COMMUTATION FUNCTIONS FOR INDIVIDUAL POLICIES PROVIDING FOR HOSPITAL, SURGICAL AND MEDICAL CARE BENEFITS AFTER RETIREMENT

BY

HENRY W. STEINHAUS, Ph.D.

INTRODUCTION

On March 5, 1958, the New York State Legislature enacted four new health insurance laws which went into effect on July 1, 1959. One of these laws provided that, if the employer so elects, his workers covered for 3 months or more by a group policy are entitled to convert to an individual policy from the same insurance company whenever they leave their jobs to retire or for any other reasons. The individual policy must provide a benefit of at least $10 per day for hospital room and board, up to 21 days; at least $100 for other hospital expenses and, at a minimum, surgical benefits under the $200 surgical schedule. In case of death of the worker, the law also extends this conversion privilege to the worker's wife or child.

As a consequence of this legislation which may spread into other states, health insurance benefits must be provided for the retired, through conversion of group insurance certificates to individual policies.

The purpose of this paper is to explore the health insurance experience available here and abroad for persons 65 years of age or over that might serve as a basis for rate calculations.

I. THE NEW YORK 1957 STUDY

The subject matter of costs of health insurance for older people has actually been under concentrated study ever since legislation was considered, involving non-cancellable* health insurance for the aged. In December 1956, the Governor of New York called a special conference on financing health costs for the aged, which was severely handicapped by the absence of factual data on which to base cost calculations. As a consequence, the Superintendent of Insurance of the State of New York initiated a study which brought together all available information as of 1957 and which was published as a report on the problem of continuation of medical care benefits for the aged in

* Originally the legislative demand was for policies which are non-cancellable except for non-payment of premiums. This was later modified to permit the use of so-called "guaranteed renewable" policies where the insurer reserves the right to increase premiums by class. As finally enacted and administered, the law allows the use of policies which can even be terminated by class although obviously this privilege cannot be used to negate the intent of the law.

New York State under the title "Voluntary Health Insurance and the Senior Citizen." This study is hereinafter referred to as the 1957 Study.

Unfortunately, the available information relating to persons over 65 years of age was not very useful for cost determination of individual policies. There were several reasons:

1. Most of the experience in this study was of a group nature. Persons over 65 included in this study were employees universally covered, without selection as to health or financial condition.
2. Since extension of insurance protection for persons 65 years and over has a relatively short history, of about 10 years, and since the privilege of continuance of protection after retirement was usually extended only to persons retiring *after* the date of adoption of such extension, the exposure is mainly in the age groups from 65 to 75 and decreases rapidly with increasing age.
3. Most individual policies utilized in the 1957 study contained cancellation privileges of the insurer that were not exercised. Therefore, the cancellable policies reported would have a more favorable experience than guaranteed renewable ones.
4. Employers who extended benefits to retired employees represented usually the wealthier corporations that do not require employee contributions, or only limited contributions, towards this health insurance coverage with the effect that there was no unfavorable selection on inception or termination.
5. With respect to surgical coverage no attempt was made to utilize the fragmentary information on costs, and it was arbitrarily assumed that the surgical rate as well as the average surgical claim will remain constant from age 65 on, and identical for both sexes.

Since this study was completed, later figures have been presented by Mr. E. J. Faulkner, on behalf of the Health Insurance Association of America and its Life Company Affiliates, at a hearing before the House Ways and Means Committee on the Forand bill (HR4700). These figures, based on insured lives of 1959, did not deviate greatly from the 1957 figures and are subject to the same limitations. I should like to stress that these figures are certainly useful for the purpose of estimating costs on a population basis (which checked out well for New York State as a whole), but not necessarily for cost studies of individual policies for retired lives. To overcome this deficiency the actuaries of the 1957 study increased the net premiums by an arbitrary 10% to reflect the effect of selection upon termination.

II. THE GERMAN EXPERIENCE

Private health insurance has flourished in Germany for many decades, partly because social health insurance limited its coverage to employees and workers earning less than a certain income which left excess earners without coverage except private insurance, and partly because salaried employee groups are permitted to contract out from the social health insurance system if they had an approved private substitute. Paralleling the experience in the United States where pending legislation brought about an intensive study of the problem, German tax laws and regulations brought about a concentrated review of the claim experience of all private health insurance carriers.

