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The Impact of Pensions on the Mean Residual Life Time of Retirees in Tanzania

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Abstract The paper examines the future life time of retirees after retirement in the United Republic of Tanzania with emphasis on exploring the impact of Pensions on the life a retiree is expected to live just after retirement (longevity). Studies which explore or examine human behavior or status for considering assorted variables such as this require the understanding of overall population characteristics of the area of scrutiny if it should be realistic and meaningful for policy purposes or otherwise. However, in order to achieve this objective the author used primary data which were collected from four selected regions in the country where by a systematic sampling technique was employed and a sample size of 115 retirees who specifically retired in 2007 were obtained. Empirically, the study found out that there are exists strong evidence that retirement pensions implicate the future status of the retirees whether being died or remain alive in a short period of time (i.e 2007 - 2015). The study found that 86.49% of those who depend heavily on pensions as their major source of income have higher mortality risk just after getting retired. Lastly, the study has shown a close link between Retirement pensions and Education level of the retirees.

Keywords Retirement mortality, Retirement Pensions, Mean Residual Time, Retirement

1. Introduction

This paper examines the future life time of retirees after retirement in the United Republic of Tanzania with emphasis on exploring the factors that affect retirement mortality (retirees' longevity). Studies which explore or examine human behavior or status for considering assorted variables such as this require the understanding of overall population characteristics of the area of scrutiny if it should be realistic and meaningful for policy purposes or otherwise. On this background it is imperative to present the population characteristics of Tanzania. According to National Bureau of Statistics (NBS) 2012 census the population of the United Republic of Tanzania (Mainland) in 2012 is 43.7 million persons of whom 51% are women, 49% are men and 44% are children under the age of 15 years. It was also showed that out of this population, persons at the age of 60 and above were 2.4 million which accounts for about 5.5%.

Every human being is vulnerable to risks and uncertainties at different levels in life with respect to income as a means of life sustenance. In order to fight against these risks, every person requires some form of social security guaranteed by family, community and the society at large. The international Labour Organization (ILO) took some steps in order to insure people at different ages and different levels in life by setting an instrument which was adopted at its 35th session in June 1952, known as "Social Security (minimum standards) conversion No. 102". The conversion listed down a number of contingencies and benefits required, namely: Old age, Invalidity, Survivorship, Employment injury, Maternity, Medical care, Sickness, Unemployment and Death.

Most Literature such as (Wald and Watt, 1997; Musick, 1996; Hummer, 1996; Lee, 1995; Allison et al, 1999; Rogers, 1995 etc.) considered Alcohol taking, Education level, Gender, Health behavior, Income, Marital status, Obesity, Occupation status, Race and Ethnicity, Age and Smoking as among the factors which may affect mortality of older people after retirement (Robert L. Brown and Joanne McDaid, 2013). With regard to this study, the researcher worked on the following factors: Income (Retirement Pensions), and Education level before and after retirement.

1.1. Retirement Pensions (Life Annuity)

Social Security Schemes in Tanzania as it is supported by the Oxford Policy Management (2010), the retirement benefit in Tanzania has been portioned into two: **As a lump sum** and **as a life Annuity**. This means that, some of the retirement benefit is paid as a lump sum on retirement and the remaining is automatically converted into life Annuity[1]. Life Annuity is seen as a major source of income particularly for low income earners before retirement and who do not

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1 Monthly payment to the retiree is offered until he/she dies

have any other source of income such as Asset investment, Shares investment etc.

1.2. Education Level

Education is an integral aspect of development because well-educated masses are better equipped to make large scale social improvements by means of business or government action Lisa *et al* (2008). Education was regarded as a major link between employment, income and access to health facilities. In formal sectors therefore, higher education implies higher income (Salary) and hence mortality in all age groups is minimized.

The Statistical Bulletin (1975) states that, occupation; education and income are associated with health and longevity. On the other hand Rogers *et al* (2000b) has commented that not only does education has some effects on mortality through its link to employment, income generation and access to information, but also it affect mortality by influencing health behavior and access to health facilities.

Some empirical researches examined the relationship of combined variables (See: Hurd *et al*, 1996; Knox and Tomlin , 1997; Preston and Elo, 1995) and others report on factors that affect retirement mortality and hence the mean residual life is shortened, but these studies are found to concentrate on developed economies and notably few in developing countries and so limited studies in Tanzania context especially those that link the longevity of retirees and different factors such as retirement pensions and education to be more specific.

Despite the fact that many studies have been conducted on the factors affecting retirement mortality and on its related topics worldwide, but in the United Republic of Tanzania little is known on the extent that Retirement Pensions may affect the mean residual life time (Retirement Longevity) of retirees. In response to this gap, this has been designed to bridge and in particular narrow down the gap on one hand and to examine systematically the association between the future life time after retirement (Mean Residual Life Time) and retirement pensions as the major source of income for most retirees. This study is important in the sense that its findings will add relevant knowledge to what is known in the field of Actuarial Science on whether the future life time of the retirees is being affected by Education level prior retirement and Retirement Pension (Life Annuity), assuming other factors are held constant. The rest of the paper is organized as follows; section 2, data and methodology; section 3, Results and discussion, Retirement pensions and education, section 4, Conclusion and implication.

