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Applied Economics

RETIREMENT INCOME ADEQUACY IN KENYA

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the research proposal contains no material previously published or written by another person except where due reference is made in the research proposal itself.

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The research project has been submitted for examination with my approval as the University Supervisor.

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ABSTRACT

Retirement income adequacy can be measured in different ways. One is by conducting a qualitative research where the researcher collects data in the form of opinions from retirees on the adequacy of the income they receive. Another is a quantitative research where adequacy of retirement income is measured by comparing a retiree's income before and after retirement. The first goal of the recent United Nations Sustainable Development Goals is to eradicate poverty. This is a very important goal and this study conducted below tries to measure retirement income adequacy which is a way of reducing poverty in retirement in Kenya.

This study works towards measuring retirement income adequacy using quantitative methods and quantitative data and it concentrates on the middle income earners. The data collected has 462 data points which shows an individual's income before retirement, income after retirement and any other retirement savings an individual made. Adequacy is measured by calculating the income replacement rates. Using the data from two main pension administrators in Kenya, the study found out that the average replacement rate for Kenyan middle income earners is 43%. This means that after retirement, an individual will receive 40% of what they were receiving as income before they retired.

1 INTRODUCTION

1.1 Background.

1.1.1 Definition of Terms

In order to discuss retirement income adequacy, It is required that some words be defined. A pension is a payment made to a person when they retire. This payment is made by the employer whether the state or an employer in the private sector. We also have pension adequacy. This is the measure of how sufficient one's income is. Second is the replacement ratio. It is a person's gross income after retirement divided by his gross income before retirement.¹

There are two types of retirement plans. A Defined Benefit (DB) pension plan and a Defined Contribution (DC) pension plan. A DB pension plan states a specific benefit that one will be paid when they retire. The retirement benefit takes into account factors like the number of years one has worked in the company and the participant's salary. The age at which an employee retires affects the amount of benefits received. Although 65 is often thought of as the "usual" retirement age, many workers participate in plans that permit retirement before age 65 with a normal (unreduced) pension. (Foster, 1998)

A DC pension plan specifies how much one will pay now into the retirement plan. The amount is typically a percentage of the individual's salary or a specific monetary amount. Then the funds are invested in mutual funds. The amount the individual finally has at retirement depends on how much the employer and employee contributes how long those funds are left vested and how long the investments perform².

According to the OECD glossary, pension adequacy can also be described as how effective a pension system provides income during retirement to replace earnings that were the main source

¹ <http://retireinmuskegon.com/your-replacement-ratio-an-important-retirement-consideration/>

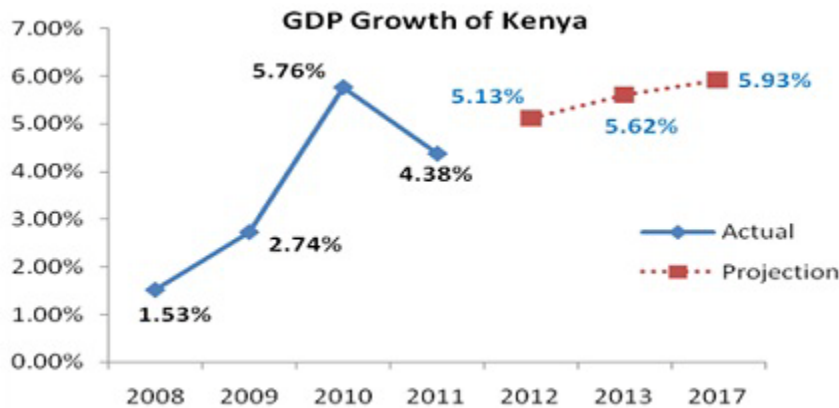
² <http://www.myretirementpaycheck.org/retirement-plans/defined-benefit-plans.aspx>

of income before retirement. Is a measure of how effectively a pension system provides income during retirement to replace earnings which were the main source of income prior to retirement of workers? Then we have per Capita income. Per capita income is basically the amount of money per person in a specific area.³

1.1.2 Pension Plans

When discussing pension plans, the population growth of the area under study is required because it is a crucial element to pension providers.

Figure 1: GDP Growth from 2008



Source: IMF World Economic Outlook 2012

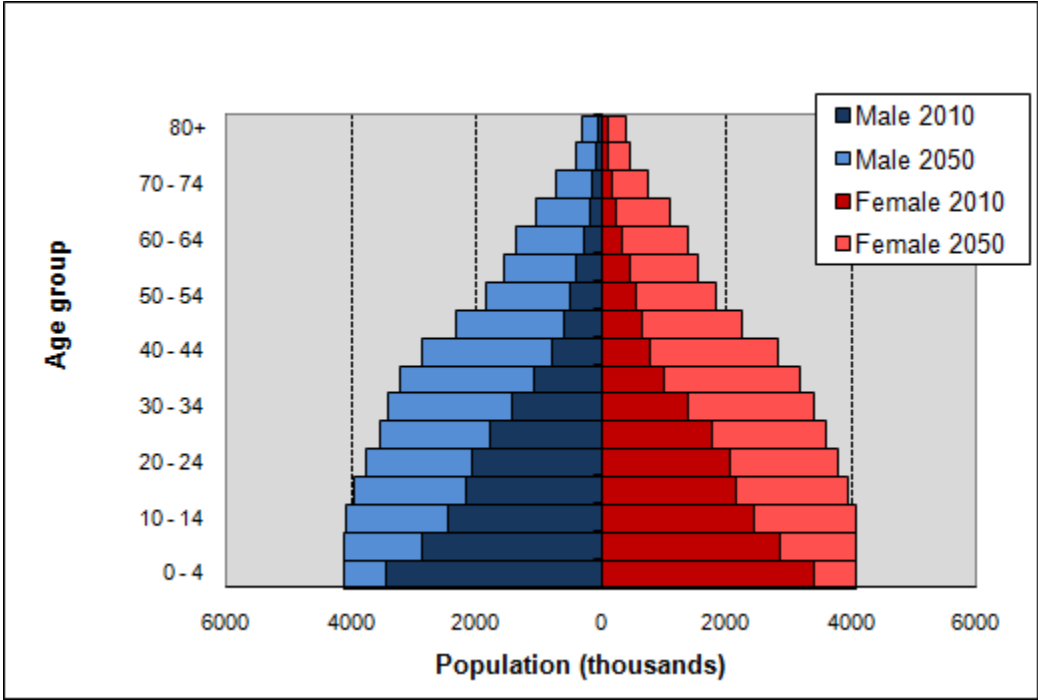
Figure 1 shows the growth in GDP of Kenya from the year 2008 and a projection to the year 2017. This information is very important because a growth in GDP indicates a growth in income and with growth in income, there is growth in investment and savings. This is because the people have an increase in their disposable income. The low in GDP in 2008 shows the effects of the Post-Election violence on the economy.