A judgment of the highest German Tax Court against one of the private casualty companies* indicated that actuarial proof of future obligations was necessary to establish the need for reserves under level premium contracts. As a consequence, the association of private sickness insurance carriers proceeded with the collection of voluminous statistics. The chief problem was, of course, the utilization of base material containing numerous benefit variations and often representing distinct social classes of policyholders, such as teachers.

Fortunately, as we shall see, most of the complexities of the solutions disappear if we limit our comparison to retired lives, say, age groups 65 and over. The basic formula we shall use for the net level annual premium is

$$P_x = \frac{\sum_{x}^{99} \frac{1}{2} (D^1_x + D^1_{x+1})\, h^1_x\, c^1_x}{\sum_{x}^{99} D^1_x}$$

where h_x represents the frequency of the occurrence of the risk (which varies by age and sex), and c^1_x the average cost (or charge) for each occurrence (which varies also by age and sex), both subject to parameter i representing benefit scales which in turn reflect income groups. As usual, $D^1_x = l^1_x v^x$ where $l^1_x = l^1_{x-1}\ (1 - q_{x-1} - w_{x-1})$, w representing the probability of voluntary termination of the contract.

In combining the experience of different benefit scales, it became necessary to operate with units such as $1 daily room and board benefit. However, it was also found that as benefits rise, costs rise disproportionately. The average first class patient went to the hospital more often and stayed longer than the ward patient. It became necessary to add the parameter i representing the income group variations.

At the outset, benefit scales for retired lives should be set at minimum levels, and while higher income groups would still stay longer,

* June 22, 1949—A.Z.I. 174/43 S.

and go more often, there is an element of co-insurance since the individual will have to bear the difference between charges and benefit, and this difference rises with income levels. No premium differentiation can be made by income groups in case of conversions from group coverage, but individual policies should contain some safety margins.

In passing, it should be noted that for retired people, income does not represent the best criterion of health demands. A combination of income, wealth and social position would be more responsive. In the case of a retired person, income may be an insignificant factor in relation to either personal wealth, or the requirements of social position, financed, in the absence of income and wealth, by relatives or friends. For these reasons a benefit scale differentiation is a better indication of the selection exercised by income factors.

The termination probabilities w were inserted for two reasons. First, in case of level premiums, reserves are accumulated if the cost rises with age. In case of termination, policyholders may expect the insurer to return any positive reserves. Insertion of some termination discount would obviate the necessity for cash surrender values.

The second reason involving use of termination probabilities is that claim costs rise with years of issue since selection against the insurer is exercised upon termination. If all costs averaged 10 per individual, the variation by persistency was:*

COST RATIOS

# of years in Effect	*All Ages*		*Age Group 71-75*	
	Male	*Female*	*Male*	*Female*
2-4	7.51	8.77	13.36	12.85
5-9	9.27	9.83	24.19	13.24
10-14	10.37	9.94	17.26	14.80
15-19	11.92	10.37	18.36	13.88
20 and over	14.16	12.72	18.15	14.52

The above figures indicate that the persistency problem is not important for older age groups. For long term contracts beginning at younger ages, these factors would affect calculation of reserves (the main subject of the German investigations) but premium calculations which took into account these separation selections did not reveal prominent changes in level premiums. The more detailed analysis by type of benefit, which follows, indicates that for the purpose of determining costs for retired lives we can utilize the actual German frequencies.

*D. G. Jaeger, Die versicherungs technischen Grundlagen der deutschen privaten Krankheitskostenversicherung—1958, p. 114 Dunker & Humboldt.

III. *Frequencies and Annual Costs*

A. *Hospitalization*

Hospital claim frequencies below age 65 of the 1957 study, conform to comparable German experience. The latest German figures* show the following hx ratio changes centered at age group 41-45.

Age Group	*hx Ratio*	*Age Group*	*hx Ratio*
16-25	.95	56-60	1.45
26-30	.90	61-65	1.70
31-35	.925	66-70	2.00
36-40	.96	71-75	2.35
41-45	1.00	76-80	2.75
46-50	1.10	81-85	3.25
51-55	1.25	Over 85	4.00

Superimposing these values on annual rates of hospitalization of the 1957 study shows identical values up to age 65, but higher values thereafter. We can therefore see no objection to extrapolation of American values below 65 to the higher age groups by the use of applicable German experience. We shall use the average cost figures of the New York 1957 study, since German costs would not be applicable.

