Catastrophic Risk: Waking Up to the Reality of a Pandemic?

Supplementary Information

Materials and Methods

Model

The structure of the survey is designed so that respondents are presented with twelve discrete pairwise policy choices that provide data for estimation based on a random utility model. The twelve choices are between a policy that would prevent US deaths from a pandemic outbreak or policies that would prevent US deaths from an environmental disaster or terrorist attack *(1)*.

Policy choices can reduce three types of risk: policies that reduce pandemic outbreak deaths (p), environmental disaster deaths (e), and terrorist deaths (t). A fundamental feature of the tradeoff choice is that respondents are valuing a specific number of US deaths for each class of risks. The utility for policy j ($j = 1,2$) for respondent i is given by u_{ji}. Following Viscusi (2009), the basic model where utility is a function of only the three main effects is:

$$u_{ji} = \beta_p p_{ji} + \beta_e e_{ji} + \beta_t t_{ji} + \varepsilon_{ji} \quad (1)$$

where ε_{ji} is the random error term. All demographic characteristics are the same for all policy option valuations. We exclude these from the model because they drop out of the analysis when taking the utility difference between the policy alternatives. The interactions of these characteristics with the main effects, however, can be observed.

The probability pr_{ji} that respondent i chooses policy option j on any given pairwise policy comparison (pandemic outbreak versus terrorist attack or pandemic outbreak versus environmental disaster) is such that

$$pr_{ji} = pr\left(\beta_p p_{ji} + \beta_e e_{ji} + \beta_t t_{ji} + \varepsilon_{ji} > \beta_p p_{ki} + \beta_e e_{ki} + \beta_t t_{ki} + \varepsilon_{ki}\right), \text{ for } j \neq k. \quad (2)$$

For the regression analysis, the results are pooled for twelve different choices made by respondents in a conditional logit model. There are six different choices for each of the two sets of paired comparisons.

We also examine the interactions of personal characteristics with the main effects. Let utility in the model including interactive effects be characterized by:

$$u_{ji} = \beta_p p_{ji} + \beta_e e_{ji} + \beta_t t_{ji} + \boldsymbol{\varphi}_p (p_{ji}\boldsymbol{x}_j)' + \boldsymbol{\varphi}_e (e_{ji}\boldsymbol{x}_j)' + \boldsymbol{\varphi}_t (t_{ji}\boldsymbol{x}_j)' + \varepsilon_{ji}$$

where $\boldsymbol{x}_j$ is a vector of interactions of demographic variables with the main effects. Let $\boldsymbol{\varphi}_k$ denote the coefficient vector of the interaction of $\boldsymbol{x}_j$ with main effect *k*, *k* = *p*, *e*, and *t*. Personal characteristics such as experience with infectious diseases and socioeconomic characteristics affect the utility values and risk tradeoffs, but do not have an independent effect on individual choices because they do not vary across the policies *(1)*.

To compute the risk tradeoffs, we totally differentiate equation (1) holding utility constant

$$du_{ji} = 0 = \beta_p dp + \beta_e de + \beta_t dt. \tag{3}$$

The rate of tradeoff between environmental disaster (terrorist attack) policies and pandemic outbreak policies is computed by deriving the derivative of environmental disaster (terrorist attack) polices with respect to pandemic outbreak policies *(2)*. These tradeoffs are shown in equations (4) and (5):

$$\partial e/\partial p = -\beta_p/\beta_e \tag{4}$$

$$\partial t/\partial p = -\beta_p/\beta_t \tag{5}$$

We use equations (4) and (5) and the stated-preference method to suggest how a representative sample of the US population values the risk tradeoffs between catastrophic events.

Survey Instrument

With the assistance of Wyoming Survey and Analysis Center (WYSAC), we administered a computer-based questionnaire to a nationally representative web-based panel. The survey instrument was distributed across the United States. Each respondent was categorized into five distinct geographic regions: Mexico border, Canada border, Pacific Ocean border, Atlantic Ocean border, and Inland states to capture areas with differing relative risk of an EID event. See SI Figure 1, which represents a worldwide map of predicted regions where new EIDs are most likely to originate (i.e., emerging disease 'hotspots'). Relative risk is demonstrated on this map such that lower values are denoted by green and higher values are denoted by red. Similar to findings from Viscusi (2009) examining risk perception of terrorist attacks, rural residents in Wyoming and other areas far removed from US borders may perceive little personal threat from a pandemic outbreak based on their observation of how pandemic outbreaks originate in the US *(1)*.

