Global Happiness Insights

Insights & forecasts

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What do happiness levels around the world look like?

The **World Happiness Report (WHR)** is an annual publication that ranks countries by their level of happiness, which is derived by surveying a representative sample of the country's population. The report measures happiness based on the answers to a **single question**: *"On a scale of 0 to 10, how satisfied are you with your life?"*, also known as the **Cantril ladder**. The **average** of these responses is then used as the **happiness score** for each country (ranging between 0 and 10) and the countries are ranked based on that score.

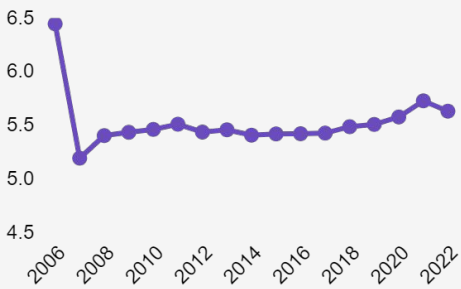
Fig 1. Happiest countries in 2022 and their scores

Country	Latest score	Earliest score	Change	Change %
FI	7.82	7.67	+0.15	+2%
DK	7.63	8.02	-0.39	-5%
IS	7.56	6.89	+0.67	+10%
CH	7.51	7.47	+0.04	+1%
NL	7.42	7.46	-0.04	+0.5%

The **5 happiest countries in 2022** were Finland, Denmark, Iceland, Switzerland and the Netherlands, while the **5 least happy countries** were Afghanistan, Lebanon, Zimbabwe and Rwanda. Overall, a significant difference in happiness can be observed between the **Global North** and the **Global South**, a difference which persists across time.[1]

There has been an **13.8% decline** in global happiness levels in the period **2005-2022** (a drop from 6.45 to 5.55), with the **largest decline** in happiness was observed in countries which have had very dire economic circumstances and/or military conflicts such as Afghanistan, Lebanon and Venezuela, while the **largest improvement** was seen in several African and Eastern European countries.

Fig 2. Global happiness across time



Quick stats on happiness

7.82

was the score of Finland, the happiest country in 2022 (41% higher than the global average)

2.40

was 2022's average score in the 6 surveyed South Asian countries, lowest of all regions

5.5%

was the max annual variation in happiness among the world's 10 happiest countries

40%

was the largest increase in happiness score between 2005-2022 (recorded in Bulgaria)

