The Lloyd's Register Foundation World Risk Poll

2019 Methodology

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ABOUT LLOYD'S REGISTER FOUNDATION

Lloyd's Register Foundation is an independent global charity that helps to protect life and property at sea, on land, and in the air. To do this, we support education, research and public engagement, and promote scientific excellence.

Lloyd's Register Foundation, 71 Fenchurch Street, London, EC3M 4BS, United Kingdom

Telephone: +44 20 7709 9166

www.lrfoundation.org.uk

ABOUT GALLUP

Gallup delivers analytics and advice to help leaders and organisations solve their most pressing problems. Combining more than 80 years of experience with its global reach, Gallup knows more about the attitudes and behaviours of employees, customers, students and citizens than any other organisation in the world. For more information about Gallup, please visit www.gallup.com/contact.

Appendix A: Methodology

This appendix will focus on key methodological details related to the Lloyd's Register Foundation World Risk Poll study, powered by Gallup, including how the questionnaire was developed, how the survey was fielded and how the data were analysed. The first section of this chapter will focus on the survey methodology of the World Risk Poll, including information about questionnaire development, translation, interviewer training, sampling and data collection and data preparation. The final section will provide additional information related to the analysis of the survey data, including the use of standardised variables, external metrics and the development of the Worry and Experience Indices[1].

Survey methodology

The 2019 World Risk Poll was included as a module within the Gallup World Poll. Since 2005, The Gallup World Poll has regularly surveyed people in over 160 countries, representing more than 98% of the world's population aged 15 and older, using randomly selected, nationally representative samples.

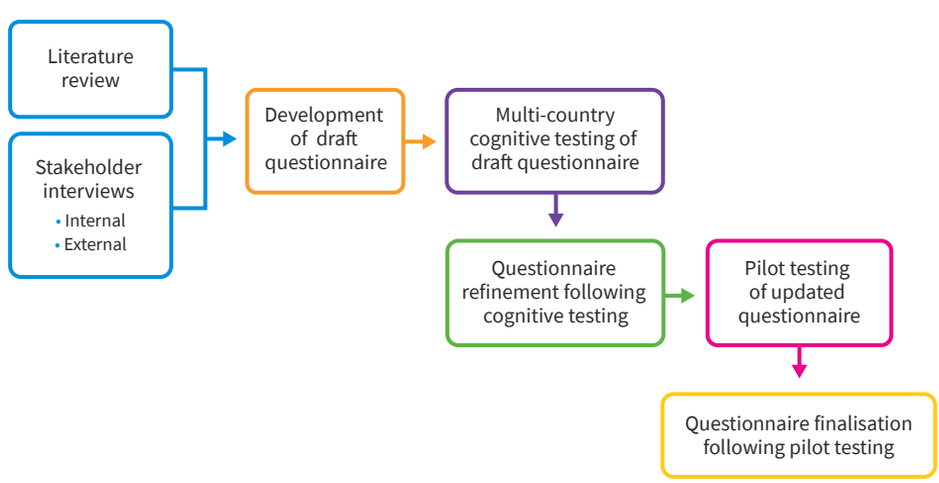
Questionnaire development

Designing policies to improve people's safety requires a robust comprehension of how people understand various aspects of risks and threats to their safety. One effective and reliable way to obtain this information is to ask people directly, through a rigorously designed survey instrument.

This was the central insight that led to the World Risk Poll, the first global survey of how people understand and perceive risk. Gallup and Lloyd's Register Foundation developed the World Risk Poll questionnaire in the second half of 2018, using a multi-step research process (see Chart A.1 below) that identified the most pressing risk and safety topics to include on the survey and how to ask about these issues in an unbiased and effective manner.

Chart A.1

Survey instrument development process



To learn more about this process, please see the 2019 report, Talking Risk: Developing the Questionnaire for the Lloyd's Register Foundation World Risk Poll[2].

1 These indices are explored in Chapter 3 of this report.
2 https://www.lrfoundation.org.uk/en/news/biggest-risks-facing-worlds-citizens/

Questionnaire translation

The questionnaire was translated into the major conversational languages of each country or territory.

First, Gallup created master language questionnaires in English, French, Spanish, Portuguese, Russian and Arabic. Then, local language translations were performed from the master language version. For example, first, the Russian master language questionnaire was created (translation from English to Russian) and it was then translated from Russian into local languages such as Ukrainian, Kyrgyz and Uzbek.

The key component of quality assurance in translation was an independent check of every questionnaire translation. One of these two translation methods was used in each country or territory:

- **Method 1:** Two independent translations are completed. An independent third party, with some knowledge of survey research methods, adjudicates the differences. A professional translator translates the final version back into the source language.
- **Method 2:** A translator translates into the target language, and an independent translator back-translates into the source language. An independent third party with knowledge of survey methods reviews and revises the translation, as necessary.

Local, professional translators who have experience in translating survey questionnaires and have typically worked for years with Gallup's local data collection network were selected. All translators received the same set of notes and guidance regarding the meaning of specific items.

Interviewers were instructed to follow the interview script and not to deviate from the translated language.

Interviewer training and quality control

In fielding the World Risk Poll, Gallup and its local vendors employed over 5,000 interviewers in the 142 countries. Interviewers for the World Risk Poll participated in standard Gallup training, which includes — among other things — the following topics:

- Research ethics, protecting respondents' confidentiality, staying safe while in the field
- Introductions: starting the interview
- Reading survey questions as on the questionnaire
- Handling questions from respondents
- Closed-ended items and open-ended items
- Read and rotate patterns
- Skip patterns
- Probing
- Respondent selection
- Household selection and substitution (for face-to-face countries)

During fieldwork, field supervisors and independent validation staff performed a minimum number of validations in each country or territory.

At least 30% of completed face-to-face interviews were validated using accompanied interviews, in-person re-contacts or telephone re-contacts. The supervisor/validator evaluated the interviewer's performance in implementing the survey methodology, including starting point selection, random route procedure, correct tracking sheet entry, respondent selection and proper questionnaire administration (reading each question, not leading the respondent, etc.).

In an accompanying interview, the supervisor was present for at least 50% of the interview (for example, if the interview was 40 minutes in length, the supervisor would have been present for at least 20 minutes). During re-contacts (in person or on the telephone), the respondent was re-contacted to validate the interview.

At least 15% of completed telephone interviews were validated by either listening to interviews live or listening to recorded interviews. Validations verify that the interview was completed, that methodological standards were followed (e.g., respondent selection) and that the questionnaire was administered appropriately (reading each question, not leading the respondent, etc.).

Sampling and data collection methodology

All samples are probability-based and nationally representative of the resident adult population. The coverage area is the entire country, including rural areas, and the sampling frame represents the entire civilian, non-institutionalised, aged 15 and older population (see Face-to-Face Survey Design and Telephone Survey Design sections below). Exceptions include areas where the safety of interviewing staff is threatened, scarcely populated islands in some countries and areas that interviewers can reach only by foot, animal or small boat.

Gallup uses telephone surveys in countries and territories where telephone coverage represents at least 80% of the population or is the customary survey methodology. In Central and Eastern Europe, much of Latin America, former Soviet states, nearly all of Asia and the Middle East and Africa, an area frame design is used for face-to-face interviewing. The data collection method used in each country is presented in Table A.3.

In most countries and territories, Gallup interviewed approximately 1,000 people as part of the World Risk Poll. Notable exceptions include China and India where over 3,000 interviews were collected, and in Russia where over 2,000 interviews were collected. Jamaica is the only country included in the World Risk Poll where fewer than 1,000 interviews were conducted; the sample size for that country was 501.

Face-to-face survey design

First stage: Stratification and sampling

In countries or territories where face-to-face surveys were conducted, sampling units were stratified by population size and/or geography, and clustering was achieved through one or more stages of sampling. Where population information was available, sample selection was based on probabilities proportional to population size, otherwise, simple random sampling was used. Samples were drawn independently of any samples drawn for surveys conducted in previous years. The goal was to identify 100 to 125 ultimate clusters (sampling units) consisting of clusters of households.

For face-to-face surveys, Gallup used three different sampling approaches, depending on the available population information:

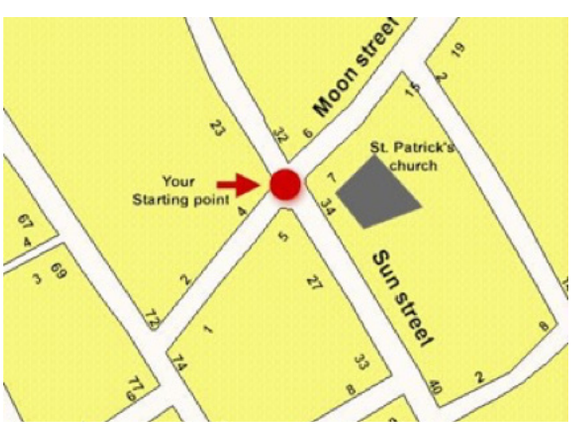
- **Method 1:** In countries or territories where Gallup has detailed population information from a recent census or other reliable sources, a stratified single-stage or multiple-stage cluster design is used. Sampling units are selected using probabilities proportional to population size for each sampling stage down to 100 to 125 ultimate clusters, with a fixed number of interviews (eight or 10) completed in each ultimate cluster. If a multiple stage of selection is used, a minimum of 33 Primary Sampling Units (PSUs) are selected.
- **Method 2:** In countries or territories with limited population information, Gallup uses a stratified multiple-stage cluster design. PSUs are selected using probabilities proportional to size, and units at subsequent stages are selected using simple random sampling. At least 33 PSUs are selected at the first stage of sampling, with 100 to 125 ultimate clusters selected at the last stage of sampling.
- **Method 3:** In countries or territories where only overall population information is available at the strata level (broad geographies/regions), and below that, just the name of units down to the lowest administrative unit are available, Gallup uses a stratified single-stage cluster design. PSUs (for example, wards or villages) are selected using simple random sampling. The sample design results in 100 to 125 PSUs/ultimate clusters.

Second stage: Household selection

Random route procedures were used to select sampled households. In each ultimate cluster, the supervisor or field manager pre-selected a starting point/address for the interviewer. Once the interviewer reached the starting point, he or she followed strict rules to determine the households he or she would visit to attempt an interview.

Definition of a household: All interviews took place at a person's home, which could be anything from a one-room flat to a single house. To be eligible, a household had to have its own cooking facilities, which could be anything from a standing stove in the kitchen to a small fire in the courtyard.

Movement from the starting point: Once at the given starting point, the interviewer placed his or her back to the (main) entrance of the structure and moved to the right (rule: *always go to the right*). Counting three households (excluding the starting point), the interviewer attempted a contact at the third household (main household). A higher interval (five or more) could be employed in dense urban areas or large apartment buildings. Unless an outright refusal occurred, interviewers could make up to three attempts to survey the household.



After visiting this first main household, the interviewer continued to select the third household to the right, and so on. If the interviewer was not successful in completing an interview at a selected household, it was replaced with another household using the same procedure.

The interviewer was instructed to count individual households and not houses, and not to count unoccupied structures. Group quarters (institutions and other group living arrangements such as rooming houses, dormitories and military barracks) were excluded from this survey.

Third stage: Respondent selection

The interviewer's next step was to randomly select the respondent within the household. The interviewer listed all household members aged 15 and older who lived in the household. The computer-assisted personal interviewing (CAPI) system then randomly selected the household member to be interviewed. If the country or territory survey was collected using paper and pencil interviewing (PAPI), then the selection of the household member to interview was performed using the Kish grid, a prominent method for randomly selecting members of a household[3].

If the selected respondent was temporarily unavailable, the interviewer would revisit the household at another time. If the selected respondent refused to take part in an interview or was unavailable for the remainder of the field period, the household was replaced with another household (following the random route procedure).

Telephone survey design

In countries or territories where interviews were conducted by telephone, a dual sampling frame was used (landline and mobile telephone), except for Finland and Libya, which were mobile telephone only.

For each country or territory, landline and mobile samples were generated by one of the following common approaches:

- Using a pure random-digit dialling (RDD) approach, where the national numbering plan was used to generate all possible telephone numbers. A stratified simple random sample was drawn, where the strata for the landline sample was based on geographic regions and for the mobile sample was based on mobile service providers.
- List-assisted RDD approach for landlines where directory listing was used to determine the active blocks of telephone numbers from which a stratified simple random sample was drawn.
- A random sample from a registered listing. The proportion of landline/mobile phone interviews to be completed in each country or territory was determined based on publicly available information from reliable large-scale nationally representative surveys on landline/mobile access and usage.

3 http://www.oecd.org/sdd/43017172.pdf

For respondents contacted by landline telephone, the respondent was randomly selected within the household (among eligible respondents aged 15 and older). In all Western Europe, Northern America and developed Asia, a random selection of the respondents was performed by asking for the person aged 15 and older who has the next birthday. For Gulf Cooperation Council (GCC) countries in the Middle East, the respondent was selected by first listing all household members aged 15 and older, and the computer-assisted telephone interviewing (CATI) program randomly selected the household member to be interviewed.

Interviewers made at least five attempts to reach a potential respondent, spread over different days and times of the day.