The survey consists of seven parts: (1) definitions (of infectious diseases, zoonotic diseases, and a pandemic), (2) background questions (experience with vaccination and diagnoses of an infectious disease), (3) information on pandemic risks, (4) context to related risks (environmental disasters and terrorist attacks) and risk questions, (5) context related to other types of death risk (e.g., traffic accidents, heart disease, flu), (6) valuation questions, and (7) socioeconomic questions. To ensure that the order of the valuation questions would not influence or bias survey responses, the order of the questions were varied. This allows for the control of ordering effects.

To determine how respondents value risk from a pandemic relative to other uncertain catastrophic events, respondents were asked a series of tradeoff questions involving two different

pairs of risks. Following Viscusi et al. (1991) and Viscusi (2009), the first set of tradeoff questions were pandemic outbreak deaths versus environmental disaster deaths and the second set were pandemic outbreak deaths versus terrorism deaths *(1, 3)*. Pandemic outbreak deaths serve as the common reference point. The survey characterizes the nature of the two types of catastrophic risks by conveying to the respondent the expected number of deaths prevented by the policy. If the respondent chooses Policy #1, this implies a policy preventing 50 environmental disaster deaths is more valuable than preventing 100 pandemic outbreak deaths, and that environmental disaster deaths are more than twice as highly valued per death than pandemic outbreak deaths. Replicating the tradeoff pairs in Viscusi (2009), respondents considered a series of six different tradeoff combinations: (50,100), (250,25), (25,125), (125,100), (150, 50), and (100,100) *(1)*. The bottom panel of Figure 2 presents the comparable tradeoff question for pandemic outbreak deaths and terrorism deaths.

These questions give insight into how the US public values saving lives by reducing the fatality risks associated with catastrophic events. After a year of pretests, in July of 2013 WYSAC implemented the survey instrument in a national study distributed across the United States. The sample was a nationally representative web-based panel recruited by the online market research company, uSamp, based out of Los Angeles, California. Participants in the panel took surveys by computer. WYSAC secured a total of 321 surveys (pre-Ebola Outbreak). Approximately, 18 months later (post-Ebola Outbreak), the survey was re-administered, securing a total of 357 surveys. After administering the survey, they provided a fully labeled data file in STATA format. SI Appendix A presents a complete example of the randomized survey.

Discussion of the Estimation Results

We estimate a conditional logit regression based on the random utility model *(4)*. As a robustness check, we also estimate a conditional logit regression with and without clustered fixed effects. The dependent variable is coded as a "0" if the respondent chooses the pandemic outbreak policy and a "1" if they choose the terrorist attack or the environmental disaster policy. Following Viscusi (2009), we tested for transitivity by comparing the series of pairwise choices made by respondents *(5)*. For the set of trade-off questions comparing pandemic deaths to environmental disaster deaths prior to the 2014 West Africa Ebola Outbreak, 190 of 321 observations passed the transitivity condition. For the trade-off questions comparing pandemic deaths to terrorist deaths, 186 out of 321observations passed. For the set of trade-off questions comparing pandemic deaths to environmental disaster deaths after the 2014 West Africa Ebola Outbreak, 187 of 357 observations passed the transitivity condition. For the trade-off questions comparing pandemic deaths to terrorist deaths, 187 out of 357 observations passed. We restrict our analysis to respondents who passed these transitivity/consistency checks. Including the respondents who did not pass the NOAA Blue Ribbon Panel's *(6)* transitive/consistent test did not substantially change our estimates. Table SI1 and SI2 report estimates that compare environmental disaster and pandemic policy (Policy Choice 1), and terrorist attack and the pandemic policy (Policy Choice 2). As utility levels are defined only up to a positive linear transformation, we focus on the signs and statistical significance of the coefficients, which are all positive and statistically significant at the 0.01 level. The coefficient ratios provide information on the tradeoff rates between the different risk categories.

