SOCIETY OF ACTUARIES

Article from:

The Actuary

September 1989 – Volume 23, No. 8

AIDS adjustments for modeling purposes

by Timothy F. Harris

With the release of the Cowell/Hoskins report and the subsequent Report of the Society of Actuaries Task Force on AIDS, it is not difficult to model the AIDS exposure that a company has on both inforce business and future sales.

However, two areas in particular remain unclear in the projection of a company's AIDS claims: adjustments for a company's level of underwriting and for the geographic distribution of its business. Comments here apply to both individual life and individual disability income forms of coverage.

The task force report contains modeled AIDS claims examples that use aggregate population data. An insurance company should be modeling using insured population data adjusted for the effects of underwriting.

Level of underwriting

Because of variations from company to company and from year to year, the above-mentioned reports do not cover adjustments that should be made to account for a company's level of underwriting.

To better analyze the issue, a company's business can be divided into the following subsets:

1) Pre-1984 issues – This represents business issued before widespread recognition of AIDS.
2) Post-1983 issues – This is further subdivided into tested and nontested business.

The pre-1984 issues will use the insured AIDS mortality projections, which will be described later, without adjustments because few potential insureds were knowledgeable about AIDS before 1984. Therefore, there was little antiselection. However, the issues addressed in adjusting the data to an insured population would still apply except for the adjustment made for transfusion-related AIDS cases. This insured AIDS mortality takes into account the elimination of certain AIDS cases such as IV drug abusers.

For the post-1983 issues, companies can expect to experience antiselection below the level at which they are testing for HIV. Therefore, the base insured AIDS mortality projection should be adjusted by a factor greater than one for those untested policies. In addition, this factor will vary by the type of product sold. An insured who decides to select against a company will attempt to do so as cheaply and as soon as possible. Therefore, the highest loads for antiselection should apply to term life insurance and disability income coverage with short elimination periods. The lower loads for antiselection will apply to whole life insurance and disability income coverage with longer elimination periods.

For post-1983 issues that are tested for HIV, using data from reports on the accuracy of HIV testing, false positives can be expected in the area of .001% of the number that tested negative. These are potential insureds whom a company will reject and who might have otherwise been insured.

You also can expect false negatives of .8% of those who tested positive. These individuals were HIV positive and were not caught in the underwriting process. The percentage is higher, but the number is considerably lower than the false positives.

These rates assume highly accurate laboratory testing. These data also assume that the standard testing procedure is one ELISA test, which if positive, is repeated. If the results are again positive, a Western Blot test is given.

The estimated cost of these tests was quoted in 1987 at about $10 for the two ELISA tests and at $90 for a Western Blot test. The laboratory may package these and charge on a per test basis, not itemizing the number of Western Blot tests given.

Companies forced to use the T-cell test in the past can expect an extremely high number of false positives (2%) as defined previously and a very high number of false negatives (15%). However, no states now limit companies to this test.

The post-1983 business that was assumed to be non-HIV after testing negative will be affected by future exposure to HIV. To calculate this exposure requires the use of projected HIV infections as opposed to historical infection data. Future AIDS data are then used by year of issue to calculate the "force" of AIDS mortality that will impact these once HIV-negative issues.

This is represented by the following diagram:

Pre-1984 issues –
  Insured population AIDS mortality

Post-1983 issues –
  Untested – Antiselection adjusted insured AIDS mortality
  Tested – False negative AIDS claims
  – Non-HIV presently but subject to insured population type HIV exposure in future

Insured population adjustments

In projecting a company's AIDS mortality it is necessary to adjust from aggregate AIDS cases to insured-population AIDS cases by geographical area.

Included in the task force report was information on the AIDS model that was developed by Milliman & Robertson – to project a company's AIDS mortality. This model was recently supplemented by a table of adjustment factors by state called Geographic Influence Factors. These factors are used to weight the inforce or sales of an insurance company by state to arrive at the aggregate factors used in the AIDS model.

Table 1 shows a matrix that breaks out reported AIDS cases in the northeast region of the United States as defined by the Centers for Disease Control (CDC). It includes only those metropolitan statistical areas with population greater than one million.

The CDC limits the subdivision of their data in order to maintain confidentiality.

These data are subdivided by category of infection, the rows of the matrix, and by sexual preference category, the columns of the matrix.

The purpose of breaking the data down into these subcategories is to eliminate those AIDS cases not representative of an insured population. Except in the home service insurance business, all IV drug users can be eliminated. Hemophiliacs and transfusions on recent issues also can be eliminated since the blood supply is much safer now than in the past.

