

# Telework and other measures reducing the presence at work to slow down COVID-19pdm in France (Sept 2020)

Report #16 [previous reports at: [www.epicx-lab.com/covid-19.html](http://www.epicx-lab.com/covid-19.html)]

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### RESUME

La pandémie de COVID-19 montre une nette et substantielle augmentation de l'activité en France depuis l'été 2020. Certaines régions sont en situation de grande vulnérabilité, avec un grand nombre d'hospitalisations par jour, une fraction importante de lits en réanimation occupés et des temps de doublement assez courts (<2 semaines). Au même temps, la rentrée depuis début septembre, avec la réouverture des écoles et le retour au travail après les vacances d'été (retour qui n'atteint pas encore le niveau pré-pandémique), laisse de nouvelles opportunités de propagation du virus. À l'aide de modèles mathématiques calibrés sur la trajectoire épidémique observée dans chaque région, ce rapport analyse les scénarios possibles de télétravail et réduction de présence au travail, et évalue leur impact sur la trajectoire épidémique dans les semaines suivantes. **Les résultats numériques confirment que le télétravail et d'autres mesures réduisant la présence au travail sous des hypothèses réalistes peuvent ralentir la courbe épidémique en gagnant quelques semaines de temps, mais ne seraient pas suffisant pour inverser la tendance croissante de l'épidémie, à moins d'être couplé à d'autres mesures de réduction des contacts.** La situation est particulièrement critique dans l'IDF. Dans ces conditions, si rien ne change, le niveau des hospitalisations du pic de la première vague devrait être atteint en IDF d'ici un mois environ (plus tôt, si le retour au travail augmente dans les semaines suivantes comme le suggère la tendance des données et si cette tendance n'est pas contrastée par la mise en œuvre du télétravail). **Des recommandations explicites sur le télétravail et des interventions pour faciliter son application à toutes les catégories professionnelles qui peuvent l'adopter devraient être fournies d'urgence.** Cette norme devrait être conservée comme mesure de routine du contrôle épidémique pendant plusieurs mois. **Des mesures plus restrictives impliquant la fermeture de certaines activités pour réduire les contacts évitables sont nécessaires de toute urgence pour ralentir la progression de l'épidémie à des niveaux**

gérables par le système de santé. Cette analyse ne peut rendre compte de l'effet des mesures mises en œuvre aujourd'hui.

## SUMMARY

COVID-19 pandemic shows a clear and substantial increase of activity in France since summer 2020. Certain regions are in highly vulnerable situations, with large number of hospitalizations per day, important fraction of ICU beds occupied, and short doubling times (<2 weeks). At the same time, activities are increasing since the beginning of September, with the reopening of schools and the return to work after summer holidays (not yet reaching pre-pandemic levels), leaving further opportunities for the virus to spread. Using mathematical models calibrated to the observed epidemic trajectory in each region, this report analyzes possible scenarios of telework and other means to reduce the presence at work, and assesses their impact on the epidemic trajectory in the following weeks. **Numerical results confirm that telework and other measures reducing the presence at work under realistic assumptions may decelerate the epidemic curve gaining few weeks of time, but would not be enough to revert the increasing tendency of the curve, unless coupled with other contact reduction measures.** The situation is particularly critical in IDF. In these conditions, if nothing changes, the level of hospitalizations of the peak of the first wave is expected to be reached in IDF in about a month from now (earlier, if return to work increases in the following weeks as suggested by the trend in the data and if not contrasted by telework). **Explicit guidance on telework and interventions to facilitate its application to all professional categories who can adopt it should be urgently provided.** This standard should be kept as a routine measure of epidemic control for several months. **More restrictive measures involving the closure of certain activities to reduce avoidable contacts are urgently needed to slow down the epidemic increase to levels that are manageable by the healthcare system.** This analysis cannot account for the effect of the measures implemented today.

## INTRODUCTION

COVID-19 pandemic shows a clear and substantial increase of activity in France since summer 2020. The increase is coherently confirmed on all epidemiological indicators (number of cases, test positivity rate, number of clusters, admissions to hospital and ICU, occupation of ICU). Doubling times measured on regional hospitalizations for COVID-19 vary between ~10 and ~30 days, with 2/3 of the regions with doubling times shorter than 2 weeks. This short report presents a scenario analysis on the impact that telework may have on the current pandemic situation. The analysis is based on a stochastic data-driven age-stratified transmission model accounting for contacts in the population in different settings and activities. The model was shown to capture the transmission dynamics of the epidemic in Île-de-France<sup>1</sup>, was used to assess the impact of lockdown, exit strategies and reopening of schools in mid-April<sup>1,2</sup>, and to evaluate the rate of under-detection of the test-trace-isolate strategy in the months of May-June<sup>3</sup>.

