

STATISTICS
BACK-UP

68
(1/15)



UNIE VAN SUID-AFRIKA

UNION OF SOUTH AFRICA

AGSTE
SENSUS

EIGHTH
CENSUS

VAN DIE BEVOLKING VAN DIE
UNIE VAN SUID-AFRIKA

OF THE POPULATION OF THE
UNION OF SOUTH AFRICA

7 MEI 1946

7th MAY, 1946

BOEKDEEL III

VOLUME III

SUID-AFRIKAANSE
LEWENSTABELLE

SOUTH AFRICAN
LIFE TABLES

Nos. E. 4 (BLANKES)

Nos. E. 4 (EUROPEANS)

EN

AND

C. 2. (GEMENGDES EN ANDER KLEURLINGE)

C. 2. (MIXED AND OTHER COLOURED)

Uitgegee op Gesag

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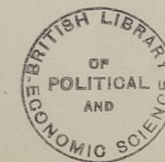
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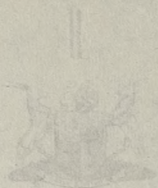
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UNION OF SOUTH AFRICA

EIGHTH
GENUS

IN THE YEAR ENDING 1910
UNION OF SOUTH AFRICA

THE MAY, 1910

VOLUME III

SOUTH AFRICAN
LIFE TABLES

STATISTICS
BACK-UP

68

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VERSLAG

DIE WERKSTELLING VAN DIE
LEWENSTABELLE

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REPORT

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VOORWOORD.

BOEKDEEL III.—LEWENSTABELLE.

Hierdie is die derde boekdeel oor die 1946 sensus van die Unie van Suid-Afrika, die boekdele voorheen uitgegee is—

Boekdeel I.—Geografiese Verdeling van die Bevolking.
Boekdeel II.—Leeftyte van die Blanke, Kleurling- en Asiatische Bevolkings.

Hierdie verslag bestaan uit lewenstabelle Nos. E. 4 en C. 2, d.i. die vierde lewenstabel vir blankes, en die tweede vir Kleurlinge en persone van gemengde ras (met uitsondering van Asië en Naturelle) soos amptelik deur die Buro vir Sensus en Statistiek, Pretoria, bereken.

Die uitdrukking „Gemengdes en ander Kleurlinge” omvat alle persone wat nie van suiwer blanke, Asiatische of Naturelle (Bantoe) afkoms is nie, en bestaan hoofsaaklik uit die groep wat bekend staan as die Kaapse Kleurlinge, maar sluit ook die Kaapse Maleiers en persone van gemengde rasseafkoms in.

Hierdie lewenstabelle is gegrond op die leeftydverdeling soos opgegee by die sensus van 1946, en op sterftes gedurende 1945, 1946 en 1947.

Ek is dank verskuldig aan Professor B. de Loor, Professor in Statistiek en Handelswiskunde van die Universiteit van Pretoria, vir advies en hulp. Die tabelle is opgestel deur Mnr. W. J. Pretorius, B.Sc., Eersteklerk, met behulp van ander lede van my personeel.

Verdere boekdele oor die 1946-sensus sal van tyd tot tyd uitgereik word na gelang die inligting beskikbaar word.

J. I. RAATS,
Direkteur van Sensus en Statistiek.

PREFACE.

VOLUME III.—LIFE TABLES.

This is the third volume on the 1946 census of the Union of South Africa, the volumes previously issued being—

Volume I.—Geographical Distribution of the Population.
Volume II.—Ages of the European, Coloured and Asiatic Populations.

This report consists of Life Tables Nos. E. 4 and C. 2, i.e. the fourth life table for Europeans, and the second for Coloured and persons of mixed race (excluding Asiatics and Natives), as officially calculated by the Bureau of Census and Statistics, Pretoria.

The term “Mixed and other Coloured” comprises all persons who are not of pure European, Asiatic or Native (Bantu) descent, and consists chiefly of the group known as the Cape Coloured, but also includes the Cape Malays, and persons of mixed racial descent.

These life tables have been based on the age distribution as returned at the 1946 census, and on deaths during 1945, 1946 and 1947.

I am indebted to Professor B. de Loor, Professor of Statistics and Commercial Mathematics of the University of Pretoria, for advice and assistance. The tables have been constructed by Mr. W. J. Pretorius, B.Sc., Principal Clerk, with the assistance of other members of my staff.

Further volumes on the 1946 census will be issued from time to time as the information becomes available.

J. I. RAATS,
Director of Census and Statistics.

VERSLAG

— OOR DIE

— AGSTE SENSUS VAN DIE BEVOLKING VAN DIE
— UNIE VAN SUID-AFRIKA, 7 MEI 1946.

INLEIDING.

In die verslag oor die Suid-Afrikaanse Lewenstabelle vir 1925-27 (No. E. 2) en 1935-37 (Nos. E. 3 and C. 1) is verwys na alle vorige Suid-Afrikaanse lewenstabelle waarvan publikasie bekend is.

Die onderhawige tabelle is die vierde vir blankes en die tweede vir Kleurlinge (gemengdes en ander Kleurlinge—met uitsondering van Asië en Naturelle) opgestel deur die Buro vir Sensus en Statistiek van die Unie van Suid-Afrika.

Die vorige tabelle opgestel deur die Buro vir Sensus en Statistiek is soos volg:—

- No. E. 1. 1920-22—Blankes.
- No. E. 2. 1925-27—Blankes.
- No. E. 3. 1935-37—Blankes.
- No. C. 1. 1935-37—Kleurlinge.

OPSTELLING VAN SUID-AFRIKAANSE LEWENSTABELLE Nos. E. 4 EN C. 2.

Die lewenstabelle is opgestel vir manlik en vroulik afsonderlik ten opsigte van die blanke en die Kleurlingbevolkings. Die grondgegewens wat gebruik is, is die aangetekende sterftes vir die jare 1945 tot 1947 en die bevolkingsyfers verkry uit die sensus van die 7de Mei 1946. Vir sekere leeftye is die sterftes vir vroeëre jare en die geboortes van 1939 af ook gebruik. Deur gebruikmaking van geboorte-, sterfte- en volkstrektatistiek is die bevolkingsyfers aangesuiwer om die stand by die middel van die jaar aan te toon.

Die grondbeginsels waarvolgens die lewenstabelle opgestel is is soos volg:—

Die bevolking en die sterftes is gesommeer in vyfjaarlikse leeftydsgroepe en die getalle by die middeljare van die groepe bereken deur interpolasie. Uit hierdie yfers is die sterftesyfers op vyfjaarafstande bereken, wat basiese sterftesyfers genoem sal word. Uiteindelik is die jaarlikse yfers tussen basiese sterftesyfers deur oskulerende interpolasie verkry. Hierdie metode is toegepas om die waardes van leeftyd 6 tot 86 jaar te verkry. Vir die kinderleeftyte is sterftesyfers gemaak uit geboortes en sterftes, terwyl 'n kromme-aanpassingsmetode en 'n metode van interpolasie vir die gevorderde leeftye gebruik is onderskeidelik vir blankes en Kleurlinge. Die ander funksies van die lewenstabelle is almal afgelei van die sterftesyfers.

Vergelyk met die lewenstabelle vir 1935-37, is daar verskille in die toegepaste tegniek en formules, wat sal blyk uit wat volg.

Gegevens gebruik.—Die nodige bevolkingsyfers is verkry uit die resultate van die sensus van 7 Mei 1946. Uit die registers van geboortes, sterftes en volkstrekk vir die twee maande Mei en Junie is die bevolking aangesuiwer om die benaderde stand volgens afsonderlike leeftye op 30 Junie 1946 aan te dui.

Geboorte- en sterfteregistrasie is verpligtend dwarsdeur die Unie vir blankes en Kleurlinge, en die registers toon sterftes volgens afsonderlike leeftye en geboortes volgens die vier kwartale van die jaar. Verder word sterftes in die eerste lewensjaar volgens leeftyd onder 1 dag, 1 tot 6 dae, 7 tot 13 dae, 14 tot 20 dae, 21 tot 30 dae, 1 tot 2 maande, 3 tot 5 maande, 6 tot 8 maande en 9 tot 11 maande aangedui.

REPORT

— ON THE

— EIGHTH CENSUS OF THE POPULATION OF
— THE UNION OF SOUTH AFRICA, 7th MAY, 1946.

INTRODUCTION.

In the reports on South African Life Tables for 1925-27 (No. E. 2) and 1935-37 (Nos. E. 3 and C. 1) reference was made to all previous South African Life Tables which have been published.

The present tables are the fourth for Europeans and the second for Coloured (Mixed and Other Coloured—excluding Asiatics and Natives) constructed by the Bureau of Census and Statistics of the Union of South Africa.

The previous tables constructed by the Bureau of Census and Statistics are as follows:—

- No. E. 1. 1920-22—Europeans.
- No. E. 2. 1925-27—Europeans.
- No. E. 3. 1935-37—Europeans.
- No. C. 1. 1935-37—Coloured.

CONSTRUCTION OF SOUTH AFRICAN LIFE TABLES Nos. E. 4 AND C. 2.

The life tables have been constructed for males and females separately in respect of the European and Coloured populations. The basic data used were the recorded deaths for the years 1945 to 1947 and the population figures obtained from the census of the 7th May, 1946. For certain ages the deaths for earlier years and the births from 1939 were also used. The population figures were adjusted to bring them to the middle of the year by making use of birth, death and migration statistics.

Basically, the method used for the construction of the Tables was as follows:—

The population and deaths were summed in quinquennial age groups and the numbers at the middle years of the groups calculated by interpolation. From these figures the mortality rates at five-yearly intervals, which will be referred to as pivotal rates of mortality, were calculated; and finally the annual rates between pivotal values were obtained by means of osculatory interpolation. This method was applied to obtain values from age 6 to 86 years. For the infantile ages the mortality rates were estimated from births and deaths, while for the advanced ages a curve-fitting method and a method of interpolation were used for Europeans and Coloured, respectively. The other functions of the life table were all derived from the mortality rates.

Compared with the life tables for 1935-37, there are differences in technique and formulae applied which will become plain in what follows.

Data Used.—The population figures required were obtained from the results of the census of the 7th May, 1946. From records of births, deaths and migration for the two months, May and June, the population was adjusted to show the approximate position at the 30th June, 1946, by single ages.

Birth and death registration are compulsory throughout the Union for Europeans and Coloured and the records show deaths in single ages and births according to the four quarters of the year. Furthermore, deaths in the first year of life are shown by age under 1 day, 1 to 6 days, 7 to 13 days, 14 to 20 days, 21 to 30 days, 1 to 2 months, 3 to 5 months, 6 to 8 months and 9 to 11 months.

Wat betref die blanke bevolking, is die getalle volgens afsonderlike leeftye tussen omtrent 5 en 50 ongelijk verdeel, soos duidelik gesien kan word uit grafiek 1. Die meeste van hierdie ongereeldhede is te wyte aan ander oorsake as volkstrek, wat opgespoor kan word deur die jare van geboorte van die persone by die leeftye waar die ongereeldhede merkbaar is, na te slaan. Van leeftyd 43 af is daar bv. skynbare tekorte in die getelde getalle manlikes en vroulikes ten tyde van die sensus. As 43 afgetrek word van die sensusjaartal, dan is 1903 en vroeëre jare die geboortejare van die persone, nl. die tydperk onmiddellik na en gedurende die Anglo-Boereoorlog van 1899-1902, wat natuurlik die geboortesyfer ernstig versteur het. By leeftyd 30 is daar 'n aanmerklike tekort, wat teruglei tot die Eerste Wêreldoorlog van 1914-18. Op dieselfde manier is die spore van ekonomiese depressies op die bevolking gelaat, soos bv. getoon word deur die tekorte by leeftye 11 tot omtrent 15, wat teruglei tot 1931 en die daaropvolgende jare, wat ooreenstem met die tydperk van 'n ekonomiese depressie in die Unie.

Die sterftes word natuurlik beïnvloed deur die onreëlmatige verdeling van die bevolking, maar boonop word die verskynsel van „ophoping” opgemerk in die sterftes, wat veroorsaak word deurdat voorkeur vir leeftye eindigende op sekere syfers soos 0, 5 en gelyke getalle getoon word deur beriggewers wanneer die sterftes geregistreer word, wat lei tot buitensporige groot getalle by leeftye eindigende op hierdie syfers en tekorte by ander. Die uitwerking kan in grafiek 2 bespeur word, veral by leeftye 40, 50, 60, 65 en so voorts. Die mate daarvan word aangetoon deur Myers se metode, waarvan die resultate later gegee sal word.

Ophoping is nie opmerklik by die blanke bevolking nie. Die feit dat die datum van geboorte sowel as die leeftyd gevra is in die sensusvorm het daartoe gelei dat baie noukeurige opgawes van leeftye verkry is. Die grafiek toon geen merkbare teken van ophoping by leeftye bo 50 jaar nie, waar die syfers betreklik vry van onreëlmatighede is wat sulke foute kan verberg. Myers se toets toon geen betekenisvolle ophoping by die syfers 0 en 5 nie, alhoewel die onreëlmatige leeftydverdeling van die bevolking die neiging kan hê om 'n geringe mate van ophoping te verberg.

In die geval van bevolking en sterftes by Kleurlinge is die verskynsel van ophoping een van die vernaamste faktore wat in aanmerking geneem moet word (grafieke 3 en 4). Daar sal opgemerk word dat die fout ernstiger is by die sterftes as by die bevolking, aangesien groter konsentrasies by die syfers 0 en 5 getoon word. Dit is te verwag by 'n bevolking waar leeftye minder noukeurig bekend is, aangesien die onsekerheid aangaande die juiste leeftyd groter sal wees in die geval van 'n sterfte, waar 'n tweede party die besonderhede vir die aantekening van die sterfte moet verskaf.

Groepering van bevolking en sterftes.—Bevolking en sterftes by blankes is gesommeer in die vyf moontlike vyfjaargroeperings en 'n ondersoek is gemaak om vas te stel watter groeperings vir bevolking en sterftes die beste resultate sal lewer.

Grafieke van die vyf groeperings vir bevolking en sterftes is geteken en ondersoek met die oog op die reëlmatige verloop van die vyfjarige somme. Vir die bevolking, het die groepering 4-8, 9-13, ens., die beste vertoon, maar vir sterftes was die resultaat nie beslissend nie.

Aangesien die verhouding van sterftes tot bevolking die belangrike faktor is in die grond-berekenings, is die waarde van die sterftesyfer, q_x , bereken by enkele leeftye vir elke groepering en op verskillende maniere getoets. Die handelwyse was soos volg:—

Die sterftesyfer by elke leeftyd van 15 tot 80 is verkry volgens die gewone metode om die sterftes en bevolking by die middelleeftye van die vyfjaargroep te bereken deur middel van 'n interpolasieformule en waardes van q_x hieruit af te lei op vyfjaarafstande. Uit hierdie basiswaardes is q_x vir afsonderlike leeftye verkry deur oskulerende interpolasie. Waardes is tot ses desimale bereken.

Uit hierdie vyf stelle waardes van q_x vir die leeftye 15 tot 80 is die gemiddelde waardes van q_x vir elkeen van die leeftye bereken. Die toets het nou daarin bestaan dat die afwykings

Regarding the European population, the numbers enumerated at single ages between about 5 and 50 are unevenly distributed, as can be clearly seen from chart 1. Most of these irregularities are due to causes other than migration, which can be traced by referring to the years of birth of the persons at the ages where irregularities are noticeable. For example, commencing at age 43, there are apparent deficiencies in the numbers of males and females enumerated. Deducting the age 43 from the census date 1946, the years of birth of these persons are obtained as 1903 and earlier years, which is the period immediately after and during the Anglo-Boer War of 1899-1902, which naturally had a disturbing effect on the birth-rate. At age 30, there is a marked deficiency and this leads back to the first world war of 1914-18. Similarly, the marks of economic depressions have also been left on the population, as for instance is shown by the deficiencies at ages 11 to about 15, which lead back to 1931 and succeeding years, concurring with the time of an economic depression in the Union.

The deaths are, of course, affected by the uneven distribution of the population, but, in addition, the phenomenon known as "heaping" is noticed in the deaths, which is caused by a preference for ages ending in certain digits like 0, 5 and even numbers being shown by informants when registering the deaths, leading to unduly large numbers at ages ending in these digits, and deficiencies at others. The effect can be seen in chart 2, especially at ages 40, 50, 60, 65 and so on. The extent is shown by Myers method, the results of which will be given later.

Heaping is not evident in the European population. The fact that date of birth as well as age was asked for in the census questionnaire resulted in very accurate returns of ages being obtained. The chart shows no appreciable evidence of heaping at ages above 50 years, where the figures are relatively free from irregularities which may tend to cover up such errors. Myers' test does not show any significant heaping at digits 0 and 5, although, of course, the irregular age distribution of the population may tend to obscure any slight degree of heaping present.

In the case of the Coloured population and deaths, the heaping phenomenon is one of the main factors that has to be considered (charts 3 and 4). It will be noticed that the error is more serious for the deaths than for the population, as larger concentrations at the digits 0 and 5 are shown. This is to be expected in a population where ages are less perfectly known, as in the case of a death the uncertainty in regard to the exact age would be greater where a second party has to furnish the particulars for the recording of the death.

Grouping of the Population and Deaths.—The population and deaths for Europeans were summed in the five possible quinquennial groupings and a study made in order to determine which groupings for population and deaths would give the best results.

Charts of the five groupings for population and deaths were constructed and examined for regularity of progression of the five-yearly sums. For population, the grouping 4-8, 9-13, etc., showed up best, but for deaths the result was not decisive.

As the ratio of deaths to population is the important factor for the basic calculations, the value of the mortality rate, q_x , was calculated at individual ages for each grouping and tested in various ways. The procedure was as follows:—

The mortality rate at each age from 15 to 80 was obtained by the usual method of calculating the deaths and populations at the middle ages of the five-year groups by means of an interpolation formula and deriving values of q_x at five-yearly intervals. From these pivotal rates, q_x was obtained at individual ages by means of osculatory interpolation. Values were calculated to six decimal places.

For these five sets of q_x for the ages from 15 to 80 the average values of q_x at each of these ages was calculated. The

van die vyf stelle waardes van q_x by elke leeftyd van die gemiddelde waardes van q_x bereken is en dat genoteer is watter stel die geringste afwyking toon. Die positiewe en negatiewe afwykings is gesommeer en netto en absolute totale gevind. Die resultate was soos volg:—

AFWYKINGS VAN $10^6 q_x$ VAN GEMIDDELDE.

LEEFTYE 15-80.

Leeftydsgroepering.	AFWYKINGS VAN GEMIDDELDE.			
	Positief.	Negatief.	Netto.	Absoluut.
	MANLIK.			
1-5.....	5,489	5,939	- 450	11,428
2-6.....	9,754	11,036	- 1,282	20,790
3-7.....	4,554	3,096	+ 1,458	7,650
4-8.....	6,601	6,355	+ 246	12,956
5-9.....	7,750	7,722	+ 28	15,472
	VROULIK.			
1-5.....	5,849	6,181	- 332	12,030
2-6.....	5,440	5,603	- 163	11,043
3-7.....	5,389	5,131	+ 258	10,520
4-8.....	6,600	6,047	+ 553	12,647
5-9.....	5,969	6,271	- 302	12,240

Hierdie toets dui aan dat dit vir manlik 'n keuse sou blyk te wees tussen die groeperings 1-5 en 4-8, wanneer sowel netto as absolute afwykings in aanmerking geneem word. Vir vroulik sou die groepering 2-6 die beste blyk as die netto verskil alleen in oorweging geneem word, aangesien daar nie veel te kies is tussen die groeperings wat absolute verskille betref nie.

'n Ander toets het bestaan uit gebruikmaking van die waardes van q_x soos verkry vir die vyf groeperings vir die doel van bogenelde toets om die verwagte sterftes vir elke groepering by afsonderlike leeftye van 15 tot 80 te bereken en hulle te vergelyk met die werklike sterftes. Die afwykings van die verwagte van die werklike sterftes is gesommeer en netto en absolute totale verkry, soos hieronder aangetoon.

AFWYKINGS VAN VERWAGTE VAN WERKLIKE STERFTES.

LEEFTYE 15-80.

Leeftydsgroepering.	AFWYKINGS.			
	Positief.	Negatief.	Netto.	Absoluut.
	MANLIK.			
1-5.....	239	257	- 18	496
2-6.....	234	257	- 23	491
3-7.....	241	271	- 30	512
4-8.....	239	262	- 23	501
5-9.....	246	268	- 22	514
	VROULIK.			
1-5.....	169	167	+ 2	336
2-6.....	165	173	- 8	338
3-7.....	167	173	- 6	340
4-8.....	170	176	- 6	346
5-9.....	166	178	- 12	344

test now consisted in computing the deviations of the five sets of values of q_x at each age from the average values of q_x and noting which set showed the least deviation. The positive and negative deviations were summed and net and absolute totals obtained. The results were as follows:—

DEVIATIONS OF $10^6 q_x$ FROM AVERAGE.

AGES 15-80.