2. Data and Methodology

In order to achieve this end the author used primary data which were collected from four selected regions and a systematic sampling employed to obtain a sample size of 115 retirees. However, a structured questionnaire used to capture information from 2007 retirees. Cross tabulations were constructed as well as survival analysis was performed to identify which group of retirees is at high risk of dying.

3. Results and Discussion

With regard to insufficient resources such as time and other important resources, this paper constrained its self on examining only two factors namely: Retirement pension and Education level.

3.1. The Effect of Pension Amounts on Life after Retirement

An employee who is governed by the Pension Scheme gets a recurring monthly payment termed as pension for life on reaching the age of superannuation or if she/he is retired earlier in accordance with existing rules and regulations.

According to Social Security Regulatory Authority (SSRA) on the social security schemes (pension Benefit Harmonization) Rule, 2014 under the Social Security Regulatory Authority Act.8 of 2008 as amended; stipulates the harmonized formula to all pension schemes and the type of factors considered in realizing the pension amounts.

Monthly Pension = (1/580 x Number of Months contributed X Annual Pensionable Emoluments) x 75% x 1/12

And the factors considered are:

- ☞ The annual accrual factor which is 1/580 per month
- ☞ The commutation rate shall be 75 per centum of the annual full amount of the pension

Thus, from the above formula we can now draw that, the smaller the Annual Pensionable Emolument the smaller the old age pension amounts.

In order to understand the effect of pension amount on life after retirement it is imperative to firstly describe the current status of retirees in the country. Figure 3.1 below depict the retirees' status quo by sex as of 2007 retirees.

Basically, the study considered a 2007 cohort of retirees from the United Republic of Tanzania, the reason being to establish the mortality risk of this particular group within a short period of time of eight years (2007-2015). Among the crucial factors considered in this paper is the pension amounts paid to retirees by different pension schemes in the country. **Figure 3.1** below describes the status of the retirees in relation to gender. At the time of analysis of the data presented in the figure above, it was observed that (37.2%) of sampled population were died and (67.8%) were still alive. This may be an indicator that majority of older persons in the United Republic of Tanzania live more than eight years after they get retired. Nevertheless the figure above describes the current status of the retirees who were retired in 2007 such that, female seems to live longer than males as the number of deaths in male is higher than in female.

