

Perceptions of immunity and vaccination certificates among the general population: a nested study within a serosurvey of anti-SARS-CoV-2 antibodies (SEROCOv-POP)

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Summary

At a time when COVID-19 immunity certificates are debated and vaccination certificates might potentially be made available if an effective vaccine is established, we conducted a study to elucidate public opinion on this issue. Our objective was to determine social and individual perceptions of COVID-19 immunity certificates through a population-based study.

A nested survey within the SEROCOv-POP study, a population-based serosurvey of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland, was conducted with a self-administered questionnaire. The questionnaire was proposed to 1520 SEROCOv-POP participants. Measures included percentage of participants agreeing or disagreeing with statements on immunity and vaccination certificates. Stratification by age, gender, education and work status was used to examine socio-demographic variations.

Of the 1520 SEROCOv-POP participants, 1425 completed the questionnaire (response rate 93%; mean age \pm standard deviation 52 \pm 15.1 years; 51.9% women). About 80% of participants agreed that knowing one's serology status would lead to a change in one's behaviour. In the event that the presence of antibodies correlated with immunity, 60% of participants reported that certificates should be offered to the general population. The results showed variations in perceptions of certificates depending on the context (73% agreed on certificates' utility for travel, 72% for entering a country, and 32% for the right to work). Provided an effective vaccine was available, 55% of participants agreed that vaccination should be mandatory and 49% agreed that a vaccination certificate should be mandatory. About 68% reported a potential risk of discrimination and 28% a risk of deliberate infection. Differences were seen with age, gender and education level.

This study shows that the general adult population in Geneva, Switzerland can envisage scenarios where COVID-19 immunity, and eventually vaccination, certi-

icates would be useful. Seroprevalence estimates of anti-SARS-CoV-2 antibodies remain low to date, and the interpretability of serological testing and immunity remains undefined. However, the information from this study is important, especially the differences based on context and the socio-demographic variations, and should be taken into account if COVID-19-related certificates are to be implemented.

Keywords: vaccination certificate, immunity certificate, COVID-19, anti-SARS-CoV-2 antibodies, travel

Introduction

Non-pharmaceutical interventions, including social distancing, wearing masks and lockdown measures, have been at the forefront of outbreak control during the COVID-19 pandemic. Although effective at containing viral spread, lockdown measures can have devastating consequences on society, causing businesses to stop operating [1], a loss of learning [2], and indirect deleterious health-related outcomes [3]. Immunity certificates from anti-SARS-CoV-2 serological testing, and eventually vaccination certificates, have been proposed as alternative solutions to lockdown measures in certain contexts. Serological testing is based on the identification of anti-SARS-CoV-2 antibodies, which a person would theoretically develop after contracting the disease. Some countries, including Germany [4], the UK [5] and Chile [6], have suggested the use of certificates as a path out of the current measures while ensuring public health safety. However, attempts to put such a system in place have been discouraged by low overall seroprevalence estimates of anti-SARS-CoV-2 antibodies around the world [7, 8]. The World Health Organization (WHO) [9] and other international bodies [10] have also cautioned against their use prior to obtaining answers on the interpretability of serological testing and the ethical and privacy aspects around disclosing or requesting serological information.

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Viewpoints have been published about immunity certificates, but to date no clear consensus has been reached. Persad et al. [11] argued that immunity-based licenses are not unethical in principle, while Hall et al. [12] raised concerns about potential risks of discrimination, fraud and lack of standardisation. Notably, there is to date no population-based data available on perceptions of immunity certificates.

Recognising this, we conducted a survey within the framework of the SEROCov-POP study, a population-based anti-SARS-CoV-2 IgG serosurvey in Geneva, Switzerland [7], to assess the social and individual perceptions of immunity and vaccination certificates, taking into account potential socio-demographic characteristics.

Methods

From May 27 to June 27, 2020, a self-administered questionnaire (ECI: survey on immunity certificates, “étude sur les certificats immunitaires”) was proposed to all individuals 18 years and older participating in the SEROCov-POP study [7]. The SEROCov-POP study participants were recruited from the Bus Santé study [13] (an annual health examination survey of a sample representative of the Geneva population). All individuals gave their consent and the study was approved by the Cantonal Research Ethics Commission of Geneva, Switzerland (CER 16-363). As information collected from subjects who consented to participate in a seroprevalence study may be influenced by participation bias, the questionnaire was also, over the same period, sent to individuals from the Bus Santé study who were invited to participate in the SEROCov-POP study but refused or did not respond. The questionnaire (supplementary table S1 in appendix 2) was collaboratively constructed by physicians (IG, MN), epidemiologists (IG, SS), a sociologist (CBJ) and an ethicist (SH). The questionnaire covered the reasons for undergoing serological testing, contexts where immunity certificates would be useful, perceived risks of immunity certificates, and potential future uses of immunity certificates if a vaccine became available. The questionnaire also included an introduction explaining the lack of current data on the interpretability of serology testing. Answers were based on a 5-point Likert scale with the following categories: “strongly agree”, “agree”, “neutral”, “disagree”, and “strongly disagree”. The categories “strongly agree” and “agree” were later combined, as were “strongly disagree” and “disagree”. Results are reported as percentages, and only comparisons with statistically significant differences are mentioned ($p < 0.05$).

