



Mortality Tables for Uganda Assured Lives from 2015 to 2019

World Bank

Contents

Executive Summary	1
1. Introduction.....	3
2. The Data.....	4
3. Mortality Experience between Uganda, Kenya and Rwanda	11
4. Development of Mortality Table for Uganda	21
5. Graduation Results.....	24
6. Comparison of Uganda Assured Lives Table.....	27
7. Summary and Recommendations	34
ANNEXURE 1	35
<i>MALE - RAW AND GRADUATED RATES</i>	<i>35</i>
ANNEXURE 2	38
<i>FEMALE - RAW AND GRADUATED RATES.....</i>	<i>38</i>
ANNEXURE 3	41
<i>KE 2007-2010 Mortality Tables for Assured Lives in Kenya.....</i>	<i>41</i>
<i>Rwanda Mortality Table 2012 - 2016.....</i>	<i>42</i>
ANNEXURE 4	43
<i>Individual Life In-Force</i>	<i>43</i>
<i>Individual Life Claims.....</i>	<i>44</i>
<i>Group Life In-Force.....</i>	<i>44</i>
<i>Group Life Claims</i>	<i>45</i>

Executive Summary

- I. The purpose of the project is to construct a new Uganda Assured Lives Mortality Table for pricing and reserving of life insurance products.
- II. The construction of the new mortality table was based on the cleaned data from the major 3 companies in Uganda. The study was carried out separately for Male and Female, including all products and all lives under the Individual Business during the five years ending 31 December 2019. The summary of data considered in this study is as follows:

Table EX.1 The summary of data with curtate duration greater or equal to 0 years

	Total Exposure 0+	Total Death 0+
Male	99,344	86
Female	68,006	47

The data from Group Business has not been considered in the study due to lack of gender and age information in the group data.

- III. Crude rates are derived based on the number of deaths and exposure in each age. Graduation methods as described in Section 4 are considered based on the distribution of the crude rates and made reference to KE 2007-2010 Mortality Tables for Assured Lives in Kenya.
 - Two graduation methods are used in order to come out with the graduated rates namely Brass Logit and Coale Kisker method:
 - Brass Logit method is used by making reference to the KE 2007-2010 Mortality Tables for Assured Lives in Kenya. Adjustments have been made to reflect the difference in population mortality rates between Uganda and Kenya.
- IV. Coale Kisker method is used instead of common exponential method as it can produce a smoother closure of a life table at older ages. The start age for Coale Kisker method is set at age 60 for Male, and age 50 for Female, with the target age of 115.

- V. The graduated mortality rates with age nearest birthday definition are as below. The details of the graduation are set out in Section 4 and 5 of this report.

GRADUATED RATES								
AGE NEAREST	MALE	FEMALE	AGE NEAREST	MALE	FEMALE	AGE NEAREST	MALE	FEMALE
20	0.001563	0.002015	47	0.004330	0.002840	74	0.059351	0.048667
21	0.001822	0.002103	48	0.004475	0.003021	75	0.066164	0.053633
22	0.002053	0.002174	49	0.004613	0.003213	76	0.073612	0.059042
23	0.002251	0.002227	50	0.004746	0.003417	77	0.081736	0.064925
24	0.002405	0.002260	51	0.004877	0.003861	78	0.090577	0.071318
25	0.002508	0.002272	52	0.005006	0.004362	79	0.100174	0.078255
26	0.002554	0.002259	53	0.005135	0.004924	80	0.110567	0.085773
27	0.002554	0.002228	54	0.005264	0.005551	81	0.121797	0.093912
28	0.002520	0.002180	55	0.005394	0.006252	82	0.133901	0.102712
29	0.002461	0.002123	56	0.006056	0.007033	83	0.146915	0.112215
30	0.002393	0.002060	57	0.006958	0.007903	84	0.160874	0.122464
31	0.002325	0.001995	58	0.007991	0.008872	85	0.175809	0.133504
32	0.002270	0.001936	59	0.009178	0.009948	86	0.191748	0.145382
33	0.002239	0.001888	60	0.010542	0.011143	87	0.208717	0.158144
34	0.002246	0.001857	61	0.012059	0.012468	88	0.226737	0.171841
35	0.002297	0.001847	62	0.013796	0.013936	89	0.245823	0.186521
36	0.002390	0.001858	63	0.015751	0.015559	90	0.265986	0.202236
37	0.002518	0.001888	64	0.017947	0.017352	91	0.287231	0.219038
38	0.002674	0.001932	65	0.020409	0.019331	92	0.309556	0.236978
39	0.002855	0.001988	66	0.023163	0.021513	93	0.332954	0.256109
40	0.003049	0.002052	67	0.026236	0.023915	94	0.357409	0.276485
41	0.003253	0.002121	68	0.029657	0.026556	95	0.382898	0.298158
42	0.003458	0.002194	69	0.033459	0.029457	96	0.409390	0.321182
43	0.003656	0.002266	70	0.037672	0.032639	97	0.436845	0.345608
44	0.003843	0.002336	71	0.042332	0.036126	98	0.465214	0.371490
45	0.004015	0.002512	72	0.047474	0.039942	99	0.494442	0.398876
46	0.004177	0.002671	73	0.053134	0.044113	100	0.524462	0.427817

1. Introduction

In 2019, the total population of Uganda was 44 million, which 46.5% were below age 15, 51.54% were aged 15 to 64 years and 1.96% were 65 years old and older. The median age of the population in Uganda is 15.9 years, this made Uganda as one of the world's youngest countries in the world. Based on the data collected in World Bank 2019, 49.26% of the population is Male in 2019.* The life expectancy at birth for male is 60.2 and for female is 64.8.**

The insurance industry is relatively young and the lack of country specific mortality tables has further hampered the product pricing and statutory valuation. The Insurance Regulatory Authority of Uganda ("IRA") has requested technical assistance to develop mortality tables for Uganda that can be applied to both mortality and longevity products.

All life insurance companies operating in Uganda have been requested to submit data from 2018 to 2019 with respect to the number of in-force policies as at the end of each calendar year as well as the number of deaths during each calendar year. The initial data was provided by IRA. The list of life insurance companies which have submitted the initial data are:

1. CIC Africa Life Assurance
2. ICEA Life Assurance
3. Jubilee Insurance Company of Uganda Limited
4. Liberty Life Assurance Uganda
5. Prudential Assurance Uganda Limited
6. Sanlam Uganda Life Insurance
7. UAP Life Assurance Uganda

Based on the initial data provided by IRA, we found that the data for year 2018 and 2019 are not sufficient to develop mortality tables for this project. We have further carried out a survey to understand the availability of data in the life insurance industry. Based on the results of the survey, we have narrowed down to 3 largest companies and have collected further data from these companies. The data from these 3 largest companies are then used to represent the mortality experience for Uganda Assured Lives.

** Data from World Bank, World Development Indicators*

*** Data from World Health Organisation, Global Health Observatory data repository*

2. The Data

Analysis of Data

- 2.1 IRA has provided initial set of data ("Initial Data") from all life insurance companies in Uganda. The initial data received are for year 2018 and 2019 only. The table below shows the analysis of Initial Data:

Table 2.1: Summary of Initial Data received from IRA.

Companies	Inforce	Death	Gender	Date of Birth
1. CIC Africa Life				
Individual	1,533	5	✓	✓
Group	2,388	735	Missing	Missing
2. ICEA Life				
Individual	10,509	No information	✓	✓
Annuity	4	No information	✓	✓
Group Credit	93,669	15	Missing	Missing
Group Life	73,225	8	Missing	Missing
3. Jubilee Uganda				
Individual	41,502	22	✓	✓
Group Life	416,397	798	Missing	Missing
4. Prudential				
Individual	26,319	17	✓	✓
Group	No information	21	Missing	Missing
5. Sanlam				
Individual	21,458	7	✓	✓
Group	No information	No information	✓	✓
6. UAP Life				
Individual	52,435	No information	✓	✓
Group	5,455	No information	Missing	Missing
7. Liberty Life				
Individual	3,712	No information	✓	✓
Group	21,134	No information	✓	✓
Total Individual	153,760	51		
Total Group	591,134	1,577		

2.2 There are some challenges in the Initial Data. For example:

- i. Data quality varies by contributor, administrative system, and other factors.
- ii. Not all companies are able to provide us the detail records as at the required date. For example, some contributors provided inforce data for year 2018 only for policies that are still remained inforce as at 31 December 2019. Hence not all exposure can be calculated correctly for each period.
- iii. Some contributors provided data for only certain blocks of business or certain study years.
- iv. Some contributors may not be able to supply crucial data field for the mortality study, for example gender and age, for significant part of their business.

2.3 Based on the Initial Data provided by IRA, we found that the amount of data available is far below the acceptable threshold required for a proper mortality study. We have further carried out a survey to understand the available data in the country. The information requested in the survey are:

- i. The number of in-force policies as at the end of each calendar year as well as the number of deaths during each calendar year for the past 10 years (2010- 2019)
- ii. The proportion of assured lives under different medical underwriting:
 - a) Medical lives: policyholders who have done medical examination at the point of entry.
 - b) Non-medical lives: policyholders who have not done medical examination at the point of entry but satisfactory evidence of health has been received.
 - c) Non-underwritten lives: policies sold without any underwriting.
- iii. The proportion of standard lives and sub-standard lives as at the end of each calendar year.
- iv. The proportion of business by plan types.

