

Importance to construct indigenous mortality table from crude death rate for life insurance industry in Bangladesh

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Abstract: This paper works on the different avenues in the crude death rates in assured lives in the demography of Bangladesh. Crude rate is studied in multi-folded ways including status of policy, sexual orientation, timeline response, monetary perspective and the overall patterns. This study is underpinned with the assumption of Uniform Death Distribution (UDD) method over time (in a single year). We demonstrate the kinetics of the contemporary crude rates along with comparative analysis with that of existing rates. Also, the level of efficacy of the existing use of mortality components that has been using for decades in every passage of life insurance instruments in Bangladesh. We point to the distinguished distortion in the existing practice to the results from the studied crude rates in the life industry and then the corresponding financial atmosphere driven by these crude rates issue. Finally, we make this instructive to the life insurance regulator in Bangladesh to pay attention to take necessary actions in life business due to notably changed demographic pattern in Bangladesh via going forward to take strong measure to construct a new indigenous mortality table based on the matrix of current crude rates instead of the existing practice of stereotype loading over extraneous tables for Bangladesh life insurance industry.

Key Words: Assured life, Crude rate, In-forced policy, Paid-up policy, Uniform Death Distribution (UDD)

I. Introduction

The demographic assumption is a basic and very core component of the life insurance business. In fact the mortality factor works at the centre of the demographic assumption in life insurance offices. It is blindly obvious that a suitable and appropriate mortality table is a must requirement in the life insurance mechanics otherwise possibility of getting experience the severe damage is huge. Its extensive in-valuable use determines the likely prospective cash flow within a sound level of confidence for the insurer at prior and hence, the product nature, and reserve status.

In Bangladesh, the case is: The Government of republic of Bangladesh opened the insurance for private sector in 1984. Three generations of companies doing business since then more recently the fourth generation has just been started. But, unfortunately, the proper use of arsenals of mortality tools is still under professional. So, the exact reflection of mortality driven issue is misleading due to the absence of indigenous mortality table. What has been going on is the patch work on the couple of mortality factors through engineering over four tables are of A (49-52), UK; A (67-70), UK; EFU(61-66); LIC (94-96). UK -A (49-52) is the most frequently used table among all. A (49-52) and A (67-70) are based on mortality experience of assured lives in the UK for major life insurance companies during the period 1949-52 and 1967-70 respectively. To be noted that A (49-52) table is for assured life whereas A (67-70) is used for annuity purpose. As most of the policies are assurance type so the widely and frequently used table is A (49-52) among all in Bangladesh. Furthermore, EFU (61-66) is based on the experience of assured lives of Eastern Federal Union Insurance Company during the period of 1961-66 and the rest LIC (94-96) is based on the data of assured lives of life insurance Corporation of India during 1994-96. The Insurance Development and Regulatory Authority (IDRA) of Bangladesh approve the actuarial works, in every avenue in life (e.g. product designing, reserve calculations etc), done relying on these tables.

II. Methodology

In this work we were constrained ourselves in around nine hundred thousand data from the life industry in Bangladesh.

All the expected value is taken based in the assured life table A49-52, UK.

Estimation taken on the basis of the next premium due date of policies

Policy are defined as in forced as the last premium is deposited

Deaths are rounded at second order after point

i = Total death record in-forced policy

p = Total death record from paid up policy
 m = male; f = female
 1 = Death during the first year of the policy inception
 R = renewal case death
 SA = Sum Assured
 (-) = SA less than BDT1, 00,000
 (+) = SA equals to and greater than BDT1, 00,000

D(o) = Observed death where the information of fully declined policies is excluded in the ground of all them are suffering in impurity, and D(e) = Expected death

This UDD is based on the fact that “x” is an integer, called age of policy holder at inception, and “t” is the progress of time after “x’ with condition of $0 \leq t \leq 1$, also the function $p(x, t) * \mu(x + t)$ is constant which implies uniform distribution of time to death with the condition of death is falling between two ages between $(x, x + t)$, i.e. intensity of time to death from age “x”.

Since $q(x, s) = \int_0^s p(x, t)\mu(x + t)dt$ and

Setting $s = 1$, we have $q(x) = p(x, t)\mu(x + t)$ for $0 \leq t \leq 1$;

Hence, $q(x, s) = \int_0^s q(x)dt = s * q(x)$

Uniform Death Distribution $p(x, t)$, $\mu(x + t)$, $q(x, t)$ data collection procedure,

$p(x)$ = probability of a life of age x now will survive for at least next 1 year
 $p(x, t)$ = probability of a life of age x now will survive for at least next t year, where
 $q(x)$ = probability of a life of age x now will die within next year
 $q(x, t)$ = probability of a life of age x now will die within t year, where
 $\mu(x + t)$ = probability of a life of age $(x + t)$ now will die within next instant of time, is called the force of mortality

III. Body

Tables bellow are the abridged version of spectrum of death, both actual and expected for both in forced and paid up policies individually

3.1 Demographic aspect(s) in terms of status of policy and sexual orientation:

Table – 1: Observed and Expected death for both male and female in both in-forced and paid-up policies.