Table 1 in the main text reports relative valuations associated with the coefficient ratios implied by the results in Tables 2a and 2b. The tradeoff rates involve nonlinear combinations of

coefficient estimates so the delta method is used for standard errors *(7)*. Table 1 also reports the standard errors for these tradeoff rates and the associated 95% confidence intervals. From equation (4) in SI Methods, the rate of tradeoff between environmental disaster policies and pandemic outbreak policies prior to the 2014 West Africa Ebola Outbreak is 1.82. Lives saved by reducing environmental deaths are valued nearly twice as much as lives saved by preventing pandemic outbreak deaths *(8)*. Applying equation (5) from SI Methods, the rate of tradeoff between terrorist attack policies and pandemic outbreak policies prior to the 2014 West Africa Ebola Outbreak is 1.51. Lives saved by reducing terrorist attack deaths are valued one and a half times more than lives saved by preventing pandemic outbreak deaths. The rate of tradeoff between terrorist attack policies and pandemic outbreak policies after the 2014 West Africa Ebola Outbreak is 1.33, while the rate of tradeoff between environmental disaster policies and pandemic outbreak policies is 1.72. Pooling the data, we find no statistical difference in the two rates of tradeoff before and after the Ebola Outbreak. *(9)*

References and Notes

1. Viscusi, W.K. (2009) Valuing Risks of Death from Terrorism and Natural Disasters. Journal of Risk and Uncertainty 38:191–213
2. Given equation (3), equation (4) states that holding the number of terrorism deaths constant ($\partial t=0$), the marginal change in environmental disaster deaths required to keep utility constant given a marginal change in pandemic outbreak deaths is $\partial e/\partial p=-\beta_p/\beta_e$. Given equation (3), equation (5) states that holding the number of environmental disaster deaths constant ($\partial e=0$), the marginal change in terrorist attack deaths required to keep utility constant given a marginal change in pandemic outbreak deaths is $\partial t/\partial p=-\beta_p/\beta_t$.
3. Viscusi, W. K., W. Magat and J. Huber (1991) Pricing Environmental Health Risks: Survey Assessments of risk-risk and Risk-dollar Trade-offs for Chronic Bronchitis. Journal of Environmental Economics and Management 21:32–51
4. The estimated standard errors reported for the conditional logit models are robust and clustered by individual respondent because the analysis uses multiple observations per individual. The conditional logit model also includes fixed effects for each set of tradeoff questions. See (1).
5. A respondent choosing Policy 1 from the choice pair (50,100) has revealed relative values for the two groups that will be inconsistent if the respondent also picks Policy 1 for the choice pairs (250,25), (125,100), or (150,50).
6. Arrow, K., R. Solow, P. R. Portney, E. E. Leamer, R. Radner, and H. Schuman (1993) Report of the NOAA Panel on Contingent Valuation. Federal Register 58: 4601–4614.
7. Greene, W. (2008) Econometric Analysis. 6th Edition. Upper Saddle River, NJ: Pearson Education Inc.
8. People place a higher value on lives saved from environmental disasters even though few people actually die from environmental disasters. In the domestic example given to respondents (Deepwater Horizon Oil Spill), no human lives were lost. However, there are many examples of foreign environmental disasters (Fukushima Daiichi nuclear disaster, Chernobyl disaster), where several thousand people died, that respondents could be referencing. Respondents may also be confusing environmental disasters (preventable) with natural disasters (non-preventable), such as Hurricane Katrina.
9. Further work was conducted exploring the heterogeneity of the risk-risk tradeoffs by examining the base result interactions with explanatory variables. This work is available upon request.