2.4 The summary of the data received from the survey results (“Survey Data”) is shown in the table below.

Table 2.2: Summary of Survey Data for Individual business

Companies		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1. CIC Africa Life	Inforce @ EOY							186	362	550	1,234	2,332
	Death Claims							0	0	2	5	7
2. ICEA Life	Inforce @ EOY	62	826	1,752	2,127	1,323	5,414	3,336	5,029	10,607	12,873	31,845
	Death Claims	0	0	2	2	1	2	10	5	11	9	35
3. Jubilee Uganda	Inforce @ EOY	420	1,347	2,717	4,014	4,851	7,306	7,976	9,488	13,264	18,750	49,478
	Death Claims	0	1	1	3	4	7	8	9	7	18	42
4. Prudential	Inforce @ EOY	0	0	58	101	124	354	2,173	5,884	9,384	17,969	35,410
	Death Claims	0	0	0	0	0	0	1	1	10	5	17
5. Sanlam	Inforce @ EOY			0	5,063	8,495	18,972	27,313	27,282	20,141	21,458	96,194
	Death Claims			1	0	1	3	5	13	62	159	239
6. UAP Life	Inforce @ EOY				1,894	2,972	4,219	6,773	7,581	8,586	8,215	31,155
	Death Claims				2	5	1	5	7	10	3	25
7. Liberty Life	Inforce @ EOY								1,682	1,044	986	3,712
	Death Claims								No information			

Table 2.3: Summary of Survey Data for Group business

Companies		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1. Jubilee Uganda	Inforce @ EOY	5,383	5,101	4,793	7,192	12,341	16,288	19,434	45,690	44,071	48,706	208,999
	Death Claims	15	8	27	22	22	20	77	94	140	157	582
2. Prudential	Inforce @ EOY			1,179	3,008	3,841	4,122	5,315	8,026	19,590	25,721	70,802
	Death Claims			1	1	8	8	6	2	8	19	53
3. Sanlam	Inforce @ EOY		4,883	3,013	3,949	2,182	70,432	95,117	79,442	87,778	75,519	422,315
	Death Claims		16	17	15	43	90	108	192	213	136	830
4. UAP Life	Inforce @ EOY				1,624	1,431	1,846	1,612	2,440	1,872	1,859	12,684
	Death Claims				4	1	0	2	2	2	0	11
5. Liberty Life	Inforce @ EOY								6,142	7,485	7,507	21,134
	Death Claims								No information			

- 2.5 Based on the survey results, we noticed that:
- Some contributors may not have the resources to transform their data into the requested survey format.
 - The survey results do not seem to be consistent with the initial data received from IRA.
 - Some contributors provided data outside the investigation period. For example, the data was prepared based on policies inforce as at October 2020.
- 2.6 Due to the data challenges and time constraint, we have narrowed down our investigation to 3 largest companies and have further collected data from these 3 companies to cover experience from 2015 to 2019. We have made the following adjustments to the data received:
- Claims which do not have corresponding exposure have been removed from the claims count.
 - Claims with inconsistent Year of Birth have been adjusted to follow the Year of Birth from the inforce data.

The cleaned data from these 3 largest companies ("Final Data") are then used to represent the mortality experience for Uganda Assured Lives. The following tables show the details of the Final Data.

Table 2.4: Summary of Final Data with curtate duration greater or equal to 0 years for Individual life

Age	Inforce At End of the Year						Death During the Year				
	2014	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
05-09			2	2	3	6					
10-14				4	7	6					
15-19	11	24	56	21	20	23					
20-24	306	615	1,382	570	779	959				1	
25-29	2,095	3,660	4,568	3,324	4,943	5,561	3	2		3	6
30-34	2,935	5,543	7,082	6,102	9,064	10,815	2	1	1	2	7
35-39	2,649	5,282	6,361	5,864	8,815	10,299		2	3	5	10
40-44	2,008	4,459	5,618	4,997	7,506	9,299		3	6	2	12
45-49	1,757	3,726	4,677	4,096	5,638	6,555	2	1	2	3	16
50-54	994	2,520	3,252	3,005	4,209	5,191		1	1	3	9
55-59	836	1,805	2,172	1,981	2,439	2,972			2	7	12
60-64	190	499	665	624	878	1,036				2	1
65-69	7	10	32	30	44	69					
70-74					2	2					
75-79				3	2	3					
80-84				2	6	6					
Total	13,788	28,143	35,867	30,625	44,355	52,802	7	10	15	28	73

Table 2.5: Summary of Final Data with curtate duration greater or equal to 2 years for Individual life

Age	Inforce At End of the Year						Death During the Year				
	2014	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
05-09					1	1					
10-14					1	3					
15-19			1		1	5					
20-24	20	29	133	43	66	72					
25-29	183	382	1,228	811	1,218	1,013	1			1	2
30-34	417	951	2,895	2,445	3,875	3,824	2			1	1
35-39	473	974	2,974	2,798	4,564	4,484		1	1	4	5
40-44	288	755	2,891	2,564	4,262	4,564			3	1	7
45-49	203	720	2,639	2,302	3,406	3,445		1		1	9
50-54	110	483	1,950	1,795	2,739	2,870			1	2	7
55-59	81	332	1,353	1,235	1,698	1,763				5	12
60-64	27	124	411	407	670	700				2	
65-69	3	4	12	14	27	37					
70-74											
75-79											
80-84					1	4					
Total	1,805	4,754	16,487	14,414	22,529	22,785	3	2	5	17	43

- 2.7 The data with curtate duration 0+ has been used in the study.
- 2.8 While seriatim data is available for most of the group business, crucial data fields such as gender and age are generally not available in the seriatim data. Furthermore, different underwriting rules tend to result in different mortality experience between group and individual business. Hence, only individual data were considered in this mortality study.
- 2.9 The data that used to represent Uganda Assured Lives are constructed based on the Final Data. The Final Data consists of individual policies from 3 largest companies from year 2015 to 2019. A summary of Final Data is shown in the following table:

Table 2.6: Type of products in the Final Data

Individual Business	Males		Females	
	Inforce	Deaths	Inforce	Deaths
Savings	41,064	29	38,305	33
Protection	74,251	57	41,957	14
Longevity	-	-	-	-
Total	115,315	86	80,262	47

All policies included in the Final Data are from Savings and Protection business.

- 2.10 Credibility methods have been widely used in actuarial work in particularly setting rates for experience analysis, pricing and actuarial valuation. The credibility of the derived rates is enhanced by the increased in data size. Full credibility is achieved when the derived rates has significant supporting data that any remaining error is insignificant. The number of 1,082 is the most commonly used measure of full credibility in actuarial work and this means that we would need 1,082 deaths in each age to achieve full credibility to build a mortality table. Based on the final data received, we only have 133 deaths for the 3 largest companies in between year 2015 and 2019. We have therefore concluded that the mortality table cannot be developed solely based the data collected.

Methodology for Deriving Mortality Crude Rates

- 2.11 The exposure is calculated using a census method. The age definition used is age nearest birthday at 31 December for in-force and age nearest birthday at death for deaths. Duration is defined as curtate.
- 2.12 The formula used to calculate the initial exposed to risk is as below;

For a particular calendar year Y:

$$Ex,r = (Startlf\ x,r + Endlf\ x,r + Death\ x,r)/2$$

Where:

Ex,r = Initial exposure at age x and duration r

Startlf x,r = In force at 1/Jan/Y at age x and duration r

Endlf x, r = In force at 1/Jan/Y+1 at age x and duration r

Death x,r = Actual death during Y at age x and duration r

Note: Startlf x,r and Endlf x,r comprise entirely different sets of lives.

2.13 The table below shows the exposure and death split by gender and by age group.

Table 2.8: The exposure and death from the Final Data

Age	Male			Female		
	ERisk 0+	Actual Death 0+	Crude Rate	ERisk 0+	Actual Death 0+	Crude Rate
01-04	0	0	0.000000	0	0	0.000000
05-09	10	0	0.000000	0	0	0.000000
10-14	12	0	0.000000	2	0	0.000000
15-19	82	0	0.000000	55	0	0.000000
20-24	2,094	0	0.000000	1,778	1	0.000563
25-29	9,904	4	0.000404	9,774	10	0.001023
30-34	18,195	5	0.000275	15,291	8	0.000523
35-39	18,098	14	0.000774	13,603	6	0.000441
40-44	16,161	17	0.001052	11,231	6	0.000534
45-49	14,087	16	0.001136	7,652	8	0.001046
50-54	11,166	11	0.000985	4,593	3	0.000653
55-59	7,138	17	0.002382	3,028	4	0.001321
60-64	2,282	2	0.000876	948	1	0.001055
65-69	109	0	0.000000	43	0	0.000000
70-74	2	0	0.000000	1	0	0.000000
75-79	2	0	0.000000	5	0	0.000000
80-84	5	0	0.000000	7	0	0.000000
85-89	0	0	0.000000	0	0	0.000000
90-94	0	0	0.000000	0	0	0.000000
95-99	0	0	0.000000	0	0	0.000000

3. Mortality Experience between Uganda, Kenya and Rwanda

- 3.1 The previous section discusses the mortality experience for lives assured under Individual Insurance policies in Uganda during the five year period ended 31 December 2019.
- 3.2 In this section, we analyse the similarities between Uganda, Kenya and Rwanda.
- 3.3 A summary of the demographic profile for Uganda, Kenya and Rwanda is shown in the Table 3.1 below.

Table 3.1 Population Composition

	Uganda	Kenya	Rwanda
Population Total (Million)*	44.27	52.57	12.63
Sex Ratio (M/F)*	97%	99%	97%
Death Rate / 1000*	6.55	5.47	5.21
Population Growth*	3.56%	2.27%	2.61%
Life Expectancy at Birth (Male)**	60.20	64.40	66.10
Life Expectancy at Birth (Female)**	64.80	68.90	69.90
Median Age in the Population	15.9	20.1	20.0
GDP per capita, PPP (current international \$)*	2,272	4,509	2,318
Health Expenditure per capita (current USD)*	38	77	49

Population Pyramid*



*Data from World Bank, World Development Indicators, 2017 - 2019

** Data from World Health Organisation, Global Health Observatory data repository, 2016

- 3.4 The world's population is aging but Uganda, Kenya and Rwanda have relatively young population. The median age in Uganda is 15.9 years and Uganda is considered as one of the youngest populations in the world. Among the three countries, Uganda has lowest life expectancy at birth.
- 3.5 Table 3.2 shows the comparison of life expectancy in various ages (every 5 years) between Uganda and Kenya.

Table 3.2 Life Expectancy at Various Ages*

Life Expectancy	Male	Female	Male	Female
	Uganda		Kenya	
AT BIRTH	60.2	64.8	64.4	68.9
AGE 5	58.9	63.1	63	67.2
AGE 10	54.6	58.8	58.6	62.6
AGE 15	50.0	54.2	53.9	57.9
AGE 20	45.9	49.9	49.5	53.3
AGE 25	41.9	45.6	45.3	48.8
AGE 30	37.9	41.5	41.1	44.4
AGE 35	34.1	37.4	37.0	40.0
AGE 40	30.4	33.4	32.9	35.8
AGE 45	26.8	29.4	29	31.7
AGE 50	23.2	25.4	25.1	27.5
AGE 55	19.8	21.5	21.4	23.4
AGE 60	16.3	17.7	17.7	19.4
AGE 65	13.1	14.2	14.3	15.6
AGE 70	10.3	11.1	11.2	12.2
AGE 75	7.7	8.4	8.4	9.2
AGE 80	5.7	6.2	6.2	6.7
AGE 85	4.1	4.5	4.4	4.9

*** Data from World Health Organisation, Global Health Observatory data repository, 2016*

- 3.6 Table 3.3 shows the top 10 causes of (crude) deaths in 2019 among Uganda, Kenya and Rwanda. The death causes are similar among the countries, which the top cause of death being neonatal conditions, followed by respiratory (lower respiratory infections) and cardiovascular (ischaemic heart disease, stroke). Other than that, the top causes of death also include communicable diseases which are HIV/ AIDS, Malaria and tuberculosis.