Tables 2 to 9 show the commutation columns for the various benefits, Tables 2 and 3 the hospitalization values for both sexes. The first column, the net annual claim costs, Sx, is the product of the frequencies and the average costs. In order to permit full use of the 1957 study for ages below 65, the identical life experience was utilized, namely the U. S. population study of 1949-51, with 3% interest, as shown in Table 1. A mental note should be made that in extending these new commutation columns to ages below 65, utilizing the 1957 study, the Kx values below 65 have to be recalculated. This can be done merely by adding the Hx values of the 1957 study for all $x < 65$ to the K_{65} value of this study. The following special comments may be of interest:

1. With regard to hospital usage, current American experience is now being compiled for the older age groups by a few companies pioneering in this field. After the original clean-up period has passed, reliable figures should become available. Preliminary indications from one company are that the 1957 study frequencies are too low.

2. The English experience was studied too, and while not directly applicable to individual policy frequency deter-

* Furnished privately by Dr. A. Tosberg in letter of Jan. 29, 1959.

mination, reveals one fact of great importance, namely that single, widowed and divorced individuals make about double the demand on hospital services that their population ratio would justify. Married people can care for each other, and perhaps prefer to do so, and therefore have proportionately smaller claims. The figures are:*

DISTRIBUTION OF HOSPITAL OCCUPANCY
ALL HOSPITALS

	Males 65 & Over		*Females 65 & Over*	
Status	*% of Pop.*	*% of Bed Usage*	*% of Pop.*	*% of Bed Usage*
Single	9%	30%	16%	32%
Married	66	38	35	23
Widowed and Divorced	25	32	49	45

As a consequence, family policies for the older age groups can have lower rates as long as the individuals involved occupy the same household.

3. In determining the cost of hospitalization, the basic $1 benefit costs would be multiplied by the basic benefit offered, say $10, but in addition, by 40% of the reimbursement offered to physicians for in-hospital visits. Assuming a charge of $3, and reimbursement for 1 visit per day, the basic benefit costs should be multiplied by 11.2 representing 40% of $3 added to the $10 basic benefit. The assumption that there would be one visit for each 2½ days of hospitalization is the currently accepted standard.

4. The definition of *hospital* must be tightened to avoid the use of rest homes for non-acute illnesses. How much of this may be involved, might be gleaned from another English study, which details the principal diseases of the aged diagnosed over a one-year period, 1955-56.** Table 10 summarizes the frequencies of the main disease headings, according to which senile and nervous conditions represent some 25% of all diagnoses. The study shows

* The cost of the National Health Services in England & Wales, Brian Abel-Smith and R. M. Titmuss, Cambridge University Press, 1956, p. 146.

** Morbidity Statistics from General Practice—Volume I General Register Office, Studies on Medical & Population Subjects #14 by Logan & Cushion, H.M.S.O.

more detailed tables which may be useful for companies wishing to experiment with special policies restricted to some specific diseases.

B. *Incidental Hospital Services*

With respect to allowances for Special Hospital Services, we use the 1957 study average charges per admission where the maximum is $150. The 1957 study set the daily hospital benefit at $15 and therefore the maximum for incidental services at 10 times this figure. The use of the New York study costs simplifies the utilization of their figures for ages below 65. The frequencies are naturally determined by those of hospitalization. Commutation columns are shown in Tables 4 and 5.

C. *Surgical Expenses*

For surgical expense costs we also used the average surgical benefit of the New York 1957 study which in turn is derived from a surgical schedule with a $325 maximum. A lower maximum, such as $200 required for New York conversion, would introduce a safety margin against the increasing frequency of complex operations (such as heart) requiring maximum reimbursements.

With respect to frequencies after age 65, the German experience was used, although the German rates below 65 are lower than the American rates. To evaluate the accuracy of the figures the number of insured were compiled from a previous study by age groups:*

	No. of Insured	
Age Group	*Male*	*Female*
65-69	10,218	15,852
70-74	7,468	10,523
75-79	3,579	4,915
80 and over	1,060	1,483

The greater number of female insured reflects the greater proportion of females in these population groups.

