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3 (i) **Title: Serosurveillance after a COVID-19 Vaccine Campaign in a Swiss Police Cohort**

4 (ii) *Short running title:* COVID-19 Serosurveillance in a Swiss Police Cohort

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6 (iii) *Authors:* Parham Sendi,<sup>1\*</sup> Marc Thierstein,<sup>2</sup> Nadja Widmer,<sup>3</sup> Flora Babongo Bosombo,<sup>4</sup>

7 Annina Elisabeth Büchi,<sup>5</sup> Dominik Güntensperger,<sup>4</sup> Manuel Raphael Blum,<sup>6,7</sup> Rossella

8 Baldan,<sup>1</sup> Caroline Tinguely,<sup>3</sup> Brigitta Gahl,<sup>4</sup> Dik Heg,<sup>4</sup> Elitza S. Theel,<sup>8</sup> Elie Barbari,<sup>9</sup> Andrea

9 Endimiani,<sup>1</sup> Peter Gowland,<sup>3</sup> Christoph Niederhauser<sup>1,3</sup> for the PoliCOV-19 study.

10  
11 (iv) *Affiliations:*

12 <sup>1</sup>Institute for Infectious Diseases, University of Bern, Bern, Switzerland.

13 <sup>2</sup>Division Operations, Cantonal Police Bern, Bern, Switzerland.

14 <sup>3</sup>Interregional Blood Transfusion Swiss Red Cross, Bern, Switzerland.

15 <sup>4</sup>CTU Bern, University of Bern, Bern, Switzerland.

16 <sup>5</sup>Department of Emergency Medicine, Inselspital, Bern University Hospital, University of  
17 Bern, Bern, Switzerland.

18 <sup>6</sup>Department of General Internal Medicine, Inselspital, Bern University Hospital, University  
19 of Bern, Bern, Switzerland.

20 <sup>7</sup>Institute of Primary Health Care (BIHAM), University of Bern, Bern, Switzerland.

21 <sup>8</sup>Division of Clinical Microbiology, Mayo Clinic, Rochester, Minnesota, USA.

22 <sup>9</sup>Division of Infectious Diseases, Mayo Clinic, Rochester, MN, USA.

27 **\*Correspondence:** Parham Sendi, MD, ORCID: 0000-0002-7347-6312  
28 Institute for Infectious Diseases, University of Bern, Friedbühlstrasse 51, 3010, Bern,  
29 Switzerland.

30 [parham.sendi@ifik.unibe.ch](mailto:parham.sendi@ifik.unibe.ch)

31 Tel: +41 31 638 69 86; Fax: +41 31 638 67 86

32

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58 *Ethics approval statement:* The study was performed in accordance with the Helsinki  
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60 the work were approved by the Cantonal Research Ethics Commission of Bern, Switzerland  
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63 enrolment in the PoliCOV-19 study.

64 *Permission to reproduce material from other sources:* Not applicable. Figure 1 is adapted  
65 from an open resource website and referenced accordingly. The baseline study using the same  
66 cohort of study participants and using the same serology methods and questionnaires have  
67 been published elsewhere [1]. Here, the follow-up results after 3 and 6 months are presented.

68 **Abstract**

69

70 **Introduction:** To assess the risk for COVID-19 of police officers, we are studying the  
71 seroprevalence in a cohort. The baseline cross-sectional investigation was performed prior to  
72 a vaccination campaign in January/February 2021, and demonstrated a seroprevalence of  
73 12.9%. Here, we demonstrate serosurveillance results after a vaccination campaign.

74 **Methods:** The cohort consists of 1022 study participants. The 3-month and 6-month follow-  
75 up visits were performed in April/May and September 2021. Data on infection and  
76 vaccination rates were obtained via measuring antibodies to the nucleocapsid protein and  
77 spike protein and online questionnaires.

78 **Results:** The mean age of the population was 41 (SD 8.8) years, 72% were male and 76% had  
79 no comorbidity. Seroconversion was identified in 1.05% of the study population at the 3-  
80 month visit and in 0.73% at the 6-month visit, resulting in an infection rate of 1.8% over a  
81 time period of 6 months. In comparison, the infection rate in the general population over the  
82 same time period was higher (3.18%,  $P=0.018$ ). At the 6-month visit, 77.8% of participants  
83 reported being vaccinated once and 70.5% twice; 81% had an anti-S antibody titer of >250  
84 U/mL and 87.1% of  $\geq 2$  U/mL. No significant association between infection and job role  
85 within the department, working region, or years of experience in the job was found. Anti-  
86 spike antibody titers of vaccinated study participants showed a calculated decreasing trend  
87 150 to 200 days after the second vaccine dose.

88 **Conclusion:** These data confirm the value of the vaccination campaign in an exposed group  
89 other than healthcare professionals.

90

91 **Keywords**

92 SARS-CoV-2; anti-S-antibodies; anti-NCP-antibodies; COVID-19 seroprevalence.

## 93 **Introduction**

94 The COVID-19 pandemic has ignited social unrest, including domestic violence, a surge in  
95 COVID-19 denials, and anti-masking and anti-vaccine protests worldwide [2-4]. It is  
96 reasonable to postulate that police officers, in particular those working in the field, are an  
97 exposure population. To assess the risk for SARS-CoV-2 infection in this group, since  
98 February 2021, we have been studying a cohort of individuals employed by the Cantonal  
99 Police Bern in Switzerland [5]. The seroprevalence of anti-nucleocapsid antibodies in the  
100 police cohort before initiating a vaccine program was 12.9% [1]. In March 2021, a  
101 vaccination campaign for their employees was promoted by the Cantonal Police Bern. Here,  
102 we present the COVID-19 infection and vaccination rate 3 and 6 months after initiating the  
103 cohort, and the dynamics of anti-spike antibody levels in vaccinated individuals. In addition,  
104 a comparison between the infection rates in the police cohort and the general population was  
105 made to estimate the success of the vaccine campaign.

106

## 107 **Methods**

108 *Cohort:* The study protocol is aligned with that of the WHO for population-based age-  
109 stratified seroepidemiological investigations [6], adapted for the specific population and  
110 geographic region in our study. The population involved in the PoliCOV-19 study has been  
111 published previously [1], and included after 6 months 1022 study participants (**Appendices,**  
112 **Figure S1**).