Table 3.3 Top 10 Causes of Total Number of (Crude) Deaths in 2019*

Uganda	Kenya	Rwanda
Neonatal conditions	Neonatal conditions	Neonatal conditions
HIV / AIDS	Lower respiratory infections	Lower respiratory infections
Lower respiratory infections	HIV / AIDS	Stroke
Malaria	Tuberculosis	Road Injury
Road Injury	Stroke	Ischamic heart disease
Diarrhoeal diseases	Diarrhoeal diseases	Malaria
Stroke	Road Injury	Diarrhoeal diseases
Ischamic heart disease	Cirrhosis of the liver	HIV / AIDS
Tuberculosis	Malaria	Cirrhosis of the liver
Congenital anomalies	Ischamic heart disease	Diabetes mellitus

* Data from World Health Organisation, Global Health Observatory data repository, 2019

The crude death rates for the top 10 causes of death is similar between Uganda (314.88 per 100,000 population) and Kenya (315.18 per 100,000 population), compared to Rwanda (297.40 per 100,000 population)

- 3.7 We understand that the type of life insurance products sold in these countries is similar (i.e. mainly on Savings and Protection plans). For savings plans, the impact of variations in mortality is not that significant on the pricing and valuation. We have carried out a sensitivity analysis on one of the popular savings products in Uganda. By increasing the mortality assumption by 20%, the reserves change by less than 1%. This shows that the products are not sensitive to the mortality assumptions.

Male

- 3.8 Table 3.4 shows the comparison of actual mortality rates by five-year group for Individual policies and the corresponding population mortality rates for Uganda.

Table3.4: Comparison of Mortality Rates between All Male Assured Lives (Crude), and All Male Population in Uganda

Age Group	Rates of Mortality		Ratios	
	All Male Assured Crude 2015/19	All Male Population 2016**		(1) Vs (2)
	(1)	(2)	(3)	(4)
20-24	-	0.00465	*	-100%
25-29	0.00040	0.00539	*	-93%
30-34	0.00027	0.00644	*	-96%
35-39	0.00077	0.00817		-91%
40-44	0.00105	0.00960		-89%
45-49	0.00114	0.01122		-90%
50-54	0.00099	0.01441		-93%
55-59	0.00238	0.01734	*	-86%
60-64	0.00088	0.02430	*	-96%
65-69	-	0.03560	*	-100%
70-74	-	0.05442	*	-100%
75-79	-	0.08404	*	-100%
80-84	-	0.12796	*	-100%
85+	-	0.33333	*	-100%

* Ratio based on 10 actual deaths or fewer

** Data from World Health Organisation, Global Health Observatory data repository

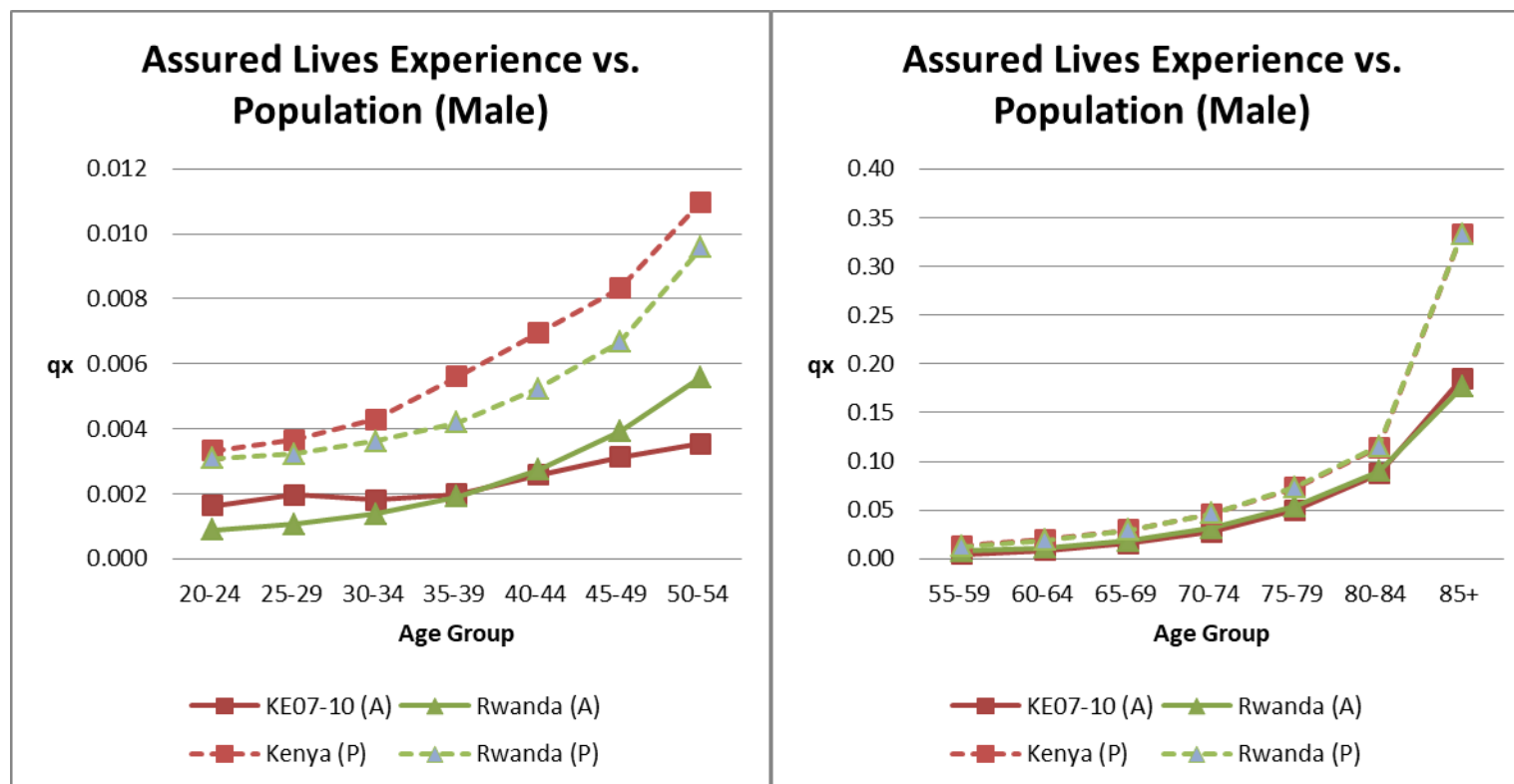
- 3.9 The mortality experience of male lives during 2015 to 2019 is significantly lower from the population mortality experience during the same period. This is mainly due to small sample size used in derivation of crude assured lives mortality rates.
- 3.10 Table 3.5 shows the comparison of mortality rates between the All Males Assured Lives and All Males Population in Kenya and Rwanda. The tables are followed by graph showing the similar comparison.

Table 3.5: Comparison of Mortality Rates between All Male Assured Lives and All Male Population in Kenya and Rwanda

	Rates of Mortality		Ratios	Rates of Mortality		Ratios
	All Male Assured KE07-10	All Male Population Kenya	(1) vs (2)	All Male Assured Rwanda	All Male Population Rwanda	(4) vs (5)
	2015/19	2016**		2015/19	2016**	
	(1)	(2)	(3)	(4)	(5)	(6)
20-24	0.00163	0.00332	-51%	0.00089	0.00310	-71%
25-29	0.00197	0.00366	-46%	0.00107	0.00322	-67%
30-34	0.00182	0.00428	-58%	0.00139	0.00361	-62%
35-39	0.00199	0.00561	-65%	0.00192	0.00420	-54%
40-44	0.00258	0.00694	-63%	0.00273	0.00524	-48%
45-49	0.00312	0.00832	-62%	0.00392	0.00667	-41%
50-54	0.00354	0.01097	-68%	0.00560	0.00959	-42%
55-59	0.00477	0.01332	-64%	0.00785	0.01277	-39%
60-64	0.00860	0.01945	-56%	0.01140	0.01930	-41%
65-69	0.01550	0.02947	-47%	0.01873	0.02965	-37%
70-74	0.02784	0.04576	-39%	0.03160	0.04643	-32%
75-79	0.04961	0.07286	-32%	0.05355	0.07373	-27%
80-84	0.08727	0.11400	-23%	0.09015	0.11553	-22%
85+	0.18522	0.33333	-44%	0.17659	0.33334	-47%

** Data from World Health Organisation, Global Health Observatory data repository

Graph 3.2: Comparison of Mortality Rates between All Male Assured Lives (A) and All Male Population (P) in Kenya and Rwanda



- 3.11 Based on the assured lives mortality rates and the corresponding population mortality rates for Kenya and Rwanda, we noted that the reasonable range of assured lives mortality rates for Males are 45%-65% lower than the population mortality rates.
- 3.12 The life expectancy of All Male Population at age 20 are as follows:

Table3.6: Life Expectancy of All Male Population at Age 20 between Uganda, Kenya and Rwanda**

Life Expectancy at Age 20		
Uganda	Kenya	Rwanda
45.1	48.7	49.7

***Derived using 2016 data from World Health Organisation, Global Health Observatory data repository*

Uganda Male has lower life expectancy compared to Male in Kenya and Rwanda.

Female

- 3.13 Table 3.7 shows the comparison of actual mortality rates by five-year group for Individual policies and the corresponding population mortality rates for Uganda.

Table 3.7: Comparison of Mortality Rates between All Female Assured Lives (Crude), and All Female Population in Uganda

Age Group	Rates of Mortality		Ratios	
	All Female Assured Crude 2015/19	All Female Population 2016**		(1) Vs (2)
	(1)	(2)	(3)	(4)
20-24	0.00056	0.00333	*	-83%
25-29	0.00102	0.00403	*	-75%
30-34	0.00052	0.00464	*	-89%
35-39	0.00044	0.00537	*	-92%
40-44	0.00053	0.00645	*	-92%
45-49	0.00105	0.00733	*	-86%
50-54	0.00065	0.00954	*	-93%
55-59	0.00132	0.01234	*	-89%
60-64	0.00106	0.01845	*	-94%
65-69	-	0.02908	*	-100%
70-74	-	0.04686	*	-100%
75-79	-	0.07432	*	-100%
80-84	-	0.11667	*	-100%
85+	-	0.33333	*	-100%

** Ratio based on 10 actual deaths or fewer*

*** Data from World Health Organisation, Global Health Observatory data repository*

- 3.14 All age group has less than 10 death and this results in the experience significantly lower from the population mortality experience during the same period.
- 3.15 Table 3.8 shows the comparison of mortality rates between the All Females Assured Lives and All Females Population in Kenya and Rwanda. The tables are followed by graph showing similar comparison.

