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Superlife: Lumaria

Health Incentive Program Implementation

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Executive Summary

SuperLife Insurance, one of Lumaria's major life insurance carriers, aims to improve expected mortality for their policyholders and is looking to implement targeted health incentive programs to achieve their goal.

This report explores the key objectives, evaluation metrics and final program design of SuperLife's new health incentive program, before diving into the assumptions and considerations involved in its development. This includes an exploration of the modelling process, and descriptions and justifications on core assumptions involved in the process of calculating premiums, claims, expenses and mortality. Sensitivity testing was also conducted under stressed economic, lapse, and mortality rates, to ensure the product remains robust even in adverse conditions.

Key risks involved with respective mitigations as well as limitations of data sources used were also discussed.

Objectives and Key Metrics

Target objectives are:

- **Incentivising healthy behaviours:** Integrating health incentive programs including encouraging healthy habits and behaviours, to encourage policyholders and the general population to cultivate healthier lifestyles.
- **Improvement in Lumaria's mortality rates:** Healthier behaviours will ultimately improve policyholder life expectancies. Given SuperLife is a major life insurance carrier, Lumaria's overall mortality will be positively impacted.
- **Long-term uplift in SuperLife's sales:** Implementation of the program is targeted to attract new SuperLife customers, whilst maintaining existing policyholders, boosting SuperLife's sales overall in the long run.
- **Improve product marketability and competitiveness:** Decreased claims costs for Superlife would be reflected in lower policyholder premium payments. Coupled with an innovative program design, SuperLife can market towards prospective policyholders in search for competitive premium rates and the potential to live longer, healthier lives.
- **Add economic value to Superlife:** Greater profits for SuperLife would be generated, driven by increased market share (policyholder rates) and SuperLife's reduced liability to pay out claims, as a result of decreased mortality across all demographics.

Key metrics to measure success of the HIP are:

- **Mortality Rates:** An overall reduction in mortality across all age ranges and demographics.

- **Customer Satisfaction / Renewal Rates:** Increased customer satisfaction, reflected through increased renewal rates and customer satisfaction surveys.
- **Sales / Financial Sustainability:** Increased levels of sales for SuperLife.
- **Policyholder Uptake:** Growth in uptake year to year for SuperLife's product.

Program Design

As part of SuperLife's in-force dataset, it was found that the two leading causes of death were neoplasms and circulatory diseases which accounted for 32.8% and 29.4% respectively of overall policyholder deaths. Of the deaths related to circulatory diseases, more than 89% had a history of smoking, where the integration of a smoking cessation program with the life insurance product offered could decrease the mortality rate by up to 50%. The program offers targeted support from counselling as well as access to nicotine replacement therapies. Cancer prevention initiatives were also chosen to tackle the leading cause of death, with the two leading causes combined accounting for over 60% of all policyholder deaths.

Furthermore, recognising the different health risks faced by both men and women, our intervention program incorporates gender-specific health screenings. Complementing the targeted nature of smoking cessation, this initiative aims to leverage early detection of diseases to significantly boost health outcomes.

Our evaluation strategy for the health intervention project is designed to capture both short and long term outcomes. The short term evaluation, to be done within 5 years of the intervention implementation, will focus on early indicators of the program's appeal and efficacy. These will include participation rates in the given interventions and any additional uptake in policies following the introduction of the interventions. The short term evaluation would allow for adjustments to meet the evolving needs of the Lumarian population. Over the long term of 20 years, we aim to assess the impact of the intervention on mortality rates as well as behaviour changes in the policyholder population. Currently in Lumaria 18% of persons aged 18 and older smoke and the decrease of this proportion can be a key indicator of long term success of the smoking cessation program.

Logistics wise, the implementation of our program will be rolled out across all six regions of Lumaria. No variation in pricing or assumptions will be applied across the differing regions, with a consistent ratio between existing urban and rural policyholders observed across all six regions, at around 63.5% urban and 36.5% rural. Furthermore, the wealth distribution is similar across all regions, given a relatively consistent distribution of policies of each face amount value. The consistent policy structure between regions is also justified by the relatively low difference between the average urban and rural policy face amounts, at around 699,000 and 607,000 crowns respectively.

