



# Corona Immunitas Nestlé

## SARS-CoV-2 antibodies among employees

Report 1 - 2021

## IMPRESSUM

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### Availability:

You can find this report on [www.fricovid.ch](http://www.fricovid.ch), section Corona Immunitas.

## Abstract

- Corona Immunitas Nestlé is a longitudinal study conducted among employees at two Swiss sites of the company Nestlé, i.e., Nestlé Research in the canton of Vaud and Nespresso factory Romont in the canton of Fribourg. This report describes the baseline results of the study aiming at estimating the proportion of employees who have been infected with the SARS-CoV-2 and have developed antibodies at the time of the decline of the second wave until February 2021.
- The study has been initiated by the Institute of Family Medicine (IMF) and the Population Health Laboratory (#PopHealthLab) of the University of Fribourg within the framework of the national Corona Immunitas research program of the Swiss School of Public Health (SSPH+). The study is funded by Nestlé Research.
- Around 1300 employees have been invited to participate and 425 (33%) accepted to be part of the study (70% Nestlé Research and 30% Nespresso factory Romont; 52% women; age range between 21 and 64 years old with a mean of 42 years). Participants completed a questionnaire and took a blood test to measure IgA and IgG antibodies against SARS-CoV-2. Study visits were carried out by trained Nestlé medical staff on work sites between December 8, 2020 and February 11, 2021.
- The proportion of individuals with antibodies, both work sites combined, was 17% (95% confidence interval (CI) 13% to 22%). The proportion was 17% (95% CI 12% to 22%) among employees working on Nestlé Research sites and 18% (95% CI 12% to 26%) among those working at the Nespresso factory in Romont.
- The second part of this study will be conducted in spring 2021 to assess the presence of antibodies among the same participants.

## Context and goal of the study

Assessing the proportion of the population that has been exposed to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) provides reliable data to support political and public health authorities in pandemic-related decisions. Conducted within the national program Corona Immunitas, initiated and coordinated by the Swiss School of Public Health (SSPH+), the main objective of the Corona Immunitas Nestlé study was to estimate the proportion of Nestlé employees who have been infected with SARS-CoV-2 and have developed antibodies.

### A brief history of the pandemic

The SARS-CoV-2 pandemic originated in Wuhan, China, causing the novel coronavirus disease 2019 (COVID-19) (1). The disease spread rapidly around the world. On March 11, 2020, the World Health Organization declared a COVID-19 pandemic and announced a public health emergency of international concern (2).

In Switzerland, as the number of COVID-19 cases increased in March 2020, meaning the start of the first wave of the pandemic, the government decided to put the country into a semi-lockdown; non-essential businesses were closed, and teleworking was largely implemented (3). By mid-April, the number of cases had declined, sanitary measures were relaxed, and the epidemiological situation

stabilized during the summer months. By October 2020, cases started to increase again and the situation deteriorated rapidly; it was the beginning of the second wave (**Figure 1**). Early January 2021, Swiss authorities reinstated the semi-lockdown and sanitary measures put in place during the first wave. At the time of writing this report, the pandemic is still very present in Switzerland.

### Infection and immune response to SARS-CoV-2

Transmission of SARS-CoV-2 occurs primarily from person-to-person close contact, mainly through respiratory droplets from an infected person. The presence of SARS-CoV-2 on contaminated surfaces represents another possible route of transmission (4, 5).