## METHODS

We used a stochastic discrete age-stratified epidemic model based on demography, age profile, and social contact data of the 12 regions of mainland France, to account for age-specific contact activity and role in COVID-19 transmission. Disease progression is specific to COVID-19 and parameterized with current knowledge to include presymptomatic transmission, asymptomatic and symptomatic infections with different degrees of severity (paucisymptomatic, with mild symptoms, with severe symptoms requiring hospitalization). Four age classes are considered: [0-11), [11-19), [19-65), and 65+ years old.

For each region, the model integrates estimates on the number of individuals at workplaces over time, based on Google mobility data<sup>4</sup> and Orange cellphone mobility data<sup>5</sup>, and it is calibrated to hospitalization data up to week 38. In absence of data on the % of individuals performing telework over time, we use the above estimates as an indicator of telework. **Therefore, here 'telework' means absence from work.** The model is fit to the different epidemic phases (pre-lockdown, lockdown, exit, summer, rentrée) using hospital admission data by region. More details on the model are provided in Refs.<sup>1,3</sup>. **Results in this report account for the epidemic situation up to week 38.**

Projections for the weeks following w38 are obtained under a set of scenarios.

**Telework scenarios** are based on the hypothesis that telework after w38 would be as observed:

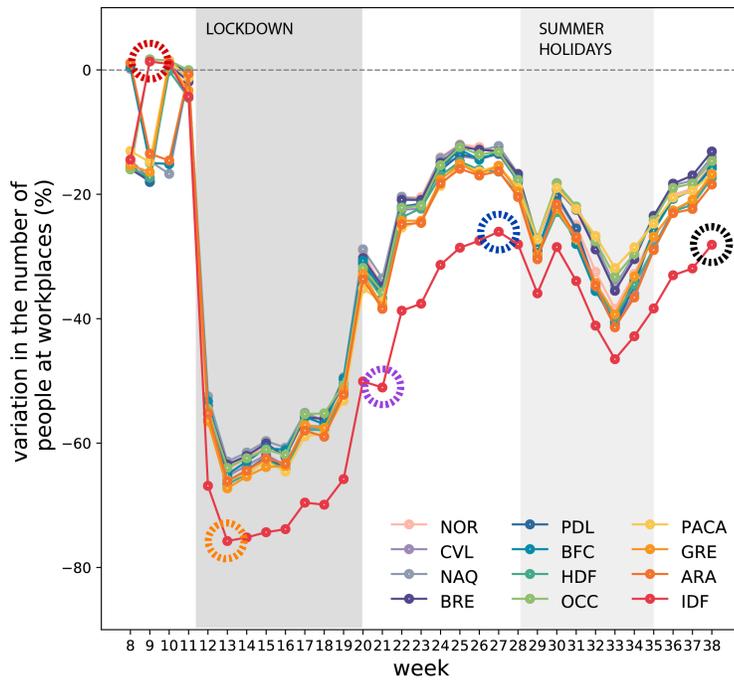
- in the week of maximum back-to-work in the exit phase prior to summer holidays (i.e. exactly the last week before summer holidays);
- in the first weeks exiting lockdown;
- during lockdown (see note in italics below);
- in the weeks in February, i.e. under pre-epidemic conditions.

In the telework scenarios, all other conditions are kept as in w38. *The scenario informed with presence at work as measured during lockdown is rather artificial in that it assumes that all other activities remain open as in w38. It should not be considered as representing the lockdown condition, and it is shown here for comparative purposes, as a synthetic counterfactual scenario.*