113 *SARS-CoV-2 exposure:* The series of COVID-19 waves in our region since the onset of the  
114 pandemic and the time points of cross-sectional analysis are shown in **Figure 1**. During the  
115 study period, there was no government-ordered lockdown. Wearing face masks for  
116 employees of the Cantonal Police Bern was made mandatory during working hours (indoor  
117 and outdoor) on October 13, 2020. On June 26, 2021, an exemption was introduced: Wearing

118 face masks was not mandatory for employees of the police within protected indoor rooms of  
119 the police departments, under the precondition that a physical distance of 1.5 meters was  
120 ascertained. For all other circumstances, mask-wearing remained mandatory.

121 *SARS-CoV-2 variants:* From mid-February to the end of June 2021, the SARS-CoV-2 Alpha  
122 variant (B.1.1.7) was dominant in Switzerland until its replacement by the Delta variant  
123 (B.1.617.2, all subvariants AY), which became predominant in late June 2021 [7].

124 *Time points of cross-sectional analysis:* The baseline investigation was performed in  
125 January/February and published elsewhere [1]. The 3-month follow-up visit was performed in  
126 April/May, and the 6-month follow-up in September 2021 (**Figure 1**).

127 *Questionnaires:* During every cross-sectional analysis of the cohort (i.e.; every 3 months), an  
128 online questionnaire was sent to study participants. The questionnaire aligned to the survey  
129 tools recommended by the WHO [8], and a questionnaire used by the Swiss Medical  
130 Association (FMH) to evaluate COVID-19 among physicians in Switzerland [9], and then  
131 adapted for police officers. It inquired job-related activity, possible COVID-19 contact,  
132 symptoms consistent with COVID-19, contact with presumed or confirmed cases, quarantine,  
133 and nasopharyngeal test results and vaccination status.

134 *Antibody tests:* SARS-CoV-2 antibodies to the nucleocapsid protein (NCP) and spike (S)  
135 protein were measured by using two commercially available immunoassays (Roche  
136 Diagnostics, Rotkreuz, Switzerland). To increase the specificity of anti-S antibody test  
137 results, we chose a cutoff value of  $\geq 2$  U/mL [10], instead of  $\geq 0.8$  U/mL, as recommended by  
138 the manufacturer.

139 *COVID-19 infection definition in the cohort:* COVID-19 infection was defined as  
140 seroconversion of anti-NCP antibodies or a self-reported PCR test from a nasopharyngeal  
141 swab in the questionnaire. To identify false-positive serological results, we contacted all  
142 individuals with anti-NCP antibody seroconversion and reinvestigated the cases. Samples

143 with low titer results from individuals with no symptoms or negative nasopharyngeal PCR  
144 test results were reanalyzed with a second and different anti-NCP antibody assay (Bio-Rad,  
145 Marnes-la-Coquette, France). In the case of seronegative results with the second assay, the  
146 serum test result was considered as a possible or likely false-positive result. Serological  
147 results from individuals with a self-reported positive nasopharyngeal PCR test result and  
148 without symptoms and without anti-NCP seroconversion were considered as possible or  
149 likely false-negative cases if the time interval between PCR test result and serum sampling  
150 was  $\geq 14$  days.

151 *The infection rate in the general population:* New infection cases in the general population  
152 are defined as laboratory-confirmed cases (positive PCR test from nasopharyngeal or saliva  
153 sample). The data were obtained from the Federal Office of Public Health [11]. The canton of  
154 Bern consists of more than 1,043,000 inhabitants; the age-matched population for this study  
155 consisted of 671'678 registered inhabitants at the 3 month-visit and 669'243 at the 6-month  
156 visit.

157 *COVID-19 vaccine:* The messenger RNA vaccines from Pfizer-BioNTech and Moderna are  
158 authorized and approved for use in Switzerland. The vaccination campaign of the police was  
159 promoted from March 12<sup>th</sup> till June 11<sup>th</sup>, 2021 (**Figure 1**).

160 *Primary endpoint:* The primary endpoint was the infection rate in the police cohort at the 3-  
161 month and 6-month visit.

162 *Secondary endpoints:* The secondary endpoints included the comparisons of the infection  
163 rates between the police cohort and the general population at the 3-month and 6-month visits,  
164 the association of age, comorbidity, job role (i.e.; mainly fieldwork or mainly office work),  
165 working department, working region, and years of experience with the infection rate.

166 Secondary endpoints included further the proportions of vaccinated individuals and those  
167 with anti-S antibody titers  $\geq 2$  U/mL in the cohort at the 6-month visit. In vaccinated

168 individuals, the time interval from vaccination to the calculated trend of anti-S antibody titers  
169 falling below 250 U/mL was defined as a secondary endpoint.

170 *Statistical analysis:* To describe the characteristics of the study cohort, we used mean  $\pm$   
171 standard deviation (SD) or median with interquartile range for summarizing continuous  
172 variables, as appropriate. Comparisons were made by using the Student t-test or Mann-Whitney  
173 test, respectively. Categorical data were shown as numbers with percentages and compared by  
174 using Fisher's exact test for binary variables or the chi-squared test for more than two  
175 categories. The Chi-squared test of homogeneity was used to compare new infection rates  
176 between the police cohort and the Bernese general population (binary variables). The  
177 comparisons included both the overall infection rates and were matched by age groups  
178 according to the following categories: 20–29, 30–39, 40–49, 50–59, and 60–69 years. For  
179 comparative analysis to identify groups at risk for infection, the variables comorbidity, working  
180 department, and working region were combined with age groups and years of experience within  
181 the police department. The latter was categorized as 0–9, 10–19, 20–29, and 30 or more years  
182 of experience.

183 Generalized additive models were used to estimate the trend of the anti-S antibody titers over  
184 time after vaccination. All analyses were performed with R (version 3.6.2).



185 **Results**

186 The mean age of the 1022 study participants was 41 (SD 8.8) years, 72% were male and 76%  
187 had no comorbidity; 58.3% (560) of study participants indicated that their main activity was  
188 fieldwork [1]. The numbers of samples analyzed at baseline, 3-month visit and 6-month visit  
189 were 978, 997, and 982, respectively. The presence or absence of seroconversion between the  
190 baseline and 3-month visit was investigated in 956 paired samples, and between the 3-month  
191 and 6-month visits in 955 paired samples. The seroprevalences of anti-NCP antibodies –  
192 without adjusting for paired sample results or false positive or false negative results – were  
193 12.9% at baseline [1], 14.4% at the 3-month visit, and 15.3% at the 6-month visit  
194 (**Appendices, Figure S2**).