Results

A flow chart of patients included in and excluded from the SEROCov-POP study as well as the nested study reported here is presented in figure 1.

Overall, 1425 SEROCov-POP participants completed the questionnaire (response rate 93%). Mean age was 52 ± 15.1 (standard deviation, SD) years and 51.9% of the participants were women. The participants' characteristics are shown in table 1, and results and stratifications are available in the supplementary material. Additionally, as part of a separate analysis to explore potential participation bias,

the questionnaire was sent to 1,736 individuals who did not participate in the SEROCov-POP study, of which 270 answered the questionnaire (response rate 15.6%). These 270 had a mean age of 56.1 ± 15.2 (SD) years, and 46.3% were women (further characteristics in table S2, appendix 2).

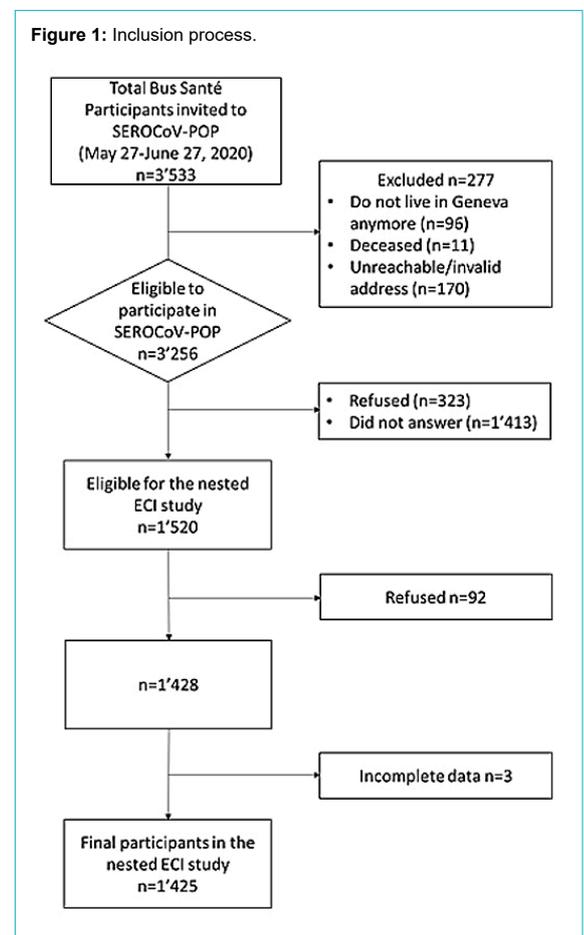
Subjects who had participated in the SEROCov-POP study had mostly done so to help advance research (78.3%), and only 4.8% reported having symptoms as a reason for participating in the serology testing.

Overall perceptions of serology testing and immunity certificates are summarised in figure 2. Results stratified by age, gender, education level and work status are presented in table S3 in appendix 2.

When asked about why serological testing would be useful, about 80% agreed that the presence of antibodies would encourage people to resume activities they had otherwise foregone, while 76% of subjects agreed that the absence of antibodies would encourage people to wear masks (80.8% of individuals 65 years and older, 76.2% of individuals 40-64 years old and 69% of individuals less than 40 years old; $p = 0.01$). Similarly, 87.4% of subjects agreed that the absence of antibodies would encourage people to respect social distancing measures (89.3% in individuals 65 years and older, 88.7% in individuals 40-64 years old and 82% in individuals less than 40 years old; $p = 0.01$).

About two thirds of the participants reported that certificates should be offered to the general population if immunity was established. The contexts where immunity certificates were perceived as potentially most useful were taking a plane (73% of participants) and entering a country (72%),

Figure 1: Inclusion process.



while fewer participants agreed with certificates being useful for participating in large gatherings (55%) or for the right to work (32%). When stratified by occupational status, a lower proportion of participants who were (or were eligible to be) in the workforce agreed with certificates being useful for the right to work: 29.3% of salaried and

27.7% of unemployed individuals versus 44.2% of students and 34.9% of retirees ($p < 0.001$).

