COVID-19 in Hungary H-UNCOVER

HUNgarian COronaVirus disease-19 Epidemiological Research
Nationwide representative epidemiological survey

Béla Merkely:

On behalf of the Clinical Epidemiology Analysis Working Group

Medical universities are the sentinels of the Nation

Webinar COVID-19: Biomedical, Social and Legal Aspects
A joint event organised by UNICA members Eötvös Loránd University and Semmelweis University

8th October 2020

250 years of EXCELLENCE
in medical education,
research & innovation and
healthcare

Semmelweis University
http://semmelweis.hu/
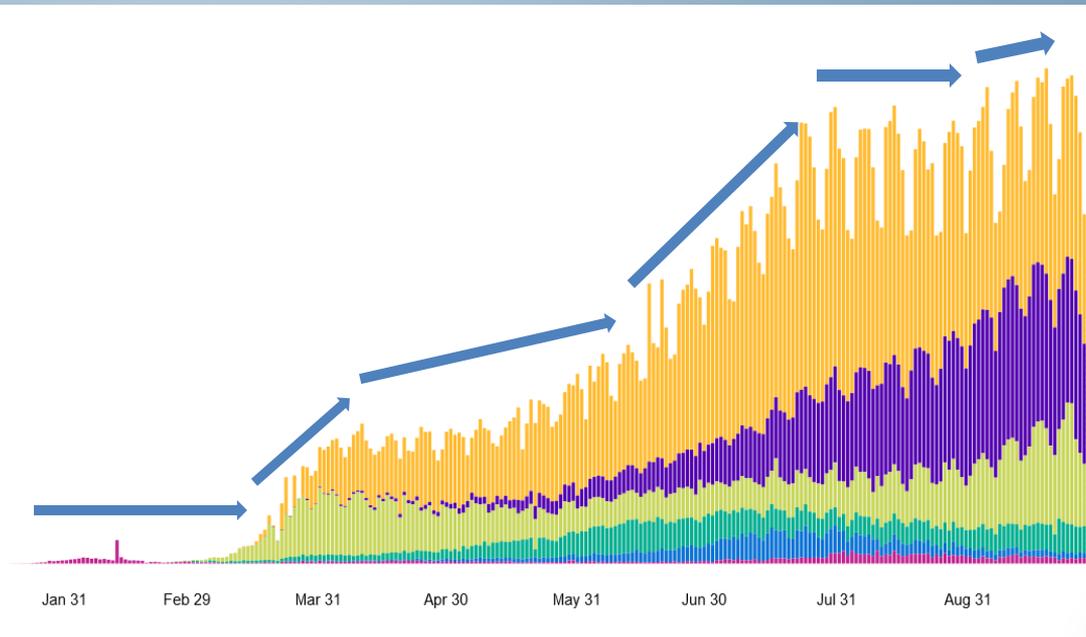
Prof. Béla Merkely, Rector

The spread of COVID-19 pandemic is still high

In the US the pandemic reached a plateau, in Europe and South-East Asia the number of new cases is still increasing


On 30th September 2020 the number of reported cases worldwide reached 33.502.430, and the number of reported deaths was 1.004.421. In every 4 days the number of reported cases has been increasing with 1 millions since 19th July (at that time the reported case number was 14 millions).

Forrás: https://covid19.who.int/

# The characteristics of the epidemic: the reproduction number (R)

- if R > 1 (which means that 1 infected person plagues in general more than 1 further person)

- if R ≈ 1 (which means that 1 infected person plagues in general 1 further person)

- if R < 1 (which means that 1 infected person plagues in general less than 1 further person)

▶ Epidemic

▶ Stagnation

▶ Eradication
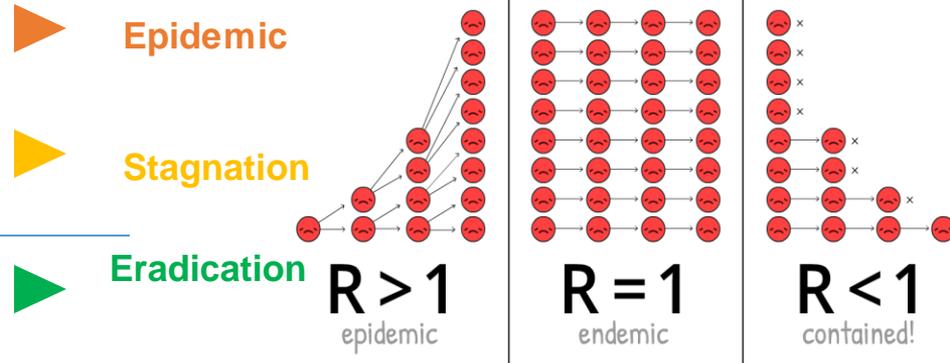
$R=$
(daily contact numbers) *
(probability of the transmission of the infections)*
(proportion of responsivity in the population)*
(length of virulent period)

- **16 March (Hungary):** „If contact reduction was the only measure, then, in order **to control the epidemic 62% of social interactions should be limited.**"

Impact of measures: red – no measures; blue – 20 % contact reduction, 40 % contact reduction, 60 % contact reduction
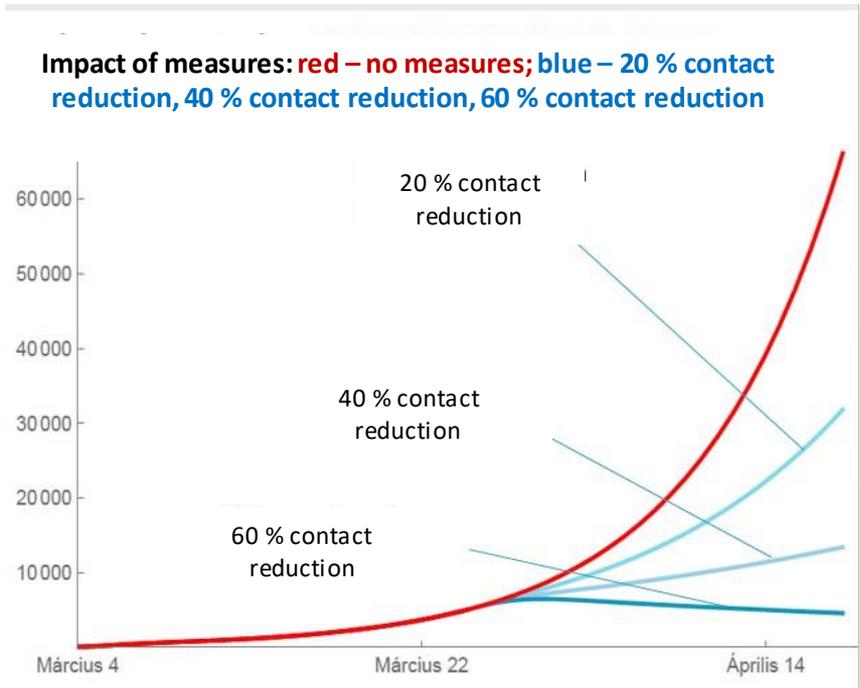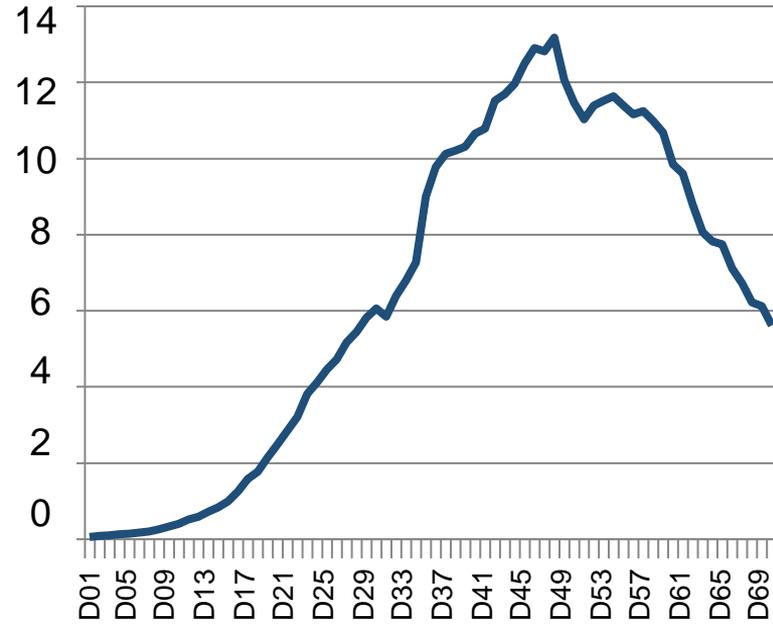
Hungary: first and 2nd wave of COVID-19 pandemic

