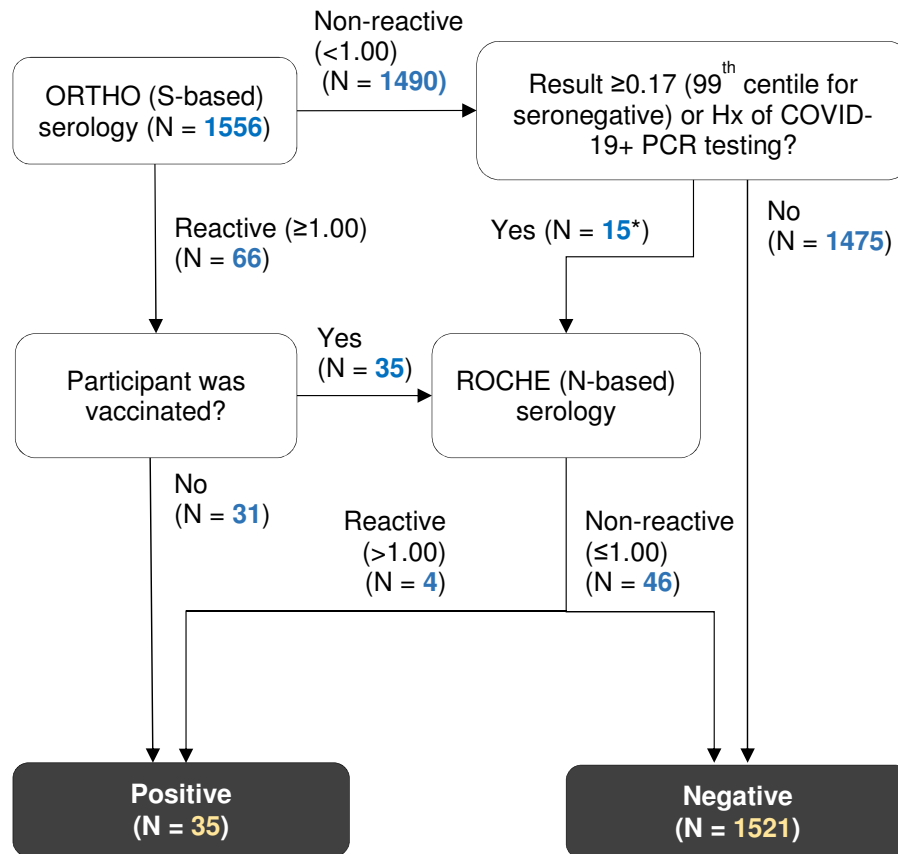
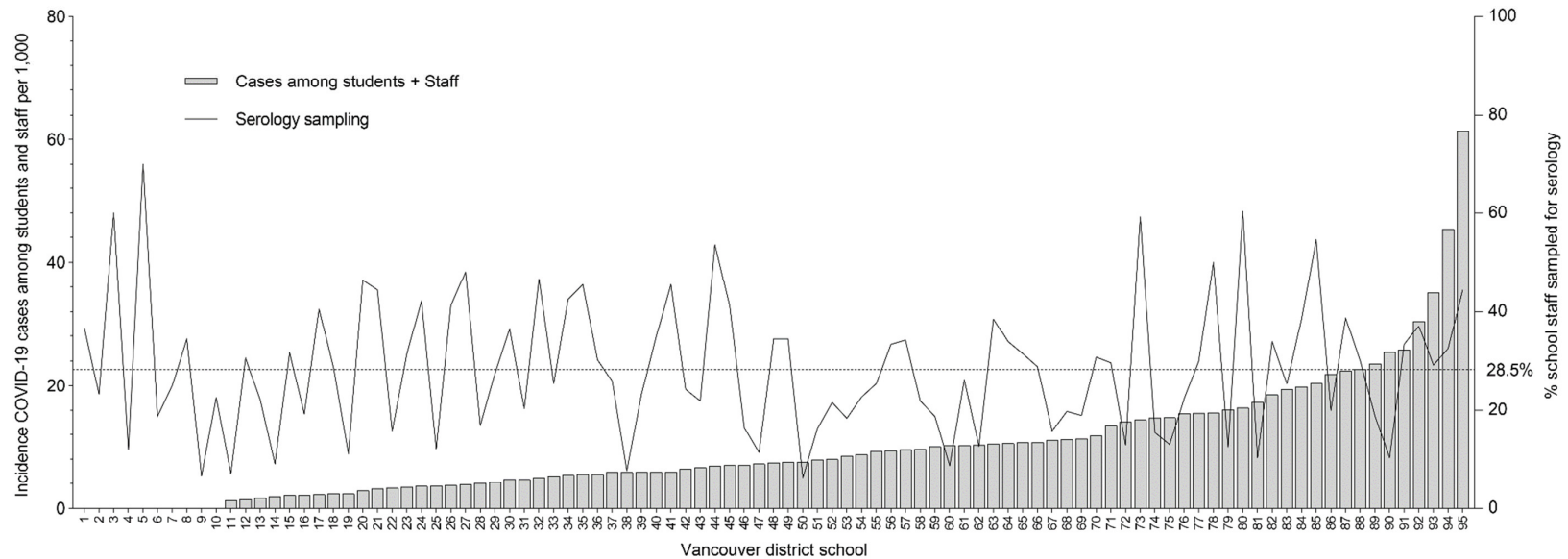


