25891

UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL

Distr.
LIMITED

E/CN.14/POP/146
5 September 1979

Original : ENGLISH

ECONOMIC COMMISSION FOR AFRICA

Expert Group Meeting on Fertility and Mortality Levels, Patterns and Trends in Africa and their Policy Implications

Monrovia, 26 November to 1 December 1979.

SOME INDIRECT MORTALITY ESTIMATES FOR LIBYA, TANZANIA AND KENYA

by

Population Division
Economic Commission for Africa,
Addis Ababa

M79-2546

1. INTRODUCTION

In most developing countries, data on fertility and mortality are very often defective and distorted. Special techniques for testing the accuracy and validity of age and sex data are usually applied to raw data prior to the exercise of estimating demographic parametres. Subsequently, some attempts at smoothing and adjusting the data are made before deriving mortality estimates.

The objectives of the present paper are two-fold : firstly, to experiment with the new techniques, and secondly, to estimate the relevant mortality indices for the three countries (Libya, Tanzania and Kenya) under study. The merits and demerits of the methods employed will be indicated. Besides the socio-economic implications of the derived mortality estimates will be examined.

Since the focus of this paper is on new techniques, others such as the Brass death distribution method, estimation of mortality from successive censuses, the Coale-Demeny age distribution method, and the various stable population model modifications (Arriaga, Stolnitz, and Coale-Hoover) will not be dealt with. Besides, not all of the new techniques to be used will be applied in each case to the three countries mainly because of the limitations of data, time and space.

2. ESTIMATION OF CHILD MORTALITY

2.1 The Brass-Sullivan Method

In the Brass basic method 1/, proportions dead amongst children ever born are converted into life table mortality risks. The proportions of children dead (D_a) are obtained from data on children ever born and children surviving to mothers in age groups 15-19, 20-24, ..., 45-49. Multiplying factors are applied to the D_a values to yield the q_a values, the probability of dying before age a.

Experience has shown that data for children surviving to ages 2, 3 and 5 (l_2, l_3 and l_5) are the most reliable because they are derived from younger women (aged 20-24, 25-29 and 30-34) who are relatively free from recall lapse. To obtain the q_a values we use the relationship: $q_a + l_a = 1$.

The Brass basic method yields more consistent estimates if used in conjunction with modifications due to Sullivan and Trussell. Sullivan 2/ applied a regression method to determine the q_a values or the probability of dying from birth to age a, and hence the l_a values. The estimating equation is given by :

1/ Brass, W., Methods for Estimating Fertility and Mortality from Limited and Defective Data, Poplab Series, University of North Carolina, 1975.

2/ Sullivan, J.M., "Estimation of Probability of Dying in Early Childhood", Population Studies, Vol. 26, No. 1, 1973.

$q_a = D_i (A_i - B_i (P_2/P_3))$,

where D_i = proportions of children dead,

A_i, B_i, are constants tabulated by Sullivan,

P_2, P_3, are the average parities of mothers in the age groups 20-24 and 25-29 respectively.

The formulations with respect to the North and West Families of Life Tables 3/ are given below:

North Family

$q_2 = D_2 (1.30 - .63P_2/P_3)$

$q_3 = D_3 (1.17 - .50P_2/P_3)$

$q_5 = D_4 (1.15 - .42P_2/P_3)$

West Family

$q_2 = D_2 (1.30 - .54P_2/P_3)$

$q_3 = D_3 (1.17 - .40P_2/P_3)$

$q_5 = D_4 (1.13 - .33P_2/P_3)$

Past experience show that the North Family formulation is suitable for Tanzania and Kenya, whereas the West or South model applies to Libya. Table 1 below illustrates the computations for Libya, Tanzania and Kenya.

Table 1. Brass-Sullivan Estimates: Libya, Tanzania and Kenya

Age group of women	i	a	Average Parity P_i	D_i	q_a	l_a
		(a) Libya 1973 Census (WEST MODEL)				
20-24	2	2	2.430	.1487	.1481	.8519
25-29	3	3	4.315	.1731	.1635	.8365
30-34	4	5	5.878	.2037	.1923	.8077
		(b) Tanzania, 1973 Demographic Survey (NORTH MODEL)				
20-24	2	2	2.0888	.153	.1541	.8459
25-29	3	3	4.4921	.167	.1566	.8434
30-34	4	5	5.6545	.191	.1823	.8177
		(c) Kenya 1969 Census (NORTH MODEL)				
20-24	2	2	1.8818	.1465	.1429	.8571
25-29	3	3	3.6530	.1737	.1585	.8415
30-34	4	5	5.1119	.2023	.1889	.8111

3/ Coale, A.J., and Demeny P. Regional Model Life Tables and Stable Populations, Princeton University Press, 1966.

