THE ACTUARIAL USE OF LIFE TABLES

Six life tables: I attach at pages 86 to 97 below six life tables suitable for South African conditions. I believe that the best method for classifying persons is according to socio-economic factors such as earnings and level of education, rather than race. Old habits die hard so that the latest tables produced by the Central Statistical Services (based on Census statistics) still refer to `Whites', `Asiatics' and `Coloureds'. Official tables are not published for `Blacks'. The most recent census was conducted on a non-racial basis so the old "racially based" tables will never be updated.

The tables appearing in this publication are modified life tables, based on the official tables, which are designed to reflect the mortality of different socio-economic groups. The tables are numbered from 1 to 6 from light mortality to heavy mortality (tables 1 to 6). There are two special tables commonly used by South African actuaries (the "Dorrington table" for employed blacks and the census table for Asiatics). These were published in the 2001 edition of this Quantum Yearbook.

Socio-economic status is in some measure reflected by an individual's level of earnings. The earnings criterion, however, should be seen only as a preliminary guide. Judgment should be applied where individual circumstances revealed by the evidence indicate a different approach.

Number alive: The most useful column in a life table is the number of persons alive at any point in time out of an original group, in this case 100000. The reduction between one year and the next permits a calculation of the risk of death. The ratio between a future year and the current year gives the chance of survival to that subsequent year.

Life expectancies: The expectation of life is not a prediction as to when death will occur. It reflects the average number of years that will be lived by a large group of lives all of the same age. A life expectancy is best described as the `half-life' because it reflects the point in time at which 50% of those alive now will be dead. In other words 50% of claimants will live beyond their expectation of life. The reader will notice from the attached tables that the expected age at death increases as a person grows older and is in this sense like the end of a rainbow. The expectation of life is what statisticians call a `point estimate' in that a single figure encapsulates a complex pattern of risks. The standard actuarial calculation does not use the expectation of life but works with the individual risks of death one year at a time on the basis the value of the chance of the benefit in that year (see Newdigate & Honey `The MVA Handbook' at 167; *Carstens v Southern Insurance Assn Ltd* 1985 3 SA 1010 (C) at 1024G-H).

Joint expectation of life: The tables show the joint expectation of life for a man and a woman of equal age. The reader should note that this expectation is less than the expectation for either of the single lives.

Reduced life expectancy: It is usual to defer to medical opinion as regards reduced life expectancy. Very few medical reports state the life table that is considered normal. This can lead to some muddled thought due to the absence of a proper definition of what is considered to be a `normal life'. `Reduced life expectancy' means that having regard to all the relevant factors, including possibilities, the risk of early death has been increased above that for the average person. In this sense all paraplegics and uncontrolled epileptics have reduced life expectancy despite having a substantial prospect of living to a ripe old age. If there is a 20% chance of epilepsy the life expectancy has been reduced by 20% of the reduction that would apply if epilepsy had occurred. I strongly recommend that medical practitioners should express their opinion as regards reduced life expectancy **after consultation with an actuary and consideration of relevant statistical data**. This is the procedure followed by life offices when determining premium loadings.

**The modified `Murfin method'**: The MVA Handbook by Newdigate & Honey describes at pages 166-7 and 170-73 a method of calculation called the `Murfin method'. The tables below can be used in the same way as follows:

For an injury:

Expectation of life for a male aged 30 on TABLE 2	41,0 years
Expectation of life at age 65	12,8 years
Number alive at age 30	95324
Number alive at age 65	67006

Expectation of working life (including allowance for early death) is then:

$$41 - (12,8 \times 67006/95324) = 32,0 \text{ years}$$

32 years is 91% of the 35 working years to retirement.

For a death:

Joint expectation of life for husband and wife both aged 30 at time of death on TABLE 2	36,36 years
Joint expectation at ages 65	9,89 years
Number of men alive at age 30	95324
Number of women alive at age 30	97750
Number of men alive at age 65	67006
Number of women alive at age 65	81357

Expectation of joint working life (including allowance for early death) is then:

$$36,36 - (9,89 \times 67006 \times 81357)/(95324 \times 97750) = 30,6 \text{ years}$$

30,0 years is 87,4% of the 35 years to normal retirement age.

Accelerated benefits: The life tables include present values for the *spes* of inheritance, that is to say the value of the chance that a wife will inherit R1,00 from her husband in years to come. Husband and wife are taken to be of equal age. The inheritance is assumed to increase in value in line with inflation. If a breadwinner dies the widow's damages will be reduced by the amount that she has inherited but there will be added back to her damages the value of the chance that she would have inherited at some other time, had her husband lived (see *Groenewald v Snyders* 1966 3 SA 237 (A) at 248E). There must also be added to the income of the deceased but for the death the value of the use of the assets (see *Laney v Wallem* 1931 CPD 360). There is no general rule that inheritances such as furniture and the family home should be ignored (see *Snyders v Groenewald* 1966 3 SA 785 (C) at 791D) but it may happen that the net effect of adding on the use value and the chance of inheritance exactly equals the inheritance to be deducted.

The authorities are divided as to whether a court should ignore changes to the value of the inheritance after the death. Rulings in favour of having regard to changes after the death are *Santam Insurance v Meredith* 1990 4 SA 265 (Tk); *Marks v Santam Insurance* 1995 (C)(unreported 12.4.95 case 1510/93). The contrary was ruled in *Searle v Guardian National Insurance* 1996 (T) (unreported 11.10.96 case 5772/95)).

Example: If a widow has inherited R100000 this is deducted from her claim. There is added back the chance of later inheritance calculated as:

$$R100000 \times 0,2787 \times 0,85 = R27870 \times 0,85 = R23690$$

The factor of 0,85 allows for general contingencies of 15%. The widow and her deceased husband have here been assumed to both be aged 30 and subject to TABLE 2 mortality.