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Research Paper

Health Insurance as an Investment Outlet

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ABSTRACT:- *The word Health Organisation has stressed the need for African Governments to increase their expenditure on health provisions. Health provisions cannot be left to governments alone. The paper examines the need for the private sector of the economy to invest in health insurance so as to enhance longevity of the people and make investment returns. It assumes that proportion sick and the cost of medical bills per week follow a normal distribution. Jointly they follow a bivariate normal distribution. It calculates the expected liability for one year using life table to represent the life expectancies of the people.*
It obtains the premium for the population as a whole without categorizing into ages and secondly obtains the premium for each age.
It shows how the investment returns of the health insurance packages can materialize into the initial investments at commencement in 21.26 years, when the returns are re-invested.
The paper recommends private investment in health insurance provisions.

Keywords:- *Incidence of sickness, medical bills, life table, Normal Distribution, Health Insurance Liability, Premiums and Investment Returns.*

I. INTRODUCTION

The proportion of the population that can take care of their medical bills is low in the developing nations. Government has been the main provider of health insurance. Such health insurance covers mainly the formal sector and does not make provision for informal sector especially the rural communities; the formal sector is less than 1% of the population.

This paper introduces health insurance to institutions and private individuals who can make it an investment outfit.

It assumes that the proportion sick for any age and the medical bill incurred for each age both follow the normal distributions.
It uses life table and sickness incidence per age per week and cost of medical bills per week to obtain the health liabilities and premium.

II. LITERATURE REVIEW

WHO (2012) in the if report on 'Investing in Health for Africa' the report shows "how much investment will be required in the African health systems, including expected returns for the level of investment in terms of morbidity and mortality reductions. These investments should result in significant health outcomes and real economic returns on investment. It is also recognized that increases in funding will not be of sufficient. Existing and new resources must be used in a more efficient manner and we suggest a number of approaches of guiding principles".

Sachs (2001) in their paper stressed the need for investing in health for economic development. Kinga (2009) stressed the need for health financing in Africa and indicated what has been achieved and what further financing should be done.
The following authors William Jack (2009), Gottret (2006) stressed that health financing should be revisited and made a priority of government and individuals.

III. METHODOLOGY

The proportion such at age x, Px is normally distributed with mean μ_{IX} and variance δ^2_{IX}, $N(\mu_{IX}, \delta^2_{IX})$. The cost of medical bill for each age Cx is normally distributed with mean ~~N~~ μ_{2X}, and variance δ^2_{2X}, N (μ_{2X}, δ^2_{2X}). The cost for medical bill is derived for each age and summed for all ages. Non medical charges such as cost of administration is added to the cost of medical bills to obtain the total cost of running the health insurance.

Let P_x be the proportion sick at age x, μ N (μ_{1x}, δ^2_{1x}) and C_x be the proportion of lives at age x in the population.
C_x be the cost of medical bills at age x for N (μ_{2x}, δ^2_{2x}).
R_x be the recurrent expenditure.
It cab be the overhead expenses which can be amortized over 10 years.
The expected cost of medical bills for each age x is P_xC_x
Let (P_1C_1, P_2C_2…….PnCn) denote a random sample of size n from a bivariate normal distribution with probability density function f (p, c) and parameters μ_1, μ_2 δ^2_1, δ^2_2 and P the correlation between variables C and P.
Let Ĉ be the mean of C_1, C_2……Cn and Þ be the mean of P_1, P_2……..Pn,
$\hat{C} = \sum_{x=1}^{n}$ C_i/n and $P = \sum_{x=1}^{n}$ P_i/n
Using the principles of moment generating function of bivariate normal distribution, Ĉ and Þ have a bivariate normal distribution with mean μ_{1x} and μ_{2x} and correlation coefficient e.
The cost of medical bills for all ages = $\sum_{x=0}^{\infty}$ E (P_x) E (C_x) = $\sum_{x=0}^{\infty}$ μ_{1x} x μ_{2x}
Recurrent expenditure which covers expenses such as salaries of the employees who administer the health insurance schemes and other expenses needed to run the scheme is taken as K% of the medical bill
Recurrent expenditure = $K \sum_{x=0}^{\infty}$ $l_x\mu_{1x}$ x μ_{2x}
Overhead expenses are expenses that are not recurrent and are amortizied over ten tears. It is denoted H.
Hence expected total liability of the health scheme in one year
= (1+k+ r)
$\sum_{x=0}^{\infty}$ $l_x\mu_{1x}$ x $\mu_{2x} + 0.1H$
A margin of profit is expected by the investors. For ease of simplicity we assume that the profit expected is Z% of the liabilities.
Hence total expected cost to the investors in one year is $\sum_{x=0}^{\infty}(1 + k + z)$
$\sum_{x=0}^{\infty}$ $l_x\mu_{1x}$ x $\mu_{2x} + 0.1H$
We will obtain the premium in two different ways. Firstly treating the population as a whole paying the same premium or secondly treat each age as one and finding the premium for each age.