From figure 2, it is clear that there is an increase in the number of the working class and these are the people who will need these retirement benefits. So the nation needs to be prepared to be able

³ <http://study.com/academy/lesson/what-is-per-capita-income-definition-example.html>

to provide adequate benefits to this group. These benefits are either the pension plans or the ill health benefits. An increase in population also means that there will be an increase in savings and an increase in the penetration level of pension in Kenya.

Figure 2: Kenya Demographic Transition and Growth



Source: World Bank computations based on United Nations, 2009, World Population Prospects

These pension plans can be viewed in several ways. First, they can be viewed as a source of retirement income for retirees, as an incentive in labor relations. This affects the turnover of employees, the workforce and the timing for retirement. Also pension plans can be viewed in the light of corporate finance because corporate pension funding and asset allocation are an important element in this market (Bodie, 1989). The research took the view that the primary economic function of a pension plan is to provide replacement income in retirement.

Perceived adequacy of retirement income differs significantly by age, gender, race, income, employment status, and planning horizon concurring with the results of previous research.

Younger respondents were likely to perceive having inadequate retirement income. They may be affected by low paying jobs without benefits, security or pensions. (Y. Lakshmi Malrouu, 1995)

The Retirement benefits system comprises of different tiers of retirement benefit arrangements. The first tier is the Unfunded Government Social Security Schemes, the Mandatory Retirement Benefits Schemes and lastly Additional Self-driven Voluntary Retirement Savings. From (Chirchir, 2009), the paper believes that since the three are supplementary, retirement benefits systems that have the three yield a higher replacement rate.

This inadequacy tends to motivate parties involved and specifically members to save more as they work so as to be able to maintain or improve their standard and eliminate poverty. This saving is known as Additional Voluntary Contribution (AVC).

1.1.3 Approaches to Retirement Income Adequacy

There are different approaches to Retirement income adequacy, depending on the values of different stakeholder groups. These different stakeholder groups are; policymakers, employers, and individuals or financial advisors. The alternative measures of adequacy include; Equivalence to pre-retirement standard of living based on the replacement ratio relationship, sufficiency to cover all forecasted future living expenses and minimum needs.

(Burns, 1990) believes that although the elderly have higher per capita income than the nonelderly, social and demographic changes such as increasing number of elderly, increased life expectancies, high divorce rates, changes in real wages, saving rates, and decreasing labor force participation may adversely affect their retirement incomes. The amount of pension one receives is calculated using the replacement ratio. This ratio is important as it defines the investor retirement liability, corresponding investment target and the appropriate savings and investment strategy.

A 1994 Survey by the RBA however showed an actual average income replacement ratio of only 22% for retirees from occupational schemes and this was largely attributed to shorter service durations and non-preservation of benefits on leaving service. The average replacement ratio for

the median income quintile household, calculated by Engen, Gale, and Uccello (1999), is expected to be around 72%.

The third corporate objective of the RBA as stated “Increase the Income Replacement Rate to 35% from 20% by 2009” while easy to articulate on paper is not an easy task to achieve. Kenya’s estimated overall retirement benefits replacement rate falls far below the ILO (International Labor Organization) recommended rate of 40% per couple. In comparison, this percentage tails further behind those of the developed countries’ average of 60% - 70% such as in Denmark, Sweden, Australia and Germany and as high as 102% in Luxembourg. (Chirchir, 2009)

This research measures the retirement benefit adequacy with respect to the replacement ratios based on pre-retirement income. This measure is mostly used by employers. Replacement ratios are best used for comparing participant results for large groups, as in the case of employer plans and social programs. On the downside, replacement ratios make it difficult to incorporate individual differences and changes in expenses that occur during the retirement period (Bajtelmsmit Vickie, 2013).

1.2 Problem Statement.

An increasing number of African countries for example, Kenya, Uganda, Tanzania and South Africa have recently initiated reform of their pension and social protection systems over the last decade. The major drive for these reforms is to strengthen the governance, management and effectiveness of the existing pensions system.

The greatest problem that retirees face is their ability to maintain their standards of living after retirement. These standards of living are measured by calculating the replacement ratios. This raises the question of whether the replacement ratio is, in fact, a perfect indicator of pension adequacy.

This being the case there is need to investigate the measures of retirement income adequacy in terms of its equivalence to pre-retirement’s standard of living based on replacement rates

relationship between post and pre-retirement income adequacy. This will help cover all forecasted future living expenses and minimum needs as defined by poverty or other threshold.

1.3 Objectives.

- To determine retirement income replacement ratios for the Kenyan pension system.
- To determine the retirement benefit adequacy using the replacement ratios based on pre-retirement income.

1.4 Questions

What is the Net replacement rate in Kenya?

Are the retirement benefits adequate when offered with respect to replacement rates?

1.5 Significance

This research will be of significance to:

Employers

Employers would be very interested in understanding the measures that help them compare the benefits they provide to those provided by their competitors. This is done mainly so that the employer can meet the business objectives.

Regulators

The regulators include the players in the market for example The RBA and the KRA. The RBA are concerned with the regulation of the pension industry. They are also concerned with the design and affordability of social benefits. KRA on the other hand is more interested on the tax policies and the distribution of taxes for social benefits. They are concerned with regulations and tax policies.

Financial Industry

The players in the industry support the employers, plan sponsors, individuals and financial advisors by developing products services and software that meet the needs of each of the groups. The industry is particularly interested in understanding needs and the purchase behavior with regards to annuities and medical insurance for older people.

Individuals

An individual will need a draw down plan adjusted with changing circumstances. They will also need an income needs forecast. Planners will also need to be able to explain the plan in order to justify the monthly savings goals and lump sum targets for clients.

2 LITERATURE REVIEW

2.1 Introduction

Several studies have focused on the importance of financial status to retirement preparation and satisfaction. An example is the United States of America which has so far depended on the so called three legged stool to finance retirement. Their legs are; Social Security, Private Pension and Additional Personal Savings also known as additional Voluntary savings. (Uccello, 2005).

2.2 Income Adequacy

Richardson and Kilty (1989) found that income was one of the important predictors of financial planning as well as age. They discovered that the closer the people were to retirement, the more likely they were to invest or save. The family cycle affects the ability to plan and divest. After children are raised, then they leave home, there are now more free funds that can be saved for retirement.

(Shore, 1995) States that retirement preparation increases with age and that financial preparation for retirement is greater among the older age groups. In anticipation of retirement, planning may be initiated as early as fifteen years before retirement. Moreover, job mobility, occupational employment, and low pension rate coverage weaken the retirement income prospects of even those workers who spent most of their adult life working.

