Study of the Effect of a Flu Pandemic on Insured Mortality

Using the Delphi Method

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Introduction

The SOA initiated and sponsored a research project studying the potential impact of a pandemic on the US life insurance industry. A committee was established to oversee the project and to work closely with the researcher, Jim Toole of MBA Actuaries, in finalizing the project report to the membership. Recognizing there are few studies that exist offering insights into how a pandemic might affect an insured population, the Project Oversight Group (POG) for the SOA's Pandemic research project, performed a Delphi study on how excess U.S. insured mortality as a result of a flu pandemic might deviate from that of the general U.S. population. While historical insured data from past pandemic periods is available, the applicability of the results of data analyses to today's insured population is unclear.

The POG surveyed life insurance industry experts for their judgments on the expected U.S. life insured population excess mortality rate per 1000 from a flu pandemic. Two pandemic scenarios were examined; a moderate scenario similar in severity to the 1957 pandemic and a severe scenario similar in severity to the 1918 pandemic. The estimates were to be used by the researcher of the SOA's larger pandemic research project, Jim Toole, in the development of the Insured Population Mortality Ratio assumption for the modeling of the potential financial impact of a flu pandemic on the U.S. life insurance industry.

In addition, the POG was very much interested in the assumptions and reasoning behind the study participants' estimates of the excess mortality rates. Participants' responses to the questions about their rationale behind the excess mortality estimates led to the identification of several factors that they believed influenced excess mortality during a pandemic.

The responses garnered by the initial survey questionnaire (Round One) were tabulated and analyzed. A summary of the results was fed back to participants for consideration in responding to a second survey (Round Two) containing the same questions as posed in the initial round. Utilizing the initial survey results, the second round survey also included three additional questions to gain better insight into the reasons for the estimates.

At the conclusion of the second round, responses again were synthesized and results from this round as well as the initial round were given to the researcher for examination and possible inclusion into the final pandemic research report, "Potential Impact of Pandemic Influenza on the U.S. Life Insurance Industry."

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Summary of Individual Responses

Thirty-one individuals participated in one or both rounds of the study and the list of participants can be found in APPENDIX A. To encourage participation in the study, questions for each round were limited. In total, the study contained 5 distinct questions. Questions 1 and 2 appeared in both survey rounds. Questions 3 through 5 only appeared in Round Two. The questionnaires for each survey round are shown in APPENDIX B and APPENDIX C.

In each survey round, background information regarding flu pandemics was provided. Included in the information was the U.S. Department of Health and Human Services' (HHS) projection for the number of excess deaths as a result of a flu pandemic:

> *Under a moderate scenario similar to the 1957 pandemic, the estimate of the number of excess U.S. deaths is 209,000 (approximately .7 excess deaths per 1000). For a severe pandemic scenario using mortality rates similar to 1918, the projected excess deaths are approximately 1.9 million (approximately 6.5 excess deaths per 1000).*

Since these projections are the underlying assumptions for US general population excess mortality in the SOA's pandemic modeling research, they were to be used as a comparison by survey participants in determining US life insured population excess mortality estimates. Thus, in responding to the questionnaires in each round, participants were to have assumed that a flu pandemic had occurred, medical technology and transportation patterns at time of occurrence were similar to today, and the HHS projection for excess number of deaths was accurate.

The following is a summary of the individual responses. Individual responses for each survey round can be found in APPENDIX D and APPENDIX E. The same respondent numbers are used in both rounds so that the reader can review an individual's response from round to round. For example, a "Response 4" in Round One and a "Response 4" in Round Two are attributable to the same study participant.

The results provided represent the estimates, rationale and opinion of the study participants. It is not to be assumed that these results are indicative of the estimates, rationale, views and beliefs of other individuals, study panels, insurers, or companies.

Question 1 Results: Expected U.S. Insured Population Mortality Rate/1000

In Round One, 30 completed surveys were received in response to the SOA's invitation to participate in the study. Of those, 29 individuals completed both survey questions. The other individual did not provide a numerical answer to Question 1 that asked for participants' thoughts about the expected US insured population excess mortality rate per 1000. See APPENDIX B for the complete Round One questionnaire. Other participants also commented on the difficulty of developing this estimate. While most used mental

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methods to project the excess U.S. insured population mortality rate, a few indicated utilizing specific models to arrive at their estimates. Models mentioned were CDC's FluAid, Stracke and Heinen, RMS, and a respondent's own developed model.

Of the 29 responding to Question 1, 6 individuals thought insured excess mortality per 1000 would be the same or greater than the general population for the moderate scenario; while 8 individuals believed it would be the same or greater for the severe scenario.

The summary of the responses to Question 1 from Round One is found below in TABLE 1.

TABLE 1

Round One Expected U.S. Insured Population Excess Mortality Rate /1000

	Moderate Scenario (.7/1000 general U.S. population)	Severe Scenario (6.5/1000 general U.S. population
Mean	.430	4.786
25th percentile	.300	3.250
50th percentile	.470	5.000
75th percentile	.600	6.500
Min Value	.035	1.000
Max Value	.800	7.800

For Round Two, 22 responses were received. Of the 21 that had participated in the first round, 11 individuals changed their response for this question indicating that the distribution of the results of Round One to study participants for consideration in Round Two did have an influencing effect. APPENDIX C contains the Round Two survey.

The analysis of the responses to Question 1 in Round Two is shown in TABLE 2. In comparing the Round Two results to Round One, the range of estimated values for Round Two is not as large as in Round One.

TABLE 2

Round Two Expected U.S. Insured Population Excess Mortality Rate /1000

	Moderate Scenario (.7/1000 general U.S. population)	Severe Scenario (6.5/1000 general U.S. population
Mean	.437	4.639
25th percentile	.350	3.388
50th percentile	.400	5.000
75th percentile	.500	5.500
Min Value	.200	1.300
Max Value	.700	7.000

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Question 2 Results: Assumptions and Reasoning

In Question 2 of each survey round, participants were asked to provide their reasoning and assumptions for the numerical estimates provided in Question 1. In both rounds, seven factors were identified that influenced excess mortality differences between the U.S. life insured population and the U.S. general population. They are discussed below.

Socioeconomic: Many participants commented that the insured population is more affluent than the general population and would have the means to obtain necessary medical care. For a moderate scenario, the majority of respondents felt that the insured population would be able to access medical care.

Some respondents expected that for a severe pandemic, the socioeconomic difference would not be as great as in the moderate scenario. If a severe pandemic occurred, demand for healthcare services would be high and some affluent individuals would not be able to obtain needed healthcare services. Those individuals who thought insured mortality would be the same or greater than population mortality indicated that socioeconomic differences would not be much of a factor in a severe pandemic because the affluent would not be able to obtain necessary healthcare treatment due to the overloaded medical system.

In addition, some individuals discussed that the more affluent would have the means to distance themselves from affected individuals/areas. On the other hand, some individuals noted the affluent would be more likely to travel internationally and could contract the virus in this manner.

In looking at the socioeconomic impact on excess mortality, a very rough estimate of the excess mortality as a result of a pandemic of the uninsured population can also be derived from the participants' numeric responses in Question 1. In looking at the responses from Round 2 and assuming 60% of the general population has life insurance, the mean excess mortality rate per 1000 for the uninsured population is 1.09 for the moderate scenario and 9.3 for the severe scenario. These excess mortality values are over twice the excess mortality rates for the insured population. It is likely that had the participants been asked to provide estimates for the uninsured population, their responses may have produced different mean estimates.

Exposure by age: In a moderate scenario, many felt the excess mortality curve would be U-shaped, similar to 1957, affecting primarily the very young and the very old. Since there is very little exposure at these ages for the insured population, the excess deaths would not be as great. For a severe scenario, most respondents expected that the excess mortality curve would either be uniform or have a W-shape, reducing the difference in exposure by age between the two populations.

Underwriting: Individuals responded that the pandemic would impact those segments of the populations with impaired immune systems or chronic diseases. With

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underwriting, many of these "high risk" individuals are excluded from the insured population; thus, a pandemic would not have as great an impact on an insured population.

Some individuals believing that insured mortality would be greater than the general population stated that underwriting would not be a factor. In looking at the historical information from 1918, most of the excess deaths were concentrated among otherwise healthy young adults, which is similar to the insured population.

Business Continuity: A few individuals noted businesses would have plans in place to keep employees from becoming exposed. A larger percentage of the insured population is employed than the general population so there would not be as much exposure as the general population.

Education level: The insured population is more educated than the general population. Some respondents felt that more educated individuals will have learned or sought out information to be better prepared for a pandemic; thus, excess deaths/1000 in an insured population will not be as high as the general population.

Geographic: Most of the insured population resides in metropolitan areas where there would be more opportunities to be exposed to the virus than in rural populations, which represent a larger proportion of the general population. Because of this, some respondents felt that the insured population will have higher excess mortality than the general population. On the other hand, some responded that geographic differences would not matter, as it is assumed that all areas in the U.S. will be affected, both metropolitan and rural.

Nonsmoking: Some respondents felt that nonsmokers will be less likely to die from a flu pandemic than smokers. Since the insured population has a larger percentage of nonsmokers than the general population, these respondents expected that insured lives will have better excess mortality.

Question 3 Results: Impact of Age in insured mortality estimate

In examining the Round One survey responses, some respondents considered a different age distribution for the insured population than the general population in developing their estimates for insured excess mortality. In Round Two a question was added to the survey to gain a better understanding of how age affects the estimated values for insured excess mortality. If a participant assumed a different age distribution for the insured population than the general population, he/she was asked to provide his/her judgment for the values of excess mortality for the US life insured population using the same age distribution for the insured and general populations.

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Of the 22 participating in Round 2, 11 responded to this question. As shown in Table 3, the mean values of the responses assuming different age distributions is lower than the mean value assuming the same age distribution.

TABLE 3
Mean Values of 11 Respondents U.S. Life Insured Excess Mortality Estimates

Scenario	Excess Mortality Estimate – Age Distribution Differs A	Excess Mortality Estimate – Same Age Distribution B	Age distribution impact on Estimate A/B
Moderate (.7/1000 general U.S. Population	.42	.49	86%
Severe (6.5/1000 general U.S. population)	4.55	5.14	89%

Question 4 Results: Ranking of Factors Advantageous to Life Insured Population

In Question 2 of each survey round, participants identified factors that impacted excess mortality from a pandemic. Question 4 was added to the second round survey to try to examine participants beliefs about which of the seven factors would be most advantageous to the life insured population during the pandemic. Participants were asked to rank the factors they felt benefited the life insured population the most. Out of the 22 individuals participating in Round Two, 18 responded to this question.

As the following TABLE 4 indicates, the most popular characteristics of the U.S. insured population that is beneficial to them versus the general population during a moderate flu pandemic are socioeconomic, underwriting and exposure by age. For a severe pandemic, the top three factors are socioeconomic, underwriting, and nonsmoking.

TABLE 4
Average Ranking of Factors

Factor	Average Ranking for a Moderate Pandemic Scenario	Number of Individuals Selecting Factor For Moderate Scenario	Average Ranking for a Severe Pandemic Scenario	Number of Individuals Selecting Factor For Severe Scenario
Socioeconomic/income	2.17	18	2.07	15
Exposure by age	2.94	16	3.00	12
Underwriting	2.19	16	2.27	15
Business Continuity	4.5	4	4.17	6
Education Level	3.15	13	2.77	13
Geographic	4.71	7	3.86	7
Nonsmoking	3.87	15	3.71	14

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Question 5 Results: Ranking of Factors Harmful to Life Insured Population

In addition to ranking those factors that are advantageous to the U.S. life insured population during a pandemic, the Round Two questionnaire also asked participants for their thoughts on the characteristics of an insured population that would be harmful to this population during a pandemic. 14 individuals responded to this question. Of the total, three individuals responded that each of the seven factors shown would benefit the insured population during a pandemic.

TABLE 5 summarizes the results of the remaining 11 respondents.