Death	i			p		
	m	f	Total	m	f	Total
D(o)	978	659	1637	136	132	268
D(e)	1103.05	1099.57	2202.63	182.03	147.07	329.10

- (1) Expected death is 34.55% higher than the observed death with respect to observed death for in-forced policies and for paid up case it is around 22.8%.
- (2) In crude rate point of view, if the total in-forced policies are compared to the total paid up policies, then the result is 25.68% higher expected death than actual death with respect to expected death for in-forced policy and is 18.87% higher expected death than actual death with respect to expected death for paid up policy.
- (3) Male and female expected death is 12.8% and 66.9% higher with respect to observed death than those of observed respectively, for in-forced policy. On the other hand in paid up policies expected death is 33.85% higher than the observed with respect to observed death for male policy holders and for female it is 11.42% higher.
- (4) again, in terms of percentage observed death with respect to expected of the same issue is 88.7% for male and 59.93% for female in in-forced type policy. But in paid up policy it is 74.71% and 89.75% for male and female respectively.
- (5) In detail, it is as such, around the observed death is 25.29% lower than the expected death for male in this section, and for female it is 10.25% lower 10.25% for paid up policy.

3.1.1 Comments

(1) Male death is higher than those of female for age range 18-65 years which is usual.
 (2) Company has less expense due to death driven cash out in every category both separately and in over-all. It is the case where real death rate is always less than the expected death for both in forced and paid up policies. So, policy holders are always in losing status and in the other end the company is in advantageous position. As the most of the policies are saving in nature the subsequent acting taken for policy holders footing on this result will be very difficult in the sense that the per head contribution is nominal. But if no action taken for this nominal issue then the expense level including pointless expense will remain a factor. Those who holds micro policies will suffer more, and those who holds the without profit policy will be victim for this kind of measure. And this type of event takes place with the higher proportional from in-forced policies rather than paid up portion

The expected rates are extracted from table of A (1949-52) with loading. This result shows that keep loading on the mostly used A (1949-52) is not a good solution.

3.2 Demographic aspect(s) in terms of status of policy and kind of policy:

Table – 2: Observed and Expected death for both first year and renewal in both in-forced and paid-up policies.

Death	i		p	
	1	R	1	R
D(o)	621	1016	0	268
D(e)	602.79	1599.84	0	329.32

(1) For in-forced policy, in renewal kind, observed death is lower than the expected death of 36.5% with respect to expected death basis. Whereas, for paid up policy, in renewal, observed death is around 18.62% lower with respect to expected death basis. So, the ratio of “observed to expected” death rate is higher in paid up section than those of in-forced section.

(2) For in-forced policy, in first year the expected death is around 97% of the observed death whereas in renewal there is the reversed picture of observed is 64% of the expected death.

(3) In renewal, the observed death is around 81% of expected death for paid-up case. The renewal death rate ratio of “observed to expected” in paid-up case is around 17.38%, i.e. (81.38-64) %, higher than that of in-forced policy.

3.2.1 Comments

The paid-up policy holders are comparatively prone to risk. But, it is observed that the comparatively risky policy holders are discontinuing the scheme. This implies an insight of: these kinds of policy holders badly need policy but their financial condition is as such they fail to keep their policy remain in-forced. May be if a worth table were used then premium rate would declined such a way that might drive policy holders remain with the scheme in some extent (i.e. continuation chance depends upon the age of policy holder.)

3.3 Demographic aspect(s) on different sum assured of policy:

Table – 3: Observed and Expected death for both Sum Assured of less than BDT 1, 00,000.00 and of more than BDT 1, 00,000.00 in both in-forced and paid-up policies.

Death	i		p	
	(-)	(+)	(-)	(+)
D(o)	1261	376	226	42
D(e)	1744.38	458.25	282.49	46.61

(1) The ratio of the deviation in actual death and expected death with respect to the actual/observed deaths are 38.33% and 21.88% for (-) and for (+) respectively for in-forced policy. The deviation between these two rates is around 75% whereas, the ratio of the deviation in actual death and expected death with respect to the actual/observed deaths are 25% and 11% for (-) and for (+) respectively for paid-up policy. The deviation between these two rates is around 128%. The propensity of cash out due to death driven issue is higher for large sum assured, i.e. (+) for both in-forced and paid-up policy. Moreover, in character wise, the cash out floe tendency is higher for paid-up case.

(2) For in-forced policy, (-) the actual death is 27.65% less than the expected death with respect to expected death. On the other side, for (+) the actual death rate is 17.95% lower than the expected death with respect to expected death. Hence there is a gap of 9.7% in between these two kinds to SA’s where the actual death is higher in (+) in piecewise view. Further more, for paid-up policy, (-) the actual death is 20% less than the expected death with respect to expected death. On the other side, for (+) the actual death rate is 10% lower than the expected death with respect to expected death. Hence there is a gap of 10% in between these two kinds to SA’s where the actual death is higher in (+) in piecewise view.

3.3.1 Comments

The death rate is higher for big Sum Assured. So, the life coverage is not uniform with respect of SA. The rich people who apprehends to life risk are very keen to buy insurance policies in accost. In the event of the existing practice remain using the exotic table then the possibilities of this kind of non-uniformity will be enhanced in the long run.

IV. Conclusion

This research is instructive in the sense this reveals the frequent miss judgments of the merit of mortality factor in the life industry in Bangladesh as well as this depicts the distinguished financial less proportional outcomes due to readily absence of indigenous mortality table. The existing frequent and limitless loading exercises on exotic table have been leading the constantly severe financial damages for some kind of participating policy holders, besides leaving the company business remain in jeopardized in terms of death risk which can't be a part of profound and sustainable practice. Actuaries in Bangladesh using inconsistent, in some extent under reliable, table in the sense of business (it is found evident through frequent loading practice and associated inconsistent business risk, in monetary, that is shifted to the policy holder by the life office, due to using this table, to the policy holders. To sum up we find that the new mortality table is essential for Bangladesh.

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