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ComCor study on places of infection with SARS-CoV-2: where are French people catching the virus?

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The Institut Pasteur, in partnership with the French National Health Insurance Fund (CNAM), Santé publique France and the Ipsos Social Research Institute, recently presented the results of the ComCor epidemiological study on circumstances and places of infection with the SARS-CoV-2 virus. The aim of the study was to identify the socio-demographic factors, places visited and behaviors associated with a higher risk of infection with SARS-CoV-2. The study contains two parts:

- the first part describes the circumstances of infection of index cases diagnosed positive for SARS-CoV-2 during the curfew period, especially when the person considered as the source of infection is known;
- the second part compares the characteristics, behaviors and practices of the index cases with those of a second series of individuals, matched in terms of age, sex, region and population density and period (curfew and lockdown).

Summary of results:

Analysis of index cases' circumstances of infection during the curfew period:

- 44% of infected individuals could identify the person considered to be the source of infection, 21% suspected they had been infected at a specific event, but could not identify the person who was the source of infection, and 35% did not know how they had been infected.
- A very large majority (97%) of index cases who responded to this questionnaire self-isolated, but only 54% on symptom onset, and 64% on discovering that they had been in

contact with an infected case, where symptoms or discovery of contact with an infected case were the only warning signs.

- As regards infections in households (35% of infections where the person considered to be the source was known), most of these adults were infected by their spouses (64% of cases). The fact that children are asymptomatic or present with few symptoms when infected may explain why they were often not identified as the person considered to be the source of the infection.
- As regards infections outside households (65% of infections where the person considered to be the source was known), the chief source of infections was family (33%), followed by the workplace (29%), and friends and acquaintances (21%). Meals played a key role in infections among family, friends and acquaintances, and, to a lesser degree, at work. Shared offices were also a major cause of infections in the workplace.

Analysis of factors associated with SARS-CoV-2 infection during the curfew and lockdown periods:
Increased risk of SARS-CoV-2 infection:

- Professions (compared to the medium-risk group of public-sector executives):
 - Corporate administrative and sales executives
 - Intermediate health and social workers
 - Industrial workers
 - Drivers
- Number of people living in households
- Having children who:
 - Are looked after by a childminder
 - Attend a nursery
 - Attend nursery school (aged 3-5)
 - Attend middle school (aged 11-14)
 - Attend high school (aged 15-18)
- Car sharing
- Recent travel abroad
- Participation in a face-to-face meeting:
 - Professional
 - Private (friends or family)
- Visits to:
 - Bars
 - Restaurants
 - Gyms

Reduced risk of SARS-CoV-2 infection:

- Professions (compared to the medium-risk group of public-sector executives):
 - Schoolteachers
 - Scientists and university lecturers
 - Intermediate public-sector administrative workers
 - Civilian employees and public-sector service staff
 - Corporate administrative employees
 - Students
 - Farmers
 - Male/female homemakers
- Home workers (compared to individuals working face-to-face in offices)
- Bus or tram travel
- Outdoor exercise
- Shopping (in food and clothes stores, etc.)

Study methodology

The "index cases" were adults emailed by the French National Health Insurance Fund (CNAM) to take part in the study based on cases entered in the "Contact-Covid" database of individuals who have tested positive for SARS-CoV-2. IPSOS identified and contacted "control subjects" matched to the index cases by age, sex, region of residence, population density, and period (curfew from October 17, 2020 and lockdown from October 29, 2020).

The index cases and control subjects were asked to complete a self-administered questionnaire concerning their socio-demographic details, places they had visited, and behaviors. The index cases were asked to provide details of the circumstances in which they were infected if known. Two types of analysis were performed. These are presented below.

1) Analysis of circumstances of infection based on the database of index cases during the curfew period.

Of the 370,000 emails sent out with invitations to take part in the study, 30,330 (8.2%) questionnaires were returned by individuals very likely to have been infected between October 17 and 30, 2020 (the curfew period): 25,644 index cases among non-healthcare workers and 4,686 healthcare workers, who were addressed separately due to potential differences in circumstances of infection.