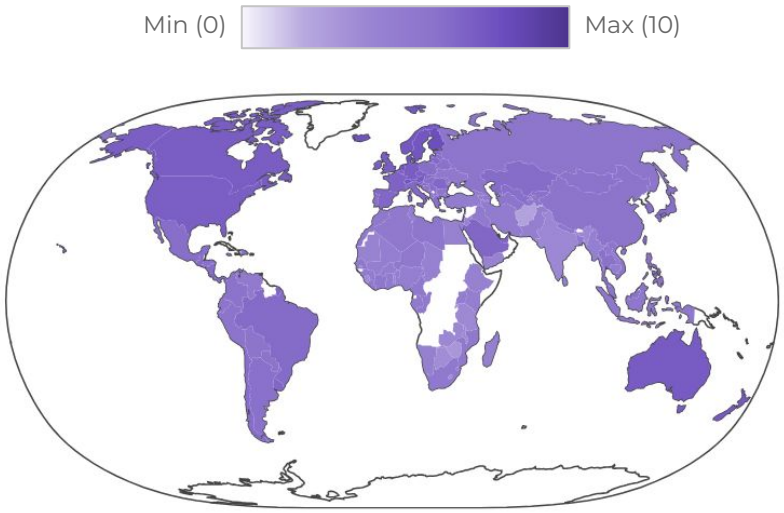
Deep dive

World happiness visualised

Latest happiness scores by country

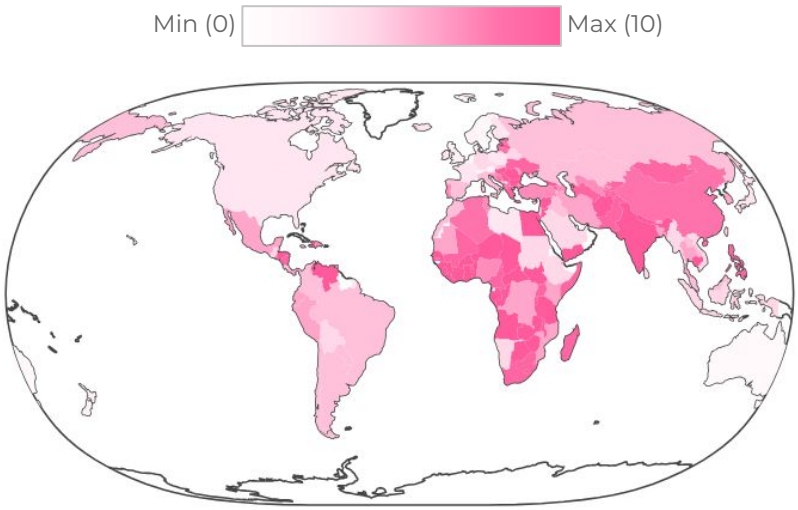
To understand the **difference in happiness** between various states, we can take a look at a color-coded world map to the right, where each country gets its own happiness score plotted with a different color shade. The higher the **intensity** of the colour, the happier the country. The data clearly shows the **happiness divide between** the Global North and the Global South, which also reflects the differences in their general level of development. Please note that some states will be colored white due to missing data.

Fig 3. Happiness score by country (2022)



Happiness variability by country

Fig 4. Happiness variability between 2005-2022



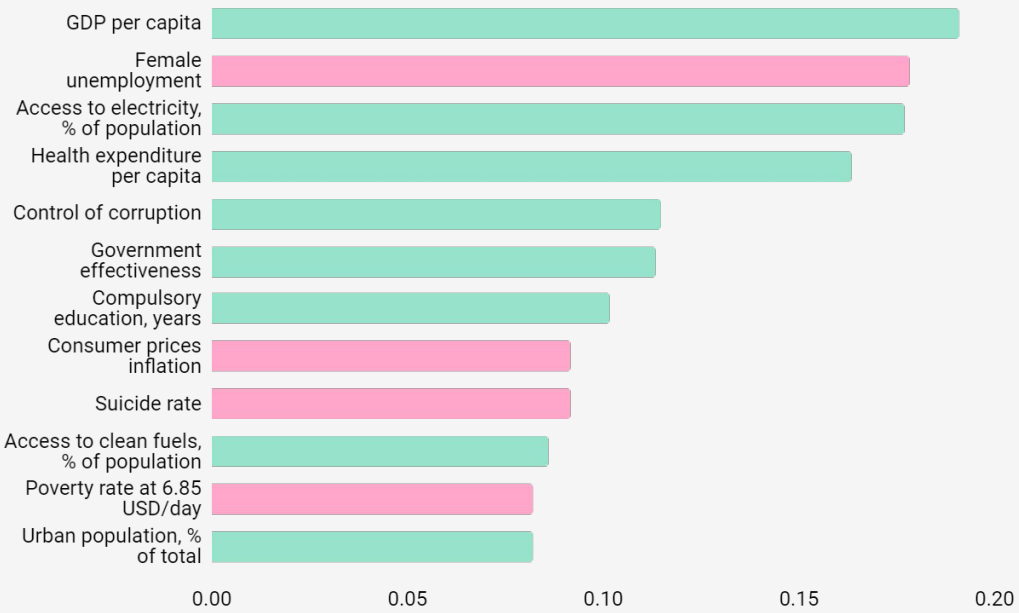
The colour-coded world map to the left shows the degree to which a country's **happiness score has varied** between 2005-2022. The conclusion that happiness is more stable in the Global North (with the exception of most "East Bloc" countries). Less stability is seen in the Global South, though with some exceptions like South-East Asia (but not India) and South America (but not Venezuela). It's worth noting that instability need not be seen as a bad thing in that countries which have improved their score over time will by definition show more variation on the map.

Which factors have the strongest impact on happiness?

Though individual mileage may vary, the average national happiness score is more or less **determined by** the level of **development** of a country. Testing a series of ridge regression models including social, political, economic, environmental and health-related factors,[2, 3] revealed that based on those factors, it was possible to account for about **74%** of the **variation** in national happiness scores and predict happiness with an **accuracy** of up to **91%**.