The frequency rates used are based on a later study by Dr. Jaeger** (p. 61), involving about twice the exposure shown above. These exposures are large enough to produce satisfactory frequencies, which were used in Tables 6 and 7, as follows:

---

* Journal of the German Society of Actuaries (Deutscher Aktuarverein), Oct. 1953, entirely devoted to a basic morbidity study by Adolf Tosberg, pp. 30, 37, 44, 50, 57, 63. See also issue of March 1956, page 431. The German title is: Blaetter der Deutschen Gesellschaft fuer Versicherungsmathematik.

** Cf: Die versicherungs, etc.

Age	Annual Rate of Surgery	
	Male	Female
65	.108	.108
70	.119	.095
75	.125	.085
80	.122	.077
85	.096	.065
90	.083	.048
95	.039	.024

As was pointed out before, the 1957 study assumed an identical frequency of surgery for all ages and both sexes. The German experience shows a general decrease of surgery with advancing age, which is uninterrupted for females after a period of operations related to the menopause, but which begins for males only after the 70's when operations reach a peak, partially due to prostate conditions. The decline is actually logical, since operations are generally avoided with increasing age and are not even attempted for the oldest age groups. Therefore, as a working hypothesis the frequency rates have been mechanically smoothed to produce zero frequency at age 100.

A word of warning is necessary with respect to reserve calculations if policies are involved related to surgical benefits for males only. If level premiums are used, negative reserves will result for some ages, since the level premiums anticipate the later decline of the frequencies, and therefore become insufficient to handle the temporary rise. If sold in connection with the other benefits which rise uniformly, this problem will not become important.

D. Physician's Services

The 1957 study does not attempt to calculate costs for physician's services, but the material compiled contains some useful figures from the Health Insurance Plan of New York (H. I. P.).

As a pre-retirement base from which to extrapolate, we shall use the H. I. P. figures since they check well with those from the English study. For instance, for those over 65, there were in England 586 home and office contacts per 100 male enrollees, and 641 per 100 female enrollees, compared to 594.4 for both sexes in an H. I. P. study of 1954 (1957 study, p. 186). Both H. I. P. and the English experience are group experiences, and the definition of "services rendered" are practically the same in H. I. P., the English and the German studies. The German experience produces the annual claim rates S_x shown in Tables 8 and 9, per $1 for each service.

The determination of the actual average charge depends, naturally, on the distribution of services by type, and the scale of payment for

each type. As an example we show the most recent German average distribution of 100 services:

Type of Service	*German % of Total (1)*	*Assumed Payment per Service (2)*	*Total Cost (1) × (2)*
Routine Office Visits	34	$ 3	$102
Home Visits	18	5	90
Special Office Visits, involving antibiotic or other injections, sprains, etc.	38	5	190
Therapeutic treatments	8	10	80
X-Ray, or E. C. Diagnosis	2	20	40
	100%		$502

or an average of $5 per service. Since medical societies are generally interested in helping the aged and are recommending to their members that charges be reduced, the above scale may be considered reasonable. The English study comments on the number of telephone consultations which take the place of office consultations for the non-ambulatory aged, but are not reimbursable—as yet! It is fully realized that this is a new field in which experience is needed, but experiments are necessary if experience is to be gained, and these figures may serve as a starting point. Since such medical care benefits are not yet a conversion requirement, experiments can be undertaken subject to change of benefit scales and premiums.

IV. MONETARY RESULTS

The total cost of such a program has been calculated. The net annual level premiums for an individual age 65 are:

	Male	*Female*
For $10 Hospital R & B up to 31 days	$ 26.370	$ 27.670
For Hospital Incidentals, up to $150	24.165	25.101
For Surgical Benefits up to $325	12.790	9.910
For Physician's services, $5 average charge	37.785	43.200
For In-Hospital visits at $3, one a day	3.164	3.320
	$104.274	$109.201

As mentioned before, the 1957 study proposes to add about 10% of the net premium to reflect termination selection. This is not necessary here since the German figures already reflect selection results.

The 1957 study also proposes to add for conversion policies an extra 10% of the gross premium to cover the special medical selection arising from automatic conversion. There is no indication what this addition should be, and until further studies become available each insurer must decide for himself whether to absorb conversion costs or charge some estimated amount against the group from which the conversion arose.