The calculation of retirement income adequacy can be viewed from three different angles. Income adequacy can be defined as a constant nominal level of consumption during retirement as during working years. This means that the consumption needs are expected to decline during retirement over time but in an arbitrary way.

Secondly, real consumption may decline if the marginal utility of consumption is held constant and uncertainty about income and life expectancy are introduced (Engen, 1999). As households must consider an uncertain future, their marginal utility of certain consumption today is higher than the marginal utility of uncertain consumption in the future.

Lastly, a household can be considered prepared for retirement if they can maintain a similar real level of consumption as during its working years. Experts say that retirees need 70-80 percent of their prior earnings to keep their standards of living in retirement. Moreover, social security today replaces about 40 percent for an average earner at 65 years. Most retirees rely on social security for most of their income. Pensions are a distant second source of income while income from assets is third. (Lavery, 2007).

Traditional replacement rate studies measure income adequacy at retirement, but do not always track income and spending into advanced old age. If some types of income (such as pensions) do not keep up with the cost of living or if some expenses (such as health care) rise faster than income, then income will become less adequate as retirees grow older. (Reno V. P., 2007)

Pension adequacy concentrates on the ability of one's pension to sustain their life in retirement at the same standards of living as their life before retirement. There are many papers written on whether the replacement ratio is an adequate indicator of pension adequacy. From the pension institute, the paper, *The Replacement Rate: An Imperfect Indicator of Pension Adequacy in Cross Country Analyses* concludes that in fact, the replacement rate, which is the most popular measure, is in fact not a sufficient indicator. Though their research is mainly based in the euro zone.

2.3 Models in Adequacy of Saving

There are three widely accepted hypotheses of saving. The Life Cycle Hypothesis, the Permanent Income Hypothesis and the cumulative advantage/disadvantage model. They all imply that individuals plan their consumption path over their lifetimes in ways that maximize their satisfaction. (Kotlikoff, Spivak, & Summers, 1992). It is believed that left to their own devices, individuals would fail to save adequately and find themselves poor in their old age. This section will look into each of these hypotheses.

2.3.1 Life Cycle Hypothesis

This hypothesis has been used by many economists as a standard way of thinking of a way of allocating time, effort and money. The hypothesis has a respected history in the economics

profession with roots in the infinite horizon model by Ramsey bone in 1926 and finite Horizon Model of Fisher (1930) the and Modigliani and Brumberg (1956).

Findings from the paper done by (Beck, 1984) revealed that it was the socially and economically advantaged worker who was most likely to have an opportunity to participate in the retirement preparations programs. Older workers who would benefit more from these programs, those with less education, lower occupational status, no occupational coverage, and consequently low retirement income are the least likely to have access to such programs and services. Retirement preparation consists of activities that are least pursued by those who need it most. These are women, Single headed households and the economically disadvantaged. (Hayes, 1993)

In the life cycle hypothesis, the method states that most people will want to smooth their income over their lifetime. It states that earlier in one's life, expenditure may exceed income due to major purchases like buying a house and starting a family. It implies that people try to vigorously save before retirement because they think they will dis-save after retirement. Here, one is assumed to borrow from their future incomes. By the time they enter into mid-life, their expenditure and income levels out. At this time, the individual pays back past borrowing and starts saving for the future. At retirement, the individual starts to de-save and live off retirement income until they die. (Ruby, 1999).

2.3.2 Cumulative Advantage/Disadvantage Model

The distribution of economic well being of the people working is determined by the direct works of the labor markets. Whereas the elderly people rely mainly on public and private benefit programs. It is often assumed that the income in retirement is more equally distributed as compared to income of the working class (Fuchs, 1984) .

One interpretation of the distribution of the economic well being of the elderly is described as the rising tide model. It suggests that because benefit programs account for a substantial share of the elderly people's income, and they are designed to lessen need, a leveling process produces a narrowed distribution of income. (Shea, 1990)

An alternative model is the Cumulative Advantage/Disadvantage Model. This focuses on the ways in which inequalities can be magnified throughout the life course. Those initially advantaged, are more likely to receive a good education, leading to good jobs, better health, better pension coverage and thus better retirement benefit income.

(Leon, 1985) Identified a recursive model of economic status in retirement that pointed to a chain of factors where previous conditions influenced later ones. He found that the family's socioeconomic and demographic characteristics determine a large extent the educational attainment, which then influences occupational achievement. At the same time family background and demographic characteristics influence the possession and level of personal economic and business assets.

A number of other previous papers have presented estimates of the social security and pension wealth. From the paper done by Martin Feldstein in 1974, we see that he introduced the concept of social security wealth and went as far as to develop a methodology. His main interest was the social security wealth aggregate level together with its effect on aggregate savings and retirement patterns. (Feldstein, 1974). He then went ahead and did another paper in 1976, using the Federal Reserve Board's 1962 Survey of Financial Characteristics of Consumers (SFCC), considered the effects of social security wealth on the overall distribution of wealth. He found that the inclusion of Social Security wealth had a major effect on lowering the overall inequality of total household wealth.

Edward Wolff followed up the paper done by Feldstein in 1976 by examining the distributional implications of both Social Security and private pension wealth. These studies include Wolff (1987), which used the 1969 Measurement of Economic and Social Performance (MESP) database and was the first paper to add estimates of private pension wealth and examine their effects on the overall distribution of wealth. The paper showed that, while Social Security wealth had a pronounced equalizing effect on the distribution of "augmented wealth" (defined as the sum of marketable wealth and retirement wealth), pension wealth had a dis-equalizing effect. The sum of Social Security and pension wealth has, on net, an equalizing effect on the distribution of augmented wealth. Wolff (1988) examined the implications of including both

Social Security and pension wealth for estimating the life-cycle model of savings; Wolff (1992) addressed the methodological issues in estimating both Social Security and pension wealth.

Papers done by Wolff 1993a and 1993b extended the estimates of Social Security and pension wealth to the 1962 SFCC and the 1983 SCF; and Chernick and Wolff (1996) examined the levels of Social Security benefits and Social Security wealth on the basis of the 1989 SCF by age group, lifetime earnings quintile, and family structure. Wolff (2002a) re-examined the distributional effects of retirement wealth based on the SCF from 1983 to 1998 and found that Social Security continued to have a mitigating distributional effect. With respect to defined contribution wealth, though, Wolff (2003) found that the rise in defined contribution wealth has led to greater wealth inequality.

2.3.3 Permanent Income Hypothesis Model

There is also the Permanent Income Hypothesis (PIH) model. This one also tries to describe how people distribute their wealth over time so that it does not fluctuate with short run fluctuation in income. Peter Diamond, who conducted the first ever systematic study of the adequacy of retirement income, concluded that in the absence of Social Security, a substantial fraction of the population would be inadequately prepared for retirement. The Interim Report of the President's Commission on Pension Policy (1979) reached a similar conclusion. (Kotlikoff, Spivak, & Summers, 1992).