Supplemental Figure 1: Seroprevalence case assignment strategy

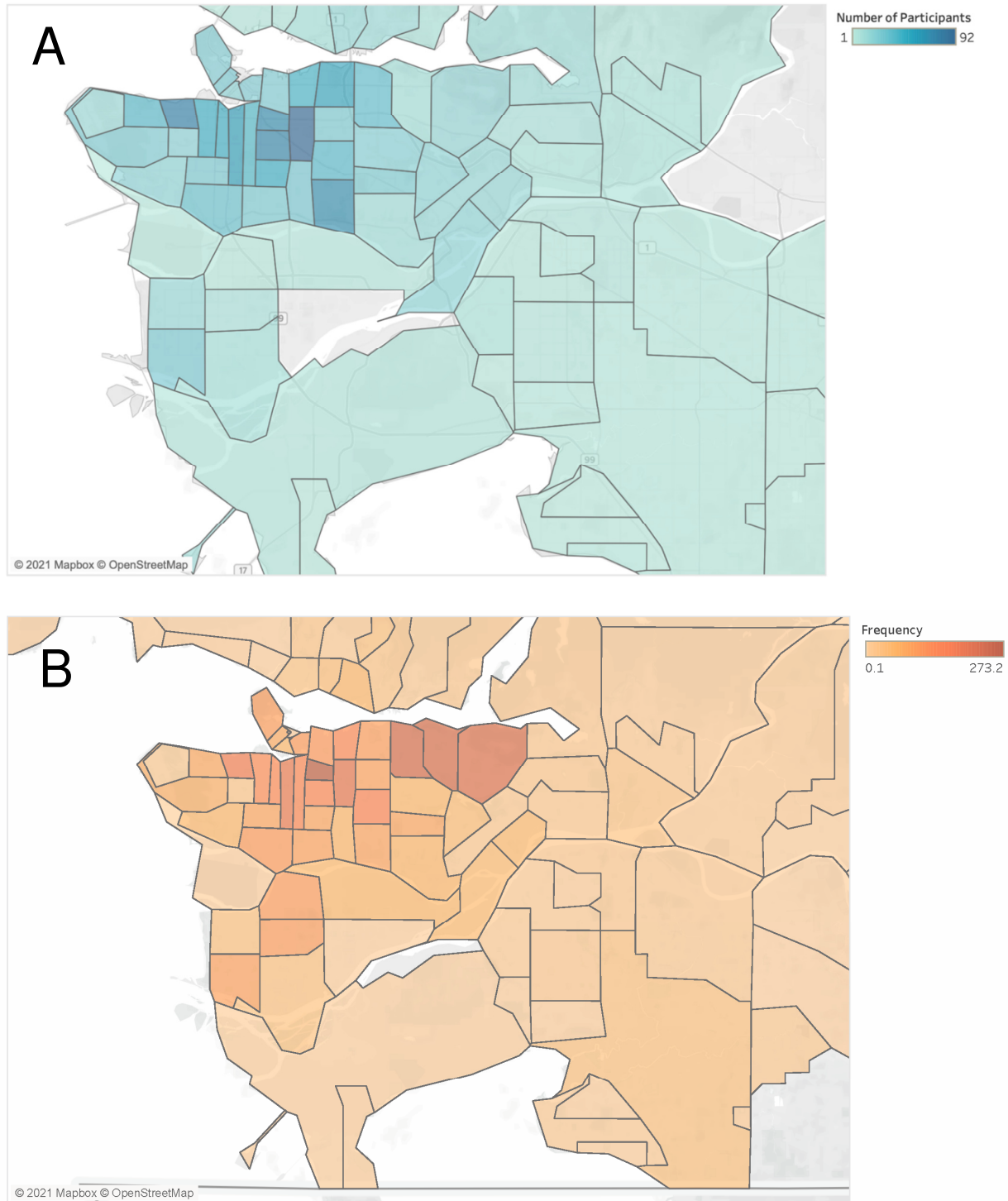
To distinguish between antibodies due to COVID-19 versus antibody responses to vaccination, a dual, stepwise serology testing strategy was employed, where more sensitive S-based testing (using ORTHO assay) was used in unvaccinated school staff who composed the majority of our study sample, and virus-specific N-based antibody testing (using Roche assay) was used in vaccinated school staff.

