Chapter 2: Construction of Complete Life Tables for 23 Districts of Assam for Both Male and Female

2.1 Introduction

A life table is a statistical device used by actuaries, demographers, public health workers and others to present the mortality experience of a population total in a structure that grants noting numerous related inquiries on mortality [47]. A complete picture of mortality is given by a life table. Life tables are used to compute life expectancy at birth and at different ages, but they are also used to compute many other indicators: death probabilities, probabilities of survival between two ages, years of life lived and the number of survivors at different ages. It joins mortality experience of a population at various ages into a single statistical model. In different applications the death rates in the life table are combined with other demographic data into a complex model which measures the joined impact of mortality and changes in one or more socioeconomic characteristics [52]. The mains columns in the table are: l_x, $_nd_x$, $_nq_x$, $_nL_x$, T_x, $e^0{}_x$ [35]. The essential synopsis measure of mortality from the life table, the expectation of life at birth, is broadly understood by general public and trends in life expectancy are closely monitored as the principal measure of changes in a population's health status. The life

expectancy at birth, the last yield of a life table, is the average number of years a new born of a particular place can expect to live. It is typically considered as an important indicator of the mortality level of population [53].

The death registration system of India is not adequate and so by using the conventional method life tables cannot be constructed [[43], [6]]. A number of indirect methods are available in the absence of observed age specific death rates [59]. Most of these methods cannot be adopted because of unavailable of one or more required data elements or the underlying assumptions are not satisfied. A set of model life tables ideally depicting the typical age-patterns of mortality for different levels may be of immense help to construct life tables for such countries if the level of mortality is indirectly estimated. United Nations made the first attempt to develop model life tables [58]. In the Coale Demeny [13] regional model life tables four patterns ascertained within the 192 life tables by sex were known. For every of those patterns coefficients of linear equations relating to $_nq_x$ and $e_{10}{}^0$ were obtained by least square regression. From the equations, it had been easy to derive an entire set of $_nq_x$ values and, therefore, a model life table from any given value of $e_{10}{}^0$ [59]. Choudhury and Sarma [12] estimated the curve of $_nq_x$ from $e_0{}^0$ instead of $e_{10}{}^0$ (as they have only the estimated $e_0{}^0$ for the districts) by using the Sample Registration System (SRS) data covering a period of 30 years from 1970-75 to 2001-05 for India and its major states. The paper by Wrycza, T. and Annette, B [67] presented and proved the central relationship between change in mortality and resulting change in e_0, and systematically applied it to investigate the effect of specific mortality perturbations. For many purposes it is necessary to have mortality data by year of age (complete life table) in the population. When such complete data are not available, estimating complete life tables from abridged life tables is required. In this chapter, we have been constructed complete life tables of 23 districts of Assam. It often happens that only an abridged life table is available when a complete one is needed. Hence it is an important problem to construct a full table. As the complete life tables of districts of Assam are not available so first we have expanded abridged life table to complete one.

In this research work one of the objectives is to compare different parametric mortality models and to find a suitable model at some selected age groups 20-60 and 60-100 for

people of mortality of districts of Assam for both male and female. As all the mortality models can not apply to the entire age range so the mortality pattern is divided by two age groups to separate working years and retirement. For fitting the mortality models to the above respective groups we need the complete one. Because of lacking information of abridged life tables we can't get the satisfactory result. In addition, another objective is to find a suitable mortality model for projection of oldest-old force of mortality rates of Assam. For this we require the data of complete ones. Moreover, to project the mortality rates by using mortality modeling the complete life tables are needed for obtaining the satisfactory result. In chapter 4 and chapter 5, the complete life tales have been applied for fitting the mortality models.

In addition the complete life table has many advantages. The advantages of the complete life table are greater accuracy and greater age detail. Complete annual life tables have the advantage of being comparable to the decennial life tables. The abridged life table is a short cut method designed for use when the time, skill, or computational resources needed to prepare a complete life table are not available. Clearly, when circumstances are favourable in terms of resources, skill, and data, the complete life table is preferred over the abridged life table. Complete life tables allow us more valuable interpretations. Complete life tables have the advantage of being more detailed than abridged tables, especially for old ages, where most of the decline in mortality has been concentrated for some years now. In addition complete life tables have many applications in health statistics. For example to estimate the mortality due to cancer, it is necessary to have mortality data by year of age in the population of cancer patients. When such data are not available, estimating complete life tables from abridged life tables is necessary. Cancer relative survival is the ratio of the observed survival in cancer patients to the survival over the same period in the age- and sex-matched general population. For the purposes of calculating relative survival, complete life tables for men and for women are required. In this chapter, a numerical methodology has been introduced to construct a complete life table from an abridged life table. Complete life tables for 23 districts of Assam have been constructed by expanding the abridged life tables using Elandt- Johnson method [20]. The Elandt–Johnson method is most useful for estimating complete life table from abridged life table [2]. In this chapter, complete 23 life tables for 23 districts of Assam

