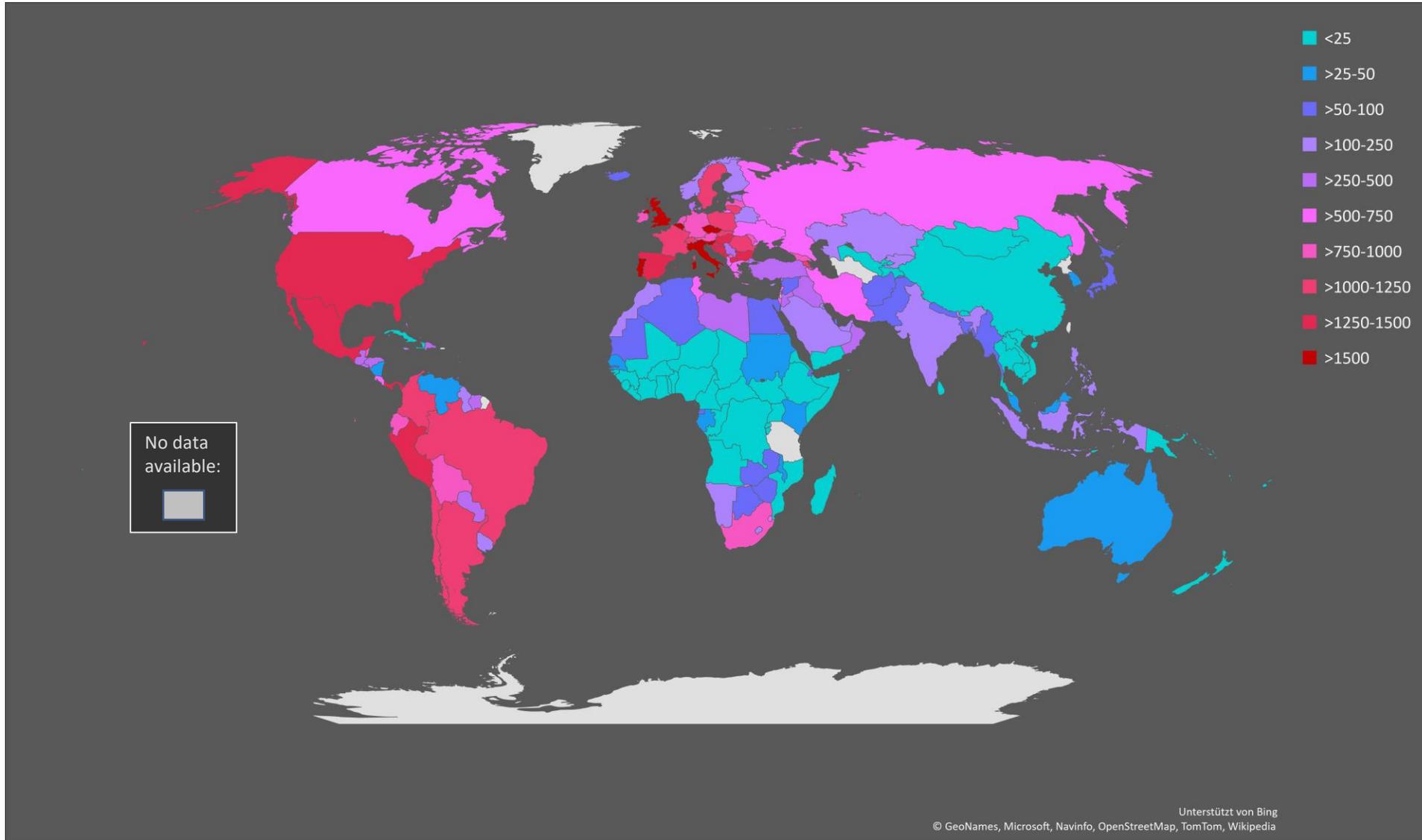


Access to COVID-19 Vaccines

Evolving Patterns of Worldwide Distribution as of 14th February 2021

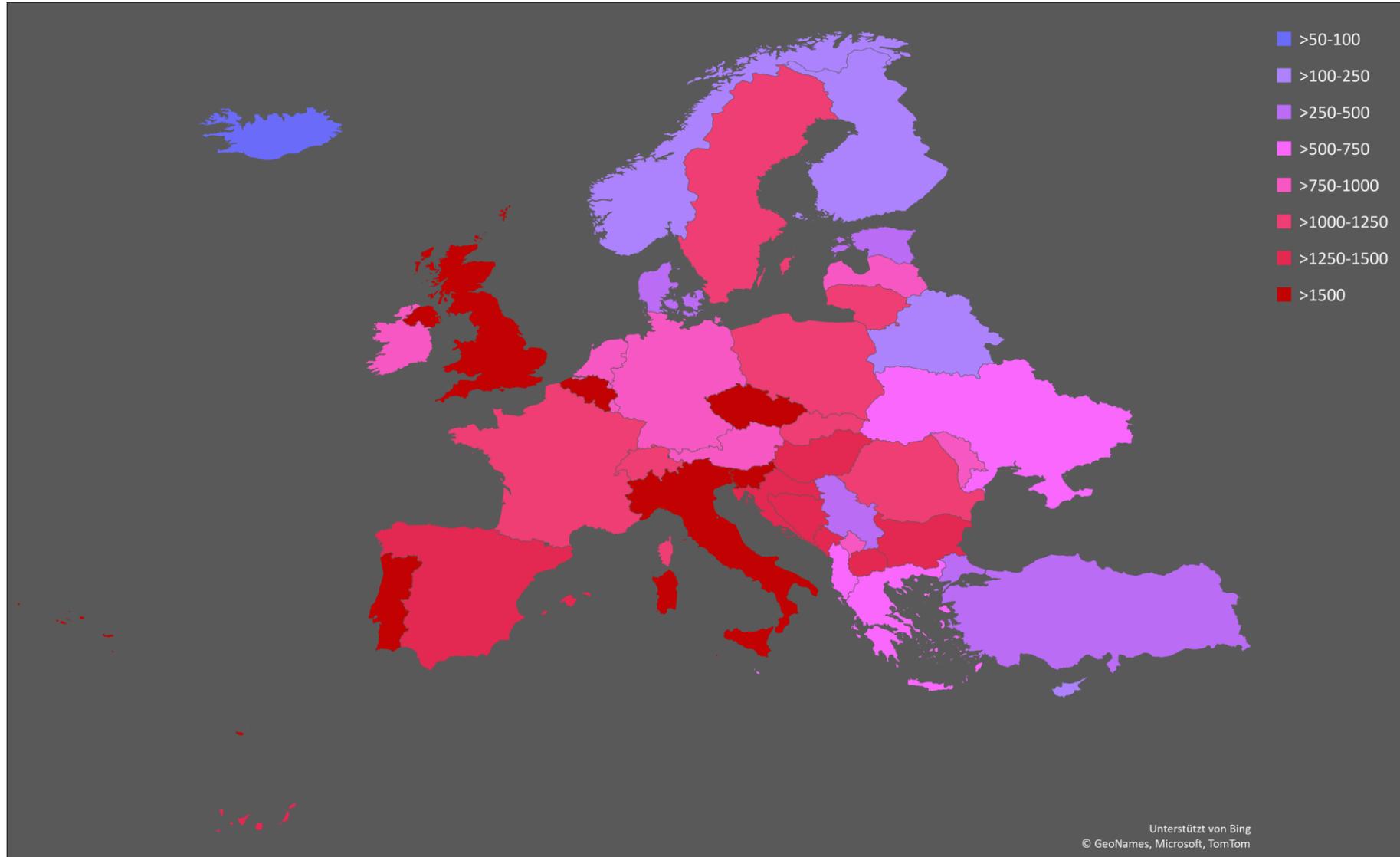
COVID-19-related Deaths per million People, until 14.02.2021



