Expectations of Life and Survival Analysis for a Cohort of University Academic Retirees: A Case Study of University of Ibadan, Nigeria

Ajayi[1], Moses Adedapo[1], Mokgathle Lucky[1], Thaga K[1], Shangodoyin Dahud Kehinde[1]

[1]Department of Statistics, University of Botswana, Botswana

Abstract: This is a follow up study of a cohort of academic retirees in retrospective in a well based record assessment. In this study, a preliminary survey was made to determine the mortality and survival profile of retired academic staff retirees of University of Ibadan in Nigeria. From total population of 302 of pensionable 60 to 65 years of age of service and 35 years in service as at year 2012 of retired academic staff retirees surveyed, 109 were randomly selected during the study dates "January 1977 to December 2012". Simple descriptive frequency count and the Life Table model were identified as the most suitable approach to analyze the demographic characteristics and pattern of mortality; this provides estimates of probabilities of surviving a given number of years after retirement. Since life table is non-parametric procedure for estimating life expectancy at different points and does not produce a measure of precision. We utilised the distribution of the survival and hazard function to give a more elegant and measure precision of life expectancy. The survival probability curves for the males and females respondents indicate that there is no significant difference in the survival probability for the two groups using Mantel-cox test with probability 0.287. There is significant difference between mortality rate of voluntary and compulsory ages of retirees during the period of study of retired academic staff of the university. The survival probability of gender and their duration of service are not significant with probability 0.738, thus one could infer that duration of service before retirement does not have effect on longevity of retired academic staff of the university. The University academic retirees' median residual life time is 9.07 years.

Keywords: Cohort; Retirement; Age; Pension; Expectancy; Mortality

1.0 Introduction

The concept retirement has so many aspects, according to Ujwal (2011), retirement is a long sigh of release from the everyday stress, huge workload and long hours of travelling. Jacob (2011) viewed retirement as a period of rest that starts roughly at age 60 where the retiree starts doing many things he has no time to do during his career. According to Crown (2013), retirement is a period when you can no longer need to work for a living. Retirement age is when an employee chooses to retire. Conventionally, normal retirement age is the age at which staffs are normally expected to retire (Longman 1995).

Life expectancy estimates in the statistical sense is the number of years of life remaining at a given age of retirement and in many occasions varied significantly to class and gender (Sullivan, and Steven, 2003). According to Richard and Charlotte (2012), life expectancy of teachers on retirement who teach for their full working life and retire at 60 years tend to have a very short life expectancy. It was shown that the earlier teacher retired from teaching the earlier they died. Mark (2009) found that retiring had a negative impact on health. The study looked at 16,827 men in Greece and compared men who retired to men who were still working; he found that the retirees had their risk of death increased by 51% after controlling for wealth, education and marital status.

On the contrary, Thomas (2013) said that early retirement lengthens once life, but is it true? And do some professions have a shorter life expectancy? He shows in his study that life expectancy at birth is about 50 years, but that life expectancy at age 50 is 70.7 years for men and 72.6 for women, the average number of years of life after stop working, with figures ranging from 23.44 for Singapore to 1.49 for Nigeria. According to Richard and Charlotte (2012) lawyers, accountants and higher managerial and professional cadres have life expectancy of nearly 19 years for males at age 65. More so teachers and other professionals are likely to have closer to 25 or even 30 years left in them at 65. The new Universities (Miscellaneous Provisions) (Amendment) Act, 2012, stipulate the new retirement ages of staff in the professorial cadre and non-academic staff in Nigerian universities increased to 70 and 65 years respectively. This is in contrast to the old Universities (Miscellaneous Provisions) Act No. 11, 1993 which pegged retirement age of university workers,

including professors, at 35 years of service like civil servants (Leadership Newspapers 2011).