Survey response rates

As is the case with Gallup World Poll surveys more generally, response rates for the World Risk Poll vary considerably across countries, depending on how the survey was conducted (by phone or in-person interviewing) and region. In general, response rates are lower in countries where interviewing is conducted by telephone than in-person countries, though in many countries and territories where telephone interviewing is used, response rates are comparable to those of other polling firms[4].

While the Gallup World Poll does not publish response rates on a country-by-country basis, the below table provides the median response rate[5] for all countries or territories within the 15 regional units used in this report.

Table A.1

World Risk Poll response rates, median result by region

Region	No. of Countries in Region	Survey Mode (No. of countries)	Response Rate (median)
Australia & New Zealand	2	Telephone (2)	9%
Central Asia	8	In person (8)	63%
Central/Western Africa	18	In person (18)	80%
Eastern Africa	11	In person (10) Telephone (1)	79%
Eastern Asia	6	In person (2) Telephone (6)	14%
Eastern Europe	10	In person (10)	47%
Latin America & Caribbean	19	In person (19)	38%
Middle East	12	In person (7) Telephone (5)	45%
Northern Africa	5	In person (4) Telephone (1)	36%
Northern America	2	Telephone (2)	6%
Northern/Western Europe	16	In person (3) Telephone (13)	7%
Southeastern Asia	9	In person (9)	48%
Southern Asia	6	In person (6)	64%
Southern Africa	5	In person (5)	79%
Southern Europe	13	In person (7) Telephone (6)	34%

4 See for instance: https://www.pewresearch.org/methods/u-s-survey-research/our-survey-methodology-in-detail/

5 Reported response rates are computed using the American Association for Public Opinion Research's (AAPOR) Response Rate 3 method. For more information, please see: https://www.aapor.org/Education-Resources/For-Researchers/Poll-Survey-FAQ/Response-Rates-An-Overview.aspx

Data weighting

Data weighting was used to ensure samples are nationally representative for each country or territory and was intended to be used for calculations within a country.

First, Gallup constructed base sampling weights to account for household size. Weighting by household size (number of residents aged 15 and older) was used to adjust for the probability of selection, as residents in large households will have a disproportionately lower probability of being selected for the sample.

Second, to ensure the sample was projectable to the target population, post-stratification weights were constructed to correct for non-response. Population statistics were used to weight the data by gender, age, and, where reliable data were available, education or socioeconomic status.

Sampling error/Precision of estimates

When interpreting survey results, all sample surveys are subject to various types of potential errors. Errors may occur, for example, due to non-response (where selected respondents are never reached or refuse to participate), interviewer administration error (where a response can be typed incorrectly or misinterpreted by the interviewer) or incomplete or inaccurate answers from the respondent.

The sampling design employed in this study was used to produce unbiased estimates of the stated target population. An unbiased sample will have the same characteristics and behaviours as those of the total population from which it was drawn. In other words, with a properly drawn sample, we can make statements about the target population within a specific range of certainty. Sampling errors can be estimated, and their measures can be used to help interpret the final data results. The size of such sampling errors depends largely on the number of interviews and the complexity of the sampling design.

The margin of error (MOE), or the level of precision used in estimating the unknown population proportion 'P' can be derived based on the following formula[6]:

$$MOE = 1.96 * \sqrt{(P*(1-P)/n)}$$

where 'n' is the sample size (i.e., the number of completed surveys). Under the most conservative assumption (P = 0.5), the MOE for a sample size of 1,000 will be $1.96 * \sqrt{(0.25/1000)} = 3.1\%$ under the assumption of simple random sampling.

Table A.2 shows the size of the 95% confidence interval half-widths for various sample sizes under the assumption of simple random sampling. They may be interpreted as indicating the approximate range (plus or minus the figure shown) around the sample estimate within which the results of repeated sampling in the same time period could be expected to fall 95% of the time, assuming the same sampling procedures, interviewing process and questionnaire. For any given sample size, the estimated precision is lowest when P = 0.5 (or 50%). For example, the sample size needed to ensure a sampling error (or half-width of confidence interval) of 0.05 at 95% confidence level is around 400 cases when P = 0.5 (or 50%). A sample size of 300 will produce a sampling error close to 0.057 at 95% level of significance when P = 0.5 (or 50%). With P = 0.4 (or 40%), a sample size of 300 will produce a sampling error of 0.056. Table A.2 shows estimated precision levels (or half-widths of confidence intervals) for different values of P and sample sizes under the assumption of simple random sampling.

6 This formula is calculated at the 95% confidence level, i.e. α=.05, resulting in $z_{\alpha/2} = 1.96$.

Table A.2

95% Confidence interval half-widths for percentages for entire sample or subgroups, in percentage points

	For Percentages Near					
Sample Sizes Near	5/95% ±	10/90% ±	20/80% ±	30/70% ±	40/60% ±	50/50% ±
400	2.1	2.9	3.9	4.5	4.8	**4.9**
500	1.9	2.6	3.5	4.0	4.3	**4.4**
600	1.7	2.4	3.2	3.7	3.9	**4.0**
800	1.5	2.1	2.8	3.2	3.4	**3.5**
1,000	1.4	1.9	2.5	2.8	3.0	**3.1**
1,500	1.1	1.5	2.0	2.3	2.5	**2.5**
2,000	0.96	1.3	1.8	2.0	2.1	**2.2**
2,500	0.85	1.2	1.6	1.8	2.0	**2.0**
3,000	0.78	1.1	1.4	1.6	1.8	**1.8**
4,000	0.68	0.93	1.2	1.4	1.5	**1.5**
5,000	0.60	0.88	1.2	1.3	1.3	**1.4**

While the above table reflects precision assuming simple random sampling, face-to-face samples use complex designs involving stratification and clustering. Even for telephone samples, although drawn as simple random samples within each frame, the overall sample design is complex. In addition to design complexities, both modes of data collection are weighted to correct for unequal probabilities of household selection and for post-stratification adjustments. This introduces a design effect that needs to be taken into account while computing the sampling error (or precision) of the estimates. The design effect is defined as the ratio of the design-based sample variance to the sample variance obtained from a simple random sample of the same size. To calculate the precision of an estimate using the complex sampling design with a design effect, one must multiply the precision under the assumption of simple random sampling by the square root of the design effect associated with this estimate.

In other words, the precision of an estimate ('p') of an unknown population proportion 'P' may be approximated as:

$$\text{Precision } (p) = \{\text{SQRT } (\text{Deff})\} \times \text{SE}(p)$$

where 'Deff' is the design effect associated with the estimate (p)

$$\text{SE}(p) = \text{SQRT}\{p^*(1-p)/(n-1)\}$$

n = the unweighted sample size

For purposes of simplicity, an estimate of 'Deff_wt' is provided for each country or territory taking into consideration only the variability of weights[7]. In addition to the variability of weights, clustered samples in face-to-face surveys also contribute to the design effect by reducing the effective sample size. The intraclass correlation coefficient for each estimate and the average cluster size impacts the design effect is as follows:

$$Deff\_c = (1 + (c-1)*\rho)$$

Where 'Deff_c' is the design effect due to clustering, 'c' is the average cluster size and 'ρ' is the intraclass correlation coefficient for a particular estimate. For the purposes of illustration, given an average cluster size of 10 and an intraclass correlation coefficient estimate of 0.1, the design effect due to clustering is:

$$Deff\_c = (1 + (10-1)*0.1) = 1.9$$

Therefore, precision for estimates generated from face-to-face surveys can be approximated by this formula:

$$MOE = 1.96 * \sqrt{(P*(1-P)/n)} * \sqrt{(Deff\_wt)} * \sqrt{(Deff\_c)}$$

7 The design effect was defined formally by Kish (1965, Section 8.2, p. 258) as "the ratio of the actual variance of a sample to the variance of a simple random sample of the same number of elements." Based on Kish's approximate formula {design effect = (sample size)*(sum of squared weights)/ (square of the sum of weights)}.

Table A.3

Country dataset details, 2019 World Risk Poll

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Afghanistan	Nov 3 – Dec 15, 2019	1,127	1.38	3.4	Face-to-Face and Face-to-Face (HH)*	Dari, Pashto	Gender-matched sampling was used during the final stage of selection.
Albania	Jul 10 – Aug 7, 2019	1,080	1.43	3.6	Face-to-Face (HH)*	Albanian	People living in remote or difficult-to-access rural areas were excluded. This represents approximately 2% of the population.
Algeria	Sep 10 – Nov 17, 2019	1,100	1.59	3.7	Face-to-Face (HH)*	Arabic	Sparsely populated areas in the far South were excluded. This represents approximately 10% of the population.
Argentina	Sep 25 – Nov 7, 2019	1,060	1.45	3.6	Face-to-Face (HH)*	Spanish	Those living in dispersed rural population areas were excluded. This represents approximately 6% of the population.
Armenia	Aug 30 – Dec 30, 2019	1,080	1.36	3.5	Face-to-Face (HH)*	Armenian	
Australia	Aug 17 – Oct 2, 2019	1,003	1.58	3.9	Landline and Mobile Telephone	English	
Austria	Sep 30 – Oct 29, 2019	1,000	1.51	3.8	Landline and Mobile Telephone	German	
Azerbaijan	Sep 24 – Nov 4, 2019	1,080	1.32	3.4	Face-to-Face	Azeri, Russian	Kelbadjaro-Lacha, Nakhichevan and Nagorno-Karabakh territories were not included. These areas represent approximately 14% of the population.
Bahrain	Dec 5 – Dec 26, 2019	1,011	1.85	4.2	Landline and Mobile Telephone	Arabic, English.	Includes only Bahrainis, Arab expatriates and non-Arabs who were able to complete the interview in Arabic or English.

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Bangladesh	Jul 4 – Aug 23, 2019	1,072	1.27	3.7	Face-to-Face (HH)*	Bengali	Three hill districts in Chittagong (Rangamati, Khagrachori and Bandarban) and two districts in Rohingya rehabilitation areas (Teknaf and Ukhiya) were excluded for security reasons. The excluded areas represent approximately 3% of the population.
Belarus	Jul 21 – Sep 3, 2019	1,128	1.29	3.3	Face-to-Face (HH)*	Russian	
Belgium	Oct 11 – Dec 4, 2019	1,000	1.26	3.5	Landline and Mobile Telephone	French, Dutch	
Benin	Aug 9 – Aug 19, 2019	1,000	1.63	4.0	Face to Face (HH)*	Bariba, Fon, French	
Bolivia	Nov 15, 2019 – Jan 5, 2020	1,000	1.31	3.5	Face-to-Face (HH)*	Spanish	
Bosnia and Herzegovina	Aug 17 – Oct 24, 2019	1,080	1.40	3.5	Face-to-Face (HH)*	Bosnian, Croatian, Serbian	
Botswana	Oct 5 – Nov 18, 2019	1,114	1.65	3.8	Face-to-Face (HH)*	English, Setswana	
Brazil	Aug 27 – Oct 25, 2019	1,080	1.35	3.5	Face-to-Face (HH)*	Portuguese	People living in indigenous lands and dangerous areas where the safety of interviewers was threatened were excluded. The excluded areas represent approximately 1% of the population.
Bulgaria	Oct 12– Dec 19, 2019	1,080	1.39	3.5	Face-to-Face (HH)*	Bulgarian	
Burkina Faso	Aug 3 – Aug 19, 2019	1,000	1.47	3.8	Face-to-Face (HH)*	Dioula, French, Fulfulde, Moore	Some communities in the East and Sahel regions were excluded due for security reasons. The areas excluded represent approximately 5% of the population.
Cambodia	Aug 12 – Sep 15, 2019	1,000	1.50	3.8	Face-to-Face (HH)*	Khmer	Koh Kong, Stueng Treng and Otdor Meanchey provinces were excluded. These excluded areas represent approximately 3% of the population.
Cameroon	Jun 19 – Jul 21, 2019	1,000	1.52	3.8	Face-to-Face (HH)*	French, English, Fulfulde	Some arrondissements in the Extreme North region, the Northwest region and the South West region were excluded due to insecurity. Neighbourhoods with less than 50 households were also excluded from the sampling. The exclusion represents approximately 20% of the total population.
Canada	Aug 13 – Oct 16, 2019	1,026	1.41	3.6	Landline and Mobile Telephone	English, French	
Chad	Nov 17 – Dec 8, 2019	1,111	1.80	3.9	Face to Face (HH)*	French, Chadian Arabic, Ngambaye	Because of security issues and difficult terrain, eight regions are excluded from the sampling: Lac, Ouaddaï, Wadi Fira, Bourkou, Ennedi, Tibesti, Salamat and Sila. In addition, the North Kanem and Bahr El Gazal North districts were excluded due to accessibility issues. Quartiers/ villages with less than 50 inhabitants were also excluded from sampling. The excluded areas represent approximately 25% of the population.