Age Grouping.	DEVIATIONS FROM AVERAGE.			
	Positive.	Negative.	Net.	Absolute.
	MALE.			
1-5.....	5,489	5,939	- 450	11,428
2-6.....	9,754	11,036	- 1,282	20,790
3-7.....	4,554	3,096	+ 1,458	7,650
4-8.....	6,601	6,355	+ 246	12,956
5-9.....	7,750	7,722	+ 28	15,472
	FEMALE.			
1-5.....	5,849	6,181	- 332	12,030
2-6.....	5,440	5,603	- 163	11,043
3-7.....	5,389	5,131	+ 258	10,520
4-8.....	6,600	6,047	+ 553	12,647
5-9.....	5,969	6,271	- 302	12,240

This test shows that for males the choice would appear to lie between the groupings 1-5 and 4-8, when both net and absolute deviations are taken into account. For females, the grouping 2-6 would appear to be best if the net difference alone is considered, as there is not much to choose between the groupings as far as the absolute differences are concerned.

Another test consisted in utilizing the values of q_x obtained for the five groupings in the above test to calculate the expected deaths for each grouping at the individual ages from 15 to 80 and to compare these with the actual deaths. The deviations of the expected deaths from the actual deaths were summed and net and absolute totals obtained, as shown hereunder.

DEVIATIONS OF EXPECTED FROM ACTUAL DEATHS.

AGES 15-80.

Age Grouping.	DEVIATIONS.			
	Positive.	Negative.	Net.	Absolute.
	MALE.			
1-5.....	239	257	- 18	496
2-6.....	234	257	- 23	491
3-7.....	241	271	- 30	512
4-8.....	239	262	- 23	501
5-9.....	246	268	- 22	514
	FEMALE.			
1-5.....	169	167	+ 2	336
2-6.....	165	173	- 8	338
3-7.....	167	173	- 6	340
4-8.....	170	176	- 6	346
5-9.....	166	178	- 12	344

Volgens hierdie toets verskil die resultate vir die vyf groeperings blykbaar nie betekenisvol van mekaar nie en sou enigeen van die groeperings aanneemlik wees.

Uiteindelik is 'n toets van geheel verskillende aard op bevolking en sterftes afsonderlik toegepas. Myers se metode (1) is gebruik om vas te stel of daar ophoping in bevolking en sterftes by sekere leeftye aanwesig is.

'n Elementêre metode om die voorkeur vir sekere syfers in die gegewens aan te toon, sou wees om die getalle vir alle leeftye eindigende op 0, alle leeftye eindigende op 1, ens., tot by leeftye eindigende op 9 te sommer en uit te druk as persentasie van die totaal wat betrokke is. 'n Mens sou verwag dat elkeen van hierdie somme 10 persent van die totaal sou uitmaak in die geval van gegewens waar geen ophoping of ander steurende element teenwoordig is nie, maar daar is bewys dat dit nie so is nie, want die resultate is gelaai as gevolg van die feit dat die telling by 'n besondere syfer begin, wat lei tot 'n oordrywing van die som vir hierdie syfer, aangesien die bevolking by 'n sekere leeftyd gewoonlik groter is as by die naas hoër leeftyd.

Myers se metode skakel hierdie fout uit deur die telling beurteilungen by elkeen van die 10 syfers te laat begin en die gemiddelde van die resultate te neem. 'n „Index van voorkeur”, wat die som is van die absolute afwykings van 10 persent af en wat die mate van ophoping toon, volg ook uit die metode.

Die metode is verder ook gebruik om die doeltreffendste groepering van die gegewens vas te stel.(2) Dit kan bewerkstellig word deur die persentasies vir die 10 syfers op te tel in die vyf vyfjarige groeperings en op te let watter een die minste afwyk van 50 persent.

Die resultate verkry deur toepassing van die metode op die gegewens vir die blanke bevolking en sterftes word hieronder aangetoon. Die metode is aangewend vir beginleeftye 10 tot 19, en sommerings is gemaak tot leeftyd 99. Die syfers in deel (a) van die tabel toon die bevolking en sterftes by die verskillende syfers van leeftyd as persentasie van die betrokke totale, terwyl die syfers in deel (b) dieselfde persentasies gesommeer in groepe van vyf is.

TOETSING VAN (a) VOORKEUR VIR SEKERE SYFERS BY LEEFTYD EN (b) VIR DOELTREFFENDSTE GROEPERING DEUR MYERS SE METODE.

Leeftye eindigende op—	BLANKES.			
	MANLIK.		VROULIK.	
	Bevolking.	Sterftes.	Bevolking.	Sterftes.
(a) VOORKEUR.				
0.....	10.0	10.4	10.0	10.7
1.....	10.1	8.9	10.0	8.8
2.....	10.2	10.0	10.1	10.2
3.....	9.9	10.4	10.1	9.9
4.....	9.8	10.0	9.7	10.2
5.....	10.0	10.9	10.0	10.6
6.....	10.1	9.8	10.0	10.2
7.....	10.0	9.5	10.0	9.8
8.....	10.0	10.1	10.0	9.9
9.....	10.0	10.2	10.1	9.7
Indeks van voorkeur.....	0.7	3.8	0.6	3.8
(b) GROEPERING.				
1-5.....	50.0	50.1	49.9	49.7
2-6.....	50.0	51.0	49.9	51.1
3-7.....	49.8	50.5	49.8	50.8
4-8.....	49.8	50.2	49.7	50.8
5-9.....	50.0	50.4	50.1	50.3

(1) „Errors and bias in the reporting of census data” deur R. J. Myers, Transactions, Actuarial Society of America, Vol. 41, Deel 2, No. 104, Oktober-November 1940.

(2) United States Life Tables and Actuarial Tables, 1939-41, bladsy 121.

According to this test, the results for the five groupings do not appear to differ significantly, and any one of the groupings would be acceptable.

Finally, a test of quite a different nature was applied to the population and deaths separately. Myers' method (1) was used to determine whether any heaping at certain ages was present in the population and deaths.

An elementary method of showing the preference for certain digits in the data would be to sum the numbers for all ages ending in 0, all ages ending in 1, etc., up to ages ending in 9, and expressing these sums as percentages of the total involved. One might expect each of these sums to be 10 per cent. of the total in data where no heaping or other disturbing element is present, but it has been shown that this is not so as the results are biased owing to the fact that the count is started at a particular digit, leading to an over-statement of the sum for this digit, since normally the population at a certain age is larger than that at the next higher age.

Myers' method eliminates this bias by starting the count at each of the ten digits in turn and averaging the results. An „index of preference”, which is the sum of the absolute deviations from 10 per cent., and which shows the extent of the heaping present, also follows from the method.

The method has further been used to determine the most effective grouping of the data.(2) This may be achieved by adding the percentages for the ten digits in the five quinquennial groupings and observing which differs least from 50 per cent.

The results obtained by applying the method to the data for European population and deaths are shown below. The method was applied for starting ages 10 to 19 and summations were carried up to age 99. The figures in part (a) of the table show the population and deaths at the various digits of age as a percentage of the totals concerned, while the figures in section (b) are the same percentages summed in groups of five.

TESTING OF (a) PREFERENCE FOR CERTAIN DIGITS OF AGE AND OF (b) MOST EFFECTIVE GROUPING BY MEANS OF MYERS' METHOD.

Ages Ending in—	EUROPEANS.			
	MALE.		FEMALE.	
	Population.	Deaths.	Population.	Deaths.
(a) PREFERENCE.				
0.....	10.0	10.4	10.0	10.7
1.....	10.1	8.9	10.0	8.8
2.....	10.2	10.0	10.1	10.2
3.....	9.9	10.4	10.1	9.9
4.....	9.8	10.0	9.7	10.2
5.....	10.0	10.9	10.0	10.6
6.....	10.1	9.8	10.0	9.8
7.....	10.0	9.5	10.0	9.8
8.....	10.0	10.1	10.0	9.7
9.....	10.0	10.2	10.1	9.7
Index of Preference.....	0.7	3.8	0.6	3.8
(b) GROUPING.				
1-5.....	50.0	50.1	49.9	49.7
2-6.....	50.0	51.0	49.9	51.1
3-7.....	49.8	50.5	49.8	50.8
4-8.....	49.8	50.2	49.7	50.8
5-9.....	50.0	50.4	50.1	50.3

(1) „Errors and bias in the reporting of census data”, by R. J. Myers, Transactions, Actuarial Society of America, Vol. 41, Part 2, No. 104, October-November, 1940.

(2) United States Life Tables and Actuarial Tables, 1939-41, page 121.

Die indekse van voorkeur vir die bevolking is laag, maar in ieder geval dui hulle nie die gewone patroon van ophoping aan nie, soos duidelik blyk uit deel (a) van die tabel.

Die saak is anders vir sterftes, waar daar 'n geringe maar definitiewe ophoping van die gewone aard geopenbaar word. Syfers 0 en 5 toon die hoogste persentasies, terwyl 1 die laagste toon.

As die groepering nou in beskouing geneem word, blyk dat daar geen groot verskil tussen die vyf maniere van uitkies is sover dit die manlike en vroulike bevolkings betref nie. Vir manlike sterftes verskil die groeperings, uitgeslote 2-6, nie grootliks van mekaar nie, met 1-5 en 4-8 die beste. Die groepering 2-6 is relatief ondoeltreffend vergelyk met die ander. Vir vroulike sterftes sou die groeperings 1-5 en 5-9 verkieslik wees, met 3-7 en 4-8 volgende. Die groepering 2-6 is net soos in die geval van die manlikes relatief minderwaardig.

As die resultate van die toetse opgesom word, is die stand van sake soos volg wat betref bevolking en sterftes:—

Vergelyking van die sterftesyfers met die gemiddelde wys die groepering 1-5 of 4-8 aan vir manlik en 2-6 vir vroulik.

Vergelyking van verwagte met werklike sterftes toon geen groot verskil tussen die groeperings nie.

Myers se metode toon dat die groepering 2-6 minderwaardig is met betrekking tot die ander, met 1-5 en 4-8 die beste vir manlik en 1-5 en 5-9 die beste vir vroulik. Die ander twee groeperings vir manlik en vroulik is nie veel swakker as dié wat as die beste aangedui is nie.

Daar is uiteindelik besluit om die groepering 4-8 sowel vir manlik as vir vroulik te gebruik. Terwyl dit voorkom of die groepering 1-5 deur die toetse hierbo aangedui sou wees as die beste, is die verskil tussen 1-5 en 4-8 nie groot nie en is laasgenoemde groepering verkies, wat in ander lande en in die Unie vir vorige lewenstabiele gebruik is.

In die geval van bevolking en sterftes by Kleurlinge is alle Myers se metode gebruik vir toetsing, aangesien die ophoping in die gegewens die vernaamste oorweging hier was. Die uitslag van die toepassing van die metode verskyn hieronder.

TOETSING VAN (A) VOORKEUR VIR SEKERE SYFERS BY LEEFTYD EN (B) VIR DOELTREFFENDSTE GROEPERING DEUR MYERS SE METODE.

Leeftyd eindigende op—	KLEURLINGGRASSE.			
	MANLIK.		VROULIK.	
	Bevolking.	Sterftes.	Bevolking.	Sterftes.
(A) VOORKEUR.				
0.....	12.7	20.1	12.7	18.2
1.....	9.1	6.7	9.2	6.9
2.....	9.3	8.2	9.4	8.7
3.....	9.3	7.9	9.4	8.4
4.....	9.4	8.3	9.4	8.7
5.....	11.9	14.6	11.3	13.7
6.....	10.9	9.5	10.8	9.4
7.....	8.8	7.8	9.0	7.7
8.....	9.9	9.6	9.9	9.8
9.....	8.7	7.3	8.9	8.4
Indeks van voorkeur.....	11.0	29.4	9.6	23.9
(B) GROEPERING.				
1-5.....	49.0	45.7	48.7	46.4
2-6.....	50.8	48.5	50.3	49.0
3-7.....	50.3	48.0	49.9	48.0
4-8.....	50.9	49.8	50.4	49.4
5-9.....	50.2	48.8	49.9	49.1

The indices of preference for the population are low, but in any case do not indicate the usual pattern of heaping, as is evident from part (a) of the table.

The case is different for deaths, where a small but definite heaping of the usual nature is revealed. Digits 0 and 5 show the highest percentages, while digit 1 shows the lowest.

Considering now the grouping, it is evident that there is no great difference between the five ways of selection, as far as male and female populations are concerned. For male deaths, the groupings, excepting 2-6, do not differ greatly, with 1-5 and 4-8 being best. The grouping 2-6 is relatively ineffective compared with the others. For female deaths, the groupings 1-5 and 5-9 would be preferable, with 3-7 and 4-8 next. The grouping 2-6 is also, as in the case of males, relatively inferior.

Summarizing the results of these tests, the following is the position as regards population and deaths:—

Comparison of the mortality rates with the average indicates the grouping 1-5 or 4-8 for males and 2-6 for females.

Comparison of expected with actual deaths shows no great difference between the groupings.

Myers' method shows the grouping 2-6 to be inferior to the others, with 1-5 and 4-8 being best for males and 1-5 and 5-9 best for females. The other two groupings for males and females are not much inferior to those indicated as best.

It was finally decided to use the grouping 4-8 for both males and females. While the grouping 1-5 would appear to be indicated by the above tests as the best, the difference between 1-5 and 4-8 is not great and it was preferred to use the latter grouping which has been used in other countries and the Union for previous life tables.

In the case of the Coloured population and deaths, only Myers' method was used for testing, seeing that the main consideration here was the heaping present in the data. The results of the application of the method appear below.

TESTING OF (A) PREFERENCE FOR CERTAIN DIGITS OF AGE AND OF (B) MOST EFFECTIVE GROUPING BY MEANS OF MYERS' METHOD.

Ages Ending in—	COLOURED RACES.			
	MALE.		FEMALE.	
	Population.	Deaths.	Population.	Deaths.
(A) PREFERENCE.				
0.....	12.7	20.1	12.7	18.2
1.....	9.1	6.7	9.2	6.9
2.....	9.3	8.2	9.4	8.7
3.....	9.3	7.9	9.4	8.4
4.....	9.4	8.3	9.4	8.7
5.....	11.9	14.6	11.3	13.7
6.....	10.9	9.5	10.8	9.4
7.....	8.8	7.8	9.0	7.7
8.....	9.9	9.6	9.9	9.8
9.....	8.7	7.3	8.9	8.4
Index of Preference.....	11.0	29.4	9.6	23.9
(B) GROUPING.				
1-5.....	49.0	45.7	48.7	46.4
2-6.....	50.8	48.5	50.3	49.0
3-7.....	50.3	48.0	49.9	48.0
4-8.....	50.9	49.8	50.4	49.4
5-9.....	50.2	48.8	49.9	49.1

Die indekse van voorkeur wys taamlike ophoping, veral in die geval van sterftes, soos verwag is.

Met betrekking tot deel (B) van die tabel is dit duidelik dat die groepering 'n baie bevredigender uitwerking het vir bevolking as vir sterftes. Vir manlike sterftes is die groepering 4-8 aanmerklik beter as die ander, terwyl hierdie groepering ook die minste afwyk van 50 persent vir vroulike sterftes. Aangesien 'n dergelike groepering op die bevolking toegepas ook bevredigend is, is die groepering 4-8 gekies vir Kleurlinge.

Berekening van sterftesyfer q_x .—Daar die metodes verskil volgens die leeftye, is hierdie beskrywing verdeel in afdelings wat mekaar volg in die orde waarin die berekenings uitgevoer is.

Leeftyd 0.—Vir die berekening van die sterftesyfer vir die leeftyd onder 1 jaar, is gebruik gemaak van die formule wat die ware sterfte aangee, nl.—

$$q_x = 1 - \delta p_x \cdot a p_x$$

soos gegee deur H. H. Wolfenden⁽²⁾ waar $a p_x$ die kans is dat 'n persoon wat leeftyd x gedurende die kalenderjaar z bereik, gemiddeld tot die end van daardie kalenderjaar sal lewe en δp_x die kans dat 'n persoon in die jaar van leeftyd x by die begin van die kalenderjaar gemiddeld sal lewe tot die leeftyd $x+1$ gedurende daardie jaar.

Ons het verder dat

$$a p_x = \frac{P_x^{z+1}}{E_x^z} \text{ en } \delta p_x = \frac{E_x^{z+1}}{P_x^z}$$

waar P_x^z en P_x^{z+1} die bevolkings onderskeidelik by die begin en einde van die kalenderjaar z aandui en E_x^z en E_x^{z+1} dié wat onderskeidelik leeftyd x en $x+1$ gedurende die kalenderjaar z bereik.

Met invoering van die waardes δD_x^z , die sterftes wat plaasvind tussen die begin van die kalenderjaar en die bereiking van leeftyd $x+1$, en $a D_x^z$, die sterftes tussen bereiking van leeftyd x en die einde van die kalenderjaar, het ons die volgende verbande:—

$$\delta D_x^z = P_x^z - E_x^{z+1} \text{ en } a D_x^z = E_x^z - P_x^{z+1}$$

Vir die jaar van leeftyd 0 word die verbande:—

$$q_0 = 1 - \delta p_0 \cdot a p_0; \quad a p_0 = \frac{P_0^{z+1}}{E_0^z} \text{ en } \delta p_0 = \frac{E_1^z}{P_0^z};$$

$$\delta D_0^z = P_0^z - E_1^z; \quad a D_0^z = E_0^z - P_0^{z+1}$$

E_0^z stel geboortes gedurende die kalenderjaar z voor, en E_1^z , P_0^z en P_0^{z+1} kan gevolglik bereken word as waardes vir $a D_0^z$ en δD_0^z beskikbaar is.

Ongelukkig is hierdie waardes nie beskikbaar uit die Unie se statistiek van sterftes nie en moet hulle geskat word. Dit is egter moontlik om hulle noukeurig uit die beskikbare gegewens te benader, soos getoon deur Wolfenden, en wel soos volg:—

As ons 1946 as die jaar onder beskouing neem, is dit duidelik dat 'n kind wat onder die leeftyd van een dag gesterf het, gedurende die tydperk 31 Desember 1945 tot 31 Desember 1946, gebore moes gewees het, d.i. gedurende 'n tydperk van 366 dae. Dus word die getal gebore gedurende 1946 en gestorwe gedurende daardie jaar onder die leeftyd van een dag op $\frac{366}{365}$ van die totale sterftes onder een dag in 1946 geskat. Net so kan met die argument voortgegaan word vir sterftes van kinders van 1 tot 6 dae, 7 tot 13 dae oud, ens., tot by 9 tot 11 maande, en die verhoudings van die sterftes by hierdie leeftye word gevind as onderskeidelik $\frac{366}{365}$, $\frac{366}{364}$, ens., tot by $\frac{1}{2}$. As die gedeeltes van die sterftes vir hierdie leeftye gesommeer word, word die getal kinders gebore en gestorwe gedurende 1946, d.i. $a D_0^{1946}$, gevind.

$a D_0$ is vir die jare 1944 tot 1946 en 1945 tot 1947 bereken en $\delta D_0^{1945-47}$ verkry deur $a D_0^{1945-47}$ van die totaal sterftes onder een jaar gedurende 1945 tot 1947 af te trek.

(2) „Population Statistics and their Compilation”, deur H. H. Wolfenden, bladsy 76 (Actuarial Studies No. 3, Actuarial Society of America).

The indices of preference indicate considerable heaping, especially in the case of deaths, as was expected.

In regard to part (b) of the table, it is obvious that the grouping has a much more satisfactory effect in so far as the population is concerned than the deaths. For male deaths the grouping 4-8 is markedly better than the others, while for female deaths, this grouping also differs least from 50 per cent. As the population similarly grouped is also satisfactory, the grouping 4-8 was selected for Coloured.

Calculation of Mortality Rate q_x .—As the methods differed according to the ages concerned, this description is divided into sections, which follow each other in the order in which the calculations were carried out.

Age 0.—For the calculation of the mortality rate at the age of under one year, use was made of the formula giving the true mortality, namely—

$$q_x = 1 - \delta p_x \cdot a p_x$$

given by H. H. Wolfenden⁽²⁾, where $a p_x$ is the probability that a person attaining age x during the calendar year z will survive on the average to the end of that year and δp_x the probability that a person in the year of age x at the beginning of the calendar year z will survive on the average until attainment of age $x+1$ during that year.

We have further that

$$a p_x = \frac{P_x^{z+1}}{E_x^z} \text{ and } \delta p_x = \frac{E_x^{z+1}}{P_x^z}$$

where P_x^z and P_x^{z+1} denote the populations aged x at the beginning and end, respectively, of the calendar year z , and E_x^z and E_x^{z+1} denote those who attain age x and $x+1$, respectively, during the calendar year z .

