SuperScreen Program for SuperLife

2024 Student Research Case Study Challenge

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Executive Summary

Zoro Consulting has been engaged by SuperLife to develop a health incentive program aligning with their longer-term life insurance offerings, which will improve its policyholders' expected mortality after the policyholder has purchased a life insurance program. This report details the proposed program, a preventative health screening rewards-based program, which consists of a mobile application to provide individualised recommendations on health screenings appropriate for each policyholder, and reimbursement for successful completion of such screenings.

The proposed program aims to reduce health risks and mortality rates amongst policyholders through prevention and early detection of health issues such as breast cancer, prostate cancer, high blood pressure and sexually transmitted diseases, leveraging preventative screening services available at GP offices. The program is supported by strong evidence that preventative screening services are associated with lower rates of mortality. For example, a recent study conducted in the UK found that a similar preventative health screening program targeting conditions such as heart disease, diabetes, stroke, and others, led to a 23% lower risk of death from any cause (Attwooll, 2024). This evidence underscores the potential effectiveness of the proposed program in improving health outcomes and reducing mortality rates amongst SuperLife's policyholder pool.

Objectives

Main Program Objectives

The proposed health incentive program has four main objectives:

1. **Risk Management**: Incentivising healthier behaviours through participation in the preventative health screening programs can lead to reduced health risks and decreased expected mortality. This, in turn, can lower the likelihood of insurance claims and helps manage the company's risk exposure.
2. **Enhanced Value Proposition and Competitive Advantage**: Offering health incentives alongside life insurance policies enhances the overall value proposition for customers. It provides additional benefits beyond financial protection, improving product marketability and competitiveness, which can attract prospective policyholders to SuperLife.
3. **Long-Term Sustainability**: Encouraging healthier lifestyles through preventative screening programs can lead to longer policy durations and lower lapse rates. Healthier individuals are more likely to maintain their life insurance policies over time, providing SuperLife with a more stable and sustainable customer base.
4. **Data Collection and Insights**: As the program tracks the type and frequency of preventive screenings, SuperLife can leverage this additional data to gain insights into policyholders' health behaviours and preferences, which can inform product development, underwriting practices, and pricing strategies.

These four objectives work together to underpin increased sales and added economic value to SuperLife with careful consideration of short- and long-term timeframes.

Key Metrics to Measure Success

The success of the program will be assessed using the following metrics:

1. **Policyholder utilisation:** Examining statistics on the number of policyholders who participate and stay in the program, with a high participation and retention rate representing success

2. **Customer satisfaction**: Gathering insights from policyholder feedback regarding satisfaction and quality of customer service through surveys and questionnaires, aiming for high customer satisfaction.
3. **Claims frequency:** Analysing the number of claims and financial impact of claims filed before and after the introduction of the program, with a decrease in claims frequency representing success.
4. **Lapse rate:** Evaluating changes in lapse rates before and after the introduction of the program, with a decrease in lapse rate indicative of the program's effectiveness.
5. **New policyholders:** Tracking how new customers discovered SuperLife during sign-up process to explore the impact of the program on attracting new policyholders

Program Design

The proposed program consists of two elements, the SuperScreen Program, and the SmartScreen App, which work in conjunction to incentivise healthy behaviours and thus reduce mortality rates, through prevention and early intervention of diseases.

SuperScreen Program

The proposed health incentive program, SuperScreen, offers reimbursement incentives for policyholders who undergo triennial preventive health screenings. Reimbursement amounts are adjusted based on the policyholders' risk categories, with higher-risk categories receiving higher reimbursement amounts proportional to their premiums. This strategy is designed to ensure equitable access and encourage participation in the program. By engaging with the SuperScreen program, policyholders proactively monitor their health indicators, enabling them to detect and address potential health risks early, thereby decreasing the expected mortality rate. The Australian Institute of Health and Welfare (2018) highlights that people with breast, cervical and bowel cancers detected through national cancer screening programs have better outcomes than those diagnosed but who have never been screened. For example, women who have undertaken screening have an 87% lower risk of dying from cervical cancer than those who have never had a cervical screening test before. This underscores the importance and impact of preventative screening measures on reducing mortality.

SmartScreen App

SuperScreen is complemented by an app, SmartScreen, which will require investment from SuperLife in the expertise of software engineers and collaboration with medical professionals for its development. The app leverages leading-edge artificial intelligence models to provide tailored screening recommendations based on the policyholder's individual characteristics, such as age, sex and region. Additionally, the app allows policyholders to update their personal information and lodge reimbursement requests immediately upon receiving screening results. As such, the SmartScreen also serves as a real-time channel for policyholders' current health status and data. This allows SuperLife to continuously update its models as needed, ensuring accuracy and relevance in risk assessment and policy management, whilst allowing participants of the program to receive tailored and individualised recommendations, increasing the attractiveness of participating in the program.

Additional Program Details

Policyholders with a 20-year term life product can receive reimbursements of up to 10% of their annual premiums. Meanwhile, whole life policyholders are eligible for reimbursements of 5% of their lump sum premium spread throughout their policy lifetime. Policyholders are

encouraged to undergo additional screenings, but reimbursement is only provided for screenings recommended by SmartScreen or with a valid referral from their family doctor.

Design Rationale

Intervention Selection

Using SuperLife's provided intervention data, each intervention was ranked based on their cost-benefit ratio. This was computed using the formula:

$$Cost\ Benefit\ Ratio\ = \frac{Average\ Impact\ on\ Mortality\ Rates}{Average\ Per\ Capita\ Cost}.$$

The top five interventions are tabulated below (see Appendix A for complete table).

Intervention Name	**Description**	**Cost-Benefit Ratio**
Safety Campaigns	Educate policyholders on safety measures at home and in daily activities.	0.178
Social Connection Initiatives	Encourage social activities to foster a sense of community and reduce isolation.	0.178
Community Fitness Challenges	Organize community-based fitness challenges with rewards for participation.	0.156
Incentives for Preventive Screenings	Offer rewards for policyholders who undergo preventive health screenings.	0.143
Cancer Prevention Initiatives	Provide resources and information on cancer prevention strategies.	0.143

The two main causes of death within the current policyholder base are neoplasms and diseases of the circulatory system, together making up approximately 63.5% of deaths (see Appendix B).

