Supplementary material

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Supplementary Information File 1. The distribution of SARS-CoV-2 variants in Europe during the six pandemic waves recorded in Serbia, March 6, 2020-January 31, 2022. (Nextstrain naming was used).

1. **First pandemic wave** (March 6-June 1, 2020): 19A, 19B, 20A, 20B, 20C, 20D.
2. **Second pandemic wave** (June 2-October 6, 2020): 19B, 20A, 20B, 20C, 20D, 20E (EU1).
3. **Third pandemic wave** (October 7, 2020-January 31, 2021): 19B, 20A, 20B, 20C, 20D, 20E (EU1), 20H (Beta, V2), 20I (Alpha, V1), 21C (Epsilon), 21D (Eta).
4. **Fourth pandemic wave** (February 1-July 23, 2021): 19B, 20A, 20B, 20C, 20D, 20E (EU1), 20H (Beta, V2), 20I (Alpha, V1), 20J (Gamma, V3), 21A (Delta), 21I (Delta), 21J (Delta), 21B (Kappa), 21D (Eta), 21G (Lambda).
5. **Fifth pandemic wave** (July 24-December 31, 2021): 19B, 20A, 20B, 20C, 20E (EU1), 20I (Alpha, V1), 20J (Gamma, V3), 21A (Delta), 21I (Delta), 21J (Delta), 21H (Mu), 21K (Omicron), 21L (Omicron).
6. **Sixth pandemic wave** (January-February 2022): 21I (Delta), 21J (Delta), 21K (Omicron), 21L (Omicron).

Supplementary Table 1. SARS-CoV-2 tests performed by assay type in Vojvodina, Serbia, March 6, 2020-January 31, 2022.

	Months	RT-PCR tests		Ag-RDTs		Overall tests	
		n	%	n	%	n	%
2020	**March-June**	22,321	7.35	0	0	22,321	1.40
	July-September	26,880	8.85	0	0	26,880	1.69
	October-December	45,538	15.00	166,256	12.92	211,794	13.32
	Total	**94,739**	-	**166,256**	-	**260,995**	-
2021	**January-March**	39,831	13.11	244,117	18.98	283,948	17.86
	April-June	34,015	11.20	142,940	11.11	176,955	11.13
	July-September	28,244	9.30	173,287	13.47	201,531	12.67
	October-December	74,240	24.45	337,368	26.23	411,608	25.89
	Total	**176,330**	-	**897,712**	-	**1,074,042**	-
2022	**January**	32,623	10.74	222,418	17.29	255,041	16.04
	Total	**303,692**	**100**	**1,286,386**	**100**	**1,590,078**	**100**

Supplementary Table 2. Characteristics of patients with death outcome caused by SARS CoV-2 reinfections, in Vojvodina, Serbia, March 6, 2020 - January 31,2022.

Gender	Age at reinfection (years)	Time between first infection and death (days)	Disease severity		Hospitalization		Pandemic wave[*]	
			First infection	Reinfection	First infection	Reinfection	First infection	Reinfection
Female	75	426	severe	critical	yes	yes	2	5
Female	51	127	critical	critical	yes	yes	2	3
Male	67	553	severe	severe	yes	yes	2	6
Male	45	110	severe	critical	yes	yes	3	4
Male	73	371	severe	critical	yes	yes	3	5
Male	83	406	mild	severe	no	yes	3	6
Male	60	367	severe	severe	yes	yes	3	5
Female	62	352	severe	severe	yes	yes	3	5
Male	75	106	severe	severe	yes	yes	3	4
Female	72	266	severe	severe	yes	yes	3	5
Male	88	227	mild	severe	no	yes	4	5
Female	37	219	mild	severe	no	yes	4	5
Female	66	191	mild	severe	no	yes	4	5
Male	47	279	mild	severe	no	yes	4	5
Female	58	269	severe	severe	yes	yes	4	5
Male	65	186	severe	severe	yes	yes	4	5
Female	64	280	mild	severe	no	no	4	6
Male	87	264	mild	severe	no	yes	4	6
Male	40	258	critical	critical	yes	yes	4	6
Male	73	91	mild	severe	no	yes	5	6

* Duration of pandemic waves: Second wave (June 2-October 6, 2020); Third wave (October 7, 2020-January 31, 2021); Fourth wave (February 1-July 23, 2021); Fifth wave (July 24-December 31, 2021); Sixth wave (January-February 2022).