TABLE 5
Average Ranking of Factors Participants

Factor	Average Ranking for a Moderate Pandemic Scenario	Number of Individuals Selecting Factor For Moderate Scenario	Average Ranking for a Severe Pandemic Scenario	Number of Individuals Selecting Factor For Severe Scenario
Socioeconomic/income	0	0	3.00	2
Exposure by age	2.6	5	2.75	8
Underwriting	0	0	6.00	1
Business Continuity	3.11	9	3.00	10
Education Level	3.00	2	2.50	2
Geographic	2.40	10	2.55	11
Nonsmoking	4.67	3	4.5	2

From the responses, the geographic location of the insured population and the business continuity plans of U.S. insured population employers are the most popular responses.

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APPENDIX A

Study Participants

For recruiting participants for the study, invitation e-mails were sent to members of the SOA's Product Development, Risk Management, Reinsurance and Smaller Insurance Company Sections. Invitations were also sent to external researchers studying pandemic influenza. This process garnered 31 participants with the overwhelming majority being practicing actuaries. The Project Oversight Group would like to thank the following individuals for their contribution to this study:

1. Marc-Andrew Betzel
2. Annemarie Brownmiller
3. Lawrence Carson
4. Scott Cochran
5. Katy Curry
6. Andrew Dean
7. Dan DeKeizer
8. Vera Dolan
9. Tom Edwalds
10. Eric Golus
11. Anthony Green
12. Dale Hagstrom
13. Jay Jaffe
14. Jason Jump
15. Sheryl Kalman
16. Brian Louth
17. Graham MacKay
18. Brett McWilliam
19. Martin Meltzer
20. David Mendelsohn
21. John Murphy
22. Gary Piccolo
23. Howell Pugh
24. Frank Reynolds
25. Max Rudolph
26. Bill Sayre
27. Manet Schuman
28. Gary Scofield
29. Jim Toole
30. Cheryl Vigen
31. Steven Weisbart

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APPENDIX B

FIRST ROUND QUESTIONNAIRE

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SOCIETY OF ACTUARIES

Study of the Effect of a Flu Pandemic on Insured Mortality Using the Delphi Method

The Society of Actuaries is seeking your expertise to help inform a research project in progress to examine the potential impact of a flu pandemic on mortality and morbidity. Industry studies have shown that mortality and morbidity of an insured population differs greatly from that of the general population. Various studies exist projecting U.S. mortality and morbidity should a pandemic occur but few offer insights into how a pandemic might affect insured mortality and morbidity. Historical insured data exists from past pandemics but the applicability of the results from these analyses to today's insured populations is unclear. Thus, varying viewpoints exist as to how excess insured mortality and morbidity from a pandemic might differ from the general population.

The researcher and Project Oversight Group for the flu pandemic study are investigating how excess U.S. insured mortality as a result of a flu pandemic might deviate from that of the general U.S. population and invite you to participate in this project by offering your knowledge, expertise, and judgments on this subject. Please complete the enclosed questionnaire and return by Friday, October 6 to: Ronora Stryker, SOA Research Actuary at researchprojects@soa.org.

Responses will be analyzed and reported back to you for consideration in completing a second round questionnaire which will be sent to you in approximately 3-4 weeks.

Research results will be summarized and included in the overall SOA pandemic research report made available to the membership. Your responses will be kept confidential. No attributions will be made, but respondents will be listed as participants in the final report which will, as appropriate, be widely disseminated in the professional literature.

In developing the survey, it has been assumed that other North American countries will experience similar excess mortality from a flu pandemic to that of the U.S. While the questionnaire has a U.S. focus, individuals from outside of the U.S. are encouraged to participate.

Please contact us with any questions and remember to return your responses in time to arrive at the SOA by October 6. Questions may also be directed to Ronora at researchprojects@soa.org or 847-706-3614.

Thank you for participating in this initiative.

Sincerely,

Tom Edwalds, FSA, ACAS, MAAA
Chairperson of the SOA's Pandemic Study Project Oversight Group

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Round 1 Questionnaire

OVERVIEW OF QUESTIONAIRE

Please complete the portions of this questionnaire in which you are knowledgeable and interested. You may omit any of these questions without affecting the analysis planned for this study.

This first round questionnaire asks for your judgments and underlying analysis and reasoning on how a flu pandemic might affect insured mortality. Background information for consideration in responding to the questions is provided after the questionnaire.

In responding to the following questions please assume that a pandemic has already occurred and that medical technology and air transportation patterns at time of occurrence are similar to today.

QUESTIONNAIRE

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Severe Scenario Reason:

BACKGROUND INFORMATION

Definitions for pandemic flu and seasonal flu follow.

> Pandemic flu is virulent human flu that causes a global outbreak, or pandemic, of serious illness. Because there is little natural immunity, the disease can spread easily from person to person. Currently, there is no pandemic flu.
>
> Seasonal (or common) flu is a respiratory illness that can be transmitted person to person. Most people have some immunity, and a vaccine is available.
>
> Source: http://www.pandemicflu.gov/

In the U.S., three flu pandemics occurred in the 20th century with differing degrees of virulence, its ability to produce severe illness causing hospitalization or death

1. 1918 is considered a severe pandemic with 675,000+ excess U.S. deaths
2. 1957 is considered a moderate pandemic with 70,000+ excess U.S. deaths
3. 1968 is considered a mild pandemic with 34,000+ excess U.S. deaths.

> Source: http://www.pandemicflu.gov/general

By applying past pandemic mortality rates to current population figures and assuming no control measures such as vaccination, the U.S. government has produced mortality estimates for the general population. Under a moderate scenario similar to the 1957 pandemic, the estimate of the number of excess U.S. deaths is 209,000 (Approximately .7 excess deaths per 1000). For a severe pandemic scenario using mortality rates similar to 1918, the projected excess deaths are approximately 1.9 million (Approximately 6.5 excess deaths per 1000).

> Source: http://www.pandemicflu.gov/plan/pandplan.html

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APPENDIX C

SECOND ROUND QUESTIONNAIRE

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Study of the Effect of a Flu Pandemic on Insured Mortality Using the Delphi Method ROUND TWO

The Society of Actuaries is seeking your expertise to help inform a research project in progress to examine the potential impact of a flu pandemic on mortality and morbidity. The researcher and Project Oversight Group for the flu pandemic study are investigating how excess U.S. insured mortality as a result of a flu pandemic might deviate from that of the general U.S. population and invite you to participate in this project by offering your knowledge, expertise, and judgments on this subject. Historical insured data exists from past pandemics but the applicability of the results from these analyses to today's insured populations is unclear. Thus, varying viewpoints exist as to how excess insured mortality and morbidity from a pandemic might differ from the general population.

The first round survey was recently completed involving 30 participants from varied backgrounds who provided judgments about the excess mortality for an insured population and the reasons for their views. The responses have been very insightful. In Round Two results from the first round are provided for consideration in responding to the enclosed questionnaire which will ask for your reassessments and comments on some of the emerging perceptions. **You need not have participated in Round One to participate in Round Two.**

Responses will be analyzed and reported back to you. They will also be included in the overall SOA pandemic research report made available to the membership. Your responses will be kept confidential. No attributions will be made, but respondents will be listed as participants in the final report which will, as appropriate, be widely disseminated in the professional literature.

In developing the survey, it has been assumed that other North American countries will experience similar excess mortality from a flu pandemic to that of the U.S. While the questionnaire has a U.S. focus, individuals from outside of the U.S. are encouraged to participate.

Please complete the enclosed questionnaire and return by Monday, November 13 to: Ronora Stryker, SOA Research Actuary at researchprojects@soa.org. Questions may also be directed to Ronora at researchprojects@soa.org or 847-706-3614.

Thank you for participating in this initiative.

Sincerely,

Tom Edwalds, FSA, ACAS, MAAA
Chairperson of the SOA's Pandemic Study Project Oversight Group

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OVERVIEW OF QUESTIONAIRE

Please complete the portions of this questionnaire in which you are knowledgeable and interested. You may omit any of these questions without affecting the analysis planned for this study.

This 2nd Round questionnaire asks for your judgments and underlying analysis and reasoning on how a flu pandemic might affect insured mortality. Background information for consideration in responding to the questions is provided and has been expanded from Round 1. In addition, Appendix 1 contains the results from Round One.

Questions 1 and 2 appeared in Round 1. Questions 3 - 5 are the results of the valuable feedback received from the Round One responses.

In responding to the following questions please assume that a pandemic has already occurred and that medical technology and air transportation patterns at time of occurrence are similar to today.

QUESTIONNAIRE

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Severe Scenario Reason:

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QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking		

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QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking		

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BACKGROUND INFORMATION

Definitions for pandemic flu and seasonal flu follow.

> Pandemic flu is virulent human flu that causes a global outbreak, or pandemic, of serious illness. Because there is little natural immunity, the disease can spread easily from person to person. Currently, there is no pandemic flu.
>
> Seasonal (or common) flu is a respiratory illness that can be transmitted person to person. Most people have some immunity, and a vaccine is available.
>
> Source: http://www.pandemicflu.gov/

In the U.S., three flu pandemics occurred in the 20th century with differing degrees of virulence, its ability to produce severe illness causing hospitalization or death

4. 1918 is considered a severe pandemic with 675,000+ excess U.S. deaths
5. 1957 is considered a moderate pandemic with 70,000+ excess U.S. deaths
6. 1968 is considered a mild pandemic with 34,000+ excess U.S. deaths.

> Source: http://www.pandemicflu.gov/general

By applying past pandemic mortality rates to current population figures and assuming no control measures such as vaccination, the U.S. government has produced mortality estimates for the general population. Under a moderate scenario similar to the 1957 pandemic, the estimate of the number of excess U.S. deaths is 209,000 (Approximately .7 excess deaths per 1000). For a severe pandemic scenario using mortality rates similar to 1918, the projected excess deaths are approximately 1.9 million (Approximately 6.5 excess deaths per 1000).

> Source: http://www.pandemicflu.gov/plan/pandplan.html

Life insurance ownership
Per LIMRA, about 3 in 4 adults between the ages of 35 and 64 have some type of life insurance coverage. In 2004 the breakdown of life insurance ownership by person's age follows:

Age	Percent Owning
Under 6	31%
6-13	49%
14-17	51%
18-24	41%
25-34	64%
35-44	74%
45-54	76%
55-64	72%
65 or older	67%
All persons	62%
Adults	68%
Children	43%

Source: Trends in Life Insurance Ownership Among US Individuals. LIMRA International, 2005

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APPENDIX D
INDIVIDUAL RESPONSES TO ROUND ONE

RESPONSE 2

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.14
Severe	6.5	3.25

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

In a moderate scenario, the insured population is much more likely to have access to the type of medical care and other socioeconomic factors that should lead to this largely being an event that affects the less affluent, lesser-insured population. The analogy would be Hurricane Katrina—the well-off are able to take actions to limit the impact on their own lives.

Severe Scenario Reason:

In a severe scenario, where the pandemic is particularly virulent and deadly, the effects are likely to be felt across a much broader range of society. Having said that, access to better and quicker medical care by the insured population should lead to very different outcomes for that group, just without as much selection as is present in the moderate scenario.

RESPONSE 3

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.5
Severe	6.5	6.5

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APPENDIX D
INDIVIDUAL RESPONSES TO ROUND ONE

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
The moderate scenario will be difficult to differentiate from the noise of normal mortality. I see insured mortality following the normal insured to population ratio that is less than one.

Severe Scenario Reason:
I see several things offsetting each other. Insureds tend to be of higher economic standing and should be able to lower their contact rate by staying at home. Others can not afford to do this. On the other hand, I assume that a severe scenario will hit the healthy harder than others (per 1918 experience), and the healthy are more likely to have insurance. In fact this is a requirement for group insurance, that you be actively at work.

RESPONSE 4

Moderate scenario (.7/1000 population): .6/1000 insured. Reasoning: insured exposure has a different age distribution than the population. Moderate scenario may have same age distribution as previous H5N1 deaths. Used employment as a surrogate for insured, with 2004 statistics from tables 16 and 577 of the 2006 Statistical abstract of the US, and H5N1 mortality rates by age from WHO (http://www.who.int/wer/wer8126.pdf).

Severe scenario (6.5/1000 population): 1.3/1000 insured. Reasoning: insured exposure has a different age distribution than the population. Severe scenario may be distributed more like seasonal influenza deaths. Used employment as a surrogate for insured, with 2004 statistics from tables 16 and 577 of the 2006 Statistical abstract of the US, and Seasonal Flu mortality rates by age from CDC (http://webapp.cdc.gov/sasweb/ncipc/leadcaus10.html).