Some employers will prefund the entire cost with techniques similar to funding of pensions. This in turn may lead to demands for single premium policies which have to the insurer the advantage of no terminations, but the disadvantage of no rate adjustment. Where the prefunding provides only for the monthly or annual premiums as they become due (similar to an annuity) there would be no termination selection. On this basis the conversion charges could be reduced or waived.

Other expense loading would depend on insurance company practices such as those relating to commissions or contributions to surplus, and on State premium taxes. A flat loading of \$5 plus 25% of gross would result, in our example, in a gross annual level premium of \$146 for males and \$152 for females. An average monthly charge of about \$12 for these medical expenses after retirement would not seem unreasonable, but it is high for retired people particularly when one considers that this includes no provision for drugs, appliances, or dental care. Moreover, the cost of medical services is likely to rise, not only in line with the similar trend of rising prices and wages, but even more importantly due to the increased cost of ever more complex services. This underlines the wisdom of prefunding some of the costs through paid-up individual policies.

TABLE 1

LIFE COMMUTATION COLUMNS

Basis for Formation: 3% Interest and l_x's from
NATIONAL OFFICE OF VITAL STATISTICS—NOV. 2, 3, 1954—VOL. 41, No. 1
Table 2 Life Table for Total Males: United States, 1949-1951
Table 3 Life Table for Total Females: United States, 1949-1951

	MALES			*FEMALES*		
AGE	$D_x = v^x l_x$	$\frac{1}{2}(D_x + D_{x+1})$	$N_x - N_{100} = \sum_x^{99} D_x$	$D_x = v^x l_x$	$\frac{1}{2}(D_x + D_{x+1})$	$N_x - N_{100} = \sum_x^{99} D_x$
65	9,014	8,729	94,910	10,852	10,580	130,034
66	8,443	8,165	85,896	10,307	10,039	119,182
67	7,887	7,616	77,453	9,770	9,505	108,875
68	7,345	7,082	69,566	9,239	8,977	99,105
69	6,819	6,564	62,221	8,714	8,454	89,866
70	6,309	6,062	55,402	8,193	7,936	81,152
71	5,814	5,575	49,093	7,678	7,423	72,959
72	5,336	5,106	43,279	7,167	6,915	65,281
73	4,875	4,653	37,943	6,662	6,414	58,114
74	4,431	4,218	33,068	6,165	5,921	51,452
75	4,004	3,801	28,637	5,677	5,439	45,287
76	3,597	3,404	24,633	5,200	4,968	39,610
77	3,210	3,028	21,036	4,735	4,509	34,410
78	2,845	2,674	17,826	4,283	4,065	29,675
79	2,502	2,343	14,981	3,847	3,638	25,392
80	2,184	2,037	12,479	3,429	3,230	21,545
81	1,890	1,755	10,295	3,031	2,843	18,116
82	1,620	1,497	8,405	2,654	2,478	15,085
83	1,374	1,263	6,785	2,302	2,139	12,431
84	1,152	1,053	5,411	1,975	1,825	10,129
85	953	865	4,259	1,675	1,540	8,154
86	777	701	3,306	1,404	1,283	6,479
87	624	559	2,529	1,161	1,054	5,075
88	493	439	1,905	946	853	3,914
89	384	339	1,412	759	679	2,968
90	293	257	1,028	598	530	2,209
91	221	192	735	462	406	1,611
92	163	141	514	350	305	1,149
93	118	101	351	260	224	799
94	83	71	233	188	161	539
95	58	49	150	133	113	351
96	39	33	92	92	77	218
97	26	22	53	61	51	126
98	17	14	27	40	33	65
99	10	8	10	25	21	25