195 *Primary endpoint – COVID-19 infection in the cohort:* Seroconversion was identified in  
196 1.05% (10/956) at the 3-month visit (**Table 1A**) and in 1.15% (11/955) at the 6-month visit  
197 (**Table 1B**). At the 3-month visit, no false-positive results were detected; at the 6-month-visit,  
198 4 of the 11 positive results were likely false-positive results (**Table 1B**). Therefore, the  
199 proportion of individuals with seroconversion at 6 months was adjusted from 1.15% (11/955)  
200 to 0.73% (7/955). The seroprevalence after excluding non-paired samples was adjusted to  
201 13.95% at the 3-month-visit, and 14.7% at the 6-month visit.

202 No breakthrough infections were seen after two doses of vaccination. Six of ten infections at  
203 the 3-month visit (**Table 1A**), and three infections at the 6-month visit occurred in non-  
204 vaccinated individuals (**Table 1B**). The remaining infections occurred in vaccinated  
205 individuals between the first and the second dose of the vaccine.

206 *Secondary endpoints:*

207 *COVID-19 infection proportions in the cohort in comparison to the ones in the general*  
208 *population:* In the police cohort, the increase in seroprevalence at 6-month was 1.80% in  
209 comparison to the baseline (i.e., from 12.9% to 14.7%), and 0.73% in comparison to the 3-

210 month visit (i.e., from 13.95% to 14.7%). These values were significantly lower in  
211 comparison to the increase of the calculated infection rate of the general population (in  
212 comparison to the 6-month span: 1.8% versus 3.18%,  $P=0.018$ ; in comparison to 3-month  
213 span: 0.73% versus 1.77%,  $P=0.021$ ). After matching for age groups, the infection rate was  
214 lower in the police cohort than that in the general population, though not statistically  
215 significant (**Appendices, Figures S3-1 and S3-2**).

216 No statistically significant difference was seen in the subgroup analysis when comparing  
217 police officers involved in the fieldwork activity and the age-matched general population. No  
218 statistically significant association was found in the comparative analysis, including  
219 comorbidity, job role within the department, and years of experience (**Appendices, Table**  
220 **S1**).

221 *Vaccination rate and anti-spike antibody titers in the cohort:* At the 6-month visit, 77.8% of  
222 participants reported being vaccinated once and 70.5% twice; 81% had an anti-S antibody  
223 titer of  $>250$  U/mL and 87.1% of  $\geq 2$  U/mL (**Figure 2**). The proportion of individuals with  
224 anti-S antibody titers  $>250$  U/mL likely represented most of the the vaccinated group because  
225 it included responders and non-responders of questionnaires. The proportions of these  
226 parameters among police officers mainly involved in fieldwork and those mainly involved in  
227 office work were similar; 85.0% and 84.5% ( $P=0.9$ ), respectively, reported being vaccinated  
228 once, 79.3% and 79.4%% ( $P=1.0$ ) reported being vaccinated twice, 84.6% and 83.6%  
229 ( $P=0.748$ ) had an anti-S antibody titer of  $>250$  U/mL, and 90.2% and 88.1% ( $P=0.377$ ),  
230 respectively, had an anti-S antibody titer  $\geq 2$  U/mL. The group with anti-S antibody titers of  
231  $\geq 2$  U/mL consisted of the proportions of both, individuals who were vaccinated and those  
232 who had recovered from COVID-19 irrespective of vaccination status.

233 Two (0.3%) double-vaccinated and immunocompromised individuals did not show anti-S  
234 antibodies at the time of point serum sampling. Fifty-six (5.7%) of the study participants were  
235 seropositive and reported not being vaccinated.

236 *Dynamics of anti-S antibody levels:* Anti-S antibody titers of vaccinated study participants  
237 showed a calculated decreasing trend after 150 to 200 days (**Figure 3**).

238

## 239 **Discussion**

240 In this cohort study, we noted a low infection rate and a relatively high vaccination rate  
241 among police officers. Despite a presumed higher exposure to SARS-CoV-2, in particular for  
242 police officers mainly involved in the fieldwork activity, the overall infection rate was not  
243 higher than in the general population. Finally, 150 to 200 days after vaccination, a decreasing  
244 trend in anti-S antibody titers was observed, underscoring the necessity of a booster vaccine  
245 four to six months after the second dose.

246 Law enforcement personnel face physical and psychological challenges during the COVID-  
247 19 pandemic [12, 13]. Their exposure to SARS-CoV-2 and possible risk of transmission  
248 during working hours (e.g.; in attendance of public protests) have been scarcely investigated.  
249 Seroprevalence studies are useful means to estimate the true extent of SARS-CoV-2 infection  
250 among a population [14, 15]. Few seroprevalence studies focused on public safety personnel  
251 [16-22]. Garbarino et al. [20] reported an overall seroprevalence of 4.8% in 10'535 police  
252 officers in Italy, with a higher seroprevalence in northern (9%) than in southern regions  
253 (1.6%).

254 In our cohort, the seroprevalence at the baseline was 12.9% in February 2021, similar to that  
255 reported in the general population [1]. The self-reported compliance with mask-wearing  
256 during working hours was very high. The results suggested that household contacts were the  
257 leading transmission venues. Regional differences in the seroprevalence were observed, and

258 police officers mainly working in the field were more frequently seropositive than those  
259 mainly working in the office [1]. In this study, the cohort was followed for 6 months. The  
260 regional and job-related differences in seroprevalence within the cohort waned over this time  
261 period. However, at the 6-month visit, the infection rate was lower in the cohort than the one  
262 in the general population (1.8% versus 3.18%,  $P=0.018$ ). The true difference was likely more  
263 pronounced, considering that the observation in the police cohort was more precise than the  
264 one in the general population and that the numbers in the general population are likely  
265 underestimated. Although the difference in the proportion of the infection rate between the  
266 police cohort and the general population was minor, the calculated absolute number of  
267 individuals in the entire population is considerable.