Other considerations in both reasonings:

- Translation from population rates to insurance rates depends heavily on how the virus mutates. A more transmissible form may have a different age distribution.
- Insurance amounts tend to vary with employment and the need to replace income. People with more insurance tend to have more education/income and thus be more informed and have better access to health care and healthy environments.

RESPONSE 5

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

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Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.7
Severe	6.5	6.5

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

For both scenarios, I have no reason to believe that insured mortality will differ from the general population. I expect the same level of exposure and infection from the influenza. I think that medical relief will be in short supply and therefore the usual distinction between insured and general will not be as strong.

RESPONSE 6

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.85 x .7 = .595
Severe	6.5	.92 x 6.5 = 5.98

QUESTION 2:

Moderate Scenario Reason:
Socio-economic factors have an important impact on mortality. The insured population will surely have better access to information, tools and healthcare, to ameliorate the impact of a pandemic in a moderate scenario. They will also be in a better to stockpile and distance. However, there are limits, as the more improvement you assume for the insured population must be reflected as a deterioration in the uninsured to arrive at the general mortality rate.

Assuming an insured mortality of .595 (85% of the general population), the implied burden on the uninsured is .8575 per 1000. This assume 60% of the population has individual or group insurance (per limra).

However, assuming the burden falls primarily on the 20% of the population at or below 125% of the poverty line, the burden on the poor becomes 1.12 per 1000, almost double the rate of .595 for higher socioeconomic classes. I am not sure that this is reasonable, and I feel that the mortality difference will be driven much more socio-economic class than anything intrinsic in having life insurance (eg underwriting is not a factor).

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Severe Scenario Reason:
While the insured population will have better access to information, tools and healthcare to ameliorate the impact of a pandemic in a moderate scenario, this will make less of a difference in a severe pandemic. Since the morbidity is more or less the same in either scenario, the difference is in the virulence. The severe cases will be unstoppable, and less resources to deal with the mild cases. Health services, which might have made a difference in the moderate scenario, will be overwhelmed.

Assuming an insured mortality of 92% of general population, the implied burden on the uninsured is 7.28 per 1000. This assume 60% of the population has individual or group insurance (per limra).

However, assuming the burden falls primarily on the 20% of the population at or below 125% of the poverty line, the burden on the poor becomes 8.58 per 1000 vs 5.98 for higher socioeconomic classes.

RESPONSE 7

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.2
Severe	6.5	3.0

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
Those populations most at risk are under represented in the insured population (< age 2, > age 80, diabetics, etc) In a moderate scenarios much of the excess deaths will come from those populations.
Severe Scenario Reason:
Those populations most at risk are under represented in the insured population (< age 2, > age 80, diabetics, etc) In a severe scenario those populations will be more heavily affected, but given the magnitude there will be a significant impact on the insured population.

RESPONSE 8

QUESTION 1:

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The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.7
Severe	6.5	6.5

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

1) We took two things into consideration:Geographical spread
Insured mortality would NOT be worse than general population mortality when considering geography. Assume that the pandemic would spread to every corner of the U.S. That means that any insured population will experience the same attack rate as the general population. There is no improvement due to geographical diversity.
2) Underwriting Selection
Insured mortality would NOT be better than general population when considering underwriting selection. Based on the 1918 w-shaped mortality curve, healthy lives did not fare better. Therefore the underwritten insured population with better health will not have a lower mortality

Overall, the insured mortality would not be worse (1) or better (2), therefore would be the same as the general population.

Severe Scenario Reason:

Same argument as for the Moderate Scenario.

RESPONSE 9

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. **Assume these excess mortality rates are accurate for the U.S. general population for each scenario**, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.5
Severe	6.5	7.5

QUESTION 2:
For each of your answers above, please provide your reasoning and assumptions for your views.

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Moderate Scenario Reason:
In a typical moderate flu outbreak, the most severely affected age groups are those under 20 and over 65—two groups that are less likely to have life insurance than the general population.

Severe Scenario Reason:
In a severe flu outbreak like the one in 1918, the most severely affected age groups are those between 20 and 45—people who are more likely than the general population to have life insurance. Further assume that the virus will be spread quickly in large workplace environments such as offices, factories, and employees in high-traffic retail establishments, which are highly likely to have group life insurance in force. Many will become sick before they can employ social distancing or other protective measures. The general population doesn't work or live in such dense environments. Also, recent changes in underwriting rules have

RESPONSE 10

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.53
Severe	6.5	4.88

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Expect impact of underwriting (ie: screening) and higher relative socioeconomic classes in the insured populations to fair better in a pandemic than the non-insured population. Underwriting leads to fewer impaired health individuals in the insured population. Higher socioeconomic classes leads to better access to healthcare and knowledge about survival techniques (eg: hydration, social distancing), although impact somewhat reduced by higher likelihood of international travel.

Other reasons supporting lower impact in insured vs. general population

- Would expect less co-morbidity in the insured population.
- Possible higher rates of immunization in the insured cohort.
- In a non age-adjusted sample, the insured population may have proportionally less people at high risk (ie. the very young and the very old).

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Due to lack of relevant data the 25% reduction is very difficult to support. A larger reduction could be argued but challenging to do so without any supporting data. Note the lack of supporting data also challenges the notion of equal general and insured population impacts.

Severe Scenario Reason:

Same as moderate, although reduction in insured population may be even greater than 25% haircut used above because socioeconomic class difference to be more prevalent.

RESPONSE 11

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.7
Severe	6.5	6.5

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

My best estimate is that insured and general population would be impacted in the same way in both scenarios. In practice the answer may be different depending on the exact situation. In practice the crucial difference will be the age profile of the insured and general populations being different. The impact of the pandemics will certainly not be flat with age, although the scenario you detail does not account for this.

Severe Scenario Reason:

See above.

RESPONSE 12

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general

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population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.8
Severe	6.5	7.8

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
I modeled the insured population's age distribution and the general population's age distribution against a model of excess mortality due to Pandemic that I have developed. According to my model's assumptions, I would expect the insured population to experience about 16% more deaths per 1000 than the general population in the event of a moderate pandemic.

Severe Scenario Reason:
I modeled the insured population's age distribution and the general population's age distribution against a model of excess mortality due to Pandemic that I have developed. According to my model's assumptions, I would expect the insured population to experience about 20% more deaths per 1000 than the general population in the event of a severe pandemic.

RESPONSE 13

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5.2

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
Under the moderate scenario, the virus would not be excessively virulent. Therefore, the vast majority of deaths will be among the high-risk population, specifically the very young, the elderly and the frail. As these populations are underrepresented in insurance coverage, the insurance industry would experience death rates much lower than those seen in the general population.

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In addition, death rates would likely be much higher in the lower socioeconomic groups than among those with greater resources, and the insured community tends to have greater financial resources than the uninsured. Lower socioeconomic groups have reduced access to healthcare including antiviral medications. While no cure may exist, medical intervention will save lives. An individual who receives intravenous fluids is much less likely than an untreated individual to die of dehydration. People of lower socioeconomic status are more likely to live in overcrowded conditions and to rely on buses and subways, putting them at higher risk for exposure to the virus. Those with greater education are more likely to be aware of the pandemic and ways of minimizing risk. Although persons of higher socioeconomic status are more likely to be world travelers, and the suspected risk would be imported from Asia, the virus would never be able to reach even moderate pandemic proportions in America without being mainly contracted within America.
Under the moderate scenario there is likely to be much more geographical difference in incidence rates than under the severe scenario. In particular, some urban areas will be hit hard while others (along with rural areas) will be less affected. Therefore, some insurers will be more affected than others, but it is not clear that there will be a difference between the insured and general populations in total.

Severe Scenario Reason:
Again the insured population would be at a lower risk than the general population, but the difference in risks would be attenuated. A virulent flu would cause deaths even within the select insured population. The severe scenario is indicative of a virus that can kill even when the patient receives appropriate medical attention.

RESPONSE 14

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.6
Severe	6.5	6.5

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Under a severe scenario, I would anticipate the level of excess mortality experienced by insured groups versus the general population to be the same.
However under a mild scenario, I would anticipate a small degree of mortality differential due to beneficial socioeconomic characteristics of insured populations. I would guess excess mortality for insured groups to be .6 versus .7 projected by US government.

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RESPONSE 15

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.035
Severe	6.5	1

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Depending on the industry, believe in the law of large numbers plus that the insured lives is a sub-population of the culture. Depending on several factors, believe it could have an effect (.035 / .7) = 5% effect. To have no effect, would be meaningless to our discussion, to have a more than a 10% effect would be too significant for the moderate scenario

Severe Scenario Reason:
I even think 1 is a heavy hit but in general (1 / 6.5) is about 15%. To say that a severe scenario is not at least 10% of the general population might be understating the outbreak. Again, would not want to put more than 1, that is truly a cap in my eyes.

Reasoning includes that insured lives are based on 1. pension plan insurability 2. group insurability that constitutes a completely different population from the general population. The insured lives could tend to be either hourly or salaried, unionized or professional. The insured lives could tend to be urban dwellers (which could cause more spreading versus country) but in general insured lives could have a higher level of education or just plain common sense. This would drive them to use their insurance to seek help during this crisis. Based on getting flu shots etc, doctors coming to the workplace etc, I just do not think that insured lives will have a disproportionate share of the disease as compared to the general population. Therefore that is why I believe in the numbers that I have. In addition, I have not based my information on historical trends data but future expectations about how disease and medical care is perceived in the future. I think there are plenty historical studies to figure that. This is more forward thinking based on 21st century technology, and WHAT the media chooses to focus on

The past breaks have been missing media coverage and public perception, insured lives have a choice and they will use it. If it truly means death, insured lives will seek medical help whereas the general population may not have access.

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RESPONSE 16

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.1
Severe	6.5	2.2

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
The epidemic will affect the sick, poorly educated and weak most. These are under represented in the insured population. Hence the mortality will be considerably less

Severe Scenario Reason: The same reasoning applies

RESPONSE 17

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5.0

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

I assume that the insured populations are more astute in "doing the right things" in a pandemic, much as they dod the right thing and are proactive about acquiring insurance. "Doing the right

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things" will involve appropriate sanitary meaures, proper medical care and preventative measures, ability to work remotely and limit contact, etc.

Severe Scenario Reason:

Similar reasoning to above but feel it may be difficult for the insureds to see as much improvement due to the increased virulence of the pandemic.

RESPONSE 18

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.2
Severe	6.5	2.8

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
We considered the four factors that primarily determine death rates in a pandemic, and contrasted their impact on mortality between the general population and insured population.

1. Number of people who become infected
We expect that the insured population, many of whom are employed, will have a higher exposure than the general population due to their interaction with others in the workplace, on mass transit, etc.

2. Virulence of the virus
No difference

3. Underlying characteristics and vulnerability of affected populations
We expect a higher proportion of the population at the working ages is insured than at the very old or very young ages and that the insured population is closer in characteristics to the working population than is the general population. As such, the insured population would be much less vulnerable than the general population because they are healthier for such reasons as having passed through underwriting, being healthy enough to be actively at work, and having better access to healthcare resources. Therefore, the mortality rates of the infected working population will be lower than for the infected general population, due to a combination of higher mortality of

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the older (general) population and healthier status of workers compared to general population of similar ages.

4. Effectiveness of preventive measures
Similar to number 3 above, we expect the insured population the have more access to healthcare and be better educated and informed which will improve the effectiveness of preventative measures relative to the general population. These dynamics for prevention and obtaining treatment if infected should serve to lower the mortality rates among the working population.

We also believe that the extra 0.7 deaths per thousand would not be level across all ages but would be higher than 0.7 at the advanced ages and lower than 0.7 at the younger working ages which we expect make up the bulk of the insured population. Assuming that the insured population mortality is about half of the general population mortality and that this mortality differential is applicable to the excess pandemic mortality, we derived our estimate of 0.2.

Severe Scenario Reason:
The general comments above about the four factors that primarily determine death rates in a pandemic are applicable in this scenario as well.

We believe the extra 6.5 deaths per thousand would be more level across all ages than in the moderate scenario, because the general better health of the population at the younger working ages will provide relatively less protection due to the severity of the infection. Again, assuming that the insured population mortality is about half of the general population mortality and that this mortality differential is applicable to the excess pandemic mortality, we derived our estimate of 2.8.

