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Country-wide seroepidemiological study on the spread of SARS-CoV-2. Estonian experience

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The study on the prevalence of the coronavirus in Estonia

- Head of the study: Ruth Kalda, Professor of Family Medicine, University of Tartu
- Principal investigator: Mikk Jürisson, Professor of Family Medicine and Public Health, University of Tartu
- Started on 23rd of April 2020
- Cross-sectional, country-wide, random statistical sampling
- Questionnaire (behavioral study), PCR-test (nasopharyngeal swab), antibody testing (since February 2021)
- Each survey wave lasts for two weeks
- The prevalence is determined among both the symptomatic and asymptomatic population
- The participation in the study is voluntary

Seroprevalence study. Timeline and results.

	Tested	Grown-ups with antibodies	Weighted share of grown-ups with antibodies (confidence limits 95%)	The amount of grown-ups with antibodies (confidence limits 95%)
29. wave 15.09–26.09 2022	2184	2091	91.6% (90,4% - 92,8%)	982 300 (969 000– 994 400)
28. wave 17.08–29.08 2022	2431	2320	88.4% (85,4% - 91,3%)	947 700 (915 900– 978 400)
27. wave 01.06–13.06 2022	2439	2306	87.5% (84,9% - 89,9%)	937 500 (910 200– 963 800)
26. wave 27.04–09.05 2022	2228	2116	86.5% (83,2% - 89,6%)	926 800 (892 300– 960 300)
25. wave 30.03–11.04 2022	2304	2193	87.1% (84,7% - 89,4%)	933 900 (908 300– 958 500)
24. wave 09.03–21.03 2022	2308	2188	89.1% (87,4% - 90,8%)	955 300 (936 400– 973 100)
23. wave 11.01–24.01 2022	2301	2113	82.8% (80% - 85,4%)	887 300 (857 900– 915 800)
22. wave 01.12–13.12 2021	2290	2103	81.5% (78.1% - 84,8%)	873 800 (837 500– 909 100)
21. wave 13.10–25.10 2021	2312	2000	76.4% (74.3% - 78,4%)	819 000 (769 400– 840 800)
20. wave 15.09–27.09 2021	2302	2035	76.7% (74.91% - 78,40%)	822 100 (803 000– 840 500)
18. wave 10.06–21.06 2021	2330	1900	67.9% (65.96% - 69.79%)	727 800 (707 000– 748 100)
17. wave 13.05–24.05 2021	2290	1369	49.52%* (47.45% - 51.59%)	530 800 (508 600– 553 000)
16. wave 08.04–19.04 2021	2491	1057	35.87% (33.97% - 37.79%)	384 500 (364 300– 405 100)
15. wave 11.03–22.03 2021	2382	534	21.41% (19.78% - 23.11%)	229 500 (212 000– 247 800)
14. wave 11.02–22.02 2021	2626	316	11.49% (10.29%–12.77%)	122 900 (110 100–136 600)