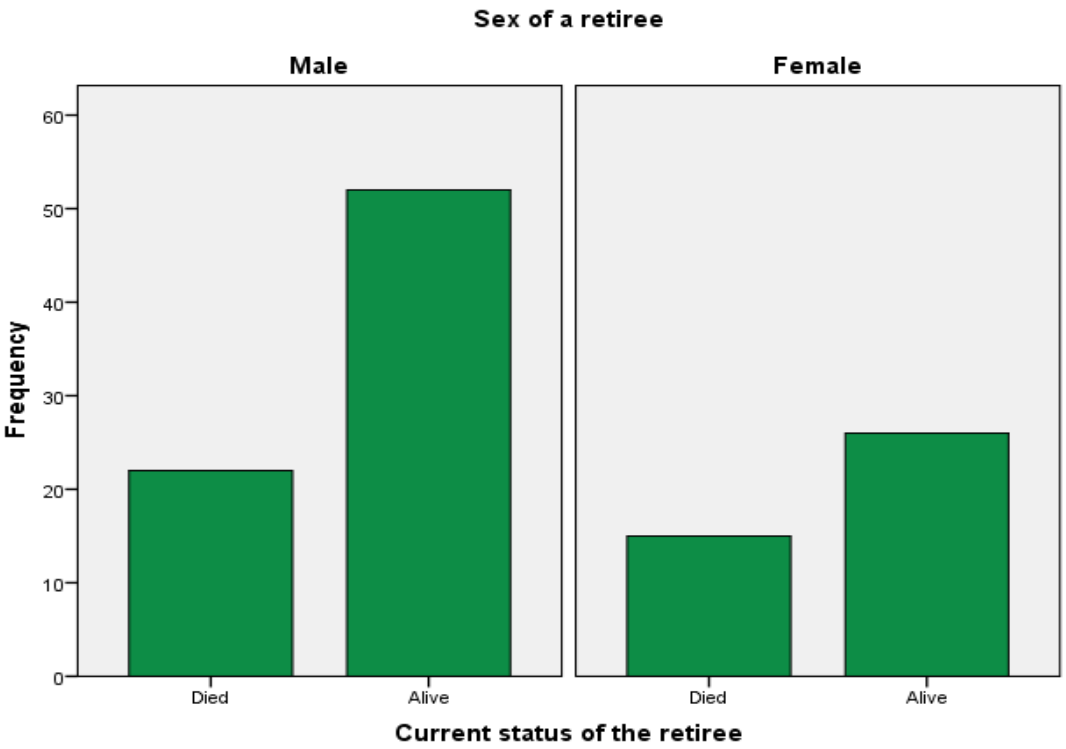

Figure 3.1. The 2007 Retirees' Current Status by Sex

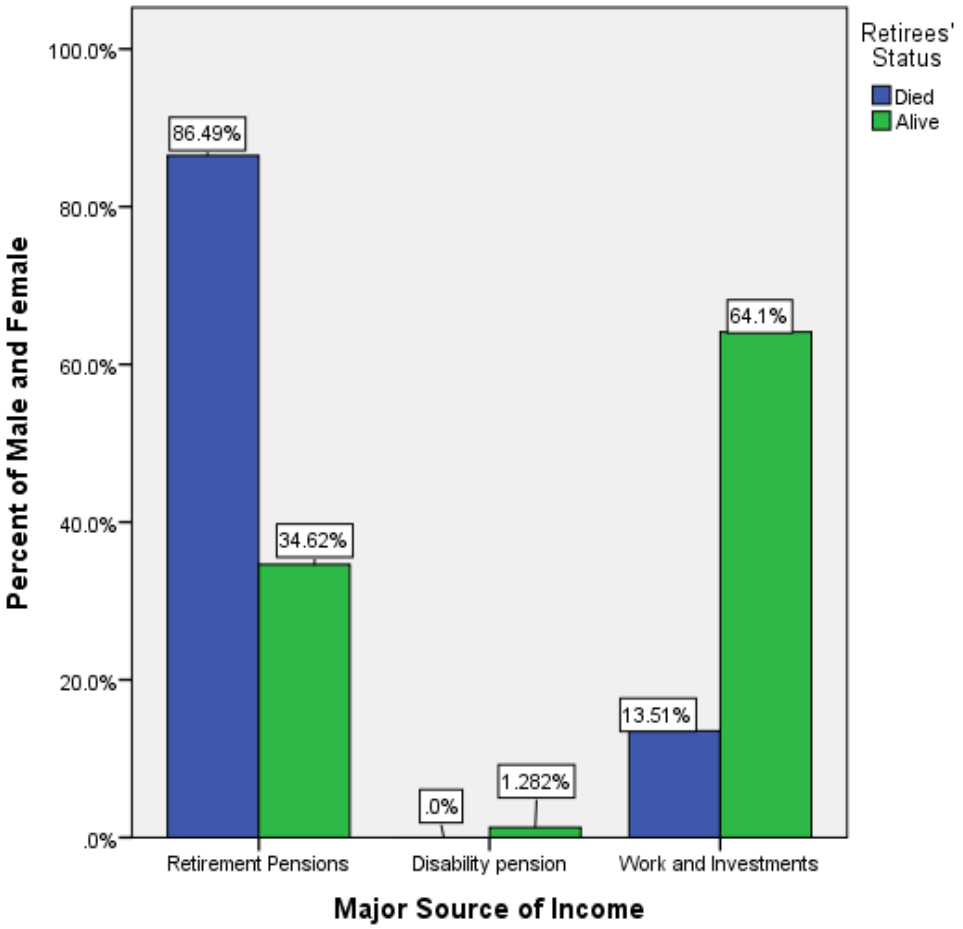

Figure 3.2. Major Source of Income of the 2007 – 2015 Retirees

3.2. Pensions as a Major Source of Income

The major source of income to most of older people in the world is said to depend highly on public and private pension in form of earnings related or resource – tested benefits which account for an average of nearly 59% of their income in the 34 OECD countries (OECD, 2013).

In the United Republic of Tanzania to be more specific, the situation is even worse simply because it indicates that 51.3% of retirees interviewed depend greatly on pensions as their major source of income (see Fig 3.2 above). This is due to the fact that Tanzania is among the poorest countries in the world and hence the per capita income and economic status of the country is relatively low compared to OECD countries such that even if they depend highly on pension (59%) the retirees may still experience a fairly good standard of living.

Similarly, the chart below has interesting results as it displays 86.49% of those who depend heavily on pensions as their major source of income they are at higher risk of dying just after getting retired. On the other hand we can see a supporting evidence that, having multiple sources of income improves the well being of a human being and hence early death just after retirement is minimized, that is, there is only 13.51% of those having multiple sources of income (i.e Pensions, Postretirement work and investment income) experienced death while 64.1% of those with multiple income survived within eight years of their retirement period.

Apart from the fact indicated on figure 3.2 above, that most of retirees because of insufficient pay they receive from Pension Schemes experience an immediate death, but also the National Audit Office of Tanzania in its Audit Report of 2010 observed key issues from Pension Schemes as follows:

i. Delay in processing payment of terminal benefits has been a long complain of many people who has been retiring from public service employment. It has been a common observation for retired officers to spend more than 12 months without receiving their terminal benefits.
ii. On account of this untimely payment of pensions there are reported cases where pensioners die before getting their dues thereby making it even more difficult for survivors (relatives) to obtain their due pensions and result in miserable life of dependants who left without any reliable source of income hence denied a decent standard of living.
iii. Retirees have been claiming that the delay of pension payments affect their purchasing power and hence the standard of living.
iv. Another critical observation made is that; Pension Schemes used different Actuarial formulas to estimate/calculate the retirees' terminal benefits.

From the above observations (i - iv), the study comes out with the following comments:

- ☞ Since there were no universal and fair Actuarial formula across all Pension Schemes in Tanzania, it is obvious that both terminal benefits and pension amounts calculated by considering the shareholders' interests vigilantly while disregarding the side of retirees, as a result they were unable to meet their day –to –day standard of living which ended up with an immediate death.
- ☞ It is an obvious evidence on what has been discussed in previous sections, that most of retirees due to delay in processing terminal benefits died before receiving their benefits and therefore become a disaster to survivors to get such benefits.

