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ESTIMATION OF ABRIDGED WORK-LIFE EXPECTANCY IN KWARA STATE NIGERIA USING KPEDEKPO'S WORKING LIFE SCHEME

A.A. Adewara, O.A. Kolawole and O. Job

Department of Statistics, University of Ilorin, Ilorin. Kwara State. Nigeria

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ABSTRACT

This study was aimed at estimating life and working life expectancies of Kwara State, Nigeria from the construction of life tables using 2006 Nigerian population census figures in line with Kpedekpo's working life table in Ghana with particular reference to the female working population and also for males. It is imperative to note here that working life table makes do with the working population and survivors at different age groups. The Nigerian 2006 population data was considered for this study due to its comprehensiveness in terms of data gathering where information about labour force was well collated. This study was carried out to estimate the work-life expectancy and expected retirement of Kwara State by Nigeria abridged work-life table. It highlighted the average years and until when a person stay in active service in Kwara State, Nigeria. Also, aimed to predict the working life expectancy and expected retirement age and providing information on length of remaining years at exact age x . It was observed that both the average years lived and average years in working life followed the same trend, starting at high values and decreased as the ages advanced. They both started at high values of 38.03 and 40.49 for the average years lived and average years in working life respectively and eventually decreased as the ages advanced. The average years lived and average years in working life began to synchronize at 30.38 years value down to 2.50 years value for age group 85 and above. The life and working life expectancies in Kwara State, Nigeria started from 55.03 and 57.49 respectively.

Keywords: expectancy, estimation, average life, average year in working life, life – table.

INTRODUCTION

Working life table construction cannot be done in isolation without recourse to life table. Life table has been a tool to measure mortality experience of both animal human populations by way of estimating the life expectancy at birth or cohort of the population.

In demographic analysis, life tables provide a description of what are the most prominent aspects of the state of human mortality. However, the technique has several other

applications because of its flexibility and robustness; for example, the construction of a working life Table.

The working life table is, in fact, a modification of the ordinary life table. One of the importance of a working life table construction is that, it provides information on the expected average number of years of working life remaining to those of a given age and many other aspects of working life in a graphic form (Kpedekpo, 1969).

Corresponding Author: A.A. Adewara, Department of Statistics, University of Ilorin, Ilorin. Kwara State. Nigeria. Email: aadewara@unilorin.edu.ng; aadewara@gmail.com,

A limitation of the working life table, as with the ordinary life table, is that, the working life table is based on the mortality experience of the past period and therefore shows what will happen in the future if these rates of loss remain unchanged.

The reasons for this and perhaps, with rare exception, the most important is the increasing attention that has been given to economic problems relating to the productive and dependent elements of the population, together with the usefulness of a working life table for framing manpower and social security policies.

This study is essentially to picture the working life expectancy of each age group and expected retirement age from the work force in Kwara State Nigeria which is similar to the mortality rate in a conventional life table. Its importance is to aid decisions on the manpower problems of the State.

Kpedekpo, (1969) constructed a working life table for males in Ghana and dealt extensively with the uses of this table for framing manpower requirements for the country. According to him, he said “the table of working life is, in fact, a modification of the ordinary life table. It provides information on the expected average number of years of working life remaining to those of a given age and many other aspects of working life in a graphic form”.

Wolfbein, (1949), in a paper on the length of working life, dealt with some aspects of the construction of life tables and suggested possible lines for further research.

At the St. Louis meeting of the Population Association of America in 1977, Dr. S.J. Smith of the US Bureau of Labour Statistics described an interesting example of the use of working life tables, namely the estimation of lost earnings in the case of death before or during active life

(Smith, 1977). This money value of man is of particular relevance in liability estimations. With the increase in the number of liability claims over the years, working life tables now are used more than ever. Liability attorneys and others interested in determining foregone earnings, rely on the concept of working life expectancy as an input to their determinations.

