Corona Immunitas Nestlé

SARS-CoV-2 antibodies among employees

Report 2 – November 2021

CORONA IMMUNITAS
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Availability:

You can find this report on www.fricovid.ch, section Corona Immunitas.

Abstract

- Corona Immunitas Nestlé is a longitudinal study conducted among employees at two Swiss sites of the Nestlé company, i.e., Nestlé Research in the canton of Vaud and Nespresso factory Romont in the canton of Fribourg. The main objective of the study was to estimate the proportion of employees who have developed antibodies against SARS-CoV-2. 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 baseline part of the study, described in the first Corona Immunitas Nestlé report, took place between December 2020 and February 2021, and was conducted among 425 employees. At the time of the decline of the second epidemic wave until February 2021, 15% of the employees, both sites combined, had developed anti-spike IgG antibodies against the virus. The same percentage was observed among employees working on Nestlé Research sites or at the Nespresso factory in Romont.
- This report describes the results of the longitudinal follow-up part of the study aiming at estimating again the proportion of employees who have developed antibodies following an infection or vaccination until July 2021. The second study visits took place between May 26, 2021, and July 27, 2021. A total of 284 (67%) participants initially included participated in the follow-up part (56% women; age range between 21 and 64 years old with a mean of 43 years). Participants completed a questionnaire and took a blood test to measure anti-spike IgG antibodies against SARS-CoV-2.
- The proportion of individuals with anti-spike IgG antibodies, both work sites combined, was 73% (95% confidence interval (CI) 68% to 78%). The proportion was 83% (95% CI 78% to 88%) among employees working on Nestlé Research sites (Lausanne area) and 42% (95% CI 31% to 54%) among those working at the Nespresso factory in Romont. Sixty-eight percent of the participants reported having received at least one dose of the vaccine at the time of the blood test (79% on Nestlé Research sites; 34% at Nespresso factory in Romont). Among the 48 participants who had already developed antibodies at baseline, 3 of them (6%) were negative at follow-up.
- These results are close to the observations made in the general population, with the proportion among Nestlé Research employees being slightly higher than the average prevalence of the cantons that collected samples until July 2021.
- Participants reported a moderate impact of the implemented measures on their wellbeing, except for the requirement to wear a mask, which appeared to be constraining.
- Conducting a seroprevalence study within a company helps understanding the situation in the workplace, i.e. to estimate antibody levels and the extent of vaccination among employees, which could help to adapt implemented measures.

Context and goal of the study

Assessing the proportion of the population that has developed antibodies against the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) due to an infection or a vaccination provides 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 objective of the Corona Immunitas Nestlé study was to estimate the proportion of Nestlé employees who have developed antibodies against SARS-CoV-2 at two points in time.

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 until the end of April (3). After a decrease in the number of cases, followed by a strong second wave in October 2020, the sanitary measures put in place by the Swiss authorities were maintained until the spring of 2021 and then gradually lifted (3). The evolution of the pandemic is shown in **Figure 1**. At the time of writing this report, after a peak in August due to the rapid spread of the delta variant, rates of new infections have begun to decline.

Immune response to SARS-CoV-2

The immune response following a SARS-CoV-2 infection is still unclear. Part of the response happens through the production of antibodies that appear several days after infection. Several studies showed long term persistence of antibodies after infection in most people (4, 5). The immunity response may vary according to the severity of the symptoms, the host response and the emerging variants (6).

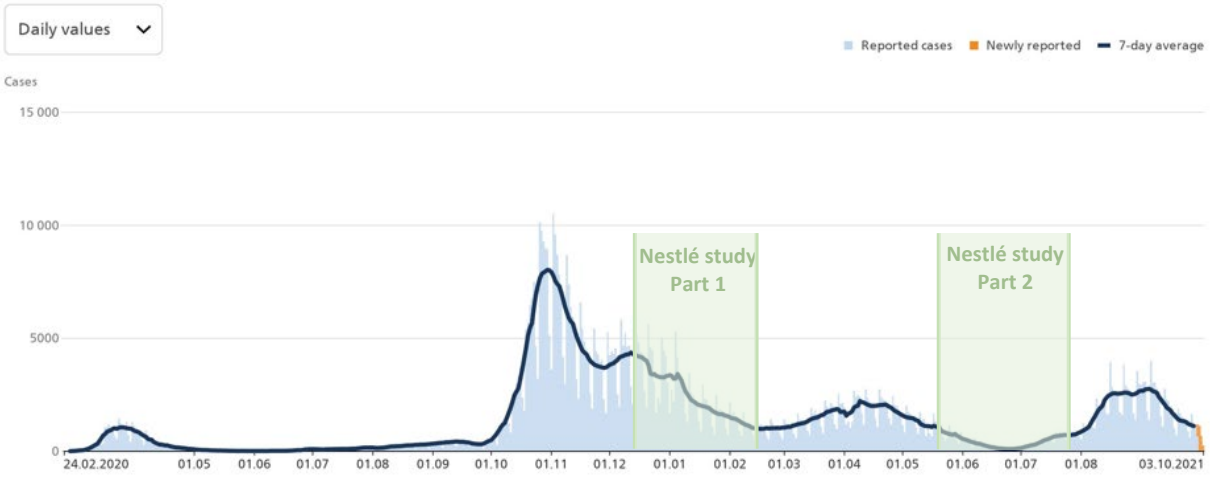
COVID-19 vaccination

The vaccination program in Switzerland started at the end of December 2020 (7). Vaccination opened to the whole adult population on April 26, 2021 in the canton of Vaud and on May 8, 2021 in the canton of Fribourg. By June, most high-risk individuals had been vaccinated and by the end of July, approximately 54% of the Swiss population had been fully vaccinated (7).