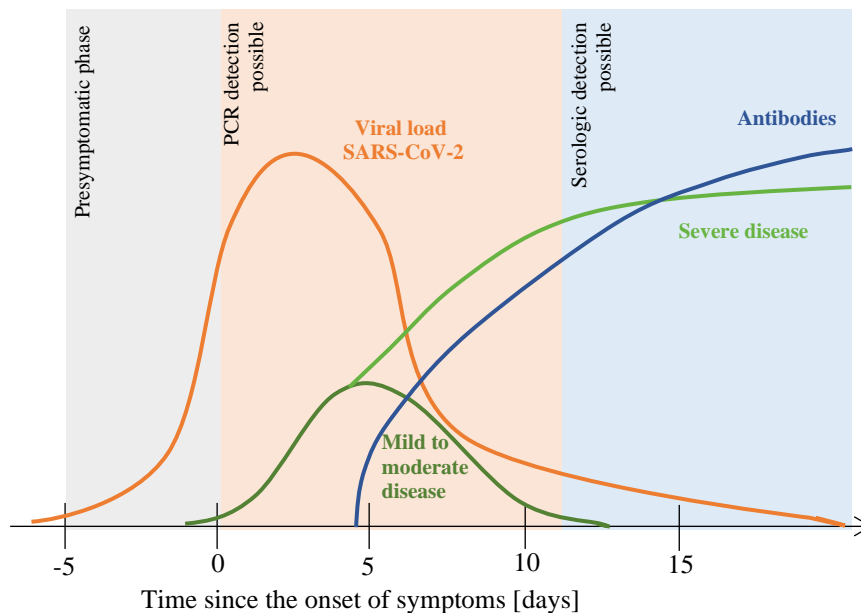
The immune response following a SARS-CoV-2 infection is still unclear. Part of the response happens through the production of antibodies that appear a few days after infection (**Figure 2**). Several studies showed long term persistence of antibodies after infections in most people (6, 7). It also remains possible that antibodies disappear rapidly in some individuals, especially if symptoms have been mild (8).

In this report, the objective was to estimate the proportion of Nestlé employees having developed antibodies against SARS-CoV-2 at the time of the decline of the second wave until February 2021.

**Figure 1.** Chronology of the pandemic in Switzerland. The graph shows the laboratory-confirmed cases in Switzerland from 24.02.2020 to 06.04.2021, in absolute case numbers. It is important to note that the number of tests performed has increased over time, since only hospitalized at-risk persons were tested in the beginning of the pandemic (FOPH. Key figures Switzerland: laboratory-confirmed cases. FOPH; 2021 [Consulted on 06.04.2021].



**Figure 2.** Simplified drawing of viral load, disease and antibody progression in a SARS-CoV-2 infection. PCR (Polymerase Chain Reaction) detection is possible during acute infection, when the viral load is high enough to be detectable. PCR testing is most often used within 10 days of symptom onset. Antibodies appear a few days after infection and are detectable between 7 and 14 days after the onset of symptoms. It is still unclear how long these antibodies remain detectable. (Figure adapted from Cevik et al. (9))



## Method

The study Corona Immunitas Nestlé was initiated by the Institute of Family Medicine (IMF) and the Population Health Laboratory (#PopHealthLab) of the University of Fribourg. Laboratory tests were performed at the University Hospital of Lausanne (CHUV). The study protocol has been validated by the Ethics Committees of cantons of Zurich and Vaud.

This study is part of the national research program Corona Immunitas (10) conducted by the Swiss School of Public Health (SSPH+, [www.corona-immunitas.ch/](http://www.corona-immunitas.ch/)).

On the national scale, this project includes more than 40 studies in various regions of Switzerland, using the same methodology, in the general population and in specific subpopulations (e.g. health care workers, bus drivers, construction workers, food retailers, Nestlé food and beverage company, etc.). The program is divided in several phases (**Figure 3**), and the Nestlé study joined in the third phase. The objective of the baseline part of this study was to estimate the proportion of employees who have been infected with the SARS-CoV-2 and have developed antibodies. The Nestlé study is funded by the Société des Produits Nestlé.

**Figure 3.** Corona Immunitas is a 5-phase program. Several cantons participate. The different cantons or specific subpopulation studies may have joined the program in different phases. The Nestlé study joined the program in phase III. Phases IV and V will probably take place in spring 2021 and autumn 2021 respectively (10).



### Phases of the Corona Immunitas program

PHASE I	Early assessment of the SARS-CoV-2 prevalence in highly affected cantons.
PHASE II	Assessment of the antibody development in the Swiss population after the first peak of the pandemic.
PHASE III	Evolution over time of the spread and the antibody levels between the first wave and the middle of the second wave.
PHASE IV	Evolution over time of spread of the SARS-CoV-2, antibody levels and vaccination needs (spring 2021).
PHASE V	Assessment of antibody levels after the majority of the Swiss population has been vaccinated.