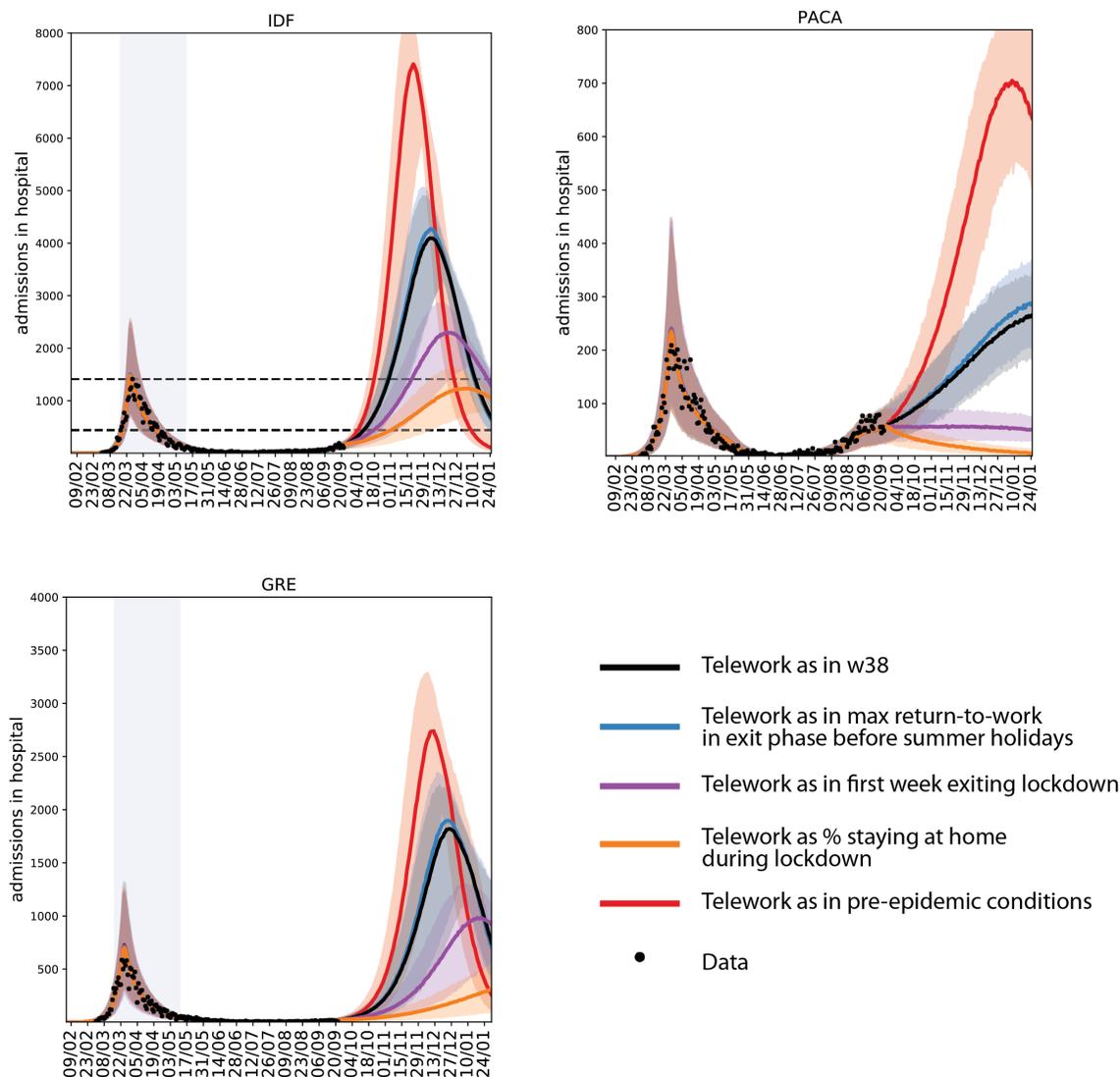
All scenarios are compared to a *no-change scenario* that assumes the situation observed in w38 would be maintained in future weeks.

The report focuses on 3 regions only (Île-de-France, Provence-Alpes-Côte d'Azur, Grand Est) to provide a showcase of scenarios under different epidemic and mitigation conditions.

## RESULTS



**Figure 1.** Estimated presence of individuals at workplaces, by region and over time. Weekly estimates are based on Google mobility data<sup>4</sup> and confirmed independently with mobility data obtained from Orange cellphone data<sup>5</sup>. The variation is computed with respect to pre-epidemic conditions, in the months of January-February (level corresponding to zero on the vertical axis). Fluctuations reported in weeks 8-10 refer to school holidays. Effects of lockdown and summer holidays are also shown. Circled points correspond to values used for telework scenarios, with the same color code as in Figure 2. Only the values for IDF are circled for the sake of visualization; corresponding values for the other regions are considered in each regional set of scenarios.



**Figure 2. Epidemic trajectories in the telework scenarios.** Each curve corresponds to a different hypothesis: black, if situation is unchanged from last observation in w38; blue, if telework is as in the maximum back-to-work conditions registered in the exit phase before summer holidays (very close to current situation in w38); violet, if telework is as when we exited lockdown; orange, if presence at work is as if during lockdown; red, if presence at work is back to pre-epidemic conditions. The orange scenario is not realistic and it is considered as a counterfactual scenario, as it is informed with the % of individuals working during lockdown but assumes that all other activities are opened as in week 38. Horizontal lines in the plot for IDF correspond to the hospitalization level measured at the start of the lockdown (March 17), and at the peak of the first wave. Scenarios for PACA suffer from large uncertainty due to the evolving epidemic situation in the last weeks that do not allow an accurate fit so far (see limitations). Scenarios for PACA reported in the figure assume that the slowing down of the epidemic observed in the last 2-3 weeks is confirmed in the following weeks.