3.3. Poverty as a Cause of Immediate Death after Retirement

Quite a number of literature evidenced that poverty is a multidimensional social phenomenon that affect people`s life span. Poverty is significantly measured using various quantitative methods Sen (1997); Foster and Sen (1997); Lipton and Ravallion (1995). All of them commented that the definition of poverty and its causes vary by gender, age, culture and other socio – economic contexts. For instance, most men in rural Tanzania associate poverty with the lack of material assets where as for women poverty is taken as food insecurity.

According to (Latvia, 1998); poverty *is humiliation, the sense of being dependant on them and of being forced to accept rudeness, insults, and indifference when we seek help*.

Now with regard to pension being the major source of income to most of retirees in the United Republic of Tanzania and given the fact that the amounts paid to them as pension payments is insufficient; to them Poverty is associated with the lack of ability to generate income, being dependant to meager payments made by public and private pension schemes and forced to accept a non-participatory planning.

It has been observed that 81% of the retirees who found died within the first eight years of their retirement (2007 - 2015) lived below the poverty line. In other words, two groups namely those received pensions less than 50,000TZS and those received between 50,000 – 100,000TZS inclusive constitute an 81% of the retirees died due to the fact that they lived below the poverty line. It also indicates an expenditure of USD1.54[2] per person per day **(see table 3.1)**. This is being evidenced by one of the mechanisms used by World Bank to measure poverty. The World Bank considered USD1.25 per person per (PPP) day as the value of resources needed to survive above the poverty line, and hence anyone who lives on less than the daily amount is considered to be poor (World Bank, 2005).

Another evidence was pointed out that retirement time kills more than hard work period ever does, because the small income they get from their pensions is affected by the change of cost of living due to cost of production, war, famine, drought among others that bring unexpected prevailing prices of goods and services (Paluka et, 2013).

2 www.bloomberg.com/quote/USDTZ:CUR as retrieved on 30/09/2015

But considering time, standard of living and time value for money being variables given pension amounts fixed it is true that USD1.54 in 2015 is worse off compared to USD1.25 in 2005.

On other hand 26.9% of the retirees who are receiving 400,000TZS and above per month found to be still alive compared to 2.7% of them found to be died within this time period. This implies that higher income help the retirees to meet their basic needs and thus retirement mortality was minimized of which implied that longevity affected positively.

The Pearson Chi-Square $\left(\chi^2 = 19.438\right)$ and the p-value $\left(p = 0.001\right)$ give us strong statistical evidence to reject the hypothesis as the p-value is far below the significance level of 5%, and hence the current status of the retiree (either Died or Alive) is being influenced greatly by the pension amounts received by a retiree per month.

3.4. How Education Level Affects Pension Amounts?

Education is one of the most important investments a country can make to her people and its future, at the same time education is termed to be a key factor in reducing if not completely eradicating poverty and inequality.

Higher education level attained by an employee during working life has a greater implication on both terminal benefits and on pension amounts as it influences appointments or promotion to higher positions of which brings in more income (higher salaries and other fringe benefits) much better than the previous positions.

From the figure 3.3 below we clearly see that as the education level of a person who is still employed rises from secondary eduacation and tertiary education level to University education level, brings in some positive financial impact at retirement life. Pension amounts grows significantly from **below 50,000TZS to 400,000TZS and above**.

Table 3.1. Current status of the 2007 retirees and the Pension amounts per month (Tshs.)

		How much is/was the retirement pension? (Tsh.)					Total	P-Value
		Less than 50,000	50,000 - 100,000	100,000 - 200,000	200,000 - 400,000	400,000 and above		
Current status of the retiree	Died	40.50%	40.50%	10.80%	5.40%	2.70%	100.00%	0.001
	Alive	15.40%	24.40%	19.20%	14.10%	26.90%	100.00%	
Total		23.50%	29.60%	16.50%	11.30%	19.10%	115 100.00%	

