

Population & Societies

Interactive maps of the world population on the INED website

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Maps provide an invaluable tool for illustrating variations in demographic phenomena across countries. Even more so when the maps are interactive and provide a moving picture of changes over time. A new application of this kind, showing changes in 30 indicators recorded since 1950 and projected up to 2100, is now available on the INED website. Its designers, Gilles Pison, Hélène Mathian, Christine Plumejeaud and Jérôme Gensel present this new tool and describe how it works.

The world population will continue to increase in coming decades, rising from 7 billion inhabitants in 2011 to slightly above 10 billion in 2100, an increase of almost 50%. [1] Its global distribution will also change, with an increasing concentration in the South, and a decrease in the North. Visitors to the website of the French National Institute for Demographic Studies (INED) can now use a free online application to observe past and future demographic trends via a set of interactive maps.⁽¹⁾ [2] Thirty demographic indicators can be visualized for all countries of the world, and moving images show how they change over time (from 1950 to 2100).

Five viewpoints to explore demographic diversity across the world

After launching the animation, you can choose from five options:

- *The world*: view the world map of an indicator and see how it changes,
- *A country and its neighbours*: select a country and

compare it with its neighbours,

- *Country to country*: see how the indicator changes from one country to another,
- *Map without borders*: observe the geographical variations of an indicator without national borders,
- *How far away am I?*: select a point on the map and see how the population, or another quantity, is distributed around this point.

Let's look more closely at the first three options.⁽²⁾

Global changes in a demographic indicator

The application first takes you to "The World" page (Figure 1) showing a world map. It opens with the birth rate indicator. Use the "Select an indicator" menu to

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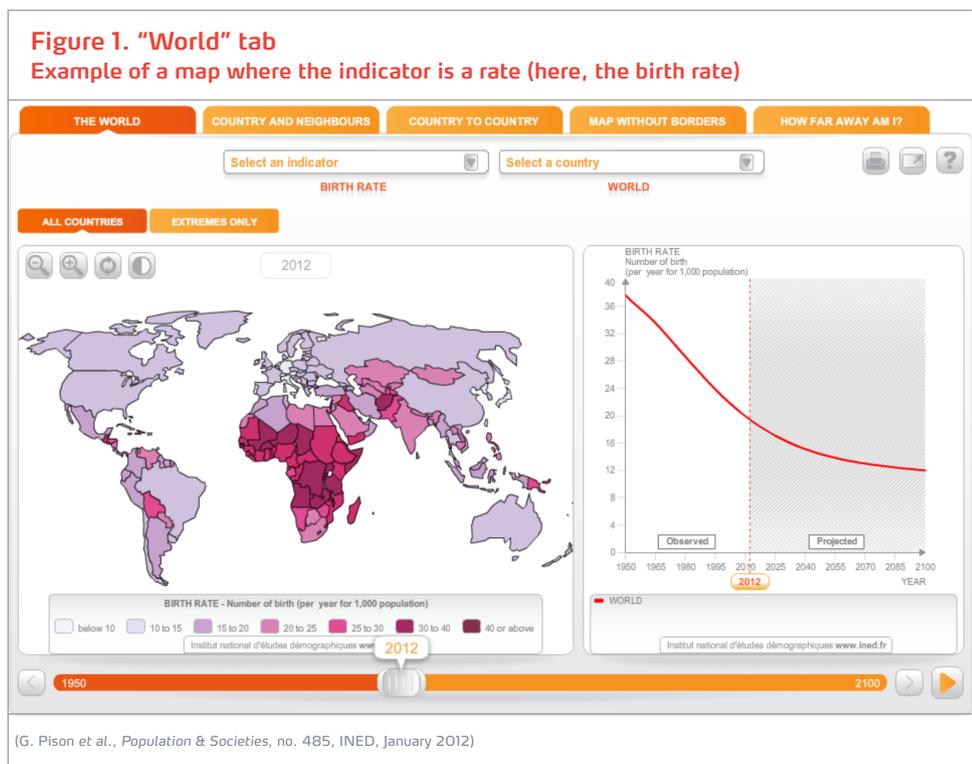
(1) http://www.ined.fr/en/everything_about_population/interactive_maps/

(2) For more information on the last two options, see reference [2].