The best model to explain the data contained **27 factors** describing a country's level of development.[4] Out of these, the ones with the strongest **relative impact** on global happiness were GDP per capita, female unemployment rate, access to electricity, health expenditure per capita and corruption. Other factors with a sizeable effect on happiness are shown below:

Fig 5. Top 12 factors impacting happiness score and their relative effect size



Measuring the actual impact

0.24

is the increase in happiness score that can be obtained by reducing **female unemployment** by 10 p.p.

0.15

is the increase in happiness score that can be obtained by using an additional 1,000 kg of **fertilizer in agriculture**

0.09

is the increase in happiness score that can be obtained by increasing **GDP per capita** by 10,000 USD

0.09

is the increase in happiness score that can be obtained by increasing **health expenditure** per capita by 1,000 USD

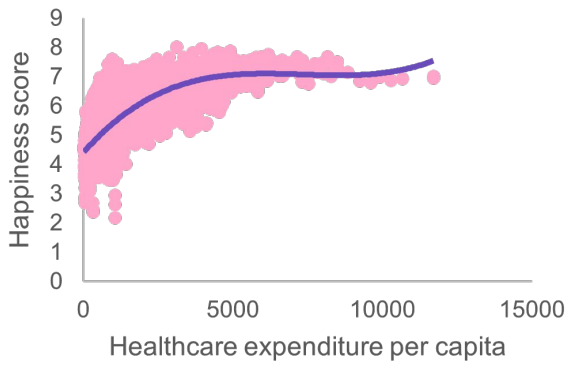
World happiness correlates

Deep dive

The plots below illustrate the **relationship** between happiness score and a selection of **highly correlated** factors. The charts are based on all historical data covering the period 2005-2022:

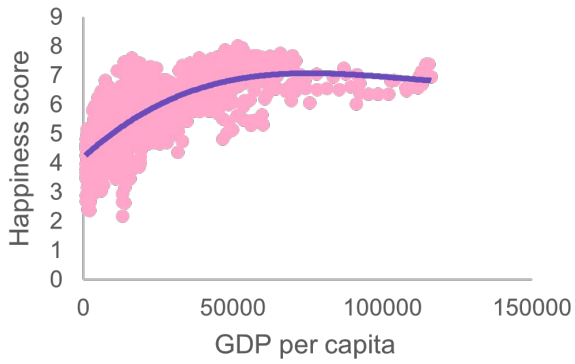
Health expenditure per capita

Fig 6



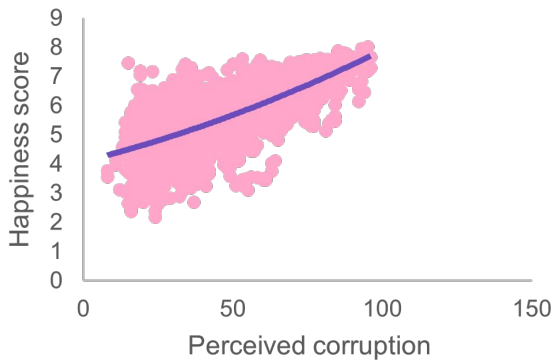
GDP per capita

Fig 7



Corruption perception

Fig 8

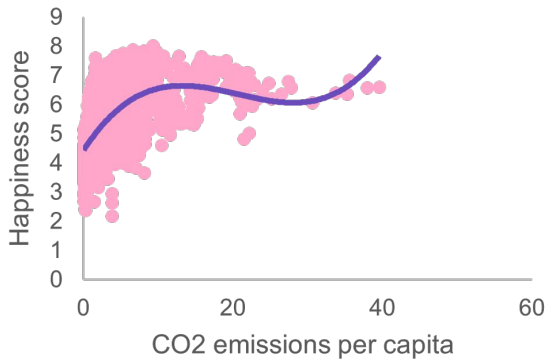


Female unemployment

Fig 9

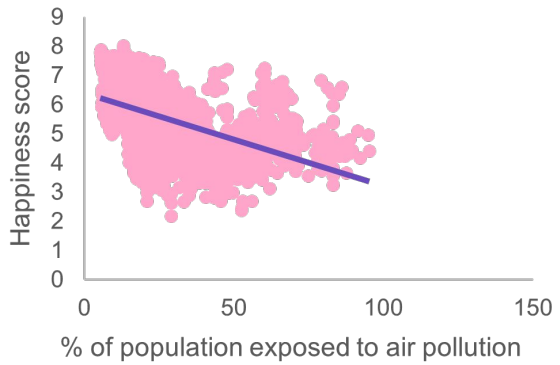
CO2 emissions per capita

Fig 10



Exposure to air pollution

Fig 11



Which countries do we expect to be the happiest in 2023-2024?