When asked about perceived risks relating to immunity certificates, 67.7% of participants agreed that there is a risk of discrimination against those without immunity and 28.6% agreed that there is a risk of deliberate infection in order to acquire immunity. The perception of a risk of discrimination was more common in younger individuals (75.7% in subjects less than 40 years old, 67.9% in subjects 40–64 years old and 59.2% in subjects 65 years and older; $p < 0.001$). The perception of a risk of discrimination was also more common in participants with a higher level of education (73% in subjects with a university or doctorate degree versus 59.7% in subjects with compulsory education, an apprenticeship or upper secondary education; $p < 0.001$). More students agreed that there was a risk of deliberate infection (58%) compared to other groups.

When asked about future uses of immunity certificates if an effective vaccine became available, 55% of participants agreed that vaccination should be mandatory (62.3% of men versus 47.9% of women, $p < 0.001$; and 62.7% of individuals 65 years and older, 51.9% of individuals 40–64 years old and 54.3% of individuals less than 40 years old, $p = 0.003$). About half of participants (49%) agreed that a vaccination certificate should be mandatory (54.1% of men vs 43.8% of women, $p < 0.001$; and 58.6% of individuals 65 years and older, 46% of individuals 40–64 years old and 46% of individuals less than 40 years old, $p < 0.001$).

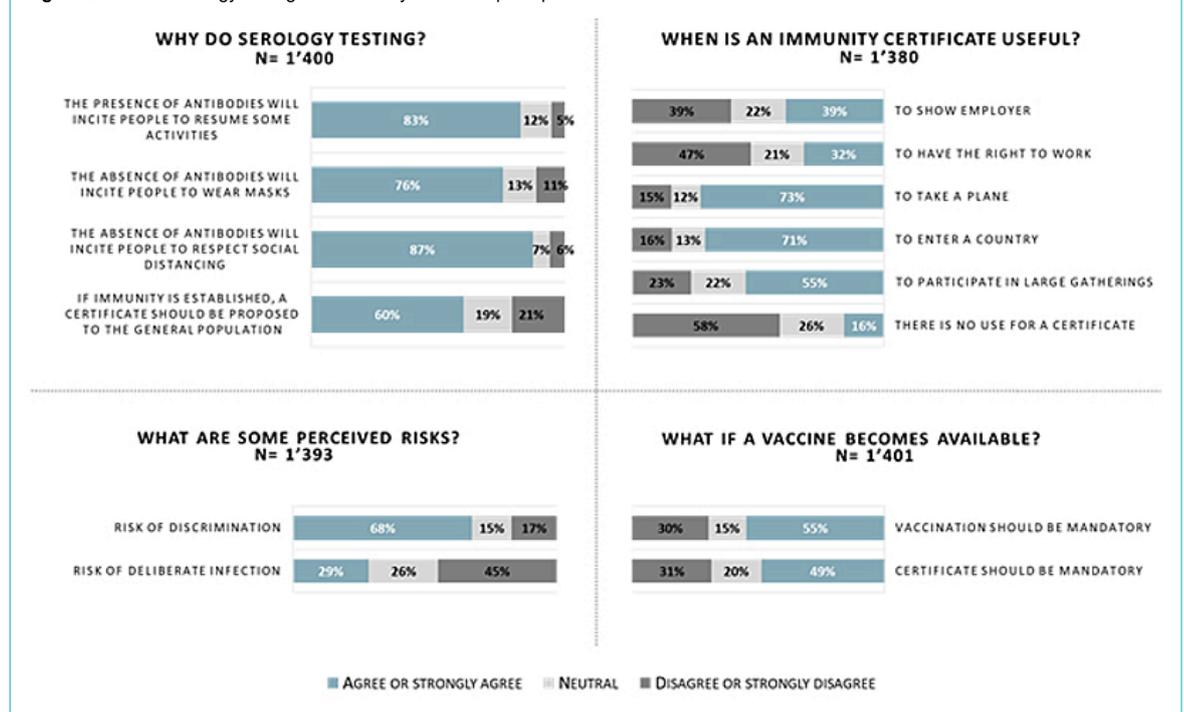
Of the subjects who had not participated in the SEROCOP-POP study but who answered this questionnaire ($n = 270$), three of the main reasons for not participating in the serology testing were lack of time (30.8%), that the subjects did not think they were infected (12.5%), or that they did not want to get out of lockdown (8.7%) (table S4, appendix 2). Subjects in this group had similar results to the rest of the participants: 74.8% agreed that the presence of an-

Table 1: Participant characteristics.

	n = 1425
Age	
Mean ± SD (years)	52.0 ± 15.1
	n (%)
Age categories (years)	
Less than 40	303 (21.3)
40–64	811 (56.9)
65 and above	311 (21.8)
Gender	
Female	740 (51.9)
Male	685 (48.1)
Education level	
Compulsory education	73 (5.1)
Apprenticeship	221 (15.5)
Upper secondary education	263 (18.5)
University	721 (50.7)
Doctorate	83 (5.8)
Does not wish to answer	NA
No diploma	NA
Other	61 (4.3)
Work status	
Retired	338 (23.8)
Student	97 (6.8)
Salaried	746 (52.5)
Independent	127 (8.9)
Unemployed	95 (6.7)
Disability	NA
Other	19 (1.3)