have been constructed for both male and female. This work is important as the complete life tables of districts of Assam are not available in sample registration system (SRS). The construction of a life table makes it possible to summarize mortality within a population at a given time or within a cohort.

2.1 Objectives

Complete life tables for the districts of Assam are not available in sample registration system (SRS). At the purpose once mortality data by year of age aren't accessible, evaluating complete life tables from abridged life tables is crucial. In this chapter, the main objective is to construct complete life tables for 23 districts of Assam for both male and female from our constructed abridged life tables.

2.2 Methods and Materials

2.2.1 Construction of Abridged Life Table

An indirect method has been applied for constructing abridged life tables of 23 districts in Assam. First the model life tables of Assam have been developed for both male and female. The SRS information covering a time period of 15 years from 1995-99 to 2009-13 (Census of India, [10]) are used to construct model life table for Assam. The life tables have been constructed by estimating the life table functions $e^0{}_x$ and $_nq_x$ based on $e^0{}_0$ by using the regression method of estimation [11]. Statistical Package for the Social Sciences (SPSS) is used to check the existence of proper functional relationship (Model) (linear, quadratic or cubic) between $e^0{}_x$ and $_nq_x$ with $e^0{}_0$. The best fit model $e^0{}_x$ is selected based on the most extreme R^2 value. On the off chance that for some x, the ascertained $_nq_x$ results in some negative value or the $_nq_x$ curve demonstrates a few inconsistencies we bring the capacity with the following most astounding and so on till all $_nq_x$ values are computed up to age $x = 85$. From the equations, it is easy to derive an entire set of $_nq_x$ values and, therefore, a model life table from any given value of $e_0{}^0$. The remaining functions of the model life table have been determined as:

The remaining functions of the model life table are determined as:

$$d_x = q_x l_x \text{ for } x = 1, 5, \cdots 85 \text{ and } l_0 = 100000,$$

$$l_{x+n} = l_x - d_x,$$

$$_1L_0 = 0.276 l_0 + 0.724 l_1,$$

$$_4L_1 = 0.034 l_0 + 1.184 l_1 + 2.782 l_5,$$

$$_5L_5 = -0.003 l_0 + 2.242 l_5 + 2.761 l_{10}.$$

The values of $_5L_x$ from ages 10 and above can be obtained as $_5L_x = T_x - T_{x+5}$ and $T_x = \frac{e^0{}_x}{l_x}$.

The generated model life tables of Assam serve as model life tables for districts of Assam with $e^0{}_0$ [51] as the only input. Finally, 23 districts of abridged life tables of Assam have been constructed.

2.2.2 Construction of Complete Life Table

2.1.1.1 The Elandt-Johnson Method

A complete life table should really be developed from the original mortality data grouped in single year (or even narrower) intervals. At the point when such information is not accessible in published form, a complete life table can often be constructed from an abridged life table using some smoothing formulae. The Elandt-Johnson Method has been used to construct complete life table from abridged life table. In this method, the survivors (l_x) of the complete life tables have been estimated from abridged life table. This method yields a complete life table from an abridged one using "smoothing" formulae and three interpolation schemes depending on age x [20]. The three kinds of interpolation are used: (1) for very young age (0 to 9); (2) for the broad class of ages (10 to 74); and (3) for very old ages (75 and above). The six-point Lagrangian interpolation has been used for estimating the survivors over the age range 1-74 ($l_1 - l_{74}$). And for ages above 75 the Gompertz distribution has been applied for expanding an abridged life table to complete life table. The Gompertz survival distribution can be written as

$$(l_x) = S(x|a,R) = e^{\frac{R}{a}(1-e^{ax})} = b^{1-c^x},$$

(2.1)

where $x > 0, R > 0, a > 0, b = e^{\frac{R}{a}}$ and $c = e^a$, x denotes age, a and R denote its parameters.