Table SI1. Pandemic Outbreak Prevention Policies compared with Environmental Disaster Prevention Policies

	Before Ebola			After Ebola		
Variable	1	2	3	1	2	3
Main effects						
Pandemic outbreak deaths	0.01*	0.02*	0.01*	0.01*	0.02*	0.01*
	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.00)
Environmental disaster deaths	0.04*	0.06*	0.02*	0.04*	0.06*	0.02*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Specification	Cond.	Uncond.	Uncond.	Cond.	Uncond.	Uncond.
Ind. FE	Yes	Yes	No	Yes	Yes	No
Clustered SE	Yes	Yes	No	Yes	Yes	No
Number of Observations	644	644	1110	648	648	1114
Number of Individuals	108	108	190	108	108	187
Chow Test χ^2 statistic						
Pandemic outbreak deaths	0.03	0.03	0.03			
	(0.86)	(0.85)	(0.85)			
Environmental disaster deaths	0.05	0.04	0.02			
	(0.83)	(0.84)	(0.90)			

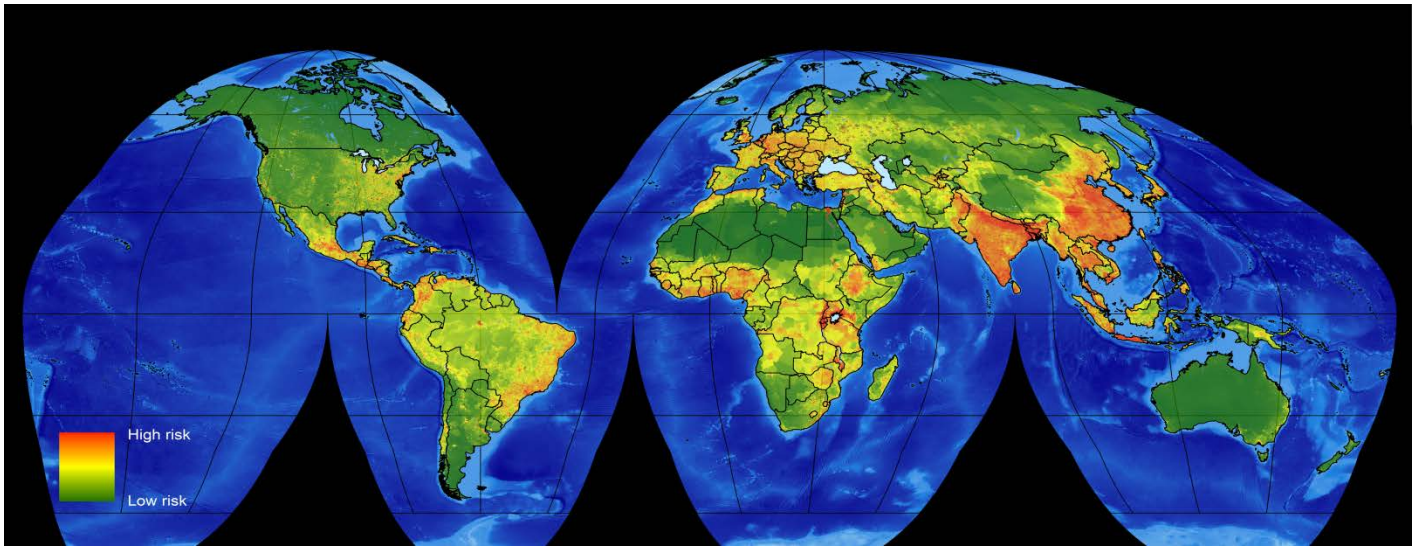
Notes: Reported standard errors are either robust or clustered robust. Chow test is for equivalence of estimated coefficients before and after Ebola with null hypothesis that coefficients are statistically equivalent (p-value reported in parentheses). * indicates significance at the 0.01 level, two-tailed test.