In our opinion, a number of studies have been carried out from several professions on mortality, survival and life expectancy, among all, no research has ever carried out study on life expectancy of retired staff of Universities. This study aims at investigating the distribution of death and survival pattern of retired Universities academic staff. This study will be first of its kind that consider life expectancy of academic staff of universities on early retirement as a result of length of service and legitimate age limit pensionable age of retirement in University of Ibadan (Nigeria). Also this study provide answers to those questions and elicit levels of life expectancy for academic lecturer cadres using data obtained on academic staff retirees from University of Ibadan, Nigeria.

2.0 Methods and Discussion

The study dealt with subjects well-being based on record assessment. The target population of the study comprises all retirees from the University of Ibadan, Nigeria from 1977 to 2012. An important characteristic of the population is that the pensioners' either retired has voluntarily between ages 60 and 64 years or mandatory age 65 years in which case, they are elderly and more vulnerable to negative retirement conditions than employees who voluntarily retired earlier without pension. Two stage sampling technique was adopted for the study. At first stage, which is purposive sampling based on the university with long history of establishment in the country and the voluntary age from ages 60 to 64 and mandatory age 65 with pension's condition of retirement of the participants. The second stage is simple random sampling techniques. The required number of academic universities staff retirees sample size for this study was based on Mark (2009), formula which yields a representative sample for epidemiological study. The sampling procedure for the selection of each retiree into the sample size is based on simple random sampling by drawing numbers that represent 109 retirees from a computed generated random numbers between 1 and 302 of total population of academic retirees as at 2012. Simple descriptive statistics of frequency counts and percentage were used to analyse the data obtained on the personal chacteristics of the respondents. Life table model was used to explain survival experience of academic retirees. Life table analysis provides approximation of probabilities of surviving beyond a given number of years after retirement and highlighting the advantage gained by including survival information on individuals entering the series late to have had the opportunity to survive the level of the period of the study. The life table estimates median residual lifetime or median remaining life expectancy year after retirement.

3.0 Results and Discussion

Table 1 contains the distribution of academic retirees by their demographic characteristics in the period of 37 years of the study. It is observed that population of males' respondents was 76.1%, at inception of academic institution and for quite some time University academic staff was predominantly male. It is observed that 66.1% of the surveyed respondents have died according to the administrative record and among the respondents that are alive (33.9%), only 71.4% of them are married while 28.6% are widowed. Table 1 show the distribution of retirees by reasons for their retirement, those who retired based on the policies of retirement which are 35 years of service is 71.6% and age limit is 28.4%. From table 1, it is observed that those retired at age 60 is 24.9%. In this case, the respondents might have served 35 years, which is a condition for mandatory retirement. A period of 35 years is long enough to for the respondents to acquire valuable skills and experiences which may be of use to some other employers or themselves. Those who retired at age 65 are 45.9%, thus confirming the demographic projection of a large population of retirees for mandatory age of retirement.

Table 1: DEMOGRAPHIC CHARACTERISTICS OF THE COHORT AND SAMPLE

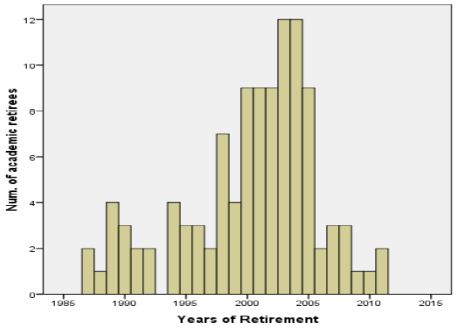
$n = 109$

VARIABLES	FREQUENCY	PERCENTAGES
GENDER		
Males	83	76.1
Females	26	23.9
Total	109	100.0
CURRENT STATUS		
Censor	37	33.9
Fail	72	66.1
Total	109	100.0
MARITAL STATUS		
Married	25	71.4
Widow	10	28.6
Total	35	100
REASONS FOR RETIREMENT		
Length of service	78	71.6
Age Limit	31	28.4
Total	109	100

LEVEL AT RETIREMENT		
PROF	92	84.41
SL	03	02.75
L	14	12.84
TOTAL	109	100.00
RETIREMENT AGE		
60	32	29.4
61	7	6.4
62	4	3.7
63	4	3.7
64	3	2.8
65	59	45.9
Total	109	100.0

Figure 1 below shows the distribution of new academic retirees for each year in the 35 years study period. All sampled academic retirees were represented. It shows that at later of the surveyed years, the annual number of retirees was much lower than in the early years, whereas it was as much higher at middle years of the study than the later and early years of the study periods. This may be as a result of younger's ages that are joining the academic service.