This world map shows cumulative deaths caused by COVID-19 in relation to population sizes. Blue indicates low death rates, whereas nations marked in red have experienced high death rates. Geographically, we see that the Americas and Europe have suffered the most, while regions like Oceania and Eastern Asia have recorded relatively low mortality rates. However, it has to be kept in mind that countries' statistical capacities and abilities to detect cases differ. Furthermore, different definitions between countries exist in terms of which deaths are officially counted into the COVID-19 statistics.

Notwithstanding the practical and methodological difficulties of determining COVID-19 as primary cause of death, mortality rates represent the most reliable and critical indicator to track the evolution of the pandemic and assess its impact on population's health. Unfortunately, excess mortality data that could be used as a complementary indicator are only available for a minority of countries.

Cumulated COVID-19-related Deaths per million People, until 14.02.2021

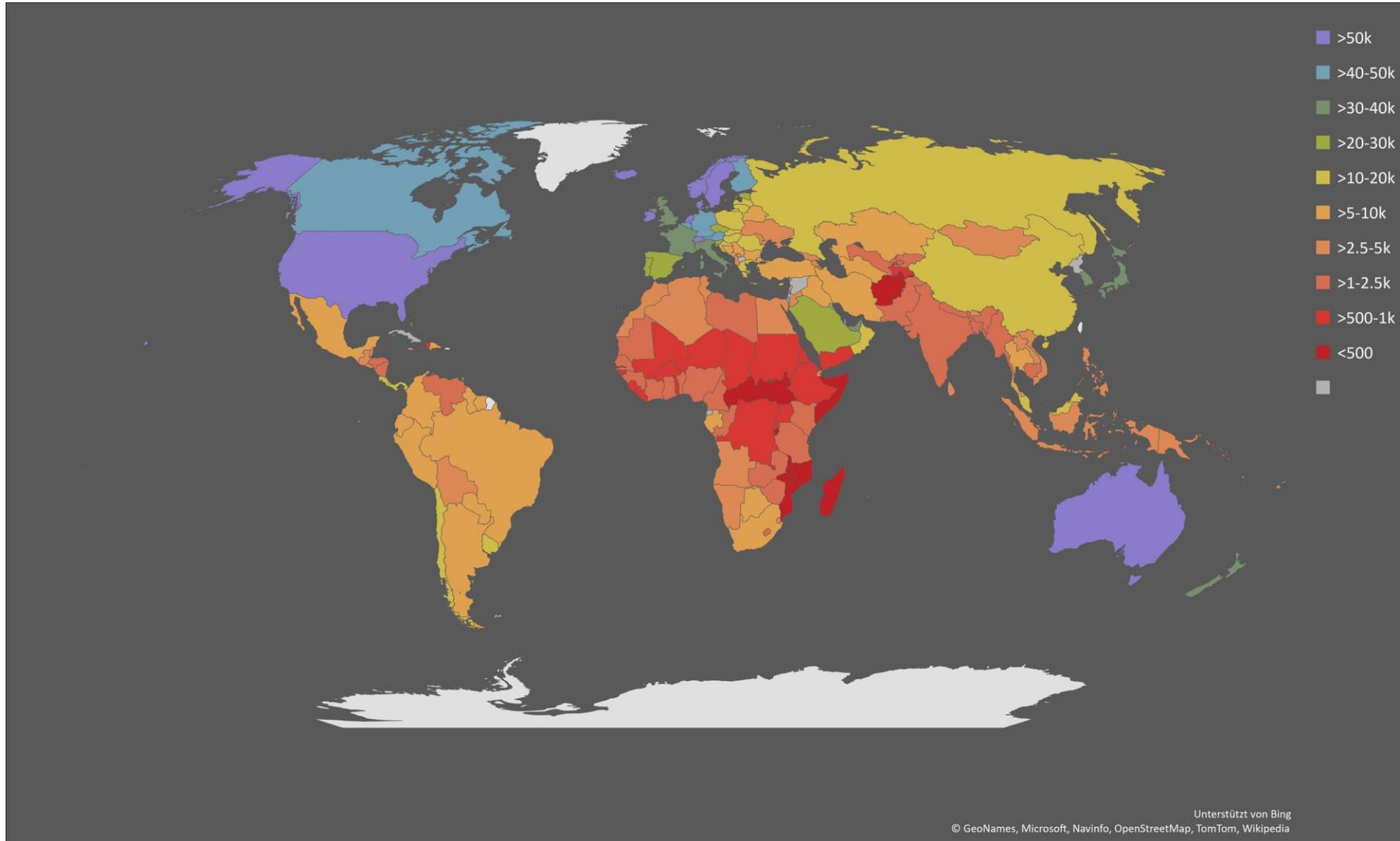


This map shows cumulative deaths caused by COVID-19 in relation to population sizes for the European continent. Blue colors indicate relatively lower death rates, whereas nations marked in red have experienced comparatively higher mortality rates.

With cumulated deaths per 1 million people already exceeding 1,500 Belgium, Slovenia, United Kingdom, Czech Republic, Italy and Portugal (in this order) are at present the worst affected countries on the worldwide level. Among the 20 countries that report the highest cumulative mortality rates 15 are to be found in Europe.