(Daily reported cases and 7-day moving average)

H-UNCOVER

Beginning of 2nd wave

New daily case number

Daily Cases   3–day moving average   7–day moving average
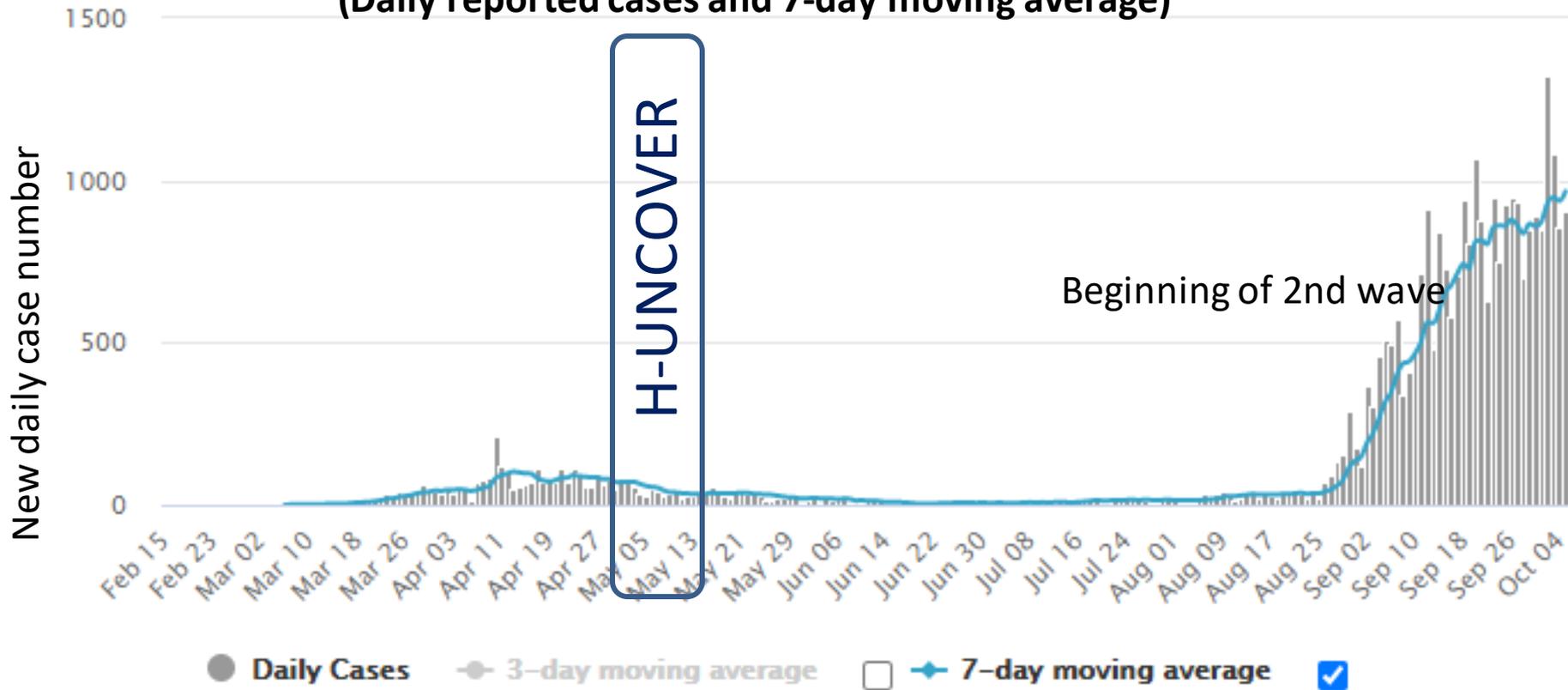
Medical Universities: Rate of Positivity Among Contacts and Symptomatic Persons

Symptomatic Persons

H-UNCOVER

the daily rate of confirmed PCR positive cases among symptomatic patients

Contacts

the daily rate of PCR positivity among the contacts of confirmed or suspected COVID cases
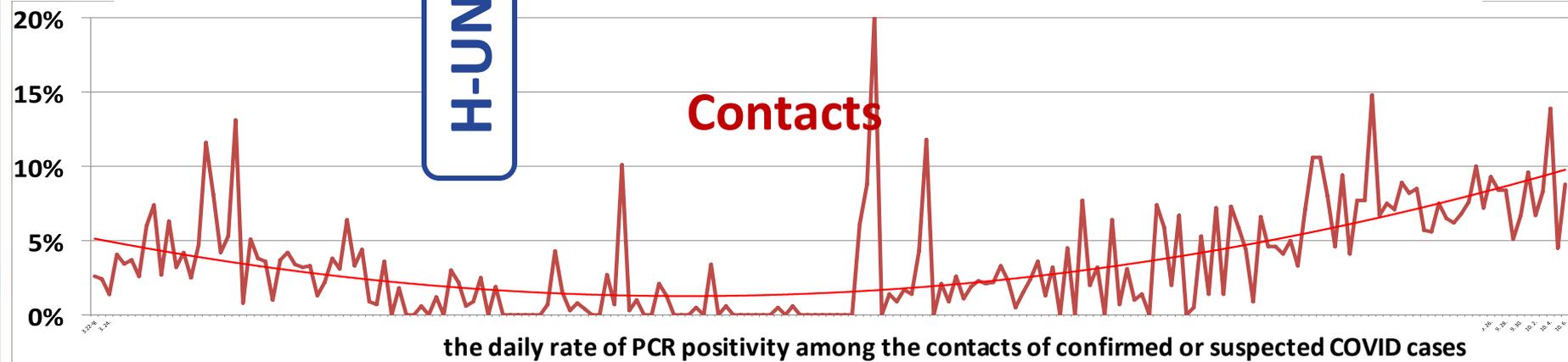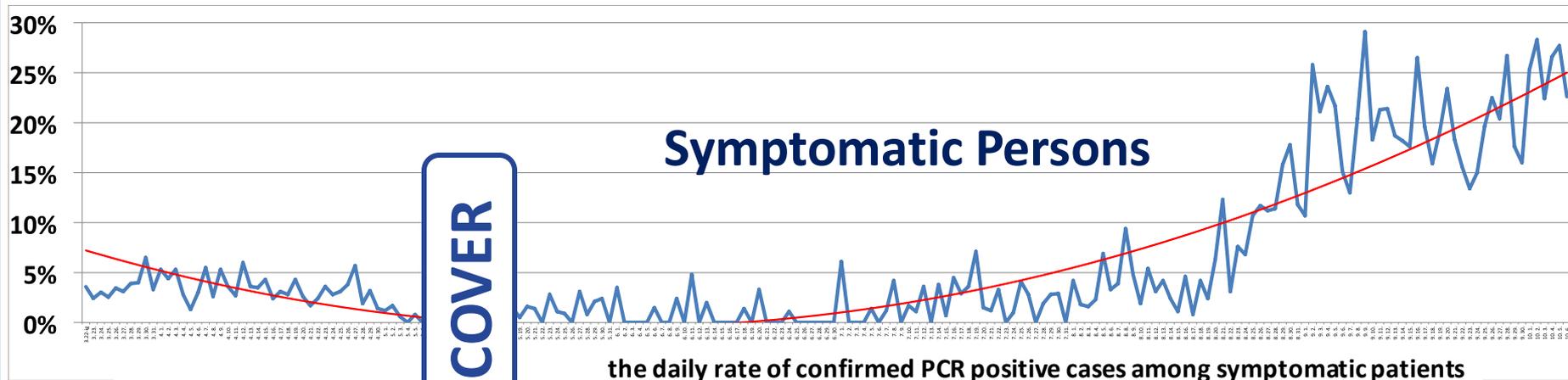
Medical Universities: Rate of Positivity Among the Quasi-Representative Screenings and the Total Screening Tests