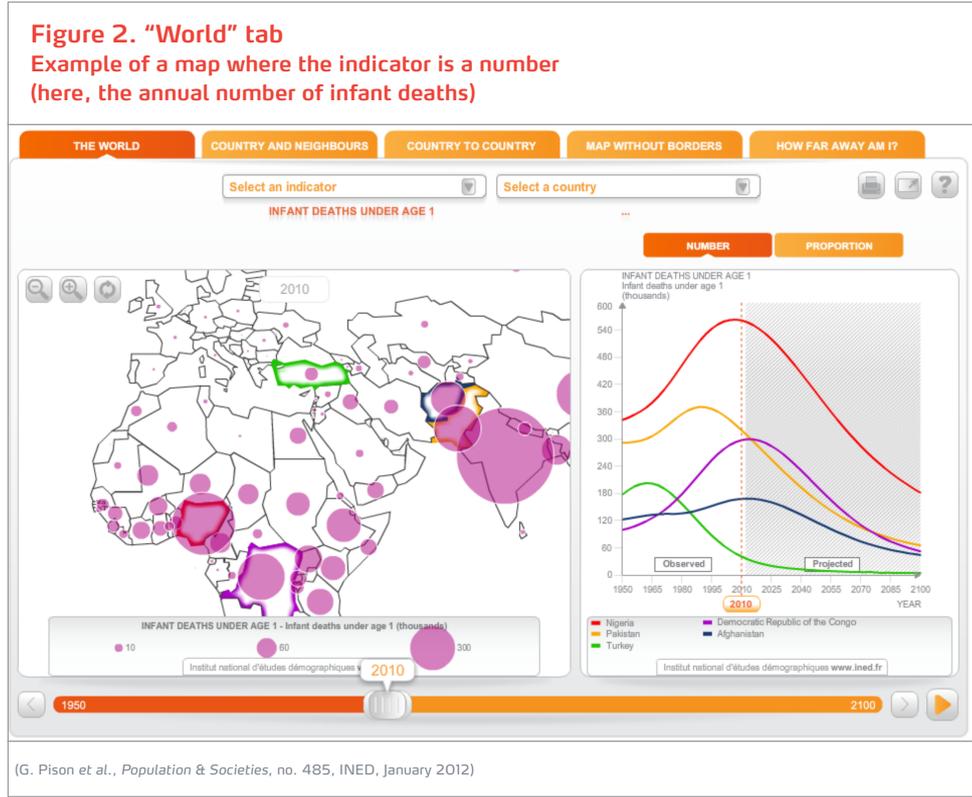
choose from among 30 different indicators and view a global map of variations in that indicator for the current year. You can also go back in time or move ahead to 2100, and the map changes accordingly.⁽³⁾ The graph on the right-hand side of the screen shows global trends in the indicator from 1950 to 2100. For the years 1950-2010

it shows observed variations, and for the future it gives the projections based on the United Nations medium scenario.⁽⁴⁾ [1]

If the indicator is a rate (such as the birth rate), variations across countries are shown on the map by colour differences (Figure 1). If the indicator is a number (for example, annual number of infant deaths, i.e. deaths of children aged below one), the values are represented by circles in the centre of each country whose surface area is proportional to the level of the relevant indicator (Figure 2). You can select one or more countries by clicking on the map or on the "Choose a country" list. The graph shows the variations of the indicators for all selected countries as curves (Figure 2).



Show highest and lowest countries



For rate indicators, such as the infant mortality rate (deaths of children aged below 1 per 1,000 births), you can display all the countries in the world or only those with the highest or lowest values. (Figure 3). Move the "Proportion of countries" cursor to choose

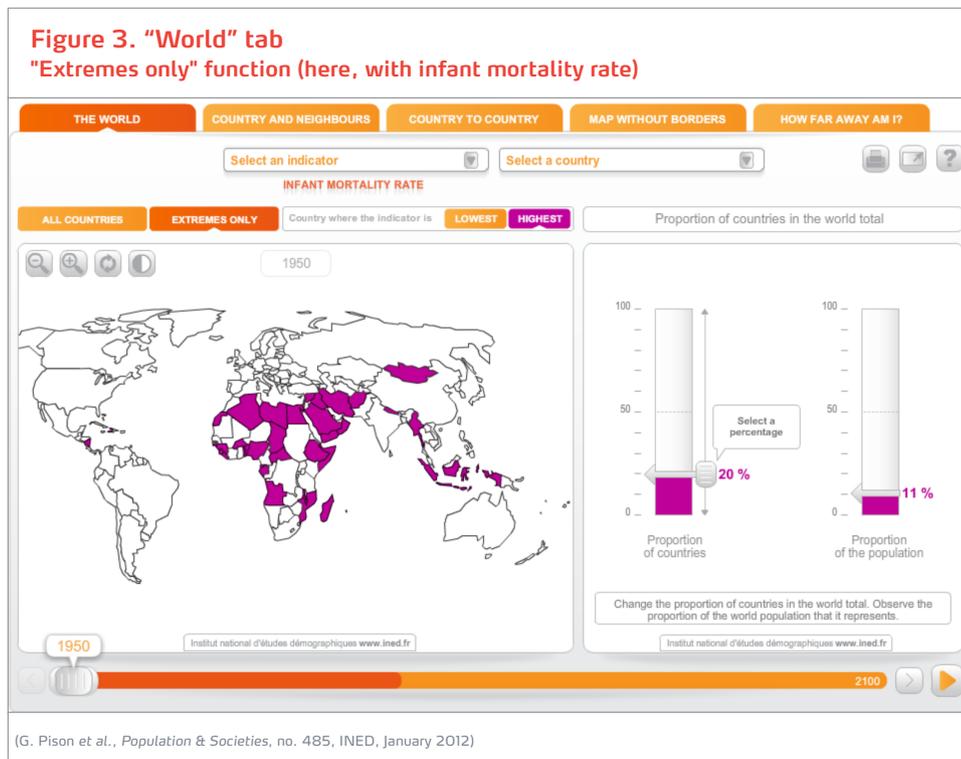
(3) The base map used corresponds to national borders in 2010. In order to provide the same spatial references and make comparisons possible, it remains unchanged over time.