We believe there will be a bigger relative differential between the insured population excess mortality and the general population excess mortality in the moderate scenario than in the severe scenario.

RESPONSE 19

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5.2

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

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Moderate Scenario Reason:

Business continuity planning by employers will help reduce infection rates.

Insured population will have better access to medical care.

Severe Scenario Reason:

Better access to medical care makes less of a difference in a severe pandemic due to the overwhelming of medical care facilities.

Infection of doctors and nurses reduces effectiveness of medical care.

The strain of virus required to cause a severe pandemic by nature does not discriminate by socio-economic situation, but education still makes a marginal difference.

RESPONSE 20

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000†	Expected U.S. insured population excess mortality rate/1000 *
Moderate	.7	"Most likely" = 0.4 Minimum = 0.2 Maximum = 0.7
Severe	6.5	"Most likely" = 3.6 Minimum = 1.5 Maximum = 6.1

† The excess death rates for the U.S. general population, as provided by the U.S. Dept. of Health and Human Services Pandemic Plan (DHHS Pandemic Influenza Plan, Part 1, Page 18 available at http://www.dhhs.gov/pandemicflu/plan/) are equivalent to the "most likely" set of estimates which I have provided.

* I can not provide any probability to any of the ranges provided (e.g., I can not provide the probability of "most likely" occurring, compared to, say, "minimum").

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

I used CDC's FluAid software, which is designed to estimate potential impact of the next influenza pandemic (e.g., deaths, hospitalizations, and outpatients), (software available at: http://www.dhhs.gov/nvpo/pandemics/). I note that this program was the basis of the projections

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presented in the U.S. Dept. of Health and Human Services Pandemic Plan (DHHS Pandemic Influenza Plan, Part 1, Page 18 available at http://www.dhhs.gov/pandemicflu/plan/).

To use FluAid give an age and risk weighted average of excess influenza pandemic-related mortality among those holding active life insurance policies in the U.S., I need to know two things: 1) The age composition (broken down into 3 age groups; 0-18, 19-64, 65+) of those holding active life insurance policies in the U.S; and, 2) the percentage of each age group that have high risk conditions. A "high risk" person is defined as having certain pre-existing medical conditions (e.g., heart disease, diabetes, emphysema, etc., etc.) which places them at higher risk than a same aged person without such conditions of having an influenza-related health outcomes such as an outpatient visit, hospitalization or death.

For those holding active life insurance policies in the U.S., I don't know either of these pieces of information. Thus I make the following assumptions:

Step 1) Assumptions: Age distribution of those holding active life insurance policies in the U.S:
0-18 yrs: 10% of all active life insurance policies in the U.S
19-64 yrs: 80% active life insurance policies in the U.S
65+ yrs: 10% of all active life insurance policies in the U.S

Step 2) Assumptions: The percentage of each age group holding active life insurance policies in the U.S. that have high risk conditions: I assumed that, for each age group, the percentage of high risk persons holding active life insurance policies would be ½ of the default rates used in FluAid (shown in data entry page 3 of 9 in FluAid). I thus assumed the following percentages of high rate persons holding active life insurance policies:
0-18 yrs: 3.2%
19-64 yrs: 7.2%
65+ yrs: 20%

Step 3): Deaths rates: from FluAid (data entry page 4 of 9): I used the following death rates (recall that these are, mostly, from 1968 and just after):

Deaths: 1968-type scenario: Rates by age and risk groups			
	Rates per 1,000 age and risk population		
High Risk	**Minimum**	**Most likely**	**Maximum**
0–18 years	0.126	0.22	7.65
19–64 years	0.1	2.91	5.72
65+ years	2.76	4.195	5.63
	Rates per 1,000 age and risk population		
Non High Risk	**Minimum**	**Most likely**	**Maximum**
0–18 years	0.014	0.024	0.125
19–64 years	0.025	0.037	0.09
65+ years	0.28	0.42	0.54

Step 4): Calculation of weighted average excess death rates:

Most likely: Moderate Scenario:
0-18 yrs "share" = .10 * ((.22 * 0.032) + (0.024 * .968)) = 0.00303
19-64 yrs "share" = .80 * ((2.91*0.072) + (0.037* .928)) = 0.19508

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65+ yrs "share" = .20 * ((4.195*0.20) + (0.42*0.80)) = 0.235
Total: "most likely" age and risk weighted excess influenza-related death rate **= 0.433/ 1,000** active life insurance policies in U.S.

Minimum: Moderate Scenario:
0-18 yrs "share" = .10 * ((.126 * 0.032) + (0.014 * .968)) = 0.00176
19-64 yrs "share" = .80 * ((0.1*0.072) + (0.025* .928)) = 0.02432
65+ yrs "share" = .20 * ((2.76*0.20) + (0.28*0.80)) = 0.1552
Total: Minimum age and risk weighted excess influenza-related death rate **= 0.181/ 1,000** active life insurance policies in U.S.

Maximum: Moderate Scenario:
0-18 yrs "share" = .10 * ((7.65 * 0.032) + (0.125 * .968)) = 0.03658
19-64 yrs "share" = .80 * ((5.72*0.072) + (0.09* .928)) = 0.39629
65+ yrs "share" = .20 * ((5.63*0.20) + (0.54*0.80)) = 0.3116
Total: Maximum age and risk weighted excess influenza-related death rate **= 0.744/ 1,000** active life insurance policies in U.S.

Severe Scenario Reason:
Step 1) Assumptions: Age distribution of those holding active life insurance policies in the U.S:
0-18 yrs: 10% of all active life insurance policies in the U.S
19-64 yrs: 80% active life insurance policies in the U.S
65+ yrs: 10% of all active life insurance policies in the U.S

Step 2) Assumptions: The percentage of each age group holding active life insurance policies in the U.S. that have high risk conditions: I assumed that, for each age group, the percentage of high risk persons holding active life insurance policies would be ½ of the default rates used in FluAid (shown in data entry page 3 of 9 in FluAid). I thus assumed the following percentages of high rate persons holding active life insurance policies:
0-18 yrs: 3.2%
19-64 yrs: 7.2%
65+ yrs: 20%

Step 3): Deaths rates: I used the `1918-type death rates presented in: Meltzer, MI. Basic Instructions and Template of Draft Report: Using FluAid and FluSurge to estimate the potential impact of the next influenza pandemic upon Locale Y. Centers for Disease Control and prevention. Atlanta 2006. Available at: http://www.cdc.gov/flu/pandemic/impactestimate.htm or http://www.pandemicflu.gov/plan/tools.html.

Deaths: 1918- type scenario Rates by age and risk groups			
	Rates per 1,000 age and risk population		
High Risk	**Minimum**	**Most likely**	**Maximum**
0-18 yrs	1.036	1.808	62.883
19-64 yrs	0.822	23.920	47.018
65+ yrs	22.687	34.483	46.279

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	Rates per 1,000 age and risk population		
Non High Risk	**Minimum**	**Most likely**	**Maximum**
0-18 yrs	0.115	0.197	1.028
19-64 yrs	0.206	0.304	0.740
65+ yrs	2.302	3.452	4.439

Step 4): Calculation of weighted average excess death rates:

Most likely: Moderate Scenario:
0-18 yrs "share" = .10 * ((1.808 * 0.032) + (0.197 * .968)) = 0.02486
19-64 yrs "share" = .80 * ((23.92*0.072) + (0.304* .928)) = 1.60348
65+ yrs "share" = .20 * ((34.483*0.20) + (3.452*0.80)) = 1.93164
Total: "most likely" age and risk weighted excess influenza-related death rate **= 3.56/ 1,000** active life insurance policies in U.S.

Minimum: Moderate Scenario:
0-18 yrs "share" = .10 * ((1.036 * 0.032) + (0.115 * .968)) = 0.01445
19-64 yrs "share" = .80 * ((0.822*0.072) + (0.206* .928)) = 0.20028
65+ yrs "share" = .20 * ((22.687*0.20) + (2.302*0.80)) = 1.2758
Total: Minimum age and risk weighted excess influenza-related death rate **= 1.49/ 1,000** active life insurance policies in U.S.

Maximum: Moderate Scenario:
0-18 yrs "share" = .10 * ((62.883 * 0.032) + (1.028 * .968)) = 0.30074
19-64 yrs "share" = .80 * ((47.018*0.072) + (0.74* .928)) = 3.25761
65+ yrs "share" = .20 * ((46.279*0.20) + (4.439*0.80)) = 2.5614
Total: Maximum age and risk weighted excess influenza-related death rate **= 6.12/ 1,000** active life insurance policies in U.S.

RESPONSE 21

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	3.25

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

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Moderate Scenario Reason:
Insured populations will have access to higher quality healthcare and will be better educated about the risks of contracting the virus and mitigation strategies to reduce the chance of infection. The 50% factor is a guess.

Severe Scenario Reason: see above

RESPONSE 22

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
if moderate expect young and old to be most affected and that would move out of the main body of insured lives.

Severe Scenario Reason:

if severe expect all ages to be affected.
can likely restrict new risks but inforce would be helped only by socio-economic factors which could have 25% value.

RESPONSE 23

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

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Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.7
Severe	6.5	6.5

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason: We thought this to be the "worst case" scenario and wanted to test the companies ability to withstand this scenario.

Severe Scenario Reason: We thought this to be the "worst case" scenario and wanted to test the companies ability to withstand this scenario. NOTE: In reality, we feel that this scenario may be overstated because it does not account for any medical and environmental improvements. An alternative to the government assumptions of an excess mortality rate per 1000 is to consider the same percentage increase in mortality. In other words, the percent increase in mortality was around 20% in 1918, which translate into a much smaller assumption in terms of excess mortality per 1000. We did not pursue this because our company was able to withstand the worst case, that being the 6.5 per 1000.

RESPONSE 24

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

MY RESPONSE:
What goes through my mind is that excess mortality for the insured population should be slightly less than for the general population. I think the insured population may be better prepared to handle a pandemic because of education, resources, etc.

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Another problem with the question is that the insured population doesn't mirror the US population demographically. A different age distribution, for example, might make a significant difference in terms of excess mortality.

RESPONSE 25

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	0.7	0.084
Severe	6.5	5.59 + [1.66=500,000/(300 mil/1000)]

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

The Moderate rate of 0.7/1000 experienced in 1957 was affected somewhat by the age distribution at the time. The number of children aged 0 to 11 was relatively high (first decade of the baby boom), who are the prime spreaders of flu in the population. The highest death rates were among the elderly, which had less proportional presence than they have today. The second highest death rates were among the very young, which had a larger presence than we have today, but they are not insured then nor now.

I should do this more precisely, but to respond today I am going to guess that today 80% of the flu deaths in the moderate scenario will occur at the young and old ages that will have very little or no insurance. Of course, I need to remove these young and old uninsured from the denominator as well, so let me guess this eminently do-able calculation if done would show a general population excess mortality rate per 1000 of just 0.2 for ages 25-65. (I doubt the government recognized the shift in age mix when it derived its 0.7 however.) Let's assume the bulk of the insured population is within this group 25-65. Let's assume the economic and social stratification of the general 25-65 population is 20% poor habits, 60% medium habits, and 20% preferred habits, where "habits" encompasses income, education, regular health and dental care, smoking, exercise and diet, etc. Assume this mix in 1957 was 30% poor habits, 60% medium habits, and 10% preferred habits. In the moderate scenario, let's assume everyone who wants can get the health care he normally gets. Let's assume the mortality rates are related to each other among the habit strata in the ratios 6:2:1 poor/medium/preferred. The weighting means a shift from 6(.3)+2(.6)+1(.1)=3.1 to 6(.2)+2(.6)+1(.2)=2.6, which I would apply to the 0.2 before I moved to separate out the insured from the noninsured. (I doubt the government recognized the

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shift in health mix when it derived its 0.7 however.) Then I would suggest the habits mix for the insured population weighting by life insurance coverage is more like 0% poor habits, 30% medium habits, and 70% preferred habits. The weighted flu severity is then 6(.0)+2(.3)+1(.7)=1.3 . Depending on how we tie to the government's 0.7 that I do not believe, perhaps we have 0.2(1.3/3.1) as the insured death rate per 1000.