On the other hand, working life tables are used in microeconomic analysis to describe the supply of labour and to study the impact of structural changes in the labour force, both in terms of changing activity rates and in terms of changing age compositions (Durand and Miler, 1968). The expanding interest in the table of working life as a powerful analytical tool for studying the work life potential of an individual or of a population forces us to view such tables in a new light and to rethink the way they are calculated. Smith, (1977) concluded her paper at St. Louis meeting as follows:

“It is urged that the user of working life tables give careful consideration to the assumptions on which they rest, and the validity of those assumptions for his particular problem. These tables can be useful in many circumstances, but should never be thoughtlessly applied” (Smith, 1977).

The technique for constructing such a life table has not improved since the design of the first tables in the late 1940s (Wolfbein, 1949). Several authors, however, refer to the unrealistic assumptions on which this technique is based and to how they may affect the results. It is only recently that one observes methodological innovations. It is a multistate increment-decrement life table which explicitly incorporates the gross flows of people between active and inactive life (Willekens, 1980).

Dejian, (2007) utilized the data from the recent three population censuses of China to calculate the expected years of working life for Chinese males and females in 1982, 1990 and 2000. Although, the results from his study showed a decreasing trend of the expected years of working life in the primary industry, majority of the expected years working life remained in the primary industry, which was mainly in agriculture. Gouranga, (2002), in his own analysis, he estimated the effects of reduction in mortality on the length of working life of Indonesian males in 1980 and 1995. He posited that problems of data have prevented any previous work in this area. He therefore used the labour force data collected at the Indonesian census of 1980 and the Intercensal Population Survey of 1995.

Madugba, (1976), in his presentation - The main features of a Working Life Table of the Female Labour Force in Nigeria stressed that female rural labour force in Nigeria in 1965 was dispersed in three major occupations: sales & petty trading, agriculture and craft. Also, he concluded that the working life table of female population showed that the main cause of withdrawal from the labour force was mortality in the age groups 15-64, which accounted for over 85 percent of all.

Having reviewed all these literatures on working life table construction, this motivated and spurred our action into researching on working life table for both sexes in Kwara State using 2006 Nigerian population data published by National Population Commission inline with Kpedekpo, (1969) working life table construction for males and females in Ghana.

MATERIALS AND METHOD

Assumptions of Working Life

One of the assumptions of working life table is that, in labour force data, there was

no distinction in the records of death for the working population and the rest of the population, so no mortality table records these differences. It also assumes that the active and inactive populations face the same probability of dying.

Besides the usual assumptions underlying a classical life table, conventional tables of working life generally adopt three additional general assumptions (Kpedekpo, 1974).

The population considered for this study was 2006 Nigerian population census figures. In the 2006 Nigerian population census, Kwara population was put at Two Million, Three hundred and Sixty-Five thousand, Three Hundred and Fifty-Three (i.e. 2,365,353) people. These figures were for age groups 0 to 85+. Also, of this human population figure in Kwara state Nigeria, Three Hundred and forty-Nine Thousand, Five hundred and Seventy-Six (349,576) people were recorded as working population for Kwara State Nigeria. The working population was distributed in terms of occupation. There are about eight categories of occupational distribution viz; professional/Technical/or related workers accounted for about 2.3 percent of the total work force, Administrative and managerial workers were 0.6 percent. In all these occupations, Agriculture and its allied accounted for 49 percent of the total working population.

Indication from this study is that, almost half of the population of Kwara State Nigeria was predominantly subsistence farmers, hence, the State could be regarded as subsistence economy. Bulk of the production, service and consumption are domiciling in the state. The implication for this is that the State consumed what it produced. These can be seen in Tables 1 and 2 shown below:

Table 1:- Population of Kwara State Nigeria by five year age groups

Age Group	Population	Age Group	Population
0-4	411,342	45-49	75,582
5-9	346,530	50-54	69,091
10-14	272,927	55-59	34,417
15-19	243,307	60-64	41,163
20-24	218,023	65-69	20,681
25-29	199,812	70-74	21,163
30-34	152,334	75-79	9,696
35-39	118,659	80-84	11,576
40-44	107,230	85+	11,820
		Total	2,365,353

Sources:- Priority tables of 2006 Nigerian population census and annual abstract of Statistics, 2008.