(4) The maps are based on the most recent United Nations statistics. Like the "Population and me" and "Population in figures" animations on the INED website, they are updated with each new revision of the United Nations projections.

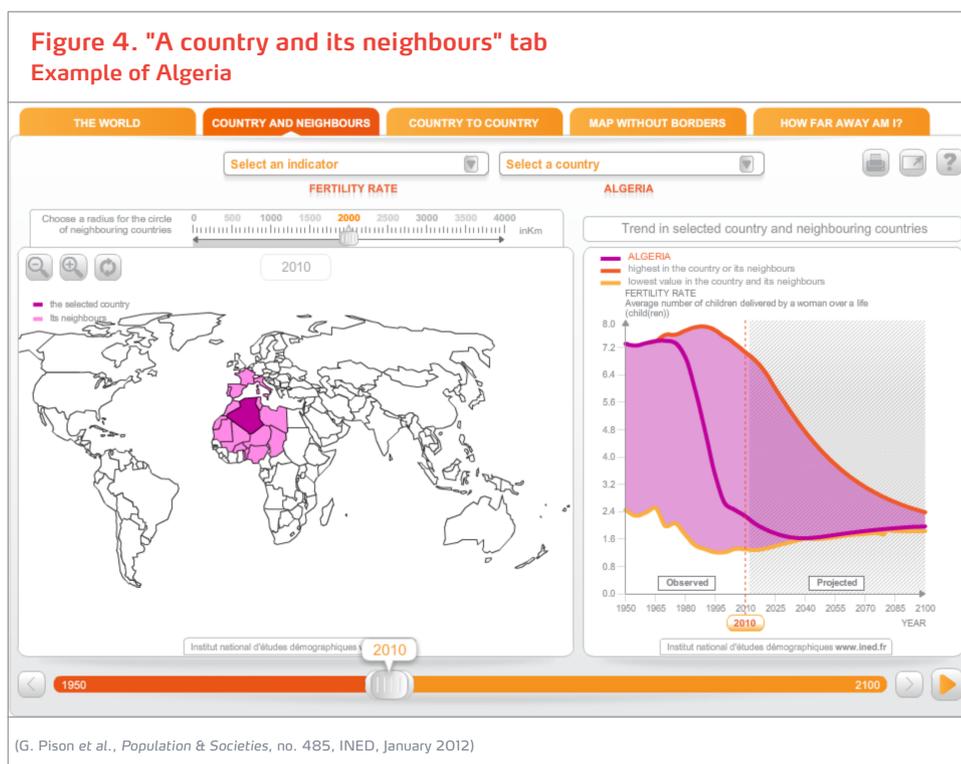
the share of world countries included in these extremes. The example in Figure 3 shows the 20% of countries with the world's highest infant mortality rates in 1950. The right-hand cursor moves automatically to give the percentage of the world population corresponding to the selected countries. If you move in time from 1950 to 2010 you will see that the 20% of world countries with

the highest infant mortality have tended to become concentrated in sub-Saharan Africa, while in 1950 they were spread quite broadly across the continents of the South.