Mark Aguiar and Erik Hurst State that the PIH is based on two premises. First, the individuals wish to equate their marginal utility of consumption across time and that they are able to respond to income changes by saving and dis-saving. This implies that today's consumption will respond differently to changes in income depending on whether the changes were expected e.g. retirement or unexpected e.g. loss of a job. (Hurst, 2007)

Decisions on retirement savings are irreversible. An individual cannot undo his previous consumption or enjoy his wealth with the benefit of hindsight. This is because there might possibly be a change in tastes between the saving period and the actual retirement.

The model described by (Hurst, 2007) is a canonical model in which an individual lives $T+1$ periods and earns y_t in period $t=0, \dots, T$. The model assumes that the income stream is known at time zero. It also assumes that the individual can borrow and lend freely at an interest rate r . The standard model also assumes that the future is discounted at the rate $0 < \beta < 1$ and utility is additively separable across time and additively separable across consumption and leisure. For simplicity, we treat leisure as fixed and treat income as exogenous to the consumer. The budget constraint then implies that consumption in each period equals the annuity value of the present discounted value of income, or “permanent income”, such that

$$c = r \sum_{t=0}^{\infty} (1+r)^{-t} y_t$$

$$y_t = y_p + y_v$$

Where y_p represents the permanent component that represents the personal attributes of the earners in the unit, such as their training, ability, personality and y_v represents all other factors that may affect income. The ability to borrow and lend is key in the PIH because it allows individuals to transfer their income across periods at the rate $(1+r)$.

2.4 Retirement Income Adequacy Risks

There are several risks that the adequacy of retirement income faces. These are: investment risk, longevity risk, inflation risk, retirement age and inadequate savings. Pension fund investment risk comes from three main sources. One, risk that the fund will fall in value, risk that the fund’s return will not keep up with inflation and the risk that the pension fund does not perform well enough to keep pace with the growth in cost of providing pension benefits.⁴

⁴ http://www.pensionsauthority.ie/en/LifeCycle/Investment_risk_and_reward/Investment_risk/

With inflation, increase in inflationary expectations increases the nominal rate of interest. Additionally, nominal rates of interest including long term rates become more volatile. Given that the liabilities of a defined benefit pension plan are nominal in form, changes in interest rates greatly affect the value of these liabilities. (Bulow, 1982)

Longevity risk is the risk of the population living longer than expected because of medical advances or declining health risks such as smoking and excessive consumption of alcohol. Longevity risk affects governments who have to fund promises to retired individuals through pensions and healthcare from a shrinking tax base. It also affects corporate sponsors who fund retirement and health insurance obligations to former employees accrued over many years. Finally, individuals who may have reduced or no ability to rely on governments or corporate sponsors to fund retirement (Jones, 2013).

The age at which an employee retires greatly affects their expected retirement adequacy. Retiring earlier than age 65 has a dramatic impact on replacement resources because of reduced Social Security and pension benefits, increased years spent in retirement, and a decreased savings period. In addition, retirement needs will increase, particularly medical needs in the years before retirees become eligible for Medicare. The majority of employees may not be able to enjoy early retirement in the same way as was experienced by prior generations.⁵

Finally, there is the risk of inadequate savings. It goes without saying that if a person saves little, and then their retirement income will also be of the same measure. This risk can also be viewed in such a way that there is a risk of the savings made being inadequate and not being able to meet the needs of the member.

2.5 Limitations of Using Replacement Ratio

Even though this paper focuses on the use of replacement ratio to calculate the adequacy of retirement income, it is important to note that the Replacement ratio has several limitations.

These are:

The funds used during the period the children are in school may or may not continue depending on when the children are considered independent.

It does not take into account the mortgage status, purchase of another house or downsizing of a house.

There is change in spending needs and priorities for retirees over time. For example, retirees may travel more in the earlier years of retirement and less in the later years.

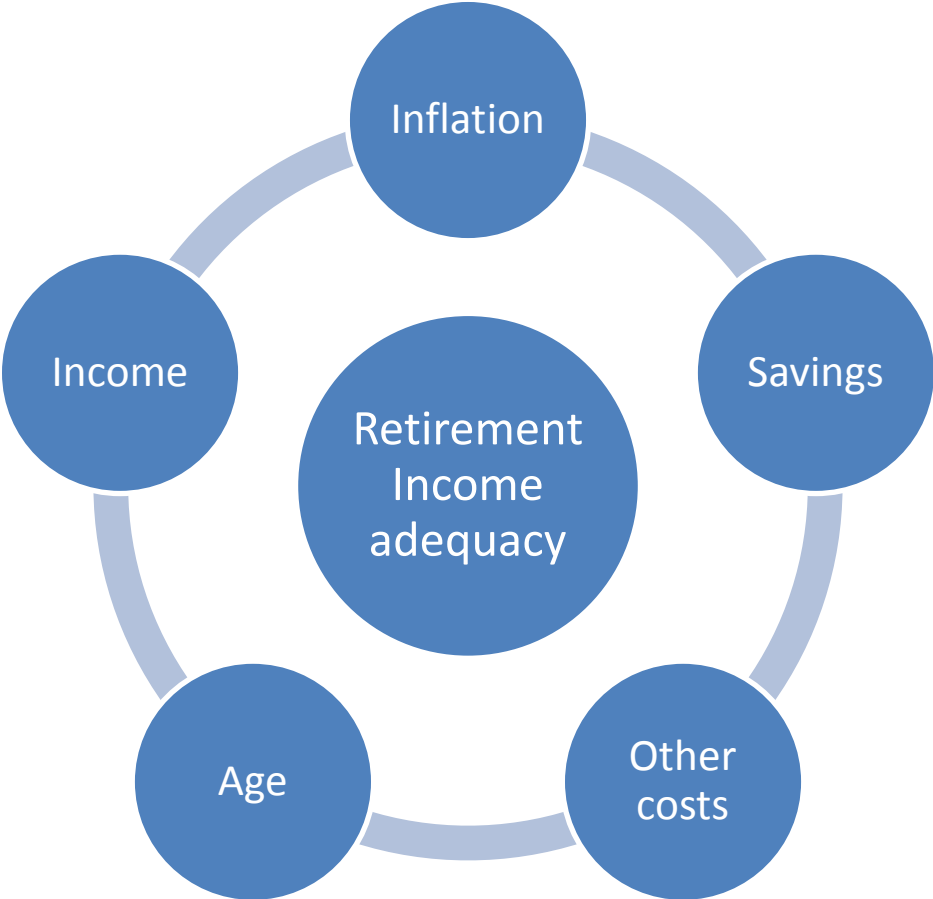
Replacement ratio does not take this into account.