268 In our view, the differences in COVID-19 infection rates are likely explained by the high  
269 compliance of police officers with hygiene precautions and mask-wearing with contacts, and  
270 by the relatively high vaccination rate. Previous studies have shown the efficacy of COVID-  
271 19 messenger RNA vaccines [23]. McLaughlin et al. [24] calculated in a negative binomial  
272 regression model that US counties with  $\geq 80\%$  of vaccine-eligible persons fully vaccinated  
273 had 30% lower rates of COVID-19 cases and 46% lower rates of COVID-19-related deaths  
274 compared to US counties with  $< 50\%$  vaccine coverage. The vaccination rate in the police  
275 cohort was more than 80% when considering the responses in the questionnaires and the  
276 proportions of individuals with anti-S antibody titers of  $> 250$  U/mL. A high proportion of  
277 study participants were vaccinated before the 4<sup>th</sup> wave of the pandemic. This proportion is  
278 higher than the one reported for the general population. For comparison, 54%-64% of the  
279 general population received at least 1 dose, and 58%-59% received 2 doses of COVID-19  
280 vaccine in Switzerland in September 2021 [11]. These proportions include elderly individuals  
281 who were prioritized in the vaccine distribution. Thus, the age-matched differences in the  
282 vaccine rate between the police cohort and the general population were likely higher because

283 retired individuals were not included in the police cohort while they were included in the  
284 vaccination registry of the general population. The lower proportion of vaccination in the  
285 general population cannot be explained by the accessibility to the vaccine. In Switzerland, the  
286 priority for receiving a vaccine depended on the risk of a severe course of COVID-19 and  
287 immune status. Because vaccination is not mandatory, individuals who are skeptical about the  
288 COVID-19 vaccine can refuse to be vaccinated.

289 The overall proportion of individuals with antibodies against SARS-CoV-2 in the police  
290 cohort – defined as the proportion of individuals with anti-S antibody titer  $\geq 2$  U/mL – was  
291 87.1% in September 2021. Similar to other studies [25], we observed a waning humoral  
292 response after vaccination. In our previous baseline study [1], we demonstrated that the  
293 neutralization capacity of naturally acquired antibodies decreased with emerging of new  
294 variants of SARS-CoV-2, and that neutralization correlated with the extent of antibody titer.  
295 Vaccine efficacy decreases over time [26, 27]. A vaccine booster dose increases the antibody  
296 neutralization level and leads to increased protection against infection of the delta variant and  
297 severe illness [28, 29]. However, this effect is likely not durable. In the police cohort, the  
298 calculated population curve of the sample results indicated a decrease in anti-S antibody titers  
299 below 250 U/mL approximately 150 to 200 days after vaccination. The aforementioned  
300 arguments together with these results justified promoting a booster vaccination (third dose)  
301 campaign.

302 Our study has limitations. The statistically significant difference in infection rate between the  
303 police cohort and the general population is arguable because it was only seen in the overall  
304 analysis but not in the age-matched comparison. We were unable to exclude the infection rate  
305 in risk groups within the general population, considering that the police cohort consists of  
306 predominantly healthy individuals. However, the true infection rate in the general population  
307 is likely underestimated. We were unable to identify an infection in individuals without self-

308 reported nasopharyngeal sample test results and at least two serum (paired) samples over the  
309 6 months (i.e.; to detect seroconversion). We believe that our results are representative,  
310 considering that in more than 95% of study participants two or three serum samples were  
311 available. The time points for blood sampling and sending out questionnaires were predefined  
312 in the study protocol. Hence, the dynamics of antibody titers over time are biased by these  
313 sampling time points. The COVID-19 infection rate in the police cohort was evaluated by  
314 self-reported PCR test results and seroconversion in serum samples. The infection rate in the  
315 general population was evaluated by analyzing laboratory-confirmed cases that were reported  
316 daily by the Federal Office of Public Health. Despite using two different methodologies, we  
317 were able to statistically homogenize these results for comparison. We are unable to perform  
318 antibody titer dynamic analysis at very high titer levels, because of the upper quantification  
319 limit of the anti-S antibody assay (i.e.; >250 U/mL).

320 In conclusion, our COVID-19 cross-sectional surveys among police officers demonstrated an  
321 increase in seroprevalence from 12.9% to 14.7% in 6 months. The increase was lower than  
322 the laboratory confirmed SARS-CoV-2 infection rate observed in the general population.  
323 During the same period, we observed a relatively high vaccination rate of approximately  
324 80%. In contrast to the pre-vaccination analysis at baseline, no significant association with  
325 the job role within the department or working regions was observed. The observed waning  
326 humoral response 150 to 200 days after vaccination together with results from other studies  
327 showing the efficacy of a third dose, supported a further campaign for a booster vaccination.  
328 The results of the cross-sectional surveys at the 9- and 12-months visit are currently being  
329 analyzed.

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416



417 **Table 1A: Newly identified COVID-19 cases between baseline (February/March 2021) and the 3-month visit (April/May 2021).**

<b>3-month visit: 10 (1.05%) newly identified COVID-19 infections in 956 study participants with samples at baseline and 3-month visits.</b>								
<b>Record ID</b>	<b>Symptoms consistent with COVID-19</b>	<b>NSP swab</b>	<b>Seroconversion Dates of sampling<sup>1</sup></b>	<b>Anti-NCP (COI)<sup>2</sup></b>	<b>Anti-S (U/mL)<sup>2</sup></b>	<b>Vaccinated</b>	<b>1<sup>st</sup> Dose</b>	<b>2<sup>nd</sup> Dose</b>
43 <sup>‡</sup>	Yes (Onset: April 10)	Negative	March 4 / May 4	176	>250	Yes	March 26	May 4
118	Yes (Onset: February 14)	Negative	March 4 / May 4	45.1	>250	Yes	April 10	May 10
123	No, and no known or traceable contacts	Not tested	Feb 16 / May 4	104	>250	Yes	March 10	May 14
130	No	Positive March 20	Feb 16 / May 11	106	104	No	-	-
291	Yes	Positive April 21	Feb 26 / June 11	123	154	No	-	-
702	Yes	Positive February 27	March 9 / April 27	4.2	74.4	No	-	-
739	Yes (Onset: March 22)	Negative	Feb 23 / April 26	93.2	25.7	No	-	-
771	Yes (Onset: End of February)	Negative	March 4 / May 12	12.5	>250	Yes	May 5	-
813	Yes	Positive March 30	Feb 25 / April 26	135	>250	No	-	-
979	Yes	Positive April 12	March 4 / April 27	128	18.1	No	-	-

418 Abbreviations: Anti-NCP, anti-nucleocapsid antibodies; Anti-S, anti-spike protein antibodies; NSP, nasopharyngeal swab testing (PCR in case of a positive  
419 result; antigen test or PCR in case of a negative result, self-reported results); COI, cut-off index.

420 <sup>1</sup> The first date is the date of sampling at baseline (seronegative); the second date is the date of sampling at the 3-month visit (seropositive).