Table SI2.
Pandemic Outbreak Prevention Policies compared with Terrorist Attack Prevention Policies

	Before Ebola			After Ebola		
Variable	1	2	3	1	2	3
Main effects						
Pandemic outbreak deaths	0.02*	0.03*	0.00*	0.02*	0.06*	0.01*
	(0.01)	(0.02)	(0.00)	(0.01)	(0.01)	(0.00)
Terrorist attack deaths	0.05*	0.07*	0.02*	0.04*	0.07*	0.02*
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Specification	Cond.	Uncond.	Uncond.	Cond.	Uncond.	Uncond.
Ind. FE	Yes	Yes	No	Yes	Yes	No
Clustered SE	Yes	Yes	No	Yes	Yes	No
Number of Observations	610	610	1104	598	598	1114
Number of Individuals	103	103	186	100	100	187
Chow Test χ^2 statistic						
Pandemic outbreak deaths	0.62	0.53	0.10			
	(0.43)	(0.47)	(0.75)			
Terrorist attack deaths	0.13	0.14	0.22			
	(0.72)	(0.71)	(0.64)			

Notes: Reported standard errors are either robust or clustered robust. Chow test is for equivalence of estimated coefficients before and after Ebola with null hypothesis that coefficients are statistically equivalent (p-value reported in parentheses). * indicates significance at the 0.01 level, two-tailed test.

FIGURE 1
Global distribution of relative risk of an EID event.



Legend: Global hotspot map of emerging infectious diseases. This map illustrates the relative risk of a zoonotic emerging infectious disease of wildlife origin spilling over into the human population. It was produced by analyzing with logistic regression the presence/absence of all known wildlife-origin EIDs since 1940 against a series of known drivers, including human population density, change in human population density and wildlife diversity (mammalian species richness), gridded at 1km2 resolution, and corrected for reporting bias by including a measure of the global distribution of infectious disease researchers. Map produced by EcoHealth Alliance, and research funded by USAID-EPT PREDICT.

FIGURE 2
Examples of risk tradeoff questions

Now suppose you can vote for one of two policies that cost the same amount but reduce different kinds of risks.

- Policy #1 prevents 50 deaths caused by an environmental disaster.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

- Policy #1 prevents 250 deaths caused by a terrorist attack.
- Policy #2 prevents 25 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

APPENDIX A

Thank you for participating in our survey on the value of avoiding a pandemic outbreak of an infectious disease. Your answers and the answers of many other people will be used to help researchers and policy makers understand what you and others think about the impacts of a potential pandemic outbreak reaching the United States. This survey is designed to give you background information on infectious diseases and similar types of risky events followed by asking your opinion.

This survey consists of eight parts:

1. Definitions
2. Background questions
3. Information of pandemic risks
4. Context to related risks and questions
5. Context to how we die
6. Valuation questions
7. Socioeconomic questions

PART I: DEFINTIONS

Infectious Disease: Diseases caused by pathogenic organisms such as bacteria, viruses, fungi or parasites. Infectious diseases can be passed from person to person or transmitted via bites from insects or animals or acquired by ingesting contaminated food or water or other exposures in the environment.

Zoonotic Diseases (also called Zoonoses): Infectious diseases of animals that can cause disease when transmitted to humans. The majority of newly discovered infectious diseases are zoonotic and are rising in frequency.

Pandemic: An epidemic of infectious disease that is spreading rapidly through the human populations across a large region. When a pandemic occurs, little or no immunity to the disease exists in the population. A global pandemic outbreak occurs every 10-20 years. Most of the recent pandemics (e.g. SARS, influenza A/H1N1) are zoonotic.

PART II: WHAT IS YOUR KNOWLEDGE OF INFECTIOUS DISEASE?

1. Have you ever been vaccinated?

_____yes _____no

2. Have you ever been diagnosed with an infectious disease?

_____yes _____no

*If yes, were you sick for: _____1 week
_____1 month
_____1 year
_____Other

If yes, how long ago was the illness? _____Less Than 3 Months Ago
_____Between 3 and 6 Months Ago
_____Between 6 Months and 2 Years Ago
_____More than 2 Years Ago

3. Have any of your immediate family members ever been diagnosed with an infectious disease?

_____yes _____no

*If yes, was your family member sick for: _____1 week
_____1 month
_____1 year
_____Other

If yes, how long ago was the illness? _____Less Than 3 Months Ago
_____Between 3 and 6 Months Ago
_____Between 6 Months and 2 Years Ago
_____More than 2 Years Ago

4. Have any of your friends ever been diagnosed with an infectious disease?

_____yes _____no

*If yes, was your friend sick for: _____1 week
_____1 month
_____1 year
_____Other

If yes, how long ago was the illness? _____Less Than 3 Months Ago
_____Between 3 and 6 Months Ago
_____Between 6 Months and 2 Years
Ago _____More than 2 Years Ago

**If diagnosed more than once, use most recent example.*

PART III: INFORMATION ON PANDEMIC RISKS

The United States government currently invests about $6.4 billion each year in disease control, research, and training—and yet emerging infectious diseases of animals are still increasing. Because emerging infectious diseases of animals are still increasing, it is more likely that a pandemic outbreak will occur within the next 10-20 years.