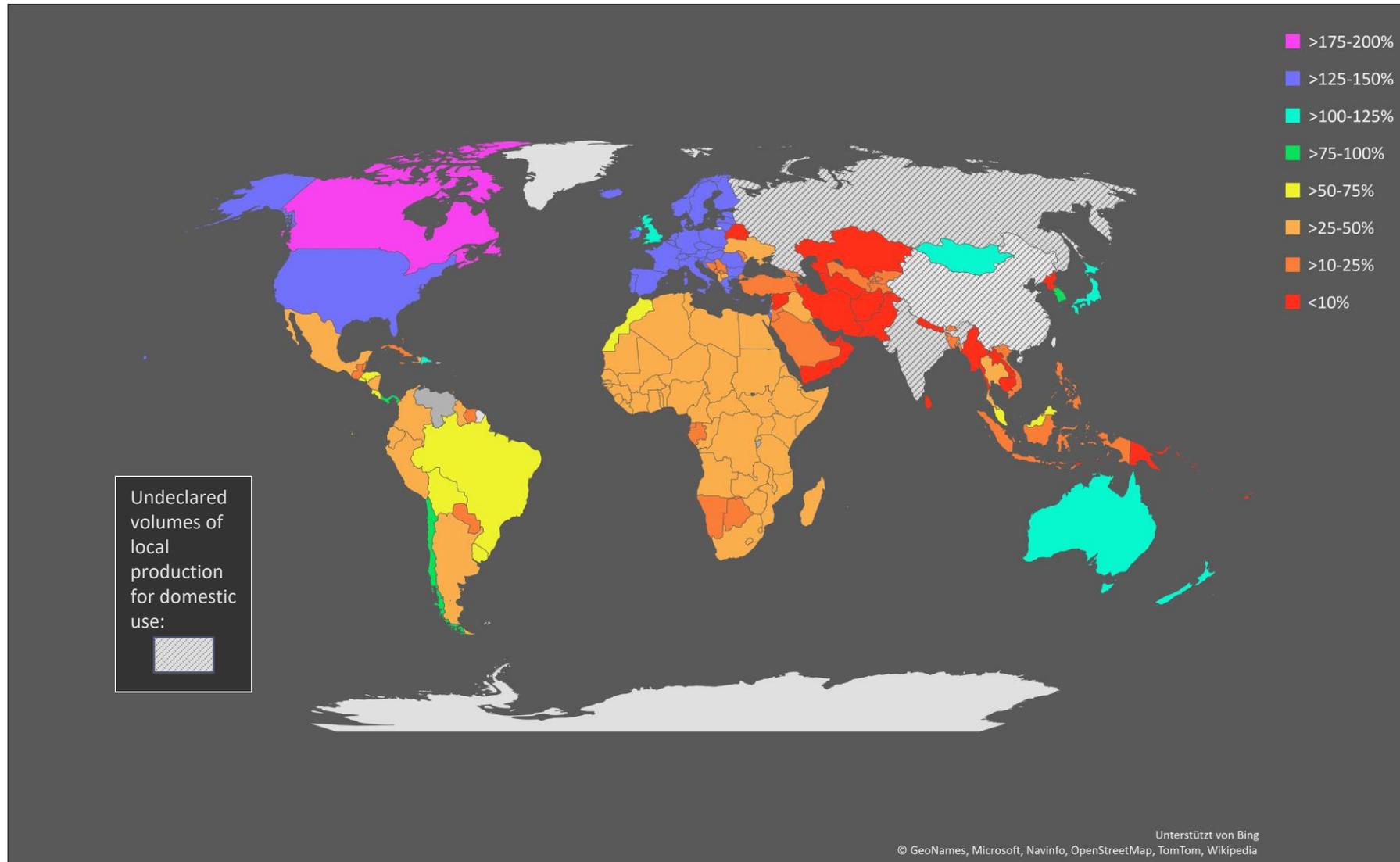
When comparing the severity of the health impact by continents, however, Europe comes third with an overall mortality of over 950 per million, while North America (1,200) and South America (1,030) suffered even greater human losses due to the pandemic.

Countries by Differentiated Income Groups based on Projected Gross Domestic Product per Capita in the Year 2020, expressed in 2019 US\$



This chart depicts the worldwide distribution of income between countries in the year 2020. The respective values were calculated using International Monetary Fund data on total GDP in 2019 combined with most recent estimates on economic growth during 2020 (World Economic Outlook of October 2020 and World Economic Outlook Update of January 2021). Values of GDP expressed in national currency were converted in US\$ based upon market exchange rates. Therefore, the shown indicator is representative for the respective economic capacities regarding the procurement of internationally traded goods. As most countries, especially those belonging to the economically more disadvantaged groups, are dependent on the importation of vaccines and other medical technologies, the chart indicates the financial potentials to acquire these essential goods. Most of the impoverished countries are to be found in Sub-Saharan Africa.

Current Population-wide Coverage through Advance Purchase Agreements for COVID-19 Vaccines that received Marketing Authorisation (AstraZeneca/Oxford, Pfizer/BioNTech, Moderna)