Severe Scenario Reason:

In the severe scenario–like in 1918 – more middle age people are dying to get the rate this high. This affects the insured population much more, because of the more uniform age mix of deaths. Whether I carve out the very young and very old or not, we are saying that the 6.5 might apply even to those in just in the age range age 25-65.

In the severe scenario, the health system is overwhelmed, the transportation system is shutting down, and the food delivery and sanitation delivery systems are unreliable at best. This affects the insured population much more, not only because of the age mix, but also because the benefits of good health habits are largely lost (doctors & nurses are not available, and the disease is able to overcome normal healthy people). Therefore I will guess that the revised relative mortality ratios fall from 6:2:1 to 6:5:4. My revised weighting is 6(.0)+5(.3)+4(.7)=4.3 in comparison to 6(.2)+5(.6)+4(.2)=5.0 . Insured rate becomes 6.5(4.3)/(5.0).

I am not sure how much insurance there is on those who are kept alive by regular medical intervention (dialysis and maybe other things like blood pressure medicines if they need very regular monitoring) -- is this 500,000 people today before we take a deduction to eliminate those who did not get insurance before they got sick? Maybe the same proportion having insurance as in total population, but they would die. I do not know if this effect got into the government's 6.5 estimate, but I assume not.

RESPONSE 26

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.25 (= .7 x 36.1%)
Severe	6.5	2.35 (= 6.5 x 36.1%)

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

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APPENDIX D
INDIVIDUAL RESPONSES TO ROUND ONE

The basis for our Pandemic projection is the Risk Management Solutions (RMS) Report, "Catastrophe, Injury, and Insurance: The Impact of Catastrophes on Workers Compensation, Life and Health Insurance". In it RMS uses advanced modeling techniques to project the number of U.S. general population fatalities (200,000) and U.S. individual life insurance fatalities (72,200) in a pandemic. We use the ratio, 72,200/200,000 (= 36.1%) to determine the U.S. insured population excess mortality. We would apply it to the assumed number of U.S. general population fatalities in a pandemic. So, this would cover both the moderate scenario and severe scenario which would differ by the number of U.S. general population fatalities assumed.

I've assumed that the per 1,000 rate you are looking for with the U.S. insured population excess mortality is per 1,000 of U.S. general population, not per 1,000 of U.S. insured population. If this is not what you are looking for an adjustment will need to be made.

Severe Scenario Reason:

See moderate scenario reason.

RESPONSE 27

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.6
Severe	6.5	5.0

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
I expect that a moderate pandemic would exhibit the "U" shaped mortality, and that nonsmokers would be less likely to die from the disease than smokers. I also expect a mortality advantage for higher socio-economic status groups. These advantages will be reflected in better mortality for insured lives, but the concentration of deaths at high and low ages will dampen the advantage

Severe Scenario Reason: The severe pandemic scenario is more unpredictable in its characteristics, but I still believe that smokers will fare worse as will lower socioeconomic groups.

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APPENDIX D
INDIVIDUAL RESPONSES TO ROUND ONE

RESPONSE 28

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.47
Severe	6.5	4.4

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate and Severe Scenario Reasons:

The flu pandemic is not likely to uniformly affect the total general population – it will first attack metropolitan population centers (international ports) where incoming overseas carriers of the flu will infect the first U.S. cases. Low-income individuals make up the majority of urban populations; I believe that a majority will not have life insurance policies, or if they do, they will have low face amounts. Affluent metropolitan dwellers who do have life insurance have the resources to leave town when the first cases of pandemic flu hits, thus lowering their risk of being exposed and dying. They also have the financial resources to afford Tamiflu and other antiviral treatment. Lower income individuals will not have the same resources to physically escape and thus avoid infection. They also do not have the same financial resources to prevent or immediately treat any pandemic flu infection.

Once the pandemic hits major metropolitan centers, massive quarantine and vaccination efforts by the government will take place, but not in time to stop the exodus of affluent (insured) individuals. I believe that most of these individuals will not be infected, so the rest of the country (including affluent suburban insureds) will not be exposed as much to the pandemic flu virus as the low-income, uninsured urban residents.

For these reasons, I have lowered the expected insured rate of mortality by 33% from the general population rate of mortality. These reasons hold for both the moderate and severe scenarios, so I lowered the expected insured rate of mortality by 33% for both scenarios. I believe a 33% difference is a middle of the road figure – the actual rate will probably be between 25% and 50% less for the insured population when compared to the general population.

RESPONSE 29

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general

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population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.5 (70% of general population)
Severe	6.5	5.5 (85% of general population)

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

There are fundamental differences between the insured and general population that affect our mortality expectations. In aggregate, we can estimate insured mortality as about 80% of population mortality in the ultimate stages, with underwriting providing an additional 35% protective value during the first decade or so in individually underwritten business. Among the more significant fundamental differences we find:

- Socioeconomic condition – individuals with some college education (or higher) have significantly lower mortality that those without. This difference correlates strongly with both the presence of life insurance and the access to private health insurance.
- Age distribution – the age distribution for those with insurance skews older than the general population, due to limited volumes in the very young and persistence of permanent coverage into the older ages.
- Geography – insurance coverage per life is higher in the metropolitan areas than in rural areas, and mortality in metropolitan areas is perhaps 5% better than rural areas.
- Compromised immune systems and other physical weakness – underwriting in individual insurance and, to a lesser extent, actively at work provisions in group insurance act to reduce the relative weight of immune-compromised lives in the insured population. These are the very lives most at risk in an influenza epidemic.

The question raised here is whether those differences persist, are weakened or are strengthened in a pandemic environment.

In addition to those fundamental differences, the actual cause of death in an influenza pandemic may generate temporary differences between the mortality rates in the two populations. Excess mortality by age at death in a typical epidemic exhibits a U-shaped curve with many deaths due to secondary and opportunistic infections. Acute Respiratory Distress Syndrome (the "cytokine storm") may play a more significant role in a severe pandemic, affecting otherwise healthy individuals and the middle age ranges. In 1918, this was apparently the cause of the W-shape excess mortality curve.

Assuming that children are a likely vector to spread influenza, it is reasonable to assume that insured adults are more likely to be caring for an ill child than uninsured adults. However, this may not be a significant factor in a severe pandemic.

We should also consider the likely value of medical intervention. In a moderate scenario, the insured population's greater access to medical care should produce relatively lower mortality. A severe scenario seems likely to collapse the health care delivery system in the US, reducing most

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families to a standard of care not materially different than that of 1918. This argues for a reducing gap between insured and general mortality as the pandemic worsens.

Finally, we should think about how bad the mortality could become in the uninsured population. If we consider that about 60% of the US population has some form of life insurance, and perhaps another 10% has a similar socioeconomic, demographic and geographic as the insured, we could determine a floor on the difference between insured and non-insured mortality by estimating a reasonable cap on the mortality of the remaining 30%, poor, less healthy lives. If we allow non-insured mortality to be as much as five times the insured mortality (an unlikely extreme), then the floor for insured mortality would be 45% of general population mortality. Perhaps a more reasonable floor would be at 65% of general population, leading the non-insured group to experience mortality three times that of the insured.

Moderate Scenario Reason:

I suggest that the differences we see due to socioeconomic status and the protective value of removing some immune-compromised individuals from the pool will persist in a moderate pandemic. Anticipating a U-shaped excess mortality curve will slightly worsen insured mortality vs. the general population (measured on a per lives basis, not per thousand of death benefit).

Severe Scenario Reason:

In a severe pandemic, I expect that the value of socioeconomic differences will be significantly reduced, and the geographic difference may be overwhelmed by higher rates of infection in urban areas. In 1918, we saw insured mortality at around 80% of population mortality, which might reflect the residual effect of social/economic/general health, but also may reflect that insurance was not as widespread through the population as it is now, so the pool was relatively more selective. I don't think that 80% difference would be maintained in a current date severe pandemic.

On the positive side, the underwriting value will still have a positive impact, and the W-shaped curve may actually lower insured mortality slightly on a per life basis as ages below 35 are underrepresented in the insured population as compared to the general population.

RESPONSE 30

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	**0.53**
Severe	6.5	**5**

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APPENDIX D
INDIVIDUAL RESPONSES TO ROUND ONE

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Assumptions:

- The difference between the Moderate and Severe scenarios is case mortality rate, rather than the attack rate. That is, in both cases, the same number of people will become infected (with the same age distribution of infection). But, in the Moderate scenario, fewer die due to the flu.
- Attack rates (by age) are the same for insured and non-insured. Justifications:
    - Pandemic flu implies there is no current immunity in the population. As such, all are susceptible.
    - The US insured population is made up of individuals in a higher socio-economic status. This population is as likely (or more) to live in concentrated urban areas, use air travel, and attend public events.
    - Attack rates do vary by age – generally decreasing by age, with schoolchildren most susceptible and elderly the least susceptible.

- Case mortality rates (the probability of death given flu has been contracted) also vary by age. The case mortality pattern is W shaped – with young children, young adults (24-34), and older adults (65+) hit hardest. Justifications:
    - Research has shown that Pandemic flu historically has affected young, healthy adults while seasonal (epidemic) flu mostly affects the very young and very old.
    - The 1918 flu showed this W pattern.

- A simple analysis performed using 1918 attack rates and case mortality rates by age (developed using values from a Stracke and Heinen model summarized in The Actuary, June/July 2006) gave the following flu mortality results:

2004 US Population	Insured Block	Difference
6.16 per thou	4.68 per thou	- 24%

  To develop my responses to question 1, I applied the -24% difference to the provided values (responses rounded). I applied the same percentage difference since I am assuming the only difference between the two scenarios is the case mortality rate.

- Important Note: This analysis still assumes that the age adjusted case mortality is the same for the general population as for the insured population. That is, the excess mortality under the insured block appears lower simply due to the fact that there are fewer children (high attack rate) and elderly (high case mortality rate) in this insured block.

- Justifications for assuming the same age-adjusted excess mortality for the insured population and general population:
    - Past pandemics have affected the young and healthy.
    - 1918 is particular example of this.
    - H5N1 (a strain with pandemic potential) case mortality has exceeded 50% for the young and healthy, with no other risk factors.

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  - Some older research (Sydenstricker 1931) suggested that the 1918 case mortality rates for the "Well-to-do" and "Moderate" (a possible proxy for the insured population) were comparable to those for the "Poor" and "Very Poor" in the 35-44 age group – a significant segment of the insured population.

- For completeness: Arguments against assuming the same age-adjusted excess mortality for the insured population and general population:
  - The complete Stracke and Heinen model and the CDC FluAid model (developed using research from Fukada, Cox, Meltzer) assume significantly worse case mortality for "at risk" populations – those populations with cardio-pulmonary impairments or impaired immune systems. Presumably, underwriting should limit the impact of these "at risk" groups on the insured population.

RESPONSE 31

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.3
Severe	6.5	5.0

QUESTION 2:

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Moderate scenario assumed to follow typical age distribution of deaths (more deaths at very young ages and older ages) so impact on insured population which is less exposed to these ages will be much lower

Severe Scenario Reason:

Assumed to follow 1918 age distribution so skewed toward younger ages typical of insured population. Assumed impact on insured will still be less than population because of socio economic differences and underwriting.

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APPENDIX E
INDIVIDUAL RESPONSES TO ROUND TWO

RESPONSE 1 (Did Not Participate in first Round)

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.4
Severe	6.5	3.8

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Based on a detailed derivation for the severe scenario case (see below), the ratio of insured population to general population excess mortality was determined to be 58%. This ratio was then applied to the estimate of 0.7 excess deaths per 1000 for the general population to obtain the estimated 0.4 deaths per 1000 for the insured population.

Severe Scenario Reason:
Using census data for the 1918 population distribution by age group, and LIMRA 2005 distribution of insured population by age group, along with the derived excess deaths rates (as per Table 1 of Jeffrey Luk, Peter Gross, et al) I computed the excess deaths per 1000 in 1918. The resulting number was then multiplied by a scaling factor to calibrate to the estimated 6.5 per 1000 deaths.

Next, I applied the maximum excess death rates (for each age group over all 3 pandemics) to the most current census population distribution, and adjusted for LIMRA 2005 distribution of insureds. This amount was then multiplied by the scaling factor above to produce a comparable death rate of 5.8 per 1000 under conditions comparable with 1918 scenario.