Vaccines offer protection against COVID-19 by inducing an immune response against the spike antigen of SARS-CoV-2 (**Box 1**). Both Pfizer and Moderna vaccines have been widely used in Switzerland. They usually require two doses, at an interval of at least 4-6 weeks. In some cases, only one dose is required (COVID-19 infection in the past).

The first part of this longitudinal study showed that at the time of the decline of the second wave of the COVID-19 pandemic until February 2021, the proportion of Nestlé employees with anti-spike IgG antibodies, both sites combined, was 15% (8). In this report, the objective was to estimate again the proportion of employees, who developed antibodies to SARS-CoV-2 following infection or vaccination until July 2021, and to report on the evolution of antibody levels.

Figure 1. Chronology of the pandemic in Switzerland. The graph shows the laboratory-confirmed cases in Switzerland from 24.02.2020 to 03.10.2021, 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 05.10.2021]).



Box 1. Interpretation of antibodies.

Anti-spike IgG antibodies (antibodies to the spike protein of the virus) appear after infection with SARS-CoV-2 or following vaccination against SARS-CoV-2. Anti-nucleocapsid (NuC) antibodies (antibodies to the nucleocapsid of the virus) appear only after infection with SARS-CoV-2 but not after vaccination against SARS-CoV-2. The presence or absence of anti-spike or anti-NuC antibodies in the blood could therefore theoretically determine whether a person has been infected with the virus or vaccinated against it (**Table 1**). However, the rapid disappearance of anti-NuC antibodies makes it difficult to estimate their actual presence in the population and their use is therefore limited (4, 9).

Table 1. Interpretation of anti-spike and anti-NuC antibodies.

Vaccination status	Results of antibodies against SARS-CoV-2		Interpretation
Vaccinated	Anti-spike +	Anti-NuC +	Antibodies after infection and vaccination or infection only
	Anti-spike +	Anti-NuC -	Antibodies after infection or vaccination
	Anti-spike -	Anti-NuC +	Antibodies after infection but no antibodies (yet) after vaccination
	Anti-spike -	Anti-NuC -	No antibodies (yet) after vaccination or infection
Not vaccinated	Anti-spike +	Anti-NuC +	Antibodies after infection
	Anti-spike +	Anti-NuC -	Antibodies after infection
	Anti-spike -	Anti-NuC +	Antibodies after infection
	Anti-spike -	Anti-NuC -	No antibodies (yet) after infection (or no more antibodies after infection)

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 conducted by the Swiss School of Public Health (SSPH+, www.corona-immunitas.ch) (10). 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, and the Nestlé study joined in the third and fourth phases. The objective of the baseline part of this study (phase 3 of Corona Immunitas) was to estimate the proportion of employees who had been infected with SARS-CoV-2 and had developed antibodies. The objective of the follow-up part (phase 4 of Corona Immunitas) was to estimate the proportion of participants with antibodies and to describe how antibodies evolved 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. The Nestlé study is funded by Société des Produits Nestlé SA.

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 beneficiate 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. The study visits were carried out by the trained Nestlé medical staff on work sites. The visits took place between December 9, 2020, and February 11, 2021 for the baseline and between May 26, 2021, and July 27, 2021 for the follow-up. At baseline, the participants were asked to give their consent, take a blood test and complete a baseline questionnaire, reporting health status, symptoms, testing for SARS-CoV-2, demographic questions, preventive measure behaviors, quality of life measures and changes in working conditions. At the follow-up visit, participants were asked to take a blood test for anti-spike IgG and anti-nucleocapsid (NuC) antibodies (**Box 1**), and to complete a short follow-up questionnaire, repeating questions from the baseline questionnaire that may change over time, with additional questions about their vaccination status.

At baseline, anti-spike IgG and IgA antibodies were measured. Since IgA antibodies were not measured at the follow-up visit, only anti-spike IgG antibodies are included in this report to compare proportions between the two parts of the study. In addition, we did not include anti-NuC antibodies, which appear to be of limited use because of their rapid disappearance in the blood (9).

The measurement of anti-spike IgG 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 vaccinated or infected by the SARS-CoV-2 in the past (specificity of 99.7% and sensitivity of 96.6% post 15 days of infection/vaccination) (10, 11).

Analyses

In this report, we focus on the subset of employees that participated in the follow-up part of this longitudinal study. The proportion of Nestlé employees with anti-spike IgG antibodies has been estimated with a Bayesian logistic regression model, accounting for test performance (false positive and false negative).

Results

Among participants of the baseline part of the study (n=425), 284 (67%) participated in the follow-up part. Of the 299 baseline participants on Nestlé Research sites, 216 joined the follow-up (72%). Of the 128 baseline participants of Nespresso factory, 68 joined the follow-up (53%). One participant was excluded because he did not fill out the follow-up questionnaire.

Among the participants, 56% were women, the age range was from 21 to 64 years old with a mean of 43 years (standard deviation = 10) and 22% had one or more vulnerability criteria. Seventy-four percent of the participants reported being involved in teleworking, during at least some periods of time, full time or part time, from the beginning of the pandemic to the baseline part of this study (December 2020 to February 2021). Seventy percent reported being involved in teleworking between January 2021 and the follow-up part of this study (May to July 2021). Sixty-eight percent of the participants reported to have received at least one dose of the vaccine at the time of the blood test (**Table 2**). Seventy-nine percent of the participants on Nestlé Research sites had at least one dose of vaccine and 34% at Nespresso factory in Romont. Supplementary tables with characteristics of participants by work sites are reported at the end of this report (see **Appendices A and B**).