## Description of the Corona Immunitas Nestlé study

This longitudinal study is conducted within a specific subgroup of the Swiss population and concerns two sites of the Nestlé company, i.e., Nestlé Research located in the canton of Vaud where employees could largely benefit from teleworking during critical periods (waves), and the Nespresso factory in Romont, located in the canton of Fribourg, where most employees continued working on site to ensure the continuity of production. Participants are employees working on Nestlé Research sites (Vers-chez-les-Blanc (VCLB) and EPFL), and employees of the Nespresso factory in Romont. The study visits were carried out by the trained Nestlé medical staff on work sites, between December 9, 2020 and February 11, 2021. The participants had to give their consent, take a blood test and complete a baseline questionnaire, reporting health status, symptoms, other tests taken for SARS-CoV-2, demographic questions, preventative measure behaviors, quality of life measures and changes in work conditions.

The measurement of IgG and IgA antibodies in the blood was performed using the SenASTrIS (Sensitive Anti-SARS-CoV-2 Spike Trimer Immunoglobulin Serological) test developed by the CHUV, the Swiss Federal Institute of Technology in Lausanne (EPFL) and the Swiss Vaccine Center (10, 11). The presence of these antibodies indicates with a high probability that

the person has been infected by the SARS-CoV-2 in the past (specificity of 99.7% and sensitivity of 96.6% post 15 days of infection) (10, 11).

## Analyses

In this report, we focus on the cross-sectional, baseline part of this longitudinal study. The proportion of Nestlé employees with antibodies has been estimated with a Bayesian logistic regression model, accounting for test performance (false positive and false negative proportion).

## Results

A total of 1310 employees have been invited to participate and 425 (33%) accepted to be part of the study. Of the 920 employees on Nestlé Research sites invited to participate, 299 (33%) were included. Of the 390 employees of Nespresso factory invited, 128 (33%) were included. Two participants have been excluded because they did not fill out the baseline questionnaire.

Among the participants, 52% were women, the age range was from 21 to 64 years old with a mean of 42 years (standard deviation= 10) and 21% had one or more vulnerability criteria. Seventy-three percent of participants did some teleworking, during at least certain periods, full time or part time, from the beginning of the pandemic (**Table 1**).

**Table 1.** Characteristics of the participants. Vulnerability is defined according to the criteria of the Federal Office of Public Health (12).

<b>Characteristics</b>	<b>Total</b>	<b>Individuals <i>with</i> antibodies<sup>1</sup> against the virus</b>	<b>Individuals <i>without</i> antibodies against the virus</b>
Number (%)	425 (100%)	78 (18%)	347 (82%)
Women	223 (52%)	38 (49%)	185 (53%)
Men	202 (48%)	40 (51%)	162 (47%)
Age [years], mean (standard deviation)	42 (10)	41 (11)	43 (10)
<b>Education level, n (%)</b>			
Mandatory school	5 (1%)	2 (3%)	3 (1%)
Professional training	84 (20%)	16 (21%)	68 (20%)
Matura, baccalaureate, vocational baccalaureate	27 (6%)	6 (8%)	21 (6%)
Higher technical college or university of applied science	65 (15%)	16 (21%)	49 (14%)
University studies or polytechnic	244 (57%)	38 (49%)	206 (59%)
<b>Nestlé sites, n (%)</b>			
Nestlé Research (VCLB, VD) <sup>2</sup>	299 (70%)	53 (68%)	246 (71%)
Nespresso factory (Romont, FR) <sup>2</sup>	126 (30%)	25 (32%)	101 (29%)
<b>Teleworking, n (%)</b>			
Yes (concerned) <sup>3</sup>	310 (73%)	55 (71%)	255 (73%)
No (not concerned)	115 (27%)	23 (29%)	92 (27%)
<b>Vulnerability criteria, n (%)</b>			
Cancer	0 (0%)	0 (0%)	0 (0%)
Diabetes	3 (1%)	1 (1%)	2 (1%)
Diseases and/or treatments that weaken the immune system	6 (1%)	2 (3%)	4 (1%)
Hypertension	19 (4%)	1 (1%)	18 (5%)
Cardiovascular disease	6 (1%)	1 (1%)	5 (1%)
Chronic respiratory disease	32 (8%)	3 (4%)	29 (8%)
Obesity	29 (7%)	10 (13%)	19 (5%)
Pregnant	4 (1%)	0 (0%)	4 (1%)
Individuals with one or more vulnerability criteria, n (%)	88 (21%)	16 (21%)	72 (21%)