With 46.4% of policyholders joining SuperLife through an agent, 28.5% joining online, and 25% through a telemarketer, we aim to increase the outreach of our program to a wider range of agents across Lumaria, whilst maintaining operations of SuperLife's website and telemarketing activities.

Pricing/Costs

To model the effects of the interventions on the last 20 years (i.e. since 2004), a model was built that would simulate how each policyholder's outcome would change when the initiatives were introduced. Under this model, SuperLife absorbs all expenses associated with the initiatives.

Prior to running the model, premiums for all policyholders were estimated using the policyholder's policy type and their own mortality rates derived from their personal attributes (e.g. age, gender, smoker status).

Once premiums were estimated, the first part of the model simulated policyholders that were known to have died from 2004 onwards. On the year of their death, the model would simulate their probability of dying based on their time spent in the policy. If they lived, they would move on to the next year and have a chance of lapsing or dying again with the same adjusted mortality rate.

The second part of the model simulated new policyholders that bought a policy as a result of the initiatives. At each year from 2004 onwards new policyholders would be simulated, their attributes generated from empirical distributions from the inforce data, including face amount and premium. The model then simulates each policyholder's probability of lapse and death.

In both parts of the model, premiums and expenses are collected at the start of the year and liabilities added upon a policyholder's death. These are then summed to give the final revenue, expense and liabilities figures.

Total Sales / Claims Costs

Prior to Program Implementation

Policyholder premiums were determined using the equivalence principle, by considering the present value of future expected benefit payments. The collection of premiums for the two policy types offered by SuperLife were as follows:

- T20: 20-year level term - annual premium payments at the beginning of each year for the duration of the policy or, until year of death.

  $$P^1_{x:\overline{n}|} = \frac{A^1_{x:\overline{n}|}}{\ddot{a}_{x:\overline{n}|}}$$

- SPWL: Single Premium Whole Life - single premium paid at the issue date.

  $$A_x = \sum_{k=0}^{\infty} v^{k+1}{}_k p_x q_{x+k}$$

For these calculations v refers to the real interest rate and is adjusted each year to account for the varying 10-year spot rate as well as the changing inflation rate. The total sales amount can then be calculated through the sum of the premium for each policy issued given the face value and each policyholder's age and respective mortality.

As a life insurance company, paying out death benefits is a major component of SuperLife's liability. Given the SuperLife inforce dataset provides death indicators, it is possible to calculate SuperLife's total claims liability from 2001-2023. This is achieved through summing the face values of each death benefit paid and adjusting this amount in terms of today's money.

In the period prior to program implementation, from 2001-2023, revenue through premium collection was 192B Č whilst claims cost was 21B Č.

Costs of Program Implementation

Smoking Cessation Programs	Cancer Prevention Initiatives	Health Screenings
2177.5 Č per particpant	52.5 Č per participant per year	217.5 Č per participant per year

Mortality Savings

Comparing the same set of inforce policies with and without the effect of the interventions, we found that on average the implementation of our plan would have saved around 6750 lives, or close to 17% of policyholders who would have otherwise died.

Economic Value

The economic value of the proposed program is approximately 190B Č based on projected profit across the 20 years.

Given different insurance policies, the benefits will depend on the timeframe. For instance, taking the 5 year and 20 year evaluation periods mentioned earlier, the 20 year term policy benefits would be comparable to the existing 20-year term insurance benefits (which range from 50K Č to 2M Č). In contrast, the benefits of a 5-year term policy would be a lot smaller, potentially ranging from 5K Č to 20K Č.

The aggregate value of the benefits after implementing the interventions is approximately 25B Č, which is higher than the pre-program implementation figure of 21B Č.

Premium Impact Justification

Given the savings realised from reduced mortality, costs of implementation will not be reflected in any changes to premium amounts. This is to allow for the target objective of improving

product marketability and competitiveness whilst still ensuring SuperLife's long-term financial sustainability.