Introducing now the values, δD_x^z , the deaths which occur between the beginning of the calendar year and the attainment of age $x+1$, and $a D_x^z$, the deaths between attainment of age x and the end of the calendar year, we have the following relations:

$$\delta D_x^z = P_x^z - E_x^{z+1} \text{ and } a D_x^z = E_x^z - P_x^{z+1}$$

For the year of age 0, the relations become—

$$q_0 = 1 - \delta p_0 \cdot a p_0; \quad a p_0 = \frac{P_0^{z+1}}{E_0^z} \text{ and } \delta p_0 = \frac{E_1^z}{P_0^z};$$

$$\delta D_0^z = P_0^z - E_1^z; \quad a D_0^z = E_0^z - P_0^{z+1}$$

E_0^z represents births during the calendar year z , and E_1^z , P_0^z and P_0^{z+1} can, therefore, be calculated if values for $a D_0^z$ and δD_0^z are available.

Unfortunately, these values are not available from the Union's statistics of deaths and they have to be estimated. It is, however, possible to estimate them closely from the available data, as shown by Wolfenden, with the following procedure:—

Taking 1946 as the year under consideration, it is clear that a child that died under the age of one day during 1946 must have been born during the period 31st December, 1945, to 31st December, 1946, i.e. during a period of 366 days. Therefore, the number born during 1946 and died during that year under the age of one day is estimated as $\frac{366}{365}$ of the total deaths under one day in 1946. Similarly, the argument can be proceeded with for the deaths of children aged 1 to 6 days, 7 to 13 days, etc., up to 9 to 11 months, and the proportions of the deaths at these ages are found as $\frac{366}{364}$, $\frac{366}{363}$, etc., up to $\frac{1}{2}$, respectively. Summing the proportions of the deaths for these ages, the number of children born and died during 1946, i.e. $a D_0^{1946}$, is obtained.

$a D_0$ was calculated for the years 1944 to 1946 and 1945 to 1947, and $\delta D_0^{1945-47}$ obtained by deducting $a D_0^{1945-47}$ from the total deaths under one year during 1945 to 1947.

(2) „Population Statistics and their Compilation”, by H. H. Wolfenden, page 76 (Actuarial Studies No. 3, Actuarial Society of America).

Leeftye 1 tot 5 jaar.—Aangesien die sterftes vir leeftye een jaar en daarbo nie beskikbaar is volgens gedeeltes van 'n jaar van leeftyd nie, was dit nie moontlik om die voorgaande metode op leeftye bo die eerste lewensjaar toe te pas nie. Die metode wat vir hierdie leeftye gebruik is, is dieselfde as wat gebruik is vir lewensstabelle No. 10 van Engeland en Wallis. Die formule gebruik vir die berekening van q_2 word as voorbeeld gegee—

$$q = \left\{ \begin{array}{l} \text{Sterftes} \\ \text{by} \\ \text{leeftyd 2} \\ \text{gedurende} \\ \text{1945-47} \end{array} \right\} \div \left\{ \begin{array}{l} \frac{1}{8}(B^{1942} + 3B^{1942} + 5B^{1942} + 7B^{1942}) \\ + \text{geboortes gedurende 1943 en 1944.} \\ + \frac{1}{8}(7B^{1945} + 5B^{1945} + 3B^{1945} + B^{1945}) \\ - \text{sterftes by leeftyd 0 gedurende 1943-45} \\ - \text{sterftes by leeftyd 1 gedurende 1944-46} \end{array} \right.$$

waar B^{1942} die geboortes gedurende die eerste kwartaal van 1942 voorstel, B^{1942} die geboortes gedurende die tweede kwartaal van 1942, ens.

Die sterftesyfers vir blankes tot by vier jaar en vir Kleurlinge tot by vyf jaar is volgens hierdie formule bereken. Volkstrek is in aanmerking geneem.

Leeftye 6 tot 86.—Soos hierbo genoem, waar die algemene metode wat gebruik is in hooftrekke aangedui is, is basissterftesyfers op vyfjaarafstande bereken en die waardes tussenin deur interpolasie verkry.

In die besonder was die prosedure soos volg: Uit die bevolking en sterftes in vyfjarige leeftydsgroepe 4-8, 9-13, ens., gegroepeer, is die bevolking en sterftes by die middelleeftye 11, 16, ens., verkry deur middel van King se formule

$$U_{x+2} = \cdot 2w_x - \cdot 008 \Delta^2 w_{x-5}$$

waar U_{x+2} die bevolking of sterftes by leeftyd $x+2$ en w_x die som van vyf waardes van die bevolking of sterftes vir leeftye x tot $x+4$ is. Die sentrale sterftesyfer, m_x , is toe bereken en q_x verkry deur middel van die formule

$$q_x = \frac{2m_x}{2+m_x}$$

waaruit basiswaardes by leeftye 11, 16, ens., tot by 86 verkry is.

Ten einde nou die waardes tussen hierdie leeftye te bereken, is interpolasieformules gebruik, en daar die metodes vir 21 en daarbo verskil het van dié vir onder 21, waar die kromme so snel verander dat spesiale metodes nodig is om dit behoorlik voor te stel, sal hulle afsonderlik beskryf word.

Leeftye 21 tot 86.—Daar is besluit om een van die nuwere interpolasieformules te gebruik wat die algemene karakteristieke van die gegewens bewaar en tegelyk 'n graderende uitwerking op die basiswaardes uitoeën.

Die basiswaardes is miskien nie sonder foute nie as gevolg van onnoukeurighede in die oorspronklike gegewens, sommige waarvan reeds genoem is, en geëskied gevolglik nie die sterftewet wat daaraan ten grondslag lê, presies weer nie, wat hierdie berekenings ten doel het om so noukeurig moontlik te benader. Derhalwe lyk dit nie onredelik om 'n geringe graderende proses op hulle toe te pas om sodoende 'n gelykmatiger verloop van die sterftesyfers te bewerkstellig nie.

Die formule wat gekies is, is Jenkins' (4) se gewysigde oskulerende interpolasieformule van die vyfde verskil. Die woord „gewysigde” dui aan dat, alhoewel die formule die gewone versie van 'n vloeiende aansluiting van die geïnterpoleerde waardes by die vyfjaaropname nakom, die punte van aansluiting nie presies ooreenkom met die basiswaardes soos dit die geval is by die gewone oskulerende interpolasieformules nie. Dit lei daartoe dat 'n vloeiender kromme opgelewer word, wat egter die tendens van die gegewens behou. Jenkins se formule in Everett se vorm met Sheppard se middelverskil-notasie is soos volg:—

$$y_x = x u_1 + \frac{1}{6} x (x^2 - 1) \delta^2 u_1 - \frac{1}{36} x^3 \delta^4 u_1 + y u_0 + \frac{1}{6} y (y^2 - 1) \delta^2 u_0 - \frac{1}{36} y^3 \delta^4 u_0$$

waar $y = 1 - x$.

(4) W. A. Jenkins „Graduation Based on a Modification of Osculatory Interpolation”, Transactions, Actuarial Society of America, Deel 28, Afd. 2, No. 78, Oktober 1927.

Ages 1 to 5 Years.—As the deaths for ages one year and above are not available by fractions of a year of age, it was not possible to apply the foregoing method to ages above the first year of life. The method employed for these ages is the same as that used for life tables No. 10 of England and Wales. The formula used for the calculation of q_2 is given as an example—

$$q = \left\{ \begin{array}{l} \text{Deaths} \\ \text{at} \\ \text{age 2} \\ \text{during} \\ \text{1945-47} \end{array} \right\} \div \left\{ \begin{array}{l} \frac{1}{8}(B^{1942} + 3B^{1942} + 5B^{1942} + 7B^{1942}) \\ + \text{births during 1943 and 1944} \\ + \frac{1}{8}(7B^{1945} + 5B^{1945} + 3B^{1945} + B^{1945}) \\ - \text{deaths aged 0 during 1943-45} \\ - \text{deaths aged 1 during 1944-46,} \end{array} \right.$$

where B^{1942} represents births during the first quarter of 1942, B^{1942} births during the second quarter of 1942, etc.

The mortality rates for Europeans up to four years, and for Coloured up to five years, were calculated by means of this formula. Allowance was made for migration.

Ages 6 to 86.—As mentioned above, in the broad outline of the general method employed, pivotal rates of mortality were calculated at five-yearly intervals and the values between obtained by interpolation.

Specifically, the procedure was as follows: From the population and deaths grouped in quinquennial age groups 4-8, 9-13, etc., the population and deaths at the central ages 11, 16, etc., were obtained by means of King's formula

$$U_{x+2} = \cdot 2w_x - \cdot 008 \Delta^2 w_{x-5}$$

where U_{x+2} is the population or deaths at age $x+2$ and w_x is the sum of five values of the population or deaths for ages x to $x+4$. The central death rate, m_x , was then calculated and q_x obtained by means of the formula

$$q_x = \frac{2m_x}{2+m_x}$$

giving pivotal values at ages 11, 16, etc., up to 86.

In order now to calculate the values between these ages, interpolation formulae were used and as the methods for 21 and above differed from those below 21, where the curve changes so rapidly that special methods are necessary to represent it properly, these will be separately described.

Ages 21 to 86.—It was decided to use one of the newer interpolation formulae which, while preserving the general characteristics of the data, exercise a graduating effect on the pivotal values.

The pivotal values may not be quite free from error due to imperfections in the original data, some of which have been mentioned, and may as a result not accurately represent the underlying law of mortality, which these calculations are intended to approximate as closely as possible. It, therefore, does not appear unreasonable to apply a slight graduating process to them, in order to secure a more uniform progression of the mortality rates.

The formula selected was Jenkins' (4) fifth-difference modified osculatory interpolation formula. The word “modified” indicates that although the formula satisfies the usual requirement of securing a smooth junction of the interpolated results at the five-yearly points, the points of junction do not exactly correspond with the pivotal values, as is the case with the usual osculatory interpolation formulae. This results in a smoother curve being produced, which, however, preserves the trend of the data. Jenkins' formula in Everett's form with Sheppard's central difference notation is as follows:—

$$y_x = x u_1 + \frac{1}{6} x (x^2 - 1) \delta^2 u_1 - \frac{1}{36} x^3 \delta^4 u_1 + y u_0 + \frac{1}{6} y (y^2 - 1) \delta^2 u_0 - \frac{1}{36} y^3 \delta^4 u_0$$

where $y = 1 - x$.

(4) W. A. Jenkins „Graduation Based on a Modification of Osculatory Interpolation”, Transactions, Actuarial Society of America, Vol. 28, Part 2, No. 78, October, 1927.

Daar kan vermeld word dat Jenkins se formule gebruik is vir interpolasie van leeftyd 32 af opwaarts by die opstelling van die lewentabelle vir die Verenigde State van Amerika vir 1939-41.

Dit was moontlik om 'n vergelyking te tref tussen die graduasie deur middel van Jenkins se formule van leeftyd 21 af tot 86 en die resultaat verkry deur toepassing van een van die gewone oskulerende interpolasieformules, aangesien die blanke sterftesyfers deur middel van een van laasgenoemde formules gegradeer is met die doel om die verskillende groeperings te toets soos vroeër beskryf. Die oskulerende interpolasieformule van Karup-King van die derde verskil is gebruik, nl.

$$u_x = xu_1 + \frac{x^2(x-1)}{2} \delta^2 u_1 + yu_0 + \frac{y^2(y-1)}{2} \delta^2 u_0$$

wat vir vorige Suid-Afrikaanse lewentabelle gebruik is. In die tabel op bladsye xi, xii word die waardes van q_x soos verkry deur middel van die twee formules, aangetoon, tesame met die verwagte sterftes vergelyk met die werklike sterftes.

Die verskille tussen die verwagte sterftes volgens die twee metodes verkry, is onbeduidend, maar betreffende die sterftesyfers, is die Jenkinsformule ontwerp om 'n vloeiender kromme as die formule van Karup-King te gee, wat blyk uit die verskille in die ordinate wanneer hulle waardes tot vyf desimale bereken word. Natuurlik kan so 'n mate van noukeurigheid nie beweer word vir sterftesyfers wat direk uit die oorspronklike gegewens bereken word nie, maar die gegradeerde sterftesyfers van die lewentabel is bereken om 'n vloeiende verloop te hê en as sodanig kan hulle tot vyf desimale korrek aangegee word.

Leeftye 5 tot 20.—Die gaping tussen leeftye 4 tot 21 vir blankes en 5 tot 21 vir Kleurlinge is oorbrug volgens die manier aan die hand gedoen deur Wolfenden⁽²⁾, deur interpolasie tussen die basiswaardes by leeftye 21, 16 en 11 en 'n waarde spesiaal bereken vir leeftyd 6. Die waarde vir 6 is bereken om die noukeurigste ooreenkoms tussen verwagte en werklike sterftes om en by leeftyd 6 te bewerkstellig.

Die ruwe sterftesyfers het geblyk die beste waardes vir q_6 te wees vir manlike blankes en vroulike Kleurlinge, terwyl q_6 vir vroulike blankes afgelei is uit bevolking en sterftes by leeftyd 6 bereken volgens die formule

$$U_6 = \cdot 2w_4 - \cdot 008 \Delta^2 w_4$$

waar w_4 die som is van vyf waardes van die bevolking en sterftes van leeftyd 4 af. Vir manlike Kleurlinge was dit nodig om die gemiddelde van 'n waarde bereken soos hierbo vir vroulike blankes en die ruwe syfer te neem.

Dit was ook nodig om die basiswaarde by leeftyd 16 vir manlike blankes te wysig.

Die interpolasie tussen leeftye 11 en 16 is uitgevoer deur middel van bogenoemde oskulerende interpolasieformule van Karup-King in die derde verskil.

Ten einde te verseker dat die geïnterpoleerde waardes tussen 16 en 21 vloeiend aansluit by die waardes vir 21 en daarbo gevind deur Jenkins se formule en die tussen 16 en 11 bereken deur die formule van Karup-King, is die interpolasie uitgevoer deur middel van 'n derdegraadskromme wat deur die basiswaardes by 16 en 21 gegaan het en dieselfde waardes vir die eerste afgeleides by hierdie leeftye gehad het as die aanliggende krommes van Jenkins en Karup-King.

Vir die interpolasie onder 11 jaar is 'n derdegraadskromme bereken wat deur die punte by leeftye 11, 6 en 4 in die geval van blankes en 11, 6 en 5 in die geval van Kleurlinge gegaan het en wat dieselfde waarde vir die eerste afgeleide by leeftyd 11 as die aanliggende kromme van Karup-King gehad het. Hierdie interpolasie het terselfdertyd die waarde van q_x vir blankes by leeftyd 5 jaar gegee.

Die interpolasies deur middel van die derdegraadskrommes soos hierbo beskryf, is vereenvoudig deur dieselfde metode te volg soos gebruik vir die opstelling van die Verenigde State se lewens- en aktuariële tabelle, 1939-1941 (bl. 136). Soortgelyke interpolasies is uitgevoer deur die derdegraadskrommes as spesiale voortsettings van Karup-King se formule te beskou.

⁽²⁾ Op. cit. bls. 116

It may be mentioned that Jenkins' formula was used for interpolation from age 32 upwards in the construction of the 1939-41 life tables for the United States of America.

It was possible to make a comparison of the graduation from age 21 to age 86 by Jenkins' formula with the result given by the application of one of the ordinary osculatory interpolation formulae, as the European mortality rates had been graduated by means of one of the latter formulae for the purpose of testing the various groupings as described earlier. The formula used was the Karup-King third difference osculatory interpolation formula

$$u_x = xu_1 + \frac{x^2(x-1)}{2} \delta^2 u_1 + yu_0 + \frac{y^2(y-1)}{2} \delta^2 u_0$$

which has been used for previous South African Life Tables. The values of q_x as obtained by the two formulae are shown, as well as the expected deaths compared with the actual deaths, in the table on pages xi, xii.

The differences between the expected deaths obtained by the two methods are negligible, but regarding the mortality rates, the Jenkins formula is designed to give a smoother curve than the Karup-King formula and this appears in the differences between the ordinates when their values are calculated to five decimal places. Of course, no such degree of accuracy can be claimed for mortality rates calculated directly from the original data, but the graduated mortality rates of the life table are calculated to form a smooth progression and as such can be given correct to five decimal places.

Ages 5 to 20.—The gap between ages 4 to 21 for Europeans and 5 to 21 for Coloured was bridged, along the lines suggested by Wolfenden⁽²⁾, by means of interpolation between the pivotal values at ages 21, 16 and 11 and a value specially calculated for age 6. The value for age 6 was so calculated as to provide the closest correspondence between expected and actual deaths around age 6.

The best values to use for q_6 for European males and Coloured females were found to be the crude mortality rates, while for European females q_6 was derived from population and death figures at age 6 calculated by means of the formula

$$U_6 = \cdot 2w_4 - \cdot 008 \Delta^2 w_4$$

where w_4 is the sum of five values of the population or deaths from age 4. For Coloured males it was necessary to take the average of a value calculated as above for European females and the crude rate.

It was also necessary to make an adjustment to the pivotal value at age 16 for European males.

The interpolation between age 11 and 16 was carried out by means of the Karup-King third difference osculatory interpolation formula mentioned above.

In order to ensure that the interpolated values between 16 and 21 would join smoothly with the values at 21 and above obtained by Jenkins' formula and those between 16 and 11 calculated by the Karup-King formula, the interpolation was effected by means of a third degree curve which passed through the pivotal values at 16 and 21 and had the same values for the first derivatives at these ages as the adjoining Karup-King and Jenkins curves.

For the interpolation below 11 years, a third degree curve was calculated which passed through the points at ages 11, 6 and 4 in the case of Europeans and 11, 6 and 5 in the case of the Coloureds and which had the same value for the first derivative at age 11 as the adjoining Karup-King curve. This interpolation at the same time provided the value of q_x at age 5 for Europeans.

The interpolations by means of the third degree curves as described above were simplified by following the same method as was used in the construction of the United States Life Tables and Actuarial Tables, 1939-1941 (page 136). Similar interpolations were carried out by regarding the third degree curves as special continuations of the Karup-King formula. By modifying

⁽²⁾ Op. cit. p. 116

GRADUASIE MET JENKINS SE FORMULE VERGELYK MET GRADUASIE MET KARUP-KING SE FORMULE.

GRADUATION BY JENKINS' FORMULA COMPARED WITH GRADUATION BY KARUP-KING FORMULA.

BLANKES.

EUROPEANS.

MANLIK.—MALE.

Leeftyd. Age.	q_x .		Verwagte sterftes. Expected Deaths.		Werklike sterftes. Actual Deaths.	Verskille.—Differences.			
	Jenkins.	Karup-King.	Jenkins.	Karup-King.		Jenkins.		Karup-King.	
						+	-	+	-
21.....	·00210	·00219	43	44	44	—	1	0	—
22.....	·00215	·00221	42	43	39	—	—	—	—
23.....	·00215	·00218	42	42	47	3	—	4	—
24.....	·00213	·00211	42	42	37	—	5	—	5
25.....	·00211	·00206	42	41	43	5	—	5	—
26.....	·00211	·00206	40	39	44	—	1	—	2
27.....	·00214	·00211	40	40	34	—	4	—	5
28.....	·00221	·00219	41	41	43	6	—	6	—
29.....	·00230	·00230	43	43	40	—	2	—	2
30.....	·00241	·00242	43	43	48	3	—	3	—
31.....	·00253	·00255	48	49	49	—	5	—	5
32.....	·00269	·00267	51	52	49	2	—	0	—
33.....	·00282	·00283	54	54	54	—	1	—	—
34.....	·00299	·00299	57	57	65	0	—	0	—
35.....	·00318	·00318	61	61	59	—	8	—	8
36.....	·00339	·00340	63	63	54	2	—	2	—
37.....	·00363	·00364	65	65	67	—	9	—	—
38.....	·00390	·00390	71	71	73	—	2	—	2
39.....	·00420	·00420	75	75	78	—	2	—	2
40.....	·00456	·00454	80	80	82	—	3	—	3
41.....	·00496	·00495	82	81	74	—	2	—	2
42.....	·00542	·00542	89	89	87	8	—	7	—
43.....	·00594	·00594	79	79	84	2	—	2	—
44.....	·00653	·00652	73	72	84	—	5	—	5
45.....	·00719	·00717	81	81	92	1	—	0	—
46.....	·00791	·00789	81	81	92	—	11	—	11
47.....	·00872	·00870	92	92	85	7	—	7	—
48.....	·00959	·00959	99	99	95	4	—	4	—
49.....	·01053	·01054	109	108	104	5	—	4	—
50.....	·01152	·01155	120	120	119	1	—	1	—
51.....	·01256	·01261	131	132	135	—	4	—	3
52.....	·01364	·01369	135	136	127	8	—	9	—
53.....	·01478	·01480	151	151	158	—	7	—	7
54.....	·01599	·01598	158	158	159	—	1	—	1
55.....	·01728	·01726	159	159	166	—	7	—	7
56.....	·01867	·01866	167	166	171	—	4	—	5
57.....	·02017	·02018	173	172	167	6	—	5	—
58.....	·02179	·02179	187	187	174	13	—	13	—
59.....	·02353	·02352	191	191	197	—	6	—	6
60.....	·02541	·02538	195	195	210	—	15	—	15
61.....	·02742	·02740	201	201	224	—	23	—	23
62.....	·02957	·02956	208	208	176	32	—	32	—
63.....	·03186	·03187	223	223	211	12	—	12	—
64.....	·03426	·03431	242	242	247	—	5	—	5
65.....	·03677	·03690	251	251	240	11	—	11	—
66.....	·03938	·03964	270	271	303	—	33	—	32
67.....	·04209	·04237	281	282	256	25	—	26	—
68.....	·04499	·04509	268	270	258	10	—	12	—
69.....	·04817	·04804	266	266	290	—	24	—	24
70.....	·05174	·05142	262	261	269	—	7	—	8
71.....	·05581	·05542	277	275	277	0	—	—	2
72.....	·06044	·06023	271	269	239	32	—	30	—
73.....	·06559	·06555	269	268	282	—	13	—	14
74.....	·07120	·07135	277	277	277	1	—	0	—
75.....	·07719	·07759	261	262	280	—	19	—	18
76.....	·08348	·08419	260	261	279	—	19	—	18
77.....	·09007	·09078	250	252	253	—	3	—	1
78.....	·09720	·09742	230	232	212	18	—	20	—
79.....	·10517	·10464	217	217	208	9	—	9	—
80.....	·11430	·11300	206	205	211	—	5	—	6
81.....	·12487	·12305	188	185	211	—	3	—	6
82.....	·13705	·13546	178	175	191	19	—	16	—
83.....	·15039	·14988	162	160	158	4	—	2	—
84.....	·16428	·16553	152	152	153	—	1	—	1
85.....	·17811	·18062	138	139	128	10	—	11	—
86.....	·19130	·19488	117	118	122	—	5	—	4
			97	99	100	—	3	—	1
TOTAAL/TOTAL.....			9,537	9,534	9,528	268	259	265	259

GRADUASIE MET JENKINS SE FORMULE VERGELYK MET GRADUASIE MET KARUP-KING SE FORMULE. GRADUATION BY JENKINS' FORMULA COMPARED WITH GRADUATION BY KARUP-KING FORMULA.