*One case reported PCR positive testing had subthreshold S-based serology reactivity of 0.39.

Supplemental Figure 2: Cumulative incidence of reported COVID-19 cases (based on Public Health data from Vancouver Coastal Health) in students (n = 47280 students) and staff (n = 7071) from September 8, 2020 to March 4, 2021, and the percentage of school staff sampled for serology, for each school of The District. Data exclude Vancouver Alternate Secondary Schools. Dotted line shows average percentage staff sampled for serology testing across all 95 schools in the District (28.5%).



Supplemental Figure 3: Geographical distribution of (A) the school staff sample with serology data (N = 1556) versus (B) the reference blood donor group (N = 5417) by areas of residency (based on first 3 postal code digits).



Map based on Longitude (generated) and Latitude (generated). Color shows sum of Frequency. Details are shown for FSA.

Supplemental Table 1: Reported positive viral testing among entire Vancouver School District staff

Reporting period	Classroom staff* N = 5091	Non-classroom staff** N = 1408	Other school staff*** N = 572	Overall N = 7071
Up to and including September 9 th , 2020	7	1	1	9
Between September 10 th 2020 and March 4 th 2021 inclusive (median date of completion of study questionnaires)	58	18	8	84
Between March 5 th 2020 and April 23 rd 2021	34	8	4	46

*Teachers, Teacher Librarians, Resource Teachers, Student Support Workers, Family and Youth Workers, and Counsellors, including staff who are on call for these positions.

**Principals/VPs, Office Administrative Assistants, Facilities Staff, Building Engineers, and Custodians, including staff who are on call for these positions.