Before we make a choice of final estimates based on Table 1, it is expedient to consider and incorporate the Brass-Trussell technique.

2.2 The Brass-Trussell Method

Trussell 4/ used the parity ratios P_1, P_2 and P_3 and arrived at the formulation:

$$q_a = K_i D_i^* ,$$

where q_a = life table parameter (death risk),

D_i^* = proportion of children dead among those ever born to women of a specified age group,

$$K_i = A_i(P_1/P_2) + B_i(P_2/P_3) + C_i \log_e(P_1/P_2 + D_i \log_e(P_2/P_3) + E_i$$

The constants A, B, C, D and E are tabulated by Trussell for values of i from i = 1 to i = 7 (women 15-19 to women 45-49). The l_a values are obtained by subtracting the q_a values from unity. The Brass-Trussell technique is illustrated in Table 2 below.

Table 2: Brass-Trussell Estimates: Libya, Tanzania and Kenya

(a) Libya 1973 Census

WEST MODEL	i	a	A_i	B_i	C_i	D_i	E_i	K_i	q_a	l_a
20-24	2	2	-.2772	-.0573	-.0305	-.0548	1.0211	.9597	.1427	.8573
25-29	3	3	-.0249	-.1153	.0101	-.1285	.9754	.9649	.1670	.8330
30-34	4	5	-.0480	-.1362	.0232	-.1273	.9975	.9849	.2006	.7994

(b) Tanzania (1973) and Kenya (1969)

NORTH MODEL	i	a	A_i	B_i	C_i	D_i	E_i	TANZANIA K_i	TANZANIA l_a	KENYA K_i	KENYA l_a
20-24	2	2	-.3615	-.0509	-.0363	-.0645	.9674	1.0281	.8427	.9764	.8570
25-29	3	3	-.0508	-.1467	.0109	-.1565	.9231	1.0006	.8329	.9285	.8388
30-34	4	5	-.0666	-.1683	.0300	-.1739	.9623	.9455	.8194	.9536	.8071

4/ Trussell, T.J. "A re-estimation of multipliers for Brass Technique for determing childhood Survivorship Rates", Population Studies, Vol. 29, 1 March 1975.

2.3 Logit Smoothing of the Brass-Sullivan and Brass-Trussell Estimates

In order to select a single best estimate of l_2, the logit smoothing technique is applied to the derived life table functions l_2, l_3 and l_5. The logit of a function x is defined by :

$$\text{Logit } x = 0.5 \log_e \frac{(1-x)}{x}$$

The differences between the logits of the Brass Standard Life Table and the logits of the survivorship ratios are found and averaged. The average differences are then applied as correction factors to the Standard logits and the antilogists give the smoothed l_a values.

A basic assumption of the logit smoothing technique is that the logits of the Brass Standard System are related in the same way as those of the observed survivorship ratios. Any errors introduced by this assumption are minimal since the age groups under consideration (2, 3, 5) are close together. Table 3 illustrates the logit smoothing of survivorship ratios in the case of Libya. The best estimate of l_2 will be taken as the average of the smoothed Brass-Sullivan and Brass-Trussell estimates.

Table 3: Logit Smoothing of Survivorship Ratios for Libya (West Model)

(a) Brass-Sullivan

a	Standard logits $y_s(a)$	Observed l (a)	logit l (a)	logit difference	Adjusted logits	Adjusted l (a)*
(1)	(2)	(3)	(4)	(5)=(4)-(2)	(6)= $+\frac{\Sigma(5)}{3}$	(7)
2	-0.7152	.8519	-0.8748	-0.1596	-0.8608	.8483
3	-0.6552	.8365	-0.8162	-0.1610	-0.8008	.8322
5	-0.6015	.8077	-0.7176	-0.1161	-0.7471	.8167
		(b) Brass-Trussell				
2	-0.7152	.8573	-0.8965	-0.1813	-0.8550	.8468
3	-0.6552	.8330	-0.8035	-0.1483	-0.7950	.8306
5	-0.6015	.7994	-0.6913	-0.0898	-0.7413	.8149

Source: 1973 Census of Libya.