Table 2. Characteristics of the participants. Information is reported from baseline and follow-up questionnaires[1]. Individuals are classified as having antibodies or no antibodies at follow-up.

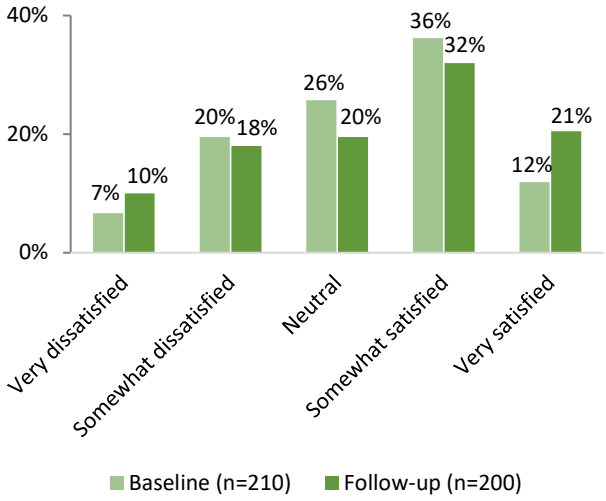
Characteristics	Total	Individuals *with* anti-spike IgG antibodies against the virus	Individuals *without* antibodies against the virus
Number (%)	284	207 (73%)	77 (27%)
Women	159	130 (82%)	29 (18%)
Men	125	77 (62%)	48 (38%)
Age [years], mean (standard deviation)	43	45 (10)	39 (9)
Education level, n (%)			
Mandatory school	4	3 (75%)	1 (25%)
Professional training	62	41 (66%)	21 (34%)
Matura, baccalaureate, vocational baccalaureate	19	15 (79%)	4 (21%)
Higher technical college or university of applied science	41	24 (59%)	17 (41%)
University studies or polytechnic	158	124 (78%)	34 (22%)
Nestlé sites, n (%)			
Nestlé Research (Lausanne, Vaud)	216	180 (83%)	36 (17%)
Nespresso factory (Romont, Fribourg)	68	27 (40%)	41 (60%)
Teleworking at baseline, n (%)			
Yes (concerned)[2]	210	158 (76%)	52 (68%)
No (not concerned)	74	49 (24%)	25 (32%)
Teleworking since January 2021, n (%)			
Yes (concerned)[3]	200	153 (77%)	47 (23%)
No (not concerned)	83	53 (64%)	30 (36%)
NA	1	1 (100%)	0 (0%)

Vulnerability criteria[4], n (%)			
Cancer	0	0 (0%)	0 (0%)
Diabetes	1	0 (0%)	1 (100%)
Diseases and/or treatments that weaken the immune system	5	4 (80%)	1 (20%)
Hypertension	15	12 (80%)	3 (20%)
Cardiovascular disease	5	4 (80%)	1 (20%)
Chronic respiratory disease	23	16 (70%)	7 (30%)
Obesity	19	12 (63%)	7 (37%)
Pregnant	1	0 (0%)	1 (100%)
Individuals with one or more vulnerability criteria, n (%)	63	43 (68%)	20 (32%)
Vaccination status, n (%)			
Yes	194	176 (91%)	18 (9%)
Number of doses, n (%)			
One	85	69 (81%)	17 (19%)
Two	105	104 (99%)	1 (1%)
Other[5]	3	3 (100%)	0 (0%)
NA	1	1 (100%)	0 (0%)
No	86	28 (33%)	58 (67%)
Do not want to answer	4	3 (99%)	1 (1%)

Results are n (%) or as stated. All data beside serology, age and sex, are self-reported. NA: not available.
[1] Baseline questionnaire: sex, age, education level, Nestlé sites, teleworking at baseline, vulnerability criteria. Follow-up questionnaire: teleworking since January 2021, vaccination status.
[2] Number of participants who reported to be concerned by telework during at least certain periods, full time or part time, from the beginning of the pandemic until the baseline part of this study (December 2020 to February 2021).
[3] Number of participants who reported to be concerned by telework from January 2021 until the follow-up part of this study (May to July 2021).
[4] Vulnerability is defined according to the criteria of the Federal Office of Public Health (12).
[5] Three participants received only one dose because of a previous COVID-19 infection.

The following longitudinal analyses include participants who responded to both baseline and follow-up parts. The percentage of employees who worked fully or partially from home does not appear to have changed over time (74% at baseline (n=210), 70% at the follow-up (n=200)) (**Table 2**). Overall, among the participants who teleworked, around half of them were satisfied with telework and around a quarter were indifferent (**Figure 4**).

Figure 4. Overall satisfaction with telework.



When employees were asked how they felt about the obligation to wear a mask in the workplace, a majority reported finding this requirement constraining both at baseline and follow-up (**Figure 5**).

When employees were asked how the implemented measures impacted their mental health or their physical health, most of them responded that the measures had a negative impact on these parameters or did not influence them (**Figure 6-7**). On the other hand, when asked about the perceived impact on work/ private life balance, the responses were evenly divided between positive, negative or neutral impact (**Figure 8**). Finally, most of them reported that the measures did not influence their performance in the workplace (**Figure 9**). Overall, the feelings collected at baseline seemed to remain stable over time.

