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Research Paper

Comparison of the Contribution Rates of the Nigerian National Health Insurance with Actuarial Contribution Rates

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ABSTRACT:- *The National Insurance package principally caters for the public sector and their families. Contributions are a fixed percentage of salaries and members pay 10% of the medical bills. Insurance deals with expected liabilities to be incurred and the premiums are calculated based on the risk factors that determine the expected liabilities. In the case of health insurance the principal factors that enter into the actuarial premium computations are the incidence of sickness and medical bills, which are probabilistic are in this paper are assumed to follow the normal distribution. The actuarial computations of premium. (Contributions) are done with the antecedent liabilities and compared with the present percentage fixed salary contribution. The functional relationship of the actuarial premium with the actuarial factors much as incidence of sickness and medical bills and life table of members is derived. Total expected liabilities are calculated for all members and the expected premium from which actuarial. Contributions are obtained. The public sector employment distribution is assumed to follow a normal distribution and the salary structure of the public sector is assumed to be linear increasing with age and years of employment and follows a normal distribution at each age. The actuarial contributions are far below the contributions of 15% levied on salaries for each employee.*

Keywords:- *incidence of sickness, medical bills, normal distribution, life table, public sector salary structure, actuarial premiums, Insurance contributions, liabilities.*

I. INTRODUCTION

Risk analysis is the major concern of activities in insurance business of all classes of business. The factors that enter into the actuarial computations are probabilistic. In the case of health insurance, the actuarial factors such as incidence of sickness and medical bills are age dependent and probabilistic. The life table of any nation gives the proportion of the population in each age and is also derived from probability. The public staff structure is assumed to follow a normal distribution between the ages of 20 and 60 with a large standard derivation, and the salary structure has a linear progression from the ages of 20 and 60. The salary increment from the ages of 20 to 60 is assumed to increase by an average of 60% per annum. The rate is comparable with the academic staff rate and other public sector rates.

The liabilities are calculated by actuarial methods and the total contribution is obtained while the present contribution is obtained by knowing the public staff structure, salary and using the fixed percentage.

II. LITERATURE REVIEW

Kelly Montor Merry (2008) states that "Community rating of health insurance policies is a method of setting premiums that spreads ovenly across the entire community. Everyone pays the same rate regardless of age, health status, or claims history. Thus, under community rating a health 20 years-old student would pay the same premium for the same coverage as a 63 years-old with diabetics or cold.

Community rating is controversial in the health policy community. Some feel that it drives premiums higher, forcing lower-income individuals to go uninsured. Others believe that it offers a crucial opportunity for those with expensive health problems to obtain affordable coverage."

Insure.com (2009), in their paper "How does the health insurance company determine our group's premium". States that 'Health insurance companies use one of three methods to calculate your group's premium: medical underwriting, adjusted or modified community rating or rating bands. Medical underwriting

is used primarily in the individual and small business health insurance markets. It is used in the large group market only at the time of purchase and rates are based on the number of employees participating in the plan, and a review of the Company's claim history. The second Method, adjusted or modified community rating is the standard for rating health insurance premiums in some states and eliminates health status from the list of factors insurers consider when setting the premiums. The rate is charged on limited factors such as ages, gender mix, and lifestyles.

III. METHODOLOGY

Actuarial

Let l_x be the number of staff at age x in the public sector and S_x the salary at age x.

where $S_x = S_{20}\,(1+ .06)^{x-20}$.

Since salary in the public sector increases by 6% per annum, until retirement.

Let C_x be the incidence of sickness at age x and M_x be the medical bills at age x.

Every member is entitled to include a wife and 4 children giving a maximum of 6 persons enjoying the health insurance package.

Expected total liabilities $L = \sum_{x=20}^{60} l_x C_x M_x S_x$

Since employees pay 10% of medical bills.