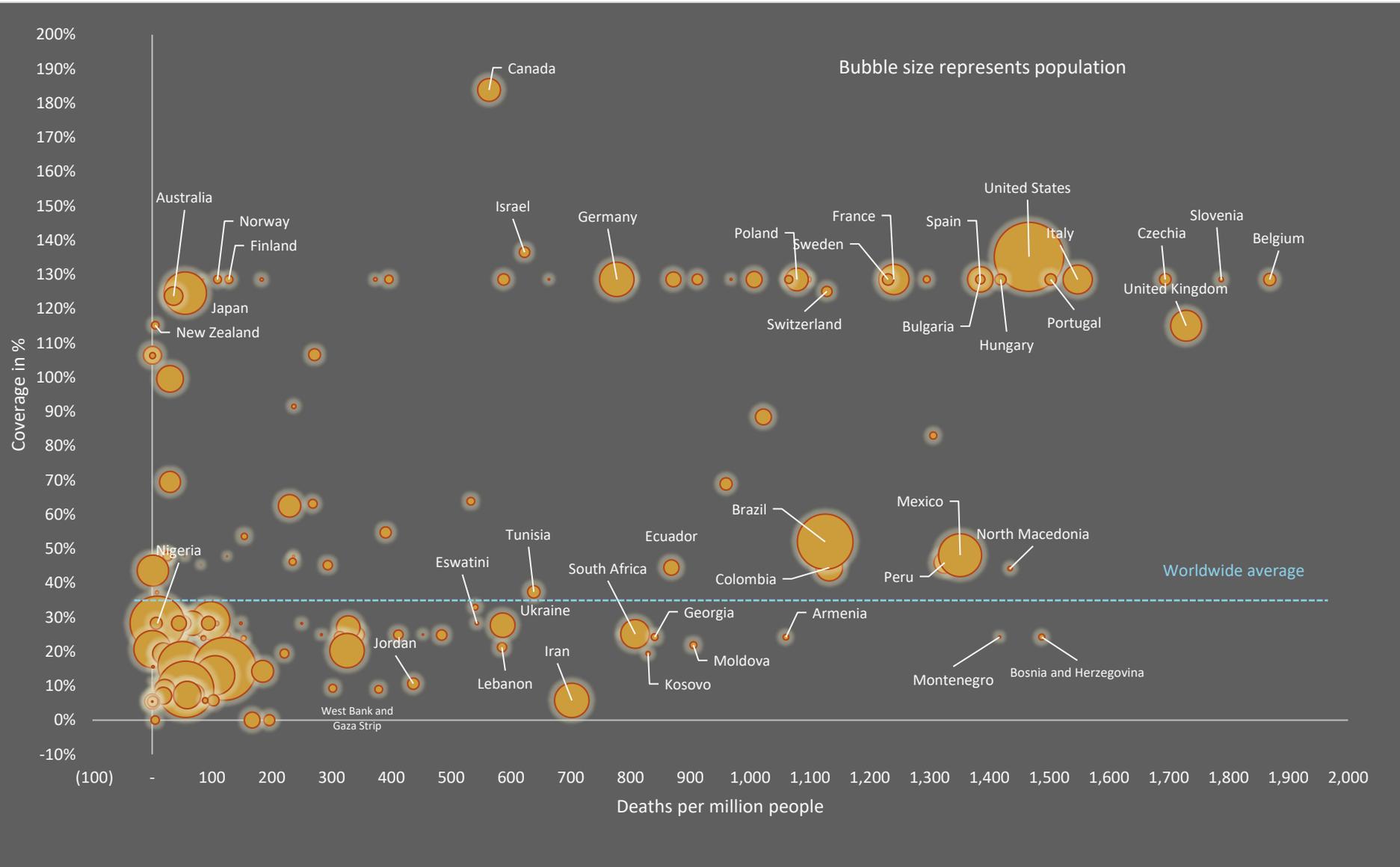


This world map shows population-wide coverage of COVID-19 vaccines per person measuring secured courses. In the absence of authoritative information systems, calculations are based on a web-based country-by-country search for official documents or, in most cases, press releases. In addition, results were cross-checked with the references of UNICEF's COVID-19 Vaccine Market Dashboard. In total, 153 bilateral agreements were identified and documented until mid-February. In addition, procurements and allocations through COVAX as well as joint agreements of the African Union, the European Union and Latin American countries (local production) were considered for the respective countries. It is important to note that the database may be incomplete due to lack of transparency or accessible publications.

The countries with the highest coverage rates exclusively are high-income nations plus member states of the European Union belonging to the upper middle-income category. Notably, several of those countries have secured more vaccine doses than needed to cover their whole populations. On the other side, many low- and middle-income countries located in Africa, Asia and the Americas can only expect to immunize less than half of their populations relying on internationally authorized vaccines.

Current Population-wide Coverage through Advance Purchase COVID-19 Vaccines that received Marketing Authorisation compared to Cumulated Deaths per million people

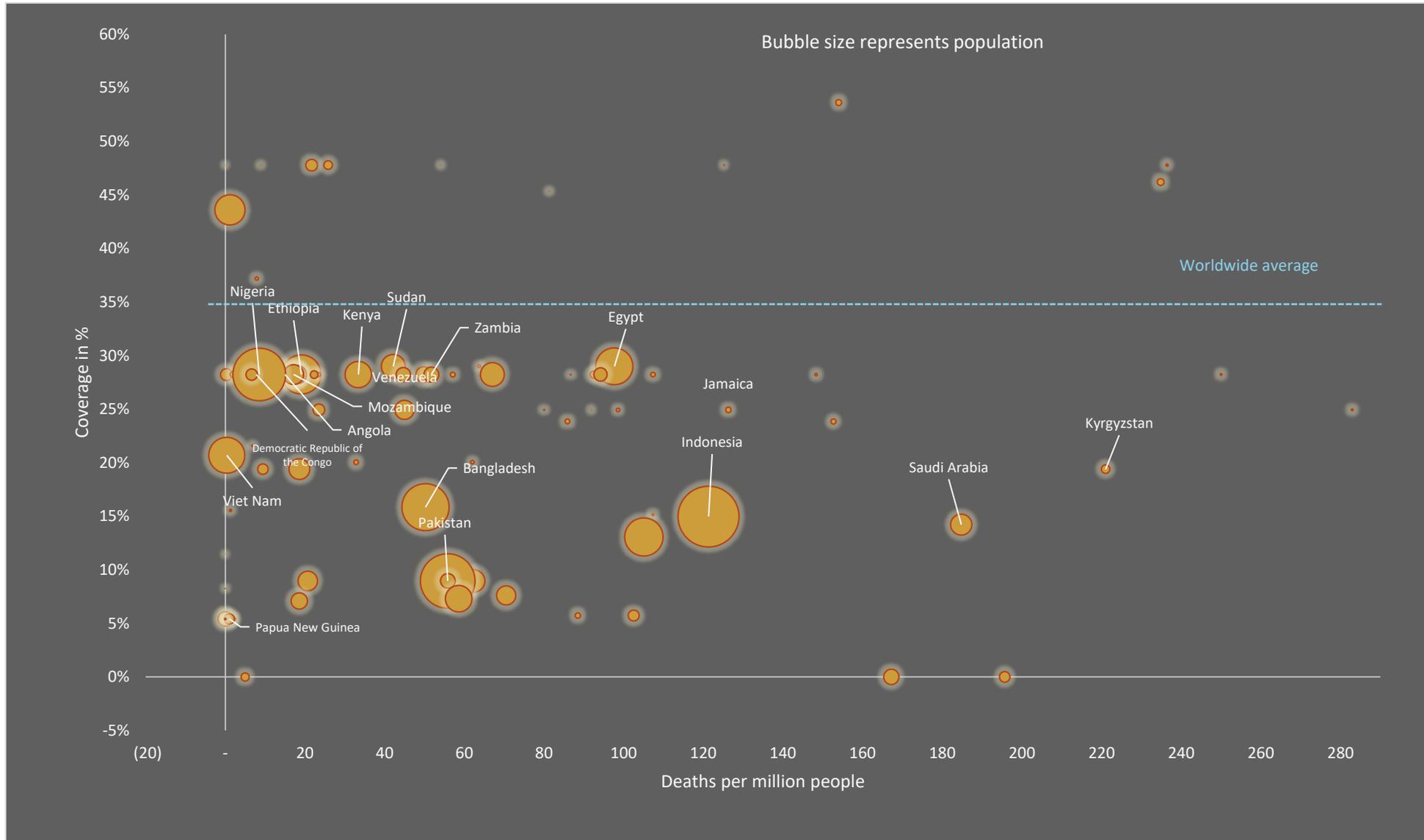
(AstraZeneca/Oxford, Pfizer/BioNTech, Moderna/NIH)



