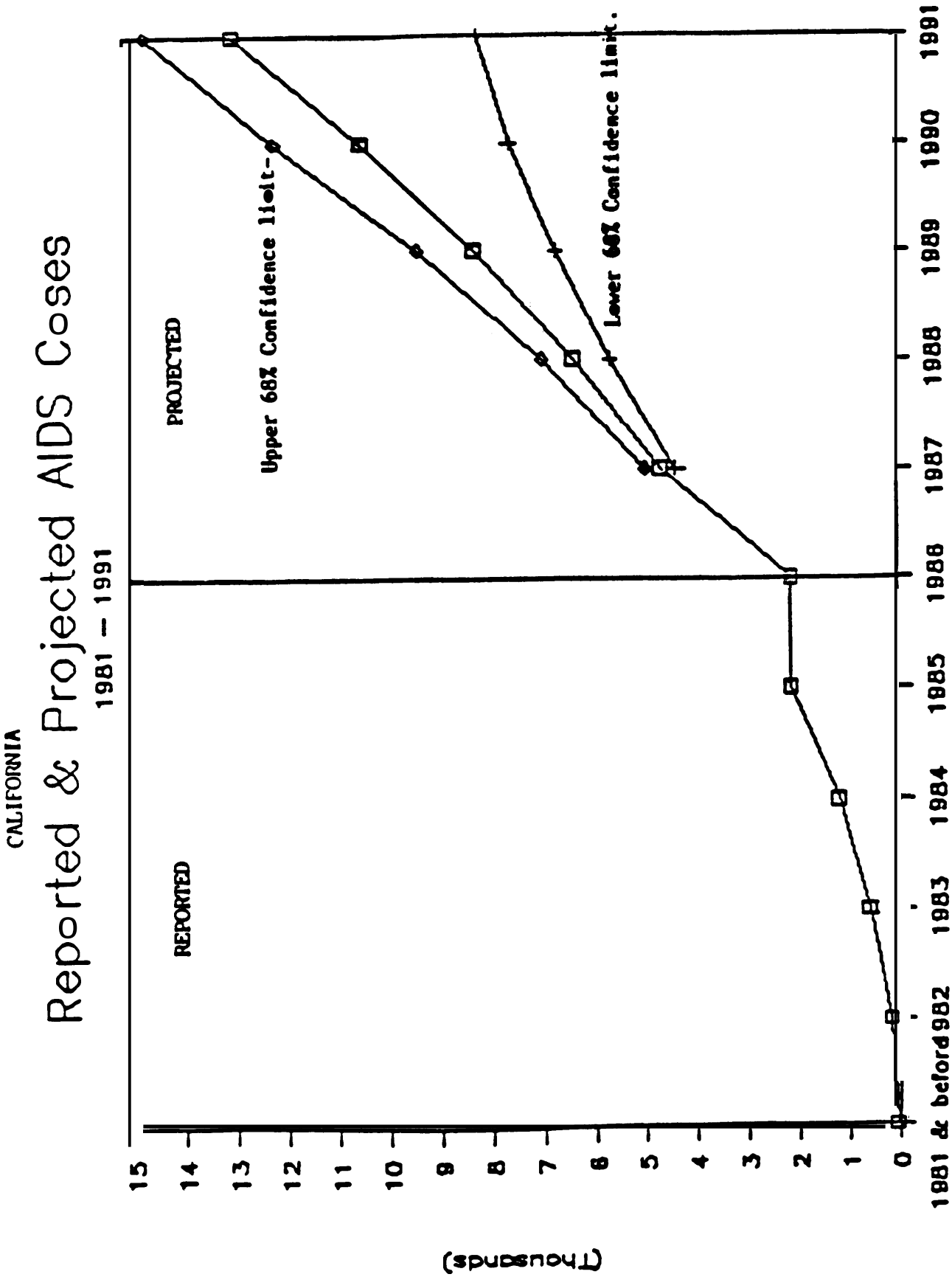
	cases Dfagnosed (68% bounds)	Deaths (Range)
1906	3250 (3100, 3400)	1930 (1870, 2000)
1987	4650 (4350, 4950)	2950 (2800, 3100)
1988	6300 (5600, 6900)	4200 (3900, 4500)
1989	8200 (6600, 9300)	5700 (5000, 63CO)
1990	~0~00 (7500, 12100)	7500 (6050, 8500)
1991	12900 (8100, 14600)	9600 (6950, 11150)