Ignoring all other expenses, flat premium per member

Present Premium $P = \frac{L}{\sum l_x} = \frac{\sum_{x=20}^{60}}{\sum_{x=20}^{60}} l_x C_x M_x S_x$

$$= \frac{\sum_{x=20}^{60} 3.6\, l_x C_x M_x S_{20}\,(1.06)^{x-20}}{\sum_{x=20}^{60} l_x}$$

Present Contribution

Assuming that Z% is the rate of contribution per salary.

Total Contribution = $TC = \sum \frac{L_x S_{20}(1.06)^{x-20}}{100}$

CASE STUDY

Public sector population (32, 000)

Starting Salary at 20 = ₦400, 000

Table 1

Age	l_x No of employees	Incidence of sickness C_x per month	Medical bill, M_x per month	Salary S_x per year
20-25	2, 000	0.8	2, 000	300, 000
26-35	5, 000	0.10	2, 500	537, 254
36-45	9, 000	0.20	3, 000	945, 237
46-55	9, 000	0.20	3, 000	1, 692, 775
56-60	5, 000	0.15	3, 500	30, 315, 029
56-60	2, 000	0.15	4, 000	5, 428, 975
	32, 000			

From the table I, we see that 8 out of 100 staff in the age group 20-25 are expected sick every month, 10 out of 100 are expected sick in the age group 26-35 until in the last age group 15 out of 100 are expected sick.

Expected Actuarial liability per week

$= 0.9\sum l_x C_x M_x$

= 1, 275, 500 Premium

455 per member per month

Contribution by fixed percentage salary of 15% per month

$= 0.15 \sum l_x S_x = 0.3\sum l_x\, S_{20}(1.06)^{x-20}$

= 15, 913, 152

Total Actuarial Contribution = ₦14, 575, 800

Fixed percentage of Salary Contribution = 15, 913, 152

The two rates are quite close

Incidence of sickness increases by 20%

Expected liability = $0.9 \sum_{x=20}^{60} l_x C_x M_x$

Where $\hat{C}_x = Ø.2\ C_x$

Hence Expected liability = $1.2 \text{ X } 0.9\sum_{x=20}^{60} l_x C_x M_x$

We derive the corresponding percentage contribution in accordance with the medical bill experienced in each age grouping.

Table2

Age	l_x No of employees	Expected Medical bill, per month	Salary per year	Corresponding percentage contribution per month	Present contribution
20-25	2, 000	320, 000	300, 000	0.64%	15%
26-35	5, 000	125, 000	537, 254	0.5%	15%
36-45	9, 000	540, 000	945, 237	0.76%	15%
46-55	9, 000	5, 400, 000	1692775	0.425%	15%
56-65	5, 000	2, 625, 000	303, 5079	0.021%	15%
66-75	2, 000	1, 200, 000	5428975	0.016%	15%
Total	32, 000	16, 195, 000			

Age	l_x	S_x	Current monthly contribution	Actuarially Computed Contribution
1	2, 000	300, 000	7, 500, 000	320, 000
2	5, 000	537, 254	33, 528, 374	1, 250, 000
3	9, 000	945, 237	106, 339, 160	5, 400, 000
4	9, 000	1, 692, 775	190, 437, 180	5, 400, 000
5	5, 000	30, 325, 029	189498820	2625, 000
6	2, 000	25, 428, 925	135, 724, 370	1, 200, 000
				16, 195, 000

IV. CONCLUSION

The records of the National Health Insurance provision will have the experience on incidence of sickness, medical bills and staff distribution obtained from the registered members. From these records the necessary computations of experienced liabilities over the years can be computed and compared to the total contributions received so far. Actuarial methods of obtaining contributions can be made from these two rates and experienced liabilities, it can be determined which of the two methods is more beneficial to the National Health Insurance provision.

The actuarial computed contribution rates are far below the fixed 15% of salary contributions levied on employees.

The government should review the national health insurance contributions according to actuarial methods.

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