Figure 5. Feeling about wearing a mask in the workplace.

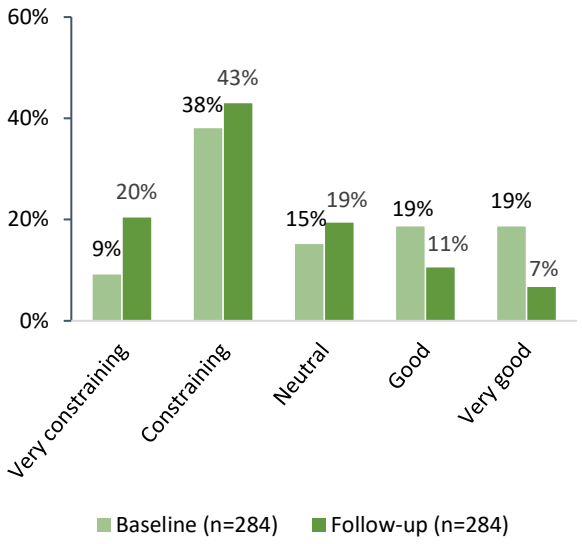


Figure 6-9. Overall perceived impact of the implemented measures (telework or protective measures in the workplace) (n=284). The questions were “Have the implemented measures had an impact on…?” in the baseline questionnaire and “Currently, do the implemented measures have an impact on…?” in the follow-up questionnaire. NA: not available.