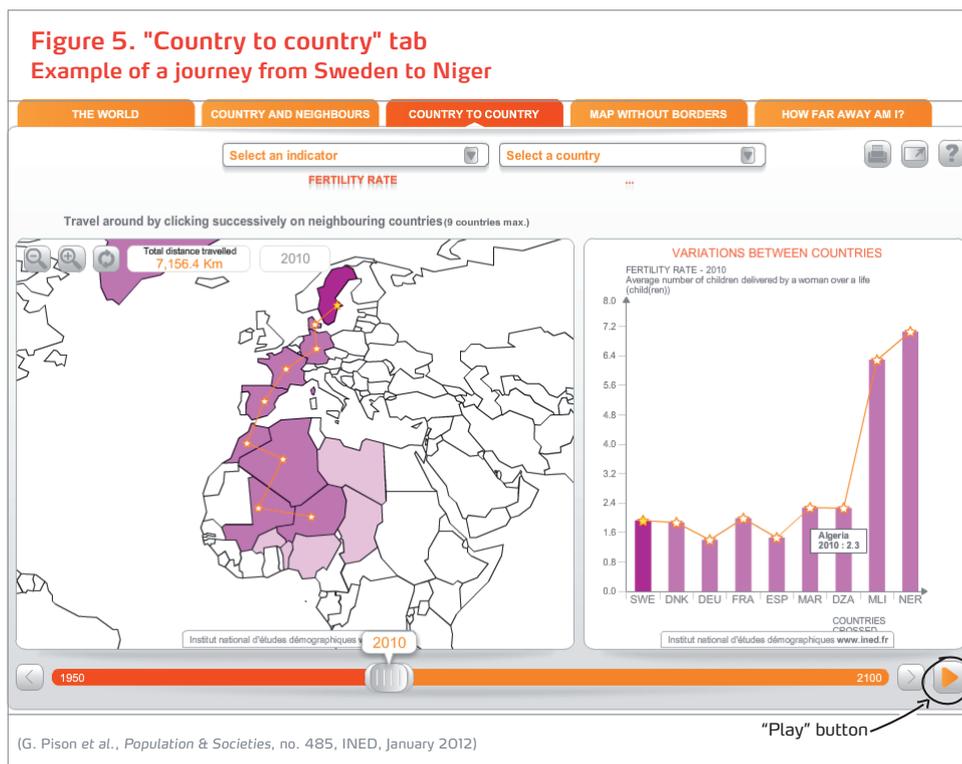
Examine the similarities and differences between countries



Click on the second tab "Country and neighbours" to compare a country with its neighbours over time. After selecting a country, you can choose a larger or smaller number of neighbours by setting a distance in kilometres on the scale (Figure 4). The graph on the right automatically shows the variations of the indicator in the chosen group of countries: it displays changes in extreme values over time and how the chosen country compares with its neighbours. In Figure 4, the indicator chosen is the fertility rate (average number of children per woman) and the country is Algeria. Up to the 1970s, Algeria had one of the highest fertility rates among countries located within a radius of 2,000 km, with 7 children per woman on average. In 2010, however, its fertility was well below that of its neighbours, at just over 2 children per woman.



(5) The route must be over land, with no sections by air. Starting from a country you can only move to another country that has a common border. If they are separated by a short stretch of sea, you may take the boat.



Identify spatial discontinuities

Click on the third tab "Country to country" to view similarities and differences between neighbouring countries (Figure 5). Choose a route through a number of countries and the graph will immediately show how the indicator varies from one country to the next, with its "gradients" (regular variations) and "discontinuities" (sudden changes). You can move through time to see how these discontinuities evolve.

In the example shown in Figure 5, the starting point is Sweden. Your path then takes you through Denmark, Germany, France, Spain, Morocco, Algeria, Mali and Niger. If you have selected the fertility rate indicator, the graph on the right shows that in 2010 fertility was around 2 children per woman from Sweden to Algeria, then increased abruptly to more than 5 in Mali and Niger. In 1950 (use the timescale at the bottom to select the year), the fertility rate was between 2 and 3 children per woman from Sweden to Spain and then rose sharply between Spain and Morocco to above 6 children. If you watch the graph as it changes over time (click the "play" button on the bottom right), you will see the 1950 discontinuity move from the Mediterranean sea to the Sahara desert. This is due to the sharp fertility decline

that began in North Africa in the 1970s. Levels there are now similar to those in northern Mediterranean countries. Age at marriage is now much later and birth control is widespread. Similar changes, although later and slower, are occurring south of the Sahara.

The maps on the INED website are designed to be educational and user-friendly. The aim was to produce an interactive tool that is attractive, easy to understand and simple to use. Offering a clear vision

of current and future demographic developments, these maps will be particularly useful to teachers and students, but also to decision makers who need to plan for the years ahead. We also hope that they will interest researchers and the public at large.

REFERENCES

- [1] United Nations - 2011, *World Population Prospects: the 2010 Revision* (<http://esa.un.org/unpd/wpp/>).
- [2] Gilles Pison, Hélène Mathian, Christine Plumejeaud, Jérôme Gensel - 2011, *Exploring World Demography Online*, Paper presented at the 25th International Cartographic Conference, Paris, 3-8 July 2011.

ABSTRACT

The website of the French National Institute for Demographic Studies (INED) features a set of free-access interactive population maps. Thirty demographic indicators can be visualized for all countries of the world, and users can watch moving images to see how they change over time. They can also compare a selected country with its neighbours, travel from one country to another to see how an indicator varies, observe geographical variations of an indicator on a map without borders and last, select a point on the world map and see how the population, or another quantity, is distributed around this point.