**KEY FINDINGS**

- Presence at workplaces has been steadily increasing since mid-August and continues to show an increasing tendency in all regions. Estimates for w38 have almost reached the peak of back-to-work attained during the exit phase, right before the start of summer holidays. Presence at work

is expected to increase in the next weeks and likely to saturate to a level close to pre-epidemic conditions, unless interventions are put in place. All regions show the same tendency over time. IDF, however, maintains a lower presence at work compared to the other regions, since the implementation of lockdown. Assuming the same potential for telework across regions (which, instead, depends on the distribution of job sectors specific to each region), in IDF there is a comparatively smaller margin to use telework as a strategy to maintain the epidemic under control (e.g. at week 38 IDF has about -30% presence at work compared to pre-epidemic conditions, whereas the other regions have around -20%).

- **Telework as the sole mitigation measure would be able to decelerate the epidemic but would not be enough to invert its increasing tendency, unless if coupled with additional measures reducing avoidable contacts** (e.g. in PACA). Few weeks of delay would be gained for realistic and achievable telework conditions (i.e. scenario assuming telework as in the first weeks exiting lockdown, violet curve), however **additional measures should be implemented to reduce the epidemic increase to manageable levels. This is urgently needed in regions in highly vulnerable situations (e.g. IDF).**
- Differences across regions are due to several factors: (i) the current epidemic situation, with regions at higher degrees of vulnerability, both in terms of number of hospitalizations and of increasing dynamics, compared to others (e.g. IDF and PACA, compared to GRE); (ii) the restrictions of certain measures, already applied in some regions and just implemented in others (e.g. PACA vs. IDF), so that the situation at w38, on which scenarios are based, corresponds to different interventions; (iii) the potential for telework that depends on the region-specific distribution of the job sectors that could allow telework (not considered here) and the current situation in terms of return to work, with IDF showing a smaller presence at workplace, and thus having less margin for further improvement.
- The situation in PACA needs to be interpreted with caution. Few data points are available that allow an accurate fit capturing the change of tendency occurred in the last few weeks, and likely the result of the measures implemented (see limitations). The scenarios reported in the figure assume that the slowing down is confirmed in the following weeks. Additional updates can be performed as data become available.
- **The situation in IDF is particularly critical. Despite the lowest presence at work registered in France, the region experiences a fast epidemic doubling the number of hospitalizations every ~11 days. At this rhythm, if nothing changes, we expect to reach the level of hospitalizations recorded at the start of lockdown by the end of next week (w41, October 5-11), and the level of the peak of the first wave by the end of October, in about one month from now. The criticality may be reached even before, as it is compatible with the probability ranges of our projections. Given the smaller margin offered by telework in this region, additional measures reducing contacts in other activities need to be urgently considered. The model cannot currently evaluate the measures implemented starting Sept 28 (see limitations).**

## MAIN LIMITATIONS

- **Telework in this report corresponds to absence from work.** This includes individuals who are not going to work because of telework, but also because of other reasons, e.g. for children care when schools are closed, or because of jobs impacted by closure due to COVID-19 regulations, etc. In absence of data on the % of individuals working from home, the model uses estimates on absence from work obtained from mobility data.
- Telework clearly depends on the job sector, as not all jobs can implement it. This is also region-specific, as some sectors are more represented in certain regions compared to others. This aspect is not included in our model. Data for 2020 indicate however that presence at work was roughly the same across all regions, except for IDF that, though sharing the same temporal trend, recorded a smaller presence throughout time. For these reasons, in each region the telework % is contextualized with respect to what was measured in 2020 in that region in different phases of the epidemic (i.e. pre-lockdown, lockdown, first weeks of exit from lockdown, maximum reached during exit, current situation). This provides effectively a measure of ‘what can be done’ regarding telework in that region, in absence of additional data.
- Results for IDF do not consider the restrictions implemented starting Monday September 28. These will be effectively accounted for once their effect will become visible on hospitalizations.
- Results for PACA are subject to larger uncertainties as the trend in hospitalizations has changed in the last few weeks, likely due to the measures implemented. This prevents a good fit of the model in the last period of time. Caution should be taken in the interpretation of the scenarios, which assume that the slowing down observed in the data is confirmed in the next weeks. A more accurate description of the possible evolution can be done next week, with more data available to see a stabilization of the trend.
- In proposing the scenarios, all other conditions that are not altered by the scenario itself (i.e. telework, or partial closure of activities) are kept constant in future weeks, and fixed to their situation of week 38. These include, among others, effects due to preventive measures by individuals or efficacy of test-trace-isolate system in slowing down the epidemic. As such, our scenarios do not include possible changes in future weeks in the adoption of preventive measures (e.g. a more rigorous adoption due to stricter regulations or risk perception) or efficiency of test-trace-isolate (e.g. more rapid and efficient tracing of contacts at risk, more rigorous respect of isolation).
- The orange scenario (telework as absence from work during the lockdown) is not realistic and it is considered as a counterfactual scenario, as it is informed with the % of individuals working during lockdown but assumes that all other activities are opened as in week 38. This does not correspond to a lockdown scenario.

## ACKNOWLEDGMENTS

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