Quasi-Representative Screening

the daily rate of positive cases among other PCR assays
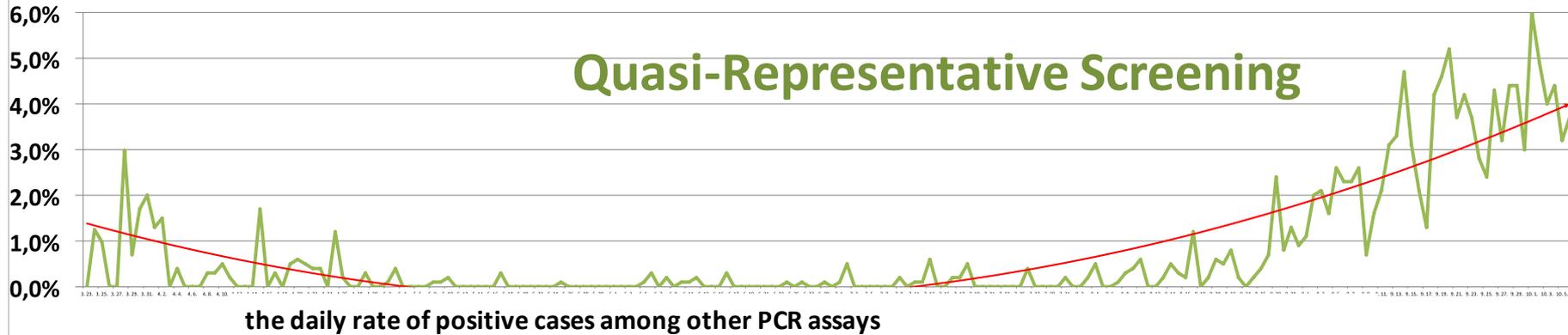
the daily rate of positive cases in all screening tests

All Screening Tests
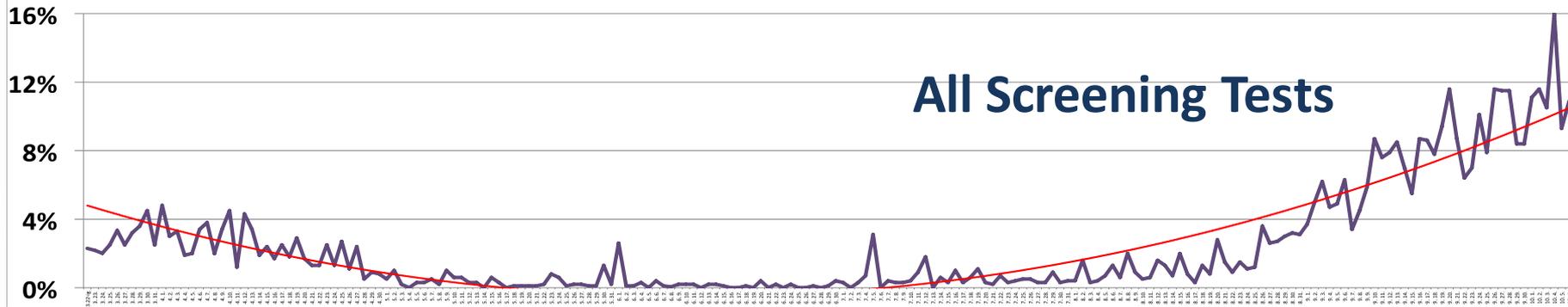
H-UNCOVER

The early-introduced restrictions were effective

Mass infection did not occur, but the nosocomial infection was significant

The PCR results showed low infection rate

We could start lifting the restrictions, but control was necessary

- University of Debrecen, University of Pécs, University of Szeged, Semmelweis University,
- In the organisation of the Central Statistical Office
- With the support of the Ministry of Innovations and Technology

Goal: to get an objective cross-sectional image about the spread of the virus, the dynamics and the real number of those infected or having been infected with the novel coronavirus through a representative nationwide clinical epidemiological survey

Representative Sample

Total population studied

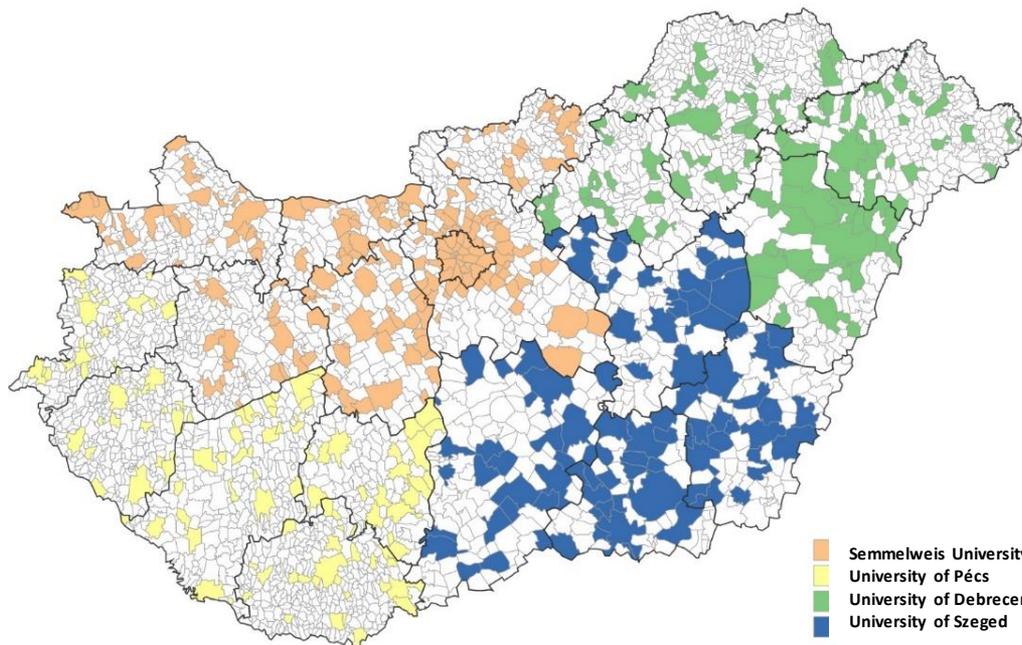**Representative sample**
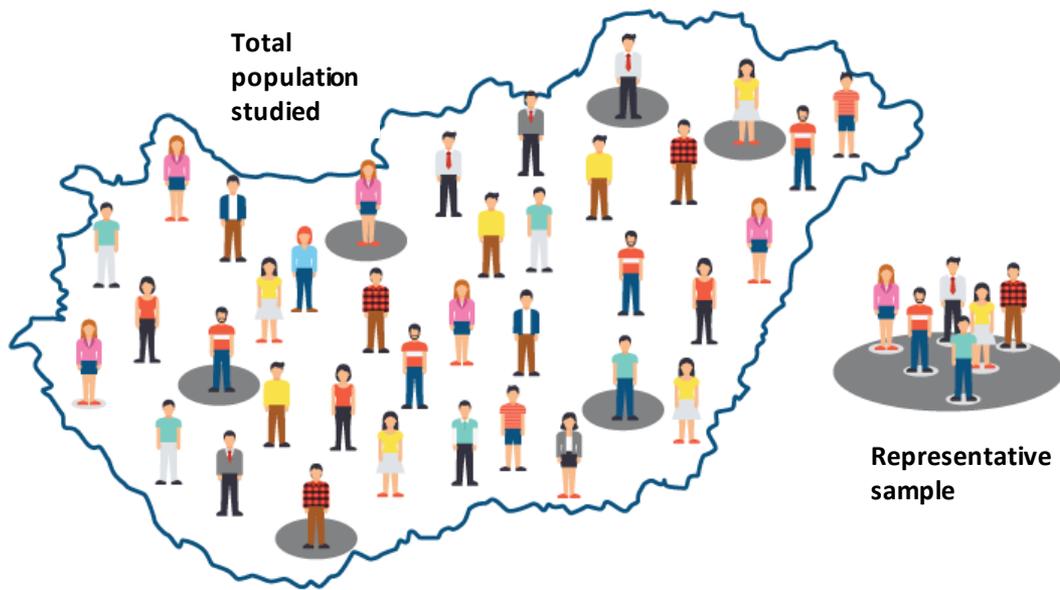
- Each individual in the population had an equal chance of getting into the sample.