BLANKES.

EUROPEANS.

Leeftyd. Age.	q_x		VERWAGTE STERFTES. EXPECTED DEATHS.		Werklike sterftes. Actual Deaths.	VERSKILLE.—DIFFERENCES.			
	Jenkins.	Karup-King.	Jenkins.	Karup-King.		Jenkins.		Karup-King.	
						+	-	+	-
21	-00133	-00128	26	25	32	—	6	—	7
22	-00143	-00139	27	27	26	1	—	1	—
23	-00154	-00153	30	30	24	6	—	6	—
24	-00166	-00168	33	33	33	0	—	0	—
25	-00177	-00182	34	35	31	3	—	4	—
26	-00186	-00192	35	36	43	—	8	—	7
27	-00192	-00197	36	37	35	1	—	2	—
28	-00196	-00198	36	36	39	—	3	—	3
29	-00199	-00198	37	37	36	1	—	1	—
30	-00204	-00200	36	35	40	—	4	—	5
31	-00211	-00206	40	39	39	1	—	0	—
32	-00221	-00218	42	42	45	—	3	—	3
33	-00234	-00233	45	45	35	10	—	10	—
34	-00250	-00251	46	47	45	1	—	2	—
35	-00268	-00270	50	48	48	2	—	2	—
36	-00286	-00289	51	52	57	0	6	—	5
37	-00306	-00308	54	55	54	—	—	1	—
38	-00326	-00327	59	59	60	—	1	—	—
39	-00348	-00347	62	62	61	1	—	1	—
40	-00373	-00371	63	63	66	—	3	—	3
41	-00400	-00398	64	64	56	8	—	8	—
42	-00432	-00431	68	68	75	—	—	—	—
43	-00467	-00466	60	60	61	—	2	—	2
44	-00506	-00505	56	56	58	—	2	—	7
45	-00548	-00548	64	64	71	—	7	—	1
46	-00593	-00593	73	73	74	—	1	—	—
47	-00642	-00642	76	76	70	6	—	6	—
48	-00694	-00694	82	82	76	6	—	6	—
49	-00748	-00749	90	90	92	—	2	—	2
50	-00805	-00806	96	96	108	—	12	—	12
51	-00864	-00867	96	96	80	16	—	16	—
52	-00926	-00928	103	103	108	—	5	—	5
53	-00990	-00992	108	108	105	3	—	3	—
54	-01057	-01058	108	108	110	—	11	—	11
55	-01127	-01130	112	112	110	2	—	2	—
56	-01201	-01208	116	116	117	—	1	—	—
57	-01279	-01287	124	125	119	5	—	6	—
58	-01364	-01368	125	125	123	—	2	—	—
59	-01459	-01456	126	126	122	4	—	4	—
60	-01568	-01559	130	129	129	1	—	0	—
61	-01692	-01685	134	133	121	13	—	12	—
62	-01836	-01833	144	143	150	—	6	—	7
63	-01998	-01998	150	150	157	—	7	—	7
64	-02177	-02181	153	153	156	—	3	—	3
65	-02372	-02382	166	167	183	—	17	—	16
66	-02582	-02603	171	173	170	1	—	3	—
67	-02808	-02831	165	166	154	11	—	12	—
68	-03057	-03065	171	171	173	—	2	—	—
69	-03339	-03324	178	177	177	1	—	0	—
70	-03663	-03627	187	185	204	—	17	—	19
71	-04039	-03994	181	179	156	25	—	23	—
72	-04474	-04438	190	189	188	2	—	1	—
73	-04956	-04945	200	200	199	1	—	—	9
74	-05473	-05497	192	193	202	—	10	—	9
75	-06011	-06073	203	205	214	—	11	—	—
76	-06556	-06652	199	199	202	13	—	16	—
77	-07103	-07193	189	192	199	—	10	—	7
78	-07677	-07709	181	179	199	2	—	2	—
79	-08308	-08263	167	166	158	9	—	8	—
80	-09028	-08918	166	164	176	—	10	—	12
81	-09871	-09734	146	144	140	6	—	4	—
82	-10857	-10750	144	142	144	0	—	—	2
83	-11969	-11925	144	143	135	9	—	8	—
84	-13177	-13201	121	121	132	—	11	—	11
85	-14453	-14524	120	121	120	0	—	1	—
86	-15770	-15838	108	108	100	8	—	8	—
TOTAL—TOTAAL			6,989	6,991	6,995	181	187	182	186

Deur een term van Karup-King se formule in Everett se vorm te wysig, word die vereiste formule wat die derdegraadskromme weergee, gevind.
Die wysiging het daarin bestaan dat die waardes van $\delta^2 u_0$ en $\delta^2 u_1$, in die formule

$$u_x = xu_1 + \frac{x^2(x-1)}{2} \delta^2 u_1 + yu_0 + \frac{y^2(y-1)}{2} \delta^2 u_0$$

vervang is deur waardes spesiaal bereken vir die interpolasie onderskeidelik tussen 6 en 11 en tussen 16 en 21. Die formule so gewysig het voldoen aan die voorwaardes wat vir die twee derdegraadskrommes gestel is.

Leeftye 87 en daarbo.—Aansienlike moeilikheid is ondervind met die voltooiing van die tabel by die hoë leeftye bo 86.

In die geval van die blankes is 'n Makehamkromme eers by die waardes by leeftye 81, 86 en 91 aangepas. Die waardes van q_x wat verkry is, het goed ooreengekom met die waargenome gegewens volgens die gewone toets om verwagte met werklike sterftes te vergelyk, maar die waardes was so laag dat die tabel uitgerek is na hoë leeftye en 'n aansienlike getal oorblywendes by leeftye 100 en bo getoon het.

Verdere Makehamkrommes op die grongslag van ander leeftye is bereken, maar geeneen was bevredigend nie. Na verskeie proefnemings is gevind dat 'n Makehamkromme deur die punte by leeftye 76, 81 en 86 waardes van q_x oplewer wat taamlik hoog voorkom, maar wat in verbinding met die uitslag gegee deur die kromme gebaseer op leeftye 81, 86 en 91 aanneemlike waardes van q_x oplewer, wat die tabel nie oormatig uitrek nie en wat verwagte sterftes bo die leeftyd van 90 oplewer wat nie die werklike sterftes te veel oortref nie.

Die formule vir die Makehamkromme is—

$$p_x = sg^{c^x(c-1)}$$

or

$$\log p_x = \log s + c^x(c-1) \log g$$

en die berekende konstantes was soos volg:—

BLANKE MANLIKES.

	Leeftye 76, 81, 86.	Leeftye 81, 86, 91.
log S:	1·9904893	-0572019
C:	1·1130152	1·0535133
log g:	1·9999267	1·9684580

BLANKE VROULIKES.

log S:	1·9884928	-0541472
C:	1·1338711	1·0532413
log g:	1·9999904	1·9720837

Die uiteindelijke waardes van p_x is verkry deur die meetkundige gemiddelde van die waardes opgelewer deur die twee stelle konstantes te bereken.

Geen gepaste Makehamkromme kon gevind word om die tabel vir gemengde en ander Kleurlingrasse te voltooi nie. Verskeie krommes is bereken, maar hoewel hulle goed ooreengestem het met die gegewens volgens die gewone toets, was die waardes van q_x in alle gevalle so laag by die hoë leeftye dat die oorblywendes by leeftyd 100 en daarbo aansienlik was. In hierdie geval is die gewone toets van aanpassing, d.w.s. die vergelyking van verwagte met werklike sterftes, nie betroubaar geag nie, as gevolg van die klaarblykbare leeftydfoute in die gegewens en die moontlike oordrywing van die bevolking by die hoë leeftye.

Uiteindelik is besluit om die tabel af te sluit deur willekeurige beperkende leeftye aan te neem, soos gedoen is in die geval van die vorige lewens tabel. Die waardes van q_x vir manlikes en vroulikes is as 1 geneem by leeftye van onderskeidelik 105 en 106, wat nagenoeg ooreenstem met die waardes voorheen aangeneem. Die interpolasie is uitgevoer deur middel van die Newton-Sheppardformule.

one term in the Karup-King formula as it appears in Everett's form, the necessary formula reproducing the third degree curve was obtained.

The modification consisted in replacing the values of $\delta^2 u_0$ and $\delta^2 u_1$, in the formula

$$u_x = xu_1 + \frac{x^2(x-1)}{2} \delta^2 u_1 + yu_0 + \frac{y^2(y-1)}{2} \delta^2 u_0$$

by values specially calculated for the interpolation between 6 and 11, and between 16 and 21, respectively. The formula so modified fulfilled the conditions laid down for the two third degree curves.

Ages 87 and Upwards.—Considerable difficulty was experienced in completing the table at the higher ages above 86.

In the case of the Europeans, a Makeham curve was first fitted to the values at ages 81, 86 and 91. The values of q_x obtained agreed very well with the observed data as far as the usual test of comparing expected with actual deaths was concerned, but the values were so low as to extend the table to high ages and show a considerable number of survivors at ages 100 and over.

Further Makeham curves were calculated on the basis of other ages, but none was satisfactory. After various trials, it was found that a Makeham curve through the points at ages 76, 81 and 86 gave values of q_x which appeared rather high, but which when combined with the result given by the curve based on ages 81, 86 and 96, gave acceptable values of q_x , which did not extend the table unduly and resulted in expected deaths above the age of about 90 which were not too much in excess of actual deaths.

The formula for the Makeham curve is

$$p_x = sg^{c^x(c-1)}$$

or

$$\log p_x = \log s + c^x(c-1) \log g$$

and the values of the constants calculated were as follows:—

EUROPEAN MALES.

	Ages 76, 81, 86.	Ages 81, 86, 91.
log S:	1·9904893	-0572019
C:	1·1130152	1·0535133
log g:	1·9999267	1·9684580

EUROPEAN FEMALES.

log S:	1·9884928	-0541472
C:	1·1338711	1·0532413
log g:	1·9999904	1·9720837

The eventual values of p_x were obtained by calculating the geometric average of the values given by the two sets of constants.

For Mixed and Other Coloured no suitable Makeham curve could be found with which to complete the table. Various curves were calculated but while they gave good correspondence with the data according to the usual test, the values of q_x were so low in all cases at the high ages that the survivors at age 100 and over were very considerable. In this case the usual test of goodness of fit, that is, comparing expected deaths with actual deaths, was not considered to be reliable, owing to the evident errors of age in the data, and the probable over-statement of the population and deaths at the high ages.

In the end it was decided to bring the table to a close by assuming arbitrary limiting ages, as was done in the case of the previous life table. The value of q_x for males and females was assumed to be 1 at age 105 and 106, respectively, which corresponds approximately with the values assumed previously. The interpolation was effected by means of the Newton-Sheppard formula.

VERGELYKING VAN VERWAGTE MET WERKLIKE STERFTES.

Onderstaande tabel tref 'n vergelyking tussen verwagte sterftes op die grondslag van die berekende sterftesyfers en gemiddelde jaarlikse sterftes vir 1945-47 van leeftyd 4 af.

VERGELYKING VAN VERWAGTE MET WERKLIKE STERFTES.

COMPARISON OF EXPECTED WITH ACTUAL DEATHS.

The table below makes a comparison between expected deaths on the basis of the calculated mortality rates, and average annual deaths for 1945-47, from age 4 upwards.

COMPARISON OF EXPECTED WITH ACTUAL DEATHS.

Leeftidsgroep. Age Group.	MANLIK.—MALE.					VROULIK.—FEMALE.				
	Verwagte Sterftes. Expected Deaths.	Werklike Sterftes. Actual Deaths.	Verwagte sterftes min werklike sterftes. Expected Deaths minus Actual Deaths.		Totale afwyking. Accumulated Deviation.	Verwagte Sterftes. Expected Deaths.	Werklike Sterftes. Actual Deaths.	Verwagte sterftes min werklike sterftes. Expected Deaths minus Actual Deaths.		Totale afwyking. Accumulated Deviation.
			Positief. Positive.	Negatief. Negative.				Positief. Positive.	Negatief. Negative.	
BLANKE.—EUROPEAN.										
4-8.....	180	184	—	4	—4	137	141	—	4	—4
9-13.....	106	102	4	—	0	83	81	2	—	—2
14-18.....	154	147	7	—	+7	111	112	—	—	—1
19-23.....	206	215	—	9	—9	132	127	5	—	+5
24-28.....	205	200	5	—	+5	174	181	—	7	—7
29-33.....	239	241	—	2	—2	200	195	5	—	+5
34-38.....	317	318	—	1	—1	260	264	—	4	—4
39-43.....	405	405	0	—	0	317	318	—	1	—1
44-48.....	454	448	6	—	+6	351	348	3	—	+3
49-53.....	695	698	—	3	—3	493	494	—	1	—1
54-58.....	877	874	3	—	+3	585	588	—	3	—3
59-63.....	1,069	1,067	2	—	+2	684	680	4	—	+4
64-68.....	1,336	1,347	—	11	—11	826	836	—	10	—10
69-73.....	1,357	1,344	13	—	+13	936	924	12	—	+12
74-78.....	1,218	1,232	—	14	—14	964	980	—	16	—16
79-83.....	886	872	14	—	+14	767	753	14	—	+14
84-88.....	493	504	—	11	—11	498	503	—	5	—5
89-93.....	190	173	17	—	+17	221	204	17	—	+17
94-98.....	39	37	2	—	+2	65	51	14	—	+14
99+.....	12	5	7	—	+7	15	10	5	—	+5
TOTAAL/TOTAL.	10,438	10,413	80	55	+25	7,819	7,790	81	52	+29

KLEURLINGRASSE.—COLOURED RACES.

4-8.....	384	382	2	—	+2	391	395	—	4	—4
9-13.....	200	202	—	2	—2	210	206	4	—	+4
14-18.....	271	270	1	—	+1	353	356	—	3	—3
19-23.....	375	387	—	12	—12	447	455	—	8	—8
24-28.....	396	392	4	—	+4	421	421	0	—	0
29-33.....	368	368	0	—	0	352	347	5	—	+5
34-38.....	389	389	0	—	0	332	336	—	4	—4
39-43.....	388	393	—	5	—5	287	290	—	3	—3
44-48.....	408	406	2	—	+2	269	261	8	—	+8
49-53.....	378	385	—	7	—7	264	276	—	12	—12
54-58.....	371	367	4	—	+4	252	245	7	—	+7
59-63.....	417	426	—	9	—9	306	312	—	6	—6
64-68.....	440	436	4	—	+4	330	329	1	—	+1
69-73.....	362	367	—	5	—5	295	299	—	4	—4
74-78.....	290	290	0	—	0	244	243	1	—	+1
79-83.....	206	207	—	1	—1	193	193	0	—	0
84-88.....	125	125	0	—	0	127	121	6	—	+6
89-93.....	82	69	13	—	+13	63	33	30	—	+30
94-98.....	54	29	25	—	+25	49	34	15	—	+15
99+.....	64	26	38	—	+38	—	—	—	—	—
TOTAAL/TOTAL.	5,968	5,916	93	41	+52	5,278	5,221	101	44	+57

Daar sal opgemerk word dat daar goeie ooreenstemming tussen verwagte en werklike sterftes is vir blankes tot by die leeftydsgroep 84-88. Die verskille is nêrens groot nie en verander reëlmatig van teken, terwyl die totale afwyking tot by die groep 84-88 maar net -1 vir manlikes en -7 vir vroulikes is. Van hierdie groep af boontoe oortref die verwagte sterftes die werklike sterftes as gevolg van die noodsaaklikheid om die tabel af te sluit by 'n leeftyd wat nie te hoog is nie. Sels so is die totale afwykings nie groot nie, nl. +25 of +0.24 persent vir manlikes en +29 of +0.37 persent vir vroulikes.

In die geval van die Kleurlinge verander die afwykings ook reëlmatig van teken, maar die totale afwykings is groter as vir blankes en meestal negatief tot by die leeftydsgroep 84-88. Daar kan hier genoem word dat die verwagte sterftes uit die ongewysigde bevolking bereken en vergelyk is met die ongewysigde sterftes, met die gevolg dat, aangesien die ophoping by die leeftye eindigende op 0 en 5 van groter omvang is by sterftes as by bevolking, die werklike sterftes oral meer is as die verwagte sterftes by dié syfers en die oorskotte nie volkome gebalanseer is deur die tekorte in die werklike sterftes by die ander syfers nie. Die totale afwyking was +52 of +0.88 persent vir manlikes en +57 of +1.09 persent vir vroulikes.

LEWENSTABELLE.

Nadat die kolom aantoonende q_x , die waarskynlikheid om binne 'n jaar na die bereiking van leeftyd x te sterf, voltooi is, is dit gebruik om al die ander kolomme van die lewenstabel af te lei, wat soos volg is:—

p_x dui die waarskynlikheid aan om een jaar van leeftyd x te lewe en is gevind deur q_x van 1 af te trek.

l_x is die getal oorblywendes tot by presiese leeftyd x volgens die lewenstabel. Die eerste waarde word die grondgetal genoem en is geneem as 100,000. Al die daaropvolgende waardes is deur aanhoudende vermenigvuldiging deur p_x verkry.

d_x , die sterftes in die jaar van lewe x onder die l_x persone wat daardie jaar binnegegaan het, is die verskil tussen pare syfers in die kolom l_x .

L_x verteenwoordig die getal wat lewe in die jaar van leeftyd x , of die getal jare gelewe in die jaar van leeftyd x en is verkry deur die gemiddelde van l_x en l_{x+1} te neem vir alle leeftye behalwe leeftyd 0. In die geval van die eerste lewensjaar, waar nie aangeneem kan word dat sterftes gelykmatig versprei is oor die jaar van leeftyd nie, is die waarde van L_x soos volg bepaal:—

Daar is aangeneem dat die kinders wat gesterf het onder die leeftyd van een dag, gemiddeld 'n halwe dag gelewe het. Die getal dae wat gevolglik gelewe is gedurende die eerste lewensdag is die getal oorblywendes aan die end van die eerste lewensdag vermenigvuldig met een plus die getal sterftes by leeftyd onder een dag vermenigvuldig met 'n halwe.

So voortgaande volg dat die kinders wat gesterf het by leeftyd een tot ses dae gemiddeld drie dae bo die eerste lewensdag geleef het; gevolglik is die getal dae gelewe gedurende die leeftydinterval 1-6 dae die getal oorblywendes aan die end van die sesde lewensdag maal ses plus die getal sterftes by leeftye een tot ses dae maal drie, ens. tot by leeftyd nege tot elf maande.

Die waardes so gevind, uitgedruk in jare, is bymekaar-geset om die getal jare gelewe gedurende die eerste jaar van lewe te gee.

T_x stel die bevolking van die lewenstabel by leeftyd x en alle hoër leeftye voor. Die waardes is gevind deur sommering van L_x .

e_x stel die volle lewensverwachting voor, of die totale toekomstige gemiddelde lewensduur van 'n persoon presies x jaar oud. Dit is verkry deur elke waarde van T_x deur die ooreenkomstige syfer in die kolom l_x te deel.

It will be noticed that for Europeans up to age-group 84-88 the correspondence between expected and actual deaths is good. The differences are not large anywhere and change sign regularly, while the accumulated deviation up to the group 84-88 is only -1 for males and -7 for females. From this group upwards the expected deaths are in excess of the actual deaths owing to the necessity of bringing the table to a close at an age which is not too high. Even so, the total deviations are not large, being +25 or +0.24 per cent. for males and +29 or +0.37 per cent. for females.