<sup>1</sup> IgG, IgA or both types of antibodies

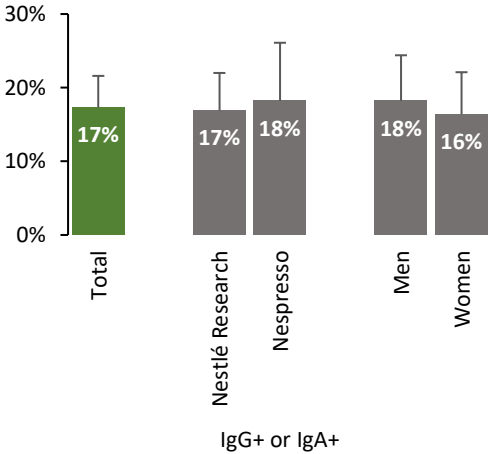
<sup>2</sup> VCLB: Vers-chez-les-Blanc; EPFL: Swiss Federal Institute of Technology in Lausanne; VD: Vaud; FR: Fribourg

<sup>3</sup> Number of employees who reported in the questionnaire that they were concerned by teleworking during at least certain periods, full time or part time, from the beginning of the pandemic.

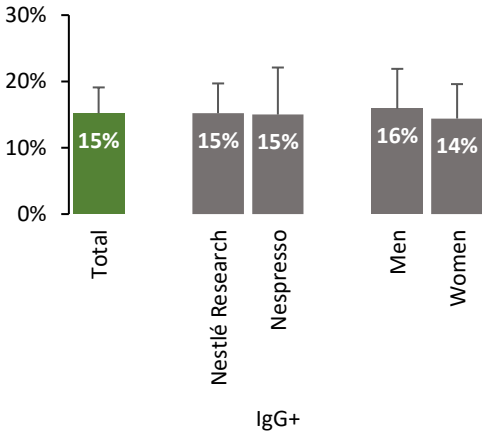


The proportion of adults aged 20-64 years with IgG or IgA antibodies (i.e. IgG, IgA, or both types of antibodies) in the sites of Nestlé Research and Nespresso factory Romont combined was 17% (95% confidence interval (CI) 13% to 22%) (**Figure 5**). The proportion of employees with antibodies working on the Nestlé Research sites (17%; 95% CI 12% to 22%) was similar to that of employees at the Nespresso factory Romont (18%; 95% CI 12% to 26%). The proportion was similar among women (16%; 95% CI 12% to 22%) and men (18%; 95% CI 13% to 24%). **Figures 6 and 7** show the proportion of adults with IgG (with or without IgA) or with IgA (with or without IgG), respectively.

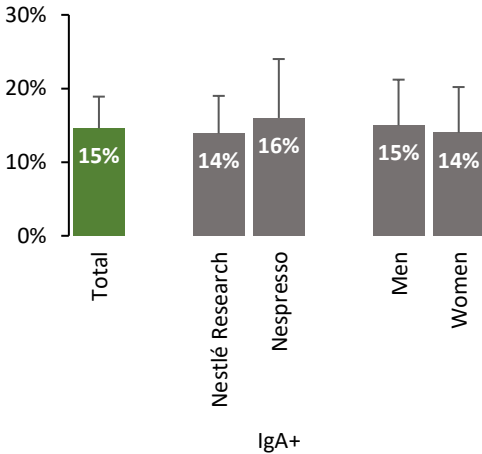
**Figure 5.** Proportion of Nestlé employees with antibodies (IgG+ or IgA+), by work sites and sex.