Next, I applied 3 multiplicative adjustments to account for inherent differences between 1918 and now and between insured population and general population. These are due to:

Reduced Attack Rate (90%) – results from greater pandemic awareness and education, increased worldwide vigilance and monitoring, plus better national coordination.

Reduced Fatality Rate (80%) – results from better national preparation, greater worldwide cooperation, increased pharmaceutical research, antiviral stockpile and availability, presence of Antibiotics. Presence of antibiotics is especially significant since a large percentage of the 1918 deaths were due to bacterial pneumonia which could have been reduced had there been antibiotics then.
Healthier Insureds (90%) – Due to the use of underwriting (whether limited or full) in insurance , the insured population will generally have less impaired lives and less co-morbidity among its population.

Consequently, insureds would be expected to fair better than the general population as a group, ceteris paribus.

The resulting excess death rate of 3.8 per 1000 was then derived as the product of 5.8 x 90% x 80% x 90%.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.5
Severe	6.5	4.3

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	3	4
Exposure By Age	2	2
Underwriting	1	1
Business Continuity		
Education Level		
Geographic	5	3
Nonsmoking	4	5

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APPENDIX E
INDIVIDUAL RESPONSES TO ROUND TWO

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age	4	4
Underwriting		
Business Continuity	2	2
Education Level	1	1
Geographic	3	3
Nonsmoking	5	5

RESPONSE 3

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.5
Severe	6.5	6.0

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
The moderate scenario will be difficult to differentiate from the noise of normal mortality, with a "U" shaped mortality curve. I see insured mortality following the normal insured to population ratio that is less than one. Socioeconomic, age exposures, education, geographic, underwriting and smoking benefits are already baked into this ratio. I don't expect business continuity to have a material benefit.

Severe Scenario Reason:
I see several things offsetting each other. Insureds tend to be of higher economic standing and should be able to lower their contact rate by staying at home. Others can not afford to do this. On the other hand, I assume that a severe scenario will hit the healthy harder than others (per 1918 experience), and the healthy are more likely to

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have insurance. In fact this is a requirement for group insurance, that you be actively at work. The age distribution will help insurers since those less than 40 are not the highest wage earners and likely have lower face amounts for both individual and group policies. I don't expect underwriting or smoker status to be beneficial, and these groups could be hit harder than those with reduced immunity.

Question 3

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.5
Severe	6.5	6.0

RESPONSE 4

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.60
Severe	6.5	1.30

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

> Moderate scenario (.7/1000 population): .6/1000 insured. Reasoning: insured exposure has a different age distribution than the population. Moderate scenario may have same age distribution as previous H5N1 deaths. Used employment as a surrogate for insured, with 2004 statistics from tables 16 and 577 of the 2006 Statistical abstract of the US, and H5N1 mortality rates by age from WHO (http://www.who.int/wer/wer8126.pdf).

Severe Scenario Reason:

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APPENDIX E
INDIVIDUAL RESPONSES TO ROUND TWO

Severe scenario (6.5/1000 population): 1.3/1000 insured. Reasoning: insured exposure has a different age distribution than the population. Severe scenario may be distributed more like seasonal influenza deaths. Used employment as a surrogate for insured, with 2004 statistics from tables 16 and 577 of the 2006 Statistical abstract of the US, and Seasonal Flu mortality rates by age from CDC (http://webapp.cdc.gov/sasweb/ncipc/leadcaus10.html).

Other considerations in both reasonings:

- Translation from population rates to insurance rates depends heavily on how the virus mutates. A more transmissible form may have a different age distribution.

Insurance amounts tend to vary with employment and the need to replace income. People with more insurance tend to have more education/income and thus be more informed and have better access to health care and healthy environments.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.65
Severe	6.5	3.90

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	2
Exposure By Age	1	1
Underwriting	4	4
Business Continuity		
Education Level	3	3
Geographic		
Nonsmoking		

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QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic	1	1
Nonsmoking		

RESPONSE 5

I do not know what the mortality impact will be. i saw nothing in any of
the comments that offered data to support their position.
I will stick with the CDC estimates of .7 and 6.5

RESPONSE 6

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.5
Severe	6.5	5.5

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

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Review of round one responses, tempered by the implication of the insured morality level assumption on the uninsured population. According to LIMRA, 60% of the US population has one or both of individual or group insurance. Assuming 70% of the US population meets the various criteria of the insured population discussed in round one (rich, healthy, access to care, etc), insured mortality of .5 implies mortality in the 90 million members of the uninsured population of 1.166; 233% of the insured assumption

Severe Scenario Reason:

Review of round one responses, tempered by the implication of the insured morality level assumption on the uninsured population. According to LIMRA, 60% of the US population has one or both of individual or group insurance. Assuming 70% of the US population meets the various criteria of the insured population discussed in round one (rich, healthy, access to care, etc), insured mortality of 5.5 implies mortality in the 90 million members of the uninsured population of 8.836; 160% of the insured assumption

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	1	1
Exposure By Age		
Underwriting	2	3
Business Continuity		
Education Level	3	3
Geographic	3	2
Nonsmoking	2	2

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QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age	1	1
Underwriting		
Business Continuity	1	1
Education Level		
Geographic		
Nonsmoking		

RESPONSE 7

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.4
Severe	6.5	5.0

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

1. Higher socio-economic status should provide better access to healthcare.
2. In addition, those with higher socio-economic status will likely be better able to observe any government quarantines (i.e. work from home, keep children home, etc)
3. The insured population has lower overall exposure to high risk individuals (i.e. diabetes, very young, very old, etc) that will have the highest mortality in a moderate pandemic.

Severe Scenario Reason:

1. There won't be enough healthcare resources in a severe scenario, so access won't be as important
2. In the severe scenario the mortality will be more evenly distributed, so there won't be as much benefit in the insured population

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3. There will still be a little lower rate in the insured population since the very young and very sick aren't in the insured population.
4. The insured will have more opportunities to observe any quarantines
5. The insured population does travel more extensively so they may be exposed in other regions at the start of the pandemic.
6. Healthcare workers are in the insured population, so that will have more exposure, especially in a severe pandemic

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7 (.5 adjusted for age)	.4
Severe	6.5 (6.0 adjusted for age)	5.0

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	4	
Exposure By Age	3	5
Underwriting	1	1
Business Continuity	5	3
Education Level	6	4
Geographic		
Nonsmoking	2	2

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QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		2
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic	1	1
Nonsmoking		

RESPONSE 9

QUESTION 1: Assume the excess mortality rates below are accurate for the U.S. general population for each scenario. Please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.55
Severe	6.5	7.0

QUESTION 2: For each answer in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
In the seasonal flu and the moderate 1957 and 1968 outbreaks, mortality was concentrated in the very young and very old. Assuming that the next moderate pandemic follows this pattern, most deaths would occur in populations that are less likely to have life insurance. (Even if the very old have life insurance, it is likely to be for smaller death benefits bought long ago.) However, in contrast to prior moderate pandemics, today there are many insured people who have compromised immune systems or other conditions that, if coupled with a pandemic flu, might be fatal.

Most public health experts say the "attack rate" will be roughly the same whether the pandemic is moderate or severe; if so, health services will be strained or overwhelmed even in a moderate pandemic. Nonetheless, people with higher socioeconomic status (who are also more likely than those with lower SES to have life insurance) will probably have somewhat better access to medical care and have somewhat lower mortality as a result.

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Severe Scenario Reason:
The U.S. population and its institutions are completely unprepared for a severe pandemic. There is no coordination, few pandemic-related business continuity plans, and no "surge" capability in the health care system. The only way we'll have any vaccine will be if the new pandemic duplicates the pattern of the 1918 pandemic—a mild wave followed at least four months later by a stronger wave. With that pattern, we might be able to create enough vaccine from the strain in the first wave to protect some people—maybe health care workers, military, police and fire personnel. Since we can't count on this happening, I assume that there would be little or no effective vaccine.

In a severe pandemic, the health care system will be a mess. Hospitals, unprepared for a deluge of highly contagious patients, will be breeding grounds for more flu victims, as will doctors' offices. Most will also be understaffed because of the pandemic. Those with health insurance will seek out health care and many will be worse off because of that. For example, healthy parents who bring a sick child to a pediatrician will likely catch the disease themselves. An otherwise healthy person with a broken arm who visits a hospital emergency room might leave with a cast and the flu. Ideally, only the most critically ill would seek care outside their homes; in practice, the higher SES group, more inclined to seek professional care and with health insurance to pay the bills (and more likely to have life insurance), would venture out when they should not.

I assume the mortality pattern would follow the W pattern of the 1918 pandemic or be high and level for insured workers up to about age 50, when it might dip a little up to age 65. This takes into account the over-one million people in the U.S. with HIV, perhaps half of whom have life insurance (mostly group life) and million of others with compromised immune systems, many of whom acquired life insurance through work or bought life insurance before they became sick.

QUESTION 3:
If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 4:
Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking. For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	
Exposure By Age	1	
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking		

QUESTION 5:
In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking. For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		2
Exposure By Age		1
Underwriting		
Business Continuity		3
Education Level		
Geographic		
Nonsmoking		

RESPONSE 10

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.53
Severe	6.5	4.88

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Expect impact of underwriting (ie: screening) and higher relative socioeconomic classes in the insured populations to fair better in a pandemic than the non-insured population. Underwriting leads to fewer impaired health individuals in the insured population. Higher socioeconomic classes leads to better

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access to healthcare and knowledge about survival techniques (eg: hydration, social distancing), although impact somewhat reduced by higher likelihood of international travel.

Other reasons supporting lower impact in insured vs. general population

- Would expect less co-morbidity in the insured population.
- Possible higher rates of immunization in the insured cohort.
- In a non age-adjusted sample, the insured population may have proportionally less people at high risk (ie. the very young and the very old).

Due to lack of relevant data the 25% reduction is very difficult to support. A larger reduction could be argued but challenging to do so without any supporting data. Note the lack of supporting data also challenges the notion of equal general and insured population impacts.

Severe Scenario Reason:

Same as moderate, although reduction in insured population may be even greater than 25% haircut used above because socioeconomic class difference to be more prevalent.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	n/a
Severe	6.5	n/a

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	1
Exposure By Age	4	4
Underwriting	1	2
Business Continuity		
Education Level	3	3
Geographic	6	6
Nonsmoking	5	5

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking		

RESPONSE 12

QUESTION 1:
The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.47
Severe	6.5	4.40

QUESTION 2:
For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

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Moderate Scenario Reason:

Severe Scenario Reason:

QUESTION 3:
If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.44
Severe	6.5	3.83

QUESTION 4:
Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	3
Exposure By Age	1	
Underwriting	4	1
Business Continuity		5
Education Level	3	2
Geographic		
Nonsmoking	5	4

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		1
Underwriting		
Business Continuity	2	
Education Level		
Geographic	1	2
Nonsmoking		

RESPONSE 13

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5.5

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
Under this scenario, appropriate medical care/exposure avoidance, influenced by socioeconomic status/education, will go a long way toward reducing mortality. General good health assured through underwriting will also reduce mortality among the insured population. J/U-shaped mortality curve by age will result in lower insured mortality.

Severe Scenario Reason:
Under this scenario, the benefits to insured lives will be reduced by the virus' lack of response to medical intervention/avoidance/health and immune system strength. I am not convinced that a W-shaped curve would apply in the severe scenario just because it did in the severe pandemic of 1918. Some feel that the W-shape was really a reduction in mortality at the upper ages afforded by some related previous exposure. Although this could happen today, I don't think it is likely, nor would it result in a difference depending on pandemic severity.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess

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mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.40
Severe	6.5	5.7

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	1	1
Exposure By Age	4	4
Underwriting	2	2
Business Continuity		
Education Level	3	3
Geographic		
Nonsmoking	5	5

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.
For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic	1	1
Nonsmoking		

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RESPONSE 15

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	3

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Insured population will have access to better medical care and higher education level will limit exposure. An estimate of 50% of the general population is provided.