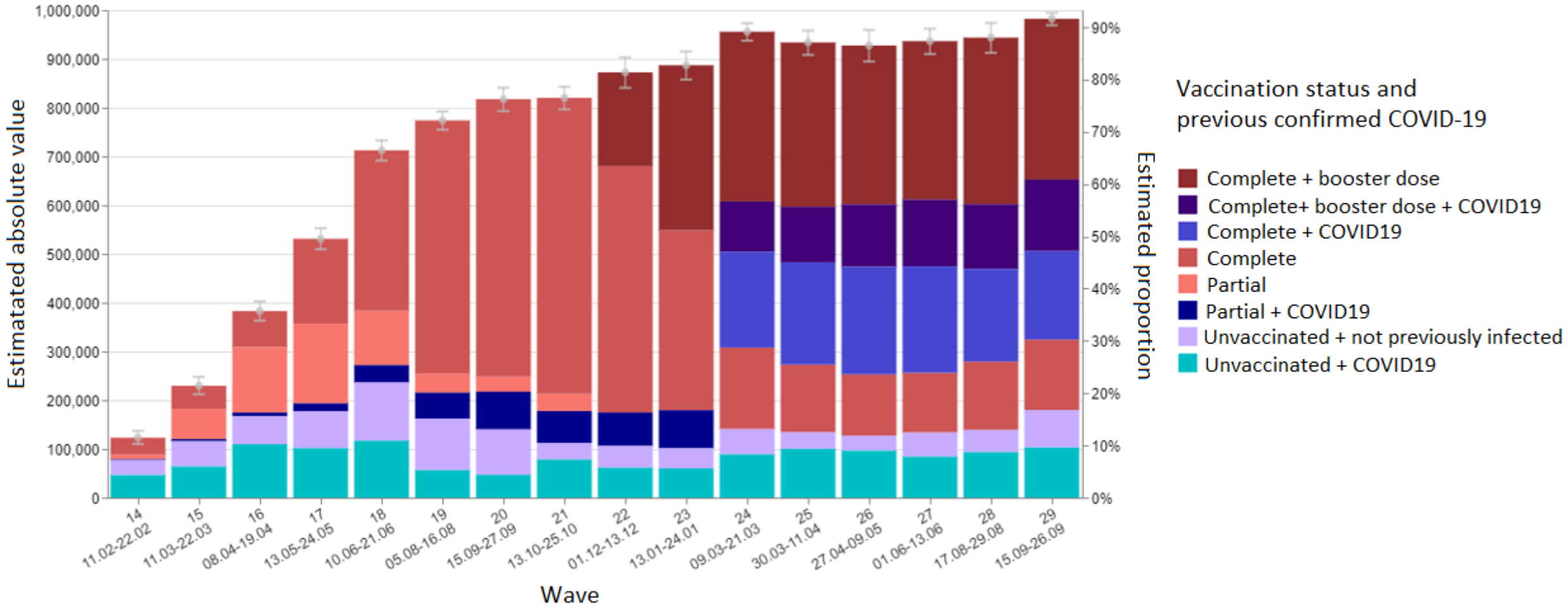
- During February 2021 – September 2022 overall seroprevalence increased from 11.5% to 91.6%

Response rate, participants' education profile and testing rate (round 29)

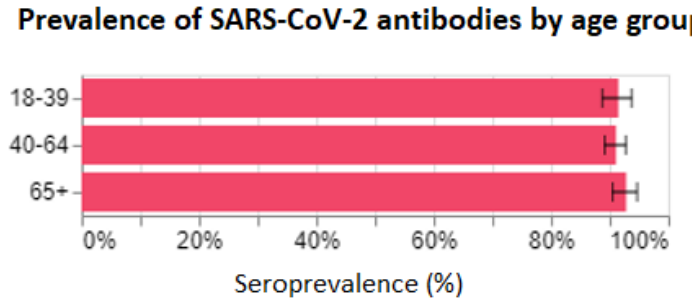
Participants' education profile % (>18 a.)		Education profile by the survey round			Testing rate during the 29th round
		27	28	29	
Primary school	2.4	1.9	1.3	2.3	59.7
Basic school	10.6	12.4	7.5	9.0	56.9
Secondary school	22	21.5	20.7	21.1	84.2
Vocational education	27	20.3	23.3	23.1	85.5
Higher education	37.1	41.2	43.8	41.5	89.6
Total					84.0

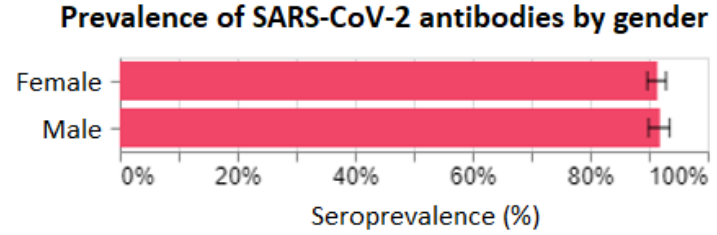
- Response rate: 8%
- There is a correlation between the participants' education profile and response rate. Highly educated individuals are more likely to participate in survey than low-educated individuals.

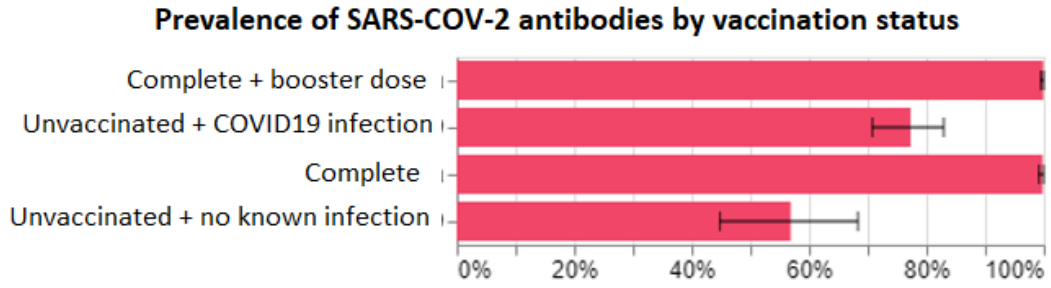
Estimation of SARS-CoV-2 antibody prevalence