- When pre-retirement earnings vary substantially, earnings near retirement age are not a good base from which to estimate required retirement income.
- As individuals make decisions about retirement, they often have to choose between scaling down and working longer. Replacement ratios do not provide help in evaluating these trade-offs.

2.6 Conclusion

Even with the limitations, the replacement rate has proven to give an approximate value for retirement income and thus will be a good measure for retirement adequacy. This paper will use the income replacement ratio to estimate the adequacy of retirement income using the permanent Income Hypothesis Model.

2.7 Conceptualized Framework



3 METHODOLOGY

3.1 Introduction

This chapter describes how the study was conducted, the steps and procedures involved. The chapter comprises of the research design, study population and sample, data and data collection, the models, comparison of the models and a conclusion.

3.2 Research Design

The study will adopt a descriptive research design. This is because the study is aimed at answering the question on replacement rates. Also the study uses survey methods. The study is a longitudinal study because it concentrates only on the middle income earners for a specified period. The study is also quantitative in nature. This is due to the fact that a quantitative research is more objective than subjective.

3.3 Population/ Sample

The population used in this study consists of the soon to retire employees and pensioners. This is because, it is prudent to use employees who are almost in their retirement to calculate the replacement rate as it is more applicable to them than to those who have just begun working. The sample used for the study is a sector of the soon to retire employees and pensioners who are middle income earners with formal jobs in Kenya. This is due to the fact that in this income bracket, employees have more disposable income and thus can put some of it aside for their pension. The sampling method used in this paper is random sampling.

The sample the paper is focusing on is a group of retirees and pre-retirees from a well known pension administrator in Kenya. The limitation of the study arises because the study only concentrates on middle income earners in the formal sector forgetting that there are those in the same income bracket but with informal jobs.

3.4 Data and Data collection

The data used for this paper was randomly selected from two of the registered pension schemes in Kenya. The data collected will be analyzed and the findings will try to measure the adequacy of retirement income. The data collected and analyzed is data for middle income earners in Kenya. They were obtained from a retirement Industry provider within the Kenyan retirement industry. The study focuses on middle income earners because they have disposable income from which they can save for retirement.

3.4.1 Variables in Data

The first set of data collected consists of the age at retirement, the final annual salary, the lump sum and the pension annuity. The second set of data consists of the age at retirement, income before retirement, the contributions remitted in the defined benefit, defined contribution and social security benefits. The data used is a sample of the middle income earners

3.5 Models

The retirement income adequacy will be determined by comparing the net replacement ratio calculated from the data to that offered as adequate by the Organization for Economic and Co-operation development (OECD) and the World Bank.

According to the Kenya National Bureau of statistics, the Kenyan middle class is defined by anyone who is spending between Kshs. 23,670 and Kshs. 199,999 per month. This paper is thus focusing on this group of individuals and tries to see whether their retirement income is indeed adequate. This study concentrates on this group of individuals.

The replacement rates can be calculated in two main ways:

Income replacement approach

Consumption replacement approach

In order to obtain the future income for a household and their consumption level, some assumptions must be made regarding the number of years that the retiree will get a pension and the growth rates. Number of years of pension is an assumption made by getting the average life expectancy for a retiree.

This paper will concentrate on the income replacement approach to calculate the replacement rates.

3.5.1 Income Replacement Model.

Here, the study comes up with a way of replacing income using savings from social security and personal savings. The study will need to put into account the fact that there are social security benefits and employer sponsored benefits. Also, it considers the two types of employer sponsored benefits which are defined benefits and defined contributions.

3.5.1.1 Social Security Benefits.

This study assumes that all members are eligible for social security benefits. These benefits are the rates calculated by the Social Security Administration and reported in the Board of Trustees' annual report. This is calculated as follows:

$$SSB = \int_0^T B(1 - \mu_t)e^{-t\delta} dt \dots \dots (1)$$

Where:

SSB – Social Security Benefits

B – Benefits

μ - Mortality rate

t – Time in relation to age and gender

δ – Discount rate

T - Age at retirement

3.5.1.2 Employer Sponsored Retirement Benefits

This pension income is calculated using member balances pension information. This information includes member balances and yearly contributions from a defined benefit and a defined contribution scheme.

3.5.1.2.1 Defined Benefits

For retirees, their retirement benefits remain fixed in nominal terms for a particular beneficiary. The gross wealth for this kind of scheme is given by:

$$DB = \int_0^T B(1 - \mu_t)e^{t\delta} dt \dots \dots (2)$$

Where:

DB – Defined Benefits

B – Benefits offered

μ - Mortality rate

t – Time in relation to age and gender

δ – Discount rate

T - Age at retirement

3.5.1.2.2 Defined Contribution

Under this plan, the paper makes an assumption that the employees stay in the company until they retire. In most cases, the employer's contribution is a percentage of the employee's salary.

Information on the contribution to a DC plan can be recorded from the point of the employer and that of the employee.

This is calculated as follows:

$$DC = \int_0^T (ERB(1 - \mu_t)e^{-t\delta} dt + EEB(1 - \mu_t)e^{-t\delta}) dt \dots \dots (3)$$

Where:

DC – Defined Contribution

ERB – Employer Benefits offered

EEB- Employee Benefits offered

μ - Mortality rate

t – Time in relation to age and gender

δ – Discount rate

T - Age at retirement

3.5.1.3 Total Benefits

The total retirement benefit will be a summation of the social security benefit and the employer sponsored benefits. This is done as:

$$RB = SSB + DB + DC \dots \dots (4)$$

3.5.2 Consumption Replacement model

Consumption is defined as income less savings. This can be written as:

$$C = Y - S \dots \dots \dots (5)$$

Where:

Y- Income.

S- Savings.

Consumption replacement model calculates the replacement rate by projecting the retirement consumption and comparing it to the total savings at retirement.

3.5.3 Replacement Ratio Model

The replacement rate will thus be:

$$IRR = \frac{RB}{PRS} \dots \dots \dots (6)$$

Where;

IRR – Income replacement ratio.

RB – Retirement benefit

PRS – Pre- retirement salary

3.5.4 The tax and Savings model

Here, the replacement ratio is a function of savings and tax only.

$$IRR = \frac{GPrRI - PrRT - PrRS + PoRT}{GPrRI} \dots \dots \dots (7)$$

IRR – Income Replacement Ratio

GPrRI – Gross Pre-retirement Income

PrRT – Pre-Retirement Taxes

PrRS – Pre Retirement Saving

PoRT - Post Retirement Taxes

NCCR – Change in age and work related expenditure

3.5.5 The Expenditure, Tax, Savings Model

Here, the replacement ratio is a function of taxes, savings and expenditure changes.

$$RR = \frac{GPrRI - PrRT - PrRS \pm NCCR + PoRT}{GPrRI} \dots \dots \dots (8)$$

3.5.6 The Tax only model

This model only incorporates tax when calculating the net replacement ratio

$$RR = \frac{GPrRI - PrRT + PoRT}{GPrRI} \dots \dots \dots (9)$$

3.6 Comparison of models

The above model shows different ways of calculating the replacement ratio. This study further tries to show the difference in the replacement rates when an individual has either additional income, added tax or more expenditures.