For estimating the parameters $\hat{c}$ and $\hat{b}$, consider two adjacent tabulated points of l_x, say, x_1 and $x_1 + 5$, and calculate,

$$y_1 = \log \frac{l_{x_1}}{l_{x_1+5}} = c^{x_1}(c^5 - 1)\log b,$$

(2.2)

where $l_{x_1} = b^{1-c^{x_1}}$, $l_{x_1+5} = b^{1-c^{x_1+5}}$ (by using equation (**2.1**)).

Similarly, for another pair x_2 and $x_2 + 5$,

$$y_2 = \log \frac{l_{x_2}}{l_{x_2+5}} = c^{x_2}(c^5 - 1)\log b.$$

(2.3)

From (**2.2**) and (**2.3**),

$$\frac{y_1}{y_2} = c^{x_1-x_2},$$

$$\Rightarrow \hat{c} = \left(\frac{y_1}{y_2}\right)^{1/x_1-x_2}.$$

(2.4)

From equation (**2.2**), the parameter $\hat{b}$ can be estimated as

$$\hat{b} = \exp\left\{\frac{y_1}{c^{x_1(c^5-1)}}\right\}.$$

(2.5)

The parameters $\hat{b}$ and $\hat{c}$ (functions of parameters a and R) have been estimated for each age x using equation (**2.4**) and (**2.5**). After estimating these parameters, the survivals have been calculated using the equation (**2.1**) as

$$\hat{S}(x+i) = \hat{b}^{1-\hat{c}^{x+i}},$$

where $i = 1, \cdots 4$ for $x = 75, 80, \cdots, 100$.

Subsequent to assessing the l_x (the number of survivors at age x) values, the other life table functions are evaluated as follows:

d_x: Expected number of deaths in $(x, x+1) = l_x - l_{x+1}$,

q_x: Probability of dying between age x to $x + 1 = \dfrac{d_x}{l_x}$,

L_x: Person-years lived between age x to $x + 1 = l_x - \dfrac{1}{2}d_x$,

T_x: Person-years lived above age x,

$e_x{}^o$: Expectation of life at age $x = \dfrac{T_x}{l_x}$.

Additionally a number of inferences can be derived from a life table as follows:

$_{y-x}p_x$: Probability of surviving from age x to age $y = \dfrac{l_y}{l_x}$,

$_{y-x}q_x$: Probability of dying between ages x and age $y = 1 - \dfrac{l_y}{l_x}$,

$_{y-x}d_x$: Number of people dying between ages x and $y = l_x - l_y$,

$_{y-x}L_x$: Number of person-years lived between ages x and $y = T_x - T_y$,

Probability that a new born will die between ages x and $y = \dfrac{d_x}{l_0}$,

Probability that a new born will experience his death between ages x and $y = \dfrac{l_x - l_y}{l_0}$,

Number of years that a new born can expect to live between ages x and $= \dfrac{T_x - T_y}{l_0}$.

Matlab version 7.11.0 has been used for programming purpose.

2.3   Results and Discussion

It is seen from our results that $e_x{}^o$ and $_nq_x$'s are related to $e^0{}_0$ by different models (linear, quadratic or cubic model) for various x's. The estimated parameters of the best fit model along with R^2 are appeared in **Table 2.1**, **Table 2.2**, **Table 2.3** and **Table 2.4** for male and female separately. Based on maximum value of R^2, the best fitting model has been selected and find that the linear model is the best fit for all $e_x{}^o$ (for female). Also it is observed that the linear model is the best fit for $_nq_x$ values (female) except q_5, q_{15} and q_{75}. In case of q_5, q_{15} and q_{75} the quadratic model gives the best fit as it has the highest R^2 value. Now in case of male the linear model is the best fit for all $_nq_x$ and $e_x{}^o$ except e_{80} and e_{85}. As the quadratic model gives the highest R^2 value in case of e_{80} and e_{85}, hence the quadratic model is considered the best fit model.

It is observed that in the SRS life tables at times a few irregularities are found in the $_nq_x$ values. Such inconsistencies result in a low R^2 in the regression and may distort the curve. Disposal of such unpredictable information focuses from the relapse examination expands the R^2 considerably. In this manner, at whatever point such a circumstance is experienced, information focuses in charge of the anomalies are to be dispensed with at the expense of level of opportunity.