Figure 1 showing the distribution of new academic retirees
for each year in the 35 years study period



Life expectancy was estimated using survival analysis procedure in SPSS (Kaplan-Meier and life table) for the cohort. Survival life table is produced, using 1 year intervals of time since retirement as the basis for the tables. The 1 year interval is chosen to ensure adequate cell frequencies for the age expectancy analysis to follow. This analysis invokes the assumption that mortality rates were stable over the 1 year time intervals, and the survival rates were similar over the 35 year period. A summary life table based on 109 individuals, of whom 72 died, total number of individuals not identified as dead from record is 35 were considered alive (right-censored) at the time of the study as shown in Table 2 (Appendix 1)

In table 2 (Appendix), we have the results of the life table analysis for 109 academic retirees from retirement age for both voluntary and compulsory ages. Column 1 (x to $x+1$) i.e. interval 0-1 refers to the first year after retirement age, interval 1-2 refers to second year, (e.t.c). Each interval is a cohort for the survival function. Column 2 (l_x) is the number of cases that have survived to the beginning of the current interval i.e those who are alive at beginning of Interval. All 109 and 108 were alive during their first and 108 second year after retirement consecutively while only 104 were alive during third year. Successive entries in this column are obtained using this formula: $l_{x+1} = l_x - (d_x + w_x)$. Number withdrawn alive during Interval is in column 3(w_x). These are the academic retirees who were known to be alive at the close of the study. During this study, there is record of respondents withdrawing from the study at different numbers. The highest withdrawal (censor) was recorded in the fifth year of the study with 13 respondents. Column 4 shows the number exposed to risk of dying. It is assumed that academic retirees withdraw from observation during an interval were exposed to the risk of dying, on the average, for one-half the interval. Those who were exposed to the risk of dying in the first and second year is 109 and 108 consecutively while those who are exposed to risk of dying in the third and fourth year is 103 and 102 respectively. It is obtained by $l_{x+1} = l_x - \{d_x + (w_x \div 2)\}$

Number of Retirees died during Interval (d_x) i.e Column 5, gives the number of academic retirees who died during the interval. For example 3 died after their second year after retirement and one die during the third year, e.t.c. The proportion dying during interval in column 6 (q_x), is an estimate of the probability of dying during the interval. The proportion of dying in the first year is 0.00 while for the second year is 0.03. It is obtained by dividing the number of deaths by the effective number of exposed to risk $(col5 \div col4)$ or $q_x = d_x \div l_x$.

Proportion of surviving in column 7 (p_x) is the alternatively to the probability of surviving in the interval, or the surviving rate. It is obtained by subtracting the proportion dying during the interval from unity; $(1 - col6)$ or $p_x = 1 - q_x$. Cumulative Proportion Surviving at end of Interval Column 8. Is generally referred to as the cumulative survival rate, and gives the probability of a academic retirees

surviving to the end of the specified yearly interval after retirement. Calculated by cumulatively multiplying the proportion surviving each interval: $\sum_{\max.i}^{\min.i} \pi p_i$ where i = 1, 2 ... indicate that the probability of an academic retirees surviving for 2 years after retirement is 0.97. For 10 and 15 years after retirement, survival probability is 0.43 and 0.25 respectively. Standard error of survival probability and hazard rate column 9 and 11, provide measures of confidence with which one may interpret the statistical result. Column 10, this column gives the instantaneous potential in an interval year for the death of academic retirees in given interval giving that individual have survived up to the following interval year.