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Chile	Nov 5, 2019 – Jan 17, 2020	1,060	1.32	3.5	Face-to-Face (HH)*	Spanish	
China	Aug 14 – Oct 23, 2019	3,709	1.42	1.9	Face-to-Face (HH)*	Chinese	Xinjiang and Tibet were excluded from the sample. The excluded areas represent approximately 5% of the population.
Colombia	Sep 17 – Oct 9, 2019	1,000	1.44	3.7	Face-to-Face (HH)*	Spanish	
Congo Brazzaville	Jul 8 – Sep 25, 2019	1,090	1.51	3.6	Face to Face (HH)*	French, Kituba, Lingala	
Costa Rica	Aug 8 – Oct 27, 2019	1,000	1.41	3.7	Face-to-Face (HH)*	Spanish	
Croatia	Sep 7 – Nov 18, 2019	1,080	1.53	3.7	Face-to-Face (HH)*	Croatian	
Cyprus	Oct 23 – Dec 23, 2019	1,009	1.42	3.7	Landline and Mobile Telephone	Greek, English	
Denmark	Sep 5 – Oct 2, 2019	1,000	1.24	3.5	Landline and Mobile Telephone	Danish	
Dominican Republic	Oct 26 – Nov 12, 2019	1,078	1.36	3.5	Face-to-Face (HH)*	Spanish	
Ecuador	Sep 26 – Nov 14, 2019	1,000	1.40	3.7	Face-to-Face (HH)*	Spanish	
Egypt	Oct 18 – Nov 18, 2019	1,070	1.25	3.3	Face to Face (HH)*	Arabic	Frontier governorates (Matruh, Red Sea, New Valley, North Sinai and South Sinai) were excluded, as they are remote and represent a small proportion of the population of the country. The excluded areas represent approximately 2% of the total population.
El Salvador	Sep 11 – Oct 26, 2019	1,080	1.42	3.5	Face-to-Face (HH)*	Spanish	
Estonia	Jun 26 – Aug 17, 2019	1,080	1.21	3.3	Face-to-Face (HH)*	Estonian, Russian	
Ethiopia	Aug 2 – Sep 6, 2019	1,121	1.38	3.4	Face-to-Face (HH)*	Amharic, Oromo, Tigrinya	Six of the nine zones of the Somali region (Degehabur, Warder, Korahe, Fik, Gode, Afder) were excluded due to accessibility, security issues, and nomadism. Additionally, in the Somali region, Liben Zone, Moyale and Dolo Ado Woreda were excluded because of security concerns. All the wordera in Benshangul region, Kamashi Zone were also excluded for security reasons. The exclusions represent approximately 4% of the population.
Finland	Aug 19 – Sep 23, 2019	1,000	1.82	4.2	Mobile Telephone	Finnish, Swedish	
France	Oct 14 – Nov 9, 2019	1,000	1.52	3.8	Landline and Mobile Telephone	French	
Gabon	Sep 19 – Oct 24, 2019	1,070	1.53	3.7	Face-to-Face (HH)*	French, Fang	
Gambia	Sep 27 – Oct 17, 2019	1,120	1.40	3.5	Face-to-Face (HH)*	English, Pulaar, Wolof, Malinke	

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Georgia	Aug 13 – Nov 9, 2019	1,080	1.46	3.6	Face-to-Face (HH)*	Georgian, Russian	South Ossetia and Abkhazia were not included for the safety of the interviewers. The excluded areas represent approximately 7% of the population.
Germany	Sep 30 – Oct 28, 2019	1,000	1.65	4.0	Landline and Mobile Telephone	German	
Ghana	Nov 25 – Dec 18, 2019	1,010	1.59	3.9	Face-to-Face (HH)*	English, Ewe, Twi, Dagbani	
Greece	Oct 6 – Dec 1, 2019	1,080	1.43	3.6	Face-to-Face (HH)*	Greek	
Guatemala	Jul 20 – Oct 18, 2019	1,100	1.22	3.3	Face-to-Face (HH)*	Spanish	
Guinea	Sep 28 – Oct 19, 2019	1,140	1.36	3.4	Face-to-Face (HH)*	French, Malinke, Pular, Soussou	
Honduras	Aug 26 – Oct 25, 2019	1,000	1.28	3.5	Face-to-Face (HH)*	Spanish	
Hong Kong	Aug 10 – Oct 25, 2019	1,002	1.27	3.5	Landline and Mobile Telephone	Chinese	
Hungary	May 8 – Sep 15, 2019	1,080	1.46	3.6	Face-to-Face (HH)*	Hungarian	
India	Nov 4, 2019 – Jan 8, 2020	3,377	1.48	2.0	Face-to-Face (HH)*	Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Odia, Punjabi, Tamil, Telugu	The survey excluded populations living in Northeast states and remote islands. The excluded areas represent approximately 10% of the population.
Indonesia	Sep 30 – Oct 26, 2019	1,094	1.41	3.5	Face-to-Face (HH)*	Bahasa Indonesia	
Iran	Jun 18 – Jun 24, 2019	1,005	1.36	3.6	Landline and Mobile Telephone	Farsi	
Iraq	Nov 27 – Dec 28, 2019	1,097	1.36	3.4	Face-to-Face (HH)* and PAPI	Arabic, Kurdish	The provinces of Maysan and Dohuk were excluded. These areas represent approximately 6% of the population.
Ireland	Sep 18 – Oct 15, 2019	1,000	1.54	3.8	Landline and Mobile Telephone	English	
Israel	Dec 5 – Jan 23, 2019	1,095	1.17	3.2	Face-to-Face	Hebrew, Russian, Arabic	The sample did not include the area of East Jerusalem. This area was included in the sample of Palestinian Territories.
Italy	Sep 23 – Oct 15, 2019	1,000	1.94	4.3	Landline and Mobile Telephone	Italian	
Ivory Coast	Jul 18 – Aug 3, 2019	1,000	1.65	4.0	Face-to-Face (HH)*	French, Dioula	
Jamaica	Dec 18 – Feb 17, 2020	501	1.51	5.4	Face-to-Face (HH)*	English	

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Japan	Aug 16 – Oct 18, 2019	1,012	1.42	3.7	Landline and Mobile Telephone	Japanese	Landline RDD, excluded 12 municipalities near the nuclear power plant in Fukushima. These areas were designated as not-to-call districts due to the devastation from the 2011 disasters. The exclusion represents approximately 1% of the population.
Jordan	Nov 4 – Nov 16, 2019	1,001	1.27	3.5	Face-to-Face (HH)*	Arabic	
Kazakhstan	Jul 11 – Sep 2, 2019	1,080	1.52	3.7	Face-to-Face (HH)*	Russian, Kazakh	
Kenya	Jul 2 – Jul 21, 2019	1,001	1.58	3.9	Face-to-Face (HH)*	English, Swahili	Mandera County, Wajir County, Marsanit County, Baringo County and Garissa County (except some areas in Garissa and Lagdera districts) were excluded due to accessibility and/or security issues. The exclusions represent approximately 8% of the population.
Kosovo	Jul 1 – Oct 27, 2019	1,088	1.43	3.5	Face-to-Face (HH)*	Albanian, Serbian	
Kuwait	Jul 8 – Aug 21, 2019	1,030	1.42	3.7	Mobile Telephone	Arabic, English	Includes only Kuwaitis, Arab expatriates and non-Arabs who were able to complete the interview in Arabic or English.
Kyrgyzstan	Jul 21 – Nov 3, 2019	1,080	1.49	3.6	Face-to-Face (HH)*	Kyrgyz, Russian, Uzbek	
Laos	Oct 7 – Oct 28, 2019	1,070	1.27	3.4	Face-to-Face (HH)*	Lao	Excluded Xaisomboun Province, Xayaboury Province and some communes that were unreachable and/or have security considerations. The excluded areas represent approximately 10% of the population.
Latvia	Oct 27 – Dec 14, 2019	1,080	1.21	3.3	Face-to-Face (HH)*	Latvian, Russian	
Lebanon	Nov 14, 2019 – Jan 14, 2020	1,040	1.33	3.5	Face to Face (HH)*	Arabic	Hermel, Baalbak and Bint Jbeil under the strict control of Hezbollah were excluded. The excluded areas represent approximately 10% of the population.
Lesotho	Dec 5 – Dec 16, 2019	1,000	1.50	3.8	Face-to-Face (HH)*	English, Sotho	
Liberia	May 30 – Jun 23, 2019	1,000	1.41	3.7	Face-to-Face (HH)*	English, Pidgin English	
Libya	Nov 5 – Nov 17, 2019	1,000	1.59	3.9	Mobile Telephone	Arabic	
Lithuania	Nov 16 – Dec 22, 2019	1,080	1.18	3.2	Face-to-Face (HH)*	Lithuanian	People living in very small settlements (with less than 100 inhabitants) were excluded from survey. These excluded areas represent approximately 9% of the population.
Luxembourg	Oct 14 – Nov 11, 2019	1,000	1.50	3.8	Landline and Mobile Telephone	French, German	

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
North Macedonia	Jul 1 – Aug 13, 2019	1,080	1.38	3.5	Face-to-Face (HH)*	Macedonian, Albanian	
Madagascar	Jun 19 – Jul 19, 2019	1,000	1.58	3.9	Face to Face (HH)*	French, Malagasy	Regions that were unsafe or unreachable were excluded from the sample. The excluded areas represent approximately 20% of the population.
Malawi	Sep 11 – Sep 23, 2019	1,000	1.32	3.6	Face-to-Face (HH)*	Chichewa, English, Tumbuka	
Malaysia	Sep 13, – Nov 7, 2019	1,060	1.32	3.5	Face-to-Face (HH)*	Bahasa Malay, Chinese, English	
Mali	Aug 23 – Oct 4, 2019	1,130	1.51	3.6	Face-to-Face (HH)*	French, Bambara	The regions of Gao, Kidal, Mopti and Tombouctou were excluded because of insecurity. Quartiers and villages with less than 50 inhabitants were also excluded from the sample. The excluded areas represent approximately 23% of the population.
Malta	Jul 24 – Sep 6, 2019	1,000	1.59	3.9	Landline and Mobile Telephone	Maltese, English	
Mauritania	Nov 5 – Nov 29, 2019	1,100	1.63	3.8	Face to Face (HH)*	French, Poulaar, Hassanya	
Mauritius	Jun 16 – Jul 22, 2019	1,000	1.55	3.9	Landline and Mobile Telephone	Creole, English, French	
Mexico	Oct 22 – Dec 8, 2019	1,001	1.27	3.5	Face-to-Face (HH)*	Spanish	
Moldova	Jun 22 – Sep 4, 2019	1,080	1.22	3.3	Face-to-Face (HH)*	Romanian/ Moldavian, Russian	Transnistria (Prednestrovie) was excluded for safety of interviewers. The excluded area represents approximately 13% of the population.
Mongolia	Jun 8 – Jul 3, 2019	1,070	1.21	3.3	Face-to-Face (HH)*	Mongolian	
Montenegro	Jun 11 – Aug 23, 2019	1,080	1.39	3.5	Face-to-Face (HH)*	Montenegrin, Serbian	
Morocco	Oct 15 – Nov 4, 2019	1,015	1.33	3.5	Face to Face (HH)*	Moroccan Arabic	Excludes the Southern provinces. The excluded area represents approximately 3% of the population.
Mozambique	Nov 20 – Dec 17, 2019	1,000	1.51	3.8	Face-to-Face (HH)*	Portuguese, Xichangana, Emakhuwa	A small number of districts were excluded due to insecurity. In addition, areas were excluded due to destruction to infrastructure caused by Cyclone Idai. The excluded areas represent approximately 6% of the population.
Myanmar	Jun 3 – Jun 23, 2019	1,100	1.25	3.3	Face to Face (HH)*	Burmese	Chin and Kayah states, and portions of Kachin and Rakhine states, were excluded. The excluded areas represent approximately 5% of the population.
Namibia	Sep 4 – Oct 15, 2019	1,002	1.51	3.8	Face-to-Face (HH)*	English, Oshivambo, Afrikaans	
Nepal	Jun 24 – Sep 27, 2019	1,095	1.39	3.5	Face-to-Face (HH)*	Nepali	
Netherlands	Sep 5 – Nov 28, 2019	1,001	1.52	3.8	Landline and Mobile Telephone	Dutch	