- Each individual in the sample represented a previously determined part of the population.

- The results of H-UNCOVER were representative in countrywide, regional and age group distribution, so they could provid a reliable estmation about the country's contamination and seroprevalence.

H-UNCOVER Sample

- **Target population:** individuals aged 14 years or older, living in private households
- **A two-stage stratified probability sample:** selecting settlements as primary sampling units at the first stage and individuals at the second stage
- **Settlements:** 489 settlements were selected

Legend:
- Semmelweis University
- University of Pécs
- University of Debrecen
- University of Szeged

- The districts of Budapest and all the larger settlements
- At least 5 cases were reported
- Other stratification methods:
  - a reported case in the settlement,
  - the size of the settlement,
  - taxable income per capita,
  - population with tertiary educational level

H-UNCOVER Sample

Selection of individuals:

- Within the settlements, individuals were selected by systematic random sampling after ordering them by age.

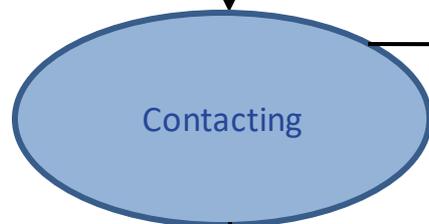## The total number of the sample size:

- assuming 10% sampling frame error and 70% participation rate 17,787 individuals were selected

Contacting and Screening Process

Population: 8 283 810 persons
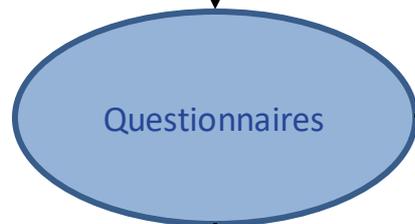
Sample: 17 787 persons

Contacting

Via mail: 17 787 persons

Via client gateway: 7 373 persons

Via telephone: 14 250 persons

Frame error (died, lives abroad or in an institution, no information): 2 315

Refusal of taking part in the survey: 3 135 persons

Questionnaires

Via online: 1 164

Via telephone (CSO): 10 584

With the help of the Universities: 589

Total participants : 10 575 pers.

384 fixed screening posts, 5 screening buses, 1 152 persons screened in their homes, 1245 co-workers from the 4 Universities and 388 volunteers, with the help of the National Ambulance Service and the Lifeguards of Veszprém

H-UNCOVER Results

- 17 787 persons - representative sample
- 12 236 persons questionnaire
- 10 575 persons screened (virus RNA and antibody testing)
- **10 474 persons** (67.7%) screened + questionnaire
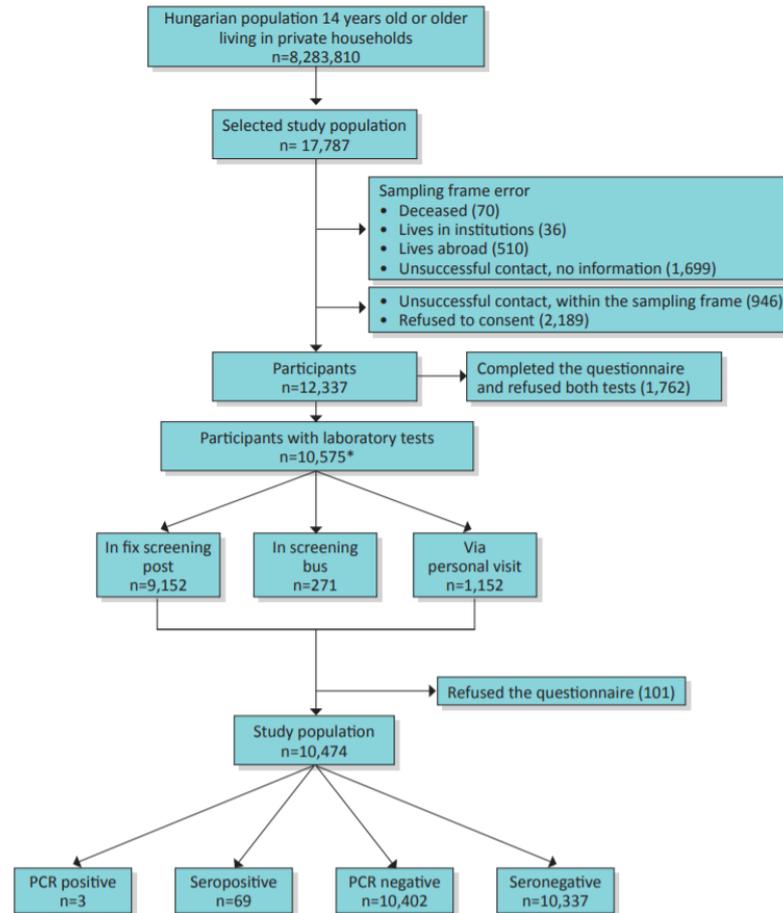
Characteristics of Confirmed Cases in the Age Groups of 14 years or Older Till 16th May

	Private Households (%)	Institutions (%)
Women	1 080 (41,9)	360 (40,7)
Men	1 500 (58,1)	524 (59,3)
Regions		
Central Hungary	1 583 (61,4)	547 (61,9)
Transdanubia	742 (28,8)	254 (28,7)
Northern Hungary and the Great Plain	255 (9,9)	83 (9,4)
Age Groups		
14-39	525 (20,4)	50 (5,7)
40-64	1 090 (42,3)	178 (20,1)
65-	965 (37,4)	656 (74,2)

* Based on the data of NNK

- **3 PCR positive cases** (2 hospitalized), (Budapest, Komárom-Esztergom, Heves counties)