3.7 Conclusion

In conclusion, the methodology in this study aims to show whether retirement income is adequate while considering the factors that affect the retirement income an individual can receive. The study will use equation (5) and (7) to determine the replacement ratio and plot a trend for the ratios. The income adequacy will be checked by a linear model that will relate the income before retirement to that after retirement considering tax, expenditure and other savings.

4 DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter gives the findings of the study and discusses them at length. This study is targeted at calculating the net replacement ratios and thus finding out whether retirement income is adequate or not.

4.2 Descriptive Analysis

This gives a summary of all demographic and financial variables under the study.

Figure 3: Summary Statistic Graph

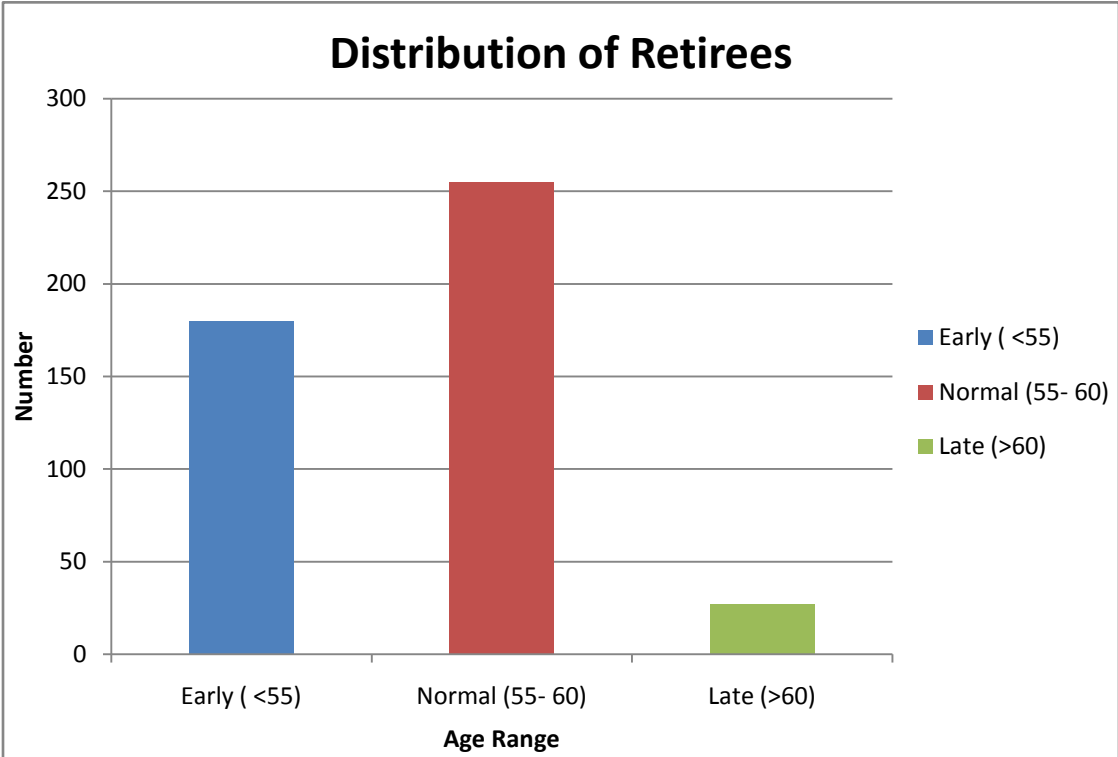


Figure three above gives the summary description of the data used in this study. The figure shows the three different age groups that show the different times of retirement and the number of people in this different set of age groups. The data used does not consider the gender of the

individuals because in Kenya, gender is not a factor when calculating the retirement income. This is because both male and female have the same normal retirement age.

The data also concentrates on the middle income earners in the country because they are major contributors to the growth of the economy of Kenya and it consists of the largest number of individuals who have the ability to save for retirement.

The study assumes that the individuals in the first set of data, consisting of 362 individuals, do not have any other additional incomes. It also assumes that all the individuals under the study are employed in formal employment sectors. This is so as to ease the collection of the data required.

The other set of data that consists of individuals who have other income assumes that not all of the individuals have a defined benefit and a defined contribution benefits. This is because, in recent times, most pension funds in Kenya are transferring from a defined benefit scheme to a defined contribution scheme.

Thus some individuals may have income from both a defined benefit and a defined contribution scheme. From the data the natural log of the pre retirement income (PRRI) and the natural log of the post retirement income (PORT) was calculated using equation (4) above.

Table 1: Descriptive statistics for individuals with contributions

	<i>PRRI</i>	<i>PORT</i>
Mean	11.62934	11.03530624
Standard Error	0.045857	0.027729722
Median	11.61866	11.06987504
Standard Deviation	0.458565	0.277297224
Sample Variance	0.210282	0.076893751
Kurtosis	0.178936	1.42953171
Minimum	10.2263	10.10250233
Maximum	12.20585	11.89304986
Count	100	100

The data used in the study has 100 observations. This is a good sample value considering that the pension industry is just picking up. The data is symmetric for both the pre retirement and post retirement income. This is because the mean and the median are supposed to be equal if the data is symmetric. This is also proved by the negative skewness values for both the pre retirement and post retirement income.

From the standard deviation, it can clearly be noted that the data is not widely spread. This might be because the study concentrates on retirees who were middle income earners. Their income ranges from Kshs. 23,670 and Kshs. 199,999 per month.

Table 2: Descriptive Statistic for individuals without contributions

	<i>PRRI</i>	<i>PORT</i>
Mean	12.44647	13.22736
Standard Error	0.06479	0.04922
Median	12.22053	13.00275
Standard Deviation	1.23273	0.93642
Sample Variance	1.51962	0.87688
Kurtosis	0.32969	-0.38641
Minimum	7.80708	11.75402
Maximum	15.97912	16.03257
Count	362	362

Table three above shows a summary of the data used in the study to calculate adequacy of retirement income. The data used had 362 data points which show the sample of individuals who did not have other forms of retirement benefits like defined benefit, defined contribution and personal savings. This shows the number of people in the sample who depended wholly on the social security benefits to cater for retirement.

The descriptive statistics were calculated on the smoothed values of the last salary and annual pension. This data is asymmetric because of the difference in the mean and the median of both the last salary and monthly pension.

The data is not symmetric. This is because the median and the mean are different values though close. The data is skewed to the right. This means that most of the individuals used in the sample are middle income earners.