Thus l_2 (average) = 0.5(.8483 + .8468) = .8476

The simple procedure of adding 0.010 for females and subtracting 0.010 for males from the smoothed l_2 value will be adopted. In this case, a female l_2 of 0.8576 is obtained, corresponding to a male l_2 of 0.8376.

The implied life expectancies at birth (e^o_o) and infant mortality rates (measured as death risk, q_o) are summarized in Table 4.

Table 4 : Brass-Sullivan-Trussell Summary Estimates (Libya)
(Based on $l_{(2)}$ F = .8576, $l_{(2)}$M = .8376)

Coale-Demeny Models	FEMALES Level	$1000q_o$	e^o_o	MALES level	$1000q_o$	e^o_o
West	13.5	112	51.3	13.3	133	48.1
North	12.6	110	49.0	12.7	128	46.0
East	14.8	120	54.5	15.0	141	51.3
South	15.3	112	55.8	14.9	126	51.7

The foregoing estimation procedure, coupled with recent findings by other authors and by the Cairo Demographic Centre point to the fact that the South Model, level 15, suitably depicts the mortality characteristics of Libya based on the 1973 census. It should be added that the South Family Model Life Tables were found to apply to the experience of the North African States and other Arab neighbouring countries.

For Libya, the South Model yields an average life expectancy at birth of 53.7, which compares fairly well with the UN estimate of 53.0 5/ for the period 1970-1975. The implied IMR is around 120 per 1000 live births.

The above procedure need not be repeated for Tanzania and Kenya. It suffices to mention that the same procedure yields an l_2 (average) value of .8478 for Tanzania and .8516 for Kenya. The implied values of average life expectancy at birth are 48.5 (Tanzania 1973) and 49.0 (Kenya 1969).

2.4 Child Survival in Past 12 months Method

Information on children born in the past 12 months indirectly provides some estimates of mortality. The proportion of these children who survive furnishes an estimate of the life table parameter $_1L_o$. The number of births in the previous year to women respondents was estimated using smoothed data and vital statistics records.

For Libya, the pertinent period is 1 July 1979 to 30 June 1973, during which 103,223 children were born. From these births, there were approximately 95,135 survivors and 8,088 deaths by the time of the 1973 census.

5/ UN Economic and Social Affairs, Population Division, Selected World Demographic Indicators, 1970-1975, New York.

Thus $_1L_o$ = 95135/103223 = .9216. Conversion from $_1L_o$ to l_1(and q_o) may be performed by either using the South Family model life tables, or by applying a separation factor of 0.34 for both sexes (0.33 for females, 0.35 for males). This procedure yields average values for l_1, q_o, e_o as .8812, .119 and 53.3 respectively, corresponding to South model level 15.

In the case of Tanzania (1973 NDS), $_1L_o$ is estimated as 0.9200. As an alternative procedure, we use the "separation factor" method to convert $_1L_o$ to l_1.

Thus $_1L_o = fl_o + (1-f)l_1$,

where f = separation factor (0.34 for both sexes),

$l_o = 1.0$

$_1L_o = 0.9200$

Solving for l_1 yields 0.8788, which implies an l_2 value of 0.8533. This technique therefore suggests much lower mortality than the Brass-type methods, suggesting that deaths of children born in the last 12 months were underreported as is usually found to be the case.

3. ESTIMATING ADULT MORTALITY

3.1 Male Adult Mortality from Widowhood

The Brass-type methods for estimating mortality are unreliable for children above ten years of age. K. Hill 6/ has tabulated multipliers for converting widowhood data into levels of adult mortality. These weighting factors are applied to the formula :

$$\frac{l_N + 5}{l_{22.5}} = W(N)\ {}_5P_{N-5} + (1 - W(N))\,{}_5P_N$$

where N = age group of respondents,

P = proportion of women in the age group whose first husband has died.

The weighting factors are functions of the male and female ages at first marriage. The above formula is applicable when the mean age at first marriage for female respondents is below 20 years. If this mean is above 20 years, $l_{22.5}$ is replaced by $l_{27.5}$ in the denominator.