***Food services, Supervision Aides, and District staff, including staff who are on call for these positions.

Supplemental Table 2: Distribution of school staff by occupation type and elementary/secondary schools, in study sample versus the entire District

Occupation, %	% Study sample (n=1689)	% District (n=7071)
Teacher (classroom teacher, teacher librarian, resource teacher)	61.0	53.4
Student Support Worker or Youth and Family Worker	17.1	20.0
Administration (Principal, Vice-principal, Administrative Assistant)	10.1	8.1
Other (maintenance staff, school district office staff, or other)	11.7	14.6

School type, %		
Elementary School	63.7	54.0
Secondary School	28.1	29.3
Other (e.g., mixed schools, district office)	8.3	16.7

Supplemental Table 3: Results of ORTHO (Spike-based) or ROCHE (N-based) serology testing, and according to self-reported viral PCR, for Spike-POSITIVE, **VACCINATED cases (n=35)**

Spike reactivity	Antibody detection			Self-reported COVID-19 PCR result?	Days between vaccine and serology	Final case assignment
	Spike (index)	N reactivity	N (index)			
R	4.8	NR	0.082	Not tested	16	Negative
R	73.6	NR	0.089	No	14	Negative
R	252	R	150.7	Yes	1	Positive
R	142	NR	0.088	No	24	Negative
R	69.9	R	99.09	Yes	20	Positive
R	31.1	NR	0.084	Not tested	20	Negative
R	279	NR	0.144	Not tested	15	Negative
R	27.8	NR	0.09	Not tested	15	Negative
R	13.7	NR	0.088	Not tested	56	Negative
R	47.3	NR	0.087	No	32	Negative
R	163	NR	0.089	Not reported	11	Negative
R	10.5	NR	0.091	No	2	Negative
R	2.64	NR	0.09	Not tested	17	Negative
R	15.3	NR	0.092	Not tested	16	Negative
R	285	NR	0.082	Not tested	16	Negative
R	7.95	NR	0.085	No	?	Negative
R	16.8	NR	0.086	Not tested	31	Negative
R	114	NR	0.087	Not tested	17	Negative
R	90	NR	0.082	Not tested	16	Negative
R	15.9	NR	0.096	Not tested	18	Negative
R	486	R	44.52	Yes	88	Positive
R	63.5	NR	0.09	Not tested	?	Negative
R	1.07	NR	0.093	No	14	Negative
R	3.78	NR	0.095	Not tested	20	Negative
R	20.5	NR	0.212	No	21	Negative
R	132	NR	0.088	No	57	Negative
R	20.7	NR	0.095	Not tested	20	Negative
R	147	NR	0.085	No	21	Negative
R	61.5	NR	0.093	Not tested	24	Negative
R	106	NR	0.096	Not tested	23	Negative
R	73.6	NR	0.091	Not tested	?	Negative
R	79.9	NR	0.094	No	35	Negative
R	2.47	NR	0.095	Not tested	16	Negative
R	9.71	NR	0.098	No	15	Negative
R	8.56	NR	0.094	Not tested	28	Negative

R: reactive; NR: non-reactive; the only 3 vaccinated staff that tested positive by both S- and N-based assays also reported a history of COVID-19 by positive PCR viral test (in red), and none of the vaccinated school staff who tested negative by the N-based serology assay reported a positive PCR viral test. All spike (S)- reactive cases were contacted by phone or email to confirm the date they received a COVID-19 vaccine between the date of survey completion and blood sampling. Three participants indicated that they had received a COVID-19 vaccine, but omitted to indicate the date in the questionnaire or email response.

Supplemental Table 4: Results of ORTHO (Spike-based) or ROCHE (N-based) serology testing, and according to self-reported viral PCR, for seropositive, **INFECTED cases (n=35)**