Table 3.8: Comparison of Mortality Rates between All Female Assured Lives and All Female Population in Kenya and Rwanda

	Rates of Mortality		Ratios	Rates of Mortality		Ratios
	All Female Assured KE07-10	All Female Population Kenya	(1) vs (2)	All Female Assured Rwanda	All Female Population Rwanda	(4) vs (5)
	2015/19	2016**		2015/19	2016**	
	(1)	(2)	(3)	(4)	(5)	(6)
20-24	0.00165	0.00207	-20%	0.00053	0.00184	-71%
25-29	0.00173	0.00256	-33%	0.00064	0.00224	-71%
30-34	0.00140	0.00301	-53%	0.00084	0.00267	-69%
35-39	0.00135	0.00407	-67%	0.00122	0.00345	-65%
40-44	0.00170	0.00511	-67%	0.00182	0.00440	-59%
45-49	0.00262	0.00572	-54%	0.00272	0.00527	-48%
50-54	0.00434	0.00738	-41%	0.00407	0.00708	-43%
55-59	0.00718	0.00918	-22%	0.00595	0.00934	-36%
60-64	0.01186	0.01388	-15%	0.00899	0.01432	-37%
65-69	0.01955	0.02249	-13%	0.01535	0.02328	-34%
70-74	0.03211	0.03739	-14%	0.02689	0.03887	-31%
75-79	0.05242	0.06195	-15%	0.04723	0.06383	-26%
80-84	0.08479	0.10190	-17%	0.08229	0.10473	-21%
85+	0.16799	0.33333	-50%	0.17050	0.33333	-49%

** Data from World Health Organisation, Global Health Observatory data repository

Graph 3.3: Comparison of Mortality Rates between All Female Assured Lives (A) and All Female Population (P) in Kenya and Rwanda



- 3.16 Based on the assured lives mortality rates and the corresponding population mortality rates for Kenya and Rwanda, we noted that the reasonable range of assured lives mortality rates for Females are 40%-70% lower than the population mortality rates.
- 3.17 The life expectancy of All Female Population at age 20 are as follows:

Table 3.9: Life Expectancy of All Female Population at Age 20 between Uganda, Kenya and Rwanda**

Life Expectancy at Age 20		
Uganda	Kenya	Rwanda
49.0	52.1	52.5

***Derived using 2016 data from World Health Organisation, Global Health Observatory data repository*

Uganda Female has lower life expectancy compared to Female in Kenya and Rwanda.

4. Development of Mortality Table for Uganda

- 4.1 This section describes the methods we applied to the mortality crude rates to produce a smooth graduated mortality table.
- 4.2 Based on the earlier section, we have concluded that the data collected is far below the threshold required to construct a mortality table. The Final Data cannot be used solely to represent the mortality experience of assured lives in Uganda. We have therefore chosen the graduation methods which take into account the data limitation that we have, and make reference to the information we have presented in the previous sections of the report.
- 4.3 The graduation methods considered in this study are as follows:
- Brass Logit
 - Coale Kisker

Method of Graduation

- 4.4 Table 5.1 shows the graduation methods used for different age band for Males and Females:

Table 5.1: Graduation Methods for Males and Females

Age range	Male
20 – 60	Brass Logit
61 – 99	Coale Kisker
	Female
20 – 50	Brass Logit
51 – 99	Coale Kisker

4.5 Brass Logit Method

Most of the graduation methods involve fitting of a smooth curve using the crude mortality rates. Due to the limited data we have, there are many ages where we do not have any experience. Therefore, we need a graduation method which assumes that the lives under this mortality investigation have similar structure as a standard mortality table.

Brass Logit assumes that the transformation of probabilities of survival to age x and the corresponding probabilities for different life tables are approximately linear.

The formula used was

$$\text{logit}(l_x) = \alpha + \beta \text{logit}(l_x^s)$$

$$\text{if } \text{logit}(l_x) = 0.5 \ln \left(\frac{(1.0 - l_x)}{l_x} \right)$$

Then

$$0.5 \ln \left(\frac{(1.0 - l_x)}{l_x} \right) = \alpha + 0.5 \beta \ln \left(\frac{(1.0 - l_x^s)}{l_x^s} \right)$$

l_x is the proportion of survival at age x based on the investigation data

l_x^s is the proportion of survival at age x based on the standard table

α is the constant which can be used to adjust the overall level of the mortality table

β is the constant which can be used to change the slope of the mortality table

We have chosen Kenya Assured Lives KE07-10 table as the standard table due to similarities between Kenya and Uganda population. Adjustments have been made to the α factor for both Male and Female tables, based on our knowledge of the mortality patterns between Uganda and Kenya.

4.6 Coale Kisker Method

Coale Kisker method assumes a steady decrease in the rate of increase in mortality in high ages. In other words, contrary to the usual constant exponential rate adopted by Gompertz and Makeham law, the method assumes the exponential rate of mortality to decline linearly.

The method extrapolates the mortality rates based on mortality rates around a chosen age t , and provides a closure to the life table at a chosen target age, ω .

For $x \geq t$, define $k(x) = k(t-1) - R$, where $k(x) = \ln(q_x/q_{x-1})$

Extending the formula up to age ω yields

$$k(t) = k(t-1) - R$$

$$k(t+1) = k(t-1) - 2R$$

.

.

.

$$k(\omega) = k(t-1) - (\omega - t + 1)R$$

Summing up the above formula, yield the following

$$k(t) + \dots + k(\omega) = (\omega - t + 1) \times k(t-1) - R(1 + 2 + \dots + (\omega - t) + (\omega - t + 1))$$

$$\ln(q_\omega) - \ln(q_{t-1}) = (\omega - t + 1) \times k(t-1) - R(1 + 2 + \dots + (\omega - t) + (\omega - t + 1))$$

Solving for R , we obtain

$$R = \{(\omega - t + 1) k(t-1) + \ln(q_{t-1}) - \ln(q_\omega)\} / (1 + 2 + \dots + (\omega - t) + (\omega - t + 1))$$

The method allows the selection of a target mortality rate for a target age, ω . This ensures the rate of increase at the oldest ages is not abrupt and a smooth closure of a life table can be obtained.

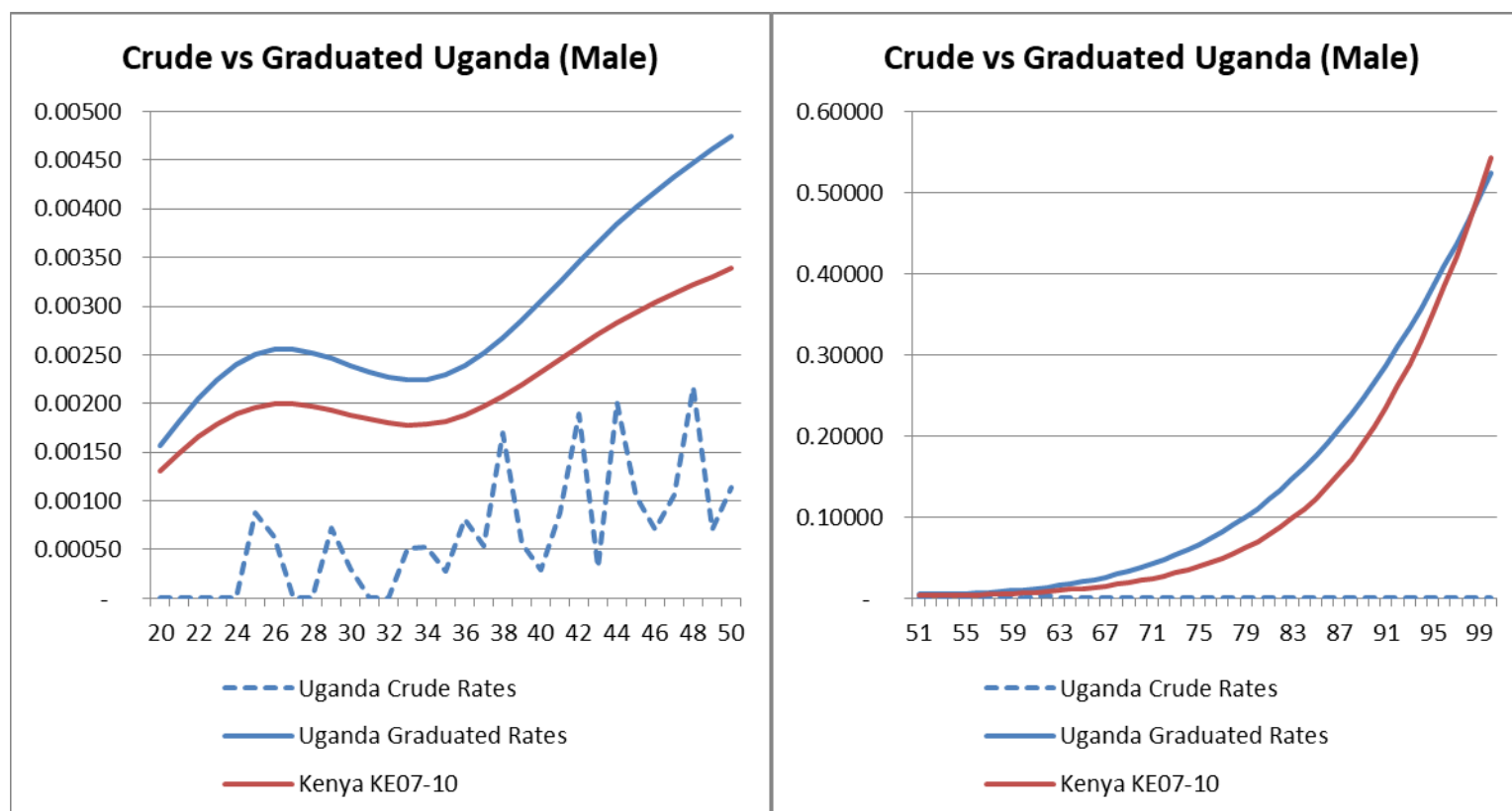
For this mortality investigation, we have a target mortality rate of 1 for age 115 for both Male and Female.

