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## Letter to the Editor

# COVID-19 vaccination uptake strongly predicts averted deaths of older people across Europe

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In a recent article, Ysrafil and colleagues emphasized the important concept that some differences observed in the risk of dying for coronavirus disease 2019 (COVID-19) across different worldwide regions seems to be strongly associated with mutations emerged in the genes of severe acute coronavirus disease 2 (SARS-CoV-2), especially in that encoding for the spike protein [1]. Nonetheless, several other aspects may contribute to such variation, such as demographic (i.e., age of the population), economic (i.e., care access and quality) clinical (presence of co-morbidities) and, last but not least, preventive or therapeutic factors (i.e., availability and diffusion of COVID-19 vaccines). To this end, Meslé et al. recently showed that nationwide COVID-19 vaccination campaigns were

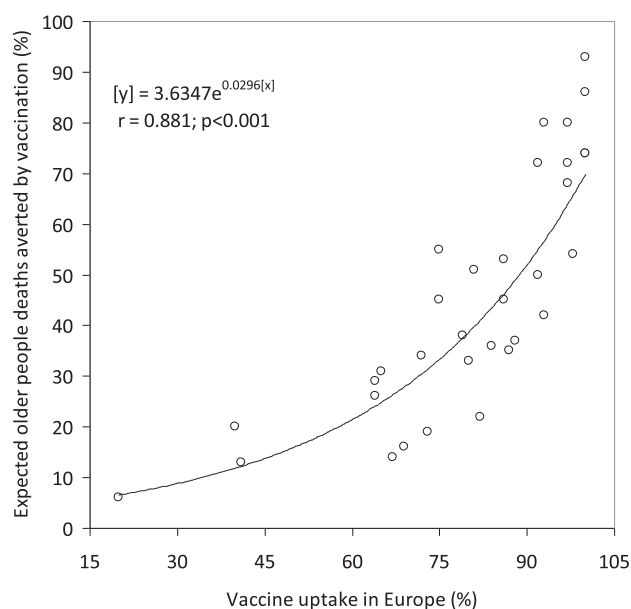


Fig. 1 Association between percentage of averted deaths and vaccine uptake per country in the European region between December 2020 and November 2021, according to data published by Meslé et al. [2].

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effective to avert as many as 51% deaths in people aged  $\geq 60$  years in the European region between December 2020 and November 2021 [2]. Nonetheless, a broad heterogeneity could be noted in the percentage of averted deaths across the different European countries, so that we carried out an additional analysis of this data.

Briefly, we downloaded the data reported in table 1 of the article of Meslé et al. in an Excel Worksheet (Microsoft Excel; Microsoft, Redmond, WA, US), which were then used to perform univariate and multivariate correlation analyses, using Analyse-it (Analyse-it Software Ltd, Leeds, UK).

A significant linear association was found between averted deaths of older people and vaccine uptake per country, both expressed in percentage (Spearman's rank correlation coefficient  $r_s = 0.872$  and 95%CI 0.754–0.935;  $p < 0.001$ ), though such relationship was even better fitted by using an exponential curve ( $[y] = 3.6347^{0.0296 \times [x]}$ ;  $r = 0.881$ ;  $p < 0.001$ ) (Fig. 1). In multiple linear regression analysis, where averted deaths were entered as dependent variable whilst vaccine uptake and types of vaccine administered in each country were entered as independent variables ( $2.80 \times [\text{types of vaccine}; 95\%CI, -2.23 \text{ to } 7.84] + 1.10 \times [\text{vaccine uptake}; 95\%CI, 0.77 \text{ to } 1.42] - 53.41$ ), the percentage of deaths averted by COVID-19 vaccination remained independently associated with vaccine uptake ( $p < 0.001$ ), but not with the type of vaccine administered ( $p = 0.264$ ).

These results confirm the existence of an almost exponential relationship between vaccine uptake and number of older people deaths saved in Europe, though we failed to observe a clear impact of COVID-19 vaccine formulation on this trend. Thus, we support the foremost importance of reinforcing nationwide COVID-19 vaccination campaigns, irrespective of the type of vaccine, especially in countries where vaccination programmes have been less successful.

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### Conflicts of interest

The authors declare no conflicts of interest.

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