TABLE 2

BASIC TABLES FOR MONETARY CALCULATIONS

Daily Hospital Benefit of $1—31-Day Maximum—Men

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_{x}^{\omega} H_x$
65	1.88	16,411	250,264
66	1.97	16,085	233,853
67	2.06	15,689	217,768
68	2.16	15,297	202,079
69	2.27	14,900	186,782
70	2.38	14,428	171,882
71	2.49	13,882	157,454
72	2.61	13,327	143,572
73	2.74	12,749	130,245
74	2.88	12,148	117,496
75	3.03	11,517	105,348
76	3.18	10,825	93,831
77	3.34	10,114	83,006
78	3.51	9,386	72,892
79	3.69	8,646	63,506
80	3.87	7,883	54,860
81	4.07	7,143	46,977
82	4.29	6,422	39,834
83	4.56	5,759	33,412
84	4.95	5,212	27,653
85	5.92	5,121	22,441
86	5.92	4,150	17,320
87	5.92	3,309	13,170
88	5.92	2,599	9,861
89	5.92	2,007	7,262
90	5.92	1,521	5,255
91	5.92	1,136	3,734
92	5.92	835	2,598
93	5.92	598	1,763
94	5.92	420	1,165
95	5.92	290	745
96	5.92	195	455
97	5.92	130	260
98	5.92	83	130
99	5.92	47	47

TABLE 3

BASIC TABLES FOR MONETARY CALCULATIONS

Daily Hospital Benefit of $1—31-Day Maximum—Women

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_{x}^{\omega} H_x$
65	1.88	19,890	359,788
66	1.97	19,777	339,898
67	2.06	19,580	320,121
68	2.16	19,390	300,541
69	2.27	19,191	281,151
70	2.38	18,888	261,960
71	2.49	18,483	243,072
72	2.61	18,048	224,589
73	2.74	17,574	206,541
74	2.88	17,052	188,967
75	3.03	16,480	171,915
76	3.18	15,798	155,435
77	3.34	15,060	139,637
78	3.51	14,268	124,577
79	3.69	13,424	110,309
80	3.87	12,500	96,885
81	4.07	11,571	84,385
82	4.29	10,631	72,814
83	4.56	9,754	62,183
84	4.95	9,034	52,429
85	5.92	9,117	43,395
86	5.92	7,595	34,278
87	5.92	6,240	26,683
88	5.92	5,050	20,443
89	5.92	4,020	15,393
90	5.92	3,138	11,373
91	5.92	2,404	8,235
92	5.92	1,806	5,831
93	5.92	1,326	4,025
94	5.92	953	2,699
95	5.92	669	1,746
96	5.92	456	1,077
97	5.92	302	621
98	5.92	195	319
99	5.92	124	124

TABLE 4

BASIC TABLES FOR MONETARY CALCULATIONS

Allowances for Special Hospital Services—$150 Maximum—Men

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_x^{\omega} H_x$
65	18.6	162,359	2,293,527
66	19.4	158,401	2,131,168
67	20.2	153,843	1,972,767
68	21.0	148,722	1,818,924
69	21.9	143,752	1,670,202
70	22.8	138,214	1,526,450
71	23.7	132,127	1,388,236
72	24.6	125,608	1,256,109
73	25.6	119,117	1,130,501
74	26.6	112,199	1,011,384
75	27.7	105,288	899,185
76	28.8	98,035	793,897
77	29.9	90,537	695,862
78	31.1	83,161	605,325
79	32.3	75,679	522,164
80	33.5	68,240	446,485
81	34.7	60,899	378,245
82	36.0	53,892	317,346
83	37.3	47,110	263,454
84	40.2	42,331	216,344
85	45.9	39,704	174,013
86	45.9	32,176	134,309
87	45.9	25,658	102,133
88	45.9	20,150	76,475
89	45.9	15,560	56,325
90	45.9	11,796	40,765
91	45.9	8,813	28,969
92	45.9	6,472	20,156
93	45.9	4,641	13,684
94	45.9	3,259	9,043
95	45.9	2,249	5,784
96	45.9	1,515	3,535
97	45.9	1,010	2,020
98	45.9	643	1,010
99	45.9	367	367