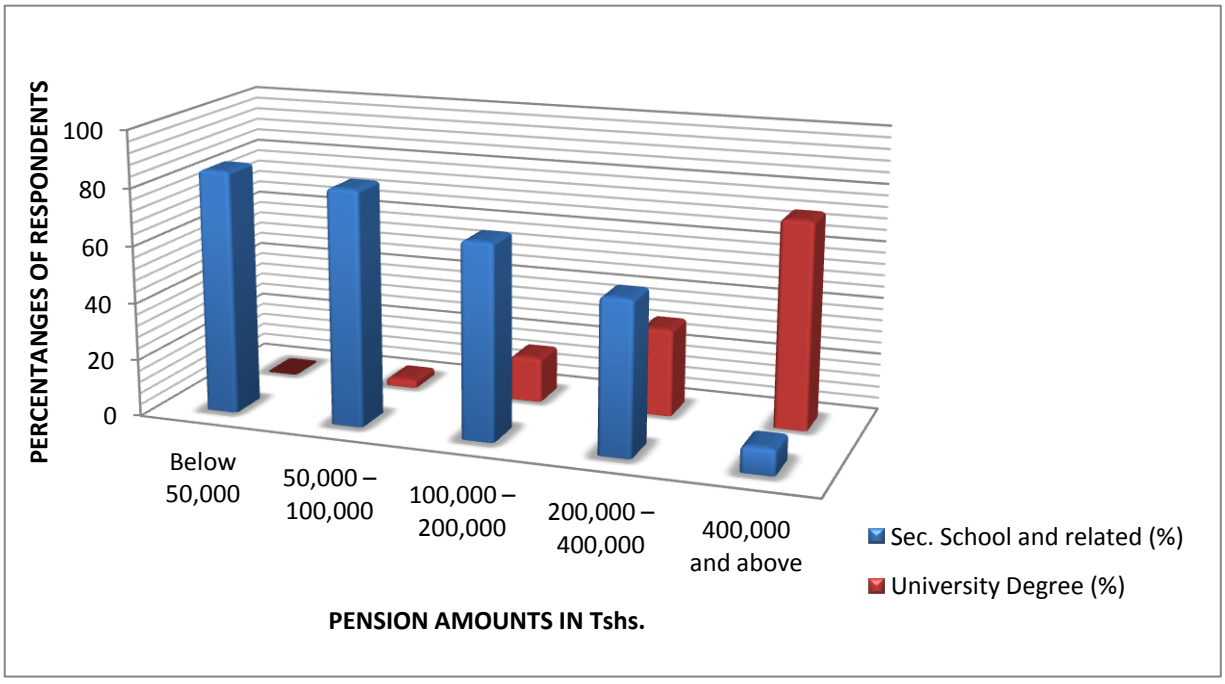

Figure 3.3. Relationship between Pension Amounts and Education Level

Table 3.3. Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
199,999TZS and below			7.472	2	.024			
200,000 - 399,999 TZS	2.199	1.015	4.689	1	.030	9.015	1.232	65.968
400,000TZS and above	.917	1.225	.559	1	.454	2.501	.226	27.621

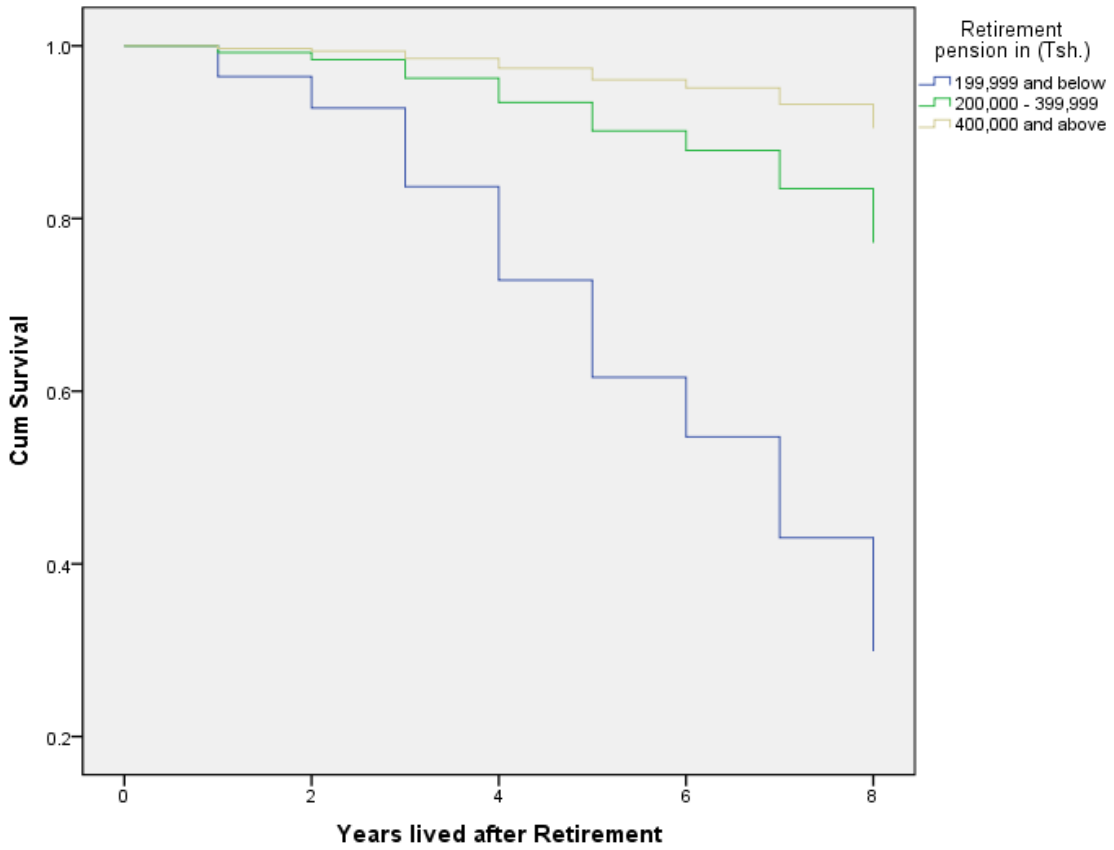

Figure 3.4. 2007 Retirees' Survival Function

3.5. The Cox Regression Model

The Cox model sometimes it is referred to as the Cox Proportional Hazard model (PH) is a statistical technique for exploring the relationship between the survival of a patient and several explanatory variables. In our case, it is concerned with exploring the relationship between the survival of the 2007 ritirees over retirement pensions and education as explanatory variables.

The Cox model allowed us to estimate the hazard (or risk) of death for a retiree given the explanatory variables (**see table 3.3 above**). The hazard function is the probability that an individual will experience an event (eg. Death) within a small interval of time, given that an individual has survived up to the beginning of the time interval.