6/ Hill, K. Indirect Methods of Estimating Adult Mortality Levels, unpublished Ph. D. Thesis, London School of Hygiene and Tropical Medicine, 1975.

In situations of high marital instability characterized by high divorce rates and remarriages, misreporting of "ever widowed" cases is more pronounced and the widowhood method becomes unreliable. Furthermore, what we are estimating is in fact the mortality experience of the ever-married population. A correction technique on the Hill formulation for localities experiencing high marital instability is available.

An advantage of the widowhood method is that most events are reported once only. Also, first marriage distributions have a low statistical dipersion, making the effects of deviations from the models relatively small. The "adoption effect" commonly associated with orphanhood data is not present here.

The estimate of male adult mortality using widowhood data is given in Table 5 for Libya and Table 6 for Tanzania.

Table 5 : Estimates of male Adult Mortality by the Hill Widowhod Method for Libya

Age Group of Respondent	Proportion not widowed	N	Weight W(N)	$l_{(N\ 5)} / l_{22.5}$	$l_{(N+5)}$	BN
(1)	(2)	(3)	(4)	(5)	(6)= (5)x.7541	(7)
15 - 19	.9980	20	.5911	.9964	.7514	.7178
20 - 24	.9941	25	.4497	.9914	.7476	.7873
25 - 29	.9892	30	.5285	.9852	.7429	.7034
30 - 34	.9807	35	.6164	.9754	.7355	.6497
35 - 39	.9668	40	.7040	.9569	.7216	.6281
40 - 44	.9335	45	.7760	.9223	.6955	.6412
45 - 49	.8837	50	.8189	.8656	.6527	.6796
50 - 54	.7836	55	.8512	.7718	.5820	.5865
55 - 59	.7044					

$l_{(2)}m = 0.8376$, Female Mean age at first marriage (Hajnal's singulate mean) = 18.8, period male mean = 24.7, A = + 0.3703, B = 0.6819, $l_{22.5} = 0.7541$

Table 6 : Estimate of Male Adult Mortality - Hill-Widowhood Method (Tanzania)

Age Group of Respondent	Proportion not widowed	N	Weight W(N)	$\frac{l_{(N+5)}}{l_{22.5}}$	$l_{(N+5)}$	BN
(1)	(2)	(3)	(4)	(5)	(6)= (5)x.7401	(7)
15 - 19	.9899	20	.7945	.9878	.7311	.8657
20 - 24	.9795	25	.6563	.9756	.7220	.8591
25 - 29	.9681	30	.7404	.9633	.7129	.7865
30 - 34	.9497	35	.8349	.9452	.6995	.8298
35 - 39	.9225	40	.9294	.9196	.6806	.7282
40 - 44	.8808	45	1.0079	.8811	.6521	.7304
45 - 49	.8410	50	1.0568	.8450	.6254	.7073
50 - 54	.7701	55	1.0944	.7751	.5737	.7269
55 - 59	.7168					

$l_{(2)}m$ = 0.8378, Female Mean at marriage = 17.3, Period male mean = 25, $l_{22.5}$ = .7401, A = -0.2583, B = 0.7868.

3.3 Female Adult Mortality from Widowerhood

The estimation of female adult mortality from data on widowerhood is identical to the foregoing estimation of male adult mortality, and the description need not be repeated here. In the present case, the estimating equation takes the form:

$$\frac{l_{(N-5)}}{l_{17.5}} = W(N)\,{}_5P_{N-5} + (1-W(N))\,{}_5P_N$$

Where W_N are the tabulated weights. In this formulation if the male mean age at marriage is above 25 years, we replace $l_{17.5}$ in the denominator by $l_{22.5}$. The widowerhood technique is exemplified in Table 7 with reference to the Libya 1973 census.

Table 7: Libya: Female Adult Mortality by the Widowerhood Method

Age group of Respondent	Proportion not widowed	N	Weight W(N)	$\frac{l_{(N-5)}}{l_{17.5}}$	$l_{(N-5)}$	B_N
15 - 19	.9996	20				
20 - 24	.9986	25	.5706	.9992	.7921	.8800
25 - 29	.9977	30	.3655	.9980	.7912	.6970
30 - 34	.9974	35	.3891	.9975	.9708	.5817
35 - 39	.9972	40	.4461	.9973	.7906	.5013
40 - 44	.9959	45	.5096	.9966	.7901	.4403
45 - 49	.9941	50	.5738	.9951	.7889	.3923
50 - 54	.9834	55	.6516	.9921	.7865	.3542
55 - 59	.9324					

$l_{(2)}F$ = .8576, male mean at first marriage = 24.7, Female period mean = 18.8, A = - 0.4542, B = 0.6201.