**Figure 6.** Proportion of Nestlé employees with antibodies (IgG+), by work sites and sex.



**Figure 7.** Proportion of Nestlé employees with antibodies (IgA+), by work sites and sex.



## Discussion

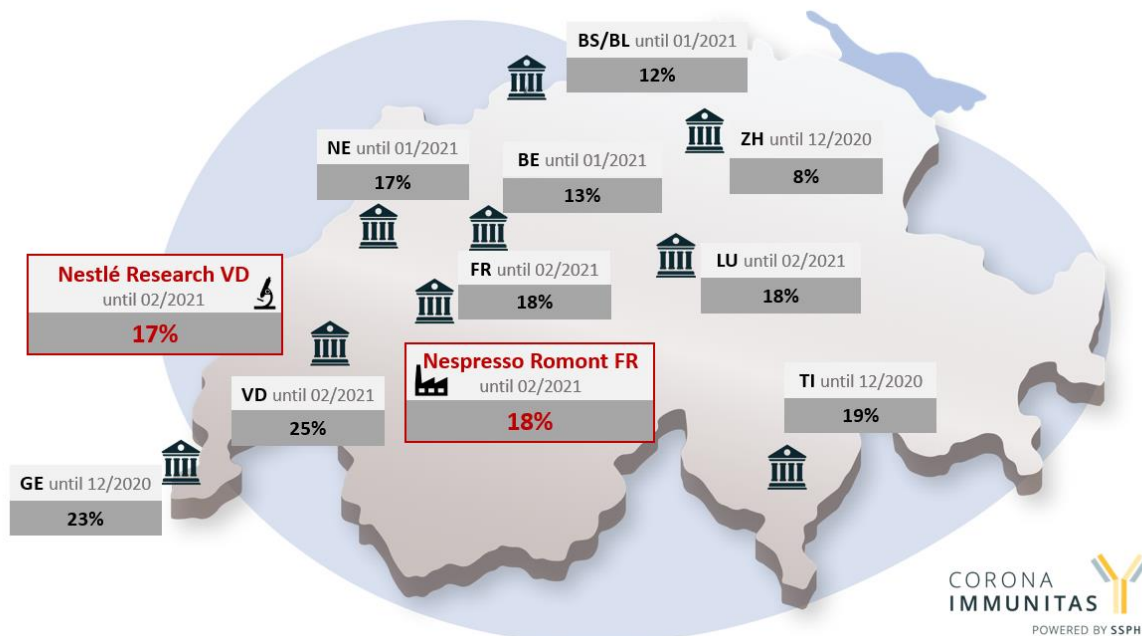
At the time of the decline of the second wave of the COVID-19 pandemic, 17% (95% CI 13% to 22%) of Nestlé employees, both sites combined, had developed antibodies against SARS-CoV-2. More precisely, the proportion was 17% (95% CI 12% to 22%) among employees working on Nestlé Research sites in the canton of Vaud, and 18% (95% CI 13% to 23%) among employees working at the Nespresso factory in Romont in the canton of Fribourg.

These results are consistent with the observations made in the general population of the two respective cantons, with a prevalence of 25 % (95% CI 21% to 29%) in adults aged 20-64 years in the canton of Vaud and a prevalence of 18 % (95% CI 13% to 23%) in adults of same

age in the canton of Fribourg, where antibodies were measured during the same period, i.e., between December 2020 and February 2021 (13, 14) (**Figure 8**).

There are few seroprevalence studies among workers, the majority of them evaluating seroprevalence among healthcare workers (15-17). A study in Geneva showed large variations in anti-SARS-CoV-2 antibody prevalence among essential workers from diverse sectors and occupations, reflecting a higher exposure in some sectors such as the healthcare system, and showing less evidence supporting that workers in other sectors faced a greater risk of SARS-CoV-2 infection than the general working-age population (18).