Historical examples of pandemic outbreaks include:

1. Smallpox killed nearly 400,000 Europeans per year during the closing years of the 18th century. During the 20th century, it is estimated that smallpox was responsible for 300–500 million deaths. An estimated 50 million cases of smallpox occurred in the world each year during the early 1950s.

2. The "Spanish flu" was first identified in March 1918 and by October 1918, it had spread to become a worldwide pandemic on all continents, and eventually infected about one-third of the world's population. In six months, some 50 million were dead; some estimates put the total of those killed worldwide at over twice that number.

3. HIV spread to the United States and much of the rest of the world beginning around 1969. HIV, the virus that causes AIDS, is currently a pandemic, with infection rates as high as 25% in southern and eastern Africa. AIDS could kill 31 million people in India and 18 million in China by 2025, according to projections by U.N. population researchers. AIDS death toll in Africa may reach 90-100 million by 2025.

Some of the personal risks and consequences of a pandemic outbreak include:

a. You may become infected resulting in illness and possibly death.
b. Your child, parent, siblings, and/or other relatives may become infected resulting in illness and possibly death.
c. Your friend(s) may become infected resulting in illness and possibly death.
d. Hospitals may become overloaded resulting in turning down infected victims.
e. There may be an inadequate supply of vaccines.
f. You will need to reduce face-to-face contact by staying home, not going to work, and not sending children to school which likely will result in an income reduction.
g. A negative shock to the economy may occur leading to a possible recession.

Pandemic outbreaks are one of many types of uncertain and potentially catastrophic events. For example, environmental disasters and terrorists attacks are both events with uncertainty as to when and where they will occur and they have similar risks and consequences to a pandemic outbreak. These events pose risks to life and limb for yourself, friends, and family. All these events can significantly slow down the economy.

PART IV: SIMILAR RISKY EVENTS and YOUR PREFERENCES FOR POLICIES TO REDUCE THESE RISKS.

SIMILAR RISKY EVENT 1 - ENVIRONMENTAL DISASTER EXAMPLE

An example of an environmental disaster would be the 2010 Deepwater Horizon Spill (also known as the Gulf of Mexico Oil Spill or the BP Oil Spill). The Deepwater Horizon oil spill is the largest marine oil spill in history. The spill was caused by an explosion on the Deepwater Horizon offshore oil platform about 50 miles southeast of the Mississippi River delta on April 20, 2010. Eleven workers died in the accident.

On May 30, 2010, the Unified Area Command published its first "Consolidated Fish and Wildlife Collection Report." According to the report, 1,014 birds were visibly oiled and 997 died; 400 sea turtles died; 47 mammals died. Wildlife biologists believe that more wildlife were killed by the oil, but their toll is hidden because their bodies have sunk in the open ocean or they were eaten by scavengers.

In a study by Moody's Analytics, it is estimated that nearly $1.2 billion in output and 17,000 jobs would be lost in the Gulf Coast states by the end of 2010. The output loss across the five Gulf Coast states amounts to less than 0.1% of national GDP.

On July 5, 2010, BP reported that its own expenditures on the oil spill had reached $3.12 billion, including the cost of the spill response, containment, relief well drilling, grants to the Gulf states, claims paid, and federal costs. The United States Oil Pollution Act of 1990 limits BP's liability for non-cleanup costs to $75 million unless gross negligence is proven. BP has said it would pay for all cleanup and remediation regardless of the statutory liability cap.