421 <sup>2</sup> Results at the 3-month visit; results at baseline are not shown because they are seronegative.

422 <sup>‡</sup> COVID-19 disease between the first and second vaccination dose.

423  
424

**Table 1B: Newly identified COVID-19 cases between the 3-month (April/May) and the 6-month visit (September 2021).**

<b>6-month visit: 11 (1.15%) newly identified COVID-19 infections in 955 study participants with samples at 3-month and 6-month visits. Four results are possibly or likely false positive (i.e., 7 [0.73%] newly identified COVID-19 infections).</b>								
<b>Record ID</b>	<b>Symptoms consistent with COVID-19</b>	<b>NSP swab</b>	<b>Seroconversion Dates of sampling<sup>1</sup></b>	<b>Anti-NCP (COI)<sup>2</sup></b>	<b>Anti-S (U/mL)</b>	<b>Vaccinated</b>	<b>1<sup>st</sup> Dose</b>	<b>2<sup>nd</sup> Dose</b>
31 <sup>‡</sup>	Yes (Onset: April 22)	Negative	April 27 / Sept 8	16.4	>250	Yes	March 29	April 30
195	No, and no known or traceable contacts	Not tested	April 27 / Sept 8	14.4	>250	Yes	April 27	May 25
220 <sup>±</sup>	Yes (Onset: August 27)	Negative	May 7 / Sept 8	2.1 <sup>±</sup>	>250	Yes	April 19	May 17
245 <sup>±</sup>	No, and no known or traceable contacts	Not tested	April 28 / Sept 10	1.0 <sup>±</sup>	0.4	No	-	-
322 <sup>±</sup>	No, and no known or traceable contacts	Not tested	April 27 / Sept 9	1.3 <sup>±</sup>	>250	Yes	April 27	May 24
380 <sup>‡</sup>	Yes (Onset: Mid-May)	Positive May 10	May 7 / Sept 20	29.2	>250	Yes	April 20	Sept 27
465	No, and no known or traceable contacts	Not tested	April 30 / Sept 9	23.7	>250	Yes	April 20	May 20
610	Yes	Positive August 21	May 6 / Oct 26	135	30	No	-	-
717	Yes (Onset: September)	Negative	April 26 / Oct 29	23.2	>250	No	-	-
841	Yes	Positive Sept 14	April 9 / Sept 27	11.2	>250	Yes	April 9	May 27
933 <sup>±</sup>	No, and no known or traceable contacts	Not tested	April 26 / Sept 21	3.3 <sup>±</sup>	>250	Yes	April 23	May 21

425 Abbreviations: Anti-NCP, anti-nucleocapsid antibodies; Anti-S, anti-spike protein antibodies; NSP, nasopharyngeal swab testing (PCR in case of a positive  
426 result; antigen test or PCR in case of a negative result, self-reported results), COI, cut-off index.

427 <sup>1</sup> The first date is the date of sampling at the 3-month visit (seronegative); the second date is the date of sampling at the 6-month visit (seropositive).

428 <sup>2</sup> Results at the 6-month visit; results at the 3-month visit are not shown because they are seronegative.

429 <sup>‡</sup> COVID-19 disease between the first and second vaccination dose.

430 <sup>‡‡</sup> SARS-CoV-2 infection after the second possible vaccination dose (vaccine breakthrough infection).

431 <sup>±</sup> False-positive anti-NCP result possible or likely

432

433

434 **Figure legends**

435

436 **Figure 1:** Series of COVID-19 waves in the canton of Bern (Switzerland) since the onset of  
437 the pandemic and the time points of cross-sectional analysis of the PoliCOV-19 study. Figure  
438 obtained and adapted from open-source data, available at [https://covid-](https://covid-kennzahlen.apps.be.ch/#/de/cockpit)  
439 [kennzahlen.apps.be.ch/#/de/cockpit](https://covid-kennzahlen.apps.be.ch/#/de/cockpit) (last accessed Dec 29, 2021).

440

441 **Figure 2:** Cumulative proportion of vaccinated individuals in the police cohort  
442 who were vaccinated or recovered from COVID-19. The proportion of individuals with anti-  
443 S antibody titers  $>250$  U/mL likely represented the vaccinated group because it included  
444 responders and non-responders of questionnaires. The group with anti-S antibody titers of  $\geq 2$   
445 U/mL consisted of the proportions of both, individuals who were vaccinated and those who  
446 had recovered from COVID-19 irrespective of vaccination status. The timeline is biased by  
447 the time point of serum sampling and filling out questionnaires.

448

449 **Figure 3:** Calculated trend of anti-S antibody titer curve over time in vaccinated study  
450 participants. Each dot reflects the sampling time point. The dynamics of antibody titers over  
451 time are biased by the sampling time points.

452

**High Vaccination and Low SARS-CoV-2 Infection Rate in a Swiss Police Cohort During the Delta Wave.**

Parham Sendi,<sup>1\*</sup> Marc Thierstein,<sup>2</sup> Nadja Widmer,<sup>3</sup> Flora Babongo Bosombo,<sup>4</sup> Annina Elisabeth Büchi,<sup>5</sup> Dominik Güntensperger,<sup>4</sup> Manuel Raphael Blum,<sup>6,7</sup> Rossella Baldan,<sup>1</sup> Caroline Tinguely,<sup>3</sup> Brigitta Gahl,<sup>4</sup> Dik Heg,<sup>4</sup> Elitza S. Theel,<sup>8</sup> Elie Berbari,<sup>9</sup> Andrea Endimiani,<sup>1</sup> Peter Gowland,<sup>3</sup> Christoph Niederhauser<sup>1,3</sup> for the PoliCOV-19 study.

<sup>1</sup>Institute for Infectious Diseases, University of Bern, Bern, Switzerland.

<sup>2</sup>Division Operations, Cantonal Police Bern, Bern, Switzerland.

<sup>3</sup>Interregional Blood Transfusion Swiss Red Cross, Bern, Switzerland.

<sup>4</sup>CTU Bern, University of Bern, Bern, Switzerland.

<sup>5</sup>Department of Emergency Medicine, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland.

<sup>6</sup>Department of General Internal Medicine, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland.

<sup>7</sup>Institute of Primary Health Care (BIHAM), University of Bern, Bern, Switzerland.

<sup>8</sup>Division of Clinical Microbiology, Mayo Clinic, Rochester, Minnesota, USA.