This bubble chart shows COVID-19 vaccine coverage in percent on the y-axis, while COVID-19-related deaths per million people is depicted on the x-axis. The bubble size represents a nation's population size.

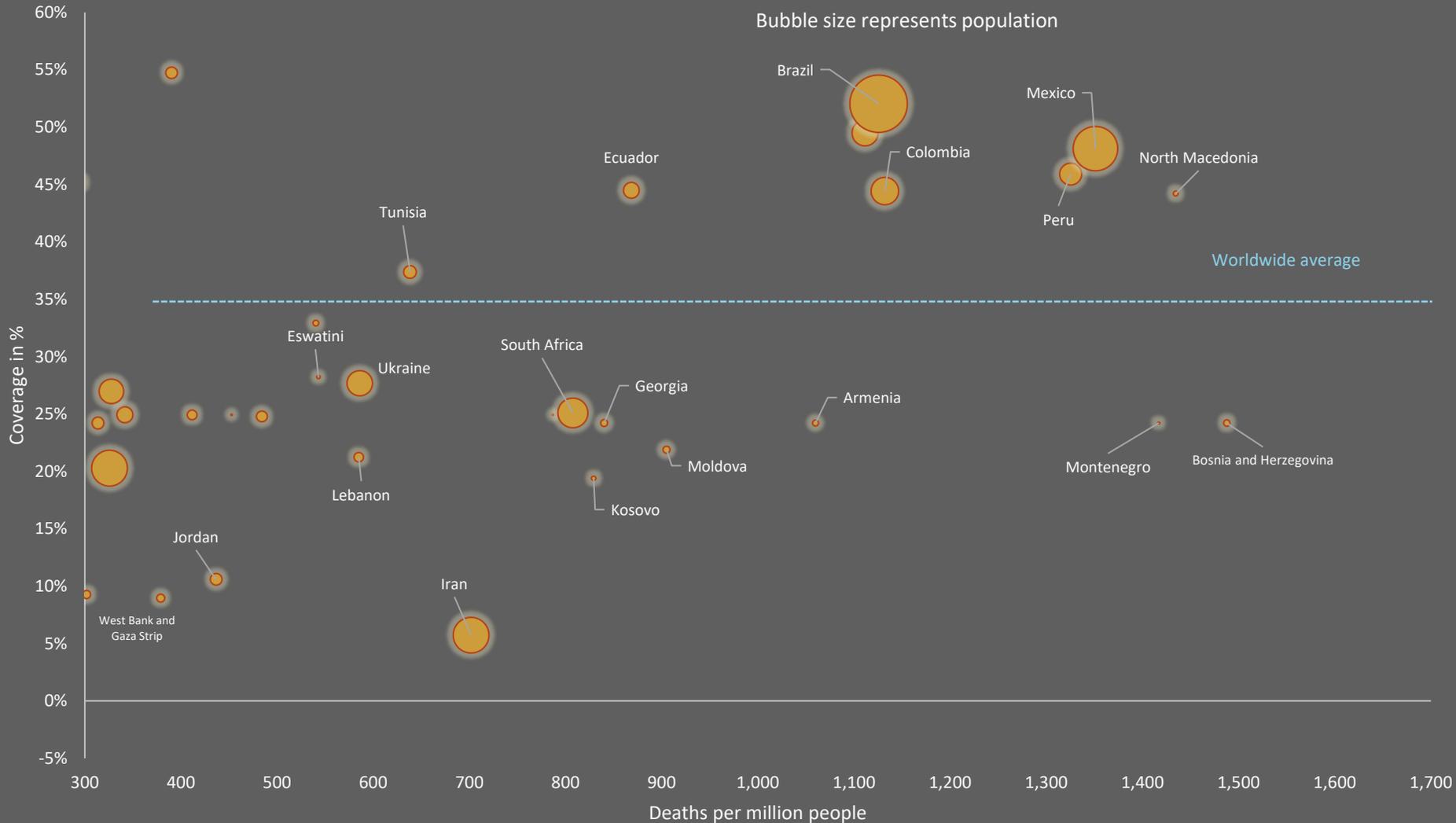
A cluster of countries are situated between a coverage rate of 110-140%, although these countries exhibit starkly diverging death rates. Meanwhile, another cluster of countries is situated below 60% coverage rate, although several of these countries show relatively high death rates. This is especially the case for countries in the Balkans as well as Latin America and the South Caucasus. On a global level the coverage rate reaches 35% at present.

Current Population-wide Coverage through Advance Purchase COVID-19 Vaccines that received Marketing Authorisation compared to Cumulated Deaths per million people focusing on countries with below average coverage and relatively lower death rates



This bubble chart shows a closer picture compared to the previous diagram in order to see those countries that were bunched together in the lower-left corner. Countries such as Bangladesh, Indonesia and Pakistan record very low coverage rates, which is especially problematic considering that these countries have relatively high population sizes. Moreover, many African countries face substantial access constraints with coverage rates that are considerably lower than the worldwide average and only being able to immunize about 25-30% of their populations so far.