Figure 6. Impact on mental health

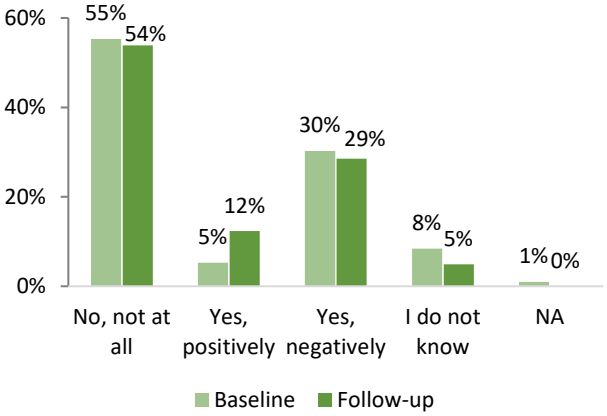


Figure 7. Impact on physical health

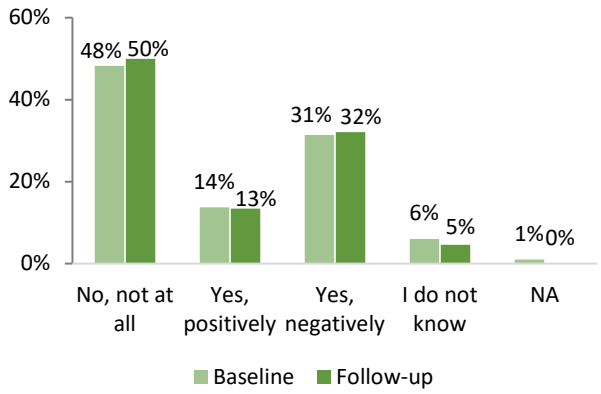


Figure 8. Impact on work/private life balance

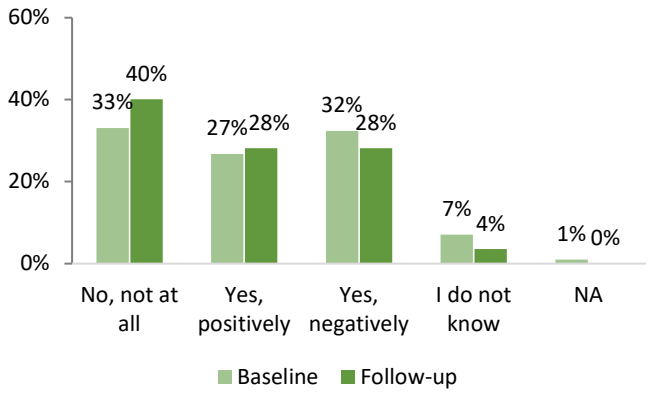
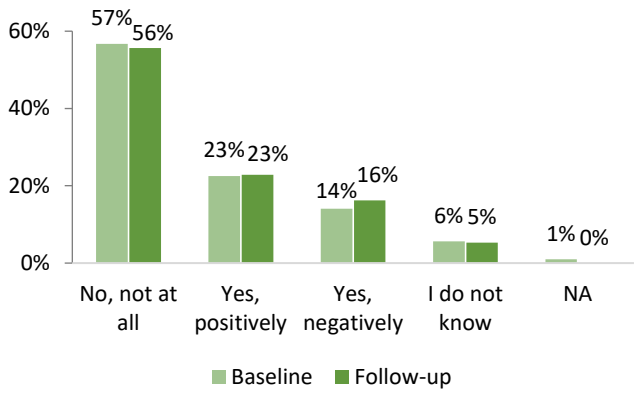
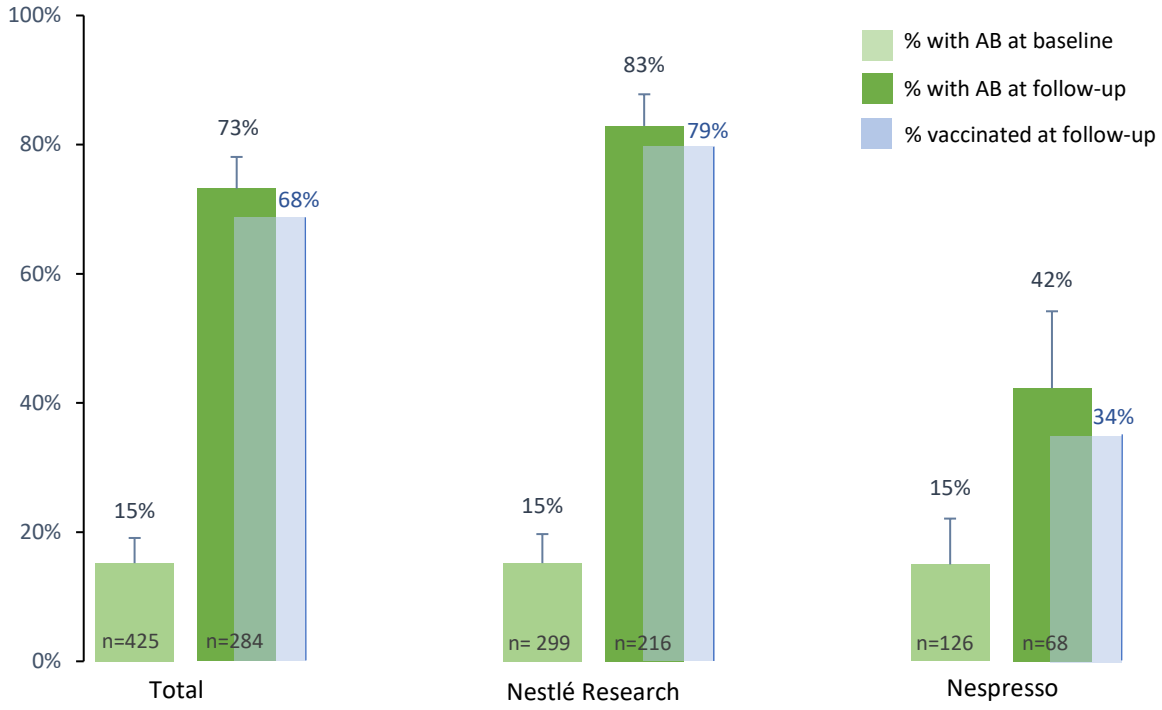


Figure 9. Impact on performance at work



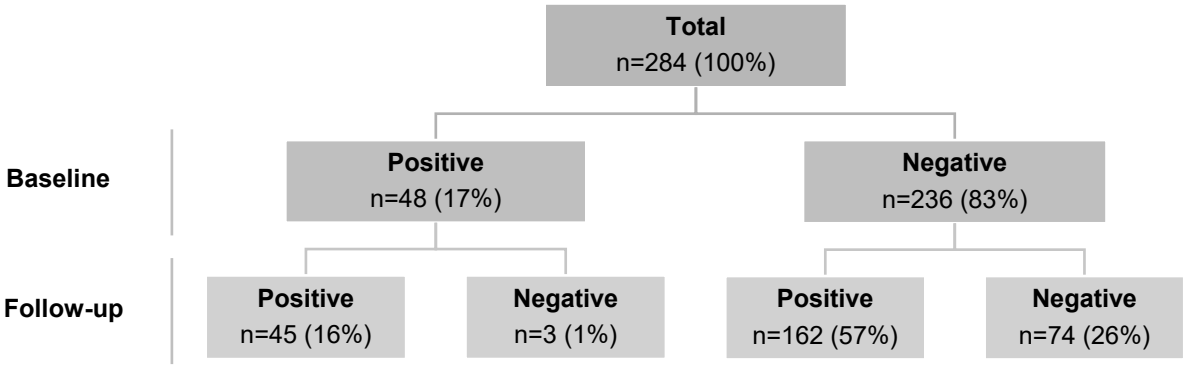
The proportion of adults aged 20-64 years with anti-spike IgG antibodies among the employees of the two sites combined, Nestlé Research and Nespresso Romont, was 73% (95% CI 68% to 78%) (**Figure 10**). The proportion of employees with anti-spike IgG antibodies working on the Nestlé Research sites was 83% (95% CI 78% to 88%) and that of employees at the Nespresso factory in Romont was 42% (95% CI 31% to 54%). Additionally, the figure shows the evolution of antibody proportions in participants from baseline to follow-up, and the proportion of employees vaccinated at the time of the follow-up phase.

Figure 10. Proportion of Nestlé employees with anti-spike IgG antibodies (AB), measured at baseline (n=425) and at follow-up (n=284), and by work site. The proportion of employees vaccinated (at least one dose) at the time of the follow-up phase is shown in blue.



Seventy-three percent of employees had antibodies detected during the follow-up part**.** **Figure 11** shows that 16% of participants were positive at baseline and follow-up, and 57% became positive at follow-up either by natural infection or vaccination. Among the 48 participants who were positive at baseline, 3 of them (6%) became negative at follow-up.

Figure 11. Evolution over time of anti-spike IgG antibodies (baseline to follow-up). Positive means presence of anti-spike IgG antibodies, negative means absence of antibodies.



Discussion

The follow-up part of this study reports that 73% (95% CI 68% to 78%) of Nestlé employees, both sites combined, had developed antibodies against SARS-CoV-2 by July 2021. More precisely, the proportion was 83% (95% CI 78% to 88%) among employees working on Nestlé Research sites in the canton of Vaud, and 42% (95% CI 31% to 54%) among employees working at the Nespresso factory in Romont in the canton of Fribourg.