<sup>9</sup>Division of Infectious Disease, Mayo Clinic, Rochester, MN, USA.

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**\*Correspondence:** Parham Sendi, MD, ORCID: 0000-0002-7347-6312

Institute for Infectious Diseases, University of Bern, Friedbühlstrasse 51, 3010, Bern,  
Switzerland.

[parham.sendi@ifik.unibe.ch](mailto:parham.sendi@ifik.unibe.ch)

Tel: +41 31 638 69 86; Fax: +41 31 638 67 86

## Content

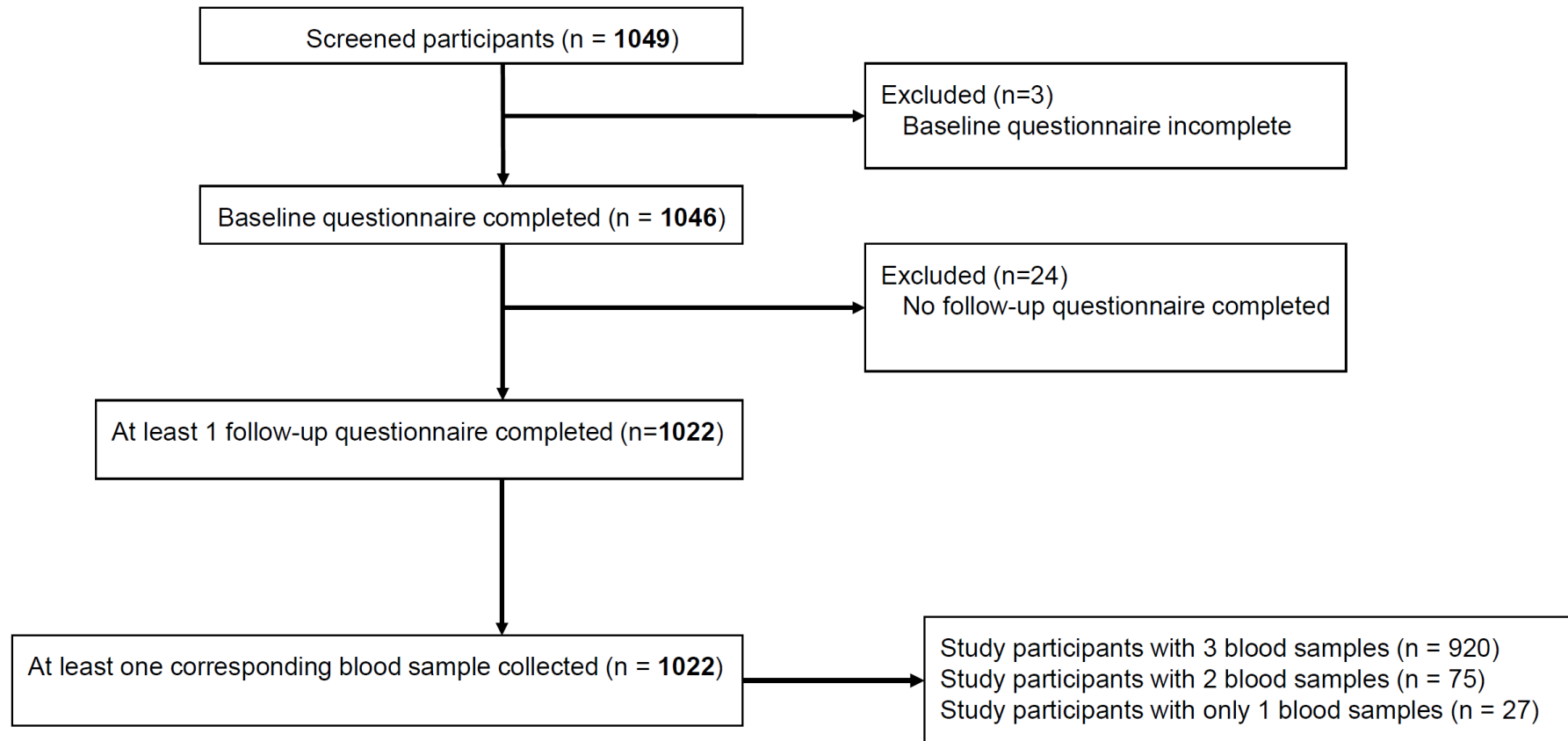
Page 3: **Appendices Figure S1:** The population involved in the PoliCOV-19 study has been published previously (Open Forum Infect Dis. 2021 Oct 16;8(12):ofab524. doi: 10.1093/ofid/ofab524), and included after 6 months 1022 study participants

Page 4: **Appendices Figure S2:** Anti-NCP antibody seroprevalence of the police cohort at baseline and 3- and 6-month visits, without correcting for paired samples, false positive or false negative results.

Page 5: **Appendices Figure S3-1:** Comparison of the SARS-CoV-2 infection rate between the police cohort and the general population of the canton of Bern. Comparisons between the infection rates at the 3-month and 6-month visits.