1. Whole population

Whole population = $\sum_{x=0}^{\infty}$ l_x

Premium or insurance contribution = $\dfrac{\sum_{x=0}^{\infty}(1 + k + z) \sum_{x=0}^{\infty} l_x\mu_{1x} \text{ x } \mu_{2x} + 0.1H}{\sum_{x=0}^{\infty} l_x}$

All ages covered pay the same premium

<u>Premium per Age</u>

Premium or contribution per age

$\text{Cont} = \dfrac{\mu_{1x} \text{ x } \mu_{2x} + 0.1H.l_x}{\sum l_x}$

Assumption of a Stationary Population

The profit expected $\sum_x$ μ_{1x} x μ_{2x}

If invested fully for f years should be able to accumulate to a figure that will be able to cater for the liabilities without recourse to the use of premiums paid.

Let i be the rate of accumulation taken as the 2% above fixed interest securities return.

$(Z\sum \mu_{1x} \text{ x } \mu_{2x})(1+i)^f = \sum (1 + K)\mu_{1x} \text{ x } \mu_{2x} + 0.1H$

$(1+i)^f = \dfrac{\sum l_x (1 + k)\, \mu_{1x} \text{ x } \mu_{2x} + 0.1H}{l_x\, \mu_{1x} \text{ x } \mu_{2x}}$

$f \log (1+i) = \log \dfrac{\sum l_x (1 + k)\mu_{1x} \text{ x } \mu_{2x} + 0.1H}{l_x\, \mu_{1x} \text{ x } \mu_{2x}}$

$f = \dfrac{1}{\log (1+i)} \dfrac{\sum l_x (1 + k)\, l_x\, \mu_{1x} \text{ x } \mu_{2x} + 0.1H}{\sum l_x\, \mu_{1x} \text{ x } \mu_{2x}}$

CASE STUDY

Population is grouped into the following age groups 0-9, 10-29, 30-49, 50-69, above 70 years of age.
Using the following Table
Age group

	0-9	10-29	30-49	50-69	>70
L_x	90069	86969	80935	63620	18700
Proportion sick per week μ_{1x}	.003	.002	.004	.004	.003
Medical bill per week μ_{2x}	1700	2000	2000	2200	200

From the table, we can deduce that the expected medical bill for a person aged 0-9 is ₦1, 700 per week for someone sick and 3 out of 1000 persons in that age group is sick per week, similarly for other age groups. Current Expenses is taken as 0.05 of the liabilities which is taken as 5 per 100 of the liabilities mainly made up of administrative expenses and expenses to collect the contributions, over head expenses H is taken as ₦5, 000, 000 amortizied over 10 years.

Liability equation is taken as
$(1+h+z)\sum_{x=0}^{\infty} l_x \mu_{1x} \text{ x } \mu_{2x} + 0.1XH$
= 37963279 + 500, 000
38463279
Total population from the abridges life fable =5900120
Premium per week per person = 6.52 and for a month ₦ 26.08
Total premium from the population for a week = 38, 463, 229
Membership 10, 000
Health Insurance scheme with 10, 000 membership or community with 10, 000 membership.
Premium per week 65, 190.67
For a year = 52.18 x 65, 190.67
Year is 52.18 week
Total premium for a year = 3,401, 649.2
Expected liability = 3357479
Profit provision = 335747.9
Profit provision is accumulated at 12%, 2% above the return on fixed interest securities profit provision is accumulated for n years. When the interest return on the accumulated equals Total fund necessary to take of the Health liabilities and yearly premium then will be extra
Profit will accumulate in n year
$335747.0\ \{(1.12)^{n-1} + (1.12)^{n-2} + (1.12)^{n-3} + \ldots\ldots\ldots\ldots + (1.12) + 1\}$
From theory of interest
$(1 + i)^{n-1} + - (-1 +)^{n-2} + \ldots\ldots\ldots\ldots + 1$
$= (1 + i)^n - 1$
I

Hence profit will accumulate to $0.2 \text{ x } 335747.9\ \{(1.12)^n - 1\}$ = Total Liabilities
.12
= 3401649.2

$\therefore (1.12)^n - 1 = 3{,}401692 \text{ x } .12$
335747.9
= 10.13156

$n = \log 11.13156$
$\log 1.12$ = 1. 0464
0.0492
Hence n = 21.26 years
Profit will accumulate to the take of the fund in 21.26 years and Profit will accumulate to the premium in 7.02 years
After 21.26 years the investment return of accumulated profit is equal to the fund take off. Hence, contributions thereafter is kept in another fund for another purpose, the health fund becomes self sustaining thereafter.

IV. CONCLUSION

Health Insurance is a good investment outlet for private individuals, institutions or coorperatorial bodies who can manage it.

The premiums are computed from the very beginning to cater for adverse conditions. It makes medical care available to everyone even in rural areas. Premium can be collected weekly or monthly.

Health insurance provision should not be left to government alone. The private sector of the economy looking for investment outlets can key into such investments. Actuarially managed, the returns are worthwhile.

REFERENCES

[1]. WHO. The World Health Report 2010, *Health Systems financing the path to universal coverage*. Geneva, World Health Organisation 2010

[2]. William Jack and Maureen Lewis, *Health Investment and Economic Growth: Macroeconomics and Microeconomic Foundation. In Commission on Growth and Development*, ed Michael Spence and Mayreen Lewis 2009

[3]. Kingia, J and Soucat, A, *Health Financing in Africa: Where are we and What has been committed?* HHA, WHO AFRO and World Bank 2009.

[4]. Gottret, P and Schiebe, G. *Health financing revisited*: A practitioner's guide World Bank, Washington DC. 2006