Supplementary Table 3. Characteristics of patients with three consecutive SARS-CoV-2 infections in Vojvodina, Serbia, March 6, 2020-January 31, 2022.

Characteristics	Thrice infected with SARS-CoV-2	
	n	%
Age (years)		
0-9	0	0.0
10-19	1	2.9
20-29	6	17.7
30-39	8	23.5
40-49	8	23.5
50-59	8	23.5
$\geq$60	3	8.9
Gender		
Male	11	32.3
Female	23	67.7
Severity		
Mild	34	100.0
Profession		
HCWs[a]	9	26.5
Non-HCWs[b]	25	73.5
Number of comorbidities		
0	33	97.1
1	1	2.9
Vaccination status		
Unvaccinated	19	55.9
Partially vaccinated	8	23.5
Fully vaccinated	4	11.8
Boosted	3	8.8
Total	**34**	**100.0**

[a] Health-care-workers (HCWs); [b] other occupations except HCWs.

Supplementary Table 4. Characteristics of study cases (reinfected with SARS-CoV-2) and control participants (who were not reinfected) in Vojvodina, Serbia, January 1, 2021–January 31, 2022.

Characteristic	Study cases [a] (n=7,071)		Controls (n=14,142)	
	n	**%**	**n**	**%**
Age group (years)				
18-29	1,108	15.7	2,293	16.2
30-39	2,036	28.8	3,873	27.4
40-49	1,855	26.2	3,712	26.2
50-59	1,259	17.8	2,552	18.0
60-69	586	8.3	1,261	8.9
70-79	179	2.5	354	2.5
≥80	48	0.7	97	0.7
Gender				
Male	3,057	43.2	6,114	43.2
Female	4,014	56.8	8,028	56.8
Occupation				
Healthcare workers (HCWs)	1,021	14.4	1,510	10.7
Non-HCWs[b]	6,050	85.6	12,632	89.3
Number of comorbidities				
0	5,715	80.8	10,951	77.4
1	1,071	15.1	2,476	17.5
2	225	3.2	555	3.9
≥3	60	0.8	160	1.1
Month of initial infection in 2020				
March	0	0.0	0	0.0
April	13	0.2	26	0.2
May	2	0.0	1	0.0
June	44	0.6	93	0.7
July	268	3.8	534	3.8
August	86	1.2	173	1.2
September	23	0.3	41	0.3
October	170	2.4	352	2.5
November	3,198	45.2	6852	48.5
December	3,267	46.2	6070	42.9