The following interventions were disqualified as they did not appropriately reflect the needs of SuperLife's policyholder pool:

- **Safety Campaigns** primarily target individuals at risk of external causes of morbidity and mortality which account for less than 8.8% deaths.
- **Social Connection Initiatives** primarily target individuals at risk of mental and behavioural disorders which account for approximately 1.4% of deaths.
- **Community Fitness Challenges** primarily target younger individuals whereas the median age of policyholders is 52 (see Appendix C). Furthermore, engaging in physical activities that lead to injuries may subject SuperLife to liability for damages.
- **Cancer Prevention Initiatives** offer a similar reduction in mortality rates to Incentives for Preventive Screenings. However, it is conditional on early detection, is specific to cancer, and does not account for a large range of other diseases prevalent in the policyholder pool.

The **Incentives for Preventive Screenings** intervention is generally applicable to all policyholders and covers most causes of death. Importantly, it addresses deaths caused by circulatory diseases which are strongly correlated with smoking (see Appendix D), a significant factor in elevated mortality rates. Additionally, it promotes taking a proactive and targeted approach to reducing health risks. Thus, **Incentives for Preventive Screenings** was selected for use in the health incentive program.

Incentive Choice

Ultimately, the decision to offer reimbursements over discounted premiums stemmed from the consideration that discounting premiums would diminish the invested premium amount, potentially resulting in lower investment returns. While reimbursements increase expenses, it does not negatively affect the premium amount being invested. For instance, for a Male Non-Smoker aged 35, with death benefit Č100,000, if premiums were discounted, there is a net profit of Č52.31 on the optimal premium. However, with reimbursements being pushed to expenses, the net profit on the same policy is Č154.22. This effect is also observed across different policies and classes.

Program Evaluation

For the purposes of evaluating SuperScreen's performance, the following terms shall have the meanings ascribed to them below:

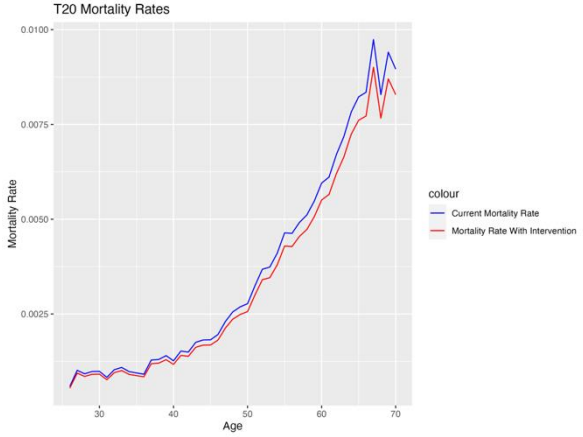
- "Short-term" means 5-year period from 2024 (i.e., 2024 to 2028)
- "Long-term" means 20-year period from 2024 (i.e., 2024 to 2043)

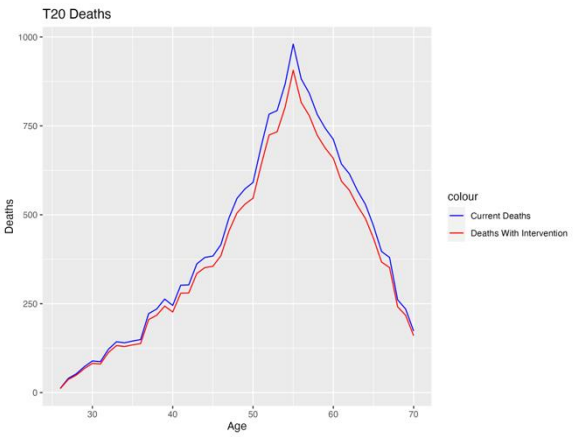
The short-term timeframe is designed for preliminary analysis of the program's initial outcome and marketing effectiveness. Conversely, the long-term timeframe is tailored to SuperLife's 20-year term life product, providing a comprehensive view of the programs sustainability and trends in policy behaviour over time. This approach ensures a holistic evaluation of the program's performance and its influence on SuperLife's objectives.

Pricing and Costs

Mortality Savings

The mortality savings were defined as the difference between the mortality experience with and without SuperScreen (i.e. the number of additional lives saved). In total, the mortality savings reached for term insurance were 1136 lives on a total original deaths of 18938. That is, 1136 who did die with the current policy would not have died if SuperScreen were in place. Similarly, for Single Premium Whole Life, there were mortality savings of 1121 lives on the original 18685 deaths. The changes in mortality are shown in the graphs below.





Cost-Benefit Analysis

The economic value of the proposed program was projected across 5 year and 20 year timeframes. Economic value was defined as the profit derived from the addition of new policies. This value was calculated across the different classes and for each death benefit, before being aggregated together to form a single value for total economic value.

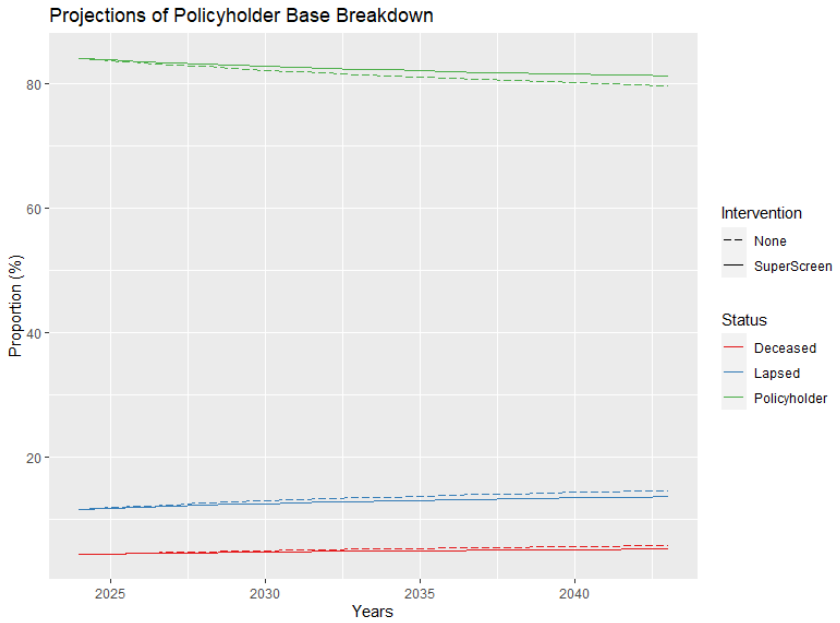
	No Intervention	SuperScreen
5-Year	Č 469,200,987	Č 690,901,952
20-Year	Č 8,581,185,103	Č 12,577,926,099

The table above illustrates the economic value of 20-Year Term Insurance with and without and introduction of SuperScreen. Evidently, the aggregate value of the policy with the program far exceeds the value without the program. This represents a 47.25% increase in the short term, and 46.58% increase in the long term, demonstrating that the program sees success in the short and long term.