Spike reactivity	Antibody detection			Self-reported COVID-19 PCR result?	Time between PCR test and serology	Vaccinated? [days between vaccine and serology]
	Spike (index)	N reactivity	N (index)			
R	6.2	R	1.44	Yes	2 months	No
R	224	R	57.99	Not tested	-	No
R	129	R	5.99	Not tested	-	No
R	112	R	127	Yes	1.9 month	No
R	226	R	125.3	Yes	3.2 months	No
R	433	R	64.64	Not tested	-	No
R	270	R	166.7	Yes	2.5 months	No
R	8.73	NR	0.483	Yes	3 weeks	No
R	272	R	6.41	Yes	3 months	No
R	3.22	NR	0.074	Not tested	-	No
NR	0.39	R	8.61	Yes	11.25 months	No
R	445	R	2.84	No	-	No
R	242	R	1.99	Not tested	-	No
R	52.4	R	4.58	Yes	5.5 months	No
R	138	NR	0.564	Not tested	-	No
R	318	R	42.54	Not tested	-	No
R	2.27	R	117.6	Yes	2.75 months	No
R	562	R	28.92	Yes	~7 months	No
R	216	R	119.3	Yes	2.3 months	No
R	381	R	193.3	Not tested	-	No
R	142	R	11.03	Yes	1.5 month	No
R	331	R	3.54	Not tested	-	No
R	69.7	R	16.88	Not tested	-	No
R	252	R	150.7	Yes	2 months + 6 days	Yes [1]
R	69.9	R	99.09	Yes	4.25 months	Yes [20]
R	4.44	R	4.26	Not tested	-	No
R	45.1	R	4.22	Not tested	-	No
R	581	R	44.07	Yes	1 year + 2 weeks	No
R	503	R	45.95	Yes	6.75 months	No
R	10.3	R	1.01	Yes	2.75 months	No
R	211	R	130.5	Yes	1.84 month	No
R	310	R	80.05	Yes	4.5 months	No
R	224	R	15.64	Not tested	-	No
R	327	R	57.04	Yes	4 months + 2 days	No
R	486	R	44.52	Yes	3.75 months	Yes [8]

R: reactive; NR: non-reactive; One school staff who tested positive for COVID-19 by PCR viral test tested negative by serology ~5 months later both by S- and N-based assays. Another who reported a positive PCR test did not complete the serology testing.

SUPPLEMENTAL DATA: Weighted seroprevalence analysis in Canadian blood donors

Create weight according to month*fsa2*sex*agegroup distribution in study sample.

By removing samples without complete information, 1527 left in study sample, which made 104 groups. Samples from February were treated as January samples. There are data from 16407 samples from British Columbia blood donors, which made 410 groups.

The weighted analysis involved: 1526 school staff and 5417 blood donors.

School staff data				Entire school district		Blood donor data	
		N	%	N	%	Weighted N	Weighted %
Total		1526	100	6751*	99.73 [#]	5417	100.0
Month	1	267	17.5			947.8	17.50
	3	873	57.21			3099.0	57.21
	4	347	22.74			1231.8	22.74
	5	39	2.56			138.4	2.56

FSA2		N	%	N	%	Weighted N	Weighted %
	V0	5	0.33	35	0.52	17.7	0.33
	V1	1	0.07	15	0.22	3.5	0.07
	V2	4	0.26	67	0.99	14.2	0.26
	V3	108	7.08	796	11.79	383.4	7.08
	V4	28	1.83	232	3.44	99.4	1.83
	V5	788	51.64	3301	48.90	2797.2	51.64
	V6	463	30.34	1686	24.97	1643.6	30.34
	V7	128	8.39	561	8.31	454.4	8.39
	V8			24	0.36		
	V9	1	0.07	16	0.24	3.5	0.07

Sex		N	%
	F	1238	81.13
	M	288	18.87

4394.7	81.13
1022.3	18.87

Age		N	%
	17-24	11	0.72
	25-	431	28.24
	40-	967	63.37
	60-	117	7.67
Roche N	Negative		
	Positive		

39.0	0.72
1530.0	28.24
3432.7	63.37
415.3	7.67
5276.7	97.41
140.3	2.59 (95%CI: 2.17- 3.11)

* with data available; [#] 18 staff had a residency location outside the “V” postal code.

APPENDIX 1: COVID-19 mitigations measures in Vancouver schools (2020/21 school year)

Prior to reopening, the District implemented COVID-19 safety plans consistent with the British Columbia Centre for Disease Control (BCCDC) COVID-19 Public Health Guidance for K-12 School Settings: http://www.bccdc.ca/Health-Info-Site/Documents/COVID_public_guidance/Guidance-k-12-schools.pdf. and Provincial COVID-19 Health & Safety Guidelines for K-12 Settings: <https://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/safe-caring-orderly/k-12-covid-19-health-safety-guidelines.pdf> with support from Public Health.