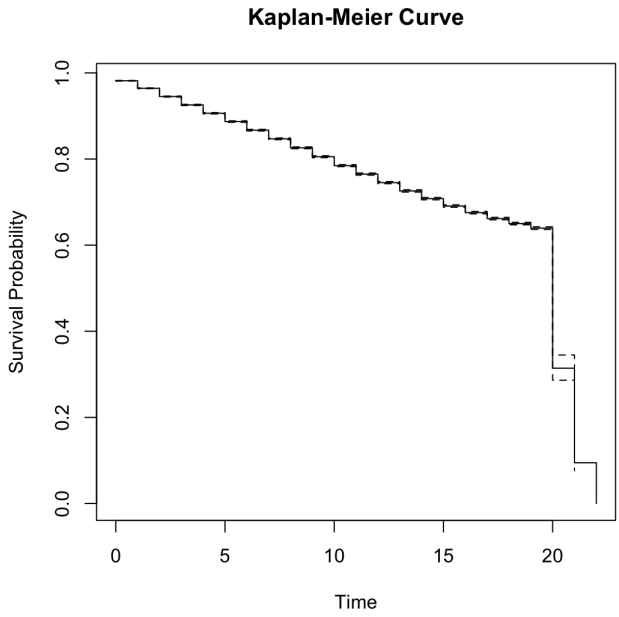
Assumptions

Economic Assumptions

The discounting factor used to model premiums and liabilities each year is the real interest rate of that year. Those were derived from the inflation rate and the 10-year spot rate data provided by SuperLife. Where projected future rates were necessary, a 20-year simple historical average excluding outliers was taken from the inflation rate and 10-year spot rate data.
The face amount of each policy is deemed to be the real benefit amount in the year that the policyholder dies should that occur.
Initiative costs as given by SuperLife are assumed to be in terms of today's money and so are not discounted.

Mortality Assumptions

Given only a general population mortality table, combining all demographics, several core assumptions were made to derive appropriate scaling factors to be applied to the Lumaria ultimate mortality table to account for sex, smoking status, and underwriting status.



Mortality data from external countries such as the USA and Australia have been used as comparable measures of mortality to Lumaria. Although mortality differs to a moderate extent between the countries, this data was only used to derive a comparison of mortality within demographic categories (e.g. male/female mortality, smoker/non-smoker mortality). The relationships within these categories are assumed to be consistent between countries.

Another key assumption is that the population of Lumaria is composed of an equal split between male and female. For smokers, it is assumed that the split of smokers and non-smokers is constant between the male and female population, with 18% of smokers and 82% non smokers. Furthermore, the effects of smoking are assumed to directly impact mortality of those over the age of 35.

The demographic impacts on mortality are assumed to be stable over time - i.e. the relationship between male and female mortality, and smoker/non-smoker mortality does not change over the years, with the relationship based on most recent available data within the policy timeline. The proportion of each underwriting status in the population is assumed to reflect the proportion within the in-force dataset. The proportion of deaths within the in-force dataset yielding similar values for low and very low underwriting status (2.49% and 2.88% respectively), as well as moderate and high underwriting status (7.09% and 6.24%). Given this, mortality scaling factors were calculated after grouping the underwriting status into high and low. Furthermore, the underwriting status are assumed to already take age into consideration, so scaling factors are constant throughout ages 1 to 120.

The mortality impacts of the cancer prevention initiatives were derived from the data supplied by SuperLife, with the impact once again taken as the average of the two endpoints. For the mortality impact of smoking cessation, it was assumed that the age distribution of incoming policy holders would be consistent with those already holding a policy.

Lapse Assumptions

Lapse probabilities are taken from the inforce data. This is to account for the large jump in lapses proportionately from 2020 onwards. The empirical probabilities are assumed to contain sufficient information about the external influences (e.g. economic) in that year contributing to the lapses.

Expense Assumptions

The only expenses considered in our analysis are those of the health initiatives. Of the three chosen, two (Cancer Prevention Initiatives and Heart Health Screenings) are yearly expenses applied to each policyholder. The yearly costs arise as so:

- A new initiative under the Cancer Prevention Initiatives is rolled out each year
- Screenings under the Heart Health Screenings program are done once a year

The last initiative (Smoking Cessation Programs) is a one-off expense applied only to smoker policyholders in the year they enter the program. All policyholders participate in the initiatives from the moment their policy is in force.

The actual expense figures are taken from the data supplied by SuperLife. Given each initiative has a range for the expenses, we have taken the average of the two endpoints to come to a single cost for each initiative.