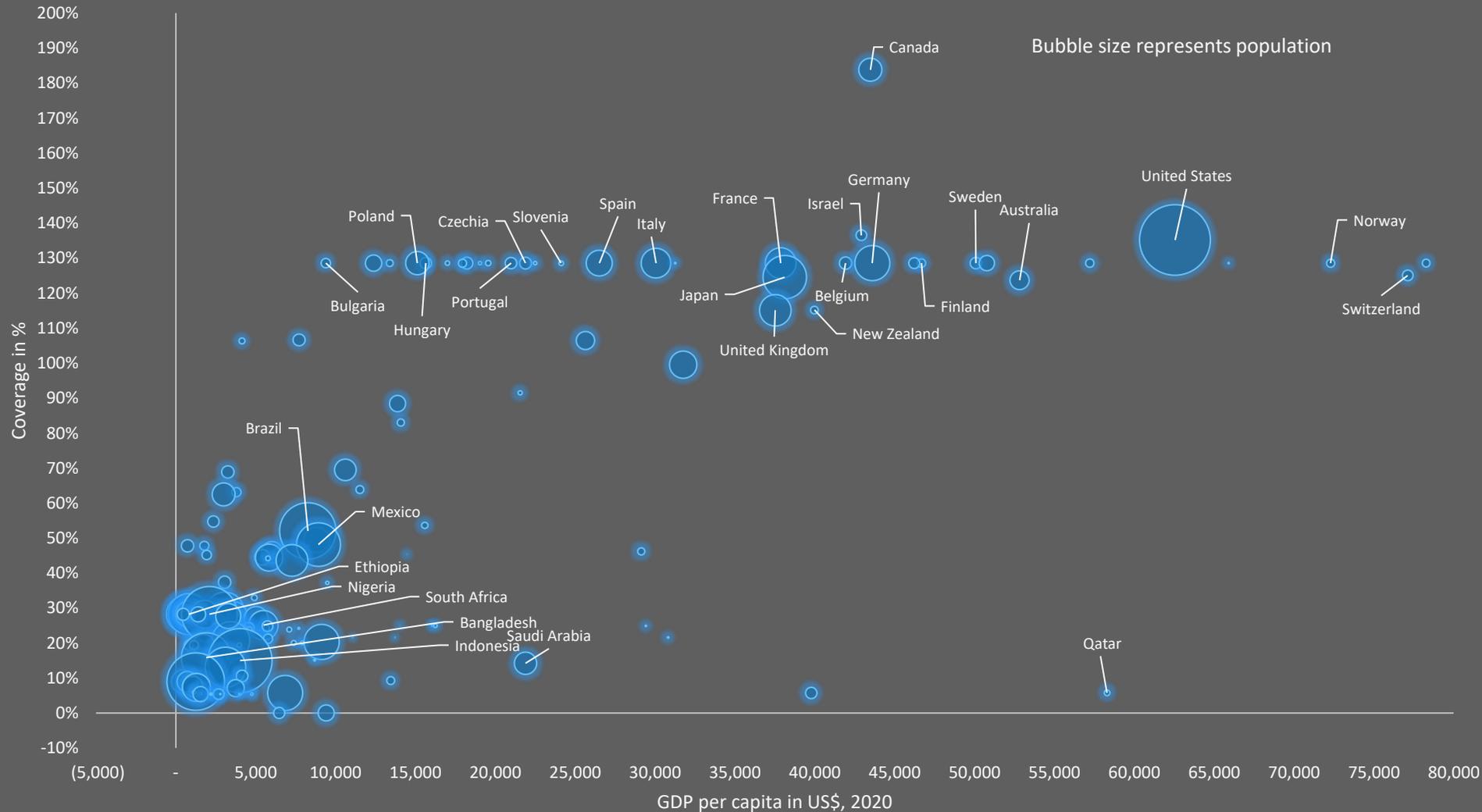
Current Population-wide Coverage through Advance Purchase COVID-19 Vaccines that received Marketing Authorisation compared to Cumulated Deaths per million people focusing on countries with below average coverage and high death rates



This bubble chart permits a closer view of those countries that suffered high mortality rates, while being confronted with insufficient coverage rates so far. Several countries within Europe or in its close neighborhood appear to require urgently additional support in order to get a more adequate access to vaccines and prevent ongoing losses of life. A significant number of Latin American countries with large population sizes are lacking the necessary means that would permit to reach a herd immunity threshold. South Africa represents another case of special concern, especially when we consider that measured excess mortality in this country is almost three times higher than reported COVID-19 related death numbers.

Current Population-wide Coverage through Advance Purchase COVID-19 Vaccines that received Marketing Authorisation compared to Gross Domestic Product (GDP) in 2020 per capita

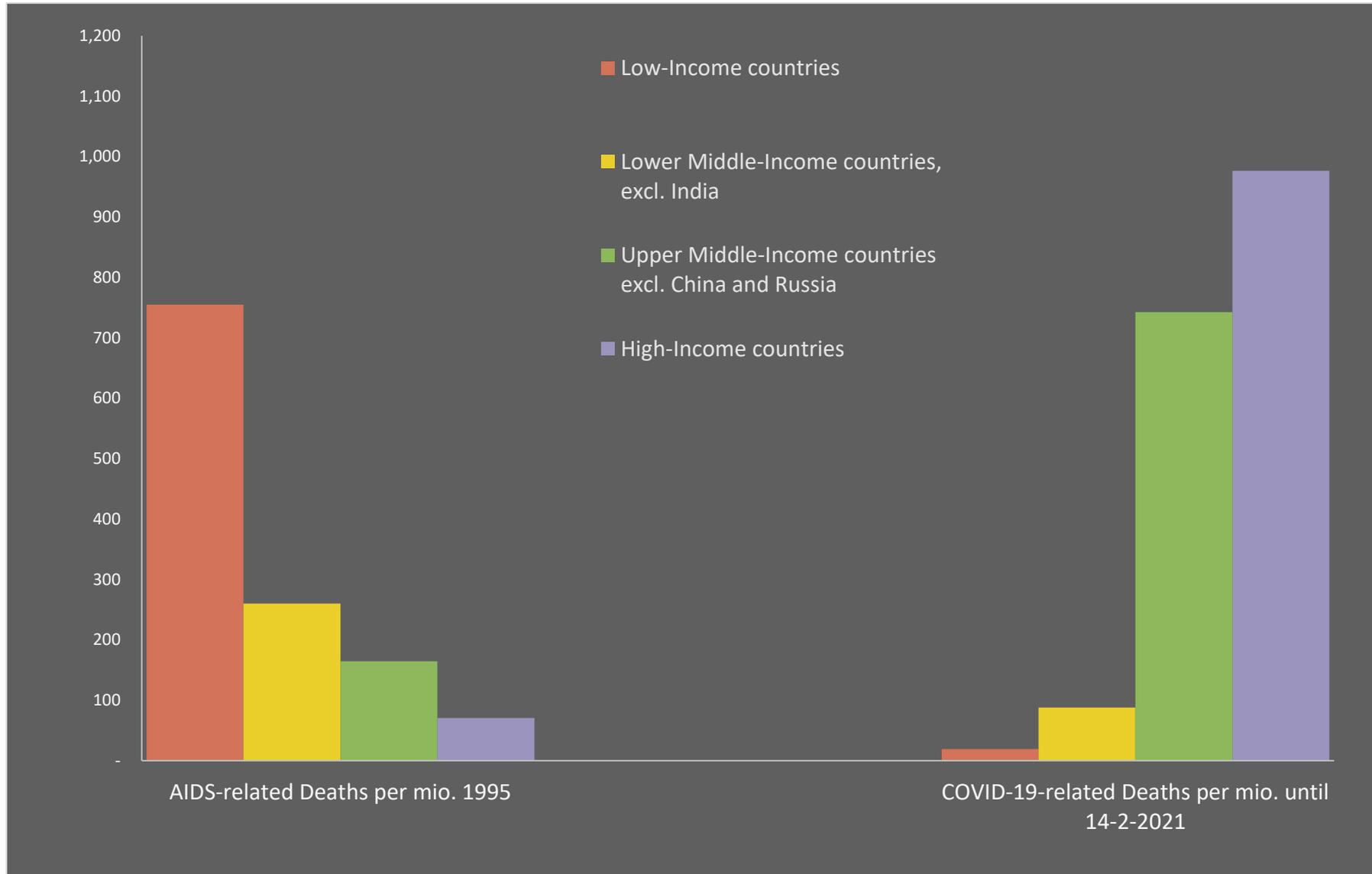
(AstraZeneca/Oxford, Pfizer/BioNTech, Moderna/NIH)