To find an answer to this question, a **machine learning model** (random forest) was used.[5] The model was trained on all years except for the most recent year with available **happiness score** (2022) and was optimised to increase its accuracy. The input variables included in the model, which were selected based on the ridge regression analysis, did not originally have values in future time periods, so those were derived by projecting historical trends into the future. Assuming country-level **historical trends** remain valid in the forecasting period, the model should be able to predict national happiness scores with an **accuracy of up to 96%**.

Fig 12. Predicted happiness scores and ranks for 2023-2024

Predictions for 2023

Country	Score	Rank
Finland	7.65	1
Denmark	7.61	2
Switzerland	7.43	3
Iceland	7.43	4
Norway	7.43	5
Sweden	7.28	6
Netherlands	7.27	7
Luxembourg	7.17	8
Austria	7.16	9
New Zealand	7.05	10
Australia	7.04	11
Israel	7.00	12
Germany	6.95	13
Ireland	6.92	14
Belgium	6.86	15
Czechia	6.85	16
US	6.83	17
UK	6.82	18
Canada	6.76	19
France	6.74	20
Estonia	6.73	21
Taiwan	6.72	22
Lithuania	6.70	23
UAE	6.64	24
Slovenia	6.64	25
Singapore	6.58	26
Saudi Arabia	6.54	27
Spain	6.50	28
Italy	6.49	29
Malta	6.46	30

Predictions for 2024

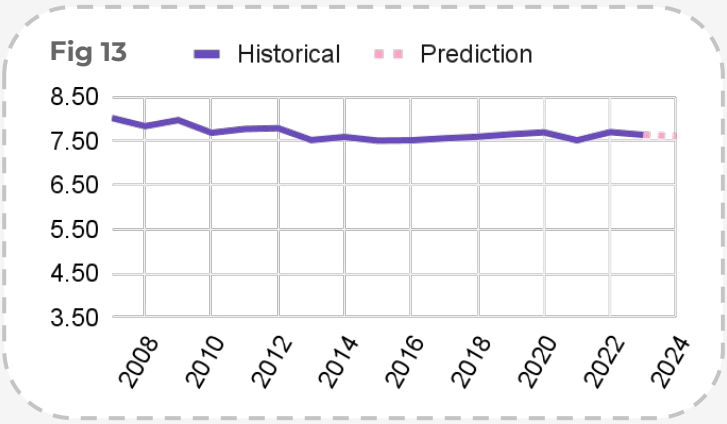
Country	Score	Rank
Denmark	7.62	1
Finland	7.57	2
Switzerland	7.40	3
Iceland	7.38	4
Norway	7.28	5
Luxembourg	7.19	6
Austria	7.15	7
Netherlands	7.14	8
Sweden	7.06	9
Australia	7.02	10
New Zealand	7.01	11
Israel	6.96	12
Ireland	6.91	13
Belgium	6.86	14
Germany	6.84	15
Czechia	6.83	16
Estonia	6.82	17
UK	6.81	18
US	6.78	19
France	6.78	20
Taiwan	6.77	21
Canada	6.73	22
Lithuania	6.72	23
Slovenia	6.64	24
UAE	6.63	25
Singapore	6.62	26
Saudi Arabia	6.55	27
Spain	6.52	28
Italy	6.51	29
Portugal	6.46	30