The survival probability curves for the two groups of retirees, the Voluntary retirement ages 60 to 64 years and the Compulsory retirement age at 65 years conditions are shown in figure 2 below. The academic retirees were divided into two groups: those who retired voluntarily before age 65 and those who retired at compulsory age 65 of retirement. This was done to determine if there is different in mortality experiences between the academic retirees who retired early and later years. The Outcome shows that there is significant difference in the survival probability for the two groups using Log rank (Mantel cox) test with p equals to zero.

Figure 2: showing survival distribution of academic retirees who retired under different conditions (voluntary age 60 to 64 years and compulsory age 65 year)

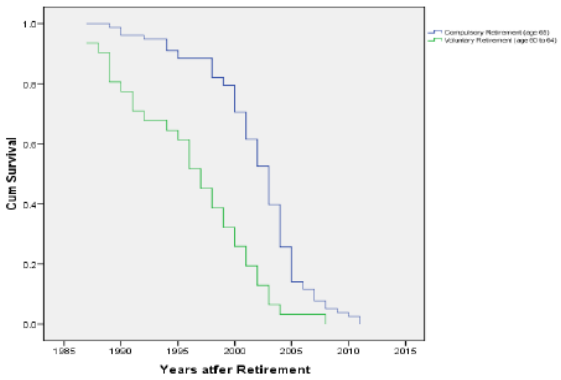
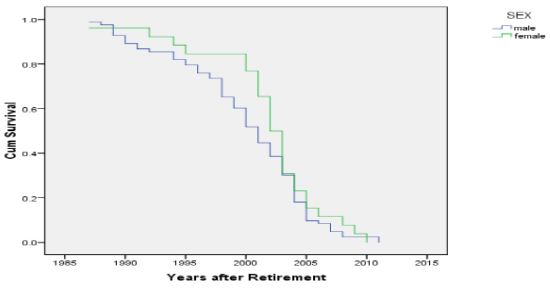


Figure 3 below compares the survival distribution of gender during the study period. The survival probability curves for the males and females respondents. There were no significant differences in the survival probability for the two groups. Using Log rank (Mantel-cox) test with p equals to 0.287, the difference between the gender survival functions was not significant.

Figure 3: showing survival distribution by gender of academic retirees who retired at different ages



The figure 4 below shows the survival distribution by gender and their duration of service during the study period. The survival probability curves for the gender and there duration of service. There is no significant difference in the survival probability for the two Groups. Estimation using Log rank (Mantel-Cox) test with p equals to 0.738, the difference between male and female survival functions was not significant.

Figure 4: showing survival distribution of gender by duration of service before retirement of academic retirees.

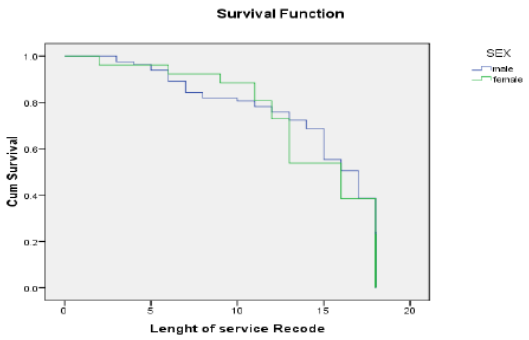
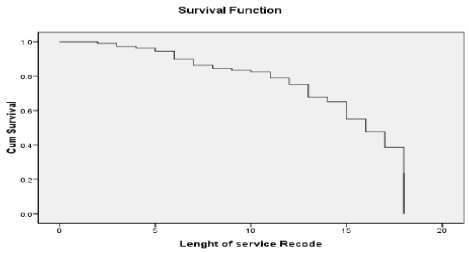


Figure 5 below consider the survival distribution of academic retirees and their duration of service during the study period. The survival probability curves show that the lower the length of service by any academic retirees, the higher the survival probability. From table 5, at the 5th year of service the probability of surviving is about 0.9 and at 15th year it is about 0.45.

Figure 5: showing survival distribution by academic retirees and duration of service before retirement.