Table 2:- Occupational distribution of Kwara State, Nigeria.

Occupations	Total Working Population	Percentage of working population
Professional, Technical & Related Workers	8,075	2.3
Administrative & Managerial workers	2,132	0.6
Clerical & Related Workers	1,888	0.5
Sales Workers	129,343	37.0
Service Workers	26,358	7.5
Agric, Animal Husbandry Workers, Fishermen & Hunters	171,292	49.0
Production & Related Workers, Transport equip. Operators & Labourers	6,362	1.8
Occupation not stated/occupation not adequately defined	4,126	1.2
Total	349,576	100.0

Sources: Priority Tables of 2006 Nigerian population census and Annual Abstract of Statistics, 2008.

RESULTS AND DISCUSSION

Comparing the percentage of the working population to the total population in Kwara state Nigeria using 2006 as benchmarks, it depicts that about 14.8 percent of the total population are in active labour force-meaning that the dependency ratio is very alarming as to the working population. This 14.8 percent was for age 15 to age 85 plus. These age groups were regarded as the active and working population.

Considering Table 3 shown below, ages 15 to 85 and above were considered as the working population in which five-year interval (as recommended demographically throughout the world, Nigeria inclusive) was used, percentage proportion working and adjusted proportion were highlighted; this was done for specific age groups. The proportion working percentage indicated the actual proportion working percentage per 100 in each age group. From ages 15-19, proportion was 0.18, from there, it moved to 0.23 for age groups 20-24. The trend of the proportion continued until it got to 0.48 for age groups 75-79 before it began to downturn to 0.08 for ages 85 and above. We need to note that this actual proportion is not enough to construct work-life table hence the adjusted proportion working.

This is largely due to the fact that recognition and consideration should be given to those whose services have not begun in labour force, that is, those in training in any institution and women of child-bearing who quit job and return after child-bearing. We also noted that not all entrants to labour force enter at the same age. However, for purpose of estimating the expected years of working life and retirement at each group, this actual proportion cannot be used so, recourse was made to adjusted proportion working per 100 for each group. Adjusted proportion was arrived at, by taking the average of the actual proportion of ages 15-44 being the likely ages of those who could still be employed into labour force. The said average was 0.26. Then, for ages 45-85+, it was 0.30-the average proportion of actual proportion was used for the same purpose stated earlier for age 15-44. The average proportion of actual proportion was also used because of continued employment nature even at an advanced age. The Kwara State Nigeria economy is subsistence and the employment nature continues even at an advanced age. Therefore, adjusted proportion working population for age groups 15-44 was 0.26 and that of age groups 45-85 was 0.30.

Table 3: Total Population, Working Population and Proportion Working of Kwara State Nigeria

Age-group	Population	Working Population	Proportion Working per 100 (p_x)	Adjusted Proportion % Adj. (p_x)
15-19	243307	43796	0.18	0.26
20-24	218023	52326	0.24	0.26
25-29	199812	51951	0.26	0.26
30-34	152334	41130		0.26

			0.27	
35-39	118659	33225	0.28	0.26
40-44	107230	33241	0.31	0.26
45-49	75582	24564	0.32	0.3
50-54	69091	22800	0.33	0.3
55-59	34417	11701	0.34	0.3
60-64	41163	10702	0.26	0.3
65-69	20681	7859	0.38	0.3
70-74	21163	9523	0.45	0.3
75-79	9696	4654	0.48	0.3
80-84	11576	1158	0.10	0.3
85+	11820	946	0.08	0.3
TOTAL	1334554	349576	4.29	4.26

where :- Proportion Working = (Total Working Population / Total Population)x 100

$$\text{Percentage Adjusted Proportion [(15-19) – (40-44)]} = \sum_{i=15-19}^{40-44} p_{x_i} = \frac{0.18 + \dots + 0.31}{6} = 0.26$$

$$\text{and Percentage Adjusted Proportion [(45-49) – (85+)]} = \sum_{i=45-49}^{85+} p_{x_i} = \frac{0.32 + \dots + 0.08}{9} = 0.3$$

Table 4 is another tool used in constructing life table for estimating life expectancy for each age group. The life table showed the average year at age's 15 through 85+. An age group of 15-19 has

38.03 remaining years to live, 35.02 years remaining for ages 20-24. The remaining age groups dwindle as the ages advance down to 2.5 years for ages 85 and above.