These results are close to the observations made in the general population, with the proportion among Nestlé Research employees being slightly higher than the average prevalence of the cantons that collected samples until July 2021 (**Figure 12**). A lower proportion of employees with antibodies is observed at the Nespresso factory in Romont. The difference between the two sites can be explained by the different periods of blood sampling (Nespresso, May 26 to June 17; Nestlé Research, June 1 to July 27) as well as the different schedule for opening the vaccination to the adult population in the two cantons (end of April in the canton of Vaud and mid-May in the canton of Fribourg). Thus, at the time of the study, 34% of the Nespresso factory employees had received at least one dose of vaccine, compared to 79% of the Nestlé Research employees. The percentage of participants vaccinated (at least one dose) at the Nespresso factory, with a mean age of 39 years, more or less coincides with the average proportion in the population of the canton (considering people aged 20 to 59 years) (**Figure 13**).

Participants reported a moderate impact of the implemented measures on their wellbeing, except for the requirement to wear a mask, which appeared to be constraining. These feelings appeared to remain stable over time. However, these variables were only assessed at two time points and long-term data would be useful.

Figure 12. Prevalence (%) of anti-spike IgG antibodies against SARS-CoV-2: situation at the end of July 2021 in Switzerland and at Nestlé sites among adults aged 20-64 years (13).

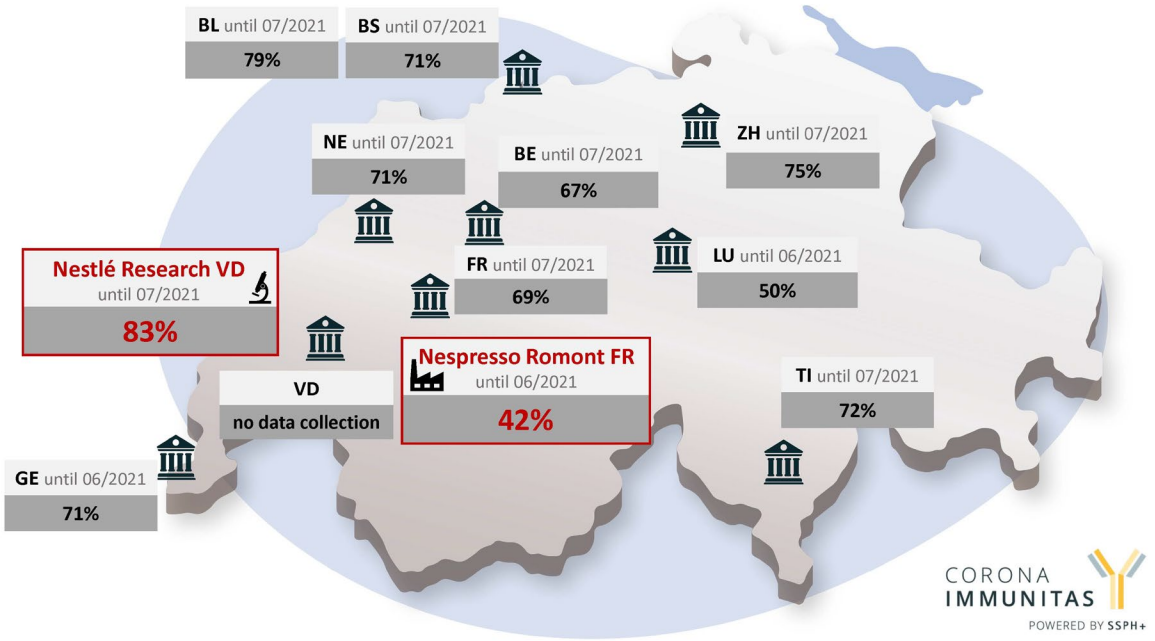
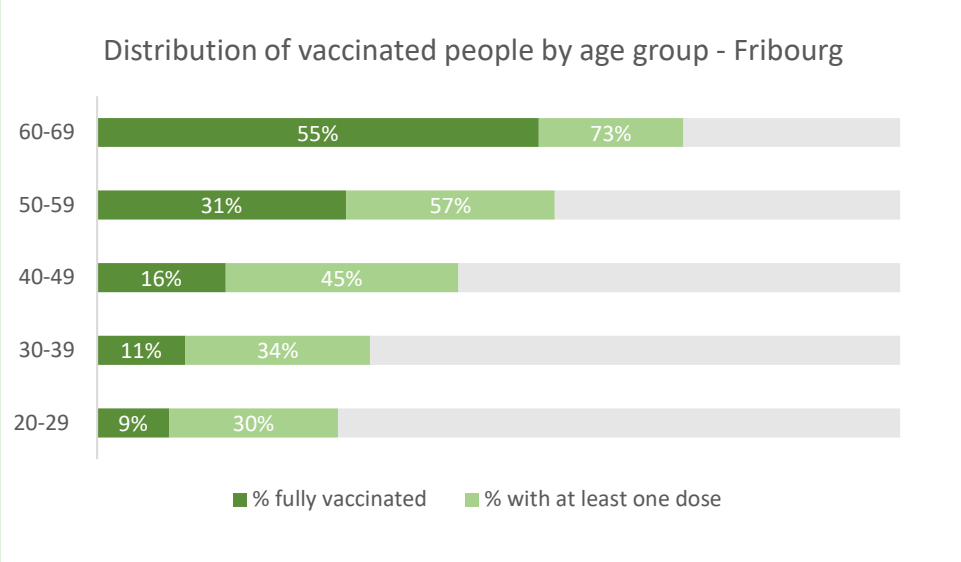
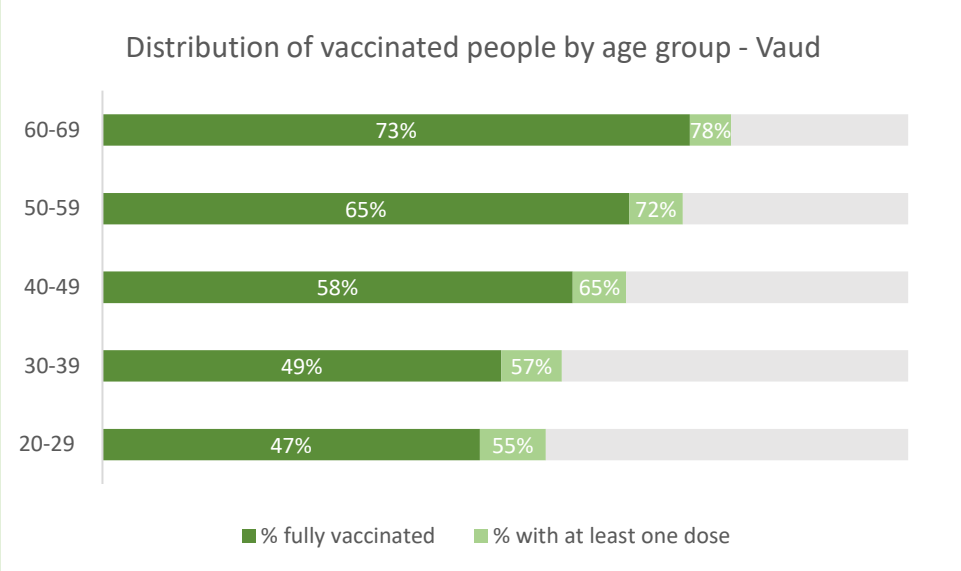