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
New Zealand	Aug 3 – Sep 14, 2019	1,006	1.65	4.0	Landline and Mobile Telephone	English	
Nicaragua	Oct 16 – Dec 19, 2019	1,080	1.51	3.7	Face-to-Face (HH)*	Spanish	
Niger	Oct 27 – Nov 13, 2019	1,000	1.52	3.8	Face-to-Face (HH)*	French, Hausa, Zarma	
Nigeria	Sep 16 – Oct 27, 2019	1,000	1.67	4.0	Face to Face (HH)*	English, Hausa, Igbo, Pidgen English, Yoruba	The states of Adamawa, Borno and Yobe were excluded for safety and security reasons. These areas represent approximately 7% of the population.
Norway	Sep 23 – Oct 10, 2019	1,000	1.47	3.8	Landline and Mobile Telephone	Norwegian	
Pakistan	Nov 18, 2019 – Jan 1, 2020	1,091	1.54	3.7	Face to Face (HH)*	Urdu	Survey did not include AJK, Gilgit-Baltistan. The excluded area represents approximately 5% of the population. Gender-matched sampling was used during the final stage of selection.
Palestinian Territories	Jun 29 – Jul 22, 2019	1,090	1.35	3.5	Face-to-Face (HH)*	Arabic	Areas with security concerns close to the Israeli borders, areas that are accessible only to special Israeli permit holders and areas with population concentrations less than 1,000 people were excluded. The excluded areas represent approximately 2% of the population. The sample included East Jerusalem.
Panama	Sep 26 – Nov 15, 2019	1,080	1.39	3.5	Face-to-Face (HH)*	Spanish	
Paraguay	Oct 25 – Nov 27, 2019	1,079	1.37	3.5	Face-to-Face (HH)*	Spanish, Jepora	
Peru	Aug 22 – Oct 7, 2019	1,000	1.47	3.8	Face-to-Face (HH)*	Spanish	
Philippines	Oct 8 – Oct 24, 2019	1,090	1.49	3.6	Face-to-Face (HH)*	Filipino, Iluko, Hiligaynon, Cebuano, Chavacano	Some areas were excluded from the sampling frame, due to security concerns (such as barangays considered as war zones in Marawi) and areas that are remote or inaccessible. The excluded population from these areas represent approximately 1% of the population.
Poland	Oct 4 – Dec 10, 2019	1,080	1.33	3.4	Face-to-Face (HH)*	Polish	Low population areas were excluded. The excluded areas represent approximately 5% of the population.
Portugal	Sep 5 – Oct 25, 2019	1,001	1.69	4.0	Landline and Mobile Telephone	Portuguese	
Romania	Jul 15 – Nov 4, 2019	1,080	1.38	3.5	Face-to-Face (HH)*	Romanian	
Russia	Nov 6, 2019 – Feb 2, 2020	2,168	1.35	2.4	Face-to-Face (HH)*	Russian	People living in very remote or difficult to access areas were excluded. The excluded areas represent approximately 5% of the population.
Rwanda	Nov 5 – Nov 22, 2019	1,000	1.36	3.6	Face-to-Face (HH)*	English, French, Kinyarwanda	

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Saudi Arabia	Jul 20 – Aug 24, 2019	1,000	1.58	3.9	Landline and Mobile Telephone	Arabic, English, Urdu, Hindi	Includes Saudis, Arab expatriates and non-Arabs who were able to complete the interview in Arabic, English, Urdu or Hindi.
Senegal	Sep 18 – Sep 29, 2019	1,000	1.35	3.6	Face-to-Face (HH)*	French, Wolof	
Serbia	Jul 29 – Nov 11, 2019	1,080	1.37	3.5	Face-to-Face (HH)*	Serbian	
Sierra Leone	Jun 7 -- Jun 29, 2019	1,133	1.52	3.6	Face-to-Face (HH)*	English, Krio, Mende	
Singapore	Jul 1 – Nov 20, 2019	1,040	1.51	3.7	Face-to-Face (HH)*	English, Chinese	Some condominiums were excluded due to restricted access. This exclusion represents approximately 12% of the population.
Slovakia	Oct 3 – Nov 19, 2019	1,080	1.34	3.5	Face-to-Face (HH)*	Hungarian, Slovak	
Slovenia	Sep 30 – Nov 17, 2019	1,001	1.50	3.8	Landline and Mobile Telephone	Slovene	
South Africa	Nov 16 – Dec 8, 2019	1,060	1.35	3.5	Face-to-Face (HH)*	Afrikaans, English, Sotho, Xhosa, Zulu	
South Korea	Aug 19 -- Oct 17, 2019	1,007	1.40	3.7	Landline and Mobile Telephone	Korean	
Spain	Sep 23 – Oct 14, 2019	1,000	1.51	3.8	Landline and Mobile Telephone	Spanish	
Sri Lanka	Sep 19 – Nov 18, 2019	1,083	1.49	3.6	Face-to-Face (HH)*	Sinhala, Tamil	
Swaziland (Eswatini)	Sep 7 – Sep 27, 2019	1,110	1.52	3.6	Face-to-Face (HH)*	Siswati, English	
Sweden	Sep 2 – Oct 1, 2019	1,000	1.39	3.7	Landline and Mobile Telephone	Swedish	
Switzerland	Oct 14 – Nov 16, 2019	1,000	1.42	3.7	Landline and Mobile Telephone	German, French, Italian	
Taiwan	Jul 15 – Aug 8, 2019	1,000	1.44	3.7	Landline and Mobile Telephone	Chinese	
Tajikistan	Dec 17 – Dec 30, 2019	1,080	1.42	3.5	Face-to-Face (HH)*	Tajik	
Tanzania	Oct 29 – Nov 18, 2019	1,000	1.43	3.7	Face-to-Face (HH)*	English, Swahili	
Thailand	Jun 17 – Nov 19, 2019	1,000	1.51	3.8	Face-to-Face (HH)*	Thai	Three provinces in the South region (Pattani, Narathiwat and Yala) were excluded for security reasons. A few districts in other provinces were also excluded. The excluded areas represent approximately 4% of the population.
Togo	Oct 1 – Oct 19, 2019	1,130	1.72	3.8	Face-to-Face (HH)*	French, Ewe	
Tunisia	Jul 16 – Jul 28, 2019	1,000	1.29	3.5	Face-to-Face (HH)*	Arabic	
Turkey	Sep 28 – Nov 25, 2019	1,059	1.27	3.4	Face-to-Face (HH)*	Turkish	

Country	Data Collection Date	Number of Interviews	Design Effect	Margin of Error	Mode of Interviewing	Languages	Exclusions
Turkmenistan	Jul 16 – Oct 19, 2019	1,089	1.15	3.2	Face-to-Face (HH)*	Turkmen, Russian	
Uganda	Dec 2 – Dec 16, 2019	1,000	1.51	3.8	Face-to-Face (HH)*	Ateso, English, Luganda, Runyankole	Three districts in the North region were excluded for security reasons – Kotido, Moroto and Nakapiripirit. The excluded areas represent approximately 4% of the population.
Ukraine	Oct 5 – Nov 14, 2019	1,080	1.42	3.6	Face-to-Face (HH)*	Russian, Ukrainian	Due to situation in the East of Ukraine, occupied and conflict areas in Donetsk and Lugansk oblasts were excluded. The excluded areas represent approximately 9% of the population.
United Arab Emirates	Nov 26 – Dec 24, 2019	1,004	1.30	3.5	Landline and Mobile Telephone	Arabic, English	Includes only Emiratis, Arab expatriates and non-Arabs who were able to complete the interview in Arabic or English.
United Kingdom	Sep 18 – Oct 14, 2019	1,000	1.48	3.8	Landline and Mobile Telephone	English	
United States	May 20 – Aug 21, 2019	1,014	1.59	3.9	Landline and Mobile Telephone	English, Spanish	
Uruguay	Nov 26, 2019 – Jan 17, 2020	1,080	1.39	3.5	Face-to-Face (HH)*	Spanish	
Uzbekistan	Jun 26 – Aug 10, 2019	1,080	1.55	3.7	Face-to-Face (HH)*	Uzbek, Russian	
Venezuela	Sep 27 – Oct 28, 2019	1,080	1.41	3.5	Face-to-Face (HH)*	Spanish	The Federal Dependencies were excluded due to remoteness and difficulty of access. Exclusions represent approximately 1% of the population.
Vietnam	May 18 – June 21, 2019	1,002	1.32	3.6	Face-to-Face (HH)*	Vietnamese	Long An province was excluded. The excluded area represents approximately 2% of the population.
Yemen	Oct 16 – Dec 22, 2019	1,140	1.49	3.5	Face-to-Face and Face-to-Face (HH)*	Arabic	Gender-matched sampling was used during the final stage of selection. Al-Mahra, Sadah Governorate and the island of Socotra were excluded due to their small size and remoteness. These excluded areas represent approximately 4% of the population. In addition, due to the ongoing security concerns, half the PSUs were replaced with similar PSUs in the same provinces.
Zambia	Oct 19 – Nov 27, 2019	1,000	1.32	3.6	Face-to-Face (HH)*	Bemba, English, Lozi, Nyanja, Tonga	
Zimbabwe	Jul 22 – Aug 26, 2019	1,082	1.44	3.6	Face-to-Face (HH)*	English, Shona, Ndebele	

Methods for report analysis

As the first global study of attitudes toward risk and safety, the overarching aim of the Lloyd's Register Foundation World Risk Poll is to provide new evidence and insight as to how people around the world think and feel about the risks they face in their daily lives. The study also aims to build on past research, by examining critical topics in the public understanding of risk in a cross-country manner.

To realise these goals, Lloyd's Register Foundation and Gallup undertook a rigorous research process to develop a cross-cultural survey questionnaire on various aspects of risk and safety. This process was briefly described in the first section of this chapter and is fully detailed in the Talking Risk: Developing the Questionnaire for the Lloyd Register Foundation's World Risk Poll.

However, constructing and then fielding an effective, relevant questionnaire is only one step, important though it may be, toward the goal of producing fresh insights and empirical discoveries that can help make the world a safer place. Another pivotal step lies in the analysis and reporting of the World Risk Poll data — the primary focus of this report — where researchers apply quantitative and statistical techniques to further investigate the major research questions and hypotheses of interest.

> The results of the poll will be used to influence action to reduce risk, accidents and deaths.
>
> By identifying differences between people's thoughts about, and experiences of risk, regulators, businesses, governments and researchers can work with communities and develop relevant and relatable policies that empower people to take action, that saves lives and help them feel safer. (Lloyd's Register Foundation)
>
> **- Lloyd's Register Foundation, The World Risk Poll**
>
> https://www.lrfoundation.org.uk/en/funding/our-major-grants/world-risk-poll/

In reviewing the results of the World Risk Poll, as well as providing additional interpretation and analysis of the data, this report has identified the major research questions of interest[8]; additional background on the research goals of the study can also be found in aforementioned Talking Risk report.

This section will focus on the quantitative and statistical methods used to investigate these research questions and, more generally, interpret the findings of the inaugural wave of the World Risk Poll. The remainder of this section is structured as follows: the discussion first focuses on how the overall survey results (i.e., estimates of how people answered questions on the World Risk Poll at the national, cross-country and global levels) were reported and calculated. Next, we review additional variables used in the analysis, including respondent demographic characteristics, other questions items on the Gallup World Poll and external statistics. The focus then shifts to examining the multivariate statistical techniques used in the report, including a detailed discussion of several key analyses, including the development of the Worry and Experience Indices (see Chapter 3), the Government Safety Performance Index (see Chapter 9) and the forecasting of key World Risk Poll metrics explored in Chapter 10.

World Risk Poll results: Reporting and calculation

The first step in the analysis was to describe the overall results of the World Risk Poll, with results generally being reported out at three levels: globally, cross-country (e.g., by region or country-income level) and nationally.

All results presented by country or territory were weighted to enhance the representativeness of the data (see Survey Methodology for more on this). Results that were aggregated across more than one country (for instance by region or country-income level) were, unless otherwise noted, weighted by the 15 and older population size of the countries or territories included in the analysis. This gave larger countries more weight than smaller countries.

8 The research questions of interest are identified at the beginning of each chapter.

Country groupings used in the analysis

Geographic region: All 142 countries or territories included in the World Risk Poll were divided into 15 regional groups (see inset box). These geographic regions closely follow those used by the United Nations Statistics Division (UNSD)[9], though in some instances these definitions were modified. Most notably, the UNSD region of 'Western Asia' was renamed to the more familiar name of the 'Middle East'; countries assigned to the Western Asia region used by the UNSD but not traditionally associated with the Middle East (such as Armenia, Azerbaijan and Georgia) were placed in different regions.

Additionally, this report combined some UNSD regions, to reduce the number of categories, including Latin America and the Caribbean (which consists of the UNSD regions of the Caribbean, South America and Central America); Middle/Western Africa (consists of the UNSD regions of Middle Africa and Western Africa) and Northern/Western Europe (consists of the UNSD regions Northern and Western Europe).

Regional groupings used in this report

Africa

- **Central/Western:** Benin, Burkina Faso, Cameroon, Chad, Congo Brazzaville, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo
- **Eastern:** Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe
- **Northern:** Algeria, Egypt, Libya, Morocco, Tunisia
- **Southern:** Botswana, Eswatini, Lesotho, Namibia, South Africa

Americas

- **Latin American and Caribbean:** Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
- **Northern America:** Canada, United States of America

Asia

- **Central Asia:** Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
- **Eastern Asia:** China, Hong Kong, Japan, Mongolia, South Korea, Taiwan
- **Middle East:** Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Palestine, Saudi Arabia, Turkey, United Arab Emirates, Yemen
- **Southeastern Asia:** Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
- **Southern Asia:** Afghanistan, Bangladesh, India, Nepal, Pakistan, Sri Lanka

Europe

- **Eastern Europe:** Belarus, Bulgaria, Hungary, Kosovo, Moldova, Poland, Romania, Russia, Slovakia, Ukraine
- **Northern/Western Europe:** Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Ireland, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom
- **Southern Europe:** Albania, Bosnia Herzegovina, Croatia, Cyprus, Greece, Italy, Malta, Montenegro, North Macedonia, Portugal, Serbia, Slovenia, Spain

Oceania

- **Australia and New Zealand:** Australia, New Zealand

9 https://unstats.un.org/unsd/methodology/m49/

Country-income level: The report frequently examines World Risk Poll results by country income group, consisting of four income groups — high, upper-middle, lower-middle and low. Countries or territories were classified according to the 2019-2020 thresholds the World Bank announced on 01 July, 2019[10]. These thresholds are as follows:

- **Low income:** Gross national income (GNI) per capita of $1,026 or less
- **Lower-middle income:** GNI per capita of $1,026 and $3,995
- **Upper-middle income:** GNI per capita of $3,996 and $12,375
- **High income:** GNI per capita above $12,375.