The pension amounts per month earned by retirees in the United Republic of Tanzania were broken into three categories/groups to enhance proper and clear interpretation. These groups are: **1:** $\leq 199,999TZS$ **, 2:** $200,000 - 399,999TZS$ and **3:** $\geq 400,000TZS$ as indicated in table 3.3 above.

The coefficients of the regression model from table 3.3 above (i.e $\beta = 2.199, \beta = 0.917$) are all positive which indicates a higher risk, though the third group has lower risk relative to second and first groups. A similar observation on the proportional hazard ratio decreases with an increase in pension amounts. That is to say, the hazard proportional ratio of being in group 2 (200,000 – 399,999TZS) is 9.015 lower than group 1 i.e. those who earn (199,999TZS and below) with a 95% confidence interval of 1.232 to 65.968. the p-value (p=0.030) suggests a statistical significance at the 5% level and thus, there is these two groups experience different risks where by the former is in higher risk compared to the later group.

Similarly, the proportional hazard ration of being in group 3 i.e. $\geq 400,000TZS$ relative to reference group is 2.501 that is to say, this group experience even less risk relative to group 1(one) as a reference group. and the p-value (p=0.454) suggests that there is no statistical significance at 5% level. That is to say, the retirees' reference group ($\leq 199,999TZS$) and the one which receives higher amounts ($\geq 400,000TZS$) experiences two different risks of death, such that those

earning $\geq 400,000TZS$ per month has relatively lower risk of dying given that retirement pensions is the solely means of income.