Severe Scenario Reason:

The severe scenario is the same reasoning.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits

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the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	2
Exposure By Age	3	1
Underwriting	1	3
Business Continuity	6	6
Education Level	4	5
Geographic	5	4
Nonsmoking	7	7

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age	1	1
Underwriting		
Business Continuity	5	5
Education Level	3	3
Geographic	2	2
Nonsmoking	4	4

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RESPONSE 16

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.5
Severe	6.5	6.0

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:
Education, underwriting help screen out many who are unhealthy Age likely to affect as fewer children and older people insured

Severe Scenario Reason:
Effects of education and underwriting not likely to be as effective

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.6
Severe	6.5	6.1

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits

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the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	5	
Exposure By Age	4	
Underwriting	1	1
Business Continuity		
Education Level	2	2
Geographic		
Nonsmoking	3	

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		3
Exposure By Age		
Underwriting		
Business Continuity	2	2
Education Level		
Geographic	1	1
Nonsmoking		4

RESPONSE 17

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

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Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5.0

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

I assume that the insured populations are more astute in "doing the right things" in a pandemic, much as they do the right thing and are proactive about acquiring insurance. "Doing the right things" will involve appropriate sanitary measures, proper medical care and preventative measures, ability to work remotely and limit contact, etc.

Severe Scenario Reason:
Similar reasoning to above but feel it may be difficult for the insureds to see as much improvement due to the increased virulence of the pandemic.

QUESTION 3:
If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.
Assumed materially the same distribution

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 4:
Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	1	1
Exposure By Age	7	6
Underwriting	4	5
Business Continuity	3	3
Education Level	2	2
Geographic	6	7
Nonsmoking	5	4

QUESTION 5:
In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking		

RESPONSE 18

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.2
Severe	6.5	2.8

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

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INDIVIDUAL RESPONSES TO ROUND TWO

See Response 14 from round 1.

Moderate Scenario Reason:

Severe Scenario Reason:

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.4
Severe	6.5	4.0

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	3	2
Exposure By Age	1	3
Underwriting	2	1
Business Continuity		
Education Level	4	4
Geographic		
Nonsmoking	5	5

QUESTION 5:

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In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity	2	2
Education Level		
Geographic	1	1
Nonsmoking		

RESPONSE 19

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.35
Severe	6.5	5.2

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

The insured population will have better access to medical care due to higher income on average.

Infection rates are sure to vary by geographic region but that affects insured and uninsured equally.

Severe Scenario Reason:

Higher income won't help as much in obtaining medical care in a severe pandemic since healthcare facilities will be overwhelmed.

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Higher average education level of the insured population does make a marginal difference in avoiding infection and self-treatment.

Infection rates are sure to vary by geographic region but that affects insured and uninsured equally.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	3
Exposure By Age	1	1
Underwriting		
Business Continuity	4	4
Education Level	3	2
Geographic		
Nonsmoking		

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

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For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age	1	1
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking	2	2

RESPONSE 20

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000†	Expected U.S. insured population excess mortality rate/1000 *
Moderate	.7	"Most likely" = 0.34 Minimum = 0.13 Maximum = 0.6
Severe	6.5	"Most likely" = 2.8 Minimum = 1.1 Maximum = 5.1

† The excess death rates for the U.S. general population, as provided by the U.S. Dept. of Health and Human Services Pandemic Plan (DHHS Pandemic Influenza Plan, Part 1, Page 18 available at http://www.dhhs.gov/pandemicflu/plan/) are equivalent to the "most likely" set of estimates which I have provided.

* I can not provide any probability to any of the ranges provided (e.g., I can not provide the probability of "most likely" occurring, compared to, say, "minimum").

For each of your answers above, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

I used CDC's FluAid software, which is designed to estimate potential impact of the next influenza pandemic (e.g., deaths, hospitalizations, and outpatients), (software available at:

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http://www.dhhs.gov/nvpo/pandemics/). I note that this program was the basis of the projections presented in the U.S. Dept. of Health and Human Services Pandemic Plan (DHHS Pandemic Influenza Plan, Part 1, Page 18 available at http://www.dhhs.gov/pandemicflu/plan/).

To use FluAid give an age and risk weighted average of excess influenza pandemic-related mortality among those holding active life insurance policies in the U.S., I need to know two things: 1) The age composition (broken down into 3 age groups; 0-18, 19-64, 65+) of those holding active life insurance policies in the U.S; and, 2) the percentage of each age group that have high risk conditions. A "high risk" person is defined as having certain pre-existing medical conditions (e.g., heart disease, diabetes, emphysema, etc., etc.) which places them at higher risk than a same aged person without such conditions of having an influenza-related health outcomes such as an outpatient visit, hospitalization or death.

Step 1) Age distribution of those holding active life insurance policies in the U.S:
0-18 yrs: 18% of all active life insurance policies in the U.S
19-64 yrs: 68% active life insurance policies in the U.S
65+ yrs: 14% of all active life insurance policies in the U.S

The above distribution of policies by age was based on the data below, provided by SOA's Pandemic Study Project Oversight Group

Table: Distribution of life policies by age

Percent Owning	% US pop	% US pop owning	% policies by age		
31%	6.80%	2%	3.45%		
49%	0.128036	6%	10.26%		
51%	0.05675	3%	4.73%	18.43%	0-17 yrs
41%	0.098283	4%	6.59%		
64%	0.138461	9%	14.49%		
74%	0.155761	12%	18.84%		
76%	0.139001	11%	17.27%		
72%	0.092249	7%	10.86%	68.04%	18-64yrs
67%	0.123459	8%	13.52%	13.52%	65+yrs
62%					
68%					
43%					
	100.00%	61.17%	100.00%	100.00%	

Step 2) Assumptions: The percentage of each age group holding active life insurance policies in the U.S. that have high risk conditions: I assumed that, for each age group, the percentage of high risk persons holding active life insurance policies would be ½ of the default rates used in FluAid (shown in data entry page 3 of 9 in FluAid). I thus assumed the following percentages of high rate persons holding active life insurance policies:
0-18 yrs: 3.2%
19-64 yrs: 7.2%

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65+ yrs: 20%

Step 3): Deaths rates: from FluAid (data entry page 4 of 9): I used the following death rates (recall that these are, mostly, from 1968 and just after):

Deaths: 1968-type scenario: Rates by age and risk groups				
	Rates per 1,000 age and risk population			
High Risk	**Minimum**	**Most likely**		**Maximum**
0–18 years	0.126	0.22		7.65
19–64 years	0.1	2.91		5.72
65+ years	2.76	4.195		5.63
	Rates per 1,000 age and risk population			
Non High Risk	**Minimum**	**Most likely**		**Maximum**
0–18 years	0.014	0.024		0.125
19–64 years	0.025	0.037		0.09
65+ years	0.28	0.42		0.54

Step 4): Calculation of weighted average excess death rates:

Most likely: Moderate Scenario:
0-18 yrs "share" = .18 * ((.22 * 0.032) + (0.024 * .968)) = 0.00545
19-64 yrs "share" = .68 * ((2.91*0.072) + (0.037* .928)) = 0.16582
65+ yrs "share" = .14 * ((4.195*0.20) + (0.42*0.80)) = 0.1645
Total: "most likely" age and risk weighted excess influenza-related death rate **= 0.34/ 1,000** active life insurance policies in U.S.

Minimum: Moderate Scenario:
0-18 yrs "share" = .18 * ((.126 * 0.032) + (0.014 * .968)) = 0.00317
19-64 yrs "share" = .68 * ((0.1*0.072) + (0.025* .928)) = 0.02067
65+ yrs "share" = .14 * ((2.76*0.20) + (0.28*0.80)) = 0.10864
Total: Minimum age and risk weighted excess influenza-related death rate **= 0.133/ 1,000** active life insurance policies in U.S.

Maximum: Moderate Scenario:
0-18 yrs "share" = .18 * ((7.65 * 0.032) + (0.125 * .968)) = 0.06584
19-64 yrs "share" = .68 * ((5.72*0.072) + (0.09* .928)) = 0.33684
65+ yrs "share" = .14 * ((5.63*0.20) + (0.54*0.80)) = 0.21812
Total: Maximum age and risk weighted excess influenza-related death rate **= 0.6208/ 1,000** active life insurance policies in U.S.

Severe Scenario Reason:
Step 1) Age distribution of those holding active life insurance policies in the U.S:
0-18 yrs: 18% of all active life insurance policies in the U.S
19-64 yrs: 68% active life insurance policies in the U.S
65+ yrs: 14% of all active life insurance policies in the U.S

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Source of age-based distribution of policies – see Step 1 for 'Moderate Scenario Reason" (above)

Step 2) Assumptions: The percentage of each age group holding active life insurance policies in the U.S. that have high risk conditions: I assumed that, for each age group, the percentage of high risk persons holding active life insurance policies would be ½ of the default rates used in FluAid (shown in data entry page 3 of 9 in FluAid). I thus assumed the following percentages of high rate persons holding active life insurance policies:
0-18 yrs: 3.2%
19-64 yrs: 7.2%
65+ yrs: 20%

Step 3): Deaths rates: I used the `1918-type death rates presented in Meltzer, MI. Basic Instructions and Template of Draft Report: Using FluAid and FluSurge to estimate the potential impact of the next influenza pandemic upon Locale Y. Centers for Disease Control and prevention. Atlanta 2006. Available at: http://www.cdc.gov/flu/pandemic/impactestimate.htm or http://www.pandemicflu.gov/plan/tools.html.

Deaths: 1918- type scenario Rates by age and risk groups			
	Rates per 1,000 age and risk population		
High Risk	**Minimum**	**Most likely**	**Maximum**
0-18 yrs	1.036	1.808	62.883
19-64 yrs	0.822	23.920	47.018
65+ yrs	22.687	34.483	46.279
	Rates per 1,000 age and risk population		
Non High Risk	**Minimum**	**Most likely**	**Maximum**
0-18 yrs	0.115	0.197	1.028
19-64 yrs	0.206	0.304	0.740
65+ yrs	2.302	3.452	4.439

Step 4): Calculation of weighted average excess death rates:

Most likely: Moderate Scenario:
0-18 yrs "share" = .18 * ((1.808 * 0.032) + (0.197 * .968)) = 0.04474
19-64 yrs "share" = .68 * ((23.92*0.072) + (0.304* .928)) = 1.36296
65+ yrs "share" = .14 * ((34.483*0.20) + (3.452*0.80)) = 1.35215
Total: "most likely" age and risk weighted excess influenza-related death rate **= 2.7598/ 1,000** active life insurance policies in U.S.

Minimum: Moderate Scenario:
0-18 yrs "share" = .18 * ((1.036 * 0.032) + (0.115 * .968)) = 0.026
19-64 yrs "share" = .68 * ((0.822*0.072) + (0.206* .928)) = 0.17024
65+ yrs "share" = .14 * ((22.687*0.20) + (2.302*0.80)) = 0.89306

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Total: Minimum age and risk weighted excess influenza-related death rate **= 1.0893/ 1,000** active life insurance policies in U.S.

Maximum: Moderate Scenario:
0-18 yrs "share" = .18 * ((62.883 * 0.032) + (1.028 * .968)) = 0.54132
19-64 yrs "share" = .68 * ((47.018*0.072) + (0.74* .928)) = 2.76897
65+ yrs "share" = .14* ((46.279*0.20) + (4.439*0.80)) = 1.79298
Total: Maximum age and risk weighted excess influenza-related death rate **= 5.103/ 1,000** active life insurance policies in U.S.

RESPONSE 21

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Severe Scenario Reason:

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

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QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	2
Exposure By Age	3	3
Underwriting	4	4
Business Continuity		
Education Level		
Geographic	2	1
Nonsmoking	4	4

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity	1	1
Education Level		
Geographic	2	2
Nonsmoking		

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RESPONSE 23

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason:

Severe Scenario Reason:

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

Response: Did not assume a different age distribution

QUESTION 4:

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Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity		4
Education Level		
Geographic		4
Nonsmoking		

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		3
Underwriting		
Business Continuity		
Education Level		
Geographic		
Nonsmoking		

RESPONSE 26

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

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Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	Same as Round One
Severe	6.5	Same as Round One

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

Moderate Scenario Reason: Same as Round One

Severe Scenario Reason: Same as Round One

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	
Severe	6.5	

Because our projection of excess mortality due to a Flu Pandemic is based upon the Risk Management Solutions (RMS) model of which we don't know the underlying age distribution., we are unable to answer this question.