Overall, 21 countries included in the study were classified as low-income economies, 34 as lower-middle income economies, 43 as upper-middle income economies and 44 as high-income economies.

Demographic comparisons: Standardisation of income and education groups

Another key research objective was to assess how attitudes about risk and safety varied across important demographic groups, including gender, education, household income and age, to name a few examples.

The ways that income and education were reported vary by country or territory, making equivalent cross-cultural comparisons difficult. Gallup harmonised education variables and consulted with Gallup Senior Scientist Angus Deaton to create income variables. In doing so, Gallup has created a worldwide data set with standardised respondent-level education and income data.

Education

Countries and territories have unique ways of classifying education levels, and these classifications needed to be preserved during data collection for weighting purposes. However, to make comparisons across countries and territories by educational attainment, consistent categories also needed to be created. All education descriptions can be placed within three categories: primary, secondary and tertiary. All responses regarding education were coded into their relevant category for global comparison.

- **Primary (0-8 years):** Functional equivalent to completing primary education or lower secondary or less, the level that is closest to completing up to eight years of education. The exact definition varies by country.
- **Secondary (9-15 years):** Functional equivalent to completing some secondary up to some tertiary education. This typically refers to individuals who have completed between nine and 15 years of education but have not yet completed the equivalent of a bachelor's degree. The exact definition varies by country.
- **Tertiary (16 years or more):** Functional equivalent to completing four years of post-secondary tertiary education, or the equivalent of a bachelor's degree. This typically refers to individuals who have completed approximately 16 or more years of education. The exact definition varies by country.

Income

To provide household income measurements, Gallup asked respondents two questions. The first question asked respondents about their monthly household income in local currency before taxes. Respondents were instructed to include all income from all wages and salaries in the household, remittances from family members living elsewhere and all other sources. If the respondents hesitated to answer or had difficulty answering the first question, they were presented with a set of income ranges in their local currency and were asked which group they fell into.

- What is your total MONTHLY household income in (country), before taxes? Please include income from wages and salaries, remittances from family members living elsewhere, farming, and all other sources.
- (If don't know or refused, ask:) Would you say your total MONTHLY household income is _____?

Estimates for respondents answering the second income question were imputed using hot-deck imputation but restricting imputing values to the reported range. Estimates for respondents who did not answer either income question were imputed using the same method, with no restriction of range. In this imputation process, each missing value was replaced with an observed value from another unit that had characteristics similar to the missing unit.

10 https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2019-2020

The hot-deck imputation procedure matched respondents with answers and without answers (called 'donors' and 'beggars,' respectively) by a set of external independent variables that are expected to be related to both household income and non-response to the household income survey question. For imputing household income, the list of these variables included survey items related to respondents' feelings about household income, ratings of standards of living, reporting of not having enough money for food, household size and other variables that may vary by country, such as urbanicity. Below is an illustration:

Louise did not report her exact household income but reported $10k–20k in the follow-up closed-ended item. Her household income was imputed by finding a respondent with the same or very similar characteristics on the survey variables who did report their income and whose reported income was between $10K and $20K. That respondent's income value was used to fill in Louise's household income.

After the imputation of income ranges and missing values, income data were annualised, and per capita annual income was calculated by dividing household income by the total number of persons living in the household. Per capita annual income was used to create income quintiles within each country dataset.

About Gallup World Poll metrics used in the analysis

The Gallup World Poll has developed over two dozen indices that summarise how people feel about social, political and economic matters. The Gallup 'Worldwide Research Methodology and Codebook' provides detailed information about each of these indices, including the specific survey questions used, the larger concepts measured and additional technical information.

This appendix provides an overview of two indices that are featured prominently in the analysis of this report, including the National Institutions Index and the Food and Shelter Index.

National Institutions Index

The National Institutions Index reflects citizens' confidence in key institutions prominent in a country's leadership: the military, the judicial system, the national government and the honesty of elections.

Index questions

- Do you have confidence in each of the following, or not? How about the military?
- Do you have confidence in each of the following, or not? How about the judicial system and courts?
- Do you have confidence in each of the following, or not? How about the national government?
- Do you have confidence in each of the following, or not? How about the honesty of elections?

Index construction

Index scores are calculated at the individual record level. For each individual record, the following procedure applies: The four items are recoded so that positive answers are scored as a '1' and all other answers (including 'don't know' and 'refused') are assigned a score of '0'. If a record has no answer for an item[11], then that item is not eligible for inclusion in the calculations. An individual record has an index calculated if it has valid scores for at least two of the four items. A record's final index score is the mean of valid items multiplied by 100. The final country-level index score is the mean of all individual records for which an index score was calculated. Country-level weights are applied to this calculation.

Reliability

The National Institutions Index has a Cronbach's alpha of 0.87 when aggregated at the country level.

11 This occurs when the respondent has not been asked the item, typically because the question was omitted from that country's Gallup World Poll questionnaire.

Food and Shelter Index

The Food and Shelter Index assesses the ability people have to meet basic needs for food and shelter. Lower scores on this index indicate that more respondents reported struggling to afford food and shelter in the past year, while higher scores indicate fewer respondents reported such struggles.

As would be expected, respondents in wealthier countries are more likely than those in lesser developed countries or territories to report difficulties in affording food and shelter. However, even in the wealthiest countries or territories, some percentage of the population has struggled. The Food and Shelter Index serves as an effective summary measure and indicator of the prevalence of poverty across individuals in a group, country, territory or region.

Index questions

- Have there been times in the past 12 months when you did not have enough money to buy food that you or your family needed?
- Have there been times in the past 12 months when you did not have enough money to provide adequate shelter or housing for you and your family?

Index construction

Index scores are calculated at the individual record level. For each individual record the following procedure applies: The two items are recoded so that positive (or favorable) answers are scored a '1' and all other answers (including 'don't know' and 'refused') are assigned a score of '0'. If a record has no answer for an item, then that item is not eligible for inclusion in the calculations. An individual record has an index calculated if it has valid scores for both questions. A record's final index score is the mean of valid items multiplied by 100. The final country-level index score is the mean of all individual records for which an index score was calculated. Country-level weights are applied to this calculation.

Reliability

The Food and Shelter Index has a Cronbach's alpha of 0.82 when aggregated at the country level.

Life Evaluation Index

The Life Evaluation Index measures respondents' perceptions of where they stand now and in the future. Building on the earlier work by Hadley Cantril and the Cantril Self-Anchoring Striving Scale[12], Gallup measures life satisfaction by asking respondents to place the status of their lives on a 'ladder' scale with steps numbered from 0 to 10, where '0' indicates the worst possible life and '10' the best possible life. Individuals who rate their current lives a '7' or higher AND their future an '8' or higher are 'thriving'. Individuals are 'suffering' if they report their current AND future lives as a '4' and lower. All other individuals are 'struggling'.

Index questions

- Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time? (WP16)
- Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. Just your best guess, on which step do you think you will stand in the future, say about five years from now? (WP18)

Index construction

Index scores are calculated at the individual record level. For each individual record, the following procedure applies. Individuals who rate their current lives a '7' or higher AND their future an '8' or higher are coded as '1', 'thriving'. Individuals are 'suffering' if they report their current AND future lives as a '4' or lower and are coded as '3'. All other individuals are coded as '2', 'struggling'. A respondent must have answered both questions to have indices calculated. The final country-level index is a variable that codes respondents into one of three categories of wellbeing and represents the percentage of respondents in each category. Country-level weights are applied to this calculation.

Reliability

The Life Evaluation Index has a Cronbach's alpha of 0.91 when aggregated at the country level.

12 Cantril, H. (1965). The pattern of human concerns. New Brunswick, NJ: Rutgers University Press.

Community Basics Index

The Community Basics Index evaluates everyday life in a community, including environment, housing and infrastructure. Because of the functional nature of the items that make up the index, it is practical to view it as a driver of more abstract constructs such as overall satisfaction with life in a community, or the likelihood that one is to recommend the community as a place to live, or the likelihood one is going to leave the community. This approach is apparent in the relationships the index has with other Gallup World Poll indices such as the Community Attachment Index.

Index questions

- In the city or area where you live, are you satisfied or dissatisfied with the public transportation systems? (WP91)
- In the city or area where you live, are you satisfied or dissatisfied with the roads and highways? (WP92)
- In your city or area where you live, are you satisfied or dissatisfied with the quality of air? (WP94)
- In your city or area where you live, are you satisfied or dissatisfied with the quality of water? (WP95)
- In your city or area where you live, are you satisfied or dissatisfied with the availability of good affordable housing? (WP98)
- In the city or area where you live, are you satisfied or dissatisfied with the educational system or the schools? (WP93)
- In the city or area where you live, are you satisfied or dissatisfied with the availability of quality healthcare? (WP97)

Index construction

Index scores are calculated at the individual record level. For each individual record the following procedure applies: The seven items are recoded so that positive answers are scored as a '1' and all other answers (including 'don't know' and 'refused') are assigned a score of '0'. If a record has no answer for an item, then that item is not eligible for inclusion in the calculations. An individual record has an index calculated if it has valid scores for at least five of the seven items. A record's final index score is the mean of valid items multiplied by 100. The final country-level index score is the mean of all individual records for which an index score was calculated. Country-level weights are applied to this calculation.

Reliability

The Community Basics Index has a Cronbach's alpha of 0.90 when aggregated at the country level.

About external data sources used in the analysis

To better understand how people's attitudes to risk and safety are shaped by their larger environment, the analysis integrated different data about the countries and territories included in the study. The table below specifies the type of data and source. For all statistics, Gallup used the most recent estimate available, typically 2018, but for some statistics that are updated on an infrequent basis (either in general or for specific countries and territories), these estimates could date as far back as 1999.

Table B.1

Summary of external statistics used in analysis

Indicator	Source	Data availability years for different countries (from data source) Oldest	Newest
Adolescent fertility rate (births per 1,000 women ages 15-19)	World Bank	2018	2018
Age dependency ratio (% of working-age population)	World Bank	2018	2018
Alternative and nuclear energy (% of total energy use)	World Bank	1999	2015
Cause of death, by injury (% of total)	World Bank	2016	2016
CO2 emissions (metric tons per capita)	World Bank	2014	2016
Current health expenditure (% of GDP)	World Bank	2011	2017
Current health expenditure per capita (current US$)	World Bank	2011	2017
Current health expenditure per capita, PPP (current international $)	World Bank	2015	2018
Death rate, crude (per 1,000 people)	World Bank	2014	2018
Domestic general government health expenditure (% of GDP)	World Bank	2011	2017
Droughts, floods, extreme temperatures (% of population, average 1990-2009)	World Bank	2009	2009
Educational attainment, at least completed short-cycle tertiary, population ages 25+, total (%) (cumulative)	World Bank	2010	2018
Educational attainment, at least completed upper secondary, population ages 25+, total (%) (cumulative)	World Bank	2010	2018
Fossil fuel energy consumption (% of total)	World Bank	2013	2015
GDP growth (annual %)	World Bank	2011	2018
GDP per capita, PPP (current international $)	World Bank	2011	2018
GINI index (World Bank estimate)	World Bank	2003	2018
Human development	World Bank	2017	2018
Individuals using the internet (% of population)	World Bank	2016	2018
Intentional homicides (per 100,000 people)	World Bank	2006	2018
Life expectancy at birth, total (years)	World Bank	2018	2018
Literacy rate, adult total (% of people ages 15+)	World Bank	2004	2018
Literacy rate, youth total (% of people ages 15-24)	World Bank	2004	2018

Indicator	Source	Data availability years for different countries (from data source) Oldest	Newest
Mortality rate, infant (per 1,000 live births)	World Bank	2018	2018
Mortality rate, under 5 (per 1,000 live births)	World Bank	2018	2018
People using at least basic drinking water services (% of population)	World Bank	2016	2017
Population growth (annual %)	World Bank	2018	2018
Population, total	World Bank	2018	2018
Proportion of women subjected to physical and/or sexual violence in the last 12 months (% of women ages 15-49)	World Bank	2006	2016
Rural population (% of total population)	World Bank	2001	2018
School enrollment, primary (% gross)	World Bank	2006	2018
School enrollment, tertiary (% gross)	World Bank	2096	2018
Smoking prevalence, males (% of adults)	World Bank	2016	2018
Smoking prevalence, total (ages 15+)	World Bank	2016	2018
Suicide mortality rate (per 100,000 population)	World Bank	2016	2016
Total alcohol consumption per capita (liters of pure alcohol, projected estimates, 15+ years of age)	World Bank	2010	2016
Unemployment, total (% of total labor force) (modeled ILO estimate)	World Bank	2009	2018
Urban population (% of total population)	World Bank	2018	2018
UL Safety Index (2018) and subcomponent data	Underwriters Laboratories	2018	2018
Global Climate Risk Index	Germanwatch	1999	2018
Estimates of foodborne disease by global region	World Health Organization	2010	2010

Development of the Worry and Experience of Harm Indices

Chapter 3 of this report introduces the two composite measures developed from World Risk Poll data, the Worry Index and the Experience of Harm Index. This section provides further methodological background of these indices.