Figure 13. Vaccination by canton.

By June 17th, 2021, corresponding to the last day of study visits at Nespresso factory Romont, 45% of people in the canton of Fribourg had at least one dose of vaccine and 25% were fully vaccinated. These numbers include people aged 65 and over. The figure below shows the proportions of people by age group fully vaccinated or with at least one dose of vaccine, by June 13th, 2021 (FOPH. Vaccination by canton of residence. FOPH; 2021 [Consulted on 31.08.2021].



By July 27th, 2021, corresponding to the last day of study visits at Nestlé Research, 56% of people in the canton of Vaud had at least one dose of vaccine and 45% were fully vaccinated. These numbers include people aged 65 and over. The figure below shows the proportions of people by age group fully vaccinated or with at least one dose of vaccine, by July 25th, 2021 (FOPH. Vaccination by canton of residence. FOPH; 2021 [Consulted on 31.08.2021].



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. Moreover, the proportion of people with antibodies at the time of the study may not accurately reflect the true 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 (9, 14) and antibodies may disappear over time (9, 15). However, in our study, only 3 participants, positive at baseline with low antibody levels, were negative at follow-up. Globally, the proportion of people who have been infected with the virus may be underestimated.

Different blood testing periods between the two sites lead to a major difference in seroprevalence across site, mainly because of different vaccination rates between cantons. Some participants had received only one dose of vaccine at the time of blood testing and antibodies may not yet be present in the blood. This may lead to an underestimation of the proportion of individuals with antibodies.

The participation rate was around 67% for the follow-up part of the study. We did not explore the reasons for not participating in the follow-up visit. It is likely, however, that people who believe they have been infected (positive diagnostic test or symptoms) or that vaccinated people who are curious to check their antibody levels, have greater motivation to participate, which could have increased the estimated seroprevalence. Conversely, people who already knew that they had been infected, had had a positive test result, or were vaccinated, could have renounced to participate in the study.

A major strength of this study is to provide valuable information on the proportion of employees with antibodies that can be used to estimate the extent of SARS-CoV-2 infection and vaccination. Indeed, confirmed cases (detected by PCR or rapid antigenic tests) represent only a fraction of infections because the majority of cases have few or no symptoms and are probably not tested (16).

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 (17).

Conducting a seroprevalence study within a company helps understanding the situation in the workplace, i.e. to estimate antibody levels and the extent of vaccination among employees, which could help to adapt implemented measures. The longitudinal design of this study allows for reporting of changes in antibody levels among the same participants between two analysis periods.

The nationwide and coordinated organization of the Swiss Corona Immunitas research program is another major strength as it facilitates comparisons between studies.

Health concerns

Assuming that there is immunity after infection or vaccination, it should be kept in mind that herd immunity is dynamic and depends on several factors. It may change depending on the effectiveness of previous immunity (infection and/or vaccination), the transmissibility of new variants, and behaviors in the population (6). Vaccination is important to slow the circulation of the virus, and protects against severe illness (18). It is important to remain vigilant to the virus and to continue to respect the sanitary measures recommended by the authorities.

Appendices

Table A. Characteristics of the participants working at Nestlé Research sites (Lausanne area). Information is reported from baseline and follow-up questionnaires[1]. Individuals are classified as having antibodies or no antibodies at follow-up.

