COVID-19 in unequally ageing European regions

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The COVID-19[1] pandemic is unequally claiming lives across age. As death risks increase with age for people infected by SARS-CoV-2[2,3] and the pandemic unfolds, the new coronavirus poses great challenges on populations with larger proportions of fragile people at older ages. How populations differ in age structures, or in the proportion of people in different age groups, partly explain the spread and the crude fatality measures of the disease.[4] Looking at population age structures is therefore critically important to assess the potential impact of COVID-19 on mortality in Europe, the oldest part of the world with considerable variations in the degree of ageing.[5]

In this correspondence we visually explore differences in population age structures across Europe's NUTS-3 regions[6] and in the proportions of population at risk of death due to COVID-19 (figure). Age-specific case-fatality ratios from COVID-19 based on the first 3047 deaths in Italy[7] are used as weights for the population age profiles. We effectively introduce a summary measure of population age structures focused on the most vulnerable to the pandemic. This approach requires careful consideration of the assumptions and limitations due to the lack of high-quality data on the unfolding pandemic. The proportions of population at risk of death are useful in predicting the pandemic toll if (1) the age-specific profile of case-fatality ratios stay as for today's Italy and (2) 2/3 of the population[8] gets infected uniformly across regions. This is unlikely to hold true by the end of the pandemic. Case-fatality ratios move upwards as more outcomes of the infection are known[9] and downwards as more mild cases are registered.[10] The final proportion of the population infected is difficult to predict and depends on the interventions taken[11] that will vary across countries and regions.

Despite the limitations, the regional differences in age structures shown here are relevant for the story of the unfolding pandemic and can inform on potential scenarios in Europe, as long as the relative differences in fatality between age groups stay proportional. Unlike the data on COVID-19, data on European population age structures are of great quality and shed light on the impact of the ongoing pandemic, which is highly relevant for planning public health interventions.

The map highlights the next big challenge of the pandemic: If the spread of COVID-19 is not mitigated, soon the most affected regions will be the remote periphery with relatively old population and less healthcare facilities.

References

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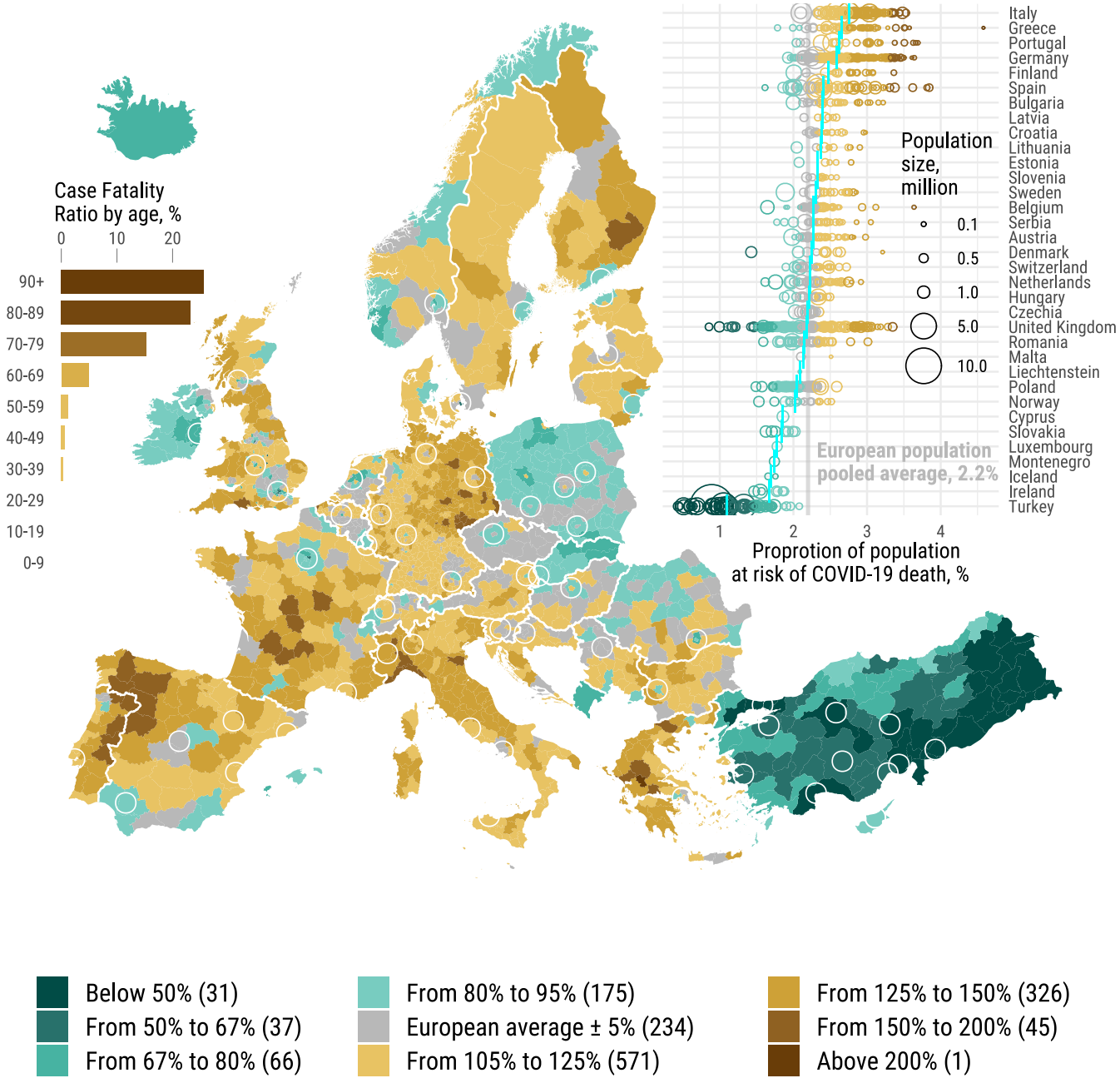

Figure: COVID-19 in unequally ageing European regions. NUTS-3 regions of Europe are colored according to the deviation from European pooled estimate of the proportion of population at risk of death due to COVID-19 – 2.2%. These estimates assume Italian age-specific case-fatality ratio – see the inset barplot on the left. The weighted average for all the NUTS-3 regions by countries are present in the top-right inset dotplot. Please note, this map reflects the unequal population age structures rather than the precise figures on COVID-19 fatality.