	No Intervention	SuperScreen
5-Year	Č 3,927,665,974	Č 4,766,302,971
20-Year	Č 52,503,692,129	Č 63,630,720,310

Similarly, the aggregate value of the policy with SuperScreen exceeds the policy without by 21.35% and 21.19% for 5-Year and 20-Year outlooks respectively.

As the economic value is underpinned by the makeup of the policyholder pool, we simulated policyholder transitions with and without the SuperScreen program to support our analysis. In a 20-year projection, the makeup of the policyholder pool is more desirable with SuperScreen in effect than without. Over this timeframe, SuperScreen yields a higher proportion of in force policies, with fewer lapsed and deceased. This is depicted in the graph below.



Pricing Recommendations

The economic value of the program is largely influenced by the trade-off between increased reimbursements and improved mortality. This was especially evident in the later ages where the gains from reduced mortality rates were not enough to offset the expenses due to higher reimbursement rates. A possible proposal could be to impose stricter underwriting on the later years particularly if they are more prone to health issues, or are a smoker. However, this could have the adverse effect of reducing sales and accessibility, which goes against the goals

of the organisation. Moreover, this effect in its current state is insubstantial to the overall profit of program intervention, as profits are significant for the ages prior.

Premiums were found to be quite variable and drastically changed across different ages, as it was increasingly difficult to reach profit margins as the issue age increases. This was mainly due to significantly larger claims frequency as age progressed due to greater mortality rates. While SuperScreen does successfully address reducing mortality rates, changes can be made to pricing and underwriting to tackle the issue of premiums. Rather than charge exceptionally high premiums on old age, the premiums of younger ages could be brought up to slightly offset the older ages, reducing their premiums. This would improve accessibility and competitiveness, thereby increasing sales. Additionally, this effect is particularly pronounced in smoker classes, where premiums are unreasonably high and would effectively bar out the market. This is due to their exceptionally high mortality rates, particularly at older ages, where it is likely that a claim would be made. It is recommended that underwriting is very strict on old age smokers as there is likely to be significant damage to health and a high chance of claim.

Assumptions

The significant assumptions used in our quantitative analysis are detailed below:

- **Discount rate: 3.00%.**
  The discount rate was determined as the average of the past 20 years' 10-year risk-free annual spot rates provided in the economic data.
- **Lapse rates:**
  - **1.00% for policies with a duration of 1 year,**
  - **0.86% for policies with durations between 2 and 5 years,**
  - **0.59% for policies with durations between 6 and 10 years,**
  - **0.36% for policies with durations between 11 and 15 years,**
  - **0.17% for policies with durations greater than 16 years.**

  Lapse rates were calculated based on experience reflected in the given InForce dataset.
- **Commission rates: 80.00% in the first year, and 2.00% thereafter.**
  Commissions are based on industry averages published by InsuranceBusiness Magazine (2023), who state front-loaded commissions of 40-115% in the first year of the policy, and 1-2% thereafter. A commission rate of 80%, approximately the median of the first-year commission range has been utilised, and 2% for subsequent years, which is the upper end of the average range. This is a conservative estimate to create a buffer to ensure viability and sustainability in less favourable conditions.
- **Mortality reduction from intervention program: 6.00% across all ages.**
  The provided interventions dataset quotes a 5-10% reduction in mortality upon successful completion of the health screening program. As a conservative assumption, we have adopted a rate of 6.00%, applying across all ages and genders.
- **Program utilisation rate: 80.00%.**
  This is the rate of policyholders that we assume will utilise the program, which will affect mortality experience (by affecting mortality improvement rates) and the costs of reimbursement upon successful completion of the program.
- **Investment earnings rate: 4.00%.**
  According to Frontier Advisors (2024), life insurers typically invest most of their portfolios in safe bonds, which earn at the same rate as the discount rate, and the remainder of their portfolio in riskier investments, making the overall investment earnings

rate slightly higher than the discount rate. On this basis, we have adopted an investment earnings rate of 4%, 1% higher than the discount rate.

- **Expenses: Č200 for first year, Č25 onwards**
  Expenses were determined through an expense analysis, involving estimation of each expense to obtain an aggregate amount.
- **Required capital: Č0.01 per Č1000 death benefit**
  Required capital for an insurance company is frequently a flat amount, but a rate of death benefit was chosen as a more conservative approach. If a regulatory flat amount was used instead, more capital could be allocated to investment earnings and distributed earnings, though the per policy impact is relatively minor.
- **Required reserves: Č0.5 per Č1000 death benefit**
  Required reserves were estimated based on industry standards (AgentSync, 2021).
- Further, for simplicity, we have assumed:
  - No change in age, income and employment distribution
  - Uniform geographic distribution of policyholders without significant regional disparities that may affect access to healthcare
  - All participants of the program undergo health screenings once every three years on average
  - No significant advances in medical technology or treatments
  - No accounting for external Black Swan events such as health pandemics, government interventions that affect mortality (such as laws banning smoking or vaping), or access to healthcare
  - No compounding of mortality rate reductions by applying multiple interventions since the interaction between interventions cannot be accurately quantified