In the cases of the Coloured, the deviations also change sign regularly but the accumulated deviations are larger than for Europeans and mostly negative up to the age-group 84-88. It may be mentioned that the expected deaths were calculated from the unadjusted population and compared with the unadjusted deaths, with the result that owing to the heaping at the ages ending in the digits 0 and 5 being more pronounced in the deaths than the population, the actual deaths were everywhere in excess of expected deaths at these digits, and the excesses were not completely balanced by the deficiencies in actual deaths at the other digits. The total deviation was +52 or +0.88 per cent. for males and +57 or +1.09 per cent. for females.

LIFE TABLES.

After the column showing q_x , the probability of dying within a year after attaining age x , had been completed for the whole range of ages, it was used to derive all the other columns of the life table, which are as follows:—

p_x denotes the probability of living one year from age x , and was found by deducting q_x from 1.

l_x is the number surviving according to the life table to exact age x . The first value of the column is called the radix and was taken to be 100,000. All the successive values were derived by continued multiplication by p_x .

d_x , the deaths in the year of age x among the l_x persons who entered on that year, is the difference between pairs of figures in the l_x column.

L_x represents the number living in the year of age x , or the number of years lived in the year of age x , and was obtained by taking the mean between l_x and l_{x+1} , for all ages except age 0. In the case of the first year of life, where it cannot be assumed that deaths are uniformly distributed over the year of age, the value of L_x was obtained as follows:—

It was assumed that the children that died aged under one day, lived on the average half a day. The number of days lived, then, during the first day of life was the number of survivors at the end of the first day of life multiplied by one plus the number of deaths at age under one day multiplied by a half.

Continuing in this way, we find that the children dying aged one to six days survived on the average three days beyond the first day of life, and accordingly the number of days lived during the age interval 1-6 days was the number of survivors at the end of the sixth day of life times six plus the number of deaths at ages one to six days times three; and so on up to age 9 to 11 months.

The values so obtained, expressed as years, were added to give the number of years lived during the first year of life.

T_x denotes the population of the life table at age x and all higher ages. The values were obtained by the summation of L_x .

e_x represents the complete expectation of life, or the total future lifetime which on the average will be lived by a person aged exactly x . It is obtained by dividing each value of T_x by the corresponding figure in the l_x column.

Oorsig van Lewentabelle en vergelyking met vorige tabelle.—'n Hoër lewensverwachting en 'n laer sterftesyfer word vir blankes by alle leeftye aangetoon in vergelyking met die lewentabelle vir 1935-37, met uitsondering van leeftye 98 en bo vir vroulikes, maar geen betekenis behoort hieraan geheg te word nie, aangesien die waardes bo omtrent 90 jaar baie benaderd is as gevolg van die klein getalle by hierdie leeftye waarop die berekenings gegrond is en verskille kan toon wat afhang van die metodes toegepas by die hoë leeftye.

By haas alle leeftye onder 90 is die verbetering in die lewensverwachting groter vir die tydperk van 10 jaar tussen 1935-37 en 1945-47 as vir die tydperk van 15 jaar tussen 1920-22 (lewentabel No. 1) en 1935-37 (lewentabel No. 3). Vir manlikes is die verbetering byvoorbeeld 4.83 jaar vergelyk met 3.34 jaar by leeftyd 0, 2.28 jaar vergelyk met 1.41 jaar by leeftyd 10 en 1.92 jaar vergelyk met 1.17 jaar by leeftyd 20, vir hierdie tydperke van onderskeidelik 10 en 15 jaar.

Die maksimum lewensverwachting, wat by die leeftyd van een jaar voorkom, het van 62.12 jaar in 1935-37 tot 65.51 jaar in 1945-47 vir manlikes en van 65.60 tot 69.63 jaar vir vroulikes verbeter. Die verbetering verminder met stigende leeftyd, en by leeftyd 50 is dit net 0.51 jaar vir manlikes en 1.36 jaar vir vroulikes.

Die sterftesyfer vir blankes is die laagste by leeftyd 11. Daarna is daar 'n gestadige styging tot by leeftyd 23, wanneer daar 'n afname intree wat duur tot by leeftyd 26, vanwaar die syfer met die leeftyd styg. Vir vroulikes styg die syfer met die leeftyd van 11 jaar af en toon dit geen tydelike daling soos in die geval van manlikes nie.

Die daling in die syfer vir manlikes van leeftyd 23 tot 26 is blykbaar kenmerkend van die Unie se manlike blanke bevolking en skyn teenwoordig te wees in die gegewens van die meeste jare sedert die opstelling van die vorige lewentabelle (1935-37), wat 'n soortgelyke daling in die syfer van leeftyd 23 tot 28 toon.

Die uitwerking is blykbaar toe te skrywe aan 'n hoë sterfte van blanke manlikes rondom die leeftyd 20 jaar as gevolg van geweld of ongeluk. Die volgende is 'n uittreksel uit die getabuleerde doodsoorsake, wat beskikbaar is in vyfjaargroepe en die posisie aantoon:—

Leeftydsgroep.	Sterftes as gevolg van geweld of ongeluk.			Sterftes as gevolg van alle oorsake.		
	1945.	1946.	1947.	1945.	1946.	1947.
10-14.....	33	22	28	121	89	89
15-19.....	45	78	86	146	158	199
20-24.....	66	112	136	166	229	237
25-29.....	56	89	107	178	216	216
30-34.....	61	84	95	245	262	289

Vir manlike Kleurlinge is daar 'n vermindering in die lewensverwachting, vergelyk met die lewentabel vir 1935-37, by alle leeftye behalwe leeftyd 0 en leeftye bo 76. Die verskille is minder as twee jaar, nl. 1.23 jaar vir die maksimum lewensverwachting wat by leeftyd 3 voorkom en 1.95 by leeftyd 22, vanwaar die verskille verminder. Die vroulikes toon aan die ander kant 'n verbetering tot by leeftyd 39, vanwaar die lewensverwachting laer, maar nie betekenisvol laer, is nie, tot by leeftyd 75. Die maksimum lewensverwachting is 51.80 jaar by leeftyd 3, wat 'n verbetering van 1.05 jaar is vergelyk met die vorige lewentabel. Die verbetering by leeftyd 0 is 3.14 jaar, vergelyk met 1.52 jaar vir manlikes.

Die sterftesyfers vir manlike Kleurlinge toon 'n verbetering tot by leeftyd 19 jaar, vanwaar die jongste sterftesyfers betekenisvol hoër word as die voriges en hoër bly tot by 'n gevorderde leeftyd. Hierdie hoër sterftesyfers van leeftyd 20 af is die oorsaak van die laer lewensverwachting van leeftyd een en bo wat voorheen genoem is. Die vroulikes het laer sterftesyfers as voorheen tot by leeftyd 44 en weer tussen leeftye 56 en 65. By ander leeftye is die sterftesyfers hoër.

Review of Life Tables and Comparison with Previous Life Tables.—A higher expectation of life and lower rate of mortality are shown for Europeans at all ages in comparison with the life tables for 1935-37, excepting at ages 98 and above for females, but no importance should be attached to this, as the values above about 90 years are very approximate owing to the small numbers at these ages on which the calculations are based, and may vary depending on the methods used at the high ages.

At nearly all ages below 90, the improvement in the expectation of life is greater for the period of 10 years between 1935-37 and 1945-47 than for the period of 15 years between 1920-22 (Life Table No. 1) and 1935-37 (Life Table No. 3). For example, for males the improvement is 4.83 years compared with 3.34 years at age 0, 2.28 years compared with 1.41 years at age 10 and 1.92 years compared with 1.17 years at age 20, for these periods of 10 and 15 years, respectively.

The maximum expectation of life, which is found at age one, improved from 62.12 years in 1935-37 to 65.51 years in 1945-47 for males and from 65.60 to 69.63 years for females. The improvement diminishes with advancing age and at age 50 is only 0.51 year for males and 1.36 years for females.

The mortality rate for Europeans is lowest at age 11. Thereafter, there is a steady increase in the case of males up to age 23, when there is a decline until age 26, from where onwards the rates increase with age. For females, the rates increase with age from 11 years and show no temporary decrease as in the case of males.

This decrease in the rate for males from age 23 to 26 seems to be a characteristic of the Union's male European population and appears to be present in the data for most of the years since the construction of the previous life tables (1935-37), which showed a similar decline in the rate from age 23 to age 28.

The effect appears to be due to a high mortality of European males around age 20 as the result of violence or accident. The following figures have been extracted from the tabulated causes of death, which are available in five-yearly groups, to show the position:—

Age Group.	Deaths by Violence or Accident.			Deaths from All Causes.		
	1945.	1946.	1947.	1945.	1946.	1947.
10-14.....	33	22	28	121	89	89
15-19.....	45	78	86	146	158	199
20-24.....	66	112	136	166	229	237
25-29.....	56	89	107	178	216	216
30-34.....	61	84	95	245	262	289

For the Coloured males, there has been a decrease in the expectation of life compared with the life tables for 1935-37, at all ages excepting age 0 and ages above 76. The differences are less than two years, being 1.23 years at the maximum expectation of life of 49.85 years at age 3 and 1.95 years at age 22, from where onwards the differences decrease. The females, on the other hand, show an improvement up to age 39, from where the expectation is lower up to age 75, but not significantly so. The maximum expectation is 51.80 years at age 3, which is an improvement of 1.05 years compared with the previous life table. The improvement at age 0 is 3.14 years, compared with 1.52 years for males.

The mortality rates for Coloured males show an improvement up to the age of 19 years, from where the latest mortality rates become significantly higher than the previous ones and remain higher up to an advanced age. These higher mortality rates from age 20 are the cause of the lower expectations of life from age 1 upwards mentioned above. The females have lower mortality rates than previously up to age 44, and again between ages 56 and 65. At other ages the mortality rates are higher.

Met betrekking tot die styging in die lewentabel-sterftesyfers vir manlike Kleurlinge, kan genoem word dat die ruwe sterftesyfer vir 1945-47 werklik laer is as dié vir 1935-37 (onderskeidelik 22.37 en 24.08 per 1,000), en derhalwe is die sterftes volgens oorsaak ondersoek om die rede hiervoor vas te stel.

Uitvoerige doodsoorsake is nie vir jare vroeër as 1937 vir Kleurlinge beskikbaar nie; by gevolg is die sterftes vir 1937 alleen vergelyk met dié vir 1945-47.

As aangeneem word dat 1937 verteenwoordigend was van die jare 1935-37, wil dit voorkom of die styging in die getal sterftes as gevolg van tuberkulose by leeftye 20 en daarbo waarskynlik die hoofoorsaak is van die styging in die lewentabelsterftesyfers wat ter sprake is.

Die volgende tabel toon die sterftes as gevolg van tuberkulose en alle ander oorsake saamgevat vir manlik en vroulik, tesame met die bevolkings en syfers daaruit bereken.

KLEURLINGGRASSE. STERFTES EN BEVOLKING.

	1937.	1945.	1946.	1947.
MANLIK.				
<i>Sterftes as gevolg van tuberkulose—</i>				
Onder 20 jaar.....	382	702	697	679
20 jaar en bo.....	960	1,434	1,517	1,563
TOTAAL.....	1,342	2,136	2,214	2,242
<i>Sterftes as gevolg van alle oorsake—</i>				
Onder 20 jaar.....	5,665	5,949	5,188	5,231
20 jaar en bo.....	3,912	4,952	5,065	4,975
TOTAAL.....	9,577	10,901	10,253	10,206
<i>Bevolking op 30 Junie—</i>				
Onder 20 jaar.....	204,646	—	245,837	—
20 jaar en bo.....	191,954	—	221,544	—
TOTAAL.....	396,600	—	467,381	—
VROULIK.				
<i>Sterftes as gevolg van tuberkulose—</i>				
Onder 20 jaar.....	496	827	747	813
20 jaar en bo.....	972	1,174	1,202	1,291
TOTAAL.....	1,468	2,001	1,949	2,104
<i>Sterftes as gevolg van alle oorsake—</i>				
Onder 20 jaar.....	5,273	5,661	4,818	5,118
20 jaar en bo.....	3,574	4,180	4,156	4,203
TOTAAL.....	8,847	9,841	8,974	9,321
<i>Bevolking op 30 Junie—</i>				
Onder 20 jaar.....	208,331	—	247,563	—
20 jaar en bo.....	183,269	—	216,945	—
TOTAAL.....	391,600	—	464,508	—

COLOURED RACES. DEATHS AND POPULATION.

	1937.	1945.	1946.	1947.
MALES.				
<i>Deaths from Tuberculosis—</i>				
Under 20 years.....	382	702	697	679
20 years and over.....	960	1,434	1,517	1,563
TOTAL.....	1,342	2,136	2,214	2,242
<i>Deaths from all causes—</i>				
Under 20 years.....	5,665	5,949	5,188	5,231
20 years and over.....	3,912	4,952	5,065	4,975
TOTAL.....	9,577	10,901	10,253	10,206
<i>Population at 30th June—</i>				
Under 20 years.....	204,646	—	245,837	—
20 years and over.....	191,954	—	221,544	—
TOTAL.....	396,600	—	467,381	—
FEMALES.				
<i>Deaths from Tuberculosis—</i>				
Under 20 years.....	496	827	747	813
20 years and over.....	972	1,174	1,202	1,291
TOTAL.....	1,468	2,001	1,949	2,104
<i>Deaths from all causes—</i>				
Under 20 years.....	5,273	5,661	4,818	5,118
20 years and over.....	3,574	4,180	4,156	4,203
TOTAL.....	8,847	9,841	8,974	9,321
<i>Population at 30th June—</i>				
Under 20 years.....	208,331	—	247,563	—
20 years and over.....	183,269	—	216,945	—
TOTAL.....	391,600	—	464,508	—

STERFTESYFERS PER 1,000 BEVOLKING.

	1937.	1945-47.	Vermeerdering Persent.
MANLIK.			
<i>Tuberkulose</i> —			
Onder 20 jaar.....	1.87	2.82	50.8
20 jaar en bo.....	5.00	6.79	35.8
TOTAAL.....	3.38	4.70	39.1
<i>Alle oorsake</i> —			
Onder 20 jaar.....	27.68	22.19	-19.8
20 jaar en bo.....	20.38	22.56	10.7
TOTAAL.....	24.15	22.37	-7.4
<i>Alle oorsake buiten tuberkulose</i>	20.76	17.66	-14.9
VROULIK.			
<i>Tuberkulose</i> —			
Onder 20 jaar.....	2.38	3.21	34.9
20 jaar en bo.....	5.30	5.63	6.2
TOTAAL.....	3.75	4.34	15.7
<i>Alle oorsake</i> —			
Onder 20 jaar.....	25.31	21.00	-17.0
20 jaar en bo.....	19.50	19.27	-1.2
TOTAAL.....	22.59	20.19	-10.6
<i>Alle oorsake buiten tuberkulose..</i>	18.84	15.85	-15.9

Die tabel toon dat die ruwe sterftesyfer laer sowel vir manlik as vroulik is vir 1945-47 vergelyk met 1937. Die syfer vir vroulik toon, egter, 'n groter verbetering, daar dit met 10.6 persent gedaal het teenoor 7.4 persent vir manlik. Die tuberkulosesterftesyfer is, aan die ander kant, hoër vir beide geslagte. Die styging in die manlike syfer is aansienlik groter as dié vir vroulik, nl. 39.1 persent vergelyk met 15.7 persent.

Die tabel toon verder dat die persentasie styging in die sterftes as gevolg van tuberkulose groter is vir leeftye onder 20 as vir leeftye 20 en bo, maar dat die sterftes by die hoër leeftye 'n groter gedeelte van die sterftes as gevolg van alle oorsake by hierdie leeftye uitmaak en dat die styging hier gevolglik 'n groter uitwerking het. In die geval van manlikes is die styging by leeftye 20 en bo aansienlik groter as vir vroulikes en werklik so groot dat dit ruim opweeg teen die verbetering getoon ten opsigte van ander oorsake, met die gevolg dat die lewensverwagting by hierdie leeftye hoër is as voorheen. In die geval van vroulikes is die styging in die sterftes as gevolg van tuberkulose nie voldoende om die verbetering getoon vir die totaal van ander oorsake uit te wis nie en dus lei dit nie tot dieselfde resultaat as in die geval van manlikes nie.

Vergelykende Tabele.—Tabel 3 vergelyk lewensverwagting, sterftesyfer en getal oorblywendes by sekere leeftye volgens die jongste lewensstabelle met waardes getoon deur vroeëre tabelle vir die Unie.

Tabel 4 toon hierdie waardes vir die Unie vergelyk met dié van sekere ander lande vir die jongste beskikbare datums.

DEATH RATES PER 1,000 POPULATION.

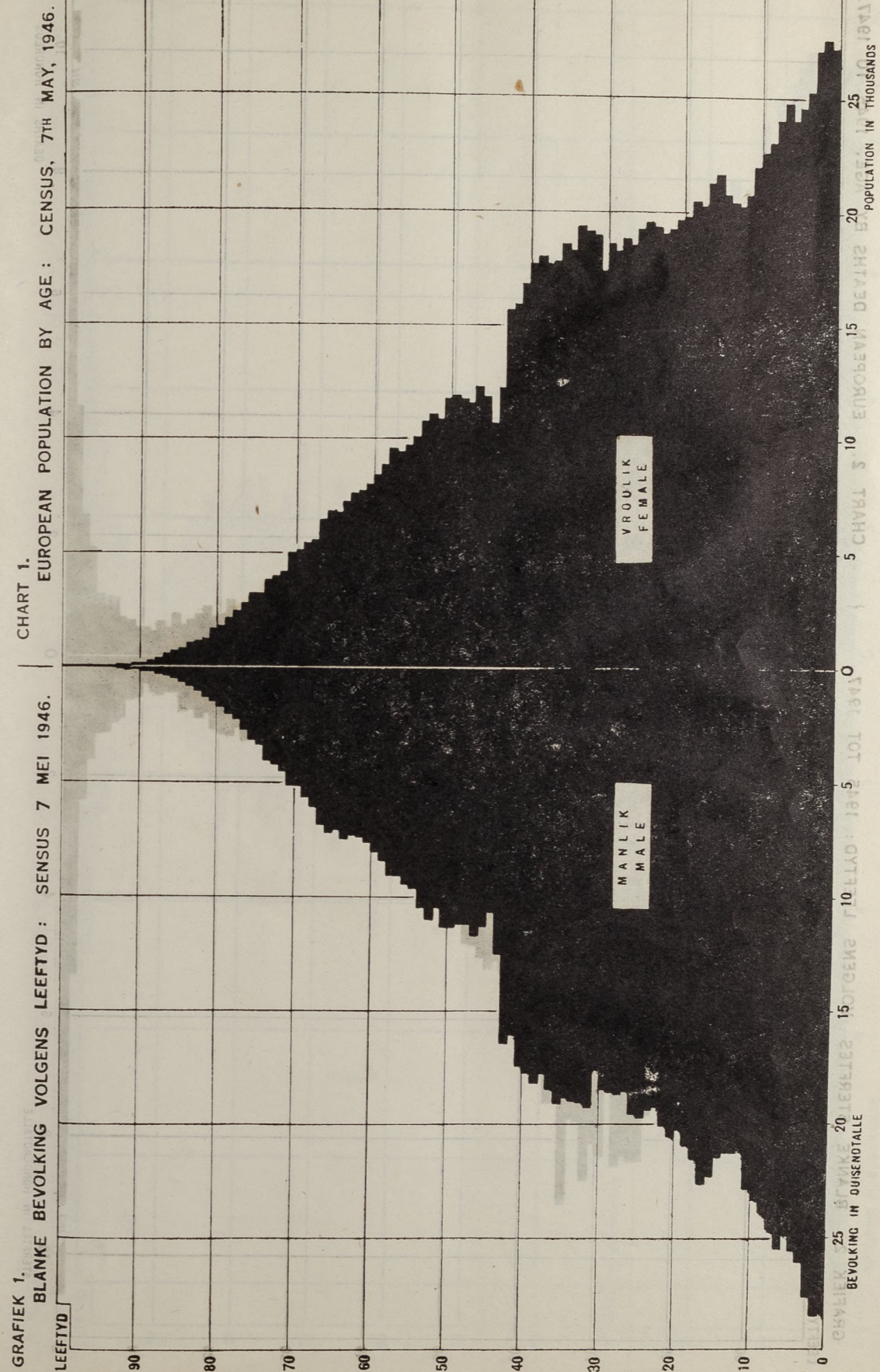
	1937.	1945-47.	Increase Per Cent.
MALES.			
<i>Tuberculosis</i> —			
Under 20 years.....	1.87	2.82	50.8
20 years and over.....	5.00	6.79	35.8
TOTAL.....	3.38	4.70	39.1
<i>All Causes</i> —			
Under 20 years.....	27.68	22.19	-19.8
20 years and over.....	20.38	22.56	10.7
TOTAL.....	24.15	22.37	-7.4
<i>All Causes other than Tuberculosis</i>	20.76	17.66	-14.9
FEMALES.			
<i>Tuberculosis</i> —			
Under 20 years.....	2.38	3.21	34.9
20 years and over.....	5.30	5.63	6.2
TOTAL.....	3.75	4.34	15.7
<i>All Causes</i> —			
Under 20 years.....	25.31	21.00	-17.0
20 years and over.....	19.50	19.27	-1.2
TOTAL.....	22.59	20.19	-10.6
<i>All Causes other than Tuberculosis</i>	18.84	15.85	-15.9

The table shows that the crude death rate is lower for both males and females for 1945-47 compared with 1937. The rate for females, however, shows a bigger improvement, having declined by 10.6 per cent. as against 7.4 per cent. for males. The tuberculosis death rate, on the other hand, is higher for both sexes. The increase in the male rate is considerably larger than that for females, being 39.1 per cent. compared with 15.7 per cent., respectively.