Characteristics	Total	Individuals *with* anti-spike IgG antibodies against the virus	Individuals *without* antibodies against the virus
Number (%)	216	180 (84%)	36 (16%)
Women	140	120 (86%)	20 (14%)
Men	76	60 (79%)	16 (21%)
Age [years], mean (standard deviation)	44	45 (10)	41 (7)
Education level, n (%)			
Mandatory school	1	1 (100%)	0 (0%)
Professional training	42	35 (83%)	7 (17%)
Matura, baccalaureate, vocational baccalaureate	12	12 (100%)	0 (0%)
Higher technical college or university of applied science	26	20 (77%)	6 (23%)
University studies or polytechnic	135	112 (83%)	23 (17%)
Teleworking, baseline, n (%)			
Yes (concerned)[2]	171	141 (82%)	30 (18%)
No (not concerned)	45	39 (87%)	6 (13%)
Teleworking since January 2021, n (%)			
Yes (concerned)[3]	167	138 (83%)	29 (17%)
No (not concerned)	48	41 (85%)	7 (15%)
NA	1	1 (100%)	0 (0%)
Vulnerability criteria[4], n (%)			
Cancer	0	0 (0%)	0 (0%)
Diabetes	1	0 (0%)	1 (100%)
Diseases and/or treatments that weaken the immune system	3	3 (100%)	0 (0%)
Hypertension	13	12 (92%)	1 (8%)
Cardiovascular disease	4	4 (100%)	0 (0%)
Chronic respiratory disease	20	16 (80%)	4 (20%)
Obesity	12	9 (75%)	3 (15%)
Pregnant	1	0 (0%)	1 (100%)
Individuals with one or more vulnerability criteria, n (% of total)	48	39 (81%)	9 (19%)

Vaccination status, n (%)			
Yes	171	159 (93%)	12 (7%)
Number of doses, n (%)			
One	69	57 (83%)	12 (17%)
Two	99	99 (100%)	0 (0%)
Other[5]	3	3 (100%)	0 (0%)
No	43	19 (44%)	24 (56%)
Do not want to answer	2	2 (100%)	0 (0%)

Results are n (%) or as stated. All data beside serology, age and sex, are self-reported. NA: not available.
[1] Baseline questionnaire: sex, age, education level, Nestlé sites, teleworking at baseline, vulnerability criteria. Follow-up questionnaire: teleworking since January 2021, vaccination status.
[2] Number of participants who reported to be concerned by telework during at least certain periods, full time or part time, from the beginning of the pandemic until the baseline part of this study (December 2020 to February 2021).
[3] Number of participants who reported to be concerned by telework from January 2021 until the follow-up part of this study (May to July 2021).
[4] Vulnerability is defined according to the criteria of the Federal Office of Public Health (12).
[5] Three participants received only one dose because of a previous COVID-19 infection.

Table B. Characteristics of the participants working at the Nespresso factory in Romont. Information is reported from baseline and follow-up questionnaires[1]. Individuals are classified as having antibodies or no antibodies at follow-up.

Characteristics	Total	Individuals *with* anti-spike IgG antibodies against the virus	Individuals *without* antibodies against the virus
Number (%)	68	29 (43%)	39 (57%)
Women	19	10 (53%)	9 (47%)
Men	49	19 (39%)	30 (61%)
Age [years], mean (standard deviation)	39	41 (10)	38 (10)
Education level, n (%)			
Mandatory school	3	2 (67%)	1 (33%)
Professional training	20	8 (40%)	12 (60%)
Matura, baccalaureate, vocational baccalaureate	7	3 (43%)	4 (57%)
Higher technical college or university of applied science	15	4 (27%)	11 (73%)
University studies or polytechnic	23	12 (52%)	11 (48%)
Teleworking, baseline, n (%)			
Yes (concerned)[2]	39	18 (46%)	21 (54%)
No (not concerned)	29	11 (38%)	18 (62%)
Teleworking since January 2021, n (%)			
Yes (concerned)[3]	33	16 (48%)	17 (52%)
No (not concerned)	35	13 (63%)	22 (37%)

Vulnerability criteria[4], n (%)			
Cancer	0	0 (0%)	0 (0%)
Diabetes	0	0 (0%)	0 (0%)
Diseases and/or treatments that weaken the immune system	2	1 (50%)	1 (50%)
Hypertension	2	1 (50%)	1 (50%)
Cardiovascular disease	1	0 (0%)	1 (100%)
Chronic respiratory disease	3	0 (0%)	3 (100%)
Obesity	7	3 (43%)	4 (57%)
Pregnant	0	0 (0%)	0 (0%)
Individuals with one or more vulnerability criteria, n (%)	15	5 (33%)	10 (67%)
Vaccination status, n (%)			
Yes	23	17 (74%)	6 (26%)
Number of doses, n (%)			
One	16	11 (69%)	5 (31%)
Two	6	5 (83%)	1 (17%)
Other	0	0 (0%)	0 (0%)
NA	1	1 (100%)	0 (0%)
No	43	9 (21%)	34 (79%)
Do not want to answer	2	1 (50%)	1 (50%)

Results are n (%) or as stated. All data beside serology, age and sex, are self-reported. NA: not available.
[1] Baseline questionnaire: sex, age, education level, Nestlé sites, teleworking at baseline, vulnerability criteria. Follow-up questionnaire: teleworking since January 2021, vaccination status.
[2] Number of participants who reported to be concerned by telework during at least certain periods, full time or part time, from the beginning of the pandemic until the baseline part of this study (December 2020 to February 2021).
[3] Number of participants who reported to be concerned by telework from January 2021 until the follow-up part of this study (May to July 2021).
[4] Vulnerability is defined according to the criteria of the Federal Office of Public Health (12).

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