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	3
Exposure By Age		
Underwriting	1	1
Business Continuity		
Education Level		
Geographic		
Nonsmoking	3	2

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age	1	1
Underwriting		
Business Continuity	2	2
Education Level		
Geographic		
Nonsmoking		

RESPONSE 27

QUESTION 1:

The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.4
Severe	6.5	5.2

QUESTION 2:

For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

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I constructed a spreadsheet to analyze the combined effects of smoking habits, socioeconomic status, and age distribution for the U.S. population split into those covered by individual life insurance and those who are not.

I split the population into 6 socioeconomic strata to correspond with the 6 face amount bands we use for studying the mortality experience of our own book of business. I arbitrarily assumed that the lowest socioeconomic stratum represents 40% of the population, and the succeeding higher strata represent 30%, 17%, 8%, 4.5%, and 0.5% of the population, respectively. I further assumed that all owners of life insurance in the lowest socioeconomic stratum have $25,000 coverage; I also assumed that life insurance owners in the succeeding higher strata have $50,000, $100,000, $250,000, $500,000, and $1,000,000 dollars of coverage, respectively.

Using the July 1, 2004 Census Bureau estimate of the population by quinquennial age band and using data from LIMRA on the incidence of ownership of individual life insurance and average face amount by age band, I constructed a grid of life insurance owners by age band and socioeconomic strata that reproduced the LIMRA data. I also constructed (after much trial and error) a grid of the U.S. population by quinquennial age band and socioeconomic strata that reproduced the Census Bureau data and my arbitrary distribution by socioeconomic strata and assured that the population in each cell equaled or exceeded the number of life insurance owners in that cell. The resulting incidence of life insurance ownership by socioeconomic strata from lowest to highest was 10%, 41%, 66%, 75%, 87%, and 90%, respectively.

Next I used data from the 2004 National Health Inteview Survey from the CDC to estimate the number of smokers by quinquennial age band. I assumed that 90% of life insurance owners between the ages of 20 and 65 are nonsmokers, and I assumed that the life insurance owners who were smokers in each age band had the lowest amounts of coverage. Using these assumptions, I constructed grids of life insurance owners and of the whole population by age band, socioeconomic strata, and smoking habits.

Moderate Scenario Reason:

For the moderate scenario, I assumed a U-shaped distribution of excess mortality by age band, and I assumed that each socioeconomic stratum would have 80% of the excess mortality of the stratum below it. On our own book of business, we find that each face amount band has about 80% of the mortality of the band below it, so I assumed that the excess mortality would follow a similar pattern during a moderate pandemic. I also assumed that the excess mortality rate for smokers would be three times the excess mortality rate for nonsmokers within each age band and socioeconomic stratum. I used these assumptions to construct a grid of excess deaths by age band, socioeconomic strata, and smoking habits. These deaths were further split into insured and uninsured deaths based only on the incidence of life insurance ownership by cell (i.e., life insurance ownership does not separately affect excess pandemic mortality).

Finally, I calculated the claim cost for the insured deaths using my initial assumption about the amount of coverage for each socioeconomic stratum, and took the ratio of excess claims to total inforce to arrive at the excess insured mortality cost of $0.39 per $1,000 inforce.

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Severe Scenario Reason:

For the severe scenario, I assumed a W-shaped distribution of excess mortality by age band, and I assumed that each socioeconomic stratum would have 90% of the excess mortality of the stratum below it. In other words, the mortality advantage of each succeeding stratum would be only half as much as it normally is. As in the moderate scenario, I assumed that the excess mortality rate for smokers would be three times the excess mortality rate for nonsmokers within each age band and socioeconomic stratum. I used these assumptions to construct a grid of excess deaths by age band, socioeconomic strata, and smoking habits, and split these deaths further into insured and uninsured deaths based only on the incidence of life insurance ownership by cell.

Again, I calculated the claim cost for the insured deaths using my initial assumption about the amount of coverage for each socioeconomic stratum, and took the ratio of excess claims to total inforce to arrive at the excess insured mortality cost of $5.16 per $1,000 inforce.

In order to answer question 3, I replaced the LIMRA distribution of life insurance ownership by age band with a flat 38% ownership for all ages.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	.4
Severe	6.5	5.7

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	1
Exposure By Age	4	3
Underwriting	3	
Business Continuity		
Education Level	Included in Socioeconomic	Included in Socioeconomic
Geographic		
Nonsmoking	1	2

RESPONSE 29

QUESTION 1:
The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.5 (70% of general population)
Severe	6.5	5.5 (85% of general population)

QUESTION 2:
For each of your answers in Question 1, please provide your reasoning and assumptions for your views.

There are fundamental differences between the insured and general population that affect our mortality expectations. In aggregate, we can estimate insured mortality as about 80% of population mortality in the ultimate stages, with underwriting providing an additional 35% protective value during the first decade or so in individually underwritten business. Among the more significant fundamental differences we find:

- Socioeconomic condition – individuals with some college education (or higher) have significantly lower mortality that those without. This difference correlates strongly with both the presence of life insurance and the access to private health insurance.
- Age distribution – the age distribution for those with insurance skews older than the general population, due to limited volumes in the very young and persistence of permanent coverage into the older ages.
- Geography – insurance coverage per life is higher in the metropolitan areas than in rural areas, and mortality in metropolitan areas is perhaps 5% better than rural areas.
- Compromised immune systems, smoking status and other physical weakness – underwriting in individual insurance and, to a lesser extent, actively at work provisions in group insurance act to reduce the relative weight of immune-compromised lives in the insured population. These are the very lives most at risk in an influenza epidemic.

The question raised here is whether those differences persist, are weakened or are strengthened in a pandemic environment.

In addition to those fundamental differences, the actual cause of death in an influenza pandemic may generate temporary differences between the mortality rates in the two populations. Excess mortality by age at death in a typical epidemic exhibits a U-shaped curve with many deaths due to secondary and opportunistic infections.

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Acute Respiratory Distress Syndrome (the "cytokine storm") may play a more significant role in a severe pandemic, affecting otherwise healthy individuals and the middle age ranges. In 1918, this was apparently the cause of the W-shape excess mortality curve.

We should also consider the likely value of medical intervention. In a moderate scenario, the insured population's greater access to medical care should produce relatively lower mortality. A severe scenario seems likely to collapse the health care delivery system in the US, reducing most families to a standard of care not materially different than that of 1918. This argues for a reducing gap between insured and general mortality as the pandemic worsens.
Finally, we should think about how bad the mortality could become in the uninsured population. If we consider that about 65% of the US population has some form of life insurance, and perhaps another 10% have similar socioeconomic, demographic and geographic characteristics as the insured group, we could determine a floor on the difference between insured and non-insured mortality by estimating a reasonable cap on the mortality of the remaining 25%, poor, less healthy lives. If we allow non-insured mortality to be as much as five times the insured mortality (an unlikely extreme for such large groups of people), then the floor for insured mortality would be 50% of general population mortality. Perhaps a more reasonable floor would be at 66% of general population, leading the non-insured group to experience mortality three times that of the insured.

Moderate Scenario Reason:

I suggest that the differences we see due to socioeconomic status and the protective value of removing some immune-compromised individuals from the pool will persist in a moderate pandemic. Anticipating a U-shaped excess mortality curve will slightly worsen insured mortality vs. the general population (measured on a per lives basis, not per thousand of death benefit).

Severe Scenario Reason:
In a severe pandemic, I expect that the value of socioeconomic differences will be significantly reduced, and the geographic difference may be overwhelmed by higher rates of infection in urban areas. In 1918, we saw insured mortality at around 80% of population mortality, which might reflect the residual effect of social / economic / general health, but also may reflect that insurance was not as widespread through the population as it is now, so the pool was relatively more selective. I don't think that 80% difference would be maintained in a current date severe pandemic.

On the positive side, the underwriting value will still have a positive impact, and the W-shaped curve may actually lower insured mortality slightly on a per life basis as ages below 35 are underrepresented in the insured population as compared to the general population.

QUESTION 3:

If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

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Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.49
Severe	6.5	5.6

QUESTION 4:

Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	1	1
Exposure By Age	5	No benefit
Underwriting	2	4
Business Continuity	No impact	No impact
Education Level	3	2
Geographic	6	No benefit
Nonsmoking	4	3

QUESTION 5:

In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		2
Underwriting		
Business Continuity		
Education Level		
Geographic		1
Nonsmoking		

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RESPONSE 30

QUESTION 1:
The table below shows U.S. governmental projections for excess mortality rates for two flu pandemic scenarios. Assume these excess mortality rates are accurate for the U.S. general population for each scenario, please provide your judgment for the values of the excess mortality for the U.S. life insured population.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.33
Severe	6.5	4.57

QUESTION 2:
For each of your answers in Question 1, please provide your reasoning and assumptions for your views.
Moderate Scenario Reason:
Assumptions

- Attack Rate = 30% for all ages.
- Case Mortality Pattern = "W" shaped – this has been the typical pattern for the past few pandemics, though most notably in the 1918 pandemic.
    - "Pandemic versus Epidemic Influenza Mortality: A Pattern of Changing Age Distribution" Simonsen, Clarke, Schonberger, Arden, Cox, Fukuda, Journal of Infectious Diseases 1998.
- Distribution of insured risks different from general population (more concentrated in middle ages).
- Insured Mortality = 50% of General Population Mortality
    - In the moderate scenario, the flu will be more deadly in the least health segments of the population. Much of this population will have been excluded from the insured population due to underwriting. (If not excluded, then likely to have smaller face amounts).
    - Also, smoking is less prevalent.
    - This distinction between "healthy" lives and impaired lives is used in several models, including the FluAid model.
    - 50% is a ballpark estimate.

Severe Scenario Reason:
Assumptions

- Attack Rate = 30% for all ages.
- Case Mortality Pattern = "W" shaped – this has been the typical pattern for the past few pandemics, though most notably in the 1918 pandemic.
    - "Pandemic versus Epidemic Influenza Mortality: A Pattern of Changing Age Distribution" Simonsen, Clarke, Schonberger, Arden, Cox, Fukuda, Journal of Infectious Diseases 1998.
- Distribution of insured risks different from general population (more concentrated in middle ages).
- Insured Mortality = 75% of General Population Mortality
    - In the severe scenario, while the flu will still be more deadly in the least health segments of the population, it will also be lethal in previously healthy middle aged adults (cytokine storm).
    - In addition, the increased severity of the pandemic will put more strain on hospital resources – limiting the benefit of those resources to the insured population (who, generally, have easier access to such things as compared to the general population).
    - 75% is another ballpark estimate.

QUESTION 3:

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If you have assumed a different age distribution for the insured population than the general population in developing your response for Question 1, please provide your judgment for the values of the excess mortality for the US life insured population, if possible, assuming the same age distribution for the insured population as the general population. Your response to this question will help the research team better understand the impact of this factor.

Virulence Level Scenario	U.S. general population excess mortality rate/1000	Expected U.S. insured population excess mortality rate/1000
Moderate	.7	0.35 = .7 *.5
Severe	6.5	4.875 = 6.5 * .75

QUESTION 4:
Several factors were identified in Round One as impacting excess mortality from a pandemic. In this question, please provide your thoughts on which factors are most advantageous for the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor benefits the life insured population mortality the most during a pandemic. If you feel a factor does not benefit the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are not important, please rank the other factors 1-5.

Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income	2	4
Exposure By Age	4	3
Underwriting	1	1
Business Continuity		
Education Level		
Geographic		
Nonsmoking	3	2

QUESTION 5:
In this question, please provide your thoughts on the factors that are harmful to or would not benefit the life insured population during the pandemic. A factor with a ranking of 1 means in your opinion, this factor is the most harmful to the life insured population during a pandemic. If you feel a factor is beneficial to the life insured population, please do not include in the ranking.

For example, if for a severe scenario, you feel income and underwriting are advantageous to the life insured population, please rank the other factors 1-5.

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Factor	Ranking - Moderate Scenario	Ranking – Severe Scenario
Socioeconomic/income		
Exposure By Age		
Underwriting		
Business Continuity	2	2
Education Level		
Geographic	1	1
Nonsmoking		

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