Prediction equation : $Y_{(a)} = A + BY_S(a) = -0.4542 + 0.6201Y_S(a)$.

The final values of B and A are averaged for N = 25 to N = 45. Corresponding parameters based on $l_{(2)}$ are: South Model level 15.3, e_o^o = 55.8, and IMR = 110 per 1,000 live births. This procedure slightly overestimates the female life expectancy at birth mainly due to deficiencies of widowerhood data.

3.4 The Brass-Hill Orphanhood Method 7/

The Brass-Hill orphanhood technique converts proportions of respondents with partents living into survivorship ratio, and hence into life expectancy values. We will illustrate this estimation procedure using data from the 1973 National Demographic Survey of Tanzania and the 1969 population census of Kenya.

Appropriate questions on orphanhood were included in both the questionnaires of the 1973 NDS of Tanzania and the 1969 Kenya census: "Is your father alive? "Is your mother alive?" "Are you the eldest child of your mother?" Answers to these questions enable computation of P_a, the proportion of children with a surviving parent, which relates to a life table function in the formulation:

$$\frac{l_{(B+N)}}{l_{(B)}} = W(N)_N P_{N-5} + (1 - W(N))_5 P_N$$

Where W(N) are multipliers tabulated by Brass and Hill,

$_5P_N$ = proportion with a surviving parent in the age group N to (N+5),

B = 25 years for females, 32.5 for males

$\frac{l_{(B+N)}}{l_{(B)}}$ = life table survivorship function

The weights W(N) convert proportions not orphaned in adjacent age groups into life table survivorship probabilities from age 25 years to the central point of the two age groups. The weighting procedure in addition introduces some smoothing between consecutive proportions not orphaned. A set of multipliers is determined by the mean age of the fertility schedule $\bar{m}$.

The application of the above procedures to maternal orphanhood data for Tanzania (1973) and Kenya (1969) is given in Tables 8 and 9.

7/ Brass, W. and Hill, K. 'Estimating Adult Mortality from Orphanhood", IUSSP Proceedings, Vol. III, Liege (1973).

Table 8 :

Mainland Tanzania Female Adult Mortality
(All Children Orphaned Method)

Age Group of respondent	Proportion not orphaned	N	Weight W(N)	$\frac{l_{(25+N)}}{l_{25}}$	$l_{(25+N)}$	BN
(1)	(2)	(3)	(4)	(5)	(6)= (5)x.7563	(7)
10 - 14	.9702	15	.673	.9570	.7238	.7814
15 - 19	.9291	20	.756	.9151	.6921	.8120
20 - 24	.8719	25	.809	.8554	.6469	.8586
25 - 29	.7853	30	.834	.7659	.5793	.9251
30 - 34	.6687	35	.844	.6548	.4952	.9816
35 - 39	.5796	40	.791	.5527	.4180	.9764
40 - 44	.4506	45	.708	.4203	.3179	.9871
45 - 49	.3469	50	.514	.2964	.2242	.9638
50 - 54	.2431	55	.270	.1848	.1398	.9227
55 - 59	.1633					

$l_{(2)}F$ = .8578, $\bar{m}$ = 26, A = -0.2066, B = 0.9676, $l_{(25)}$ = 0.7563

Source: 1973 NDS of Tanzania, Vol. I.

Table 9 :

Kenya: Female Adult Mortality
(All children Oraphaned Method)

Age Group of respondent	Proportion not orphaned	N	Weight W(N)	$\frac{l_{(25+N)}}{l_{25}}$	$l_{(25+N)}$	B_N
(1)	(2)	(3)	(4)	(5)	(6)= (5)x.7620	(7)
10 - 14	.9644	15	.832	.9587	.7305	
15 - 19	.9304	20	.963	.9285	.7075	
20 - 24	.8779	25	1.067	.8826	.6725	.7776
25 - 29	.8078	30	1.142	.8211	.6257	.7990
30 - 34	.7141	35	1.199	.7312	.5572	.8234
35 - 39	.6280	40	1.193	.6509	.4960	.8640
40 - 44	.5096	45	1.157	.5275	.4020	.8463
45 - 49	.3955	50	0.993	.3946	.3007	
50 - 54	.2650	55	0.751	.2491	.1898	
55 - 59	.2010					

$l_{(2)}F$ = .8616, $\bar{m}$ = 28.5, A = -0.3263, B = 0.8221, $l_{(25)}$ = 0.7620

Source : 1969 Population census of Kenya, Vol. IV.