We are interested in your opinion about a new US policy to reduce the risk of a global pandemic. To better understand how you think about this policy relative to other risks, please answer the next two questions.

5. Now suppose you can vote for one of two policies that cost the same amount but reduce different kinds of risks.

- Policy #1 prevents 50 deaths caused by an environmental disaster.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

- Policy #1 prevents 250 deaths caused by an environmental disaster.
- Policy #2 prevents 25 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

- Policy #1 prevents 25 deaths caused by an environmental disaster.
- Policy #2 prevents 125 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

- Policy #1 prevents 125 deaths caused by an environmental disaster.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

- Policy #1 prevents 150 deaths caused by an environmental disaster.
- Policy #2 prevents 50 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

- Policy #1 prevents 100 deaths caused by an environmental disaster.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____environmental disaster policy
_____pandemic outbreak policy

SIMILAR RISKY EVENT 2 – TERRORIST ATTACK EXAMPLE

The September 11 Terrorist Attacks were a series of four suicide attacks that were committed in the United States on September 11, 2001, coordinated to strike the areas of New York City and Washington, D.C. Nearly 3,000 people died in the attacks.

The stock exchanges did not open on September 11 and remained closed until September 17. Reopening, the Dow Jones Industrial Average (DJIA) fell 684 points, or 7.1%, to 8921, a record-setting one-day point decline. By the end of the week, the DJIA had fallen 1,369.7 points (14.3%), at the time its largest one-week point drop in history. In 2001 dollars, US stocks lost $1.4 trillion in valuation for the week.

In New York City, about $2.8 billion dollars in wages were lost in the three months after the attacks. The city's GDP was estimated to have declined by $27.3 billion for the last three months of 2001 and all of 2002. The US government provided $11.2 billion in immediate assistance to the Government of New York City in September 2001, and $10.5 billion in early 2002 for economic development and infrastructure needs.

The September 11 attacks also led indirectly to the US wars in Afghanistan and Iraq, and additional homeland security spending, totaling at least $5 trillion.

Hundreds of thousands of tons of toxic debris resulted from the collapse of the Twin Towers containing more than 2,500 contaminants, including known carcinogens. Approximately 18,000 people have been estimated to have developed illnesses as a result of the toxic dust.

We are interested in your opinion about a new US policy to reduce the risk of a global pandemic. To better understand how you think about this policy relative to other risks, please answer the next two questions.

6. Again suppose you can vote for one of two policies that cost the same amount but reduce different kinds of risks.

- Policy #1 prevents 50 deaths caused by a terrorist attack.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

- Policy #1 prevents 250 deaths caused by a terrorist attack.
- Policy #2 prevents 25 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

- Policy #1 prevents 25 deaths caused by a terrorist attack.
- Policy #2 prevents 125 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

- Policy #1 prevents 125 deaths caused by an terrorist attack.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

- Policy #1 prevents 150 deaths caused by a terrorist attack.
- Policy #2 prevents 50 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

- Policy #1 prevents 100 deaths caused by a terrorist attack.
- Policy #2 prevents 100 deaths caused by a pandemic outbreak.

Which of the two policies would you prefer?
_____terrorist attack policy
_____pandemic outbreak policy

PART V: HOW DO PANDEMICS RELATE TO HOW WE DIE?

According to the National Institute of Health, infectious diseases kill more people worldwide than any other single cause. Over 14 million people per year die of infectious diseases. In the United States, on average 609 in 100,000 people are diagnosed with an infectious disease annually and approximately 55 per 100,000 people die of infectious diseases annually.

The Center for Disease and Pollution Control cites that "in the absence of any control measures (vaccination or drugs), it has been estimated that in the United States a medium–level pandemic could cause 89,000 to 207,000 deaths, 314,000 and 734,000 hospitalizations, 18 to 42 million outpatient visits, and another 20 to 47 million people being sick. On average the number of people who die from infectious diseases could more than double (123 in 100,000) in one year and the number of people infected could rise to over one-third of the population being infected.