Deep dive

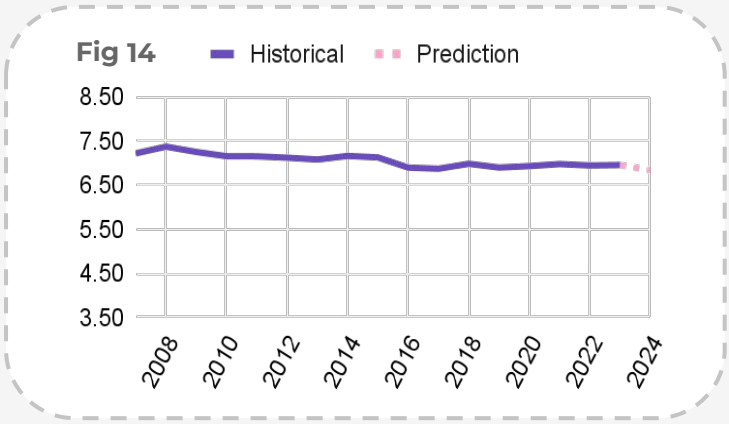
Predictions by country

The charts below show the **historical development** (2005-2022) and the **predicted future** happiness score (2023-2024) for 6 select countries:

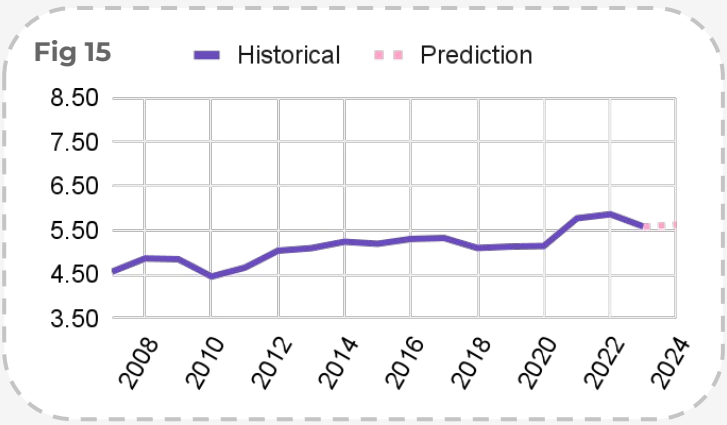
Denmark



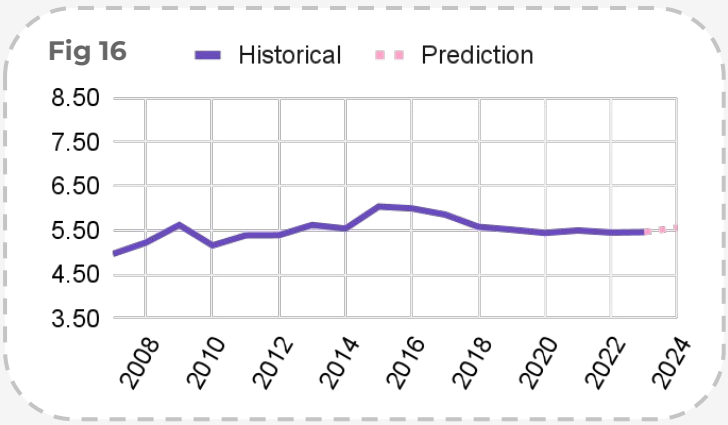
United States



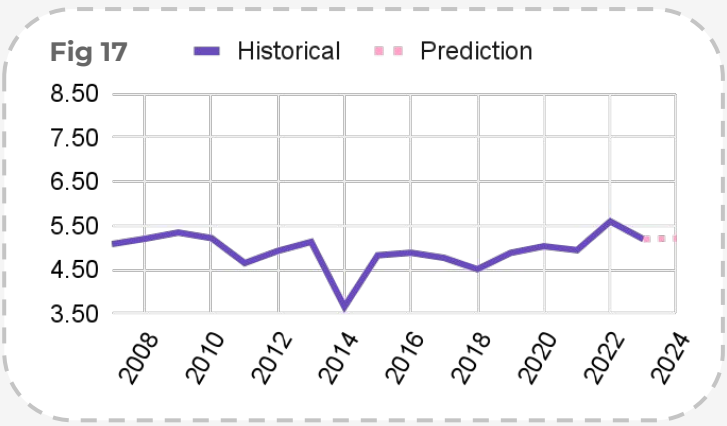
China



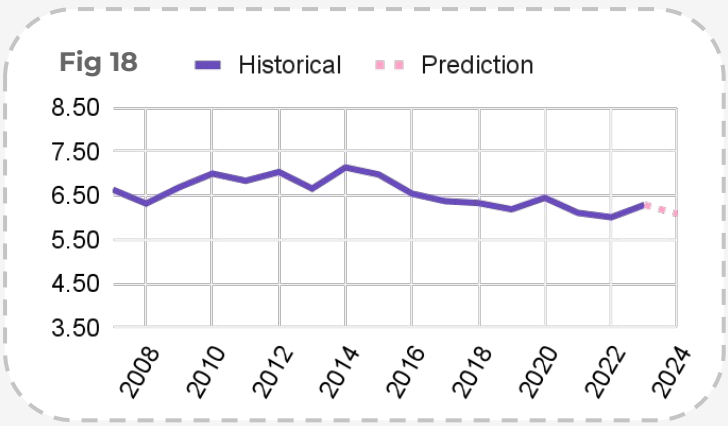
Russia



South Africa



Brasil



Technical footnotes

1. The World Happiness Report provides data covering the period 2005-2022 (as of the end of 2023), though not every country has a happiness score in each year. Whenever possible, when comparing scores across time, 2005 was used as the base year and 2022 as the reference year.

2. For some factors in the background data, there were missing values for some countries and/or years. Not to discard what could be useful information, missing values were imputed for by using the random forest imputer from the *mice* package (a 5-fold cross-validation was applied). For each missing value, a total of 10 possible values were generated by this method, after which point the average value thereof was retained for use in the analysis.

3. In an attempt to deal with the complexity of the background data, which originally contained 80+ different variables, a dimensions reduction technique was applied (principal component analysis or PCA). This way, it was possible to reduce the total number of variables by 69%, while retaining 83% of the variance in the data. The 19 principal components derived were then used in the ridge regression analysis.

4. The ridge regression analysis was carried out once based on the principal components and then based on the actual variables. The idea behind the first part was to reduce the complexity of the data and allow for an easier comparison between different factors. However, the conclusions were not that easy to interpret as principal components are rather abstract. Therefore, in the second run of the analysis, the original variables were used as exogenous variables. In either case, one model was tested per category (e.g. model based on economic factors) and a final model was tested combining factors from different categories. As is required for ridge, all input variables were scaled using their mean and standard deviation. Lambda values were optimized for each model, choosing the best performer from a range between 0 and 1, with a frequency of 0.05.