- **70 seropositive cases**

	Total Studied Population (n=10 474)	Positivity (n=70)
Men (%)	4 864 (46,4)	35 (50,0)
Age (years)		
Mean age (average)	48,7 (18,0)	52,2 (18,2)
14-39 (%)	3 353 (32,0)	18 (25,7)
40-64 (%)	4 735 (45,2)	33 (47,1)
65- (%)	2 386 (22,8)	19 (27,1)

H-UNCOVER results – characteristics of the population

Estimated Population Infection Rate

	PCR positivity		Seropositivity	
	Estimated total number	**Prevalence per 10 000**	**Estimated total number**	**Prevalence per 10 000**
Total population	2421	2,9 (0-6,7)	56 439	68 (50-86)
Labor activity				
Active worker	1269	3,0 (0-9,0)	22 406	53 (33-74)
Pensioner	1152	5,4 (0-14)	23 412	109 (66-152)
Student, not working	0	0 (0-38)	4 932	69 (0-149)
Housewife	0	0 (0-142)	1 239	73 (0-174)
Other not working	0	0 (0-27)	4 450	43 (1,6-84)

Estimated Population Infection Rate

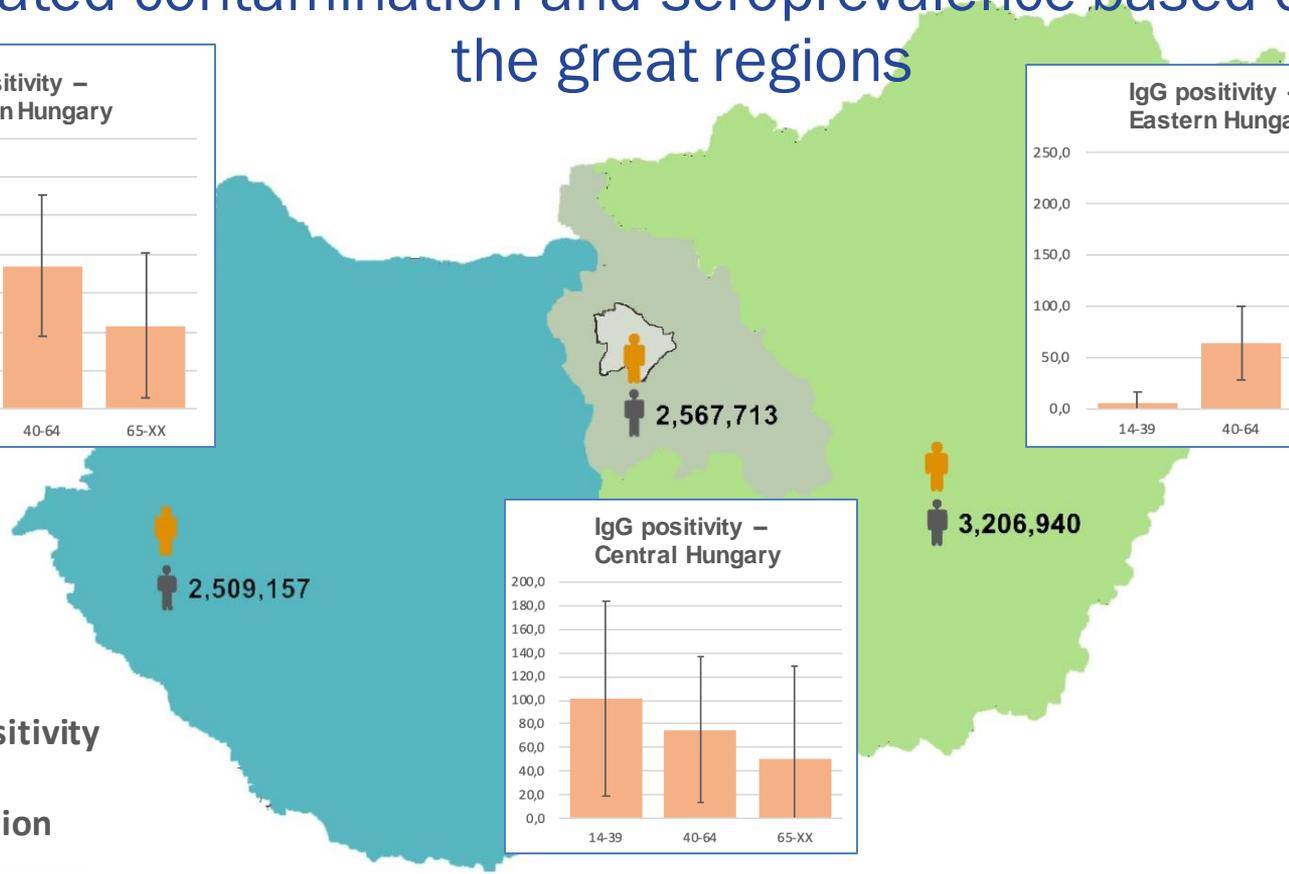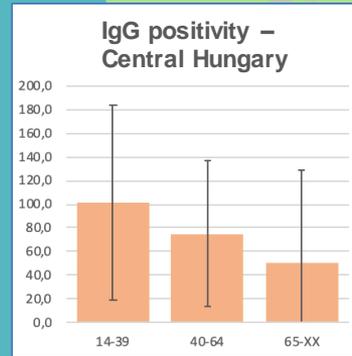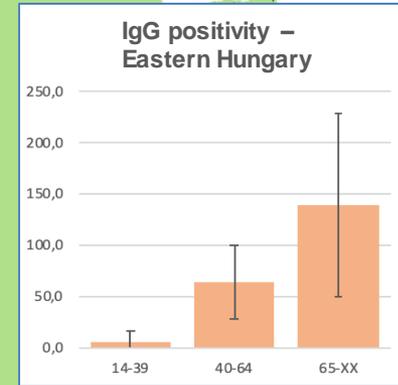|	PCR positivity		Seropositivity	
	Estimated total number	**Prevalence per 10 000**	**Estimated total number**	**Prevalence per 10 000**
Total population	2 421	2,9 (0-6,7)	56 439	68 (50-86)
Known contact with a confirmed SARS-CoV-2–infected person or a person being in quarantine				
Yes	0	0 (0-73)	3 386	114 (24-204)
No	2 421	3,1 (0-7,0)	52 044	66 (48-84)
Refused to answer	0	0 (0-252)	1 009	106 (0-286)
International travel after March 2020				
Yes	0	0 (0-79)	3 460	106 (12-200)
No	2 421	3,1 (0-7,0)	52 979	67 (49-86)

Estimated contamination and seroprevalence in the great regions based on the results of H-UNCOVER (representative)

Great Plain and Northern Hungary
- 🧍 2,2‰ (0,0–7,1)
- 🧍 60‰ (34–86)
- 🧍 3 206 940 fő