[a] Each individual study case was matched to a control appropriate for age (±3 years), gender, and date of testing (±10 days).
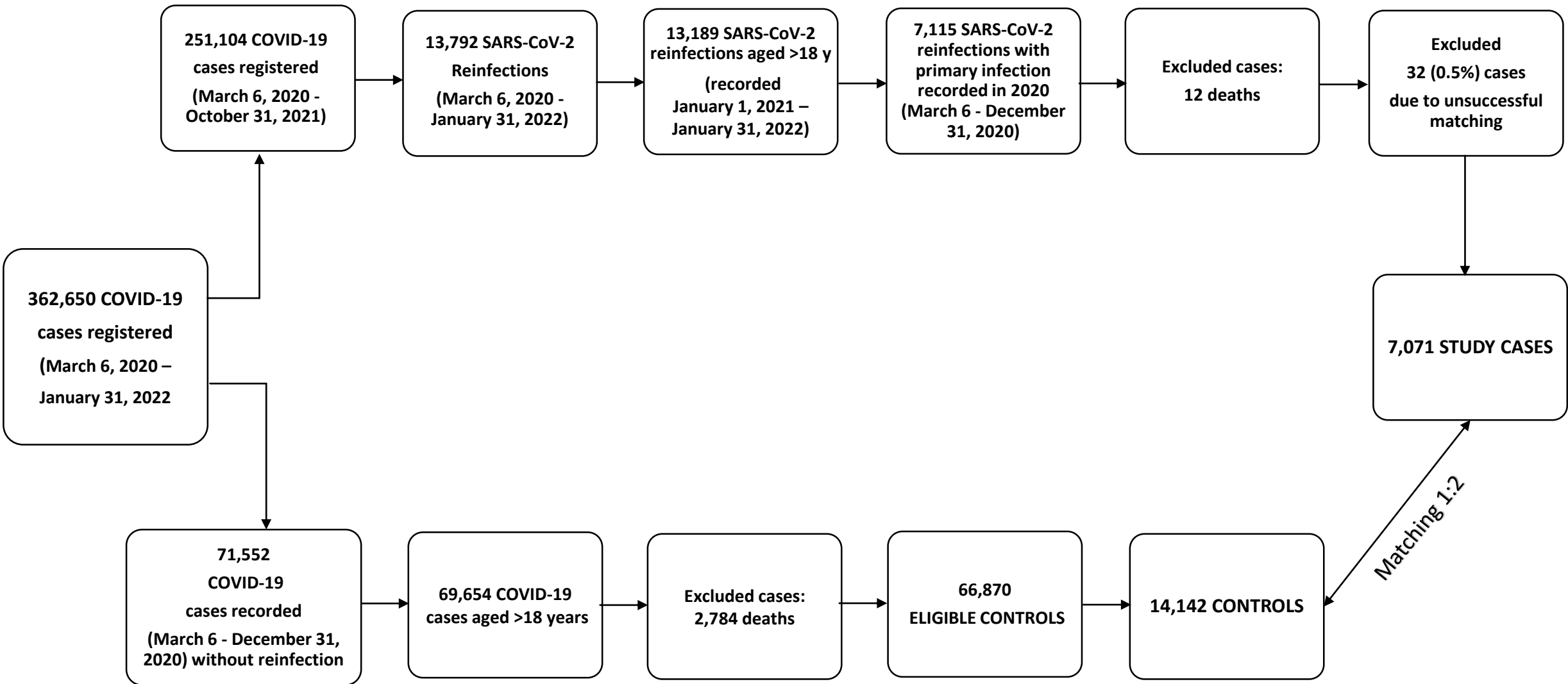[b] Non-HCWs included professions that provide various services (e.g. caregivers, waiters), other employment categories as well as retired individuals.

Supplementary Table 5. Association of SARS-CoV-2 reinfection with COVID-19 vaccination status of study cases and controls, Vojvodina, Serbia, January 1, 2021-January 31, 2022.