5. To predict future happiness, a random forest (RF) regressor model was used. The data was split into a training, validation and test set. The training set comprised of all rows except for the last year in the data, which was used for validation and tuning the model's parameters. The test set comprised of ⅓ of the validation set, selected on a random basis. The model was optimized by varying the values of the *mtry*, *ntree*, and *nodesize*. The MAP of the final model was 2.7% on the validation set and 3.6% on the test set, corresponding to an accuracy higher than 96% on a previously unseen set of data, an indication of excellent reliability for making predictions (assuming reliable input data).

   To be able to generate predictions for future time periods, it was necessary to first generate future values for all input variables (e.g. GDP, corruption, exposure to air pollution, etc.). This was done separately for each indicator for each country, where the historical trends were projected into the future (2023-2024). The projections were made based on OLS regression, with the following specifications tested: linear trend, quadratic trend, cubic trend, autoregressive model with 1-3 lags and forward-filling (used for constant values only). All possible specifications were tested for each country and indicator, predicting future values based on the model that had the closest fit to the historical data (selection based on the RMSE score).

Legal disclaimer

Please note that this is not a commercial product. The data used in it has been collected from publicly available sources and has been used purely for educational purposes.

A complete list of all external resources used is provided below:

- Data on world happiness: www.worldhappiness.report
- Data on general social, political, economic etc. factors: www.worldbank.org
- Data on corruption perception: www.transparency.org
- Data on quality of democracy: www.v-dem.net
- Data on victims of military conflicts: www.ucdp.uu.se
- Illustrations and icons: www.pixabay.com and www.iconfinder.com
- RStudio, RMarkdown and Google Workspace apps
- R packages: arrow, caret, corrr, countrycode, data.table, e1071, factoextra, gbm, ggplot2, glmnet, gridExtra, mice, modelr, openxlsx, plotly, plyr, randomForest, rdbnomics, readxl, rjson, stats, tidyverse, zoo

Let's get in touch

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