5. Graduation Results

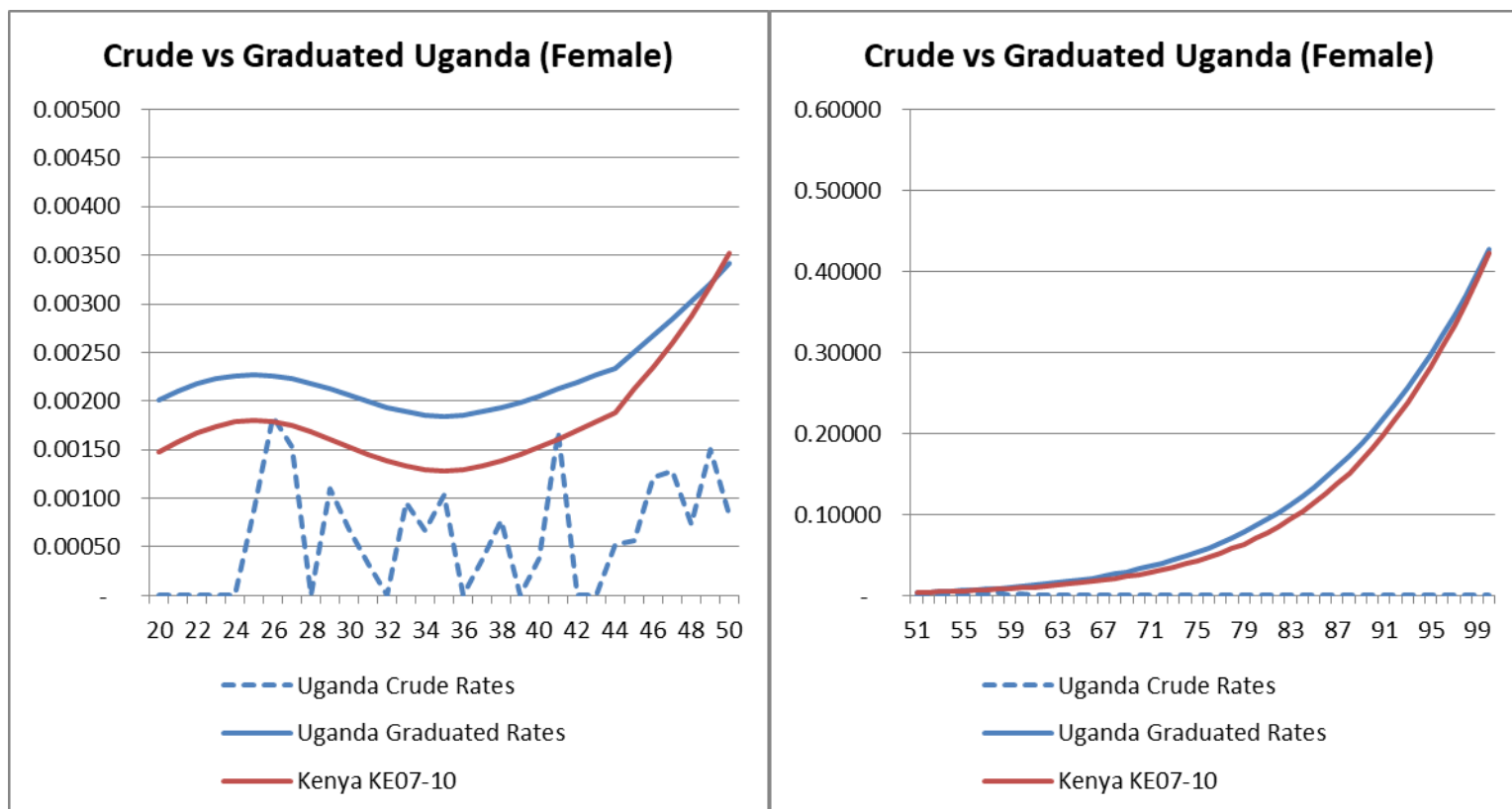
5.1 This section summarises the graduated mortality table for lives assured in Uganda during the five year period ended 31 December 2019.

Graduation Results

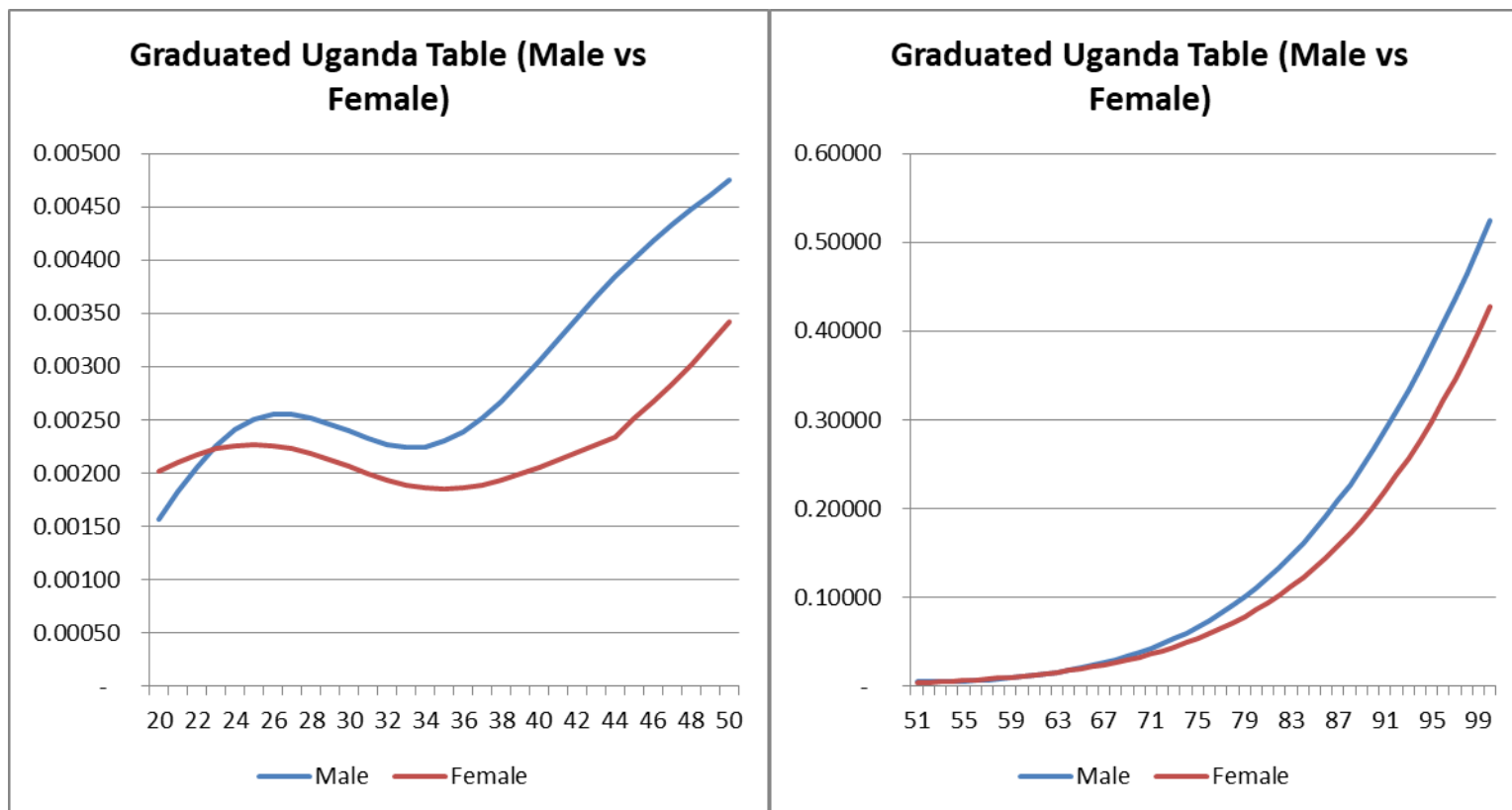
5.2 Annexure 1 and 2 show the raw and graduated mortality rates for lives assured in Uganda during the five year period ended 31 December 2019. The comparison between Male graduated rates, raw rates, KE07-10 rates are shown below.



5.3 The comparison between Female graduated rates, raw rates, KE07-10 rates are shown below.



5.4 The graph below shows the comparison between Male and Female graduated rates.



6. Comparison of Uganda Assured Lives Table

- 6.1 The mortality experience for Uganda Assured Lives table is compared to the mortality experience for the published mortality tables around the region, in particularly from Kenya and Rwanda.
- 6.2 We have selected two published mortality tables for comparison purposes. These tables are:
- a) KE 2007-2010 Mortality Tables for Assured Lives in Kenya.
 - b) Rwanda Mortality Table 2012 - 2016.

Annexure 3 shows the complete mortality tables for Kenya and Rwanda.

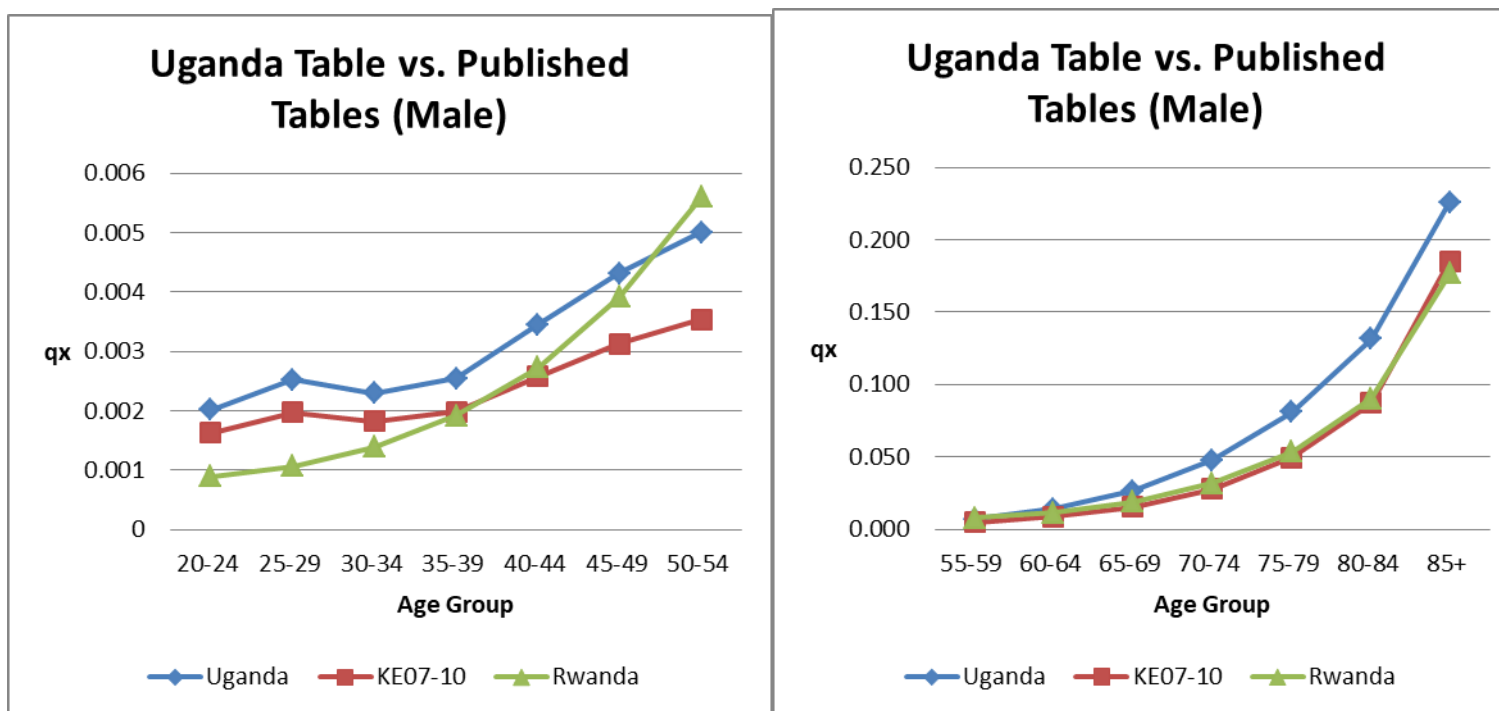
Male

- 6.3 Table 6.1 shows the actual mortality rates by five-year age group, and the corresponding mortality rates of KE 2007-2010 and Rwanda Mortality Table 2012-2016 for the exposed to risk in the same age group and the corresponding ratios. A graph of these mortality rates is presented on the following pages.