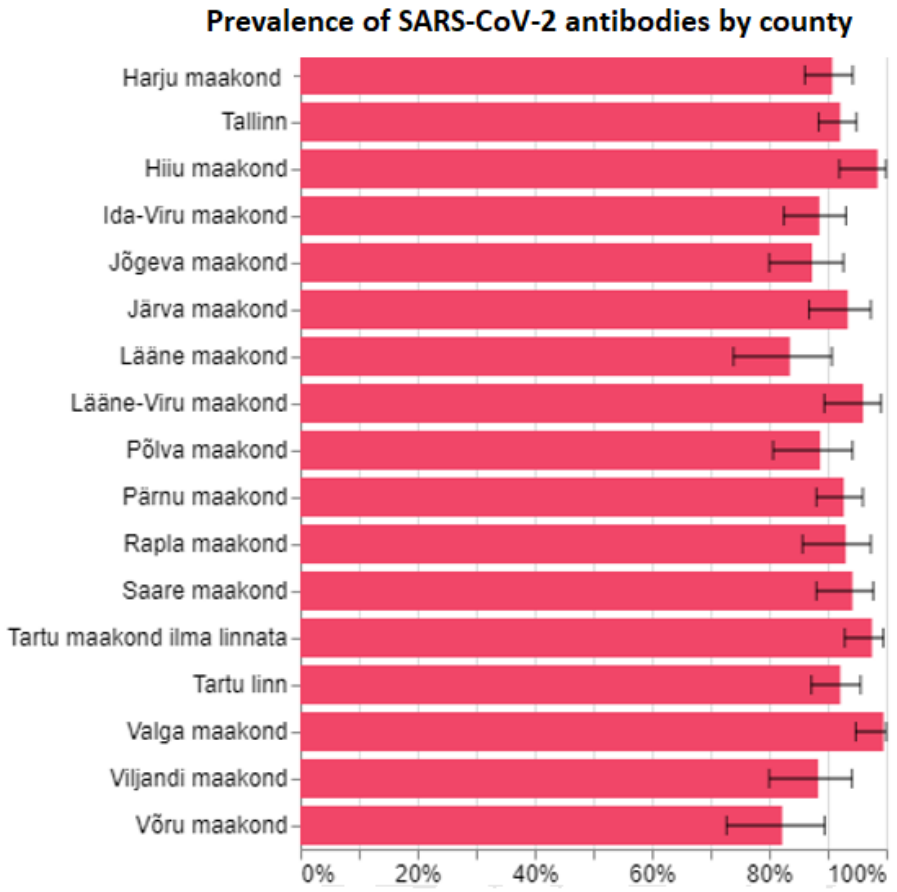


Prevalence of SARS-CoV-2 antibodies









Results and conclusions of a recently ended round of the prevalence study

- The prevalence of SARS-CoV-2 infection is ~5%.
  - Each one out of 20 persons is PCR positive
  - Each one out of 30 is expected to be contagious (70% have mild or moderate symptoms)
- The lowest prevalence 1,9% - among those with hybrid immunity.
- ~92% of adult population have SARS-CoV-2 antibodies.
  - ~100% of fully vaccinated people had detectable antibodies
  - 77% - unvaccinated, infected people
  - 57% - unvaccinated people with no known infection
- Planning to get a booster dose:
  - ~50% of 65+ participants
  - ~25% of age groups 18-39 and 43-64

Strengths and limitations

- Strengths:
  - based on a nationally representative sample
  - helps to follow the change of the number of people infected and to monitor population immunity over time
  - helps decision makers to implement measures, to evaluate and update the vaccination program etc.
- Limitations:
  - Lack of funding
  - Lack of human resources

Future plans

- Ongoing discussion:
  - to continue COVID-19 prevalence (incl. seroprevalence) study in 2023
  - to design Influenza seroprevalence study
- Challenges:
  - funding
  - human resources

Research team:

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- Deniss Vender (rahvatervishoiu magistrant)
- Tiina Mändla (rahvatervishoiu magister)
- Silver Ratnik (arstiteaduse üliõpilane)

Partners:

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- OÜ Medicum Eriarstiabi
- SYNLAB Eesti OÜ