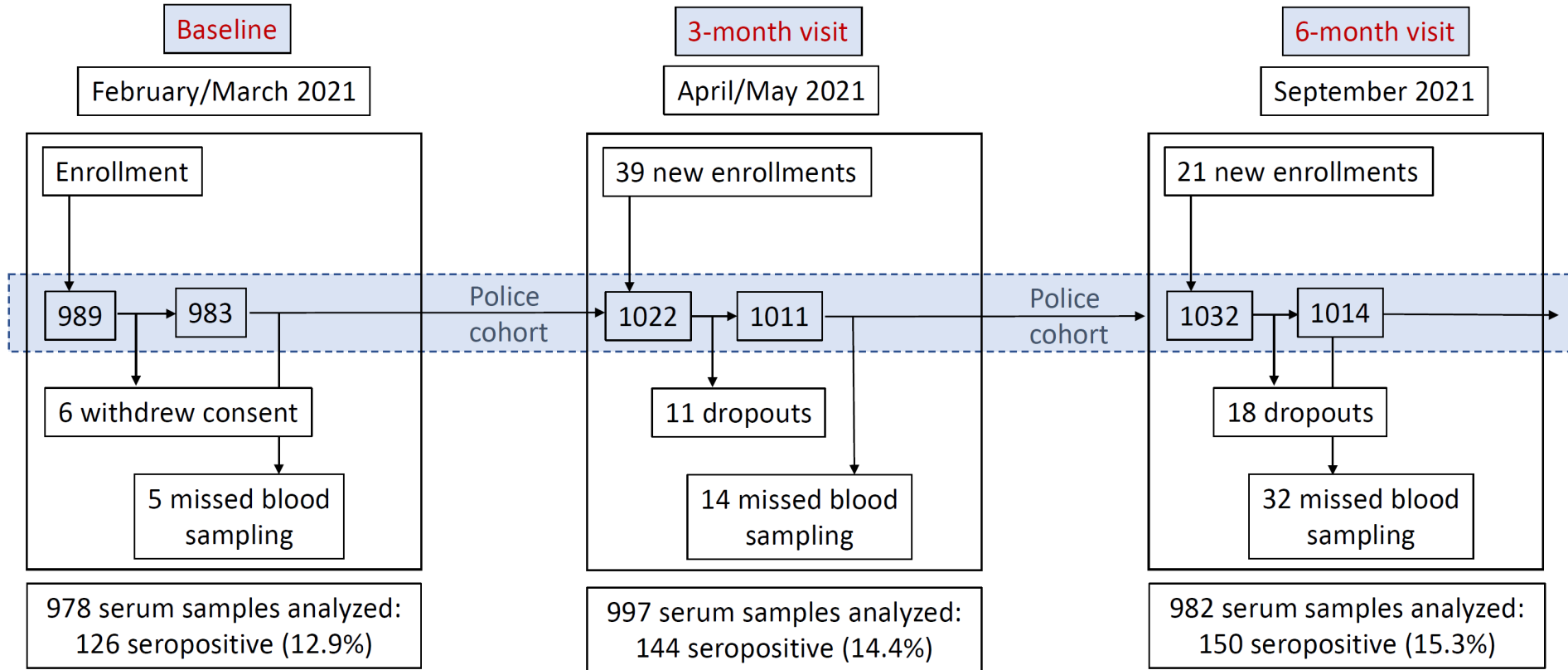
Page 6: **Appendices Figure S3-2:** Comparison of the SARS-CoV-2 infection rate between the police cohort and the general population of the canton of Bern over a time period of 6 months (i.e., from February to September 2021).

Page 7: **Supplementary Table S1:** Association of comorbidity and work-related factors with the infection rate:

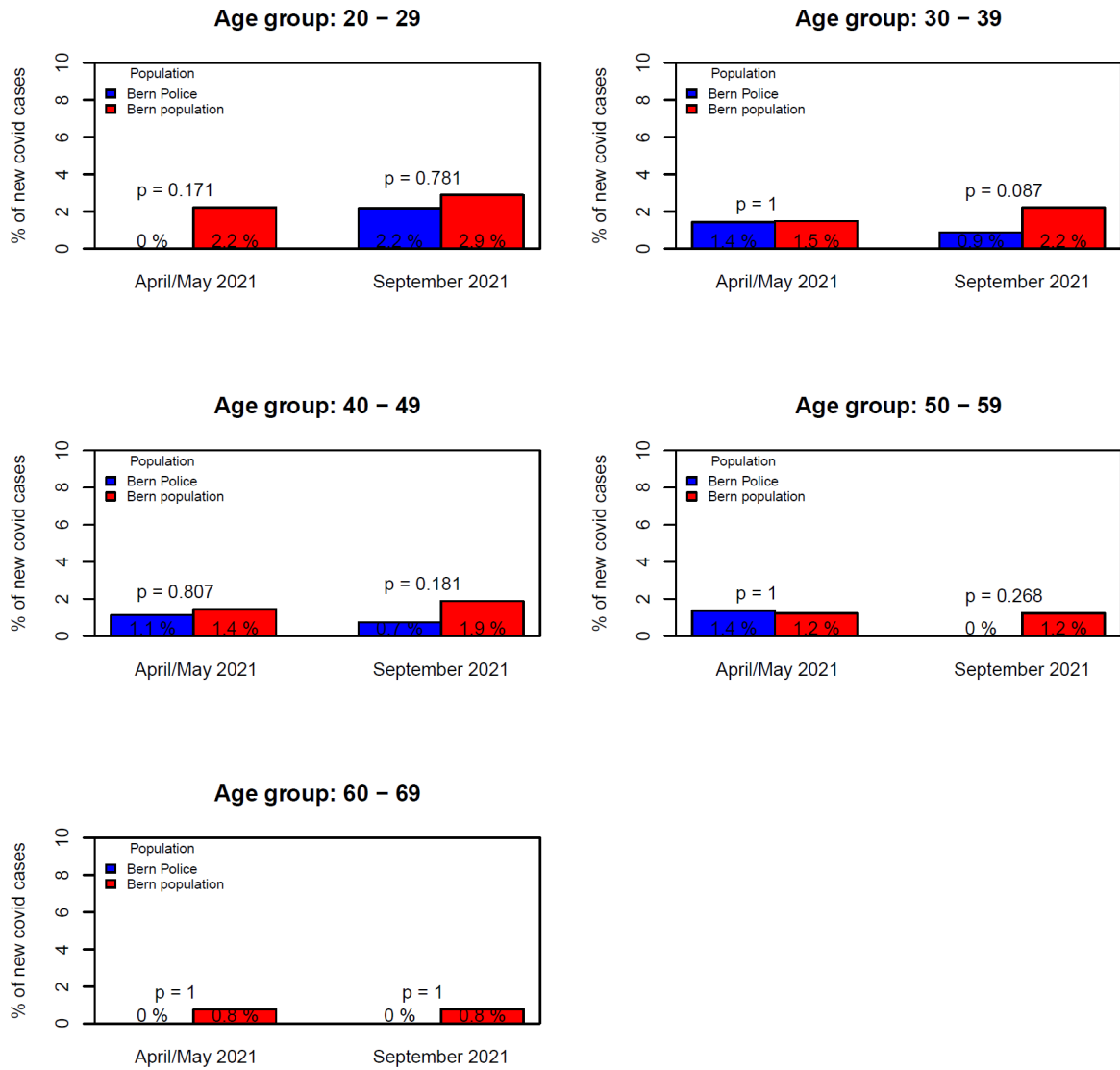


**Figure S1:** Number of individuals included in the cohort analysis between January/February and September 2021 (**n = 1022**)