This bubble chart shows COVID-19 vaccine coverage in percent on the y-axis, while a country's economic strength measured in GDP per capita is depicted on the x-axis. The bubble size represents a nation's population size.

Almost all economically more privileged countries achieve high coverage rates of 100% and more. In addition, member states of EU belonging to the upper middle-income group are benefitting from the joint advance purchase agreements. Meanwhile, a cluster of economically more disadvantaged countries is situated in the lower-left corner and achieve coverage rates of merely or less than 70%. Most countries of this cluster even show coverage rates of less than 30%.

Cumulative Mortality Rates related to COVID-19 by Income Groups as defined by World Bank compared to AIDS-related Death Rates prior to the Development of an effective Antiretroviral Therapy

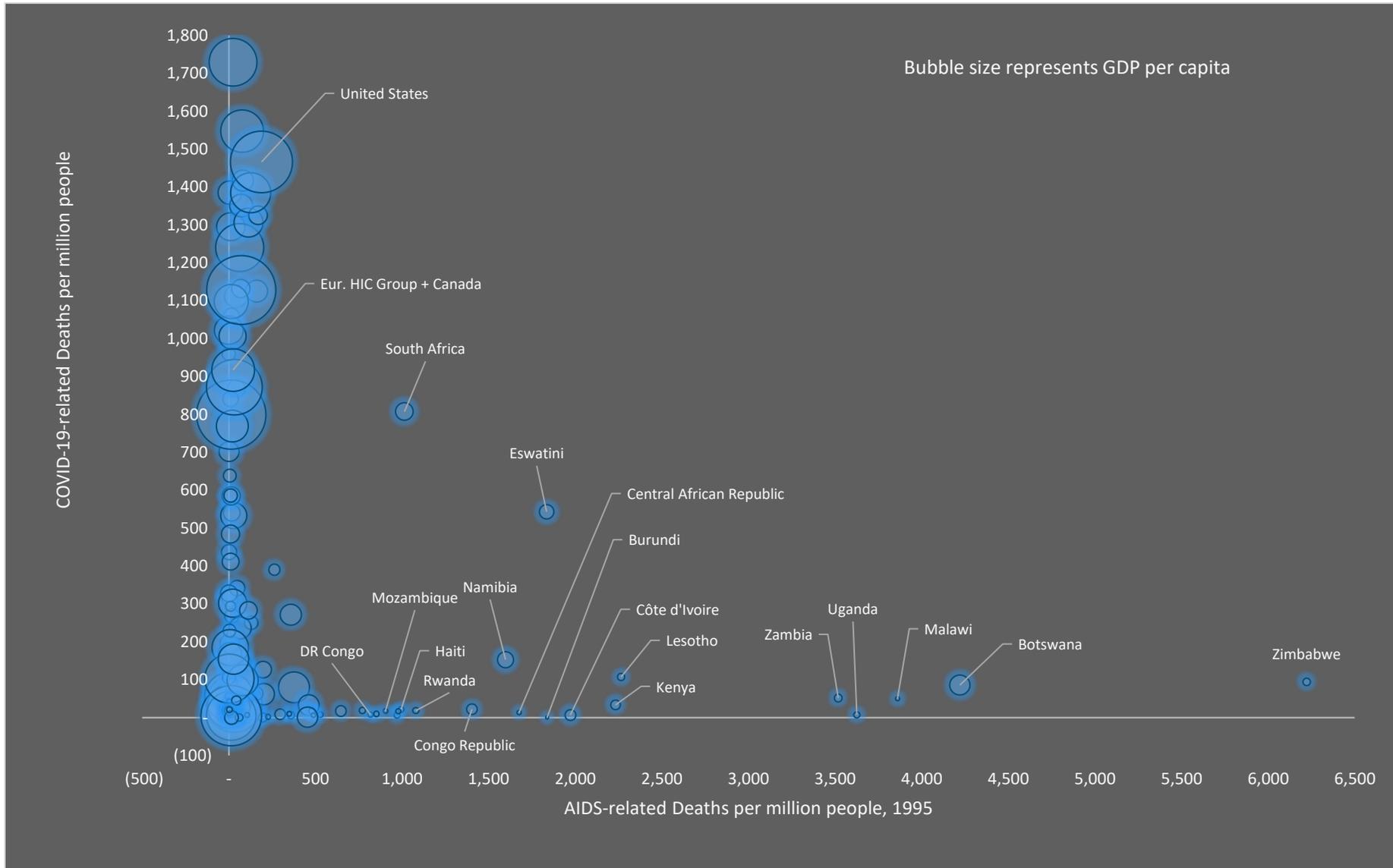


Looking back on the evolution of other devastating pandemics can be intriguing and offer important insights, but it may be misleading in other essential aspects. HIV is of special interest, as it poses one of the greatest threats to global health and human development seen in recent history.