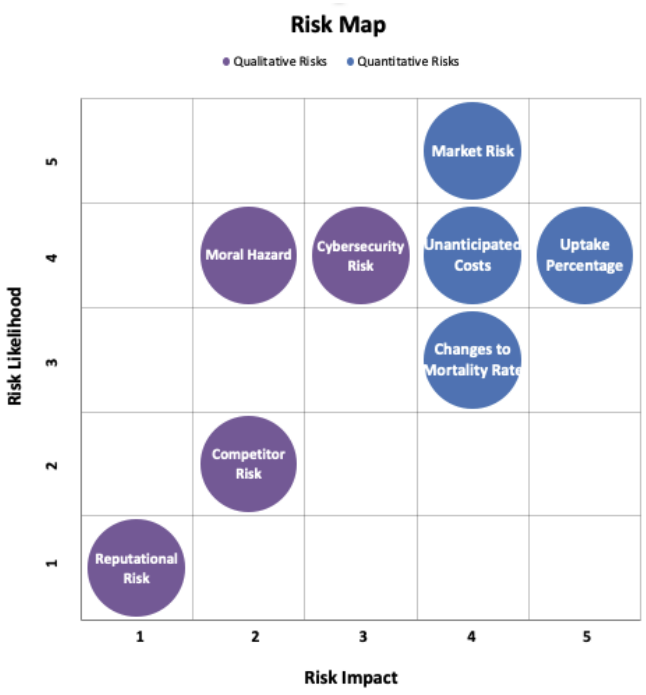
Risks

- Low Program Utilisation Rate: Low participation in the program due to a lack of awareness or unwillingness to participate, caused by high costs or low accessibility. The reduction in Australian bulk billing providers (Attwooll, 2024) mean increases in out-of-pocket expenses for healthcare screenings and may lead to resistance in policyholders undertaking preventative health screenings.
- Changes to Mortality Rates: External events such as government interventions and pandemics may affect the mortality rates underpinning the pricing of the proposed incentive program. For example, the COVID-19 pandemic led to excess mortality, whereas government interventions to ban vaping or smoking may lead to lighter mortality experience.
- Market Risk: Market risk such as rising interest rates and inflationary pressures can increase the costs and expenses associated with running the program, making it unsustainable in the long-term.
- Moral Hazard Risk: unnecessary overuse of preventative screening: due to the incentive that they will be financially rewarded, which can lead to increased costs, reduced resources/supply and a reduction in overall effectiveness of the program. Further, policyholders may become complacent about their health, solely relying on the screening program instead of actively maintaining healthy habits, leading to long-term health risks.
- Unanticipated Costs and Effectiveness: Administrative costs associated with the reimbursement program and monitoring compliance with the health screening program may be higher than expected, reducing the long-term financial viability of the program. Further, if the program is ineffective in reducing mortality, SuperLife may suffer large expenses without any fruitful benefits in the form of reduced claims.

- Reputational Risk: In the case that the program is ineffective or that policyholders are concerned about the security and privacy of sharing their health screening data, SuperLife may suffer a loss of public trust or negative publicity.
- Competitor Risk: If competing insurers offer similar health screening programs, there may be pressure to match or exceed their offerings, increasing costs and competitive pressures.
- Cyberthreat Risk: Requiring users to input sensitive health and other personal data into a mobile application may expose them to the threat of a cyberattack, compromising their data privacy and security.

Risk Mitigations

- Low Program Utilisation Rate: Introducing comprehensive awareness campaigns and educational marketing, and offering accessible screenings such as online screening guides and at-home screening kits to increase attraction to the program. Further, carry out market research to anticipate demand.
- Changes to Mortality Rates: Maintaining adequate reserves as shock absorbers to provide temporary relief or transferring the risk to reinsurers for increased protection against unforeseen catastrophes. Further, conducting annual reviews of mortality experience and adjusting prices accordingly.
- Market Risk: Diversifying the investment portfolio to mitigate market volatility and hedging against interest rate fluctuations and inflation.
- Moral Hazard Risk: Setting recommended time limits on the frequency of preventative screenings to avoid unnecessary check-ups. Further, monitoring and tracking the use of preventative screening to identify patterns and guidelines of appropriate use.
- Unanticipated Costs and Effectiveness: Regular monitoring and evaluation of program effectiveness and administration costs to help identify inefficiencies or areas of improvement, such as asking policyholders for feedback. Further, investigating the costs of running similar health incentive programs at other insurance companies before implementing the program.
- Reputational Risk: Transparent communication with policyholders, providing updates with the program's processes and outcomes to ensure trust. Addressing concerns and feedback promptly to mitigate negative perceptions.
- Competitor Risk: Strategic partnerships with healthcare providers, wellness brands or technology companies to enhance program value and efficiency. Employ effective marketing and communication to make the program more attractive.
- Cyberthreat Risk: Implementing strong data encryption protocols and using mechanisms such as multi-factor authentication to prevent unauthorised access to the application.



The most significant risks to the program are displayed in a risk map, categorised by severity and likelihood of the risk occurring.

Sensitivity Analysis

A sensitivity analysis of the significant assumptions was conducted to examine the financial impact of deviations from expected assumptions below. Based on this analysis, a suggested range has been identified to ensure the financial viability of the program.

Assumption	**Explanation**	**Recommended ranges**
Discount rate • Lower at 2% • Higher at 4%	The program was designed under the assumption of 3% discount rate. However, changes in this value especially due to inflation and market risk affects profits and cashflows. As the discount rate decreases, the present value of profit also decreases, and vice versa.	2% - 4%
Program utilisation rate • Lower of 70% • Higher of 90%	Policyholder uptake in the program can vary annually based on demand for insurance. Factors such as, fluctuations in employment rates, government regulations, market risk and social factors can affect the number of enrolments. As the program utilisation rate decreases, present value of profit decreases, and vice versa.	50% - 100%
Mortality reduction rate • Lower at 5% • Higher at 7%	The program takes a conservative estimate of 6% however this can change depending on several factors. Some include, improved effectiveness of program, changes in health trends, program adjustments from feedback, etc.	5% - 10%

Based on the sensitivity analysis conducted, particularly on program utilisation and reimbursement rate, there is a high degree of certainty that the value of benefits derived from the policies sold with SuperScreen will exceed those sold without. The only factor with material impact on feasible changes is the reimbursement rate. It is recommended that the reimbursement rate should follow the average of one screening every three year, which maps well to a linear increase of reimbursement rate as age increases. Additionally, reimbursement rate is entirely controlled by SuperLife.

We also maintain a high degree of certainty that the proposed program would have lowered mortality for the past 20 years. This is dependent on the design of the program as well as utilisation rate. We are confident that the design of the program would be effective in uptake as it presents little downside to the customer. Additionally, our sensitivity analysis revealed that utilisation rate does not pose a significant risk to the certainty of lowered mortality or economic value loss, largely because reimbursement scales in the opposite direction to mortality improvement.