Central Hungary
Buda-pest
- 🧍 4,9‰ (0,0–15,0)
- 🧍 79‰ (36–120)
- 🧍 2 567 713 fő

Transdanubia
- 🧍 1,8‰ (0,0–5,3)
- 🧍 67‰ (44–90)
- 🧍 2 509 157 fő

- 🧍 : **PCR positivity**
- 🧍 : **Seropositivity**
- 🧍 : **Population**
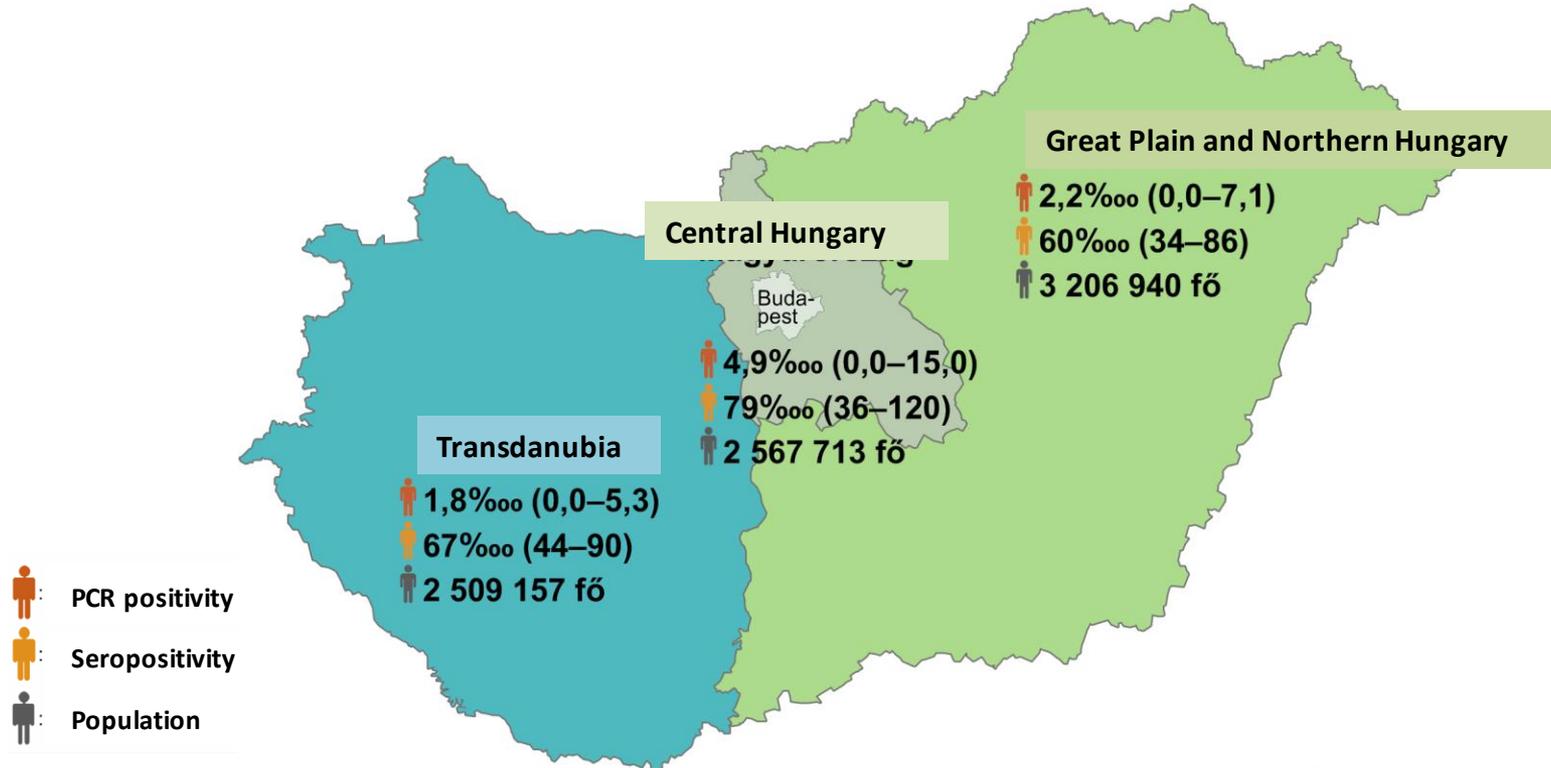
Estimated contamination and seroprevalence based on the results of H-UNCOVER in 8 regions

Number of infections per 10.000.inhabitants (95% confidence interval)

Number of seroprevalence per 10.000.inhabitants (95% confidence interval)

Population

Northern-Hungary
7,6 fő (0,0–23,6)
45,0 fő (4,6–85,3)
942 357 fő

Budapest
8,6 fő (0,0–25,5)
90,5 fő (29,0–151,9)
1 480 190 fő

Northern Great Plain
0,0 fő (0,0–21,3)
70,0 fő (22,5–117,6)
1 212 205 fő

Central Transdanubia
4,8 fő (0,0–14,6)
67,7 fő (28,8–106,7)
907 796 fő

Pest
0,0 fő (0,0–38,9)
63,6 fő (9,4–117,9)
1 087 523 fő

Western Transdanubia
0,0 fő (0,0–20,2)
84,5 fő (40,4–128,7)
853 686 fő

Southern Great Plain
0,0 fő (0,0–20,9)
62,5 fő (21,6–103,3)
1 052 378 fő

Southern Transdanubia
0,0 fő (0,0–22,4)
46,3 fő (13,7–79,0)
747 675 fő

Estimated contamination and seroprevalence based on age in the great regions
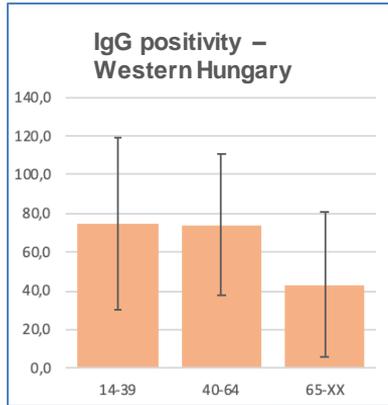
Estimated contamination and seroprevalence based on gender in the great regions

IgG positivity – Western Hungary

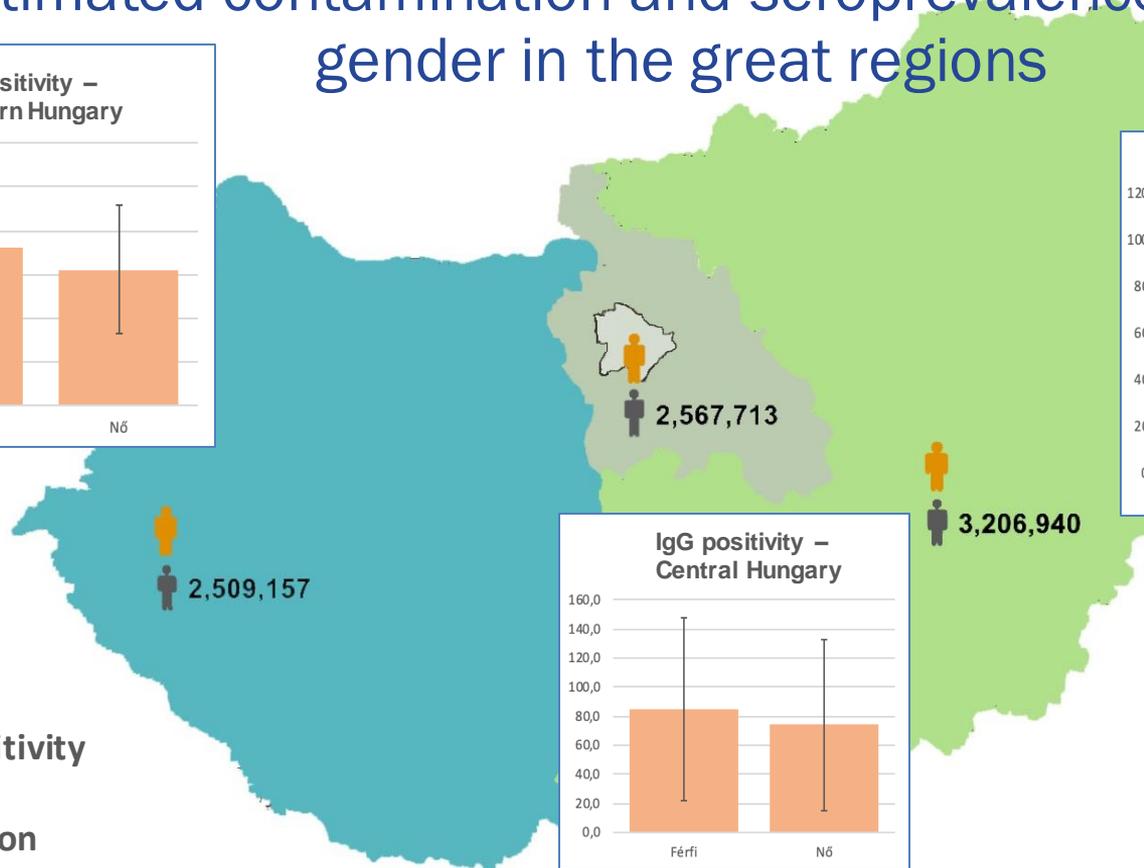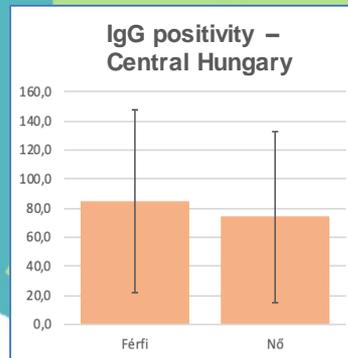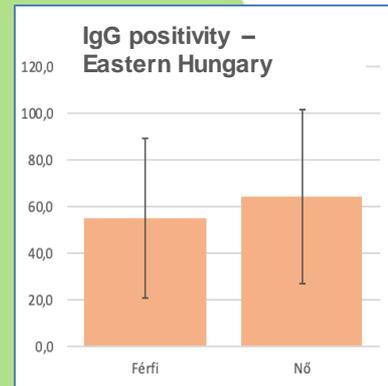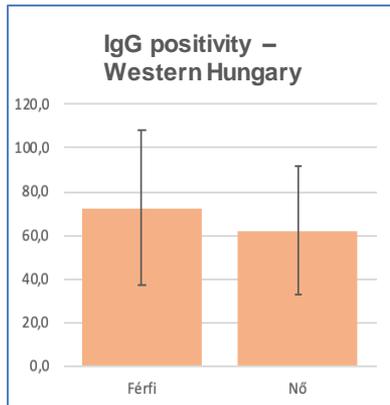IgG positivity – Eastern Hungary