To put this in perspective:

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On average 794 per 100,000 people die annually in the United States

- If the terrorist attacks of 2001 were repeated annually, less than 1 per 100,000 people in the United States would die annually
- 12 per 100,000 people in the United States die from the flu annually
- 14 per 100,000 people in the United States die in traffic accidents annually
- 195 per 100,000 people in the United States die from heart disease annually. Heart disease is the leading cause of death in the United States. Heart disease is not an infectious disease.

PART VI: HOW MUCH ARE YOU WILLING TO PAY TO REDUCE THE NUMBER OF DEATHS FROM A PANDEMIC?

Suppose a pandemic outbreak from diseased animals will reach the US in the next 15 years. The pandemic could be mild, medium, or severe, in terms of predicted deaths. Predicted US deaths for a mild pandemic are 22,000 more deaths in a year, for a medium pandemic are over 200,000 more deaths in a year, and for a severe pandemic are over one million more deaths in a year.

1. Suppose a US/global policy exists to reduce the probability of a pandemic outbreak from interactions with diseased animals; this policy would prevent _____ expected US deaths. This policy would cost your household $5 more each year. If you vote in favor of this policy it implies taking money away from other programs to reduce terrorism, flu, traffic accidents, cancer, and heart disease. Would you vote in favor of this policy?

   _____yes _____no

PART VIII: DEMOGRAPHICS

2. How old are you? _____

3. Are you _____male _____female

4. Are you currently _____married _____not married

5. How would you describe the people in YOUR HOUSEHOLD? (Mark ALL boxes that apply.)

_____Hispanic or Latino
_____Asian or Pacific Islander
_____Native American or Native Alaskan
_____Black or African American
_____White
_____Other

6. Which of the following describes your own current employment? (Please mark ALL boxes that apply.)

_____Employed full-time in one job
_____Employed part-time in one job
_____Employed part-time in two or more jobs
_____Self-employed
_____Looking for a job
_____Homemaker
_____Enrolled in school as a full-time student
_____Enrolled in school as a part-time student
_____Retired
_____Disabled
_____(None of these)

7. What is the highest level of education you have completed? (Mark only one.)

_____Did not complete high school
_____High school diploma or G.E.D.
_____Some college or technical school, no degree
_____Degree from a 2-year college or technical school
_____Degree from a 4-year college or university (B.A. or B.S.)
_____Post-graduate or professional degree (Masters, Ph.D., M.D., etc.)

8. Have you completed any courses in disease at a college or technical school?

_____yes _____no

9. Have you completed any courses in economics at a college or technical school?

_____yes _____no

10. Which do most likely affiliate with

_____Republican Party
_____Democratic Party
_____Other

11. Which one of the following categories best describes your household's total income during 2011, before taxes and other deductions? (Please include all income to the household such as wages, social security, interest, welfare payments, child support, etc. If you're not sure, please give us your best guess. This information is needed for statistical purposes, and will be kept confidential.)

_____$4,999 or less
_____$5,000 to $9,999
_____$10,000 to $14,999
_____$15,000 to $24,999
_____$25,000 to $34,999
_____$35,000 to $49,999
_____$50,000 to $74,999
_____$75,000 to $99,999
_____$100,000 to $149,999
_____$150,000 to $199,999
_____$200,000 or more
_____(Don’t know)
_____(Prefer not to answer)

APPENDIX B

Table A1: Interactions with main effects

Main effect	*Explanatory variable*	*Reasoning for interest*
Pandemic outbreak interactions		
	Region 1	Closer to Asian countries with history of outbreak
	Respondent diagnosed with ID	Risk more realistic
	Family diagnosed with ID	Risk more realistic; may feel inability to protect
	Friend diagnosed with ID	Risk more realistic; may feel inability to protect
	Retired	More severe on elderly
	Disease education	Understand risk better
	Income <$35,000	Favor more regulation
Environmental disaster interactions		
	Region 3	Expereince with Hurricane Katrina
	Hispanic	H5N1 originated in Mexico - Hispanic country
	Asian	Japan Tsunami
	Disabled	More severe on disabled
Terrorist attack deaths interactions		
	Region 2	Closer to 9/11
	White	Prejudice issues
	Republican	More in favor of terrorist policy
	Income >$150,000	Less regulation