Data and Data Limitations

A summary of data limitations and remedies for these limitations are detailed below:

Data limitation	Impact	Remedy/External Data Source
InForce Data contained very few people aged over 85, with a maximum age of 87.	Mortality rates for ages 85-87 were inaccurate due to the small number of people surviving to these ages, and no mortality rates could be calculated for ages over 87.	Rates for ages 85-87 were deemed unnecessary as it was outside the maximum possible age for a policy under 20-year term insurance based on historical data and was not used in the computation of whole life mortality.
InForce Data contained values of "1", "Y" and "NA" in the Lapse Indicator column, whereas the Key to Inforce Data indicated "0" to represent No Lapse and "1" to represent Lapse.	Lapse data impacts the calculation of lapse rates, which will affect pricing and thus premiums.	It was assumed that policyholders with a lapse indicator of either "1" or "Y" had lapsed, since all these policyholders had a year of lapse, and those with "NA" had no lapse.
InForce Data contains no policyholders with an age at death of 75.	Unable to calculate premium for joining policyholders aged 55 since it requires the mortality rate of age 75.	The mortality for age 74 was determined based on the ratio of change from 73 to 74 on the population mortality table.
The Lumaria mortality table was not split up by gender or smoking status.	Difficulty in pricing SPWL product where ages up to 120 are needed and not observed in data	Used parameters from Cox-Regression model and smoking/gender distribution from comparable countries to split Lumaria mortality table into required classes.

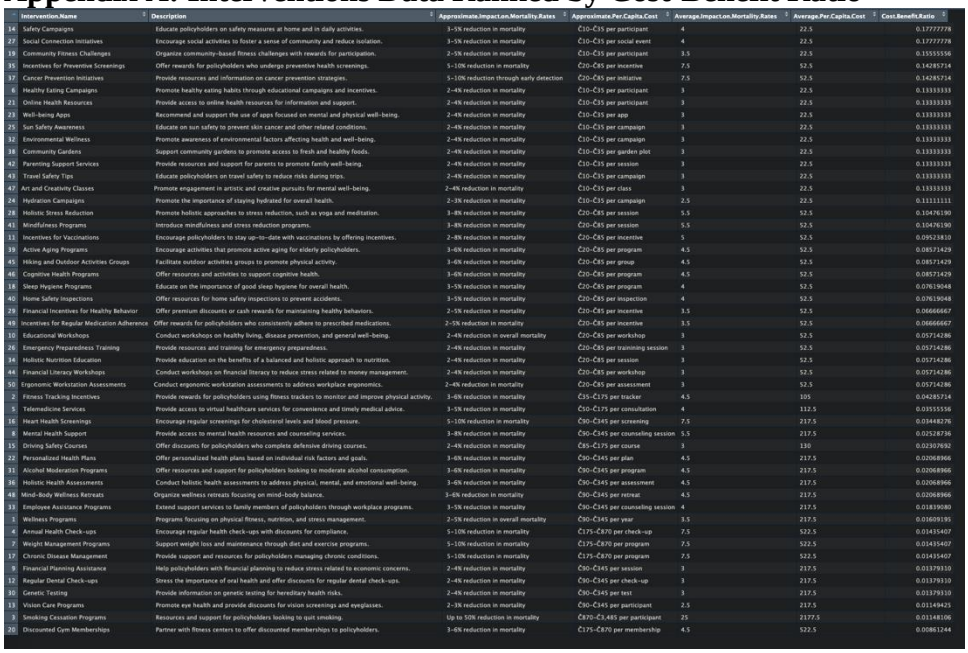
Ethical Considerations

A critical ethical concern with the program lies in the potential for inadvertent discrimination, particularly against individuals who cannot fully engage in preventative health screenings, for example, due to personal reasons, disabilities, or those not able to afford GP appointments. For example, people with disabilities have a 10% lower health screening participation rate compared to those without disabilities (Kim, 2023). Such barriers not only marginalise certain groups but also excludes them from accessing the benefits of the program.

Offering reimbursements to policyholders in the form of a percentage of their premiums introduces an ethical concern of equity, especially between smokers and non-smokers. At first glance, this incentive is designed to alleviate some costs and encourage policyholders towards better health. However, since smokers face higher premium rates due to increased health risks, they also receive higher reimbursements compared to non-smokers. Non-smokers may perceive this as unfair and feel penalised as their lower-risk status leads to a lower dollar value of financial reward, despite their efforts to maintain or improve their health. Further, this approach can also be seen as an endorsement of risky health behaviours. The direct link of financial benefits to smoking status can be wrongly perceived as a greater reward for unhealthy habits, complicating the ethics with unintended consequences.