Model Assumptions

In building the model, the inforce dataset is taken to be a sufficient sample of the population for the purposes of drawing demographic statistics for the simulation of new policyholders. The mortality table is also taken to be accurate as a baseline for all lives in force.
In a given year, the timeline for a claim is as follows :

1. A policyholder has their birthday at the start of the year.
2. Their policy is purchased/renewed immediately after their birthday.
    a. The policyholder pays the premium and SuperLife pays the expenses for the relevant initiatives.
3. Lapses occur anytime between policy purchase/renewal and the end of the year.
4. Death (if it happens) occurs at the end of the year.

The interventions only have a positive effect on mortality, such that any policyholder that stayed alive until 2023 or the lapse of their policy will remain so in the model. As such, policyholders who either stayed alive or lapsed are essentially unaffected mortality-wise and will not incur death in the model. This extends to policyholders which were known to die at a certain year; they will remain alive until at least that year. Their disease will only affect their mortality from the year of death onwards.

Risks and Risk Mitigation Considerations

The processes surrounding implementation and maintenance of the health intervention program comes with various quantifiable and qualitative risks as tabulated below.

Risk Category	Risk Description	Mitigation Techniques
Unexpected incentive engagement	The incentives may not be as attractive as anticipated, leading to the increased costs, with subpar growth	Ensure sufficient marketing of new program incentives, throughout all distribution channels. Adjust product throughout for feedback.
Cost Overruns	The actual cost of health initiatives could exceed estimates, placing additional financial stress on SuperLife.	Establish strict budget control, with budget contingencies for unforeseen expenses. Having a detailed project plan before implementation can also mitigate scope creep and budget overruns.
Cybersecurity Risks	The implementation of additional interventions may necessitate the integration of multiple databases. This increased reliability on digital systems leave SuperLife vulnerable to cyber attacks.	Establish strict data security policies and procedures with data only released to employees on a “need to know” basis. Data should also be encrypted, with additional layers of

		security such as anti-virus and firewalls installed.
Insurance Risk	Due to factors such as inadequate underwriting or product design, claims paid by SuperLife may exceed plan, potentially causing an inability for SuperLife to meet their liabilities.	Do sufficient stress testing for adverse conditions. Hold sufficient reserves to account for insurance risk. Consult with reinsurance firms to mitigate the risk of SuperLife being unable to pay its liabilities.
Legal Considerations	Lumaria may have anti-competition laws which prevent the bundling of health initiatives with life insurance. Possible conflict of interest laws for an insurance company with health initiatives.	In the transition process, consult with external lawyers and maintain an internal legal team to protect the company against any breaches of the law.

Sensitivity Analysis

Sensitivity analysis was performed by adjusting the key assumptions mentioned previously in the report. Comparing the results to our base scenario revealed the following:

1. An increase in the inflation rate to 5% would result in a decrease in the value of premium payments in the long term (over 20 years) by 0.6% p.a. and increase the cost of claims. Due to fixed premiums, the immediate impact was negligible, however, there were more significant effects in the long term.
2. An increase in interest rates to 4% improved the present value of future premium income thereby increasing the profitability of SuperLife by 2.3%. Conversely, a decrease in interest rates led to a drop in SuperLife's finances in the long term.
3. A 1% reduction in mortality rates decreased claim expenses by 1.3% in the short term, thereby improving profitability. In the long term, the liability duration would be extended with longer policyholder lifespans. This can be mitigated through an enhanced reputation, leading to higher sales.

The proposed Health Incentive Program demonstrated a reduction in mortality by an average of 6,700 deaths per year over the past 20 years. This empirical evidence with consistent mortality reduction highlights the program's direct impact on improving health outcomes. This allows for the confident assertion of a 95% degree of certainty in its effectiveness. Furthermore, the focus on healthy behaviours known to decrease mortality rates reinforces its potential success.

Additionally, the reduction in mortality rate through initiatives such as the smoking cessation program suggests policyholders are generally healthier people. This improvement in policyholder health allows SuperLife to underwrite policies for a higher value of benefits due to the reduced risk of early claims. Hence, due to the 17% reduction in mortality rate, there is a 95% degree of certainty that the value of benefits derived from policies sold with the proposed program will exceed the value of benefits derived from policies sold without the proposed program.