IgG positivity – Central Hungary
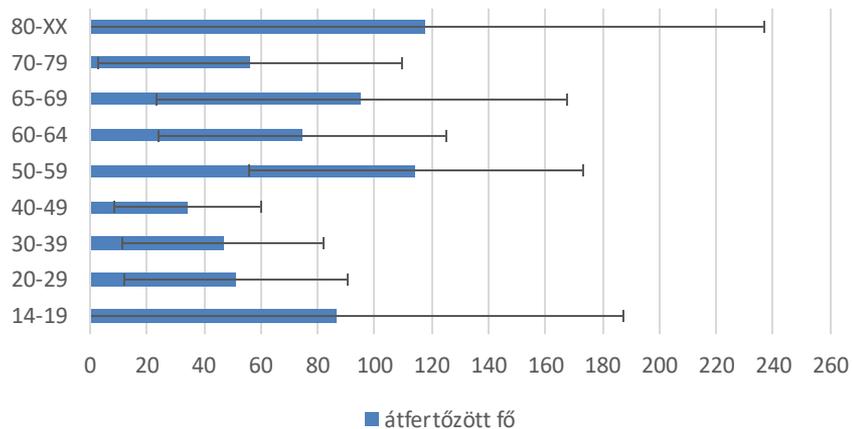
2,567,713

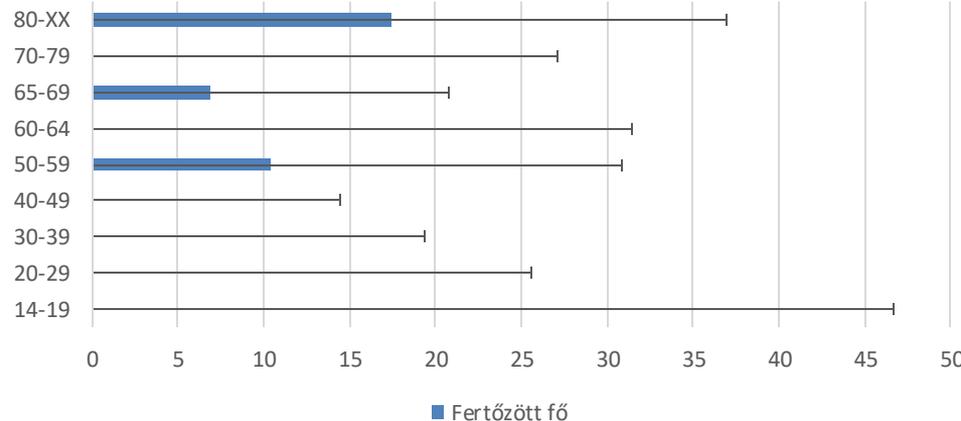2,509,157

3,206,940

: Seropositivity

: Population

Estimated contamination and seroprevalence based on age in 10-year age groups
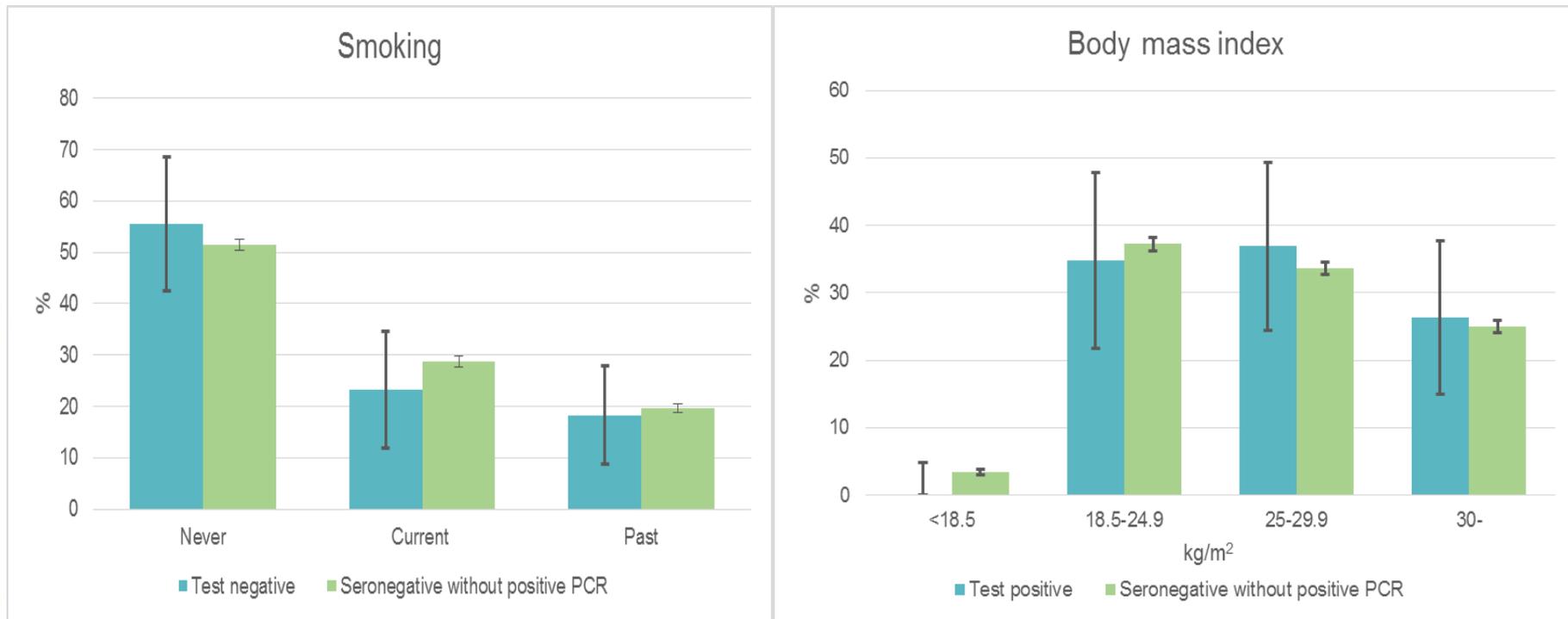