Appendix

Appendix A: Interventions Data Ranked by Cost-Benefit Ratio



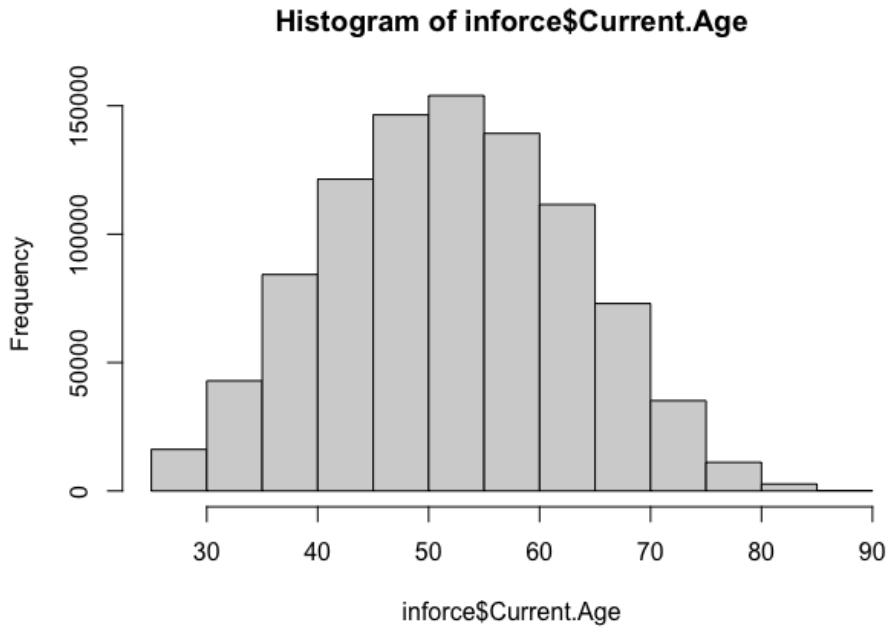
	Intervention.Name	Description	Approximate.Impact.on.Mortality.Rates	Approximate.Per.Capita.Cost	Average.Impact.on.Mortality.Rates	Average.Per.Capita.Cost	Cost.Benefit.Ratio
14	Safety Campaigns	Educate policyholders on safety measures at home and in daily activities.	3–5% reduction in mortality	€10–€35 per participant	4	22.5	0.17777778
27	Social Connection Initiatives	Encourage social activities to foster a sense of community and reduce isolation.	3–5% reduction in mortality	€10–€35 per social event	4	22.5	0.17777778
19	Community Fitness Challenges	Organize community-based fitness challenges with rewards for participation.	2–5% reduction in mortality	€10–€35 per participant	3.5	22.5	0.15555556
35	Incentives for Preventive Screenings	Offer rewards for policyholders who undergo preventive health screenings.	5–10% reduction in mortality	€20–€85 per incentive	7.5	52.5	0.14285714
37	Cancer Prevention Initiatives	Provide resources and information on cancer prevention strategies.	5–10% reduction through early detection	€20–€85 per initiative	7.5	52.5	0.14285714
6	Healthy Eating Campaigns	Promote healthy eating habits through educational campaigns and incentives.	2–4% reduction in mortality	€10–€35 per participant	3	22.5	0.13333333
21	Online Health Resources	Provide access to online health resources for information and support.	2–4% reduction in mortality	€10–€35 per participant	3	22.5	0.13333333
23	Well-being Apps	Recommend and support the use of apps focused on mental and physical well-being.	2–4% reduction in mortality	€10–€35 per app	3	22.5	0.13333333
25	Sun Safety Awareness	Educate on sun safety to prevent skin cancer and other related conditions.	2–4% reduction in mortality	€10–€35 per campaign	3	22.5	0.13333333
32	Environmental Wellness	Promote awareness of environmental factors affecting health and well-being.	2–4% reduction in mortality	€10–€35 per campaign	3	22.5	0.13333333
38	Community Gardens	Support community gardens to promote access to fresh and healthy foods.	2–4% reduction in mortality	€10–€35 per garden plot	3	22.5	0.13333333
42	Parenting Support Services	Provide resources and support for parents to promote family well-being.	2–4% reduction in mortality	€10–€35 per session	3	22.5	0.13333333
43	Travel Safety Tips	Educate policyholders on travel safety to reduce risks during trips.	2–4% reduction in mortality	€10–€35 per campaign	3	22.5	0.13333333
47	Art and Creativity Classes	Promote engagement in artistic and creative pursuits for mental well-being.	2–4% reduction in mortality	€10–€35 per class	3	22.5	0.13333333
24	Hydration Campaigns	Promote the importance of staying hydrated for overall health.	2–3% reduction in mortality	€10–€35 per campaign	2.5	22.5	0.11111111
28	Holistic Stress Reduction	Promote holistic approaches to stress reduction, such as yoga and meditation.	3–8% reduction in mortality	€20–€85 per session	5.5	52.5	0.10476190
41	Mindfulness Programs	Introduce mindfulness and stress reduction programs.	3–8% reduction in mortality	€20–€85 per session	5.5	52.5	0.10476190
11	Incentives for Vaccinations	Encourage policyholders to stay up-to-date with vaccinations by offering incentives.	2–8% reduction in mortality	€20–€85 per incentive	5	52.5	0.09523810
33	Active Aging Programs	Encourage activities that promote active aging for elderly policyholders.	3–6% reduction in mortality	€20–€85 per program	4.5	52.5	0.08571429
45	Hiking and Outdoor Activities Groups	Facilitate outdoor activities groups to promote physical activity.	3–6% reduction in mortality	€20–€85 per group	4.5	52.5	0.08571429
46	Cognitive Health Programs	Offer resources and activities to support cognitive health.	3–6% reduction in mortality	€20–€85 per program	4.5	52.5	0.08571429
18	Sleep Hygiene Programs	Educate on the importance of good sleep hygiene for overall health.	3–5% reduction in mortality	€20–€85 per program	4	52.5	0.07619048
40	Home Safety Inspections	Offer resources for home safety inspections to prevent accidents.	3–5% reduction in mortality	€20–€85 per inspection	4	52.5	0.07619048
29	Financial Incentives for Healthy Behavior	Offer premium discounts or cash rewards for maintaining healthy behaviors.	2–5% reduction in mortality	€20–€85 per incentive	3.5	52.5	0.06666667
49	Incentives for Regular Medication Adherence	Offer rewards for policyholders who consistently adhere to prescribed medications.	2–5% reduction in mortality	€20–€85 per incentive	3.5	52.5	0.06666667