TABLE 5

BASIC TABLES FOR MONETARY CALCULATIONS

Allowances for Special Hospital Services—$150 Maximum—Women

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_{x}^{\omega} H_x$
65	18.6	196,788	3,264,028
66	19.4	194,757	3,067,240
67	20.2	192,001	2,872,483
68	21.0	188,517	2,680,482
69	21.9	185,143	2,491,965
70	22.8	180,941	2,306,822
71	23.7	175,925	2,125,881
72	24.6	170,109	1,949,956
73	25.6	164,198	1,779,847
74	26.6	157,499	1,615,649
75	27.7	150,660	1,458,150
76	28.8	143,078	1,307,490
77	29.9	134,819	1,164,412
78	31.1	126,422	1,029,593
79	32.3	117,507	903,171
80	33.5	108,205	785,664
81	34.7	98,652	677,459
82	36.0	89,208	578,807
83	37.3	79,785	489,599
84	40.2	73,365	409,814
85	45.9	70,686	336,449
86	45.9	58,890	265,763
87	45.9	48,379	206,873
88	45.9	39,153	158,494
89	45.9	31,166	119,341
90	45.9	24,327	88,175
91	45.9	18,635	63,848
92	45.9	14,000	45,213
93	45.9	10,282	31,213
94	45.9	7,390	20,931
95	45.9	5,187	13,541
96	45.9	3,534	8,354
97	45.9	2,341	4,820
98	45.9	1,515	2,470
99	45.9	964	964

TABLE 6

BASIC TABLES FOR MONETARY CALCULATIONS

Surgical Benefit According to a Representative Surgical Schedule—Men

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_x^{\omega} H_x$
65	12.4	108,240	1,213,911
66	12.8	104,512	1,105,671
67	13.1	99,770	1,001,159
68	13.3	94,191	901,389
69	13.5	88,614	807,198
70	13.7	83,049	718,584
71	13.9	77,493	635,535
72	14.0	71,484	558,042
73	14.1	65,607	486,558
74	14.2	59,896	420,951
75	14.3	54,354	361,055
76	14.4	49,018	306,701
77	14.3	43,300	257,683
78	14.2	37,971	214,383
79	14.1	33,036	176,412
80	14.0	28,518	143,376
81	13.8	24,219	114,858
82	13.6	20,359	90,639
83	13.3	16,798	70,280
84	12.9	13,583	53,482
85	12.4	10,726	39,899
86	11.8	8,272	29,173
87	11.2	6,261	20,901
88	10.6	4,653	14,640
89	10.0	3,390	9,987
90	9.05	2,442	6,597
91	8.5	1,632	4,155
92	7.5	1,058	2,523
93	6.5	657	1,465
94	5.5	391	808
95	4.5	221	417
96	3.5	116	196
97	2.5	55	80
98	1.5	21	25
99	.5	4	4

TABLE 7

BASIC TABLES FOR MONETARY CALCULATIONS

Surgical Benefit According to a Representative Surgical Schedule—Women

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_x^{\omega} H_x$
65	12.4	131,192	1,288,653
66	12.1	121,472	1,157,461
67	11.8	112,159	1,035,989
68	11.5	103,236	923,830
69	11.2	94,685	820,594
70	10.9	86,502	725,909
71	10.6	78,684	639,407
72	10.4	71,916	560,723
73	10.2	65,423	488,807
74	10.0	59,210	423,384
75	9.8	53,302	364,174
76	9.6	47,693	310,872
77	9.4	42,385	263,179
78	9.2	37,398	220,794
79	9.0	32,742	183,396
80	8.8	28,424	150,654
81	8.6	24,450	122,230
82	8.4	20,815	97,780
83	8.1	17,326	76,965
84	7.8	14,235	59,639
85	7.5	11,550	45,404
86	7.1	9,109	33,854
87	6.7	7,062	24,745
88	6.3	5,374	17,683
89	5.9	4,006	12,309
90	5.5	2,915	8,303
91	5.0	2,030	5,388
92	4.5	1,373	3,358
93	3.9	874	1,985
94	3.3	531	1,111
95	2.7	305	580
96	2.1	162	275
97	1.5	77	113
98	.9	30	36
99	.3	6	6

TABLE 8

BASIC TABLES FOR MONETARY CALCULATIONS

Cost of Medical Care—Physicians' Services—Charged at the Rate of $1 per Service—Men