62% of respondents were women and 72% were aged 29-58 years (only adults were eligible for this study). 55% were resident in conurbations of over 100,000 inhabitants, with large proportions in the Auvergne-Rhône-Alpes and Ile-de-France regions (22% and 21% respectively).

44% of the infected individuals could identify the person considered to be the source of infection and most were aware of their high-risk behavior (failure to wear a mask or socially distance, no measures taken to isolate the person considered to be the source within the household, etc.), 21% suspected they had been infected at a specific event, but could not identify the person who was the source of infection, and 35% did not know how they had been infected.

A very large majority (97%) of index cases who responded to this questionnaire self-isolated, but only 54% on symptom onset, and 64% on discovering that they had been in contact with an infected case, where these were the only warning signs.

As regards infections in households (35% of infections where the person considered to be the source was known), most of these adults were infected by their spouses (64% of cases). The fact that children are asymptomatic or present with few symptoms when infected may explain why they were often not identified as the person considered to be the source of the infection. It was noted that only 51% of individuals considered to be the source of infection within households self-isolated, and of those who did, only 52% did so on symptom onset.

As regards infections outside households (65% of infections where the person considered to be the source was known), the chief source of infections was family (33.1%), followed by the workplace (28.8%), and friends and acquaintances (20.8%). Meals played a key role in infections among family, friends and acquaintances, and, to a lesser degree, at work. Shared offices were also a major cause of infections in the workplace.

2) Case-control study of the curfew and lockdown periods.

For this part of the study, responses to the self-administered questionnaire from 3,426 cases and 1,713 control subjects matched by age, sex, region, population density, and period (curfew or lockdown) were analyzed.

Compared to public sector executives, who are a medium-risk group, administrative and sales executives, industrial workers, drivers, and intermediate health and social workers **were at higher risk of SARS-CoV-2 infection** during the curfew or partial lockdown. Higher occupancy in households, particularly with children at nursery or school, participation in face-to-face business meetings, car sharing, visits to bars, restaurants and gyms, and participation in private meetings among friends or family were also **associated with higher risk**.

Schoolteachers, scientists or university lecturers, civilian employees and public sector service staff, corporate administrative employees, students, farmers, male and female homemakers, and people belonging to intermediate public-sector administrative professions **were at lower risk of SARS-CoV-2 infection** during the curfew or partial lockdown, again compared to public-sector executives. Home working (compared to individuals working face-to-face in offices), bus or tram travel, outdoor exercise, and shopping (in food and clothes stores, etc.), were **all associated with a lower risk of SARS-CoV-2 infection** during the curfew or partial lockdown.

Of all the circumstances analyzed, the highest proportion of infections (19%) can be attributed to private meetings during the study period.

These results should be treated very cautiously as they only relate to the curfew and lockdown periods, and may be considerably skewed by the study population selected, which only represents a small proportion of all infections, and by the fact that some responses may have been influenced by respondents' knowledge of whether or not they were infected.

Nevertheless, these results are compliant with data from the literature in terms of those already reported in other studies, and are in keeping with our knowledge of SARS-CoV-2 transmission. The places and circumstances of infection are likely to change over the course of the epidemic, and this study may provide a tool for monitoring trends in infection conditions over time. It would be useful to implement this type of monitoring, particularly when certain public or private spaces reopen, to determine whether or not reopening is associated with an increased risk of SARS-CoV-2 transmission.

According to Arnaud Fontanet, Head of the Epidemiology of Emerging Diseases Unit at the Institut Pasteur and Professor at the National Conservatory of Arts and Trades: "This study demonstrates that there is significant risk of SARS-CoV-2 infection during meals and private meetings. It is very important that we minimize this risk during gatherings over the festive period".

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The ComCor study was conducted in partnership with:



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Étude des facteurs sociodémographiques, comportements et pratiques associés à l'infection par le SARS-CoV-2 (ComCor) : [for download at pasteur.fr \(in French\)](#)

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