10	Educational Workshops	Conduct workshops on healthy living, disease prevention, and general well-being.	2–4% reduction in overall mortality	€20–€85 per workshop	3	52.5	0.05714286
26	Emergency Preparedness Training	Provide resources and training for emergency preparedness.	2–4% reduction in mortality	€20–€85 per training session	3	52.5	0.05714286
34	Holistic Nutrition Education	Provide education on the benefits of a balanced and holistic approach to nutrition.	2–4% reduction in mortality	€20–€85 per session	3	52.5	0.05714286
44	Financial Literacy Workshops	Conduct workshops on financial literacy to reduce stress related to money management.	2–4% reduction in mortality	€20–€85 per workshop	3	52.5	0.05714286
50	Ergonomic Workstation Assessments	Conduct ergonomic workstation assessments to address workplace ergonomics.	2–4% reduction in mortality	€20–€85 per assessment	3	52.5	0.05714286
2	Fitness Tracking Incentives	Provide rewards for policyholders using fitness trackers to monitor and improve physical activity.	3–6% reduction in mortality	€35–€175 per tracker	4.5	105	0.04285714
5	Telemedicine Services	Provide access to virtual healthcare services for convenience and timely medical advice.	3–5% reduction in mortality	€50–€175 per consultation	4	112.5	0.03555556
16	Heart Health Screenings	Encourage regular screenings for cholesterol levels and blood pressure.	5–10% reduction in mortality	€90–€345 per screening	7.5	217.5	0.03448276
9	Mental Health Support	Provide access to mental health resources and counseling services.	3–4% reduction in mortality	€90–€345 per counseling session	5.5	217.5	0.02528736
15	Driving Safety Courses	Offer discounts for policyholders who complete defensive driving courses.	2–4% reduction in mortality	€85–€175 per course	3	130	0.02307692
22	Personalized Health Plans	Offer personalized health plans based on individual risk factors and goals.	3–6% reduction in mortality	€90–€345 per plan	4.5	217.5	0.02068966
31	Alcohol Moderation Programs	Offer resources and support for policyholders looking to moderate alcohol consumption.	3–6% reduction in mortality	€90–€345 per program	4.5	217.5	0.02068966
36	Holistic Health Assessments	Conduct holistic health assessments to address physical, mental, and emotional well-being.	3–6% reduction in mortality	€90–€345 per assessment	4.5	217.5	0.02068966
48	Mind-Body Wellness Retreats	Organize wellness retreats focusing on mind-body balance.	3–6% reduction in mortality	€90–€345 per retreat	4.5	217.5	0.02068966
33	Employee Assistance Programs	Extend support services to family members of policyholders through workplace programs.	3–5% reduction in mortality	€90–€345 per counseling session	4	217.5	0.01839080
1	Wellness Programs	Programs focusing on physical fitness, nutrition, and stress management.	2–5% reduction in overall mortality	€90–€345 per year	3.5	217.5	0.01609195
4	Annual Health Check-ups	Encourage regular health check-ups with discounts for compliance.	5–10% reduction in mortality	€175–€870 per check-up	7.5	522.5	0.01435407
7	Weight Management Programs	Support weight loss and maintenance through diet and exercise programs.	5–10% reduction in mortality	€175–€870 per program	7.5	522.5	0.01435407
17	Chronic Disease Management	Provide support and resources for policyholders managing chronic conditions.	5–10% reduction in mortality	€175–€870 per program	7.5	522.5	0.01435407
9	Financial Planning Assistance	Help policyholders with financial planning to reduce stress related to economic concerns.	2–4% reduction in mortality	€90–€345 per session	3	217.5	0.01379310
12	Regular Dental Check-ups	Stress the importance of oral health and offer discounts for regular dental check-ups.	2–4% reduction in mortality	€90–€345 per check-up	3	217.5	0.01379310
30	Genetic Testing	Provide information on genetic testing for hereditary health risks.	2–4% reduction in mortality	€90–€345 per test	3	217.5	0.01379310
13	Vision Care Programs	Promote eye health and provide discounts for vision screenings and eyeglasses.	2–3% reduction in mortality	€90–€345 per participant	2.5	217.5	0.01149425
3	Smoking Cessation Programs	Resources and support for policyholders looking to quit smoking.	Up to 50% reduction in mortality	€870–€3,485 per participant	25	2177.5	0.01148106
20	Discounted Gym Memberships	Partner with fitness centers to offer discounted memberships to policyholders.	3–6% reduction in mortality	€175–€870 per membership	4.5	522.5	0.00861244