Data and Data Limitations

Data	Description and Limitations
Superlife Inforce Dataset (Source: SOA) Dataset describing the 978582 policies under superlife.	**Completeness:** Some of the dataset had missing data entries, potentially leading to miscalculations. Thorough processing and cleaning of data was conducted prior to analysis.
	Limited scope: Limited factors which play into mortality were included within this dataset, leading to limited factors considered during analysis of mortality, and interventions. Furthermore, causes of death were limited to high-level categories, preventing further investigation into correlations involving death.
Lumaria Encyclopedia Entry (Source: SOA) Key statistics regarding Lumaria, including demographic, economic, social, cultural, and more.	**Surface level statistics:** Majority of statistics are vague and only offer general insight into Lumaria's environment. Without providing insights and breakdowns into specific demographics and circumstances, it is difficult to draw accurate conclusions from data. As such, external data was used to supplement this data.
Lumaria Mortality Table (Source: SOA) General population mortality for Lumaria	**High level mortality:** The mortality table does not allow for differing mortality across various factors such as gender, smoking status, underwriting status, and more - all which have a significant impact on the mortality of an individual, and would need to be accounted for during pricing.
SuperLife Interventions Dataset (Source: SOA) Description of interventions, including	**High variation:** Mortality impacts and costs of given interventions is vague with a high potential range. This results in strong assumptions having to be set regarding the impacts of implementing the interventions into the program.
Economic Data (Source: SOA) Lumarian economic data, including inflation and spot rates.	**Time frame:** Does not project data past 2023 - with pricing requiring economic values years into the future to account for life expectancy of policyholders. This was accounted for through historical averages.
	Lack of context: Many factors may influence future inflation and spot rates. For simplicity, we assume such factors have been already accounted for in historical data.

Smoker Status Data (Source - ABS) Australian smoking data - number/proportion of Australians aged over 15, split between male and female.	**Sampling bias:** Data collected through the National Health Survey - where the methodology involves sending out online forms which participants voluntarily participated in. As surveys were sent out at random, and there is an extensive list of demographics to be excluded, this may result in bias in the results.
	Self reporting bias: As data is self reported through an online form, individuals may misrepresent their true habits, due to personal biases, societal stigma, and other pressures.
	Australian data: Data may not accurately reflect trends from Lumaria - however, given data is only used as a comparison between male and female factors, no material implications.
Smoker Mortality Data (Source: J Lariscy, R Hummer, R Rogers - using US National Health Interview Survey Linked Mortality Files) American smoking mortality data - deaths from smoking attributed causes of death for smokers, former smokers, and non-smokers.	**Self reporting bias:** As above.
	Death Causality: The development of these diseases could potentially be caused or influenced by other lifestyle factors other than smoking - the exact impact of smoking is not quantified.
	American data: Data may not accurately reflect trends from Lumaria - however, given data is only used as a comparison between male and female factors, no material implications.