4.2.1 Correlations

The correlation between the data used in this study is very important because it indicates the strength and direction of the linear relationship between the two variables in question. There are two different sets of data used in this study and each of their correlations was calculated so as to ease interpretation of the data and thus the results that will be found from the data.

For the first set of data that represents individuals who have other forms of contribution, the correlation was calculated and the table below shows the outcome.

Table 3: Correlation for with contribution

	<i>PRRI</i>	<i>PORT</i>
<i>PRRI</i>	1	
<i>PORT</i>	0.133932	1

From table 3 above, we can see that the correlation of the pre-retirement income and the post retirement income is 0.133932. The positive correlation shows that the two data sets have the same direction in the linear relationship. This means that when one increases then the other also increases.

The correlation is low. This shows that even though the data is headed in the same direction, the strength of the linear relationship is different. This just means that the pre retirement income is increasing faster than the post retirement income.

The second set of data represents individuals who have no other added incomes in retirement. They only depend on the social security benefits.

Table 4: Correlation for without contribution

	<i>PRRI</i>	<i>PORT</i>
<i>PRRI</i>	1	
<i>PORT</i>	0.662262	1

From table 4 above, the correlation is also positive like that of table 3. This has the same interpretation as that of table 3 which is that the two data sets have the same direction in the linear relationship.

The correlation value in table 4 is high. This shows that this linear relationship is stronger than the one shown in table 3.

4.3 Graphical comparison of data

The study also goes a step further to give a visual description of the data using graphs as a means of comparing. This has one limitation which is that one is not able to know the exact difference between the income before retirement and the income after retirement.

Due to the two sets of data, the study goes ahead to graphing the two sets of data differently. It begins by describing the data with contributions then later talking about the data that does not have other contributions.

Figure 4: Graph of income for individuals without other contributions

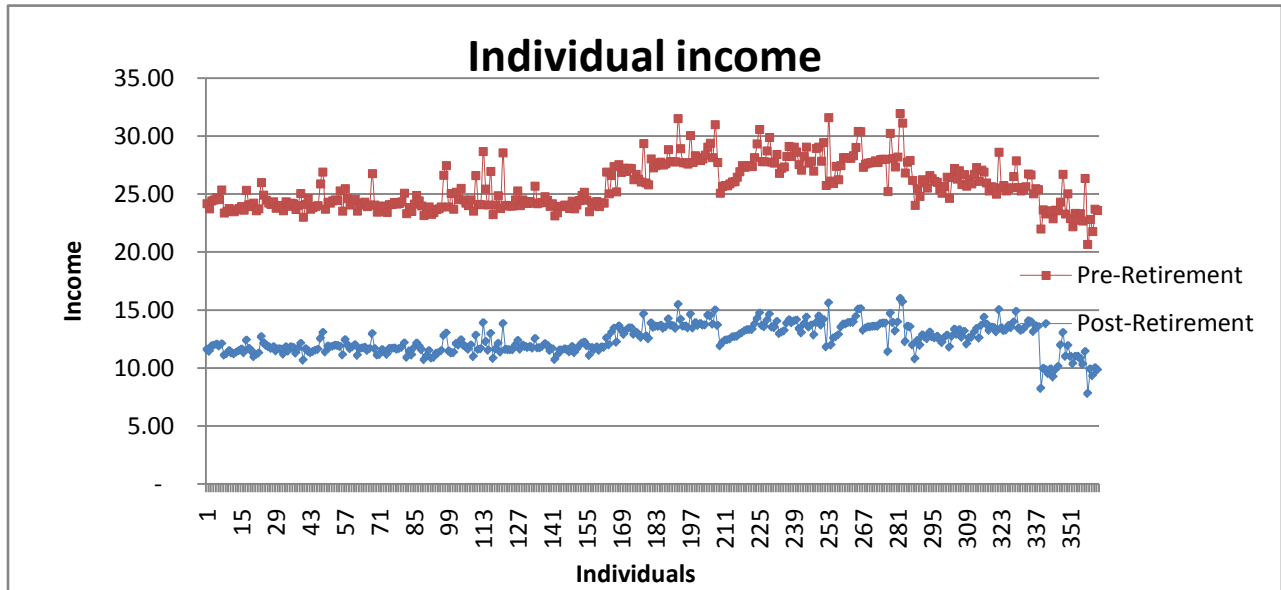


Figure three above shows the graphical representation of the income before retirement and the income after retirement for an individual who does not have any other forms of income. It shows that the income before retirement is higher than that after retirement but this is partly expected as an individual does not require the exact same amount of income after they retire. This is due to several reasons one of them being that they have fewer expenses to cater for.

Figure 5: Graph of income for individuals with other contributions

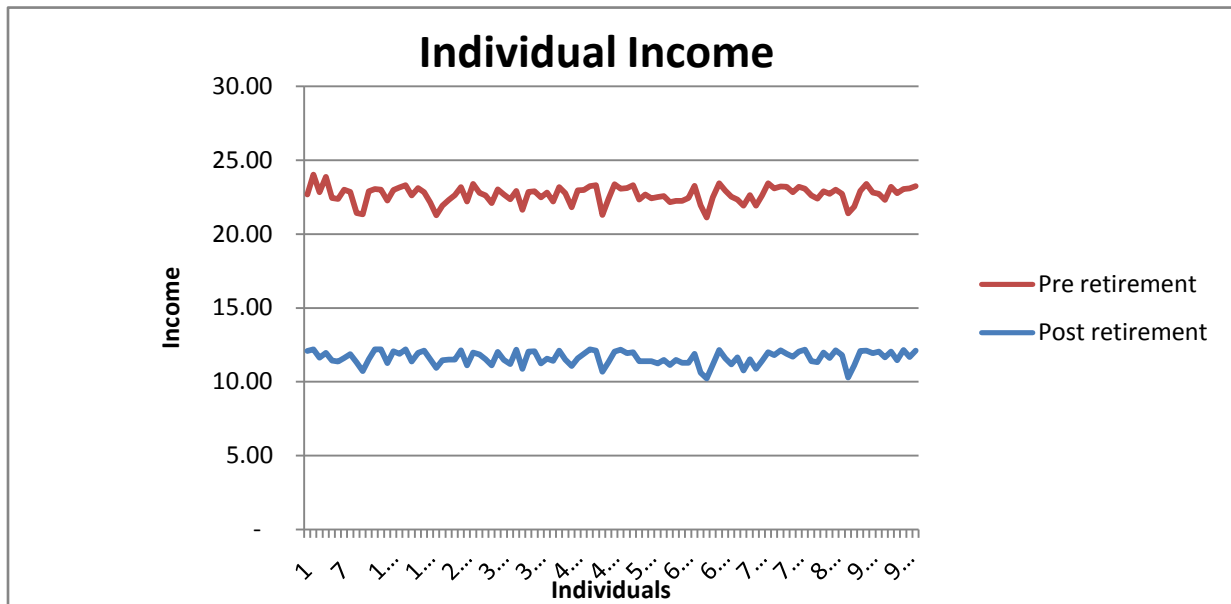


Figure 4 above shows a graphical representation of the income before and after retirement for an individual with other incomes. From the graph, it is easy to deduce that the income after retirement is lower than that before retirement, with the income after retirement being almost half of that before retirement.