Utilizing the coefficients (**Table 2.1** to **Table 2.4**), $e_x{}^o$ and $_nq_x$ column of the life table can be completed for different age groups from a given $e_0{}^o$ of the districts and the entire life table can be finished utilizing the equations as given above. The life table for Assam generated from SRS and the relating SRS life tables have been contrasted and find with be tastefully closer to each other (as shown in **Table 2.7** and **Table 2.8**). From the generated abridged life tables of 23 districts of Assam, the complete life tables have been developed by using the Elandt–Johnson method. The Child mortality rate of the age group (0-6) for 23 districts of Assam has been evaluated and is presented in **Table 2.9**. The diagrammatic representation of child mortality rate according to high, medium and low are shown in **Figure 2.1** and **Figure 2.2** for male and female respectively. The constructed abridged and complete life tables of 23 districts of Assam for both male and female are given in the appendix A and appendix B respectively. The evaluated life

expectancy for the districts of Assam and watched qualities are stood out and found to be acceptably nearer to each other.

Table 2.1: Estimated Parameters of the model along with R^2 for fitting $e_x{}^o$ for Female in Assam.

Dependent	Model	R^2	$\hat{a}$	$\hat{b}$
e_1	Linear	.989	14.743	.817
e_5	Linear	992	17.653	.735
e_{10}	Linear	.991	19.121	.641
e_{15}	Linear	.985	16.338	.611
e_{20}	Linear	.977	13.755	.583
e_{25}	Linear	.958	12.688	.529
e_{30}	Linear	.951	11.298	.481
e_{35}	Linear	.959	10.172	.429
e_{40}	Linear	.942	6.912	.411
e_{45}	Linear	.927	6.703	.345
e_{50}	Linear	.930	2.957	.341
e_{55}	Linear	.886	.828	.313
e_{60}	Linear	.845	.516	.262
e_{65}	Linear	.763	3.261	.163
e_{70}	Linear	.720	-1.786	.207
e_{75}	Linear	.726	-8.067	.279
e_{80}	Linear	.756	-13.909	.351
e_{85}	Linear	.748	-16.943	.381

Table 2.2: Estimated Parameters of the model along with R^2 for fitting q_x for Female in Assam.

Dependent	Model	R^2	$\hat{a}$	$\hat{b}$	$\hat{c}$
q_0	Linear	.854	.298	-.004	
q_1	Linear	.767	.238	-0033	
q_5	Quadratic	.932	.291	-.007	.00004568
q_{10}	Linear	.721	.0539	-.0008	
q_{15}	Quadratic	.782	-.056	.003	-.00003143
q_{20}	Linear	.848	.089	-.001	
q_{25}	Linear	.712	.099	-.001	
q_{30}	Linear	.912	.1	-.001	
q_{35}	Linear	.672	.1221	-.0017	

	Model	R^2	$\hat{a}$	$\hat{b}$	$\hat{c}$
q_{40}	Linear	.959	.175	-.002	
q_{45}	Linear	.893	.2222	-.0032	
q_{50}	Linear	.867	.19	-.002	
q_{55}	Linear	.875	.298	.004	
q_{60}	Linear	.959	.569	-.008	
q_{65}	Linear	.767	-.048	.004	
q_{70}	Quadratic	.717	13.836	-.459	.004
q_{75}	Linear	.889	1.098	-.012	
q_{80}	Linear	.718	1.372	-.015	

Table 2.3: Estimated Parameters of the model along with R^2 for fitting $e_x{}^o$ for male in Assam.

Dependent	Model	R^2	$\hat{a}$	$\hat{b}$	$\hat{c}$
e_1	Linear	.938	21.517	.695	
e_5	Linear	.930	29.600	.518	
e_{10}	Linear	.883	32.843	.390	
e_{15}	Linear	.871	30.087	.359	
e_{20}	Linear	.891	24.846	.371	
e_{25}	Linear	.861	23.365	.321	
e_{30}	Linear	.897	20.125	.302	
e_{35}	Linear	.904	16.461	.290	
e_{40}	Linear	.890	14.969	.243	
e_{45}	Linear	.955	11.440	.233	
e_{50}	Linear	.923	10.242	.191	
e_{55}	Linear	.801	10.060	.133	
e_{60}	Linear	.851	6.651	.139	
e_{65}	Linear	.888	10.627	.024	
e_{70}	Linear	.808	15.227	-.093	
e_{75}	Linear	.859	16.093	-.140	
e_{80}	Quadratic	.791	376.367	-12.341	.103
e_{85}	Quadratic	.797	410.918	-13.531	.113

Table 2.4: Estimated Parameters along with R^2 of fitted q_x for Male in Assam.