Table 4: Life table for the Population

Age-group	Survivors at beginning of interval (l _x)	Total No. of person-years lived (L _x)	Total life lived (T _x)	Average years lived (e _x)
15-19	321	1563	12210	38.03
20-24	304	1448	10647	35.02
25-29	275	1335	9199	33.45

30-34	259	1185	7864	30.36
35-39	215	1010	6679	31.06
40-44	189	868	5669	29.99
45-49	158	785	4801	30.38
50-54	156	750	4016	25.74
55-59	144	728	3266	22.67
60-64	147	715	2538	17.26
65-69	139	650	1823	13.11
70-74	121	540	1173	9.69
75-79	95	360	633	6.66
80-84	49	198	273	5.56
85+	30	75	75	2.50

Source: Column 2: 2006/2007 Demographic Sample Survey

where :- $l_x = l_x(Adj.p_x)$, $L_x = \frac{n}{2}(l_x + l_{x+}) = \frac{5}{2}(l_x + l_{x+})$, where n = age interval = 5

$$T_x = \sum L_x, e_x = \frac{T_x}{l_x}, wL_x = \frac{n}{2}(wl_x + wl_{x+}) = \frac{5}{2}(l_x + l_{x+}), wT_x = w \sum L_x \text{ and}$$

$$we_x = \frac{wT_x}{wl_x}.$$

The thrust of this study is to estimate working life expectancy and expected year of retirement of age groups for active population of workers in Kwara State Nigeria.

From the analysis and construction of working life table in Tables 5 and 6 below, it was discovered that work-life expectancy followed the same trend as that of life expectancy only that at age group 15-19, on average years in working life is 40.49 against what was obtained in

conventional life table which was 38.03. The implication of this is that ages 15-19 is expected to live 38.03 years more putting the life expectancy of 55.03 at that age cohort on average. Again, on the same age cohort of 15-19, it was discovered that average years in working life was 40.49. The expected retirement age was 57.49 on average which was estimated by adding the working life expectancy with the mean age of that particular age group.

Table 5: Working Life Table of Kwara State Nigeria

1	2	3	4	5	6	7
X	P_x	l_x	$w l_x$	$w L_x$	$w T_x$	$w e_x$
Age-group	Proportion working	Survivors at beginning of age interval	Number in working life (%)	$w L_x$	Total years lived in working life	Average years in working life
15-19	0.26	321	83	405	3361	40.49
20-24	0.26	304	79	376	2956	37.42
25-29	0.26	275	72	348	2580	36.83
30-34	0.26	259	67	308	2232	33.31
35-39	0.26	215	56	263	1924	34.36
40-44	0.26	189	49	240	1661	33.90
45-49	0.3	158	47	235	1421	30.21
50-54	0.3	156	47	225	1186	25.23
55-59	0.3	144	43	218	961	22.35
60-64	0.3	147	44	215	743	16.89
65-69	0.3	139	42	195	528	12.57
70-74	0.3	121	36	163	333	9.25
75-79	0.3	95	29	110	170	5.86
80-84	0.3	49	15	60	60	4
85+	0.3	30	9	-	-	-