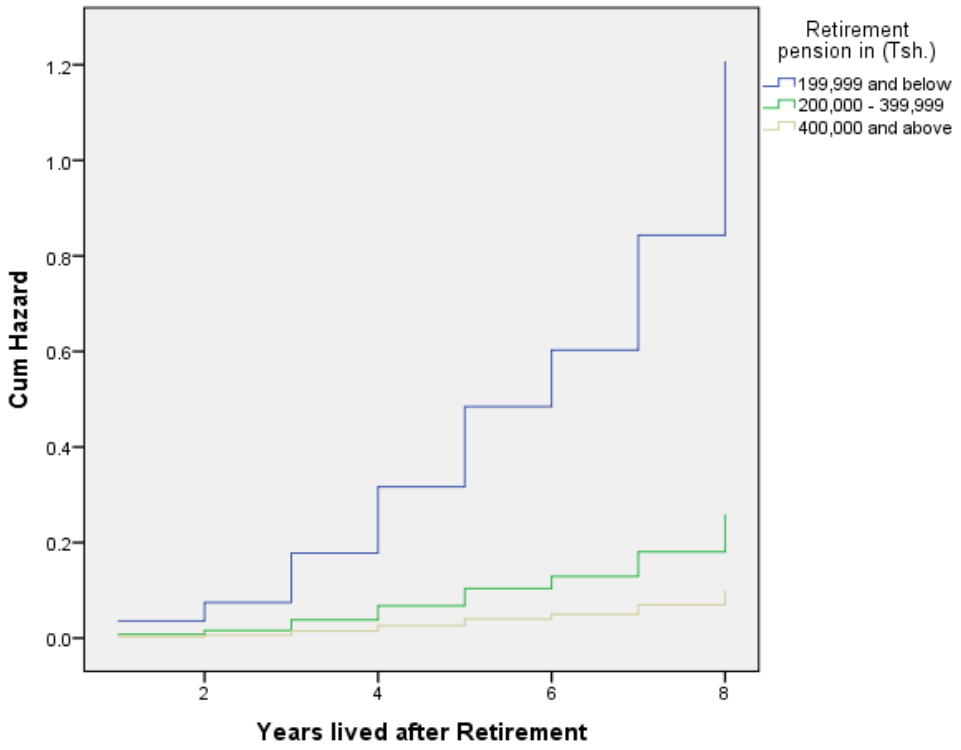

Figure 3.5. 2007 Retirees' Hazard Function

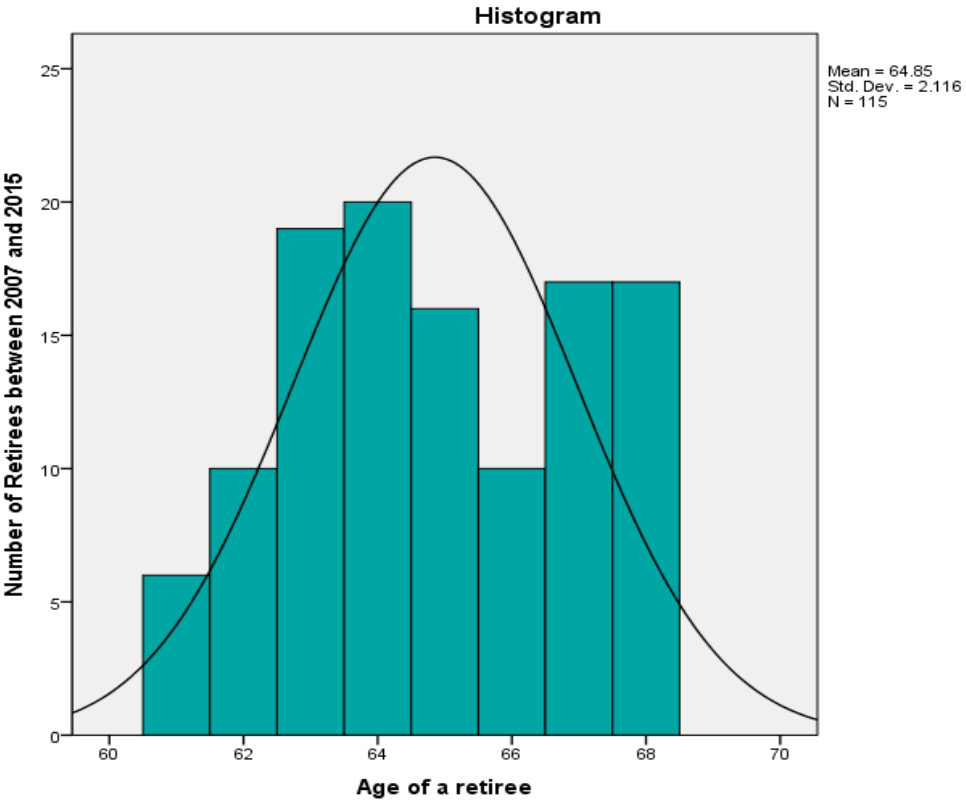

Figure 3.6. Years lived after Retirement

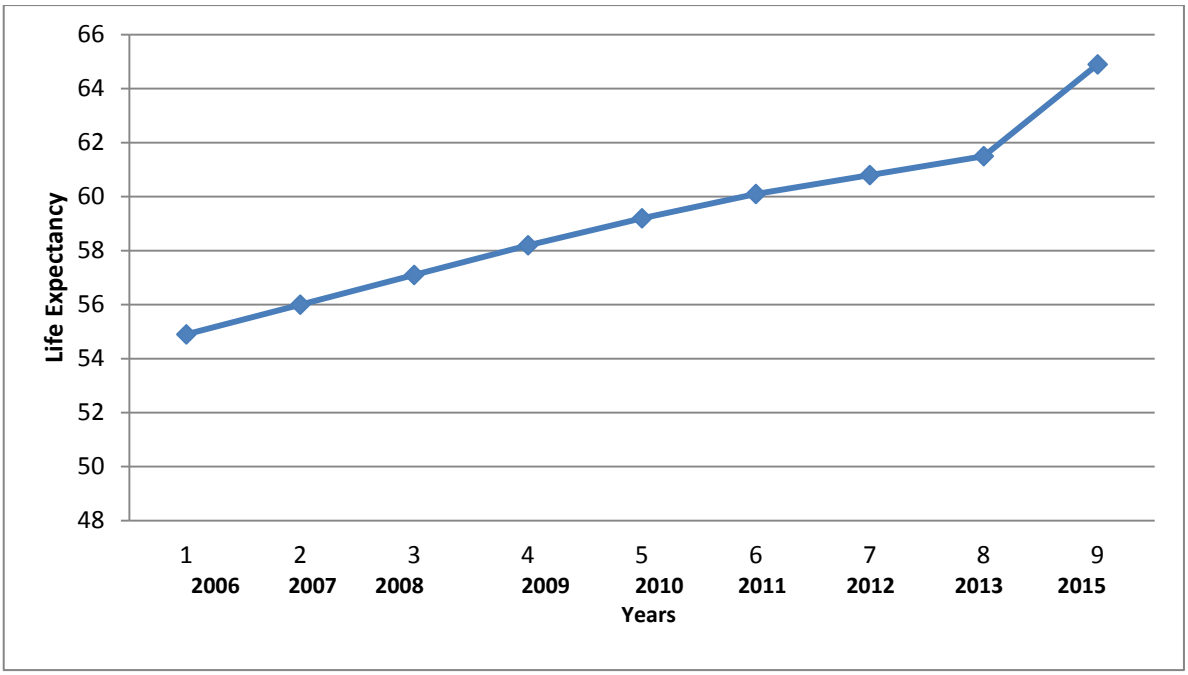

Figure 3.7. Tanzanians' Life Expectancy at Birth Trend

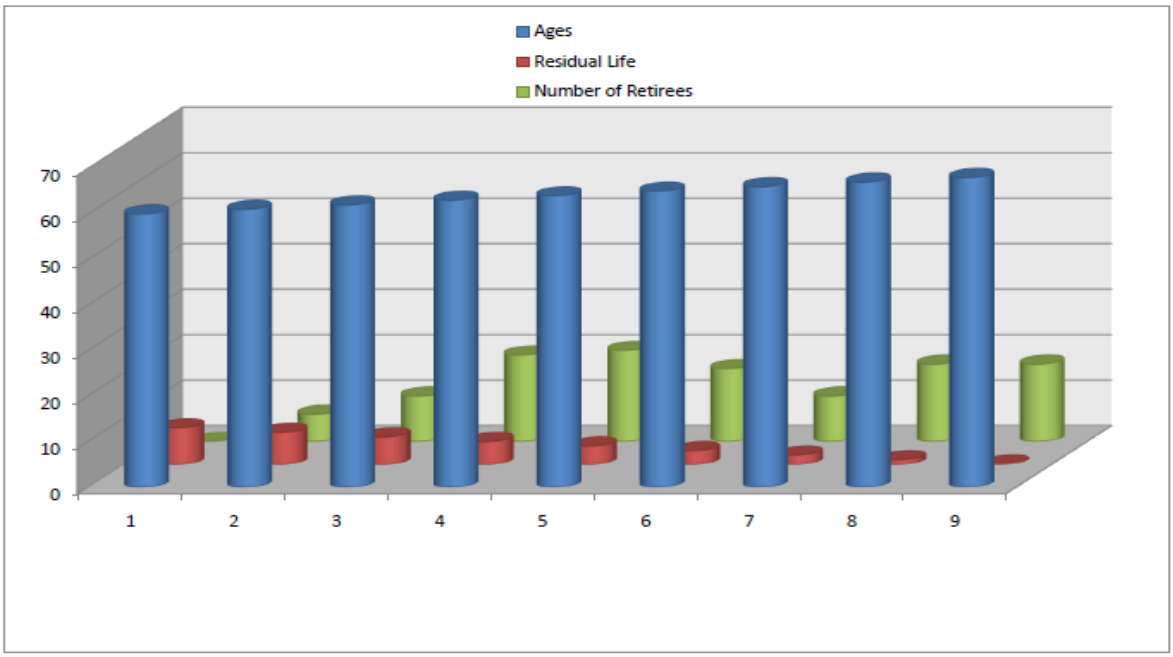

Figure 3.8. Residual Life for Retirees from 2007 to 2015

Figure 3.4 above is the survival function of three retirees' groups divided on the basis of their retirement pensions. It depicts that the group earning higher retirement amounts of $\geq 400,000TZS$ seems to be in better position of living longer that other two groups as shown below. The group of retirees which seems to have lower survival rate is one that earns $\leq 199,999TZS$, the figure portrays that, this group has better survival rate within the first three years of their retirement and it approaches zero as twenty years of their retirement time.

The truth is that group one as per categorization above ($\leq 199,999TZS$) has lower survival rate as indicated in figure 3.4.

Same scenario has been confirmed by figure 3.5 below which tells us that the group has found to experience higher mortality rate (Hazard) as compared to that group receiving $\geq 400,000TZS$.

3.6. Average Future Life Time (Mean Residual Life) of the Retirees

The findings indicate that the total life expectancy at birth (both male and female) in the United Republic of Tanzania in 2015 is 64.9 years that means, most of the respondents had an average age of around 64 years. On the other hand it was

found that the life expectancy for male was 64 years while that of female was 67 (see figure 3.6) above.

Similar results were found by the Unicef (2012) that the life expectancy at birth was 59.58 for male and 62.17 for female in 2012. But also WHO (2013) that the life expectancy at birth in 2013 for male was 61 years while that of female found to be 65 years. Within the same year, World Bank also published a report on life expectancy for different countries Tanzania being one of them indicating that, the life expectancy at birth for both male and female is 61.5 measured in years and it provided with life expectancy data[3] for various years from 2006 to 2013 which managed the author to produce the life expectancy trend graph (figure 3.7) above.

The figure 3.7 above gives an intuition that; the life expectancy for Tanzanian has been in increasing trend every year. For example, we see that in 2007 life expectancy was recorded as 56 years while in 2009 increased to 58.2 years. However, this trend continued to 2013 where it was found to 61.5 years. This is enough evidence to confirm this study's findings that the life expectancy at birth for both male and female for 2015 to be 64.9 years.