Dependent	Model	R^2	$\hat{a}$	$\hat{b}$
q_0	Linear	.829	.414	-.006

q_1	Linear	.840	.210	-.003
q_5	Linear	.908	.142	-.002
q_{10}	Linear	.934	-.0539	-.0008
q_{15}	Linear	.712	-.039	.001
q_{20}	Linear	.724	.126	-.002
q_{25}	Linear	.825	.087	-.001
q_{30}	Linear	.761	.14	-.002
q_{35}	Linear	.609	.132	-.002
q_{40}	Linear	.863	.267	-.004
q_{45}	Linear	.777	.153	-.002
q_{50}	Linear	.880	.271	-.003
q_{55}	Linear	.827	.107	.000
q_{60}	Linear	.934	.724	-.010
q_{65}	Linear	.716	.065	.003
q_{70}	Linear	.848	1.040	-.013
q_{75}	Linear	.747	-.671	.018
q_{80}	Linear	.872	-1.225	.029

Table 2.5: Lagrangian Coefficients used to Calculate l_2 to l_9.

	$x = 1$	$x = 5$	$x = 10$	$x = 15$	$x = 20$	$x = 25$
l_2	0.562030	0.717600	-0.478400	0.283886	-0.100716	0.015600
l_3	0.273392	1.047199	-0.531911	0.299200	-0.103747	0.015867
l_4	0.096491	1.108800	-0.328533	0.172800	-0.058358	0.008800
l_6	-0.041667	0.798000	0.354667	-0.152000	0.048000	-0.007000
l_7	-0.048872	0.561600	0.665600	-0.240686	0.072758	-0.010400
l_8	-0.037281	0.333200	0.888533	-0.244800	0.070147	-0.009800
l_9	-0.018379	0.140800	1.001244	-0.160914	0.043116	-0.005867

Table 2.6: Lagrangian Coefficients used to Calculate l_{11} to l_{74}.

	$x = 5m - 10$	$x = 5m - 5$	$x = 5m$	$x = 5m + 5$	$x = 5m + 10$	$x = 5m + 15$
l_{5m+1}	0.008064	-0.07392	0.88704	0.22176	-0.04928	0.006336
l_{5m+2}	0.011648	-0.09984	0.69888	0.46592	-0.08736	0.010752
l_{5m+3}	0.010752	-0.08736	0.46592	0.69888	-0.09984	0.011648
l_{5m+4}	0.006336	-0.04928	0.22176	0.88704	-0.07392	0.008064

Where

for l_{11} to l_{14} put $m = 2$,

for l_{16} to l_{14} put $m = 3$,

$$\vdots$$

for l_{71} to l_{74} put $m = 14$.

Table 2.7: Comparison Between Generated and SRS Based Life Tables for Assam
(Male, 2009-13).

Generated							SRS based	
age	l_x	q_x	d_x	L_x	T_x	$e_x^{\ o}$	q_x	$e_x^{\ o}$
0	100000	0.04260	4260	96916	6190000	61.90	0.05385	61.90
1	95740	0.02430	2326	376633	6178820	64.54	0.02116	64.50
5	93414	0.01820	1700	462354	5760270	61.66	0.00379	61.80
10	91713	0.00438	402	449764	5226196	56.98	0.00568	57.00
15	91312	0.02290	2091	510713	4776432	52.31	0.00757	52.40
20	89221	0.00220	196	416760	4265720	47.81	0.01223	47.70
25	89024	0.02510	2235	479882	3848959	43.23	0.01395	43.30
30	86790	0.01620	1406	430849	3369078	38.82	0.01543	38.90
35	85384	0.00820	700	396812	2938229	34.41	0.01996	34.40
40	84684	0.01940	1643	393757	2541417	30.01	0.03187	30.10
45	83041	0.02920	2425	368875	2147660	25.86	0.04983	26.00
50	80616	0.08530	6877	429891	1778785	22.06	0.05802	22.20
55	73740	0.10700	7890	344356	1348895	18.29	0.11190	18.40
60	65849	0.10500	6914	290680	1004539	15.26	0.12443	15.40
65	58935	0.25070	14775	295649	713858	12.11	0.19304	12.20
70	44160	0.2353	10391	418210	418210	9.47	0.30170	9.50
75	33769	0.4432	14967	250804	250804	7.43	0.42025	7.50
80	18803	0.5701	10719	133780	133780	7.11	0.49188	6.30
85	8083	1	10719	51095	51095	6.32	1.00000	5.10