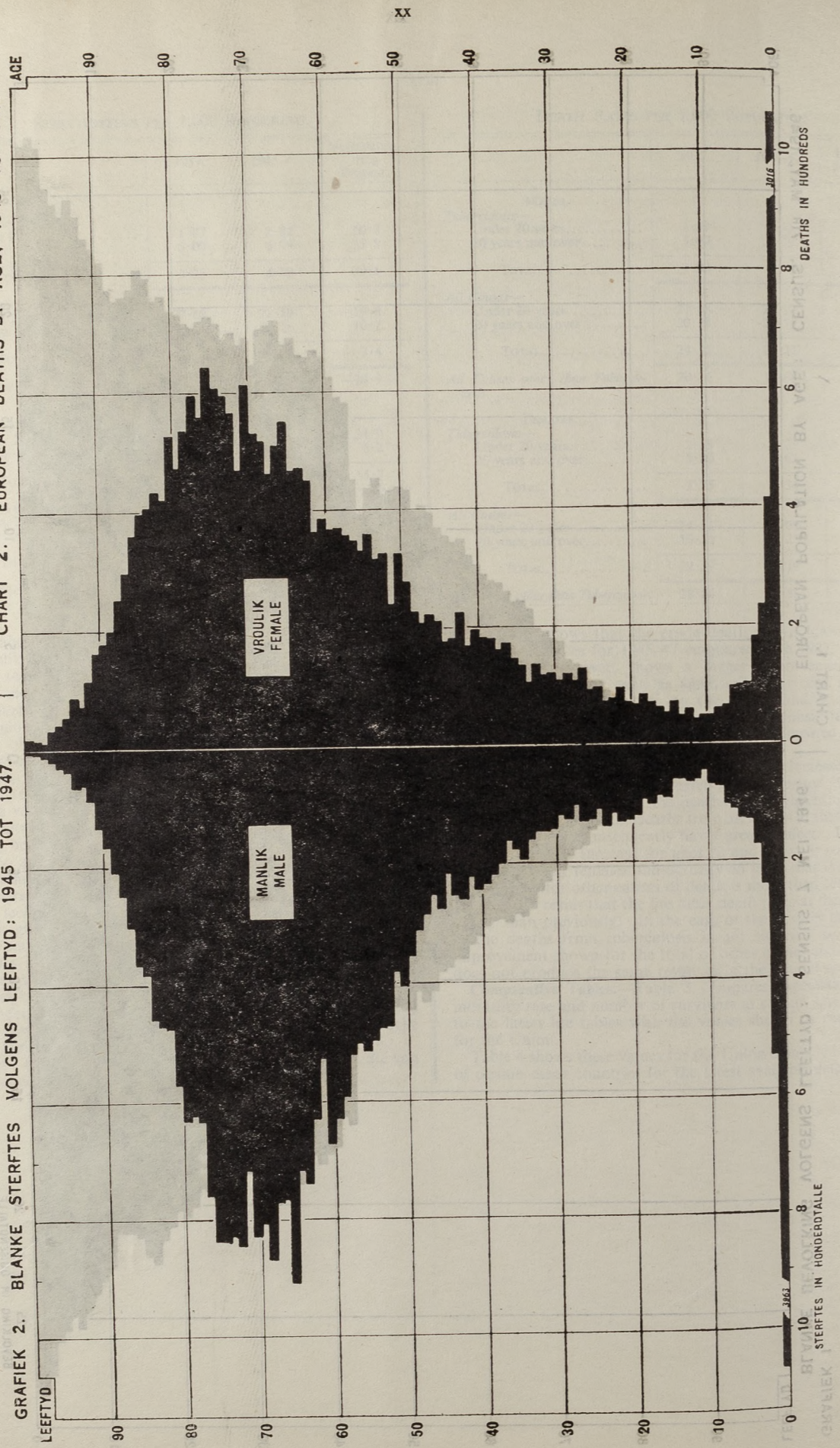
The table further shows that the percentage increase in deaths from tuberculosis has been greater for ages below 20 than for ages 20 and over, but that the deaths at the higher ages and the increase here consequently has a greater effect. In the case of the males, the increase for ages 20 and above is considerably greater than for females and actually so large that the improvement shown for other causes of death is more than compensated for with the result that the life table death rates at these ages are higher than previously. In the case of the females the increase in the deaths from tuberculosis is not sufficient to offset the improvement shown for the total of other causes and, therefore, does not produce the same result as in the case of males.

Comparative Tables.—Table 3 compares expectation of life, mortality rate and number of survivors at certain ages according to the latest life tables with the values shown by earlier tables for the Union.

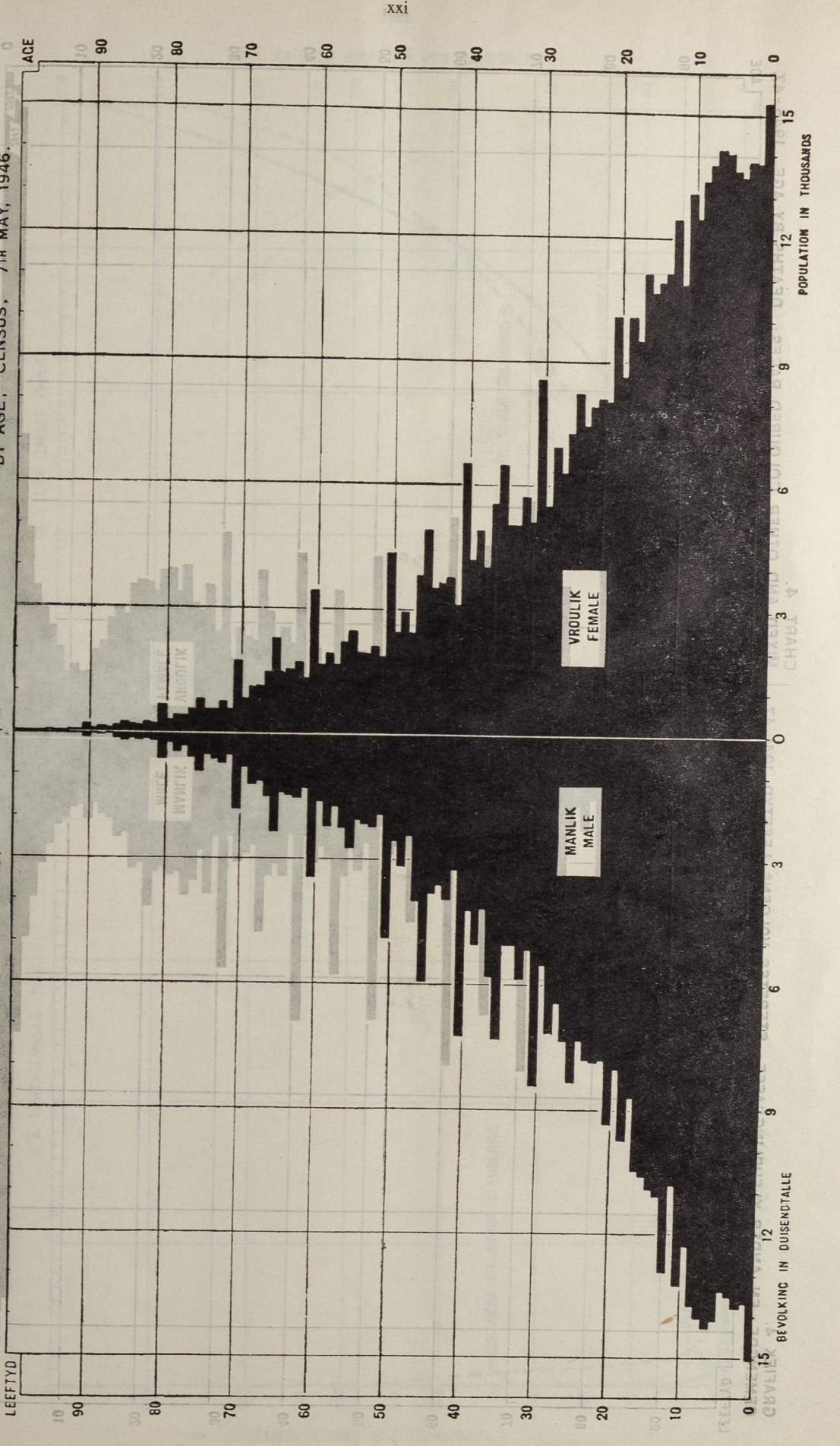
Table 4 shows these values for the Union compared with those of certain other countries for the latest available dates.

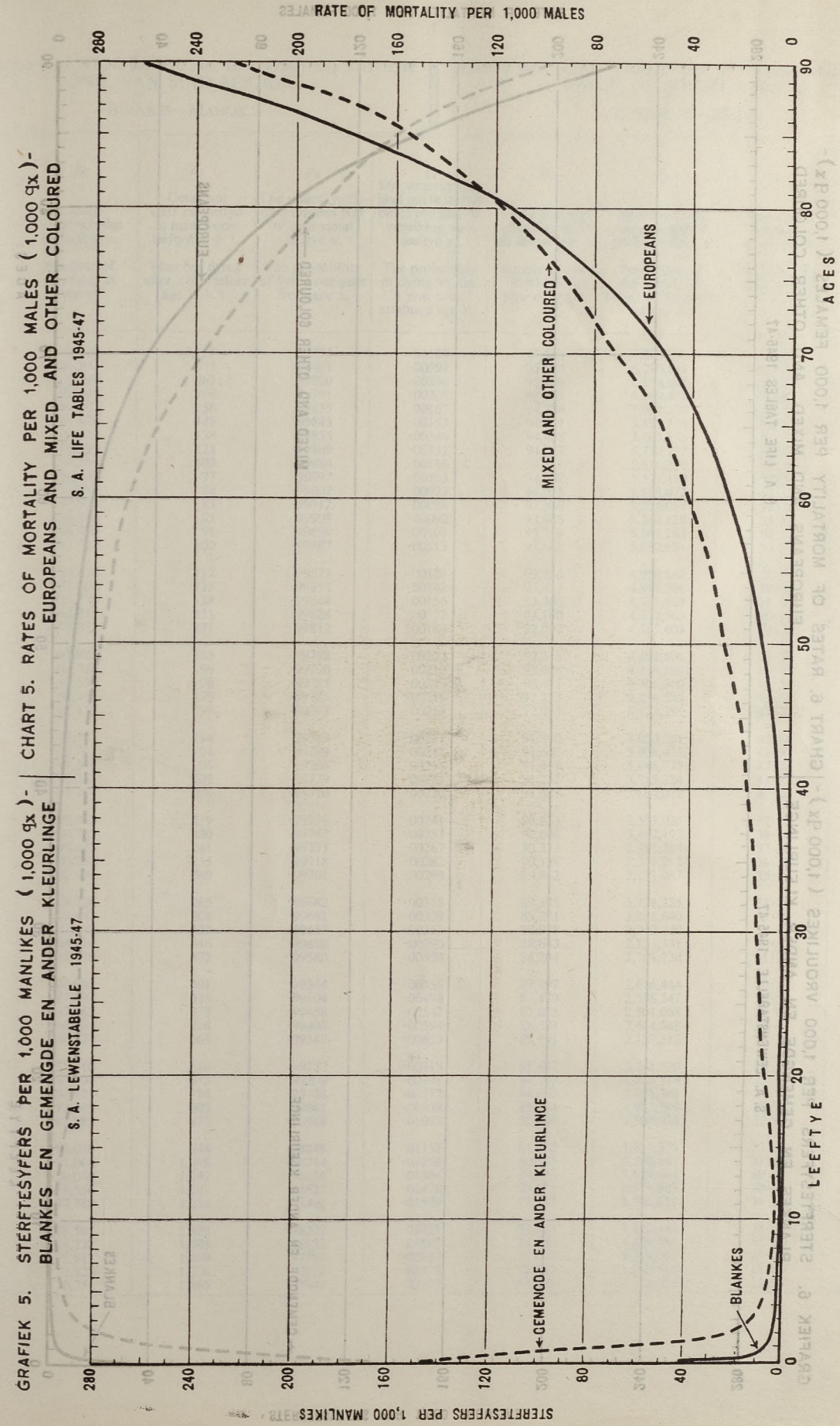
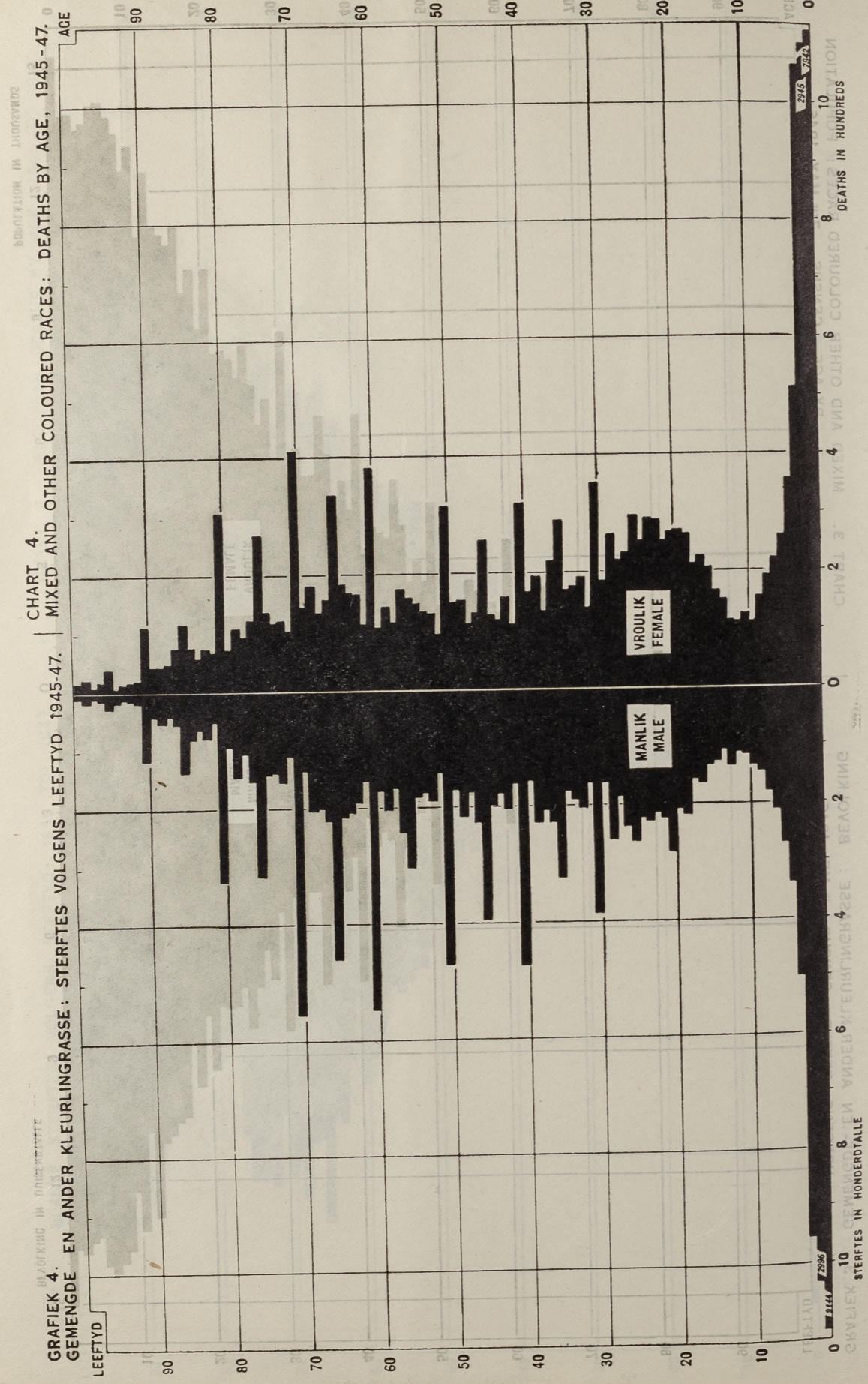


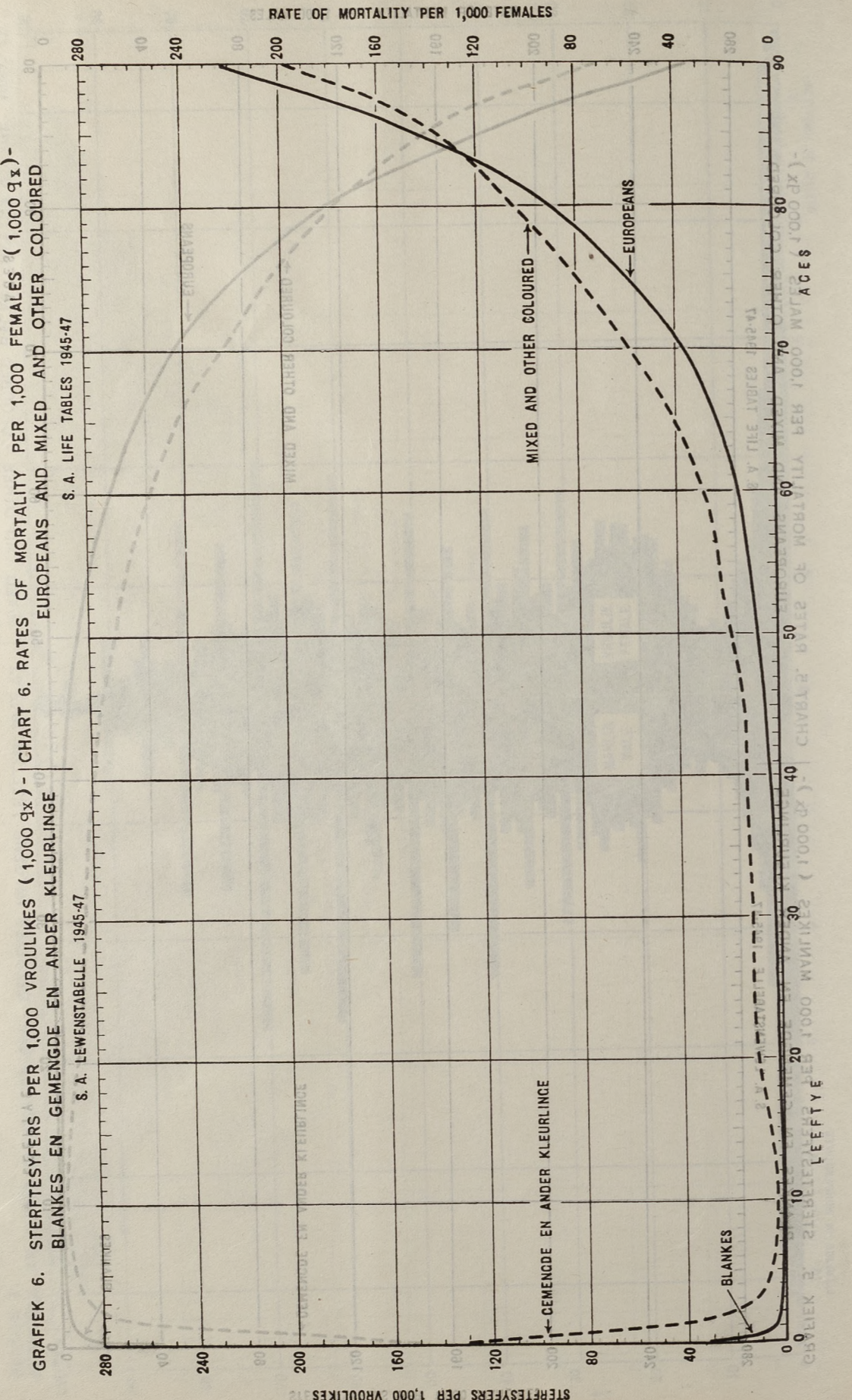
GRAFIEK 2. BLANKE STERFTES VOLGENS LEEFTYD: 1945 TOT 1947. CHART 2. EUROPEAN DEATHS BY AGE, 1945 TO 1947.



GRAFIEK 3. GEMENGE- EN ANDER KLEURLINGRASSE: BEVOLKING VOLGENS LEEFTYD, SENSUS 7 MEI 1946. CHART 3. MIXED AND OTHER COLOURED RACES: POPULATION BY AGE, CENSUS, 7TH MAY, 1946.







TABEL 1 (a).-LEWENSTABEL No. E. 4. (1945-47) VAN DIE UNIE VAN SUID-AFRIKA.