While both pandemics show us the importance of acting with reason and solidarity both on the societal and the scientific level, the biological characteristics of HIV evidently differ from COVID-19 in many fundamental ways. Worldwide patterns of vulnerability in socioeconomic terms appear to show notable disparities, too.

Before an effective treatment became available for the first time in 1996, HIV infection ultimately lead to death everywhere. Thus, the mortality rates observed in 1995 reflect the relative risks of the virus spread at that stage. This overview chart demonstrates that the probability of suffering a more severe health impact due to HIV and AIDS is, in general, remarkably higher in economically disadvantaged countries, whereas the opposite holds true so far with respect to the SARS-CoV-2 pandemic.

Cumulative Mortality Rates related to COVID-19 by Individual Countries compared to AIDS-related Death Rates prior to the Development of an effective Antiretroviral Therapy

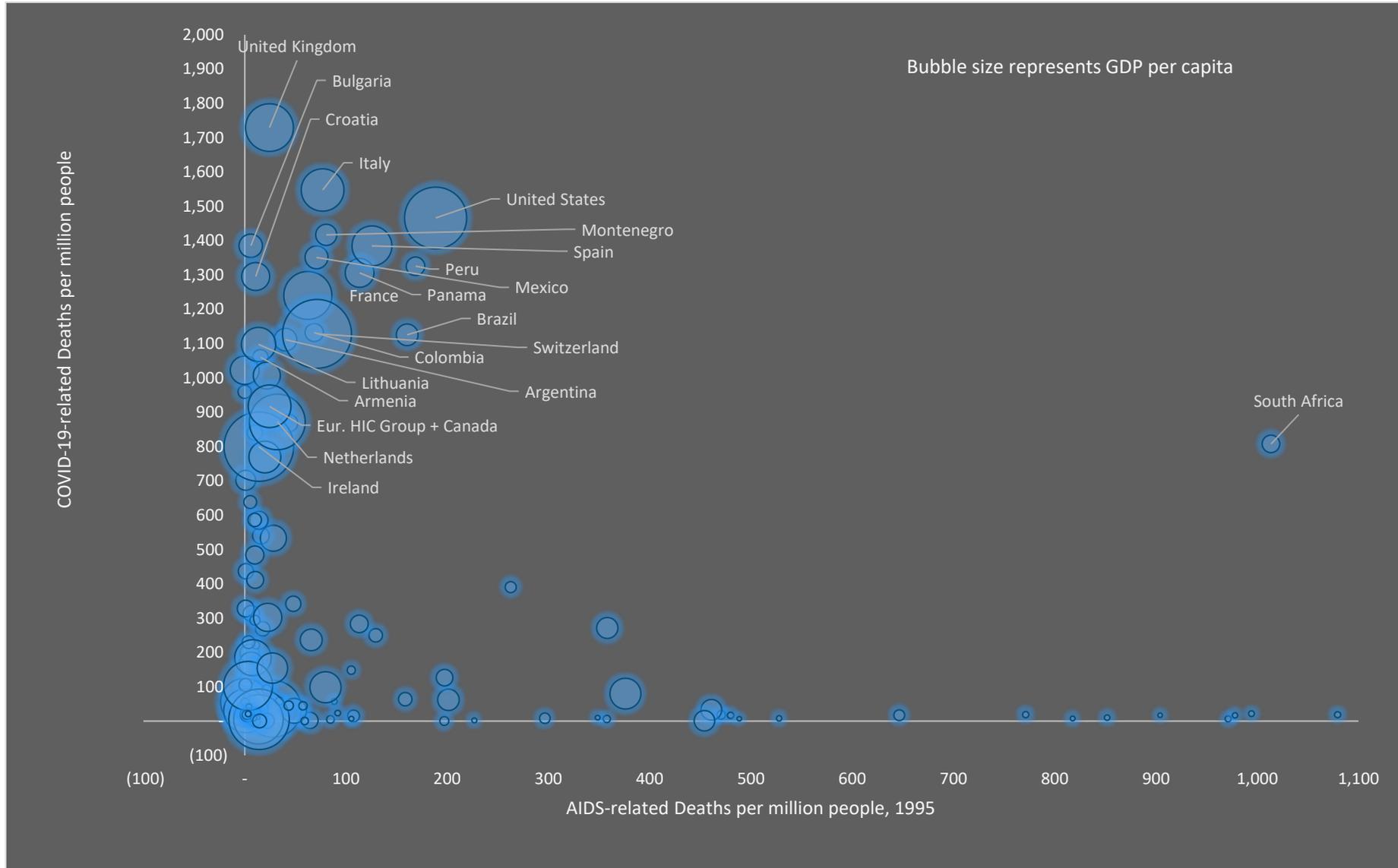


This chart looks at the level of individual countries and relates the historical deaths rates caused by HIV and AIDS according to the most recent estimates for the year 1995 (x axis) to the cumulated mortality related to the COVID-19 pandemic. Represented by the proportional bubble sizes it also shows national economic capacities measured by GDP per capita.

It is easy to recognize that the disproportional concentration of AIDS related deaths in lower income countries reflects the fact that Sub-Saharan Africa, and more specifically the southern and eastern region, had become the worst affected region of the world. It is important to bear in mind that AIDS-related deaths more than doubled in eastern and southern Africa between 1995 and the peak in 2004, mainly because of the delayed access to antiretroviral therapy.

Several European countries, including Germany, and Canada are grouped together here, since regional AIDS mortality estimates are used due to lacking national data.

Cumulative Mortality Rates related to COVID-19 by Individual Countries compared to AIDS-related Death Rates prior to the Development of an effective Antiretroviral Therapy excluding Sub-Saharan Countries with the highest death rates at that stage of the AIDS Pandemic



This chart offers a closer view of the bulk of countries while excluding the cases with the highest estimates of AIDS-related death rates in 1995. Thereby, it becomes clear that the nations located in North and South America as well as Europe, which mostly are belonging to the high-income and upper middle-income groups as defined by World Bank, show the highest mortality risks due to COVID-19. Furthermore, the respective bubble sizes representing economic capacity indicate that the statistical relationship between relative risks and higher income levels persists when excluding Sub-Saharan countries, with the few exceptions of better-off nations that managed to curb effectively the spread of SARS-CoV-2 virus with consequent public health measures.

South Africa represents the most outstanding case of those countries that were severely affected by both pandemics. This is all the more evident as excess mortality estimates exceed by far reported deaths.