Table 6.1: Comparison of Graduated Mortality Rates against KE2007-2010 and Rwanda Mortality Tables

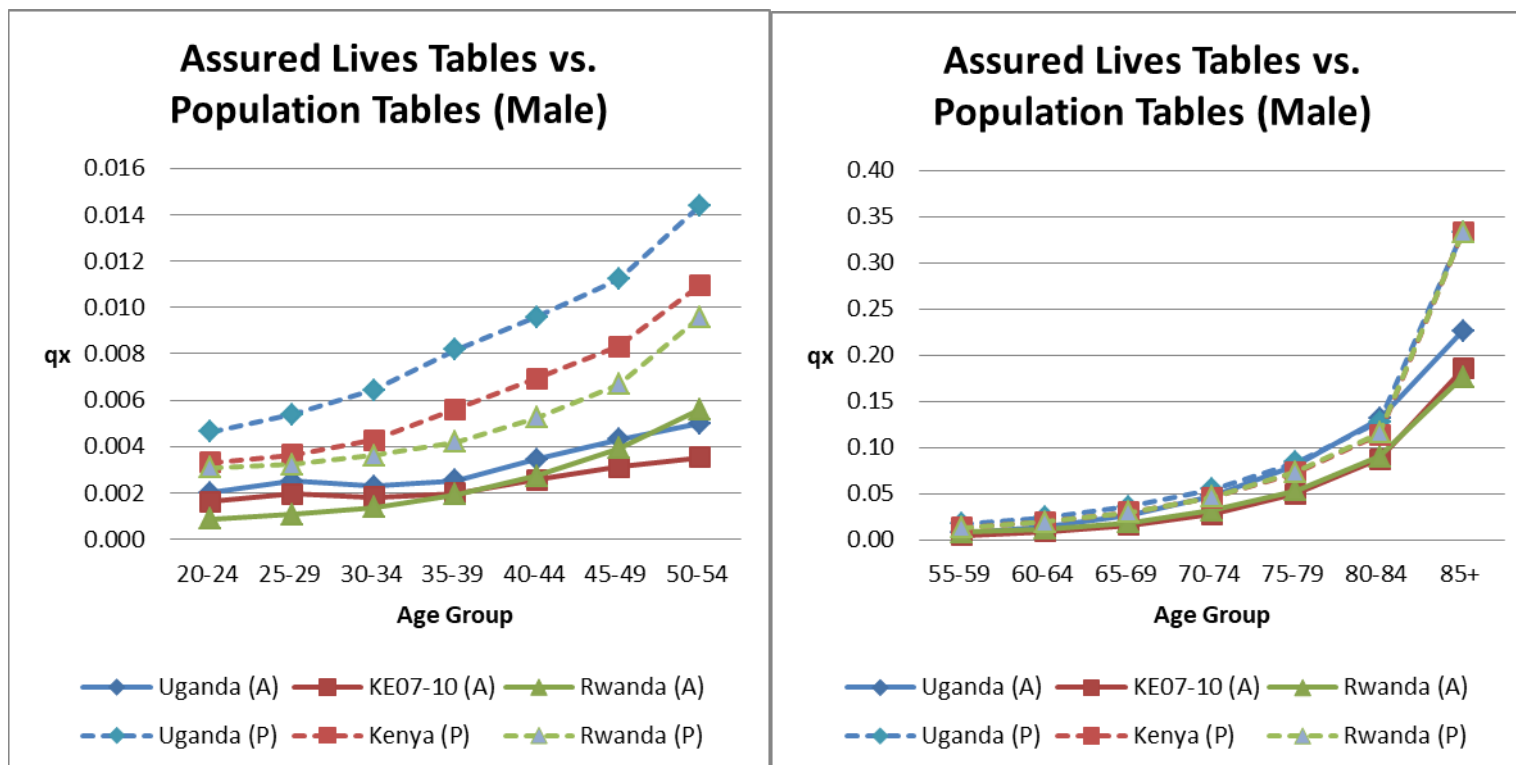
Age Group	Rates of Mortality			Ratios	
	Uganda Graduated	KE2007-10	Rwanda	(1) Vs (2)	(1) Vs (3)
	(1)	(2)	(3)	(4)	(5)
20-24	0.002018	0.001628	0.000889	24%	127%
25-29	0.002519	0.001971	0.001067	28%	136%
30-34	0.002295	0.00182	0.001386	26%	66%
35-39	0.002546	0.001988	0.001919	28%	33%
40-44	0.003450	0.002578	0.002733	34%	26%
45-49	0.004321	0.003125	0.003917	38%	10%
50-54	0.005004	0.003543	0.005597	41%	-11%
55-59	0.007103	0.004773	0.007854	49%	-10%
60-64	0.013970	0.008598	0.011396	62%	23%
65-69	0.026421	0.015502	0.018727	70%	41%
70-74	0.047494	0.027835	0.031602	71%	50%
75-79	0.081084	0.04961	0.053546	63%	51%
80-84	0.131422	0.087268	0.090151	51%	46%
85+	0.226165	0.185216	0.176593	22%	28%

Graph 6.1: Comparison of Graduated Mortality Rates against KE2007-2010 and Rwanda Mortality Tables



6.4 The graph below shows the comparison of assured lives tables and population table for Uganda, Kenya and Rwanda.

Graph 6.2: Comparison of Assured Lives Mortality Rates (A) against Population Mortality Tables (P)**



***Derived using data from World Health Organisation, Global Health Observatory data repository*

6.5 The Table below show the life expectancy at age 20.

Table 6.2: Life Expectancy for Male at age 20

Life Expectancy at Age 20			
	Uganda	Kenya	Rwanda
Population Table**	45.1	48.7	49.7
Assured Lives Table	52.6	57.0	56.2

***Derived using 2016 data from World Health Organisation, Global Health Observatory data repository*

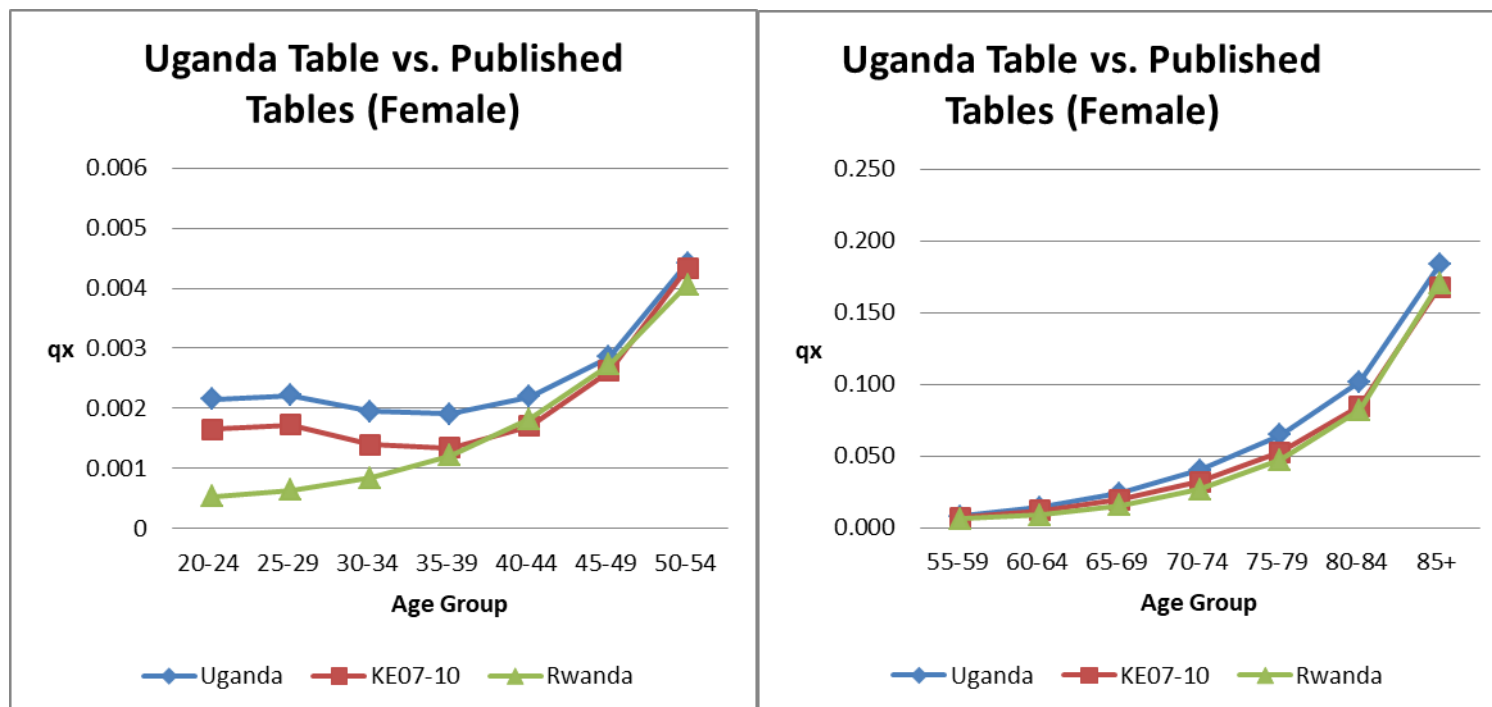
Female

6.6 Table 6.3 shows the actual mortality rates by five-year age group, and the corresponding mortality rates of KE 2007-2010 and Rwanda Mortality Table 2012-2016 for the exposed to risk in the same age group and the corresponding ratios. A graph of these mortality rates is presented on the following pages.