BLANKES—MANLIK.

(x)	l_x	d_x	p_x	q_x	L_x	T_x	e_x	(x)
Leeftyd.	Getal oorblywendes by leeftyd x.	Getal wat sterf na leeftyd x maar voor leeftyd x + 1.	Die waarskynlikheid om een jaar te lewe vanaf leeftyd x.	Die waarskynlikheid om te sterwe binne een jaar na bereiking van leeftyd x.	Getal jare wat gelewe word in die lewensjaar x.	Bevolking van lewensstabel bo die leeftyd x.	Die volle lewensverwagting.	Age.
	Number of survivors at age x.	Number dying after x but before age x + 1.	The probability of living one year from age x.	The probability of dying within a year after attaining age x.	Number of years lived in the year of age x.	Population of the Life Table above the moment of age x.	The complete expectation of life.	
0	100,000	4,127	.95873	.04128	97,584	6,377,795	63.78	0
1	95,873	575	.99401	.00599	95,585	6,280,211	65.51	1
2	95,298	267	.99720	.00280	95,164	6,184,626	64.90	2
3	95,031	199	.99791	.00209	94,931	6,089,462	64.08	3
4	94,832	156	.99835	.00165	94,754	5,994,530	63.21	4
5	94,676	149	.99843	.00157	94,601	5,899,776	62.32	5
6	94,527	138	.99855	.00146	94,458	5,805,175	61.41	6
7	94,389	124	.99869	.00131	94,327	5,710,717	60.50	7
8	94,265	109	.99884	.00116	94,211	5,616,390	59.58	8
9	94,156	97	.99897	.00103	94,107	5,522,180	58.65	9
10	94,059	88	.99907	.00093	94,015	5,428,072	57.71	10
11	93,971	83	.99912	.00088	93,930	5,334,057	56.76	11
12	93,888	85	.99908	.00092	93,846	5,240,128	55.81	12
13	93,803	91	.99899	.00101	93,758	5,146,282	54.86	13
14	93,712	100	.99887	.00113	93,662	5,052,524	53.92	14
15	93,612	112	.99872	.00128	93,556	4,958,862	52.97	15
16	93,500	125	.99858	.00142	93,437	4,865,306	52.04	16
17	93,375	138	.99844	.00156	93,306	4,771,869	51.10	17
18	93,237	155	.99828	.00172	93,160	4,678,563	50.18	18
19	93,082	171	.99812	.00188	92,997	4,585,403	49.26	19
20	92,911	185	.99798	.00202	92,818	4,492,406	48.35	20
21	92,726	196	.99790	.00210	92,628	4,399,588	47.45	21
22	92,530	198	.99785	.00215	92,431	4,306,960	46.55	22
23	92,332	199	.99785	.00215	92,233	4,214,529	45.65	23
24	92,133	196	.99787	.00213	92,035	4,122,296	44.74	24
25	91,937	194	.99789	.00211	91,840	4,030,261	43.84	25
26	91,743	194	.99789	.00211	91,646	3,938,421	42.93	26
27	91,549	196	.99786	.00214	91,451	3,846,775	42.02	27
28	91,353	202	.99779	.00221	91,252	3,755,324	41.11	28
29	91,151	209	.99770	.00230	91,047	3,664,072	40.20	29
30	90,942	219	.99759	.00241	90,833	3,573,025	39.29	30
31	90,723	230	.99747	.00253	90,608	3,482,193	38.38	31
32	90,493	241	.99733	.00267	90,373	3,391,584	37.48	32
33	90,252	255	.99718	.00282	90,124	3,301,212	36.58	33
34	89,997	269	.99701	.00299	89,862	3,211,087	35.68	34
35	89,728	285	.99682	.00318	89,585	3,121,225	34.79	35
36	89,443	304	.99661	.00339	89,291	3,031,640	33.89	36
37	89,139	323	.99637	.00363	88,978	2,942,349	33.01	37
38	88,816	346	.99610	.00390	88,643	2,853,371	32.13	38
39	88,470	372	.99580	.00420	88,284	2,764,728	31.25	39
40	88,098	401	.99544	.00456	87,897	2,676,444	30.38	40
41	87,697	435	.99504	.00496	87,479	2,588,547	29.52	41
42	87,262	473	.99458	.00542	87,025	2,501,068	28.66	42
43	86,789	516	.99406	.00594	86,531	2,414,042	27.82	43
44	86,273	563	.99347	.00653	85,991	2,327,512	26.98	44
45	85,710	616	.99282	.00719	85,402	2,241,520	26.15	45
46	85,094	673	.99209	.00791	84,757	2,156,118	25.34	46
47	84,421	736	.99128	.00872	84,053	2,071,361	24.54	47
48	83,685	803	.99041	.00959	83,284	1,987,308	23.75	48
49	82,882	872	.98948	.01053	82,446	1,904,025	22.97	49
50	82,010	944	.98848	.01152	81,538	1,821,579	22.21	50
51	81,066	1,018	.98744	.01256	80,557	1,740,041	21.46	51
52	80,048	1,092	.98636	.01364	79,502	1,659,484	20.73	52
53	78,956	1,167	.98522	.01478	78,372	1,579,983	20.01	53
54	77,789	1,244	.98401	.01599	77,167	1,501,611	19.30	54
55	76,545	1,323	.98272	.01728	75,883	1,424,444	18.61	55
56	75,222	1,405	.98133	.01867	74,520	1,348,560	17.93	56
57	73,817	1,489	.97983	.02017	73,073	1,274,041	17.26	57
58	72,328	1,576	.97821	.02179	71,540	1,200,968	16.60	58
59	70,752	1,665	.97647	.02353	69,919	1,129,428	15.96	59

TABLE 1 (a).-LIFE TABLE No. E. 4 (1945-47) OF THE UNION OF SOUTH AFRICA.

EUROPEANS—MALE.

(This table contains the same data as the previous table, but is labeled as 'EUROPEANS—MALE' in the original document.)

TABEL 1 (a).—LEWENSTABEL No. E. 4 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA—(vervolg).

BLANKES—MANLIK.

Table with 9 columns: (x), l_x, d_x, p_x, q_x, L_x, T_x, e_x, (x). Rows represent ages from 60 to 104.

TABLE 1 (a).—LIFE TABLE No. E. 4 (1945-47) OF THE UNION OF SOUTH AFRICA—(continued).

EUROPEANS—MALE.

TABEL 1 (b).—LEWENSTABEL No. E. 4 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA.

BLANKES—VROULIK.

Table with 9 columns: (x), l_x, d_x, p_x, q_x, L_x, T_x, e_x, (x). Rows represent ages from 0 to 54.

TABLE 1 (b).—LIFE TABLE No. E. 4 (1945-47) OF THE UNION OF SOUTH AFRICA.

EUROPEANS—FEMALE.

TABEL 1 (b).—LEWENSTABEL No. E. 4 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA—(vervolg).
 TABLE 1 (b).—LIFE TABLE No. E. 4 (1945-47) OF THE UNION OF SOUTH AFRICA—(continued).
 BLANKES—VROULIK. EUROPEANS—FEMALE.

(x)	l_x	d_x	p_x	q_x	L_x	T_x	e_x	(x)
Leeftyd.	Getal oorblywendes by leeftyd x.	Getal wat sterf na leeftyd x maar voor leeftyd x + 1.	Die waarskynlikheid om te lewe vanaf leeftyd x.	Die waarskynlikheid om te sterwe binne een jaar na bereiking van leeftyd x.	Getal jare wat gelewe word in die lewensjaar x.	Bevolking van lewensstabel bo die leeftyd x.	Die volle lewensverwachting.	Age.
	Number of survivors at age x.	Number dying after x but before age x + 1.	The probability of living one year from age x.	The probability of dying within a year after attaining age x.	Number of years lived in the year of age x.	Population of the Life Table above the moment of age x.	The complete expectation of life.	
55	81,589	920	.98873	.01127	81,129	1,775,013	21.76	55
56	80,669	968	.98799	.01201	80,185	1,693,884	21.00	56
57	79,701	1,020	.98721	.01279	79,191	1,613,699	20.25	57
58	78,681	1,073	.98636	.01364	78,145	1,534,508	19.50	58
59	77,608	1,132	.98541	.01459	77,042	1,456,363	18.77	59
60	76,476	1,199	.98433	.01568	75,876	1,379,322	18.04	60
61	75,277	1,274	.98308	.01692	74,640	1,303,445	17.32	61
62	74,003	1,358	.98164	.01836	73,324	1,228,806	16.60	62
63	72,645	1,452	.98002	.01998	71,919	1,155,482	15.91	63
64	71,193	1,549	.97823	.02177	70,419	1,083,563	15.22	64
65	69,644	1,652	.97628	.02372	68,818	1,013,144	14.55	65
66	67,992	1,756	.97418	.02582	67,114	944,327	13.89	66
67	66,236	1,860	.97192	.02808	65,306	877,213	13.24	67
68	64,376	1,967	.96943	.03057	63,393	811,906	12.61	68
69	62,409	2,084	.96661	.03339	61,367	748,514	11.99	69
70	60,325	2,209	.96337	.03663	59,220	687,147	11.39	70
71	58,116	2,348	.95961	.04039	56,942	627,927	10.80	71
72	55,768	2,495	.95527	.04474	54,521	570,985	10.24	72
73	53,273	2,640	.95044	.04956	51,953	516,464	9.69	73
74	50,633	2,771	.94527	.05473	49,248	464,511	9.17	74
75	47,862	2,876	.93989	.06011	46,424	415,263	8.68	75
76	44,986	2,950	.93444	.06556	43,511	368,839	8.20	76
77	42,036	2,986	.92897	.07103	40,543	325,328	7.74	77
78	39,050	2,997	.92324	.07677	37,551	284,785	7.29	78
79	36,053	2,996	.91693	.08308	34,555	247,234	6.86	79
80	33,057	2,984	.90972	.09028	31,565	212,679	6.43	80
81	30,073	2,969	.90129	.09871	28,589	181,113	6.02	81
82	27,104	2,942	.89143	.10857	25,633	152,525	5.63	82
83	24,162	2,892	.88031	.11969	22,716	126,892	5.25	83
84	21,270	2,803	.86823	.13177	19,869	104,176	4.90	84
85	18,467	2,669	.85547	.14453	17,133	84,307	4.57	85
86	15,798	2,491	.84230	.15770	14,552	67,175	4.25	86
87	13,307	2,294	.82761	.17240	12,160	52,622	3.95	87
88	11,013	2,073	.81177	.18823	9,976	40,463	3.67	88
89	8,940	1,835	.79471	.20529	8,022	30,486	3.41	89
90	7,105	1,589	.77635	.22365	6,310	22,464	3.16	90
91	5,516	1,343	.75660	.24340	4,844	16,154	2.93	91
92	4,173	1,104	.73540	.26461	3,621	11,310	2.71	92
93	3,069	882	.71266	.28735	2,628	7,689	2.51	93
94	2,187	682	.68832	.31168	1,846	5,061	2.31	94
95	1,505	508	.66233	.33767	1,251	3,214	2.14	95
96	997	364	.63466	.36534	815	1,963	1.97	96
97	633	250	.60530	.39470	508	1,148	1.81	97
98	383	163	.57426	.42574	302	640	1.67	98
99	220	101	.54159	.45841	170	339	1.54	99
100	119	59	.50739	.49261	90	169	1.42	100
101	60	31	.47181	.52819	45	79	1.31	101
102	29	17	.43505	.56495	21	35	1.22	102
103	12	7.1	.39737	.60264	9	14	1.11	103
104	4.9	3.1	.36325	.63675	3.4	5.3	1.08	104
105	1.8	1.2	.32063	.67937	1.2	1.9	1.06	105
106	.6	.3	.28244	.71756	.5	.7	1.03	106

TABEL 2 (a).—LEWENSTABEL No. C. 2 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA.
 TABLE 2 (a).—LIFE TABLE No. C. 2 (1945-47) OF THE UNION OF SOUTH AFRICA.
 KLEURLINGE—MANLIK. COLOURED—MALE.

(x)	l_x	d_x	p_x	q_x	L_x	T_x	e_x	(x)
Leeftyd.	Getal oorblywendes by leeftyd x.	Getal wat sterf na leeftyd x maar voor leeftyd x + 1.	Die waarskynlikheid om te lewe vanaf leeftyd x.	Die waarskynlikheid om te sterwe binne een jaar na bereiking van leeftyd x.	Getal jare wat gelewe word in die lewensjaar x.	Bevolking van lewensstabel bo die leeftyd x.	Die volle lewensverwachting.	Age.
	Number of survivors at age x.	Number dying after age x but before age x + 1.	The probability of living one year from age x.	The probability of dying within a year after attaining age x.	Number of years lived in the year of age x.	Population of the Life Table above the moment of age x.	The complete expectation of life.	
0	100,000	14,665	.85335	.14665	90,529	4,170,446	41.70	0
1	85,335	5,037	.94097	.05903	82,816	4,079,917	47.81	1
2	80,298	1,707	.97874	.02126	79,444	3,997,101	49.78	2
3	78,591	929	.98818	.01182	78,127	3,917,657	49.85	3
4	77,662	638	.99179	.00821	77,343	3,839,530	49.44	4
5	77,024	499	.99351	.00649	76,775	3,762,187	48.84	5
6	76,525	392	.99488	.00512	76,329	3,685,412	48.16	6
7	76,133	318	.99582	.00418	75,974	3,609,083	47.40	7
8	75,815	273	.99640	.00360	75,678	3,533,110	46.60	8
9	75,542	249	.99671	.00329	75,418	3,457,431	45.77	9
10	75,293	238	.99683	.00317	75,174	3,382,014	44.92	10
11	75,055	237	.99684	.00316	74,936	3,306,840	44.06	11
12	74,818	245	.99672	.00328	74,695	3,231,903	43.20	12
13	74,573	269	.99640	.00360	74,438	3,157,208	42.34	13
14	74,304	302	.99593	.00407	74,153	3,082,770	41.49	14
15	74,002	343	.99536	.00464	73,830	3,008,617	40.66	15
16	73,659	388	.99474	.00526	73,465	2,934,787	39.84	16
17	73,271	438	.99402	.00598	73,052	2,861,322	39.05	17
18	72,833	499	.99315	.00685	72,583	2,788,270	38.28	18
19	72,334	561	.99224	.00776	72,053	2,715,687	37.54	19
20	71,773	618	.99139	.00861	71,464	2,643,634	36.83	20
21	71,155	669	.99071	.00929	70,824	2,572,170	36.15	21
22	70,494	721	.99022	.00978	70,149	2,501,346	35.48	22
23	69,805	707	.98988	.01012	69,451	2,431,197	34.83	23
24	69,098	716	.98963	.01037	68,740	2,361,745	34.18	24
25	68,382	722	.98945	.01055	68,021	2,293,005	33.53	25
26	67,660	726	.98927	.01073	67,297	2,224,984	32.88	26
27	66,934	731	.98907	.01093	66,568	2,157,687	32.24	27
28	66,203	739	.98884	.01116	65,833	2,091,119	31.59	28
29	65,464	748	.98858	.01142	65,090	2,025,285	30.94	29
30	64,716	757	.98829	.01171	64,338	1,960,195	30.29	30
31	63,959	769	.98797	.01203	63,574	1,895,858	29.64	31
32	63,190	782	.98763	.01238	62,799	1,832,283	29.00	32
33	62,408	797	.98724	.01276	62,010	1,769,485	28.35	33
34	61,611	812	.98682	.01318	61,205	1,707,475	27.71	34
35	60,799	830	.98635	.01365	60,384	1,646,270	27.08	35
36	59,969	850	.98583	.01417	59,544	1,585,886	26.44	36
37	59,119	871	.98526	.01474	58,684	1,526,341	25.82	37
38	58,248	894	.98465	.01535	57,801	1,467,658	25.20	38
39	57,354	917	.98401	.01599	56,895	1,409,857	24.58	39
40	56,437	939	.98337	.01663	55,967	1,352,962	23.97	40
41	55,498	958	.98274	.01726	55,019	1,296,995	23.37	41
42	54,540	975	.98212	.01788	54,053	1,241,976	22.77	42
43	53,565	991	.98149	.01851	53,069	1,187,923	22.18	43
44	52,574	1,010	.98080	.01920	52,069	1,134,854	21.59	44
45	51,564	1,031	.98000	.02000	51,049	1,082,785	21.00	45
46	50,533	1,059	.97905	.02095	50,004	1,031,736	20.42	46
47	49,474	1,092	.97793	.02208	48,928	981,733	19.84	47
48	48,382	1,129	.97668	.02333	47,818	932,805	19.28	48
49	47,253	1,163	.97537	.02463	46,672	884,987	18.73	49
50	46,090	1,196	.97407	.02593	45,492	838,316	18.19	50
51	44,894	1,218	.97285	.02715	44,285	792,824	17.66	51
52	43,676	1,234	.97175	.02825	43,059	748,538	17.14	52
53	42,442	1,243	.97070	.02930	41,820	705,480	16.62	53
54	41,199	1,253	.96960	.03040	40,572	663,659	16.11	54

TABEL 2 (a).—LEWENSTABEL No. C. 2 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA—(vervolg).

KLEURLINGE—MANLIK.

Table with 9 columns: (x), l_x, d_x, p_x, q_x, L_x, T_x, e_x, (x). Rows represent ages from 55 to 102. Includes descriptions for each variable in Afrikaans and English.

TABEL 2 (b).—LIFE TABLE No. C. 2 (1945-47) OF THE UNION OF SOUTH AFRICA—(continued).

COLOURED—MALE.

TABEL 2 (b).—LEWENSTABEL No. C. 2 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA.

KLEURLINGE—VROULIK.

Table with 9 columns: (x), l_x, d_x, p_x, q_x, L_x, T_x, e_x, (x). Rows represent ages from 0 to 54. Includes descriptions for each variable in Afrikaans and English.

TABEL 2 (b).—LIFE TABLE No. C. 2 (1945-47) OF THE UNION OF SOUTH AFRICA.

COLOURED—FEMALE.

TABEL 2 (b).—LEWENSTABEL No. C. 2 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA—(vervolg). TABLE 2 (b).—LIFE TABLE No. C. 2 (1945-47) OF THE UNION OF SOUTH AFRICA—(continued).

Table with 8 columns: (x), lx, dx, px, qx, Lx, Tx, ex, (x). It contains life table data for the Union of South Africa, including survivorship, mortality, and life expectancy.

TABEL 3.—VERGELYKING MET VROEËRE LEWENSTABELLE. TABLE 3.—COMPARISON WITH EARLIER LIFE TABLES.

Table with 12 columns: Leef-tyd./Age, Manlik.—Male (Blankes.—Europeans, Kleurlinge.—Coloured), Vroulik.—Female (Blankes.—Europeans, Kleurlinge.—Coloured). It compares life table data across different groups and time periods.

(a) VOLLE LEWENSVARWAGTING—COMPLETE EXPECTATION OF LIFE (ex).

Table with 12 columns showing complete expectation of life (ex) for various age groups, comparing different population segments.

(b) STERFTESYFER—RATE OF MORTALITY (1,000dx).

Table with 12 columns showing the rate of mortality (1,000dx) for various age groups, comparing different population segments.

(c) GETAL OORBLYWENDES—NUMBER OF SURVIVORS (lx).

Table with 12 columns showing the number of survivors (lx) for various age groups, comparing different population segments.

TABEL 4.—VERGELYKING MET ANDER LANDE.

TABLE 4.—COMPARISON WITH OTHER COUNTRIES.

MANLIK.—MALE.					VROULIK.—FEMALE.				
Leeftyd.	Unie van Suid-Afrika. Blankes. Union of South Africa. Europeans.	Engeland en Wallis. England and Wales.	Australië. Australia.	Verenigde State van Amerika. Blankes. United States of America. Whites.	Leeftyd.	Unie van Suid-Afrika. Blankes. Union of South Africa. Europeans.	Engeland en Wallis. England and Wales.	Australië. Australia.	Verenigde State van Amerika. Blankes. United States of America. Whites.
Age.	1945-47.	1930-32.	1946-48.	1939-41.	Age.	1945-47.	1930-32.	1946-48.	1939-41.
0.....	63.78	58.74	66.07	62.81	0.....	68.31	62.88	70.63	67.29
1.....	65.51	62.25	67.25	64.98	1.....	69.63	65.48	71.45	68.93
2.....	64.90	62.21	66.47	64.30	2.....	68.97	65.37	70.66	68.23
3.....	64.08	61.62	65.60	63.46	3.....	68.16	64.76	69.77	67.38
4.....	63.21	60.89	64.70	62.58	4.....	67.31	64.03	68.84	66.49
5.....	62.32	60.11	63.77	61.68	5.....	66.40	63.24	67.91	65.57
10.....	57.71	55.79	59.04	57.03	10.....	61.73	58.87	63.11	60.85
20.....	48.35	46.81	49.64	47.76	20.....	52.27	49.88	53.47	51.38
30.....	39.29	38.21	40.40	38.80	30.....	43.06	41.22	44.08	42.21
40.....	30.38	29.62	31.23	30.03	40.....	34.07	32.55	34.91	33.25
50.....	22.21	21.60	22.67	21.96	50.....	25.66	24.18	26.14	24.72
60.....	15.34	14.43	15.36	15.05	60.....	18.04	16.50	18.11	17.00
70.....	9.79	8.62	9.55	9.42	70.....	11.39	10.42	11.14	10.50
80.....	5.51	4.74	5.36	5.38	80.....	6.43	5.46	6.02	5.88
90.....	2.78	2.63	2.74	3.06	90.....	3.16	2.98	3.08	3.24
100.....	1.35	1.48	—	1.96	100.....	1.42	1.65	—	1.95

(a) GEMIDDELDE LEWENSVERWAGTING—COMPLETE EXPECTATION OF LIFE (e_x).