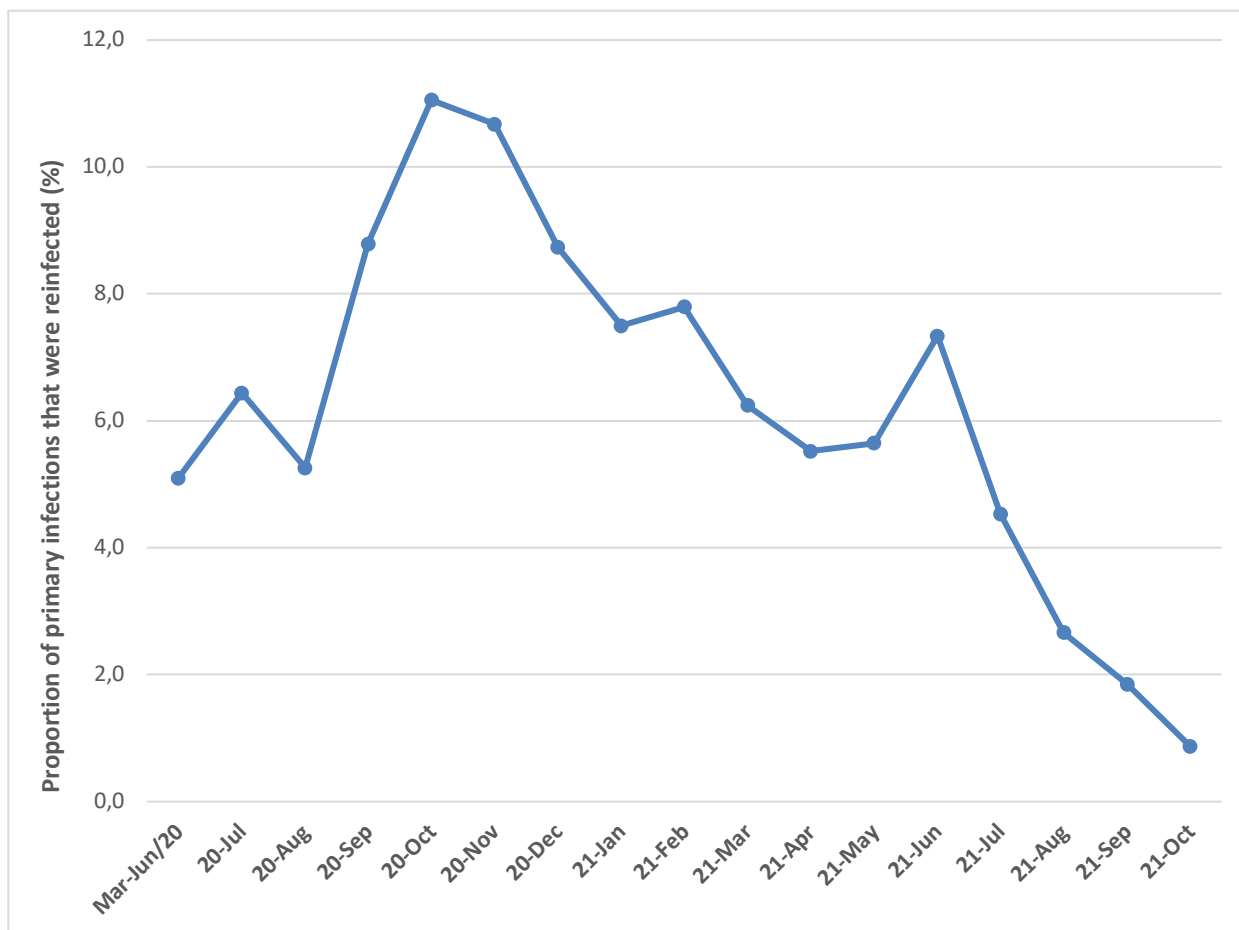| Vaccination status	Study cases (n=7,071) n (%)	Controls (n=14,142) n (%)	OR* (95% CI)#	p-value
Unvaccinated	3,667 (51.9)	7,326 (51.8)	1.23 (1.14, 1.33)	<0.001
Incompletely vaccinated	148 (2.1)	276 (2.0)	1.33 (1.08, 1.64)	0.008
Fully vaccinated	1,747 (24.7)	2,874 (20.3)	1.50 (1.37, 1.63)	<0.001
Boosted	1,509 (21.3)	3,666 (25.9)	Reference group	

*OR: odds ratio; CI: confidence interval.