The Worry Index summarises an individual's overall level of worry or anxiety across the seven hazards tested on the World Risk Poll, including the food you eat, the water you drink, violent crime, severe weather events — such as floods or violent storms, electrical power lines, household appliances — such as a washing machine, dryer or refrigerator and mental health issues. The Experience of Harm Index represents an individual's combined experience from harm from these seven areas of risk.

One challenge inherent to the development of a measure of risk perception is that the items used in the World Risk Poll can only capture a small subset of all the possible sources of risk that could have been included. For example, the study includes questions about food poisoning, violence and severe weather, but does not ask about other common risks such as burns, falls or chemical exposures. Additionally, the items used to ask about these risks are categorical — i.e., there are only a few possible response categories — whereas the latent construct of risk perceptions is more likely to be a continuum.

Item Response Theory (IRT) provides a modeling framework to estimate continuous measures from categorical variables as a function of the trade-off between (a) the respondent's level of 'risk perception' and (b) the 'risk severity' of the item — for example, being 'somewhat worried' about harm from household appliances represents a much lower level of overall worry than being 'very worried' about harm from violent crime.

The Rasch model is an IRT psychometric model for analysing categorical data, providing tools to assess the suitability of the risk perception items for constructing a measurement scale. IRT tools indicated that risk perception items met appropriate validity and reliability criteria for measure development.

Below is a summary of results from the Rasch Analysis used to model the question sets asking people about their level of worry, perceived likelihood and previous experience with seven threats discussed in Chapter 3.

1) Chronbach's alpha: 'worry' series = 0.80, 'likelihood' series = 0.83, 'previous experience' series = 0.76.
2) Rasch reliability: 'worry' series = 0.80, 'likelihood' series = 0.83, 'likelihood' series = 0.65.
3) All series show good item infit (values between 0.7 and 1.3), indicating equal discrimination of items.
4) The 'likelihood' series shows high levels of outfit (values between 0.7 and 1.3), indicating a high number of erratic responses not conforming with conditions of Rasch model.

Background on multilevel model (MLM) used in regression analysis of Worry Index

In the analysis of the Worry Index, researchers used a multilevel model (MLM), a statistical technique that allows researchers to account for country-related differences in the data. While the primary interest of the analysis was in identifying those individual-level characteristics — such as a person's demographic profile, personal experiences or risk-related attitudes — which are associated with a higher (or lower) than average score on the Worry Index, MLM models also allow researchers to test how differences between societies — such as a country's overall level of income — might also shape how an individual scores on the Worry Index.

The main findings of this analysis are discussed in Chapter 3. Table B.2 provides the main output from this analysis, including the variables used in the analysis. Note that all variables are from World Risk Poll or Gallup World Poll, unless otherwise noted.

Table B.2

Worry Index regression results

Mixed-effects regression	Number of obs=67165
Group variable: wp5	Number of groups=81
Obs per group:	min=519
	avg=829.2
	max=2224
	Wald chi2(36)=245887.43
Log pseudolikelihood = 3.483e+11	Prob > chi2=0

Worry Index	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Experience of Harm Index	0.255	0.007	36.56	0.000	0.241	0.269
Gender	0.036	0.004	10.11	0.000	0.029	0.042
WP14 Respondent lives in						
• Small town or village	-0.023	0.009	-2.60	0.009	-0.041	-0.006
• A large city	0.003	0.006	0.57	0.567	-0.008	0.014
• Suburb of a large city	-0.008	0.010	-0.80	0.426	-0.027	0.012
• (DK/Refused)	0.021	0.005	4.08	0.000	0.011	0.030
WP3117 Educational attainment						
• 9-15 years of education	0.032	0.007	4.55	0.000	0.018	0.046
• 16+ years of education	0.049	0.020	2.52	0.012	0.011	0.088
• (DK/Refused)	0.101	0.073	1.39	0.166	-0.042	0.243
WP2319 Which one of these phrases comes closest to your own feelings about your household's income these days?						
• Getting by on present income	0.040	0.005	8.23	0.000	0.030	0.049
• Finding it difficult	0.067	0.014	4.9	0.000	0.040	0.094
• Finding it very difficult	0.071	0.005	13.6	0.000	0.060	0.081
• (DK)	-0.011	0.018	-0.62	0.535	-0.047	0.024
• (Refused)	-0.026	0.018	-1.45	0.146	-0.061	0.009
INCOME_5 Household income quintiles						
• Second 20%	0.021	0.013	1.63	0.103	-0.004	0.046
• Third 20%	-0.001	0.006	-0.17	0.863	-0.013	0.011
• Fourth 20%	0.026	0.016	1.67	0.096	-0.005	0.057
• Top 20%	0.031	0.015	2.03	0.042	0.001	0.061
L1 When you hear the word RISK, do you think more about opportunity or danger?						
• Danger	0.051	0.008	6.14	0.000	0.035	0.067
• Both	0.009	0.005	1.74	0.081	-0.001	0.020
• Neither	-0.081	0.011	-7.62	0.000	-0.102	-0.060
• (DK/Refused)	-0.013	0.008	-1.56	0.119	-0.029	0.003

Worry Index	Coef.	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
L12 Do you think that 10% is bigger than 1 out of 10, smaller than 1 out of 10, or the same as 1 out of 10? If you do not know, please just say so.						
• 10% is smaller than 1 out of 10	0.039	0.014	2.89	0.004	0.013	0.066
• 10% is the same as 1 out of 10	-0.022	0.005	-4.28	0.000	-0.032	-0.012
• (DK)	-0.021	0.002	-8.89	0.000	-0.026	-0.017
• (Refused)	-0.091	0.010	-8.83	0.000	-0.111	-0.071
WP23 Do you have any health problems that prevent you from doing any of the things people your age normally can do?						
• Do not have health problems	-0.017	0.002	-7.28	0.000	-0.021	-0.012
• (DK/Refused)	0.078	0.019	4.18	0.000	0.041	0.115
WP16 Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?			-			
• 0-10	0.000	0.001	0.60	0.551	-0.002	0.001
Gallup World Poll Life Evaluation Index[13]	-0.005	0.004	-1.21	0.226	-0.012	0.003
Gallup World Poll National Institutions Index[14]	0.000	0.000	-4.02	0.000	0.000	0.000
Gallup World Poll Community Basics Index[15]	-0.001	0.000	-19.20	0.000	-0.001	-0.001
Social trust[16]	-0.020	0.003	-6.56	0.000	-0.027	-0.014
Country-level statistics (World Bank)						
• GDP, PPP (log)	0.002	0.011	0.22	0.824	-0.018	0.023
• GDP growth rate	0.002	0.003	0.89	0.371	-0.003	0.007
• GINI coefficient	-0.003	0.002	-1.73	0.084	-0.006	0.000
• Constant	0.475	0.144	3.30	0.001	0.193	0.757

13 For more information, please see section 'About Gallup World Poll metrics used in the analysis' further above.

14 For more information, please see section 'About Gallup World Poll metrics used in the analysis' further above.

15 For more information, please see section 'About Gallup World Poll metrics used in the analysis' further above.

16 This metric was created using three questions from the World Risk Poll, including:
L17 Suppose you lost a small bag that contained items of great financial value to you that had your name and address written on it. If it were found by each of the following people, in general, how likely is it that it would be returned to you with all of its contents?

- L17A A neighbour
- L17B A stranger
- L17C The police

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf. Interval]	
wp5: Identity				
• var(_cons)	0.003	0.001	0.001	0.007
• var(Residual)	0.048	0.003	0.043	0.054

Random-effects Parameters	ICC	Robust Std. Err.	[95% Conf. Interval]	
WP5 (Country)	0.0589014	0.02578	0.024538	0.134743

Development of Government Safety Performance Index

The World Risk Poll Government Safety Performance Index (GSPI) measures whether people believe their governments are doing a good job in looking out for their own safety, particularly in the critical areas of food, water and the power lines in their city or area.

The Government Safety Performance Index is constructed from L16A, L16B and L16C on the 2019 World Risk Poll. For each question, respondents who said 'yes' were coded '1'; respondents who provided any other answer, including 'don't know' or 'refused', were coded '0'.

L16 Series: In general, in your opinion does the government do a good job ensuring that the following are safe, or not? (Yes/No)

- **L16A:** The food you buy
- **L16B:** The water you drink
- **L16C:** Power lines in the city or area where you live

Results were then aggregated to the country level, using appropriate weights. In the aggregation process, scores were multiplied by 100 to aid interpretation, such that a country's average score for any given question would range between 0 (i.e., nobody believes the government is doing a 'good job') and 100 (everybody believes the government is doing a 'good job'). At this stage of the index development phase, the unit of analysis becomes the country or territory. The summary statistics related to L16A, L16B and L16C for the 140 countries and territories included in this analysis appear in the table below.

Table B.3

Summary statistics for component items of Government Safety Performance Index, at the country level

	Food you buy	Water you drink	Power lines in city
Number of countries	140	140	140
Mean	57.4	62.1	64.3
Percentiles			
• 25th	47.8	51.6	52.2
• 50th (median)	58.5	63.6	64.0
• 75th	69.0	73.9	79.1
Standard Deviation	16.2	15.9	17.1

As indicated in Table B.3, the three items exhibited a strong positive correlation at the country level. Researchers used principal components analysis to investigate unidimensionality, or the idea that all three of these items represent the same underlying concept. The analysis pointed to a one-factor solution, which represented 88.6% of the collective variance.

Cronbach's alpha was used to assess reliability. At the country level, Cronbach's alpha was 0.93 indicating very strong reliability.

The Government Safety Performance Index is the simple average of the three items. The minimum score of the Index is 0 and the maximum score is 100. The below table highlights notable correlations (at the country level) between the Government Safety Performance Index and other Gallup World Poll indices and/or external measures.

Table B.4

Government Safety Performance Index: Correlations with other measures

	Correlation
Gallup World Poll Community Basics Index	0.764*
Gallup World Poll National Institutions Index	0.715*
Gallup World Poll Corruption Index	-0.606*
Gallup World Poll Law and Order Index	0.505*
Government Effectiveness Score (UL Safety Index)	0.503*
Institutions Resources (UL Safety Index)	0.400*
UL Safety Index (overall score)	0.393*

The Government Safety Performance Index (GSPI)

Variables tested in the analysis of the predictive factors of the GSPI scores

To identify which factors are predictive of an individual's GSPI score, we tested the following factors:

- **Country-level:** GDP per capita, GINI coefficient (a measure of inequality in a country), region effect, country effect, Gallup World Poll National Institutions Index, Gallup World Poll Community Basics Index, literacy rates
- **Individual-level demographics or background factors:** Gender, feelings about household income, level of education, basic numeracy skills (World Risk Poll question asking if 10% is more than, less than or the same as 1 in 10), urban/rural residence, age, household income in quintiles, level of social trust[17], the importance of religion in daily life[18]
- **Individual-level attitudes toward risk and safety:** Responses to five World Risk Poll questions
  - How worried are you that the food you eat will cause you serious harm[19]?
  - How worried are you that the water you drink will cause you serious harm[20]?
  - Do you feel more or less safe than five years ago[21]?
  - Do you agree/disagree the government should require businesses to adopt safety procedures at work[22]?
  - In general, do you wear a seat belt if you are in a motorized vehicle and one is available[23]?

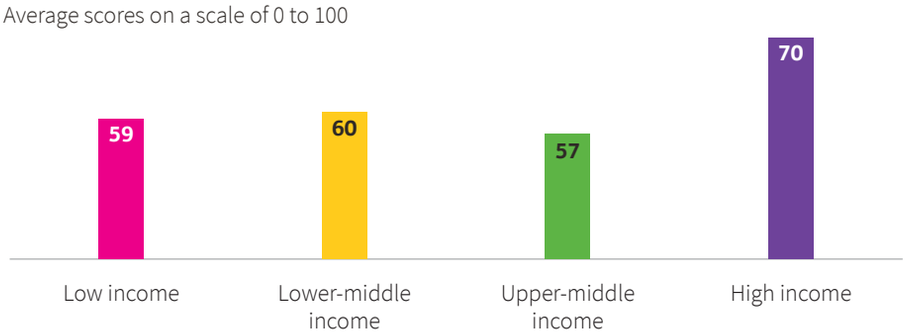
GSPI drivers at the country-level

The country in which people reside is a critical factor in understanding why people express different levels of confidence in their government's safety performance. Individual ratings of how well a government is functioning in safety-related issues are shaped, to some degree, by the economic, political or cultural context of the society in which people live. For example, Chart 9.10 demonstrates that high-income economies generally had higher GSPI scores than lower-income economies.

Chart 9.10

Median GSPI results, by country income group

Average scores on a scale of 0 to 100



Survey question: In general, in your opinion does the government do a good job ensuring that the following are safe, or not — the food you buy, the water you drink, and power lines in the city or area where you live?