Table 2.8: Comparison Between Generated and SRS Based Life Tables for Assam
(Female, 2009-13).

Generated							SRS based	
Age	l_x	q_x	d_x	L_x	T_x	$e_x^{\ o}$	q_x	$e_x^{\ o}$
0	100000	0.05516	5516	96006	6510000	65.10	0.05597	65.10
1	94484	0.02317	2189	372033	6674321	70.60	0.02666	67.90
5	92295	0.00708	653	459647	6045448	65.50	0.00548	65.80

10	91641	0.00182	167	438799	5576386	60.90	0.00474	61.10
15	91475	0.00160	146	415160	5137587	56.20	0.01065	56.40
20	91328	0.01964	1794	503031	4722427	51.70	0.01064	52.00
25	89535	0.01480	1325	460695	4219395	47.10	0.00856	47.50
30	88209	0.00993	876	431303	3758700	42.60	0.01149	42.90
35	87333	0.01143	998	420653	3327397	38.10	0.01627	38.30
40	86335	0.01271	1097	420993	2906745	33.70	0.01406	33.90
45	85238	0.01388	1183	371260	2485752	29.20	0.03769	29.40
50	84055	0.04029	3387	403978	2114492	25.20	0.04458	25.40
55	80668	0.04985	4021	363659	1710514	21.20	0.06779	21.50
60	76647	0.07532	5773	363672	1346856	17.60	0.08744	17.90
65	70874	0.11996	8502	254076	983184	13.90	0.17860	14.30
70	62372	0.90714	56580	729109	729109	11.70	0.21940	11.90
75	5792	0.3168	1835	58474	58474	10.10	0.36203	9.50
80	3957	0.3955	1565	35380	35380	8.90	0.37726	8.50
85	2392	1	2392	18801	18801	7.90	1.00000	7.10

Table 2.9: The Child Mortality Rate of the Age Group (0-6) of 23 Districts of Assam for Both Male and Female.

Districts	Male (in %)	Rank	Female (in %)	Rank
Kokrajhar	10.66	6	12.06	5
Dhubri	14.56	1	13.08	2
Goalpara	12.53	2	11.63	7
Bongaigaon	10.84	5	11.12	9
Barpeta	10.12	9	9.97	19
Kamrup	8.14	17	9.27	22
Nalbari	7.50	21	8.84	23
Darang	12.35	3	13.36	1
Marigaon	10.30	7	10.76	12
Nagaon	8.86	14	10.30	16
Sonitpur	9.67	11	11.48	8
Lakhimpur	7.96	18	10.11	18
Dhemaji	8.23	15	10.61	13
Tinsukia	7.68	19	10.32	14
Dibrugarh	6.50	23	9.57	21

Sibsagar	7.59	20	10.25	17
Jorhat	6.59	22	9.71	20
Golaghat	8.21	16	10.98	11
Karbi angling	11.02	4	12.89	3
North Cachar	9.04	13	12.21	4
Cachar	9.31	12	10.32	15
Karimganj	10.21	8	11.03	10
Hailakandi	9.94	10	12.06	6

1. Dhubri
2. Kokrajhar
3. Bongaigaon
4. Goalpara
5. Barpeta
6. Kamrup
7. Nalbari
8. Darrang
9. Morigaon
10. Sonitpur

11. Nagaon
12. Karbi Anglong
13. North Cachar Hills
14. Cachar
15. Hailakandi
16. Karimganj
17. Golaghat
18. Lakhimpur
19. Jorhat
20. Dhemaji
21. Dibrugarh
22. Sivasagar
23. Tinsukia