Table 6.3: Comparison of Graduated Mortality Rates against KE2007-2010 and Rwanda Mortality Tables

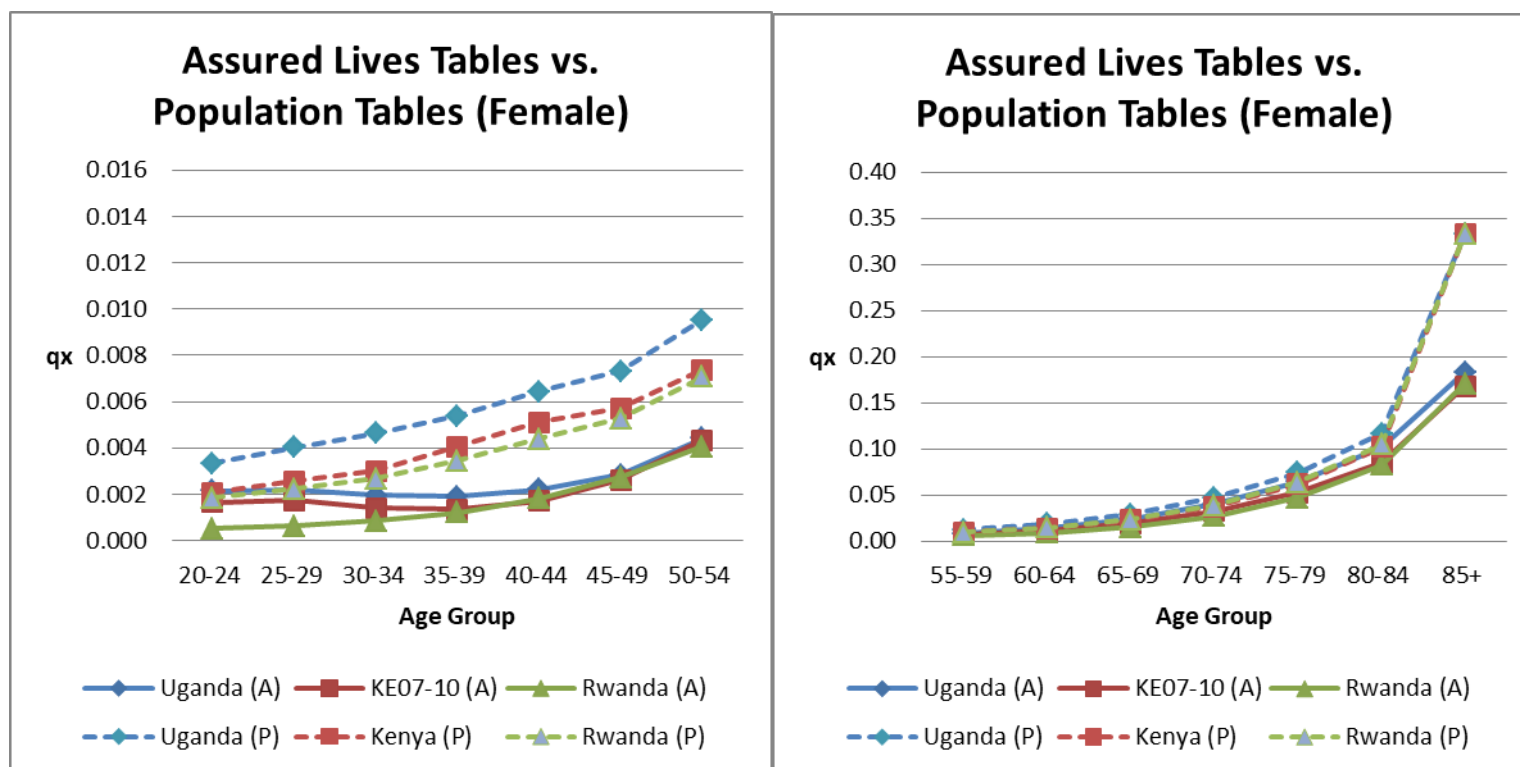
Age		Rates of Mortality			Ratios	
Group	Female	Female	Female	(1) Vs (2)	(1) Vs (3)	
	Uganda	KE2007-10	Rwanda			
	Crude					
	(1)	(2)	(3)	(4)	(5)	
20-24	0.002156	0.001654	0.000534	30%	304%	
25-29	0.002213	0.001725	0.000640	28%	246%	
30-34	0.001947	0.001400	0.000839	39%	132%	
35-39	0.001902	0.001347	0.001215	41%	57%	
40-44	0.002193	0.001702	0.001816	29%	21%	
45-49	0.002850	0.002622	0.002724	9%	5%	
50-54	0.004419	0.004341	0.004065	2%	9%	
55-59	0.007988	0.007180	0.005947	11%	34%	
60-64	0.014050	0.011860	0.008987	18%	56%	
65-69	0.024038	0.019548	0.015353	23%	57%	
70-74	0.039986	0.032105	0.026890	25%	49%	
75-79	0.064649	0.052423	0.047226	23%	37%	
80-84	0.101533	0.084793	0.082288	20%	23%	
85+	0.183407	0.167988	0.170505	9%	8%	

Graph 6.3: Comparison of Graduated Mortality Rates against KE2007-2010 and Rwanda Mortality Tables



6.7 The graph below shows the comparison of assured lives tables and population table for Uganda, Kenya and Rwanda.

Graph 6.4: Comparison of Assured Lives Mortality Rates against Population Mortality Tables**



6.8 The Table below show the life expectancy at age 20.

Table 6.4: Life Expectancy for Female at age 20

Life Expectancy at Age 20			
	Uganda	Kenya	Rwanda
Population Table**	49.0	52.1	52.5
Assured Lives Table	54.1	56.6	58.4

***Derived using 2016 data from World Health Organisation, Global Health Observatory data repository*

7. Summary and Recommendations

7.1 This is the first mortality table for Uganda Assured Lives. The data collected through this project is far below the threshold required to construct a mortality table. We have therefore chosen graduation methods which take into account the data limitation that we have, and adjust the table based on information we gathered on the mortality experience of the Uganda population.

7.2 The data from group business has been excluded in the study due to lack of gender and age information for majority part of the business.

We recommend the companies to start collecting crucial information from now onwards so that more data can be used in the next mortality study. The full list of crucial fields can be found in Annexure 4.

7.3 Only 1 company offer longevity product and no death claim has been recorded. Therefore there is no data available to build a separate mortality table for longevity product.

For countries that do not have annuitant mortality table, it is common for the insurers to take two years setback using the assured lives mortality table. Therefore, companies may consider applying two years setback of the Uganda Mortality Table for longevity product.

7.4 Given that majority of the products sold in Uganda is savings products with low surrender value at initial duration, variation in mortality would not have significant impact to profitability and reserving. On the other hand, high lapses may have a much higher impact on profitability compared to mortality.

7.5 We recommend the industry to redo the mortality experience analysis once there is sufficient data collected.

ANNEXURE 1

MALE - RAW AND GRADUATED RATES

AGE	EXPOSURE	CLAIMS	RAW	GRADUATED
20	154.0	-	-	0.001563
21	262.0	-	-	0.001822
22	364.5	-	-	0.002053
23	521.5	-	-	0.002251
24	792.0	-	-	0.002405
25	1,132.0	1.0	0.000883	0.002508
26	1,589.0	1.0	0.000629	0.002554
27	2,031.5	-	-	0.002554
28	2,355.0	-	-	0.002520
29	2,796.5	2.0	0.000715	0.002461
30	3,283.0	1.0	0.000305	0.002393
31	3,531.5	-	-	0.002325
32	3,700.0	-	-	0.002270
33	3,901.0	2.0	0.000513	0.002239
34	3,779.5	2.0	0.000529	0.002246
35	3,677.5	1.0	0.000272	0.002297
36	3,701.5	3.0	0.000810	0.002390
37	3,677.5	2.0	0.000544	0.002518
38	3,522.5	6.0	0.001703	0.002674
39	3,518.5	2.0	0.000568	0.002855
40	3,496.0	1.0	0.000286	0.003049
41	3,400.5	3.0	0.000882	0.003253
42	3,171.5	6.0	0.001892	0.003458
43	3,104.5	1.0	0.000322	0.003656
44	2,988.0	6.0	0.002008	0.003843
45	2,860.5	3.0	0.001049	0.004015
46	2,829.5	2.0	0.000707	0.004177
47	2,824.0	3.0	0.001062	0.004330
48	2,770.5	6.0	0.002166	0.004475
49	2,802.0	2.0	0.000714	0.004613
50	2,624.0	3.0	0.001143	0.004746
51	2,464.5	-	-	0.004877
52	2,166.0	2.0	0.000923	0.005006
53	2,034.5	4.0	0.001966	0.005135
54	1,876.5	2.0	0.001066	0.005264
55	1,658.5	4.0	0.002412	0.005394
56	1,533.5	4.0	0.002608	0.006056

AGE	EXPOSURE	CLAIMS	RAW	GRADUATED
57	1,389.0	4.0	0.002880	0.006958
58	1,333.0	2.0	0.001500	0.007991
59	1,224.0	3.0	0.002451	0.009178
60	998.0	-	-	0.010542
61	639.5	1.0	0.001564	0.012059
62	328.5	1.0	0.003044	0.013796
63	193.0	-	-	0.015751
64	123.0	-	-	0.017947
65	80.5	-	-	0.020409
66	19.0	-	-	0.023163
67	5.5	-	-	0.026236
68	2.5	-	-	0.029657
69	1.5	-	-	0.033459
70	0.5	-	-	0.037672
71	1.0	-	-	0.042332
72	0.5	-	-	0.047474
73	-	-	-	0.053134
74	-	-	-	0.059351
75	-	-	-	0.066164
76	0.5	-	-	0.073612
77	-	-	-	0.081736
78	-	-	-	0.090577
79	1.0	-	-	0.100174
80	2.0	-	-	0.110567
81	1.0	-	-	0.121797
82	1.0	-	-	0.133901
83	0.5	-	-	0.146915
84	-	-	-	0.160874
85	-	-	-	0.175809
86	-	-	-	0.191748
87	-	-	-	0.208717
88	-	-	-	0.226737
89	-	-	-	0.245823
90	-	-	-	0.265986
91	-	-	-	0.287231
92	-	-	-	0.309556
93	-	-	-	0.332954
94	-	-	-	0.357409
95	-	-	-	0.382898

AGE	EXPOSURE	CLAIMS	RAW	GRADUATED
96	-	-	-	0.409390
97	-	-	-	0.436845
98	-	-	-	0.465214
99	-	-	-	0.494442
100	-	-	-	0.524462