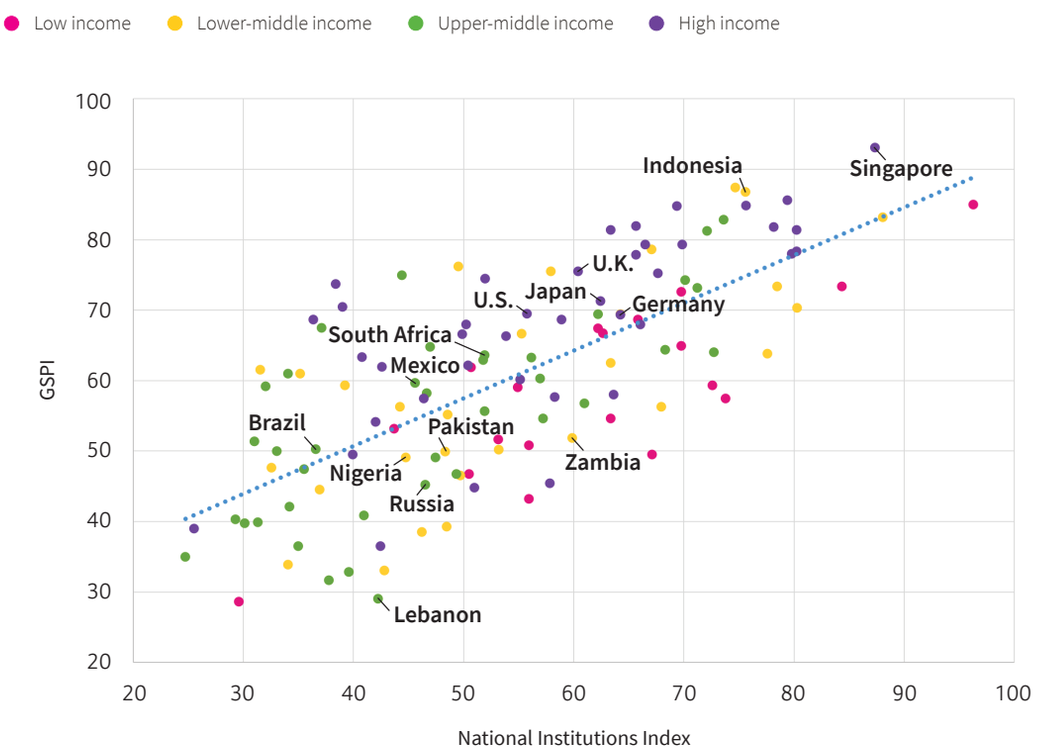
17 Using the Social Trust Index calculated from three World Risk Poll questions about the likelihood of a stranger, a neighbour or a police officer returning a lost bag of value (see Chapter 4).
18 Measured by a Gallup World Poll question asking if religion plays an important role in your daily life or not.
19 For analysis and results of this question, see Chapter 3.
20 Ibid.
21 For analysis and results of this question, see Chapter 1.
22 For analysis and results of this question, see Chapter 4.
23 Ibid.

People's feelings about their government's safety performance were also linked to broader feelings about their governing institutions. To that point, the GSPI has a strong positive relationship with the Gallup World Poll National Institutions Index, which reflects people's confidence in the institutions vital to a country's leadership: the national government, the military, the judicial system and the honesty of elections (as measured on 0 to 100 scale, with a higher score indicating greater confidence).

This relationship, illustrated in Chart 9.11, suggests that a government's overall credibility is associated with whether people perceive that their government is doing a good job in keeping their food, water and power lines safe.

Chart 9.11

GSPI and the Gallup World Poll National Institutions Index



Survey question: In general, in your opinion does the government do a good job ensuring that the following are safe, or not — the food you buy, the water you drink, and power lines in the city or area where you live?

GSPI drivers at the individual level

World Risk Poll results show that factors such as a country's overall economic wealth (GDP) partly shaped people's perceptions of how well their government is faring in keeping their food, water and power lines safe. However, people's attitudes and personal backgrounds played an even larger role. The following factors were found to be relevant in predicting how a person felt about their government's safety performance.

Finding 1: Water safety was most important.

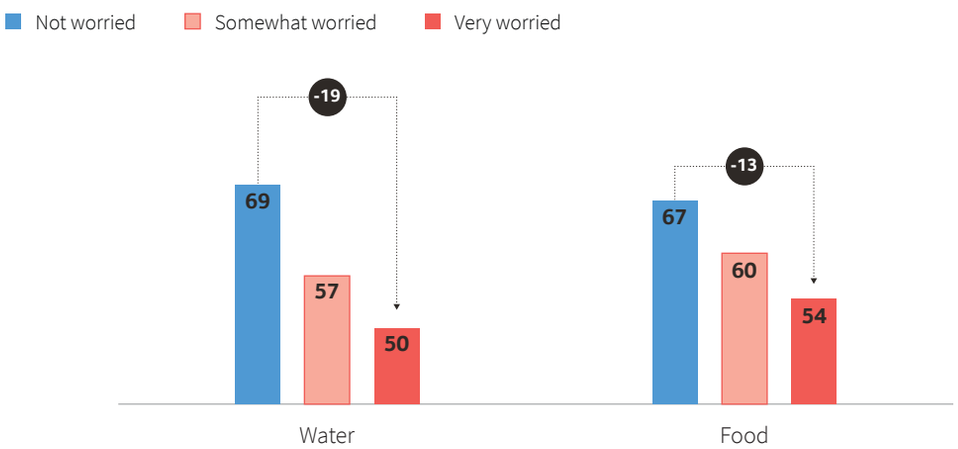
People who were concerned about the safety of their water — more so than food or power lines — gave their government lower-than-average safety performance ratings.

On average, the GSPI score of people who were 'very worried' about the water they drink in a country was about 19 points lower than the GSPI score of a person who was not worried about the water they drink (see Chart 9.12). Likewise, the GSPI rating by people who were 'very worried' about the food they eat was, on average, 13 points below the comparable figure for individuals who were 'not at all worried'.

Chart 9.12

GSPI score, by level of worry about experiencing serious harm from the 'food you eat' or the 'water you drink', average country result

Average scores on a scale of 0 to 100



Survey question: In general, how worried are you that each of the following things could cause you serious harm? Are you very worried, somewhat worried, or not worried?

Finding 2: Social trust and GSPI were linked.

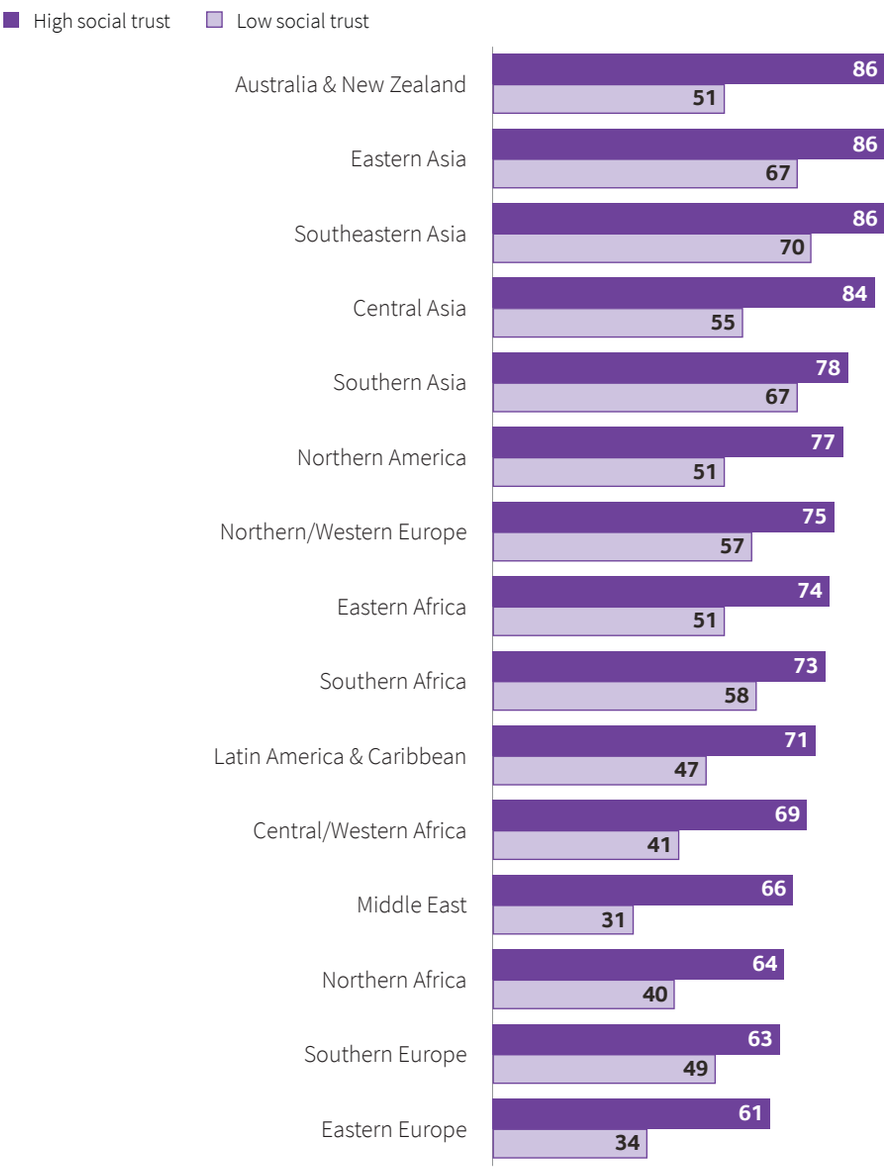
As discussed in Chapter 4, social trust plays an important role in key outcomes for individuals, such as their overall wellbeing or economic growth[24]. Past research also suggests that increased social trust helps improve certain safety outcomes in a country, such as traffic accidents[25].

As shown in Chart 9.13, the analysis also finds that an individual's level of social trust was positively related to the GSPI score that person gave their country. People with greater social trust were more likely to highly rate the job their government is doing in keeping food, water and power lines safe.

Chart 9.13

GSPI score, by level of worry about experiencing serious harm from the 'food you eat' or the 'water you drink', average country result

Average scores on a scale of 0 to 100



Survey question: In general, in your opinion does the government do a good job ensuring that the following are safe, or not — the food you buy, the water you drink, and power lines in the city or area where you live?

24 Helliwell, J. F., & Wang, S. (2011, January). Trust and wellbeing. *International Journal of Wellbeing, 1*(1). https://www.researchgate.net/publication/49615205_Trust_and_Wellbeing

25 Helliwell, J. F., & Putnam, R. D. (2007). Education and social capital. *Eastern Economic Journal, 33*(1), 1-19. http://dx.doi.org/10.1057/eej.2007.1

Finding 3: People who felt less financially secure also felt that their government was not doing a good job keeping them safe.

This general pattern — that the financially secure felt good about their government's safety performance while the financially insecure felt the opposite — holds even when taking into account various country-level and individual-level factors. This finding is consistent with others explored in this report and past research, though this is the first time this relationship has been tested on a global scale[26].

Forecasting methodology

This section discusses the forecasting analysis, which appears in Chapter 10 of the report. The key challenge in this projection exercise is the fact that there are no historical data for the five questions of interest in the first administration of the World Risk Poll. In any forecasting effort, the overall accuracy of the predictions is largely determined by the existence of historical data, which allow analysts to see how the outcomes of interest change as conditions change.

However, while the World Risk Poll currently lacks a historical trend, it does have broad coverage across 142 countries and territories. This provides an opportunity to identify country-level predictors — that is, statistical measures that describe social, economic, political or other macro-level trends in a country or territory — that may help shape risk perceptions and attitudes. Some of these predictors, such as GDP growth, unemployment rates or population growth, in turn either have up-to-date projections available, or long-running time series that researchers can use to generate predictions.

Any projection exercise taking place in 2020 faces the additional major challenge of the uncertainty associated with the evolution of the COVID-19 crisis, and its significant impact on public health, the economy and on public perceptions and attitudes toward risk and safety. It is still uncertain whether the crisis will be long and deep or relatively short-lived and followed by a rapid recovery in perceptions and attitudes toward risk and safety.

For our purposes, projections of mortality rates, international arrivals and the most recent estimates from the IMF April 2020 Economic Outlook were incorporated into the analysis to model the potential effect of the pandemic.

26 Satterfield, T. A., Mertz, C. K., & Slovic, P. (2004). Discrimination, vulnerability, and justice in the face of risk. *Risk Analysis, 24*(1), 115-129. https://doi.org/10.1111/j.0272-4332.2004.00416.x

Predictor selection

Given the absence of prior models of risk perceptions, many country-level predictors were considered initially to achieve robust forecasts for each outcome. The starting dataset included several questions and indices from the Gallup World Poll, as well as other secondary data sources from data providers such as the IMF, World Bank and others. Country coverage for each variable (or predictor) needed to be high enough to not bias or impact the results, and the focus was on those factors that were available for 100 countries or more.

The final selection excluded 15 countries out of the total 142 countries and territories available, suggesting a low probability of geographic coverage bias. Additional considerations that helped guide the predictor identification process were the availability of a historical data series or future projections.

Researchers selected the initial set of variables based on the existing literature on risk perceptions (cited throughout this report), and emerging research about the impact of the COVID-19 pandemic on economies, health and wellbeing.