In Tables 8 and 9, it is evident that the estimates of B rise to a peak in the middle range age groups, and then fall somewhat. Estimates based on respondents aged less than 20 are unreliable due to the "adoption effect" whereby very young orphans are adopted by relatives who are reported as natural parents. Hence we estimate $\bar{B}$ by averaging values for N = 25 to N = 45 (thus excluding young respondents).

An advantage in using parental orphanhood data is that every respondent will give only three possible answers: "Yes", "No" or "Don't know", to the question on parental survival. The procedure assumes that mortality risks for orphans and non-orphans are the same, which may not be strictly true. The derived estimates will also be biased if some correlation exists between the mother's survival and the number of surviving children. This is not a major source of error since to have several children implies that a mother must have survived through most of her reproductive life.

The assumptions of constant fertility, constant mortality and a closed population, implied in the above procedure, will not hold in view of the long periods involved in the analysis, i.e. 30 to 45 years. In this respect we are unable to relate estimates from parental survivorship to a specific period.

Paternal orphanhood data can equally be used to estimate male adult mortality, but because male migration is relatively more prevalent and the male reproductive span is about 60 years (female, 33 years), the analysis of the male fertility/mortality distribution is rather complex.

An alternative technique for estimating female adult mortality uses maternal orphanhood data of "Eldest surviving children". Data on this are not available in both the 1973 NDS of Tanzania and in the 1969 Kenya census. An advantage of this technique is that every parent with a surviving child is reported once only, thus reducing misreporting errors resulting from the survival of a parent being related to several surviving children. A setback of the technique is the assumption of a constant birth interval - the linear interpolation between first and all birth orders is not justifiable. In conditions of natural fertility women with say 10 children will have smaller second or third birth intervals than women with only 3 or 4 children.

4. CONCLUSION

The merits and demerits of the various techniques discussed were presented in the appropriate places. This section therefore will only present general issues of relevance to the techniques applied.

In developing areas the rebustness of estimates depends very much on how far the estimates are internally related and on the extent to which the estimates depict the underlying demographic realities of the area under investigation. To this extent, the estimates made for the three countries under investigation seem plausible.

Appraisal and improvement of data collection tehniques will inevitably reduce dependence on the wider use of indirect methods of estimation. Errors associated with retrospective techniques are partially offset by the fact that most of the recorded events occurred only recently. The child mortality procedure estimates mortality levels 2 or 3 years before the survey or census, and the orphanhood techniques perhaps 10 years earlier. The widowhood approach is intermediate between these two.

Questions on child and parental survival generally yield reliable estimates of mortality in full-scale censuses or surveys. Retrospective questions on deaths in the household (past 12 months), or the dual-record system have not yet given highly consistent results. "Deaths in this household" question does not normally locate the household, which introduces misreporting errors if migration is prevalent.

The Brass basic method and its modifications by Sullivan and Trussell give fairly consistent estimates, though experience has shown that the Sullivan and Trussell estimates are preferable, especially after logit smoothing. The Brass-Hill (orphanhood) and Hill-Trussell (child survival-widowhood) approaches have not yet been properly evaluated in the absence of reasonable criteria or standard for comparison. The "Eldest Child Orphanhood" method would seem to yield more reliable estimates than the "All Children Orphanhood" approach because every parent with an oldest surviving child is reported once only. A common set-back in the Brass-type techniques is that no correlation is assumed between the child's and mother's mortality. There is also a possibility of replacement of real parents by foster parents, which introduces the "adoption effect" error.

The spouse survival technique gives more reliable estimates than the orphanhood method because there is only one first spouse per respondent, and the period of exposure to mortality is relatively smaller than in the case of parental survival. An appropriate correction factor must be incorporated with respect to cases of remarriage.