Appendix B: Cause of Death Frequency Table

	ICD.Code	ICD.Classification	Frequency
1	O00–O99	Pregnancy, childbirth and the puerperium	4
2	L00–L98	Diseases of the skin and subcutaneous tissue	47
3	Q00–Q99	Congenital malformations, deformations and chromo…	118
4	D50–D89	Diseases of the blood and blood-forming organs and …	170
5	M00–M99	Diseases of the musculoskeletal system and connecti…	189
6	R00–R99	Symptoms, signs and abnormal clinical and laborator…	554
7	F01–F99	Mental and behavioural disorders	560
8	N00–N98	Diseases of the genitourinary system	623
9	G00–G98	Diseases of the nervous system	943
10	A00–B99	Certain infectious and parasitic diseases	1523
11	E00–E88	Endocrine, nutritional and metabolic diseases	1774
12	K00–K92	Diseases of the digestive system	1800
13	J00–J98	Diseases of the respiratory system	2651
14	V01–Y89	External causes of morbidity and mortality	3478
15	I00–I99	Diseases of the circulatory system	11871
16	C00–D48	Neoplasms	13235

Note that the Classification is the broadest applicable to the Code provided.

Appendix C: Distribution of Current Age

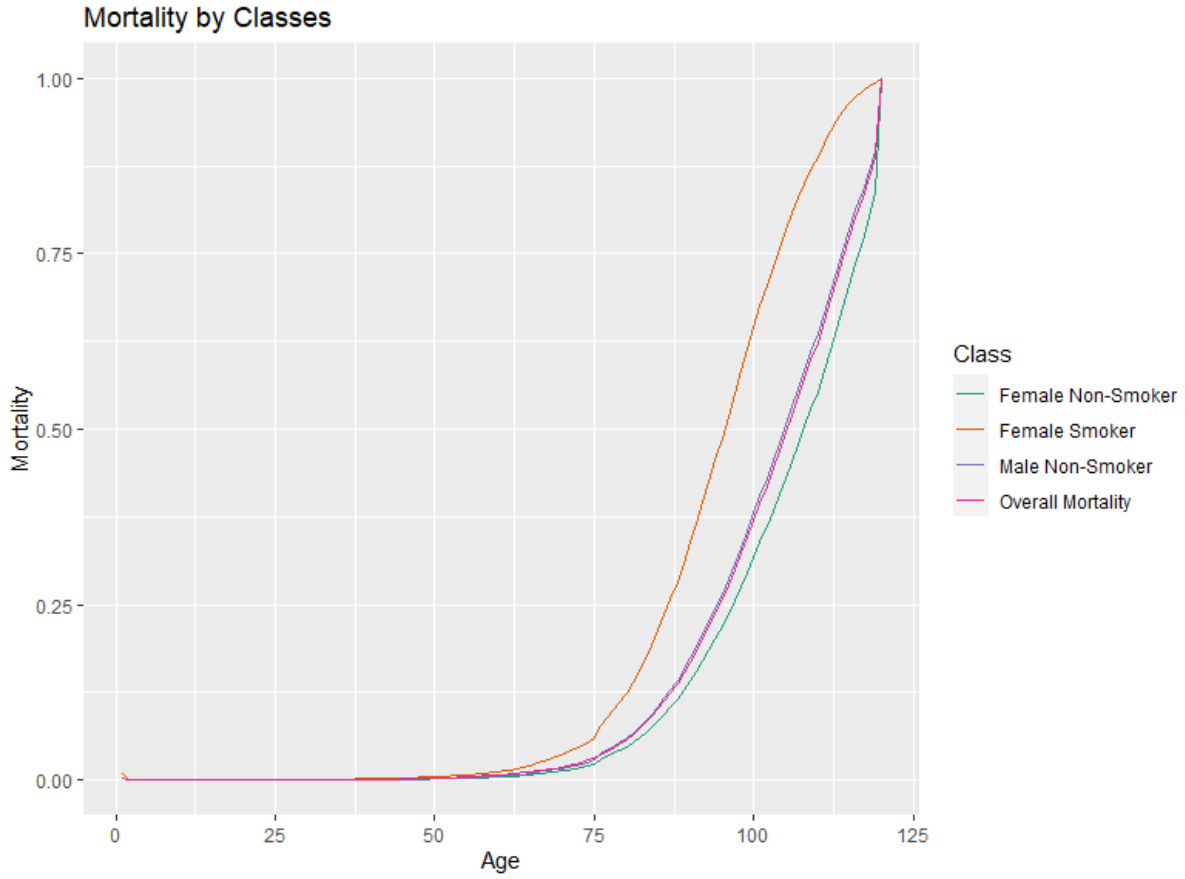


Appendix D: Correlation between Cause of Death and Sex/Smoker Status.

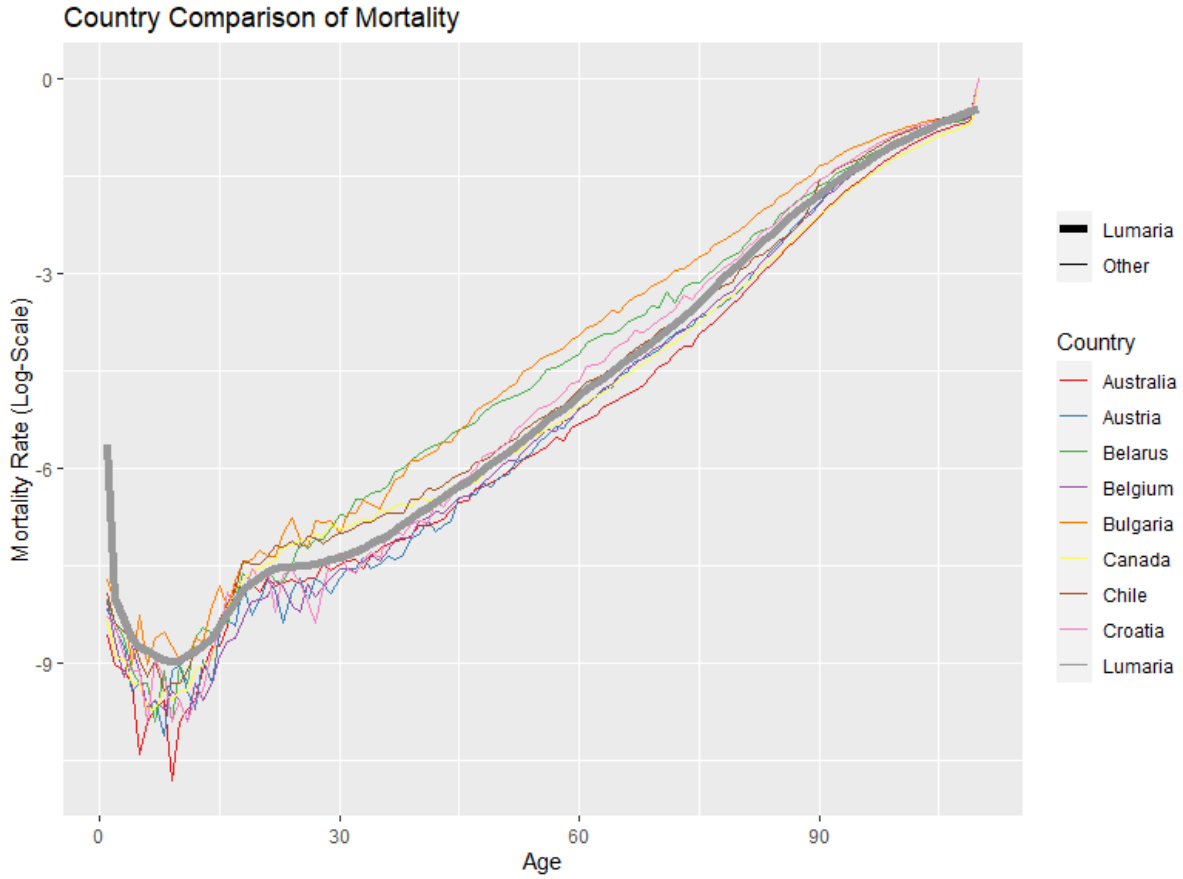
	Sex (M – 0, F – 1)	Smoker Status (NS – 0, S – 1)
Pregnancy, childbirth and the puerperium	0.015312	-0.002192
Diseases of the skin and subcutaneous tissue	0.014127	-0.02555appen0
Congenital malformations, deformations and chromosomal abnormalities	0.015590	-0.035673
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0.015798	-0.029271
Diseases of the musculoskeletal system and connective tissue	0.038378	-0.049794
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	0.003752	-0.084688
Mental and behavioural disorders	-0.026496	-0.053865
Diseases of the genitourinary system	0.028856	-0.092433
Diseases of the nervous system	0.011826	-0.090465

Certain infectious and parasitic diseases	-0.020934	-0.087787
Endocrine, nutritional and metabolic diseases	0.011513	-0.125778
Diseases of the digestive system	-0.005710	-0.158702
Diseases of the respiratory system	0.033469	0.137420
External causes of morbidity and mortality	-0.052229	-0.225151
Diseases of the circulatory system	-0.065822	0.753575
Neoplasms	0.066855	-0.402974

Appendix E: Mortality by Classes



Appendix F: Mortality by Country



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