4.4 Replacement ratios and retirement Adequacy

Using the data gotten from the pension administrators, the study goes further to calculate the replacement rates of the different age groups with respect to when one retires. This can either be early which represents retirement before the age of 55, normal which shows retirement between the ages 55 and 60 and late which shows retirement after the age of 60.

These categories are very important when discussing retirement adequacy because an individual could have decided to retire early maybe because they feel that whatever they have accumulated during their working years is enough to cater for their retirement thus gives them a higher a higher probability of having the better replacement ratios.

Table 5: Statistics for replacement ratios

Age range	Number	PRRI	PORT				Replacement Ratio
		SSB	DC	DB	Total		
50-54	180	1,023,655.06	13,028.38	13,220.64	4,987.27	529,617.82	0.46
55-60	255	962,499.27	12,806.56	11,141.08	8,385.45	521,199.27	0.45
61-64	19	2,204,120.02	15,989.50	15,463.00	9,553.50	1,334,779.79	0.52
65-69	4	183,665.50	12,574.50	13,684.50	8,781.50	35,040.50	0.35
70>	4	180,211.25	12,973.25	12,965.00	9,560.25	35,498.50	0.37
TOTAL	462	4,554,151.10	67,372.19	66,474.23	41,267.97	2,456,135.88	

The table above shows how the retirement income was calculated from the data received. The columns represent the age group, the number of individuals in the age group, the amount of monthly pre-retirement income they receive, the different types of contributions they have and a total of all which gives us an approximate amount that they will receive as they retire and their replacement ratio which is calculated using equation (6) above.

It is important to note that the retirees of ages 61-64 have a higher replacement ratio. This is because they have worked and maybe saved more as they waited for retirement.

The average replacement ratio from the data above that shows the individuals with an additional method of saving apart from the social security benefit is 43%. This replacement ratio is very low as compared to the required that is used as a benchmark for this study which is 75% which is the average OECD replacement ratio. This is a true indicator that the retirement income in Kenya is indeed not adequate to cater for the retirement needs.

5 POLICY IMPLICATIONS

5.1 Recommendations

The recommendations gotten from the study are that individuals should consciously plan for their retirement both financially and psychologically. This implies saving more during their most productive stages of life (work) so that they can have a higher income in retirement to sustain them during their lifetime.

Also, policies should be put by policy makers that will bar individuals from being able to access their retirement income before retirement age. This is because r the present policies being used, an individual is allowed to take up all their retirement income when they exit from a company. This beats the logic of saving for retirement.

Employees and sponsors should also make saving be eye catching so that their employees may be drawn into the thought of saving. This may be done by creating incentives. One incentive that is at work now is the tax incentive where, when one puts their money into a retirement, this money is not taxed thus reducing the total amount of tax paid by an individual.

It would also add more meaning to saving if everyone was given the opportunity to learn about the importance of saving during employment. This would be done by having regular financial planning sessions for those in employment organized by their employers.

6 CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1 Summary

The aim of the study was to calculate the retirement income adequacy in Kenya by calculating the replacement rates and thus checking the adequacy using this rate. Adequacy in this sense is comparing the replacement rates in Kenya with that of developed countries and with the rate that is declared adequate by the OECD. The study uses the OECD as a basis of comparison because most pension administrators in Kenya use this as a basis.

The methodology used in this study concentrates on calculating the income replacement ratios for each of the individuals who were part of the study. This is because when comparing income replacement ratios and consumption replacement ratios, the consumption replacement ratios would be more accurate but the limitation would be finding appropriate and enough data to be used in the study.

The study finally came up with the Kenyan replacement rate that is 43%. This rate is lower than what is expected because the average OECD replacement rate is 75%. The result indicates that at the time of the study, the population's retirement income was not adequate to sustain retirees in their post retirement life. This may be attributed to the poor savings culture of the people.

6.2 Conclusion

The conclusion of the study is that even with the average replacement ratio being 75%, it is important to note that this is not a fixed value for all individuals and households. Some individuals have more expenses in their retirement as compared to others maybe because of having children at a later age. This will cause their required replacement ratio to increase.

The above findings are very important to those in retirement and the country as a whole because, before the country completely moves to defined contribution schemes, the employer and the

government have to be prepared to pay the deficit between the amount contributed by an individual and the retirement benefit agreed upon by both parties at the beginning of the policy.

The findings could also be useful in encouraging individuals who are yet to retire to save for their retirement and ensure that they plan for it to avoid poverty that may arise in retirement. income is not adequate to sustain post retirement life.

The findings imply that standards of living will change due to decrease in income received by retirees in retirement as compared to pre-retirement. The results are evidence that more needs to be done by Policy makers, the Government, regulators, Industry Players and Individuals to improve the state of retirees. The inadequacy retirement income may motivate the parties involved and especially members to try and save more during their work life (Additional Voluntary Contributions) so as to be able to maintain, better or improve their retirement income, standard of living and eliminate thus poverty.

6.3 Limitations

The study had several limitations in trying to calculate retirement income adequacy. One, it was difficult to locate data that would be relevant and useful to the study. This is because of confidentiality issues that would arise because the data used for the study related to an individual's income. Such information is deemed private and could only be shared at the consent of the individuals. This led to a limited amount of data being used.

There was also the fact that there are some benefits that can be accessed before retirement age. Thus, the current employment income saved for retirement would give a lower figure as compared to using savings accumulated throughout the work life of an individual.

The study was also limited to individuals who work in the formal employment sectors. This is because it is easier to collect data from these sectors due to the fact that pension administrators already have it. If one wanted to concentrate on the informal sector, it would take a longer time to complete the study because collection of data would consume a lot of time.

The study also does not consider the ways in which the individuals retired. It is possible that one could have retired on the grounds of ill health or due to other unavoidable circumstances. These factors would also greatly influence the income after retirement.

6.4 Suggestions for further research

The study can serve as a base for future research on post-retirement income considering other variables and how they may affect the final outcome for example the addition of taxes on retirement income compared to the effect of waiting until the non taxable age which in Kenya is 65 years.

The study could also be done in a qualitative way where one concentrates on the retirees' opinion on whether their retirement income is adequate or not. This will be a very important way of looking at adequacy of retirement income because it is one thing to project and get assumptions on the adequacy of retirement income and it is another to actually hear from those in retirement.

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