**Figure 8.** Prevalence (%) of antibodies (IgA+/IgG+) against SARS-CoV-2: situation at the end of February 2021 in Switzerland and at Nestlé sites among adults aged 20-64 years (14).



### **Box 1. Seroprevalence studies**

When comparing seroprevalence between different studies, it is important to be aware of the tests used, the methodology, as well as to consider the period during which the study was conducted in relation to the evolution of the pandemic. For all studies conducted within the Corona Immunitas program, a common test was used to facilitate comparison (10, 11). This test has a high sensitivity (96.6%) even in individuals with mild infections, meaning that it generates few false negatives (people incorrectly classified as negative), and high specificity (99.7%) to the SARS-CoV-2, meaning that it generates few false positives (people incorrectly classified as positive) (11, 19). In addition, comparability between the different regions is facilitated by conducting these studies during well-defined periods and by using a similar methodology (questionnaires and serological test standardized across study sites).

### **Limits and strengths of the study**

This study has some limitations. Despite the use of an accurate test with high sensitivity and high specificity, the performance of tests measuring antibodies remains imperfect and includes the risk of false positive or false negative results. In addition, the proportion of people with antibodies at the time of the study may not accurately reflect the cumulative infection rate in the company since the beginning of the pandemic. Indeed, antibody response may be weaker in individuals who have been infected by SARS-CoV-2 presenting no or only mild symptoms (20). Additionally, as we conducted the study during the second wave of the pandemic, it is possible that the testing happened before the antibodies became detectable in the blood of newly infected individuals. Furthermore, antibodies may

disappear over time, particularly in individuals who have experienced pauci- or asymptomatic infections (21). Globally, the proportion of people who have been infected with the virus may be underestimated.

The participation rate was around 33% among the invited Nestlé employees. We did not explore the reasons for not participating. A large part of the employees was mainly working from home at the time of recruiting. It is likely, however, that people who believe they have been infected (positive PCR test or symptoms) have greater motivation to participate, which could have increased the estimated seroprevalence. Conversely, people who already knew that they had been infected, with a positive PCR testing, could have renounced to participate in the study.

A major strength of this study is to allow a more comprehensive count of SARS-CoV-2 infections that have occurred among the employees since the beginning of the pandemic, compared to the count of laboratory-confirmed cases by PCR testing. PCR-confirmed cases represent a smaller portion of the infections due to limited testing (especially in the beginning of the pandemic) and due to the majority of cases with few or no symptoms (19).

This phase of the study was conducted before vaccination was deployed in the cantons of Vaud and Fribourg. Since the observed population is workers aged 20-64 years and are invited to be vaccinated later than the elderly, it can be assumed that the presence of antibodies is related to a viral infection.

This study used a SARS-CoV-2 test which was developed on a population-based sample, not on a clinical sample, thus limiting the risk of spectrum bias (22).

Conducting a seroprevalence study within a company helps understanding the situation in the workplace, i.e. to estimate the levels of antibodies among the employees which could help to adapt implemented measures.

The nationwide and coordinated organization of the Swiss Corona Immunitas research program

is another major strength as it facilitates comparisons between the studies (**Box 1**).

In the next part, this study aims to investigate the kinetics of antibodies, i.e. to describe how antibodies evolve in the blood of the same individuals over time; more precisely whether the antibodies disappear over time, and if there were newly infected or vaccinated individuals.

### **Health concerns**

Assuming that there is immunity after infection, the current proportion of immune individuals in the population is still too low to slow the circulation of the virus and influence the pandemic; a large part of the population is probably still susceptible to infection. Today, it is difficult to determine a precise value to achieve a herd immunity because of the very dynamic evolution of the pandemic (23). It is therefore important to remain vigilant against the virus and to continue respecting the sanitary measures recommended by the authorities.

### **Next steps**

In order to assess the presence of antibodies among Nestlé employees, the seroprevalence study will be repeated in spring 2021 (phase IV of the Corona Immunitas program). The participants of the first part of this study will be invited for a second serological test.

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