**Appendices Figure S2** : Anti-NCP antibody seroprevalence of the police cohort at baseline and 3- and 6-month visits.

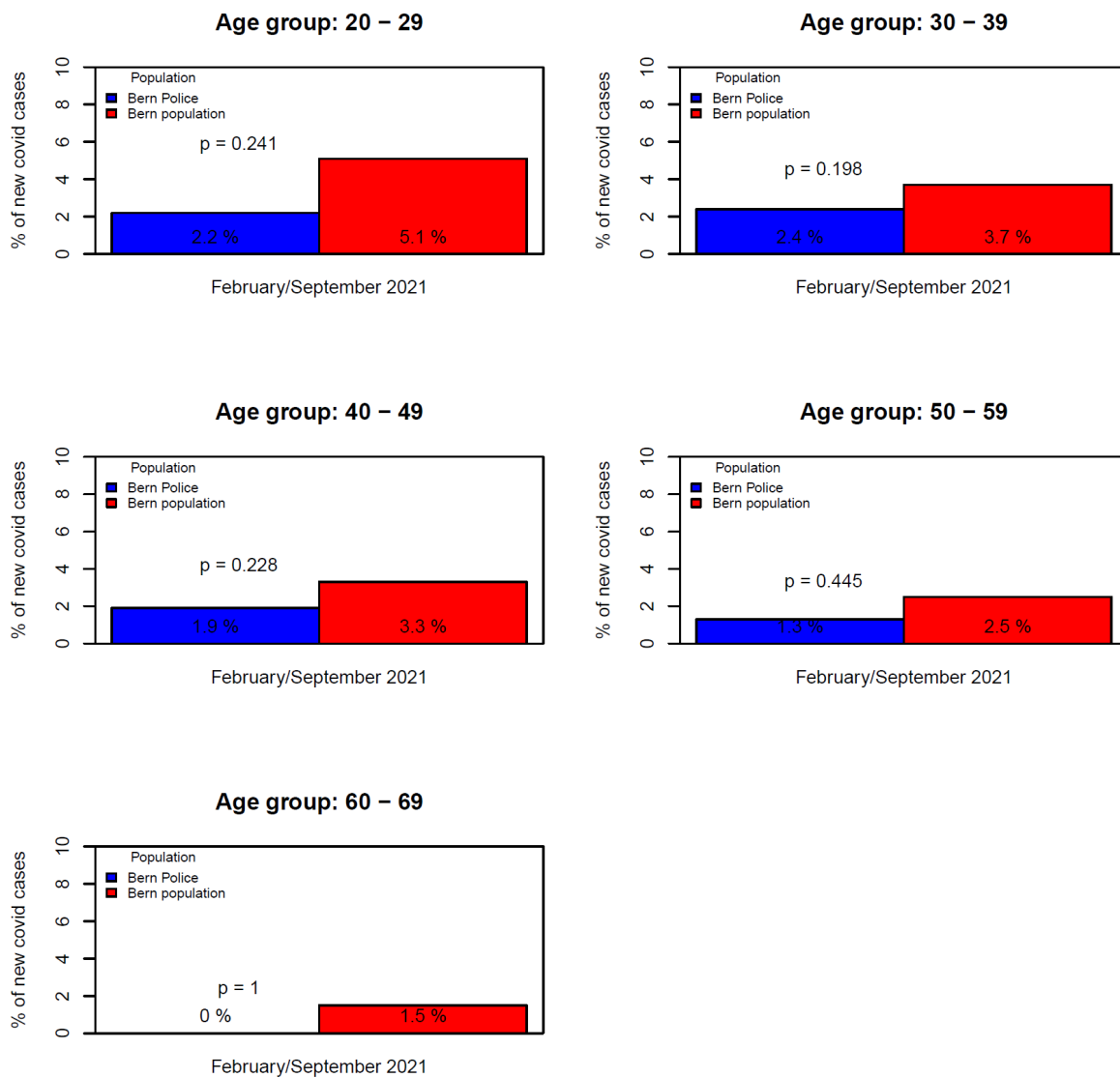


Anti-NCP antibody seroprevalence of the police cohort at the baseline, 3-month and 6 month-visits. Results are displayed without correcting for the sensitivity and specificity of the anti-NCP antibody assay (i.e.; unadjusted seroprevalence).



**Appendices Figure S3-1:** Comparison of the SARS-CoV-2 infection rate between the police cohort and the general population of the canton of Bern. Comparisons between the infection rates at the 3-month (April/May 2021) and 6-month visits (September 2021).





**Appendices Figure S3-2:** Comparison of the SARS-CoV-2 infection rate between the police cohort and the general population of the canton of Bern over a time period of 6 months (i.e., from February to September 2021).

**Appendices Table S1: Association of comorbidity and work-related factors with the infection rate:**

	<b>Comorbidity</b>					
	<b>Yes</b>			<b>No</b>		
<b>Age group</b>	beta	Odds ratio	p-value	beta	Odds ratio	p-value
<b>20 - 29</b>	ref			ref		
<b>30 - 39</b>	17.168	28578730	0.999	0.025	1.025	0.938
<b>40 - 49</b>	0	1	1	-0.161	0.851	0.629
<b>50 - 59</b>	18.131	74849054	0.999	-0.092	0.912	0.805
<b>60 - 69</b>	0	1	1	-0.297	0.743	0.788
<b>Intercept</b>	-19.566	0	0.999	-1.649	0.192	<0.001
	<b>Department</b>					
	<b>Regional police</b>			<b>Others</b>		
<b>Years of experience</b>	beta	Odds ratio	p-value	beta	Odds ratio	p-value
<b>0 - 9</b>	ref			ref		
<b>10 - 19</b>	-0.266	0.766	0.285	0.491	1.634	0.297
<b>20 - 29</b>	0.144	1.155	0.653	0.498	1.645	0.32
<b>&gt; 30</b>	0.175	1.191	0.739	-0.954	0.385	0.384
<b>Intercept</b>	-1.561	0.21	<0.001	-2.181	0.113	<0.001
	<b>Work region</b>					
	<b>Bern City, Region Bern</b>			<b>Bernese Oberland; Mittelland, Emmental, Oberaargau; Seeland, Bernese Jura</b>		
<b>Years of experience</b>	beta	Odds ratio	p-value	beta	Odds ratio	p-value
<b>0 - 9</b>	ref			ref		
<b>10 - 19</b>	-0.037	0.963	0.912	-0.167	0.846	0.541
<b>20 - 29</b>	0.229	1.257	0.54	0.094	1.098	0.791
<b>&gt; 30</b>	-0.436	0.647	0.576	-0.196	0.822	0.734
<b>Intercept</b>	-1.915	0.147	<0.001	-1.462	0.232	<0.001