The Pattern II category, consisting of persons born in "Pattern II" countries, including those in Africa and the Caribbean, also should be dropped. The remaining three categories of infection are homosexual/bisexual, heterosexuals and undetermined.

Continued on page 10 column 1

AIDS adjustments cont'd

In the homosexual/bisexual group, the male homosexual number can be weighted by some factor less than one since it is assumed that these individuals do not have the level of insurable interest expected from a heterosexual or bisexual.

A 50% adjustment of this category will be assumed. The entire number of bisexuals is included for weighting purposes, as are heterosexuals.

The undetermined category may include many males who later are assigned to the homosexual/bisexual category; however, they are included here without adjustment.

The female heterosexual category also may include women in high-risk professions that would cause them to be rejected for insurance coverage. However, they are included here without adjustment.

The lower portion of Table 1 shows the AIDS cases remaining after these adjustments. The Geographical Influence Factors (GIF) calculated by region as defined by the CDC are then shown in Table 2 both before and after the insured-population adjustments.

A GIF of 3.051 indicates that business sold or inforce in the area defined should be weighted by this multiple before applying future projected AIDS claims that reflect an overall insured-population adjustment by a factor of 0.150/0.355, per Table 2.

These GIFs do not vary greatly with the percentage of homosexuals assumed to represent the insured population. The overall adjustment from aggregate AIDS cases to insured-population AIDS cases does, however, vary with this percentage.

These calculations were made using CDC data on the number of AIDS cases reported through December 31, 1988. For the purpose of calculating the GIFs, 1980 census data were used.

The calculations shown have been made by region as defined by the CDC, taking into account their confidentiality limitations. This type of geographical weighting also can be done on a state-by-state basis or even a city-by-city basis. There are, however, some limitations in this process because of CDC confidentiality restrictions.

Any attempt to make adjustments may be construed as arbitrary without adequate facts or other supporting data. However, some attempt is better than none, and perhaps several attempts could be investigated to test the sensitivity of the model to these adjustments to the AIDS data.

Another approach would be to generate, for example, three sensitivity scenarios and then weight each scenario by the expected probability of its actual occurrence to get a composite set of adjusted data.

Timothy F. Harris is a Consulting Actuary with Milliman & Robertson.

TABLE 1

Northeast Region
SMSAs Greater Than 1,000,000
Reported AIDS Cases Through December 31, 1988
Includes: Buffalo, NY; Boston, MA; Nassau, NY; New York City, NY; Newark, NJ

	Male Homosexual	Male Bisexual	Male Heterosexual	Female	Total
Homosexual/Bisexual	8,964	1,488			10,452
IV Drug Abuser			6,194	1,889	8,083
Homosexual/Bisexual IV Drug Abuser	689	288			977
Hemophiliac			51	4	55
Heterosexual			70	710	780
Pattern II Country			421	123	544
Transfusion			164	106	270
Undetermined			599	239	838
Total	9,653	1,776	7,499	3,071	21,999
After Described Adjustments to Possible Insured Population					
Homosexual/Bisexual	4,482	1,488			5,970
IV Drug Abuser					0
Homosexual/Bisexual IV Drug Abuser					0
Hemophiliac					0
Heterosexual			70	710	780
Pattern II Country					0
Transfusion					0
Undetermined			599	239	838
Total	4,482	1,488	669	949	7,588

TABLE 2

Reported AIDS Cases Through December 31, 1988
Compared to U.S. Population Figures From 1980 Census

	(1) AIDS Cases	(2) Population (000)s	(3) Cases Per Thousand	(4) GIF (3)/Total (3)
Northeast Region	21,999	16,581	1.327	3.741
Central Region	5,541	25,032	0.221	0.624
West Region	16,201	20,937	0.774	2.182
South Region	11,205	16,613	0.674	1.902
Mid Atlantic Region	5,008	12,387	0.404	1.140
SMSAs <1,000,000	21,532	138,192	0.156	0.439
Total	81,486	229,742	0.355	1.000
AIDS Cases Adjusted to Represent Insured Population				
Northeast Region	7,588	16,581	0.458	3.051
Central Region	2,806	25,032	0.112	0.747
West Region	7,866	20,937	0.376	2.505
South Region	4,986	16,613	0.300	2.001
Mid Atlantic Region	2,427	12,387	0.196	1.306
SMSAs <1,000,000	8,785	138,192	0.064	0.424
Total	34,458	229,742	0.150	1.000