COVID-19 safety plans included public health measures (e.g., protocols for testing and contact tracing), environmental measures (e.g., maximization of distance in classrooms, enhanced cleaning and disinfection, improved fresh air intake), administrative measures (e.g., staggered scheduling, assigning students and staff cohorts), personal measures (e.g., daily symptom checks, physical distancing, hand hygiene, respiratory etiquette), and personal protective equipment.

At the beginning of the school year (late August/September), parents were given the option of: 1) full time in-person schooling, 2) home schooling, 3) online learning and 4) a temporary online learning with return to full time schooling with re-entry dates offered later in fall and in January 2021.

During the entire school year, daily health assessments were required by all staff and students (via parents) prior to arriving at school and again upon arrival. Anyone with even minor symptoms of cold or flu-like illness was to stay home or go home if these symptoms developed mid-day. Classrooms and other spaces were arranged to maximize distance between students and staff. Class sizes were set by grades: 20 students / class for kindergarten; 22 for grades 1 to 3; 30 for grades 4 to 12. School staff and their students were assigned specific classrooms which were between 75 m² – 83 m² for elementary students (K to grade 7) and 75 m² – 80 m² for secondary students (grades 8 to 12) with larger spaces available for elective courses (e.g., physical education, food studies, metal, woodworking, automotive). In addition, secondary classrooms were divided into two separate groupings (AM and PM) of 15 students.

The plan also included revising school schedules and learning groups where students also had staggered recess and lunch breaks, and were assigned specific outside areas. Elementary students (K-7) received full day in-class instruction in their assigned learning groups/cohorts. Secondary students (grades 8 to 12) had both in-class instruction and remote learning and their schedules shifted to a quarter system with maximum two in-person classes a day with further instruction given remotely.

Ventilation measures included opening windows to promote fresh air flow to classrooms as well as indoor air ventilation improved with the HVAC systems running longer during the day, recirculating less air and the filters changed to higher efficiency (MERV13) filters.

Other measures included, the addition of hand sanitizer to classrooms and common areas, directional traffic flow within the school, provision of plexiglass as needed for certain staff roles, and the training of all staff on the safety plan and protocols. In addition to the regular daily cleaning by custodial staff, twice daily disinfection of all high touch frequency items was conducted. Shared items in classrooms were limited and the teachers, or if in secondary school, the students disinfected those used. Initially, masking was encouraged, but not required. Non-medical mask use was encouraged but not required early in the school year, and then in February 2021 masks were required for all staff and students in grades 6-12 in common spaces, and ultimately from April onward for students grades 4-12 at all times while indoors at school. This guidance did not apply if staff or students did not tolerate a mask for health or behavioural reasons. Masks remained recommended for K-3 students and were not required until October 4, 2021. Two reusable cloth masks were distributed to all staff and students in September 2020, and again in

January 2021. The vast majority of enrolled staff did not wear face shields. Face shields were made available to student support staff who work in close proximity to students with diverse needs and to first aid attendants.

SARS-CoV-2 nucleic acid amplification (PCR) was available for anyone with symptoms through the provincial health system, and advised for students or staff with fever or new symptoms which persisted for over 24 hours. Tests were generally processed within 24 hours, and positive tests were automatically reported to Public Health which investigated cases within 24 hours, and initiated contact tracing. Symptomatic close contacts were asked to seek testing; asymptomatic testing was not used to release contacts from isolation on an earlier timeline. All close contacts, including close contacts at school, were isolated for at least 14 full days. Entire classes were not isolated unless all members were identified as close contacts. School closures to control transmission were not required during the study period. Also, at the time, vaccination programs had not substantially reached working-age people until April 14, and the majority of school staff vaccinations occurred in May. Last day of classes was June 29th, 2021 and June 30th was the last day for staff (administrative day).