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_x^{\omega} H_x$
65	6.2	54,120	717,228
66	6.4	52,256	663,108
67	6.6	50,266	610,852
68	6.8	48,158	560,586
69	7.0	45,948	512,428
70	7.3	44,253	466,480
71	7.5	41,813	422,227
72	7.7	39,316	380,414
73	8.0	37,224	341,098
74	8.3	35,094	303,874
75	8.6	32,689	268,780
76	8.9	30,296	236,091
77	9.2	27,858	205,795
78	9.5	25,403	177,937
79	9.8	22,961	152,534
80	10.1	20,574	129,573
81	10.4	18,252	108,999
82	10.7	16,018	90,747
83	11.1	14,019	74,729
84	11.5	12,110	60,710
85	11.9	10,294	48,600
86	12.3	8,622	38,306
87	12.7	7,099	29,684
88	13.1	5,751	22,585
89	13.4	4,543	16,834
90	13.6	3,495	12,291
91	13.8	2,650	8,796
92	14.0	1,974	6,146
93	14.0	1,414	4,172
94	14.0	994	2,758
95	14.0	686	1,764
96	14.0	462	1,078
97	14.0	308	616
98	14.0	196	308
99	14.0	112	112

TABLE 9

BASIC TABLES FOR MONETARY CALCULATIONS

Cost of Medical Care—Physicians' Services—Charged at the Rate of $1 per Service—Women

	NET ANNUAL CLAIM	*COMMUTATION COLUMNS*	
AGE	$COST = S_x$	$H_x = \frac{1}{2}(D_x + D_{x+1})S_x$	$K_x = \sum_x^{99} H_x$
65	7.1	75,118	1,123,550
66	7.3	73,285	1,048,432
67	7.5	71,288	975,147
68	7.7	69,123	903,859
69	7.9	66,787	834,736
70	8.1	64,282	767,949
71	8.3	61,611	703,667
72	8.6	59,469	642,056
73	8.9	57,085	582,587
74	9.2	54,473	525,502
75	9.5	51,671	471,029
76	9.8	48,686	419,358
77	10.1	45,541	370,672
78	10.4	42,276	325,131
79	10.7	38,927	282,855
80	11.0	35,530	243,928
81	11.3	32,126	208,398
82	11.6	28,745	176,272
83	12.0	25,668	147,527
84	12.4	22,630	121,859
85	12.8	19,712	99,229
86	13.1	16,807	79,517
87	13.4	14,124	62,710
88	13.7	11,686	48,586
89	13.9	9,438	36,900
90	14.1	7,473	27,462
91	14.3	5,806	19,989
92	14.4	4,392	14,183
93	14.4	3,226	9,791
94	14.4	2,318	6,565
95	14.4	1,627	4,247
96	14.4	1,109	2,620
97	14.4	734	1,511
98	14.4	475	777
99	14.4	302	302

TABLE 10

CONSULTATION AND PATIENT CONSULTING RATES PER 1,000 POPULATION FOR THE PRINCIPAL DISEASES AND CONDITIONS DIAGNOSED

Disease or Condition		*Consultations*	*Patients Consulting*
ALL DISEASES AND CONDITIONS	M	5862	684
	F	6414	727
Infective and Parasitic Diseases	M	103.0	20.2
	F	87.4	17.8
Neoplasms	M	278.4	29.6
	F	227.5	24.6
Allergic, Endocrine System, Metabolic and Nutritional Diseases	M	190.2	31.6
	F	313.9	52.8
Diseases of the Blood and Blood-forming Organs	M	164.1	14.4
	F	270.1	33.1
Mental, Psychoneurotic and Personality Disorders	M	128.3	27.7
	F	323.6	62.8
Diseases of Nervous System and Sense Organs	M	620.1	150.6
	F	652.2	152.5
Diseases of the Circulatory System	M	1537.2	186.0
	F	1781.1	226.8
Diseases of the Respiratory System	M	1424.3	260.3
	F	1000.9	225.7
Diseases of the Digestive System	M	536.5	133.7
	F	515.5	119.0
Diseases of the Genito-Urinary System	M	205.6	42.8
	F	164.7	45.8
Diseases of the Skin and Cellular Tissue	M	250.7	68.1
	F	248.0	68.8
Diseases of the Bones and Organs of Movement	M	451.6	119.2
	F	716.4	165.2
Congenital Malformations	M	0.7	0.5
	F	1.2	0.4
Symptoms, Senility and Ill-Defined Conditions	M	459.2	109.7
	F	621.3	136.6
Accidents, Poisoning and Violence (Nature of Injury)	M	195.2	66.0
	F	265.1	84.9
Non-Sickness	M	15.5	11.2
	F	13.2	9.1