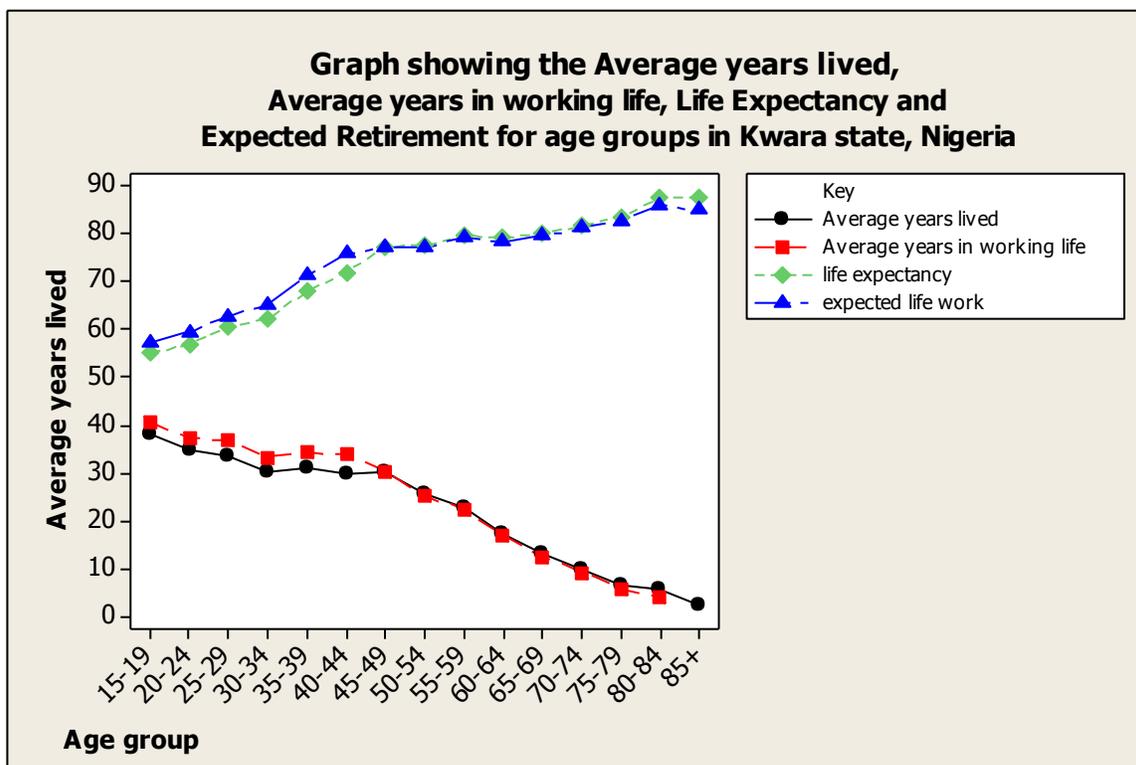
Table 6: Expected retirement age for age x.

X	e_x	we_x			
Age-group	Average years lived	Average years in working life	Mean of ages per age interval	Life expectancy	Expected Life Work
15-19	38.03	40.49	17	55.03	57.49
20-24	35.02	37.42	22	57.02	59.42
25-29	33.45	36.83	27	60.45	62.83
30-34	30.36	33.31	32	62.36	65.31
35-39	31.06	34.36	37	68.06	71.36
40-44	29.99	33.90	42	71.99	75.9
45-49	30.38	30.21	47	77.38	77.21
50-54	25.74	25.23	52	77.74	77.23
55-59	22.67	22.35	57	79.67	79.35
60-64	17.26	16.89	62	79.26	78.35
65-69	13.11	12.57	67	80.11	79.57
70-74	9.69	9.25	72	81.69	81.25
75-79	6.66	5.86	77	83.66	82.86
80-84	5.56	4	82	87.56	86
85+	2.50	-	85	87.50	85

where: Life expectancy = Average years lived + Mean of ages and

Expected Life Work = Average years in working life + Mean of ages

Graph showing the Average years lived, Average years in working life, Life Expectancy and Expected Retirement for age groups in Kwara state, Nigeria



CONCLUSION

Having estimated the working life expectancy and life expectancy for each age group in Kwara State in Nigeria as shown in the graph above, it was observed that both the average years lived and average years in working life followed the same trend, starting at high values and decrease as the ages advance. They both started at high values of 38.03 and 40.49 for the average years lived and average years in working life respectively which at a point (that is) age groups 45-85+, they assumed the same values. The average years lived and average years in working life began to synchronize at 30.38 years value down to 2.50 years value for age group 85 and above. The life and working life expectancies in Kwara State, Nigeria started from 55.03 and 57.49 respectively.

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