High (10.84 - 14.56)
Medium (7.96 - 10.66)
Low (6.50 - 7.68)
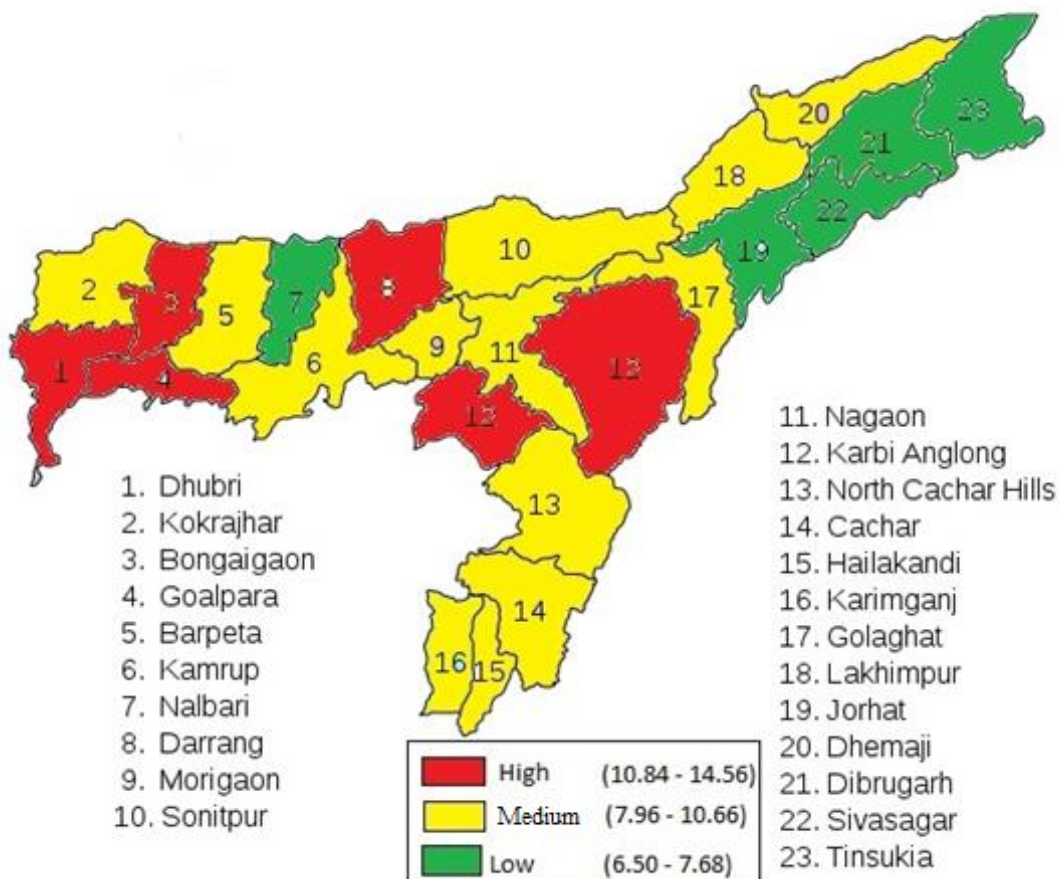
Figure 2.1: The Child Mortality Rate of the Age Group (0-6) of 23 Districts of Assam for Male.

1. Dhubri
2. Kokrajhar
3. Bongaigaon
4. Goalpara
5. Barpeta
6. Kamrup
7. Nalbari
8. Darrang
9. Morigaon
10. Sonitpur

11. Nagaon
12. Karbi Anglong
13. North Cachar Hills
14. Cachar
15. Hailakandi
16. Karimganj
17. Golaghat
18. Lakhimpur
19. Jorhat
20. Dhemaji
21. Dibrugarh
22. Sivasagar
23. Tinsukia

