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EXTENDED ABSTRACT

A15 One year of the pandemic in Portugal: incidence of COVID-19

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Introduction:

On the 9th of January 2020, World Health Organization members spoke out to the public announcing that recent cases of an etiologically unknown pneumonia arose in the province of Wuhan, China [1]. By March 11 of the same year, the disease caused by this novel coronavirus, Sars-Cov-2, was declared a pandemic [1]. By this point, the virus had already spread throughout Europe. Over time, both the number of daily cases and the rate of transmission (Rt) have undergone major fluctuations, that can be mainly due to the pandemic control measures implemented by the government [2].

Methods:

An observational retrospective study was conducted including all reported cases of COVID-19 from March 2 (2020) until February 28 (2021) in Portugal. The dataset provided by the Portuguese Directorate-General of Health (DGS) contains anonymized epidemiologic surveillance data, made available for academic research, and collected through SINAVE (National System for Information and Visualization). Using the Census 2011 Population description, the incidence per 100,000 population was estimated by age group. The statistical analysis was performed using software R version 3.6.1 [3] and RStudio version 1.2.5001 including the packages: 'incidence' to obtain the incidence data over time and "EpiEstim" [4] for Rt estimation.

Results:

It is evident that the daily incidence of COVID-19 in Portugal is exceptionally different when comparing the intervals March to August with September to February (see Figure 1). Despite the relatively low incidence in the first period, the first pandemic peak in Portugal is considered to have occurred between April and May 2020. The increasing incidence rate suffered a leap in the month of October, reaching the second peak between the last quarter of November and beginning of December. The third one occurred around Christmas and New Year celebrations in late December. These differences between the first and second semesters could be attributed to two separate phenomena: the beginning of a new school year in mid-September, with in-person classes replacing previous online paradigms, and the loosening of restrictions and general population adhesion to such restrictions around Christmas and New Year's celebrations.

In Figure 2, the absolute and cumulative incidences of COVID-19 as well as the weighted incidence of the last 7 days are represented using a logarithmic scale as well as weekly and daily incidence, with coloured seasons (first Winter not included due to lack of data). In Figure 2 it is also possible to observe that from May to October a stationary behaviour of incidence took place, and that the curves reflect three growth drivers, the initial one in March / April 2020, the second one in November 2020 and the last one in January 2020.

According to Figure 4, the Rt has remained under the threshold of 2 during every month, except for March 2020, where there was a quick increase in infections. Subsequently, pandemic control measures were enforced. On March 16, schools were closed throughout the country and a State of Emergency was declared two days later, on March 18 (2020). Following these measures, Rt sharply declined [5].

Figure 3 presents a heatmap of the monthly COVID-19 incidence rate per 100,000 people by age groups. The attained results suggest that the age group that contributed the most to the incidence rate at the beginning of the pandemic (from May to November 2020) were those of 80 or older, 20 to 29 and 30 to 39. From December 2020 to February 2021 the population over 80 years old were most infected. The age group of 10 to 19 years old has not been identified as a major contributor over the months, however, from October

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Conflict of interest:
The authors declare no conflict of interests.

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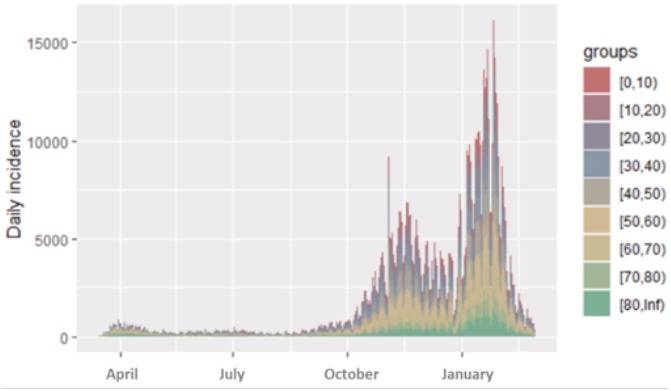

Figure 1 - Daily COVID-19 incidence (March 2020-February 2021). The incidence was visualized by age group.

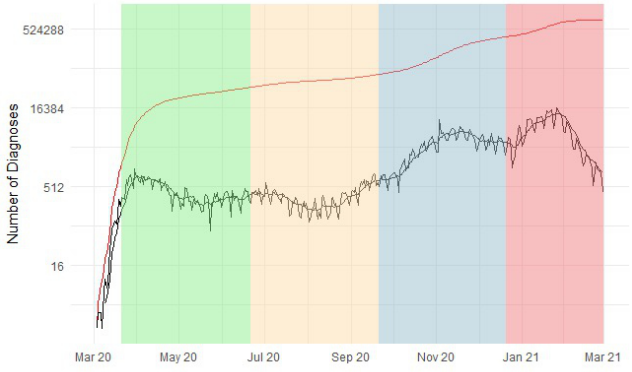

Figure 2 – Cumulative COVID-19 cases, number of diagnosis and seasonal point of view (Red line: cumulative incidence; Oscillating black line: daily incidence; Smooth black line: seven-day average incidence).

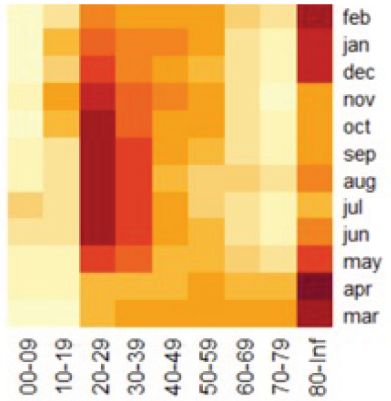

Figure 3 - Heatmap of monthly COVID-19 incidence rate per population in each age class (March 2020-February 2021). The values were centred and scaled in row direction

Figure 4 - Estimated Rt for Portuguese COVID-19 incidence.

to January there is an intensification of its contribution. The age groups of 60 to 70 and 70 to 80 make a reasonable contribution in the beginning of the pandemic, but in the remaining months this relative contribution is smaller.

Discussion:

COVID-19 has spread globally, causing a severe pandemic. Portugal has also suffered, alongside with the rest of the world, the surge of infected cases and death toll caused by this virus. In this study we have explored how the incidence varied with age and season. Although the incidence may change form one set of conditions to another, the underlying concept is that a defensive behaviour is key to decrease the incidence rate of this disease and diminish its consequences, both at the individual level and in the broader society.

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