ANNEXURE 2

FEMALE - RAW AND GRADUATED RATES

AGE	EXPOSURE	CLAIMS	RAW	GRADUATED
20	101.0	-	-	0.002015
21	175.5	1.0	0.005698	0.002103
22	258.5	-	-	0.002174
23	468.5	-	-	0.002227
24	774.0	-	-	0.002260
25	1,142.0	1.0	0.000876	0.002272
26	1,630.0	3.0	0.001840	0.002259
27	1,957.5	3.0	0.001533	0.002228
28	2,326.0	-	-	0.002180
29	2,718.0	3.0	0.001104	0.002123
30	2,957.5	2.0	0.000676	0.002060
31	3,063.5	1.0	0.000326	0.001995
32	3,123.5	-	-	0.001936
33	3,132.5	3.0	0.000958	0.001888
34	3,014.0	2.0	0.000664	0.001857
35	2,896.0	3.0	0.001036	0.001847
36	2,816.0	-	-	0.001858
37	2,667.0	1.0	0.000375	0.001888
38	2,597.5	2.0	0.000770	0.001932
39	2,626.0	-	-	0.001988
40	2,582.0	1.0	0.000387	0.002052
41	2,375.5	4.0	0.001684	0.002121
42	2,265.0	-	-	0.002194
43	2,108.0	-	-	0.002266
44	1,900.5	1.0	0.000526	0.002336
45	1,752.5	1.0	0.000571	0.002512
46	1,651.5	2.0	0.001211	0.002671
47	1,553.5	2.0	0.001287	0.002840
48	1,360.5	1.0	0.000735	0.003021
49	1,333.5	2.0	0.001500	0.003213
50	1,221.0	1.0	0.000819	0.003417
51	1,016.0	-	-	0.003861
52	854.0	1.0	0.001171	0.004362
53	784.5	-	-	0.004924
54	717.0	1.0	0.001395	0.005551
55	677.5	-	-	0.006252
56	633.0	1.0	0.001580	0.007033

AGE	EXPOSURE	CLAIMS	RAW	GRADUATED
57	613.0	1.0	0.001631	0.007903
58	596.0	2.0	0.003356	0.008872
59	508.0	-	-	0.009948
60	408.0	1.0	0.002451	0.011143
61	273.0	-	-	0.012468
62	135.0	-	-	0.013936
63	77.5	-	-	0.015559
64	54.0	-	-	0.017352
65	34.5	-	-	0.019331
66	7.0	-	-	0.021513
67	1.0	-	-	0.023915
68	-	-	-	0.026556
69	-	-	-	0.029457
70	-	-	-	0.032639
71	-	-	-	0.036126
72	-	-	-	0.039942
73	-	-	-	0.044113
74	1.0	-	-	0.048667
75	2.5	-	-	0.053633
76	1.5	-	-	0.059042
77	-	-	-	0.064925
78	-	-	-	0.071318
79	1.0	-	-	0.078255
80	1.0	-	-	0.085773
81	2.5	-	-	0.093912
82	2.0	-	-	0.102712
83	1.0	-	-	0.112215
84	-	-	-	0.122464
85	-	-	-	0.133504
86	-	-	-	0.145382
87	-	-	-	0.158144
88	-	-	-	0.171841
89	-	-	-	0.186521
90	-	-	-	0.202236
91	-	-	-	0.219038
92	-	-	-	0.236978
93	-	-	-	0.256109
94	-	-	-	0.276485
95	-	-	-	0.298158

AGE	EXPOSURE	CLAIMS	RAW	GRADUATED
96	-	-	-	0.321182
97	-	-	-	0.345608
98	-	-	-	0.371490
99	-	-	-	0.398876
100	-	-	-	0.427817

ANNEXURE 3

KE 2007-2010 Mortality Tables for Assured Lives in Kenya

AGE	MALE	FEMALE	AGE	MALE	FEMALE	AGE	MALE	FEMALE
16	0.000448	0.000946	44	0.002827	0.001885	72	0.027633	0.031992
17	0.000675	0.001088	45	0.002935	0.002123	73	0.031068	0.035333
18	0.000897	0.001227	46	0.003036	0.002348	74	0.034922	0.039015
19	0.001111	0.001359	47	0.003131	0.002597	75	0.039244	0.043073
20	0.001311	0.001480	48	0.003220	0.002873	76	0.044089	0.047541
21	0.001494	0.001587	49	0.003305	0.003178	77	0.049516	0.052461
22	0.001655	0.001676	50	0.003386	0.003515	78	0.055592	0.057874
23	0.001790	0.001743	51	0.003466	0.003888	79	0.062388	0.063827
24	0.001894	0.001786	52	0.003544	0.004301	80	0.069984	0.070368
25	0.001963	0.001801	53	0.003622	0.004757	81	0.078466	0.077552
26	0.001994	0.001785	54	0.003700	0.005261	82	0.087926	0.085435
27	0.001994	0.001744	55	0.003778	0.005819	83	0.098465	0.094078
28	0.001971	0.001684	56	0.004171	0.006436	84	0.110188	0.103544
29	0.001932	0.001612	57	0.004697	0.007118	85	0.123210	0.113902
30	0.001886	0.001534	58	0.005288	0.007871	86	0.137648	0.125221
31	0.001840	0.001456	59	0.005954	0.008705	87	0.153624	0.137576
32	0.001803	0.001386	60	0.006704	0.009626	88	0.171264	0.151040
33	0.001782	0.001330	61	0.007547	0.010644	89	0.190692	0.165692
34	0.001787	0.001294	62	0.008496	0.011768	90	0.212028	0.181607
35	0.001821	0.001283	63	0.009563	0.013012	91	0.235385	0.198860
36	0.001884	0.001296	64	0.010764	0.014385	92	0.260864	0.217524
37	0.001970	0.001330	65	0.012116	0.015902	93	0.288545	0.237666
38	0.002074	0.001381	66	0.013635	0.017578	94	0.318482	0.259347
39	0.002193	0.001447	67	0.015343	0.019428	95	0.350694	0.282614
40	0.002320	0.001524	68	0.017264	0.021472	96	0.385154	0.307505
41	0.002452	0.001610	69	0.019423	0.023727	97	0.421781	0.334037
42	0.002583	0.001701	70	0.021849	0.026216	98	0.460427	0.362207
43	0.002709	0.001793	71	0.024573	0.028963	99	0.500869	0.391986

Rwanda Mortality Table 2012 - 2016

AGE	MALE	FEMALE	AGE	MALE	FEMALE	AGE	MALE	FEMALE
20	0.000845	0.000507	54	0.006872	0.005113	88	0.164134	0.155599
21	0.000862	0.000517	55	0.007347	0.005511	89	0.179359	0.171141
22	0.000885	0.000531	56	0.007843	0.005932	90	0.195537	0.187786
23	0.000912	0.000547	57	0.008358	0.006373	91	0.212757	0.205640
24	0.000943	0.000566	58	0.008888	0.006832	92	0.230996	0.224697
25	0.000977	0.000586	59	0.009440	0.007315	93	0.250087	0.244814
26	0.001018	0.000611	60	0.010300	0.008045	94	0.269714	0.265695
27	0.001063	0.000638	61	0.011280	0.008880	95	0.289682	0.287156
28	0.001112	0.000667	62	0.012400	0.009838	96	0.309842	0.309057
29	0.001167	0.000700	63	0.013676	0.010935	97	0.330071	0.330071
30	0.001229	0.000738	64	0.015123	0.012185	98	0.350267	0.350267
31	0.001300	0.000780	65	0.016749	0.013599	99	0.370287	0.370287
32	0.001377	0.000829	66	0.018574	0.015196	100	0.390019	0.390019
33	0.001464	0.000890	67	0.020621	0.016999	101	0.409471	0.419471
34	0.001561	0.000959	68	0.022919	0.019034	102	0.428466	0.428466
35	0.001666	0.001033	69	0.025505	0.021340	103	0.446903	0.446903
36	0.001782	0.001116	70	0.028303	0.023856	104	0.464711	0.464711
37	0.001908	0.001207	71	0.031433	0.026688	105	0.481815	0.481815
38	0.002046	0.001307	72	0.034934	0.029878	106	0.498088	0.498088
39	0.002194	0.001415	73	0.038851	0.033467	107	0.513530	0.513530
40	0.002355	0.001534	74	0.043224	0.037502	108	0.528146	0.528146
41	0.002530	0.001663	75	0.048099	0.042028	109	0.541913	0.541913
42	0.002719	0.001804	76	0.053527	0.047102	110	0.554818	0.554818
43	0.002923	0.001958	77	0.059579	0.052797	111	0.566845	0.566845
44	0.003145	0.002126	78	0.066316	0.059177	112	0.577990	0.577990
45	0.003379	0.002305	79	0.073776	0.066290	113	0.588251	0.588251
46	0.003632	0.002500	80	0.081990	0.074178	114	0.597627	0.597627
47	0.003900	0.002709	81	0.090996	0.082888	115	0.606125	0.606125
48	0.004189	0.002935	82	0.100858	0.092495	116	0.613748	0.613748
49	0.004498	0.003179	83	0.111648	0.103081	117	0.620508	0.620508
50	0.004831	0.003445	84	0.123407	0.114700	118	0.626410	0.626410
51	0.005191	0.003733	85	0.136107	0.127346	119	0.631464	0.631464
52	0.005577	0.004046	86	0.149708	0.140997	120	1.000000	1.000000
53	0.005987	0.004380	87	0.164134	0.155599	121	-	-

ANNEXURE 4

This section provides recommendations and provides a data template for future data collection.

Individual Life In-Force

Policy Number	Valuation Date	Date of Commencement	Date of Birth	Gender	Product Name	Product Type	Policy Status	Medical Underwriting
This column should contain the unique identifier of the policy.	The data included should follow this valuation date. E.g. Valuation Date 31/12/2019. All the data provided should be the in force data as at 31/12/2019, not the business written in 2019 only.	Make sure the date of commencement is before or as at valuation Date. E.g. If the valuation date is 31/12/2019, all the data have to be commenced before 31/12/2019		M/F only		Please include the type of product. (Longevity, Protection, Savings, etc.)	In Force/ Paid Up	Medical lives / Non-medical lives / non-underwritten lives

Individual Life Claims

Policy Number	Date of Commencement	Date of Birth	Gender	Product Name	Product Type	Date of Loss	Claim Cause	Medical Underwriting
			M/F only				Only Death data should be included.	Medical lives / Non-medical lives / non-underwritten lives

Group Life In-Force

Group	Valuation Date	Unique Identifier	Date of Commencement	Date of Birth	Gender	Policy Status	Annual Salary	Industry
The insured group / institution				The company should start collecting the date of birth of each member in the group.	The company should start collecting the gender of each member in the group.			Light industries included companies operating in financial services, business administration and other services such as retail, education, healthcare and information technology. Mid industries included light manufacturing and other blue collar work that does not involve heavy machinery. Heavy industries included companies operating in mining, transport and other heavy manufacturing

Group Life Claims

Group	Unique Identifier	Date of Commencement	Date of Birth	Gender	Date of Loss	Claim Cause
				Please indicate the gender of the death member in the group		Only Death data should be included.