Figure 3.8 above displays the information for age, residual life and the number of retirees in each category. It highlights that as the age of the retiree increases from 60 years (at point 1) which is the age of mandatory retirement in Tanzania to 68 years (point 9) the residual life falls. Nevertheless, the number of retirees in each residual life category fluctuated considerably. Hence the figure reveals that the **mean residual life time is 5.02** as most of the retirees found to live an average of 5.02 years. Given pensions as the only source of income, life expectancy increases at a decreasing rate holding other factors constant. That is to say, within a short period of 8 years, retirees in Tanzania live only 5 years on average.

4. Conclusions and Implication

Empirically, the paper found out that there are exists strong evidence that retirement pensions implicate the future status of the retirees whether to die soon or remain alive. The study found that 86.49% of those who depend heavily on pensions as their major source of income they are at higher risk of dying just after getting retired. On the other hand the study found some supporting evidence that, having multiple sources of income improves the well being of a human being and hence early death just after retirement is minimized, that is, there is only 13.51% of those having multiple sources of income (i.e Pensions, Postretirement work and investment income) experienced death while 64.1% of those with multiple income survived within eight years of their retirement period.

Nevertheless, the study considered the 2007 group of retirees due to a number of reasons including the scarce resources like fund, time and other resources which were allocated for the study, but the aim was to explore retirees' situation given a short period of time i.e from 2007 to 2015. It was found that, the Mean Residual Life (MRL) of retirees' is only 5 years from the date of retirement but it diminishes quickly as the retirees are getting older and older (see fig. 3.8).

Education is explained to be a critical link to retirees' future life time through pensions as it has been shown in the discussion above.

Therefore, since education is the key criterion for a person to be employed, promoted and or being appointed to a higher position, employees who are expected retirees in fact are supposed to educate themselves in order to attain higher levels of education during their working life so as to improve their income in terms of salary and hence improve retirement pensions. Therefore the findings of this study should also send alarming information to the Social Security Regulatory Authority (SSRA) on behalf of the Government to formulate appropriate rules, regulations and policies to suite the present and future life times of the retirees.

3 www.data.worldbank.org/indicator as retrieved on 13/11/2015

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