For example, existing literature and the analysis of the World Risk Poll results often show that people's perceptions of risk are strongly associated with income and education levels. Economic conditions — and changes in those conditions — are hypothesised to have an impact on risk perceptions. The impact of the COVID-19 pandemic on economies is already beginning to be felt through its effect on things such as employment, tourism, personal income levels and economic growth.

Furthermore, prior literature on the public understanding of risk and safety, as well as the analysis in this report, have shown that personal demographic factors sometimes have an impact on risk perceptions. Therefore, predictors related to demographic trends were tested in the analysis to determine which of them contributed to the best model fit. Some of those population-related items are listed.

Similarly, perceptions of safety and security, as well as confidence in government, have been shown to be associated with risk perceptions and levels of worry about various risks.

Altogether, the analysis started with more than 100 predictors that were related to economic, demographic, socio-political or health-related aspects.

These predictors were further refined through statistical analysis. This took a twofold approach:

5) Identify which subset of predictors carried greater importance toward each of the outcomes using a Random Forest algorithm with cross-validation to optimise regression fit, thus reducing the number of predictors to 15 to 20 factors.
6) Use a stepwise regression forward selection procedure to track the addition of each predictor into the model and their statistical contribution to the improvement of the fit by measure of the overall Adjusted R2, Akaike information criterion (AIC) and Bayesian information criterion (BIC). This second step was repeated for all outcomes (the five World Risk Poll questions of interest) until no additional predictors improved the model fit to a statistically significant degree.

The number of predictors in the final models, selected per the criteria above, ranged from eight to 10, with a total of 14 predictors across all three outcomes (see full definitions in Table B.7):

1) **Economic indicators**
   - GDP growth (IMF)
   - Unemployment (IMF)
   - International tourism (number of arrivals, log)
   - Food and Shelter Index (Gallup World Poll)
   - Standard of living getting better (Gallup World Poll)
2) **Population-related indicators**
   - Fertility rate: average number of births per woman
   - Population growth (annual %)
   - Age Dependency Ratio (% of working-age population)
   - Urbanicity (% of the population that is urban)
3) **Mortality-related indicators**
   - Mortality rate: crude (per 1,000 people)
   - Cause of death, by injury (% of total)
   - Maternal mortality ratio (per 100,000 live births)

4) Governance-related indicators

   - Law and Order Index (Gallup World Poll)
   - Government Effectiveness (Worldwide Governance Indicators)

COVID-19 impact scenarios

Critical to the estimation exercise is ensuring that the shock arising from the COVID-19 crisis is incorporated into the forecast. Predictors associated with mortality, GDP growth, unemployment and tourism in particular, are expected to show the largest impacts. The crisis is also expected to have a large impact on education. With school closures affecting more than 1.4 billion children, effective out-of-school rates are expected to increase to levels last seen in the mid-1980s.

Being out of school will have long-term impacts on learning, earning potential and wellbeing. However, we do not expect these effects to have a short-term impact on the education indicators considered in this forecast, including youth literacy rates, secondary educational attainment and tertiary educational attainment. For example, it is estimated that the effect of school closures on literacy rates will be large for younger children. Kindergarten children are expected to lose 67% of their literacy abilities because of COVID-19. However, the youth literacy indicator includes those aged 15 to 24. School closures will have a negligible effect on the literacy rate of enrolled individuals within that age range, who are expected to have achieved full literacy.

Impacts on GDP growth and unemployment were obtained from the most recent IMF estimates. The average shock to GDP growth is expected to surpass the effect of the 2007-2009 Great Recession at its trough, followed by fast recovery in 2021.

Likewise, a large impact is expected for unemployment in 2020, followed by a slow recovery in 2021. This scenario represents *The Economist's* central scenario of a '90% economy' (see Table B.5). To test the potential range of impacts, researchers considered two alternative scenarios: A pessimistic '85% economy' scenario, where the impact of the COVID-19 crisis is 50% larger than the central scenario, and an optimistic '95% economy' scenario, where the impact is 50% smaller than the central scenario.

The COVID-19 impact on tourism was estimated from the latest forecasts of international arrivals available from the United Nations World Tourism Organization (UNWTO) (at the global level) and Trading Economics (at the country level). Country-level forecasts are only available for 61 countries and territories, focusing on those with a larger number of international arrivals. The change in expected arrivals was calculated using 2018 data as the baseline value for each country. Where missing, forecast data for international arrivals were imputed for some countries and territories using the average regional percentage change in international arrivals over the 2018 baseline, and aggregate levels were adjusted to correspond with the three scenarios considered by UNWTO:

- **Scenario 1:** (-58%) based on the gradual opening of international borders and easing of travel restrictions in early July
- **Scenario 2:** (-70%) based on the gradual opening of international borders and easing of travel restrictions in early September
- **Scenario 3:** (-78%) based on the gradual opening of international borders and easing of travel restrictions only in early December

In addition to its economic impact, the COVID-19 crisis will have a noticeable impact on mortality rates. While the precise toll of the disease in 2020 and 2021 is still extremely uncertain, studies on excess mortality in eight European countries indicate that mortality may have increased between one and 10 percentage points as of May 15, 2020. Table B.5 shows Gallup's estimates of the increase in the mortality rate, considering the increase in deaths over the baseline mortality rate in 2018.

Since the average increase in mortality is 7.9% and the pandemic has not yet been suppressed, it is reasonable to assume that many countries will show at least a 10% increase over their baseline mortality rate by the end of the year. This approximation is nonetheless extremely uncertain and probably conservative, as some countries such as Italy may have already reached a 10% increase in mortality. Therefore, researchers also considered alternative scenarios, including a pessimistic scenario, where the average increase in the mortality rate reaches 15%, and an optimistic scenario, with a 5% increase in mortality. Given the absence of secondary country-level estimates, these scenarios were applied to every country or territory globally as a percentage increase over each country's baseline mortality rate.

Table B.5

Estimated increase in mortality rates in eight European countries

Country	2018 Mortality Rate (deaths per 1,000 population)	Total Population	Annual Mortality (total deaths)	COVID-19 Death Toll (May 15, 2020)*	COVID-related Deaths as % of Total Excess Mortality**	Estimated Excess Mortality (May 15, 2020)	Estimated Increase in Mortality
Italy	10.5	60,431,283	636,244	31,106	48%	64,804	10.2%
Spain	9.1	46,723,749	413,366	27,459	78%	35,204	8.5%
Great Britain	9.3	66,488,991	620,841	50,972	72%	70,794	8.2%
Belgium	10.7	11,422,068	106,579	8,843	102%	8,670	8.1%
France	9.2	66,987,244	617,302	27,707	93%	29,792	4.5%
Sweden	9.1	10,183,175	91,028	3,460	92%	3,761	4.1%
Austria	9.5	8,847,037	84,516	624	57%	1,095	1.3%
Netherlands	8.9	17,231,017	151,692	624	51%	1,224	0.8%
Total	9.4	288,314,564	2,721,568	150,795	79%	215,334	7.9%

* Source: https://elpais.com/sociedad/2020/04/09/actualidad/1586437657_937910.html

** Source: https://www.economist.com/graphic-detail/2020/04/16/tracking-covid-19-excess-deaths-across-countries

Time-series analysis

Those predictors lacking authoritative forecasts for 2020 and 2021 were projected into 2020 and 2021 using time-series analysis. There are multiple approaches to time-series analysis, but most consider four basic parameters: trend, seasonality, autoregression and external regression.

- Trend indicates the overall direction of the time series (negative, positive, neutral), as well as its functional form (e.g., linear, exponential, logarithmic).
- Seasonality is present when patterns are recurring. For example, economic cycles of boom and bust often occur with regularity.
- Autoregression appears when time series have momentum and move slowly, e.g., fertility rates are similar from year to year.
- External regression appears when a time series correlates with another. For example, GDP growth and unemployment are correlated, often with a lag, changes in GDP growth tend to precede changes in unemployment.

Autoregressive integrated moving average (ARIMA) models are broadly used to incorporate all four parameters in time series analysis. This type of analysis often requires careful tuning of model parameters, which may be time-consuming.

The current exercise relies on the projection of 14 indicators, only four of which have existing projections from secondary data sources (GDP growth, unemployment, international arrivals and mortality), while the remaining 10 need to be projected. Since each country's levels and trends are different, each indicator is to be estimated for each of the 142 countries and territories separately, and then again separately for each of the three scenarios, representing a total of nearly 6,000 time series to be modeled. Since manual tuning of parameters for each time series would be impractical, an auto-ARIMA model was implemented, with the April 2020 projections from the IMF on GDP growth and unemployment used as regressors.

Projection of outcomes: How will the World Risk Poll variables of interest trend in 2020-21?

Once all predictors were projected to 2020-2021, a penalised regression model with a logit link was built for each outcome and each scenario using 2019 World Risk Poll data. Penalised regression attempts to minimise the size of the regression coefficients (shrinkage), which is particularly beneficial to ensure the stability of predictions when the ratio of variables to cases is relatively low, as is the case.

The penalised regression model was estimated with cross-validation to identify shrinkage parameters that would minimise predictive errors. The final models for each outcome (central scenario) are presented in Table B.6. The models have a moderate fit, with all three showing adjusted r-squared values between 0.62 and 0.48, indicating that the regression model can explain slightly more than half of the variation in the outcomes.

Table B.6

Penalised regression coefficients and model fit

	Experience of Harm Index	Worry Index	Feeling Less Safe (compared to 5 years prior)	Experience of Workplace Injuries
(Intercept)	-1.358	0.203	0.001	-1.331
Fertility rate	-0.121	.	.	-0.310
Population growth	0.117	0.006	.	0.055
Food and Shelter Index (log)	-0.085	-0.134	0.085	-0.135
Law and Order Index (log)	-0.390	-0.241	-0.702	-0.145
Standard of living getting better (log)	-0.029	.	-0.175	.
Age Dependency Ratio	0.014	.	0.010	0.034
Injury-related deaths	0.028	-0.002	.	0.032
% Urban population	-0.004	-0.001	0.002	0.002
Tourism (log International arrivals)	-0.012	.	-0.015	0.008
Mortality rate	-0.046	-0.011	-0.035	-0.056
GDP growth (%)	-0.001	.	-0.062	-0.005
Government effectiveness	0.231	.	.	0.279
Unemployment	0.027	0.005	0.002	0.018
Maternal mortality	0.001	0.000	0.000	0.001
MSE	0.145	0.111	0.214	0.150
RMSE	0.381	0.333	0.462	0.388
R2	0.661	0.533	0.609	0.589
Adjusted R2	0.619	0.475	0.561	0.537

Empty cells indicate that the coefficient was penalised down to zero.

The penalised regression models were finally used to predict each outcome in 2020 and 2021. The projected values of the predictors for 2020 and 2021 were multiplied by the coefficients from the regression models and added to the country residuals (the portion of the country score that is not explained by the model).

Table B.7

Indicator definitions

Variable	Source	Definition
GDP growth	IMF	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
Unemployment	IMF	The share of the labour force that is without work but available for and seeking employment.
International tourism	UNWTO, Trading Economics	Total arrivals of non-resident overnight visitors (tourists) and same-day visitors (excursionists) at national borders.
Food and Shelter Index	Gallup World Poll	The Food and Shelter Index assesses people's ability to meet basic needs for food and shelter. Two items that ask about people's ability to afford food or shelter in the past year comprise this index. Lower scores on this index indicate that more people reported struggling to afford food and shelter in the past year, while higher scores indicate fewer people reported such struggles.
Standard of living getting better	Gallup World Poll	Percentage of national population (15+) responding 'better' to the question 'Right now, do you feel your standard of living is getting better or getting worse?'
Fertility rate	World Bank	Number of children who would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.
Population growth	World Bank	Annual population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.
Age Dependency Ratio	World Bank	Ratio of dependents (people younger than 15 or older than 64) to the working-age population (those aged 15-64). Data are shown as the proportion of dependents per 100 working-age population.
Urbanicity	World Bank	Urban population refers to people living in urban areas as defined by national statistical offices. The data are collected and smoothed by United Nations Population Division.
Mortality rate	World Bank	Number of deaths occurring during the year, per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.
Cause of death, by injury	World Bank	Share of all deaths for all ages by underlying causes. Injuries include unintentional and intentional injuries.

Variable	Source	Definition
Maternal mortality ratio	World Bank	Number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births. The data are estimated with a regression model using information on the proportion of maternal deaths among non-AIDS deaths in women aged 15-49, fertility, birth attendants and GDP measured using purchasing power parities (PPPs).
Law and Order Index	Gallup World Poll	The Law and Order Index is a composite score based on people's reported confidence in their local police, their feelings of personal safety and the incidence of theft and assault or mugging in the past year. The higher the score, the higher the proportion of the population that reports feeling secure.
Government Effectiveness	Worldwide Governance Indicators	Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e., ranging from approximately -2.5 to 2.5.

Lloyd's Register Foundation

Get in touch

Please visit www.lrfworldriskpoll.com
for more information
Or call +44(0)20 7709 9166

Lloyd's Register Foundation
71 Fenchurch Street
London
United Kingdom
EC3M 4BS