NA = not applicable; SD = standard deviation

Figure 2: Overall serology testing and immunity certificate perceptions.



tibodies would encourage people to resume activities they had foregone, 86.7% agreed that the absence of antibodies would encourage people to wear masks, and 88.8% agreed that the absence of antibodies would encourage people to respect social distancing. Also, 73% agreed that certificates would be useful for taking a plane, 74.6% for entering a country, 57.3% for participating in large gatherings and 48.6% for the right to work. Fewer subjects in this group agreed that there was a risk of discrimination (51.7% vs 67.7% in the serosurvey participants; $p < 0.001$), or of deliberate infection (20.7% vs 28.6% in the serosurvey participants; $p = 0.02$). If an effective vaccine were established, 59.3% of these subjects agreed that vaccination should be mandatory, and 53% agreed that a vaccination certificate should be mandatory.

Discussion

We found that in a general adult population sample from Geneva, Switzerland, anti-SARS-CoV-2 serological testing is perceived to be useful, and participants can envisage scenarios where immunity certificates would be applicable. While the interpretability of antibodies is yet to be determined, if they correlate well with immunity, our results suggest they could influence individuals' behaviour. Younger individuals less frequently believed that the absence of antibodies would encourage people to wear masks, potentially a sign of more risk taking in this population, which suggests a targeted way to reinforce public health messaging.

Linking serological results to certain rights, as immunity certificates would intrinsically be designed to do, raises ethical and societal concerns [12, 14]. It could also, however, be useful for certain goals. Our results show that the general population does consider such certificates to have some utility in specific contexts, including travel and entering countries. Human rights aspects, as well as economic and social consequences, need to be balanced against the utility of public health measures in controlling outbreaks, so that the least restrictive path is chosen [15].

When addressing controversies surrounding immunity certificates, the issues of discrimination and privileging those with immunity are raised. Indeed, authors have argued that immunity certificates could create a world of haves and have-nots [16], a risk also perceived in our study. It is important to note, however, that lockdowns can also widen the societal gap, affecting those who are socio-economically vulnerable the most [17]. Immunity certificates also raise the issue of freedom of choice and decision-making at the individual level. As long as a vaccine is not available, individuals cannot choose to be immune, thus increasing the risks of discrimination and deliberate infection. Only a minority of participants agreed that there was a risk of deliberate infection, and only 55% agreed that a vaccine should be mandatory once established. This could be a reflection of a society that is less prone to accepting mandatory measures and that values freedom of choice. Of note, men seemed to be more in favour of vaccination and vaccination certificates than women, as did older individuals.

While some editorials have been published, to our knowledge this is the first population-based survey contributing information to the overall perceptions of immunity certificates, especially in the general public. Limitations include

administering the questionnaire during a pandemic and immediately following a strict lockdown, which could create a higher degree of acceptance of any solution to controlling the disease while removing restrictions. As is usual in survey research, participants are unlikely to be aware of all the advantages and disadvantages of the studied intervention. While the answers from individuals who did not participate in the SEROCov-POP study were very similar to those from individuals who did participate, the low response rate (15.6%) of subjects who did not participate in the SEROCov-POP study means we cannot exclude the potential for participation bias. Stratification also showed that 51% of participants had a university degree, which may not be representative of the general population in terms of education level.

Seroprevalence estimates of anti-SARS-CoV-2 antibodies remain low [7] to date, and the interpretability of serological testing and immunity remains undefined. If the current scientific uncertainties were lifted, however, and governments or institutions chose to implement immunity or vaccination certificates, differences in the perceptions of such certificates based on the context and on socio-demographic characteristics should be taken into account to limit inequalities and mitigate risks. Implementation should be accompanied by the widespread availability of any solution (i.e., an effective vaccine), as well as awareness and education campaigns empowering individuals to selectively disclose and use their seroprevalence status to benefit both the individual and society.

Disclosure statement

There are no potential conflicts of interest, nor any significant financial contributions to this work. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We also confirm that any aspect of the work covered in this manuscript that involved human patients was conducted with the ethical approval of the Cantonal Research Ethics Commission of Geneva, Switzerland, and that such approvals are acknowledged within the manuscript.

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Appendix 1

SEROCov-POP study team

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Appendix 2

Supplementary tables

Table S1: Survey instrument.

Table S2: Comparison of characteristics of subjects who participated and did not participate in SEROCov-POP.

Table S3: Results stratified by age, gender, education level and work status (n = 1425).

Table S4: Comparison of results between subjects who participated and did not participate in SEROCov-POP.

Appendix 2 is available as a separate file at: <https://smw.ch/article/doi/smw.2020.20398>.