High (12.21 - 13.36)
Medium (10.11 - 12.06)
Low (8.84 - 9.97)
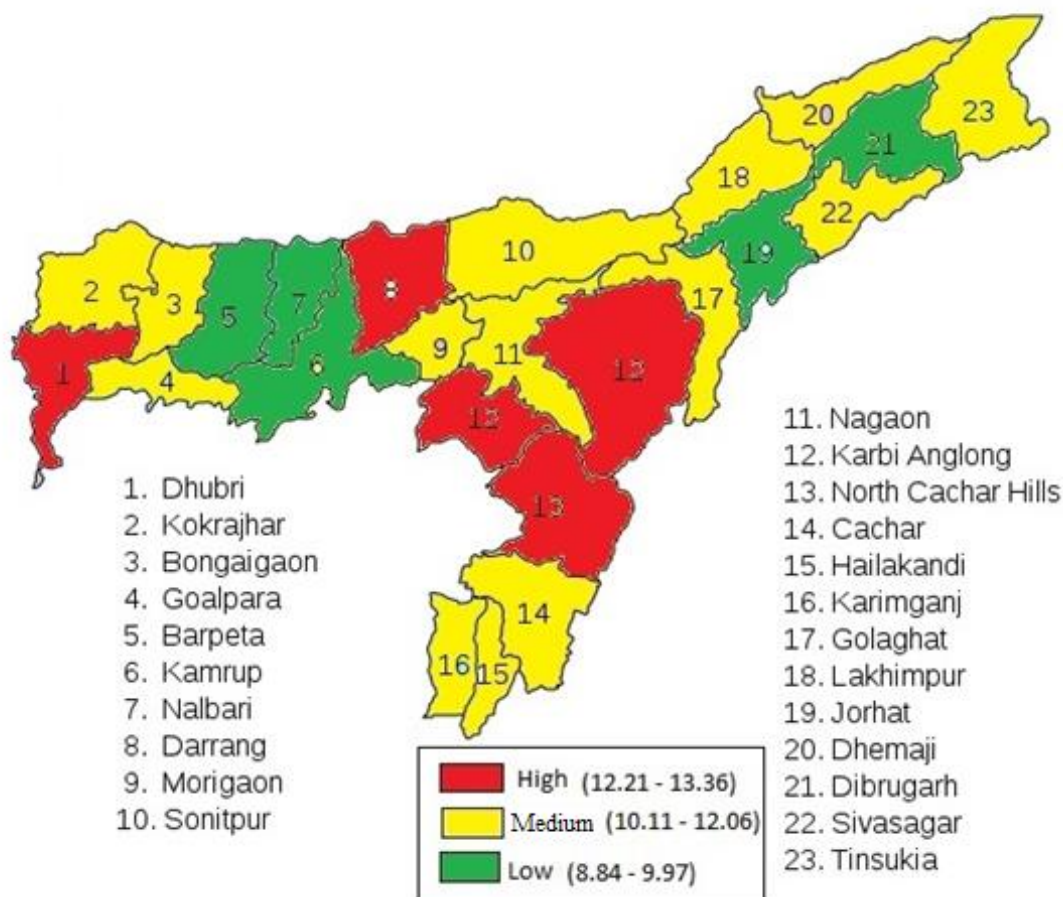
Figure 2.2: The Child Mortality Rate of the Age Group (0-6) for 23 Districts of Assam for female.

2.4 Conclusion

The complete life tables for 23 districts of Assam for both male and female are constructed by using Elandt-Johnson method. From the constructed life tables, the information of mortality, survivorship and the life expectancy of various districts at various ages have been obtained. Also, it can be known probability of surviving any particular year of age and the remaining life expectancy for people at different ages. Based on the

Table 2.9, it can be concluded that, among all the districts of Assam, Dhubri has the highest child mortality rates in the age groups (0-6) years for male. It has been observed that the female child mortality rate is also the highest in the district of Dhubri. Kokrajhar, the district bordering Dhubri and dominated by Bodo tribes has also high mortality rate.

On the other hand, Dibrugarh and Jorhat have the lowest child mortality for male and Kamrup and Nalbari have the lowest child mortality for female respectively. Out of 23 districts, child mortality for male seems to be more than 10 in 9 districts, whereas in 18 districts of Assam, child mortality rate for female more than 10. It is also noted that child mortality for female is always more than that of male for all the districts. Additionally, it is calculated from our result that the probability of surviving from birth to any age x for any districts. For an example, the probability of surviving from birth to age 40 for Dhubri (male) district is lower than Dibrugarh district. Then again, probability of a person who survived to age 40 would die before age 60 for Dhubri (male) district is higher than Dibrugarh (male) district. It might likewise presume that number of years that a new born male of Dibrugarh district can expect to live more in the age interval 25-30 than Dhubri district. Life table information can give much insight into the demographics of a population. Evaluating age-specific birth and demise rates empowers us to recognize patterns and make predictions about the development or decrease of later on. Finally, it can be concluded that the Elandt – Johnson method is most valuable tool for expanding the abridged life table to complete life table for Assam and its districts.

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