(b) STERFTESSYFER—RATE OF MORTALITY (1,000q_x).

0.....	41.28	71.86	31.99	48.12	0.....	32.91	54.55	25.19	37.89
1.....	5.99	15.30	3.27	4.87	1.....	4.83	13.45	2.96	4.32
2.....	2.80	6.57	1.97	2.65	2.....	2.81	6.03	1.48	2.20
3.....	2.09	4.41	1.46	1.90	3.....	2.25	4.07	1.09	1.61
4.....	1.65	3.59	1.21	1.53	4.....	1.34	3.36	.94	1.28
5.....	1.57	3.43	1.07	1.38	5.....	1.25	2.98	.79	1.10
10.....	.93	1.46	.72	1.00	10.....	.76	1.34	.50	.70
20.....	2.02	3.16	1.69	2.12	20.....	1.25	2.68	.91	1.20
30.....	2.41	3.40	1.86	2.79	30.....	2.04	3.19	1.65	3.68
40.....	4.56	5.62	3.37	5.13	40.....	3.73	4.40	2.84	7.62
50.....	11.52	11.28	9.19	11.55	50.....	8.05	8.16	6.41	17.14
60.....	25.41	24.15	22.78	25.48	60.....	15.68	17.70	13.60	42.33
70.....	51.74	60.35	52.56	54.54	70.....	36.63	44.51	36.07	108.19
80.....	114.30	145.00	120.11	124.71	80.....	90.28	118.58	100.27	231.41
90.....	261.49	286.14	265.00	248.94	90.....	223.65	250.61	233.84	468.32
100.....	517.27	483.50	504.41	389.35	100.....	492.61	441.07	468.32	387.39

(c) GETAL OORBLIWENDES (l_x).—NUMBER OF SURVIVORS (l_x).

0.....	100,000	100,000	100,000	100,000	0.....	100,000	100,000	100,000	100,000
1.....	95,873	92,814	96,801	95,188	1.....	96,709	94,545	97,481	96,211
2.....	95,298	91,394	96,484	94,724	2.....	96,242	93,273	97,192	95,796
3.....	95,031	90,794	96,294	94,474	3.....	95,972	92,711	97,048	95,585
4.....	94,832	90,394	96,153	94,295	4.....	95,756	92,334	96,942	95,431
5.....	94,676	90,069	96,037	94,150	5.....	95,628	92,024	96,851	95,309
10.....	94,059	89,023	95,619	93,601	10.....	95,136	91,082	96,549	94,890
20.....	92,911	87,245	94,562	92,293	20.....	94,235	89,383	95,953	93,984
30.....	90,942	84,416	92,967	90,092	30.....	92,672	86,792	94,740	93,220
40.....	88,098	80,935	90,823	86,880	40.....	90,243	83,690	92,758	89,805
50.....	82,010	74,794	85,946	80,521	50.....	85,485	78,958	89,011	85,267
60.....	69,087	63,620	74,251	67,787	60.....	76,476	70,204	81,257	76,200
70.....	47,872	43,361	52,230	46,739	70.....	60,325	53,144	65,398	58,363
80.....	21,730	16,199	22,785	19,860	80.....	33,057	24,869	35,401	28,882
90.....	3,196	1,609	3,144	2,812	90.....	7,105	3,611	6,556	5,061
100.....	31	15	32	65	100.....	119	64	114	139

TABEL 5.—STATISTIEK WAAROP LEWENSTABEL No. E. 4 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA GEBASEER IS.

TABLE 5.—STATISTICS ON WHICH LIFE TABLE No. E. 4 (1945-47) OF THE UNION OF SOUTH AFRICA IS BASED.

Leeftyd: Jare.	Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	BLANKES, MANLIK.—EUROPEANS, MALE.				Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	BLANKES, VROULIK.—EUROPEANS, FEMALE.				Age: Years.
		Sterfgevälle geregistreer.—Deaths Registered.					Sterfgevälle geregistreer.—Deaths Registered.				
		1945.	1946.	1947.	Totaal. Total.		1945.	1946.	1947.	Totaal. Total.	
0	28,477	1,384	1,282	1,297	3,963	27,280	1,015	1,018	983	3,016	0
1	28,526	187	184	161	532	27,673	172	130	112	414	1
2	27,711	86	74	81	241	27,106	94	77	62	233	2
3	26,187	68	59	47	174	25,364	69	58	53	180	3
4	25,623	48	36	48	132	24,627	47	30	26	103	4
5	24,983	49	53	28	130	24,118	40	32	28	100	5
6	25,495	42	37	32	111	24,857	42	28	28	98	6
7	24,743	40	38	26	104	24,076	27	21	15	63	7
8	23,997	34	28	13	75	23,162	22	21	17	60	8
9	23,401	31	21	18	70	22,601	17	17	15	49	9
10	22,946	17	15	15	47	22,026	27	13	9	49	10
11	21,132	28	17	16	61	20,858	20	10	11	41	11
12	21,349	28	17	21	66	20,329	16	23	19	58	12
13	21,342	23	23	17	63	20,511	15	16	16	47	13
14	21,588	25	17	20	62	20,845	29	20	21	70	14
15	22,389	28	33	33	94	21,787	20	16	17	53	15
16	22,724	24	31	34	89	21,303	23	17	21	61	16
17	21,631	35	28	38	101	20,343	32	18	20	70	17
18	21,040	28	35	32	95	20,524	27	27	29	83	18
19	20,304	31	31	62	124	19,839	28	17	21	66	19
20	20,638	27	49	54	130	19,736	28	24	18	70	20
21	20,123	42	44	47	133	19,373	30	32	34	96	21
22	19,371	36	36	46	118	19,115	23	32	22	77	22
23	19,426	38	49	54	141	19,440	26	23	23	72	23
24	19,873	23	51	36	110	19,676	33	33	32	98	24
25	19,665	34	48	47	129	19,332	31	30	32	93	25
26	18,652	36	47	48	131	18,627	43	47	38	128	26
27	18,740	26	39	36	101	18,800	42	25	39	106	27
28	18,633	41	39	48	128	18,312	42	37	39	118	28
29	18,557	41	43	37	121	18,607	46	38	25	109	29
30	17,634	42	52	51	145	17,475	42	39	39	120	30
31	19,330	50	53	53	147	19,018	46	44	27	117	31
32	19,074	42	50	56	148	19,222	42	56	37	135	32
33	19,066	44	51	66	161	19,425	39	39	27	105	33
34	18,943	67	65	63	195	18,376	45	41	48	134	34
35	19,102	57	66	55	178	18,622	43	60	42	145	35
36	18,513	62	47	54	163	17,812	59	62	50	171	36
37	17,825	49	75	76	200	17,774	66	50	45	161	37
38	18,267	71	78	69	218	18,075	64	53	63	180	38
39	17,837	66	90	79	235	17,762	63	57	62	182	39
40	17,401	86	85	74	245	16,852	64	59	74	197	40
41	16,192	79	63	80	222	15,900	63	60	45	168	41
42	16,484	76	81	104	261	15,741	79	76	70	225	42
43	12,588	71	86	96	253	12,289	58	63	61	182	43
44	10,783	76	69	71	216	10,798	54	57	64	175	44
45	11,317	99	89	89	277	11,905	90	63	59	212	45
46	11,700	93	82	79	254	12,338	69	80	73	222	46
47	11,224	97	94	95	286	11,653	83	45	81	209	47
48	11,274	107	106	99	312	11,804	95	67	65	227	48
49	11,350	129	119	108	356	11,980	96	83	97	276	49

TABEL 5.—STATISTIEK WAAROP LEWENSTABEL NO. E. 4. (1945-47) VAN DIE UNIE VAN SUID-AFRIKA GEBASEER IS—(vervolg).

TABLE 5.—STATISTICS ON WHICH LIFE TABLE NO. E. 4 (1945-47) OF THE UNION OF SOUTH AFRICA IS BASED—(continued).

Leeftyd: Jare.	Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	BLANKES, MANLIK.—EUROPEANS, MALE.				Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	BLANKES, VROULIK.—EUROPEANS, FEMALE.				Age: Years.
		Sterfgevälle geregistreer.—Deaths Registered.					Sterfgevälle geregistreer.—Deaths Registered.				
		1945.	1946.	1947.	Totaal. Total.		1945.	1946.	1947.	Totaal. Total.	
60	7,783	204	236	232	672	8,198	147	118	122	387	60
61	7,465	200	179	148	527	7,803	118	109	137	364	61
62	7,458	223	208	201	632	7,774	152	159	139	450	62
63	7,509	255	256	229	740	7,396	158	169	145	472	63
64	7,165	262	245	212	719	6,895	160	143	164	467	64
65	7,276	322	301	286	909	6,971	196	170	183	549	65
66	6,961	262	253	253	768	6,503	159	183	169	511	66
67	6,131	280	220	274	774	5,682	145	152	165	462	67
68	5,745	323	279	268	870	5,503	201	168	149	518	68
69	5,266	292	247	268	807	5,216	182	175	174	531	69
70	5,254	305	264	263	832	5,033	200	201	212	613	70
71	4,647	236	234	248	718	4,277	162	144	162	468	71
72	4,292	280	276	289	845	4,173	191	196	178	565	72
73	4,098	313	256	261	830	3,935	208	191	197	596	73
74	3,470	301	247	290	838	3,362	216	203	187	606	74
75	3,235	279	260	299	838	3,300	235	189	218	642	75
76	2,849	251	264	245	760	2,898	174	204	181	559	76
77	2,394	220	206	209	635	2,546	194	182	222	598	77
78	2,104	221	183	220	624	2,243	159	192	185	536	78
79	1,832	208	187	239	634	1,890	154	162	157	473	79
80	1,527	184	185	203	572	1,757	190	154	183	527	80
81	1,327	167	162	147	476	1,361	156	118	146	420	81
82	1,081	165	140	168	473	1,259	136	151	146	433	82
83	938	143	149	168	460	1,130	150	123	133	406	83
84	761	129	115	140	384	829	137	123	137	397	84
85	587	121	121	125	367	785	115	130	116	361	85
86	448	84	102	115	301	618	84	105	110	299	86
87	332	83	72	95	250	413	81	75	97	253	87
88	264	75	66	68	209	324	57	56	87	200	88
89	223	67	47	53	167	271	63	54	60	177	89
90	147	50	35	50	135	232	59	46	58	163	90
91	106	31	26	30	87	152	40	46	28	114	91
92	71	17	20	26	63	98	17	22	33	92	92
93	57	21	27	18	66	80	30	35	22	87	93
94	36	14	11	13	38	56	19	19	16	54	94
95	26	11	10	11	32	44	14	13	15	42	95
96	14	8	8	5	21	24	8	14	10	32	96
97	4	2	5	6	13	13	2	7	11	11	97
98	3	2	4	1	7	16	4	6	4	14	98
99	8	1	3	2	6	14	6	8	2	16	99
100	9	2	2	1	5	6	1	—	4	5	100
101	1	1	—	—	1	1	2	—	—	4	101
102	—	—	—	—	—	—	—	—	—	—	102
103	—	—	—	—	—	—	—	—	—	—	103
104	—	—	—	—	—	—	—	—	—	—	104
105	—	—	—	—	—	—	—	—	—	—	105
106	—	—	—	—	—	—	—	—	—	—	106
107	—	—	—	—	—	—	—	—	—	—	107
108	—	—	—	—	—	—	—	—	—	—	108
109+	2	—	1	—	—	1	—	—	—	—	109+
Onges.	687	—	—	—	—	559	—	—	—	—	Unsp.
Totaal	1,194,626	12,307	11,747	12,093	36,147	1,178,064	9,454	8,848	8,917	27,219	Total.

TABEL 6.—STATISTIEK WAAROP LEWENSTABEL NO. C. 2 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA GEBASEER IS.

TABLE 6.—STATISTICS ON WHICH LIFE TABLE NO. C. 2 (1945-47) OF THE UNION OF SOUTH AFRICA IS BASED.

Leeftyd: Jare.	Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	KLEURLINGE, MANLIK.—COLOURED, MALE.				Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	KLEURLINGE, VROULIK.—COLOURED, FEMALE.				Age: Years.
		Sterfgevälle geregistreer.—Deaths Registered.					Sterfgevälle geregistreer.—Deaths Registered.				
		1945.	1946.	1947.	Totaal. Total.		1945.	1946.	1947.	Totaal. Total.	
0	15,046	3,271	2,864	3,009	9,144	15,282	2,836	2,461	2,645	7,942	0
1	13,704	1,153	933	910	2,996	13,825	1,152	890	903	2,945	1
2	13,811	332	318	307	957	13,832	365	333	363	1,061	2
3	13,567	189	155	156	500	13,468	200	144	168	512	3
4	13,410	138	98	103	339	13,633	130	107	119	356	4
5	14,096	102	89	79	270	14,053	102	86	70	258	5
6	14,287	65	89	57	211	14,132	78	83	60	221	6
7	14,013	56	66	59	181	13,790	82	54	57	193	7
8	13,775	59	43	44	146	13,399	57	37	62	156	8
9	12,304	48	43	45	136	12,496	38	34	41	113	9
10	13,248	44	35	36	115	13,071	49	42	35	126	10
11	10,832	37	41	35	113	10,898	42	39	33	114	11
12	12,938	54	45	37	136	12,471	44	30	39	113	12
13	11,100	39	40	28	107	11,159	47	56	49	152	13
14	10,924	48	45	35	128	10,944	58	47	60	165	14
15	10,647	45	46	44	135	10,681	60	69	75	204	15
16	10,507	54	60	53	167	11,126	72	78	74	224	16
17	8,715	62	36	61	159	9,507	68	69	76	213	17
18	9,776	76	72	72	220	10,093	90	80	92	262	18
19	8,013	77	70	61	208	8,625	91	79	97	267	19
20	9,340	106	92	86	284	10,098	73	98	96	267	20
21	7,761	66	63	95	224	7,978	79	82	91	252	21
22	7,817	65	75	76	216	8,043	98	96	94	288	22
23	7,767	59	87	84	230	7,874	95	88	107	290	23
24	7,282	69	83	73	225	7,400	84	76	92	252	24
25	8,302	91	83	90	264	8,162	100	101	96	297	25
26	7,286	68	90	81	239	7,204	70	79	83	232	26
27	6,400	62	61	64	187	6,253	65	83	71	219	27
28	7,113	84	92	85	261	6,921	88	91	85	264	28
29	5,500	61	46	55	162	5,456	65	65	55	185	29
30	8,384	132	123	130	385	8,508	127	106	118	351	30
31	5,142	51	62	49	162	5,095	49	42	48	139	31
32	5,860	66	73	65	204	5,695	68	66	57	191	32
33	5,036	66	66	59	191	5,038	66	46	62	174	33
34	5,011	65	67	45	177	5,010	62	46	62	170	34
35	7,259	99	116	109	324	6,435	90	96	103	289	35
36	5,781	70	80	78	228	5,522	62	81	75	218	36
37	4,165	78	69	61	208	3,985	46	40	48	134	37
38	4,988	88	63	79	230	4,881	65	71	60	196	38
39	4,189	58	45	55	158	4,173	54	53	60	167	39
40	7,169	183	153	138	474	6,470	111	101	105	317	40
41	3,219	52	52	59	163	3,115	30	41	40	111	41
42	3,964	67	68	70	205	3,759	48	58	51	157	42
43	3,614	61	57	61	179	3,588	33	48	38	119	43
44	3,811	69	72	58	199	3,488	46	41	40	127	44
45	5,881	160	143	93	396	4,880	107	71	77	255	45
46	3,979	63	87	79	229	3,788	32	36	65	133	46
47	2,412	41	55	81	177	2,405	28	30	56	114	47
48	3,156	84	74	59	217	2,959	59	46	48	153	48
49	2,570	54	59	58	171	2,432	50	54	47	151	49
50	4,871	162	158	154	474	4,320	109	103	100	312	50
51	1,928	46	41	57	144	1,862	32	29	37	98	51
52	2,206	58	73	59	190	2,106	53	47	31	131	52
53	2,139	58	55	63	176	1,946	52	45	38	135	53
54	2,026	63	56	65	184	1,961	46	51	50	147	54
55	2,746	101	104	98	303	2,464	49	56	52	157	55
56	2,280	75	87	82	244	2,190	55	68	50	173	56
57	1,751	46	68	54	168	1,681	44	29	43	116	57
58	2,198	55	74	73	202	1,964	46	49	48	143	58
59	1,615	59	63	52	174	1,680	32	39	37	108	59

TABEL 6.—STATISTIEK WAAROP LEWENSTABEL NO. C. 2 (1945-47) VAN DIE UNIE VAN SUID-AFRIKA GEBASEER IS—(vervolg).

TABLE 6.—STATISTICS ON WHICH LIFE TABLE NO. C. 2 (1945-47) OF THE UNION OF SOUTH AFRICA IS BASED—(continued).

Leeftyd: Jare.	Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	KLEURLINGE, MANLIK.—COLOURED, MALE.				Bevolking-sensus, 7 Mei 1946. Population Census, 7th May, 1946.	KLEURLINGE, VROULIK.—COLOURED, FEMALE.				Age: Years.
		Sterfgevallen geregistreer.—Deaths Registered.					Sterfgevallen geregistreer.—Deaths Registered.				
		1945.	1946.	1947.	Totaal. Total.		1945.	1946.	1947.	Totaal. Total.	
60	3,464	179	192	177	548	131	141	109	381	60	
61	1,294	44	53	60	157	44	39	31	114	61	
62	1,538	45	78	69	192	54	67	44	165	62	
63	1,471	75	71	62	208	66	52	50	168	63	
64	1,432	73	76	67	216	66	66	51	183	64	
65	2,376	150	149	164	463	116	115	103	334	65	
66	1,543	69	70	85	224	52	49	54	155	66	
67	1,130	64	68	69	201	43	41	50	134	67	
68	1,243	60	84	61	205	60	55	65	180	68	
69	823	45	44	47	136	45	52	46	143	69	
70	1,821	196	170	193	559	155	117	138	410	70	
71	575	25	43	41	109	36	32	36	104	71	
72	761	45	49	62	156	40	44	37	121	72	
73	659	48	56	37	141	49	42	27	118	73	
74	551	44	52	48	144	32	50	53	135	74	
75	949	109	112	98	319	98	75	92	265	75	
76	598	41	48	65	154	32	44	40	122	76	
77	349	29	37	40	106	25	32	26	97	77	
78	463	46	46	55	147	40	34	36	110	78	
79	283	33	33	28	94	23	21	30	74	79	
80	658	131	95	101	327	97	93	115	305	80	
81	216	16	17	19	52	21	24	22	67	81	
82	206	26	31	23	80	24	21	29	74	82	
83	203	23	25	19	67	16	22	22	60	83	
84	176	30	25	28	83	22	31	23	76	84	
85	205	58	39	41	138	41	31	45	117	85	
86	159	20	21	15	56	25	27	26	78	86	
87	78	9	16	19	44	23	12	14	49	87	
88	93	21	16	16	53	11	22	11	44	88	
89	60	19	9	16	44	11	17	15	43	89	
90	149	45	37	35	117	38	39	36	113	90	
91	32	7	5	7	19	4	7	9	20	91	
92	36	6	2	6	14	1	7	8	16	92	
93	24	7	1	5	13	5	4	5	14	93	
94	14	3	6	8	17	3	3	2	8	94	
95	32	11	7	10	28	18	11	11	40	95	
96	33	3	2	8	13	5	8	6	19	96	
97	11	3	3	4	10	3	6	1	10	97	
98	18	4	8	6	18	10	8	4	22	98	
99	12	3	4	3	10	3	7	6	16	99	
100	50	12	15	14	41	7	20	20	47	100	
101	6	—	2	2	4	2	1	6	9	101	
102	1	3	2	1	5	2	3	1	6	102	
103	4	—	2	2	4	3	2	—	5	103	
104	1	—	—	1	2	2	1	—	4	104	
105	7	—	3	—	5	6	1	—	6	105	
106	3	2	2	—	2	2	1	—	3	106	
107	3	—	—	—	2	1	2	—	3	107	
108	2	—	—	—	2	—	—	—	1	108	
109+	15	4	4	5	13	4	7	8	16	109+	
Onges.	1,324	—	—	—	—	1,703	—	—	—	Unsp.	
Totaal	465,785	10,901	10,253	10,206	31,360	462,699	9,841	8,974	9,321	28,136	Total.