

COVID-19 transmission risk factors

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Abstract

We analyze risk factors correlated with the initial transmission growth rate of the recent COVID-19 pandemic in different countries. The number of cases follows in its early stages an almost exponential expansion; we chose as a starting point in each country the first day d_i with 30 cases and we fitted for 12 days, capturing thus the early exponential growth. We looked then for linear correlations of the exponents α with other variables, for a sample of 126 countries. We find a positive correlation, {i.e. faster spread of COVID-19}, with high confidence level with the following variables, with respective p -value: low Temperature ($4 \cdot 10^{-7}$), high ratio of old vs. working-age people ($3 \cdot 10^{-6}$), life expectancy ($8 \cdot 10^{-6}$), number of international tourists ($1 \cdot 10^{-5}$), earlier epidemic starting date d_i ($2 \cdot 10^{-5}$), high level of physical contact in greeting habits ($6 \cdot 10^{-5}$), lung cancer prevalence ($6 \cdot 10^{-5}$), obesity in males ($1 \cdot 10^{-4}$), share of population in urban areas ($2 \cdot 10^{-4}$), cancer prevalence ($3 \cdot 10^{-4}$), alcohol consumption (0.0019), daily smoking prevalence (0.0036), UV index (0.004 , smaller sample, 73 countries), low Vitamin D serum levels ($0.002-0.006$, smaller sample, ~ 50 countries). There is highly significant correlation also with blood type: positive correlation with types RH- ($3 \cdot 10^{-5}$) and A+ ($3 \cdot 10^{-3}$), negative correlation with B+ ($2 \cdot 10^{-4}$). We also find positive correlation with moderate confidence level (p -value of $0.02 \sim 0.03$) with: CO₂/SO emissions, type-1 diabetes in children, low vaccination coverage for Tuberculosis (BCG). Several of the above variables are correlated with each other and likely to have common interpretations. We thus performed a Principal Component Analysis, in order to find the significant independent linear combinations of such variables. We also analyzed the possible existence of a bias: countries with low GDP-per capita, typically located in warm regions, might have less intense testing and we discuss correlation with the above variables

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