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Appendix

Mortality Scaling Factors

Age	Male	Female	Male_S	Male_NS	Female_S	Female_NS	UW_very_low	UW_low	UW_moderat	UW_high
1	1.0802497	0.9197503	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
2	1.0962672	0.9037328	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
3	1.0666667	0.9333333	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
4	1.2	0.8	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
5	1.0928962	0.9071038	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
6	1.0797546	0.9202454	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
7	1.0849673	0.9150327	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
8	1.1066667	0.8933333	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
9	1.1216216	0.8783784	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
10	1.1292517	0.8707483	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
11	1.1409396	0.8590604	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
12	1.164557	0.835443	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
13	1.1620112	0.8379888	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
14	1.146789	0.853211	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
15	1.1191336	0.8808664	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
16	1.1129477	0.8870523	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
17	1.192389	0.807611	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
18	1.3137255	0.6862745	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
19	1.3925104	0.6074896	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
20	1.4116095	0.5883905	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
21	1.4263566	0.5736434	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
22	1.4409149	0.5590851	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
23	1.4520548	0.5479452	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
24	1.4585366	0.5414634	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
25	1.457346	0.542654	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
26	1.4535017	0.5464983	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
27	1.4430939	0.5569061	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
28	1.4316013	0.5683987	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
29	1.417004	0.582996	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
30	1.4013474	0.5986526	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
31	1.3843352	0.6156648	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
32	1.3688736	0.6311264	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
33	1.3532741	0.6467259	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
34	1.3388931	0.6611069	1	1	1	1	0.6448258	0.6448258	1.6520857	1.6520857
35	1.3267045	0.6732955	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
36	1.3165229	0.6834771	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
37	1.3073593	0.6926407	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
38	1.3010381	0.6989619	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
39	1.2957595	0.7042405	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
40	1.2937063	0.7062937	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
41	1.2900232	0.7099768	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
42	1.2816117	0.7183883	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
43	1.2742382	0.7257618	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
44	1.2684711	0.7315289	1.7494818	0.8354796	1.877665	0.8073418	0.6448258	0.6448258	1.6520857	1.6520857
45	1.2636917	0.7363083	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
46	1.2617408	0.7382592	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
47	1.2551286	0.7448714	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
48	1.2554275	0.7445725	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
49	1.25	0.75	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
50	1.2430297	0.7569703	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
51	1.2356247	0.7643753	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
52	1.234657	0.765343	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
53	1.2362219	0.7637781	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
54	1.2378998	0.7621002	1.9924705	0.7821406	1.9554094	0.790276	0.6448258	0.6448258	1.6520857	1.6520857
55	1.2434906	0.7565094	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
56	1.2480744	0.7519256	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
57	1.2519064	0.7480936	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
58	1.257961	0.742039	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
59	1.2628461	0.7371539	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
60	1.2666807	0.7333193	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857

61	1.2707968	0.7292032	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
62	1.2727273	0.7272727	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
63	1.2719533	0.7280467	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
64	1.2701597	0.7298403	2.3056017	0.7134045	2.1025041	0.7579869	0.6448258	0.6448258	1.6520857	1.6520857
65	1.2657382	0.7342618	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
66	1.2612495	0.7387505	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
67	1.2561826	0.7438174	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
68	1.2510168	0.7489832	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
69	1.2453331	0.7546669	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
70	1.240758	0.759242	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
71	1.2362416	0.7637584	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
72	1.2342446	0.7657554	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
73	1.2302233	0.7697767	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
74	1.2253798	0.7746202	2.1951203	0.7376565	2.1401476	0.7497237	0.6448258	0.6448258	1.6520857	1.6520857
75	1.2235489	0.7764511	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
76	1.2217579	0.7782421	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
77	1.2163181	0.7836819	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
78	1.2120117	0.7879883	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
79	1.2059717	0.7940283	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
80	1.2016995	0.7983005	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
81	1.1952685	0.8047315	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
82	1.1897332	0.8102668	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
83	1.1834833	0.8165167	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
84	1.1766213	0.8233787	1.7927094	0.8259906	1.8906362	0.8044945	0.6448258	0.6448258	1.6520857	1.6520857
85	1.1684951	0.8315049	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
86	1.1603271	0.8396729	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
87	1.1509402	0.8490598	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
88	1.142026	0.857974	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
89	1.131926	0.868074	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
90	1.1198558	0.8801442	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
91	1.1089563	0.8910437	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
92	1.0888123	0.9111877	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
93	1.0745015	0.9254985	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
94	1.0618784	0.9381216	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
95	1.055141	0.944859	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
96	1.0466741	0.9533259	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
97	1.0390103	0.9609897	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
98	1.02609	0.97391	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
99	1.0137672	0.9862328	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
100	1.00199	0.99801	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
101	0.9908616	1.0091384	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
102	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
103	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
104	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
105	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
106	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
107	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
108	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
109	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
110	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
111	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
112	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
113	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
114	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
115	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
116	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
117	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
118	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
119	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857
120	1	1	1.3169696	0.9304213	1.2783883	0.9388904	0.6448258	0.6448258	1.6520857	1.6520857

Incentive Impacts

Intervention Name	Mortality Scaling	Annual Cost	
Smoking Cessation Programs	0.441289821	2177.5	per participant
Cancer Prevention Initiatives	0.925	52.5	per participant per year
Heart Health Screenings	0.925	217.5	per participant per year

Model Notes

The number of policyholders generated each year is predetermined based on a percentage of the number of actual new policyholders. This percentage was chosen to be 1.6% based on market research on life insurance customers who are also either smokers and/or individuals that use medical screening services.