ORs >1 mean that there are greater odds for reinfection in exposed (unvaccinated, incompletely, and fully vaccinated) groups compared to the reference (boosted) group.
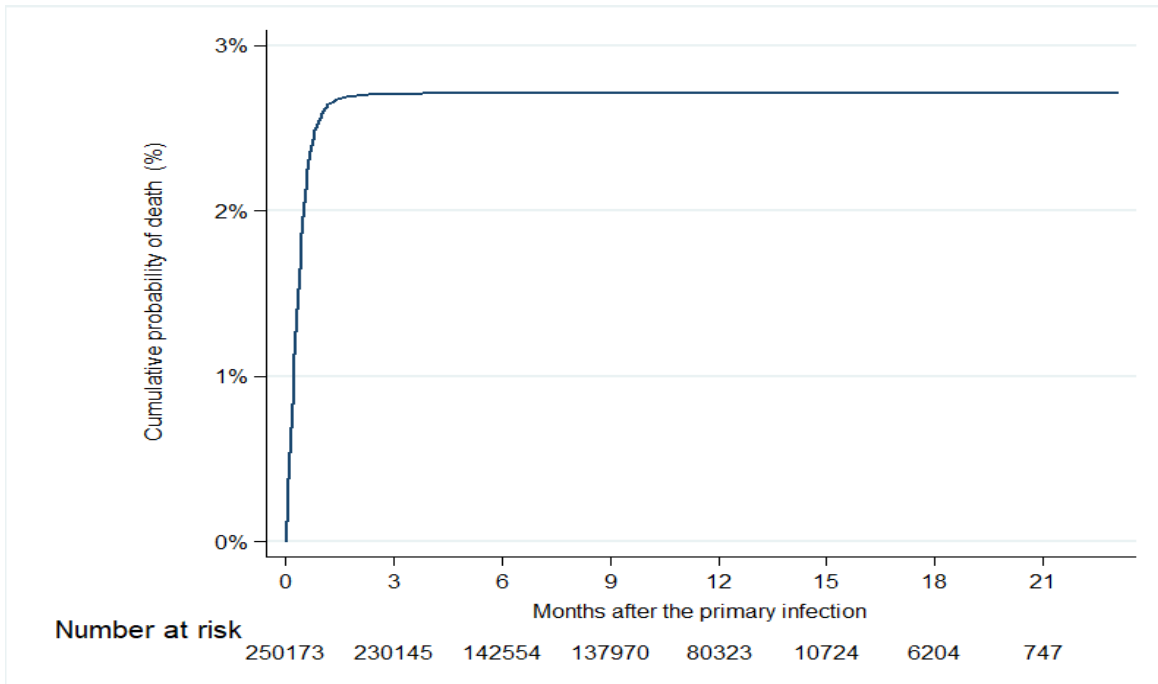
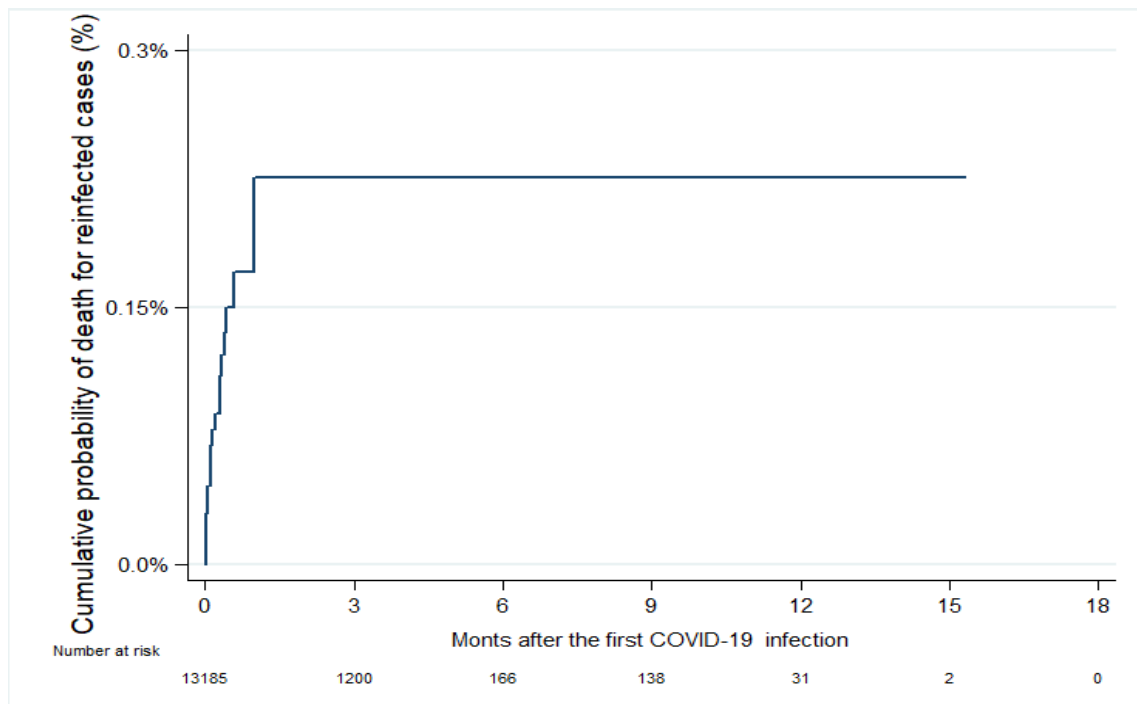Supplementary Figure 1. Flow chart summarizing the study design.

Supplementary Figure 2. The proportion of primary infections that were reinfected in Vojvodina, Serbia, March 6, 2020-October 31, 2021. The Cochran–Armitage test was applied.

(A)

(B)

Supplementary Figure 3. Kaplan-Meier curve showing the cumulative probability of death in the overall cohort (A) and for the patients with reinfection (B) in Vojvodina, Serbia, March 2020-January 2022.