4.0 Conclusion

The survival probability curves for the males and females respondents as shown in the figure 3 indicate that there is no significant difference in the survival probability for the two groups. Using Log rank (Mantel-cox) test with p equals to 0.287, the difference between the gender survival functions was not significant. We can also claim that there is no different between mortality rate of those retired early as a result of length of service and late retirement as a result of age limit during the period of study of retired academic staff of universities as it was supported by the data in the study. The survival probability of age limit retirement of academic retirees is higher than length of service retirement of academic retirees. The survival probability curves for the gender and there duration of service as shown in figure 4 indicates that there is no significant difference in the survival probability for the two Groups. Estimation using Log rank (Mantel-cox) test with probability of 0.738, the difference between male and female survival functions was not significant. More so, one could infer that duration of service before retirement does not have effect on longevity of retired academic staff of university this was supported by argument put forward by Ujiwal (2011) that the longer you work and the longer you handle work related to stress in your life, the less are your chances of survival after retirement. The academic retirees' median residual life time is 9.07 years. The median residual life time is the remaining lifetimes among survivors beyond that particular point. This means that 9.07 year is the time by which half of the academic retirees are expected to have died after retirement. The new Nigerian academic retirement policy approved by president Good Luck Jonathan in 2012 implies that university academic staffs in Nigeria who retire at age 70 years would have 9+ years to enjoy retirement pension benefit.

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Appendix 1

Table 2: Combined life table and survival estimate of academic Retirees age 60 to 65 and 35 years of service from 1977 to 2012

Years after Retirement interval X to $x+1$ (1)	Number alive at beginning of Interval l_x (2)	Number Withdrawing during Interval w_x (3)	Number Exposed to Risk of dying $l_{x+1} = l_x - \{d_x + (w_x \div 2)\}$ (4)	Number of Retirees died during interval d_x (5)	Proportion Dying $(col5 \div col4)$ q_x (6)	Proportion Surviving $(1 - col6)$ p_x (7)	Cumulative Proportion Surviving at end of Interval πP_x (8)	Std. Error of Probability (9)	Hazard Rate (10)	Std. Error of Hazard Rate (11)
0-1	109	0	109.000	0	.00	1.00	1.00	.000	.00	.00
1-2	109	2	108.000	3	.03	.97	.97	.032	.03	.02
2-3	104	1	103.500	1	.01	.99	.96	.014	.01	.01
3-4	102	0	102.000	3	.03	.97	.93	.046	.03	.02
4-5	99	2	98.000	6	.06	.94	.88	.096	.06	.03
5-6	91	3	89.500	13	.15	.85	.75	.216	.16	.04
6-7	75	1	74.500	8	.11	.89	.67	.139	.11	.04
7-8	66	9	61.500	7	.11	.89	.59	.134	.12	.05
8-9	50	6	47.000	7	.15	.85	.50	.159	.16	.06
9-10	37	3	35.500	5	.14	.86	.43	.131	.15	.07
10-11	29	3	27.500	2	.07	.93	.40	.062	.08	.05
11-12	24	1	23.500	4	.17	.83	.33	.138	.19	.09
12-13	19	2	18.000	1	.06	.94	.32	.041	.06	.06
13-14	16	2	15.000	3	.20	.80	.25	.145	.22	.13
14-15	11	1	10.500	0	.00	1.00	.25	.000	.00	.00
15-16	10	0	10.000	3	.30	.70	.18	.182	.35	.20
16-17	7	1	6.500	2	.31	.69	.12	.134	.36	.25
17-18	4	0	4.000	1	.25	.75	.09	.080	.29	.28
18-19	3	0	3.000	1	.33	.67	.06	.084	.40	.39
19-20	2	0	2.000	0	.00	1.00	.06	.000	.00	.00
20-21	2	0	2.000	1	.50	.50	.03	.090	.67	.63
21-22	1	0	1.000	1	1.00	.00	.00	.090	2.00	.00

The median survival time is 9.07