Table 2
Perceng of **California Ca'rea (SWA)** of Residence
December 29, 1986

REPORm CASES:

Year	*San* Francisco	Los Angeles	Other California
1981 6 before	52.2	32.8	*14.9*
1982	*53.0*	*35.6*	*11.b*
1983	*48.0*	*39.3*	*12.7*
1984	*48.6*	*35.7*	*15.7*
198S	*42-6*	3a.2	*19.2*
1986	*45.1*	37.2	*17.7*
PROJECTED CASES:			
1986	42.8	37.3	19.9
1991	33.5 (2Y.4, 37.7)*	35*7 (3L4, 40.1)*	30e8 (26.4, 35.5)0

● 68z confidence bouncls **are given** in Darencheses.



This graph depicts the reported and projected AIDS cases for the State of California as of 12/29/86
Source: Department of Health Services, Office of AIDS, Sacramento, California 95814.

AIDS	--acquired immunodeficiency syndrome
ARC	--AIDS-related complex
AZT	--azidothymidine (currently known as zidovudine)
CDC	--Centers for Disease Control
HIV	--human immunodeficiency virus
IUS	--Inpatient Utilization System
KFH	--Kaiser Foundation Hospitals
KFHP	--Kaiser Foundation Health Plan
KPNCR	--Kaiser Permanence Northern California Region
KPMCP	--Kaiser Permanence Medical Care Program
KS	-- Kaposi's sarcoma
PCP	--*Ptleumocyslis cat-itlii* pneumonia
TPMG	--The Permanence Medical Group, Inc.

REFERENCES

1. American Hospital Association, *Hospital Statistics* (Chicago, IL: AHA, 1971- 1985).

2. Andrulis, D., Beers, V., Bentley, J., et al., "The Provision and Financing of Medical Care for AIDS Patients in U. S., Public, and Private Teaching Hospitals," .I.4.,11. A. 258(10): 1343-1346, Sept. 11, 1987.

3. Boufford, J., President, New York City Health and Hospitals Corporation, testimony to the Presidential Commission of the Human Immunodeficiency Virus Epidemic, Washington, D. C., April 26, 1988.

4. Hardy, A., Rauch, K., Echenberg, D., et al., "The Economic Impact of the First 10,000 Cases of Acquired Immunodeficiency Syndrome in the United States," J.,4..II.A. 255(2):209-211, Jan. 10, 1986.

5. Interstudy, *The I}ltersfudy Edge,* Excelsior, MN, Summer 1987.

6. Kaiser Permanence (Northern California Region), "Annual Statistical Review," unpublished internal document, Oakland, CA, 1980 and 1986.

7. Kaiser Permanence (Northern California Region), "Facts 1987," internal document, Oakland, CA, 1987.

8. Kaplan, E. L., and Meier, P., "Nonparametric Estimation From incomplete Observation," *J. A.M.A. 53:457-481, 1958.*

9. Lyman, D., Chief, Office of AIDS, Department of Health Services, Health and N'elfare Agency, State of California, "Centers for Disease Control (CDC) California AIDS Projections," memo to readers of t}~e AIDS Monthly Field Activities Report, Sacramento, CA, Jan. 12, 1297.

10. Morbidity and Mortality Weekly, "Update on Acquired Immune Deficiency Syndrome (AIDS), United States," M.~f.ii'.R. 3 1:507-5 14, 1982.

11. Morbidity and Mortality Weekly, "Revision of the Case Definition of Acquired Immunodeficiency Syndrome for National Reporting, United States," M.i14.1i'. R. 34(25):373-375, June 28, 1985.

12. Pete, R. and Pete, J., "Asymptotically Efficient Rank Invariant Procedures," ***J. Roj'.*** S/a/. Soc. Series A, 135:185-207, 1972.

13. San Francisco Department of Public Health, AIDS Office, "San Francisco AIDS Incidence and Mortality Monthly Report," San Francisco, CA, March 1988.

14. Seage, G. R., Landers, S., Barry, A., et al., "Medical Care Costs of AIDS in Massachusetts," ***J. A.M.A. 256(22):3107,*** Dec. 12, 1986.

15. Scitovsky, A., Cline, M., and Lee, P., "Medical Care Costs of Patients With AIDS in San Francisco," ***J. A.M.A. 256(22):3103-3106,*** Dec. 12, 1986.

16. State of California, Office of Statewide Health Planning and Development, "Quarterly Financial and Utilization Report, 4th Quarter, 1986," Sacramento, CA, April 15, 1987.