Number of seroprevalent persons per 10 thousand persons

Number of contaminated persons per 10 thousand persons

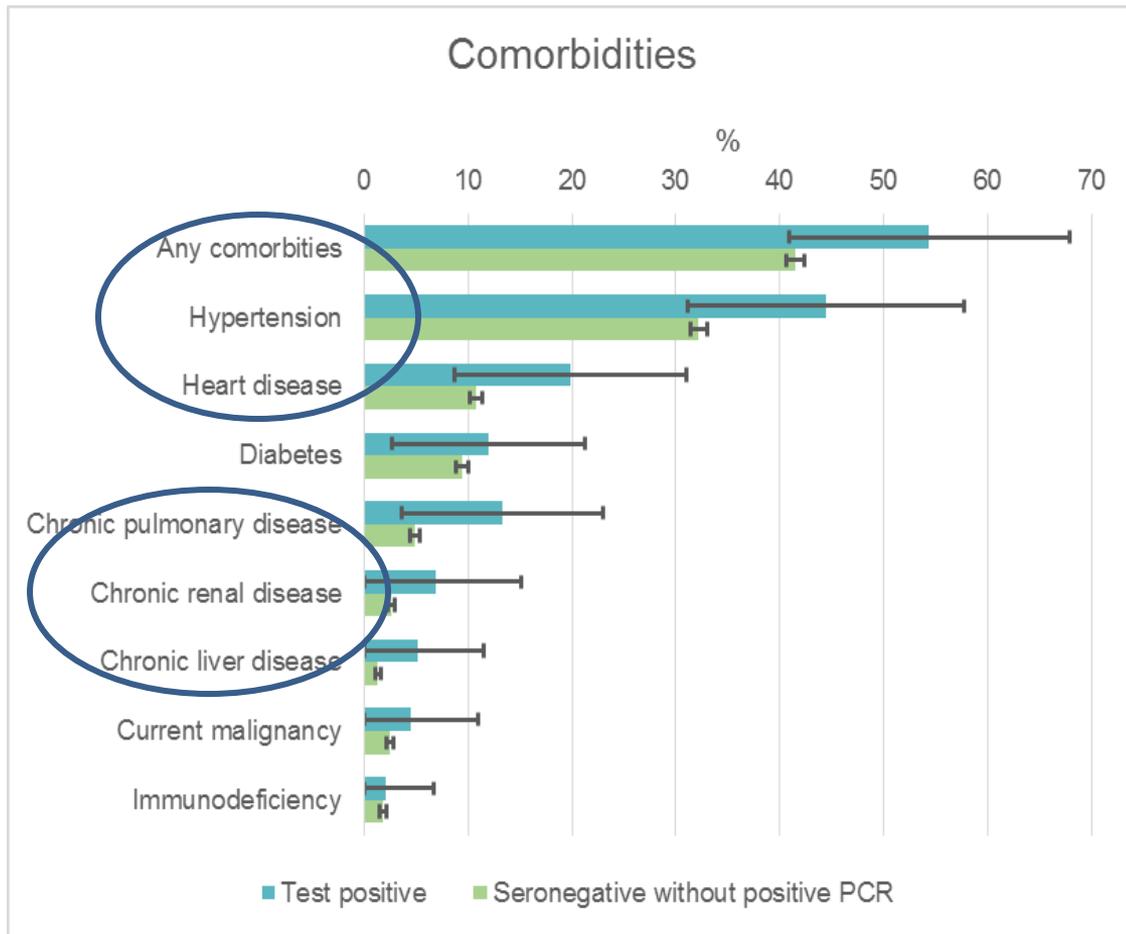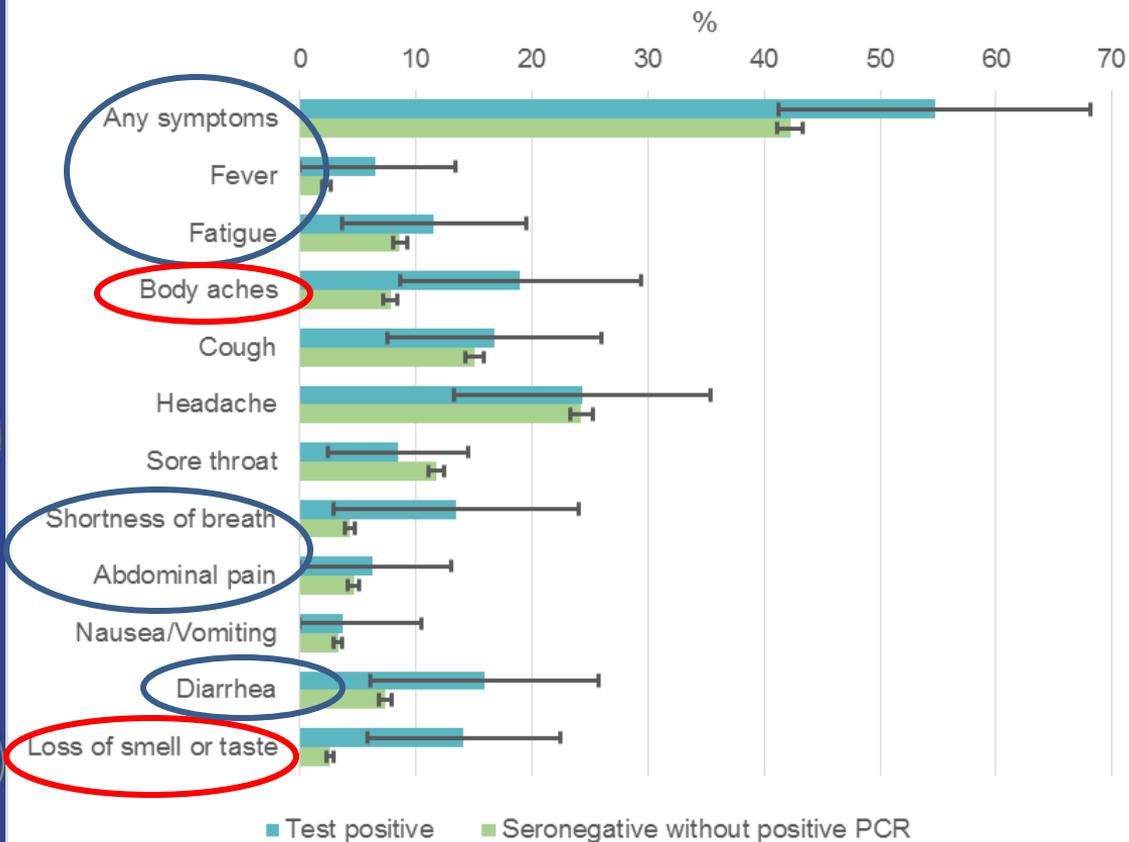# H-UNCOVER results: smoking status and weight

H-UNCOVER results: comorbidities

Infection is consistently more common in case of comorbidities

(high blood pressure, heart disease, chronic lung, liver, or kidney disease)

Comorbidities

Symptoms suggestive for SARS-CoV-2 infection

H-UNCOVER
results: symptoms

Test positive patients: muscle pain, smell and taste disorders are significantly more common.
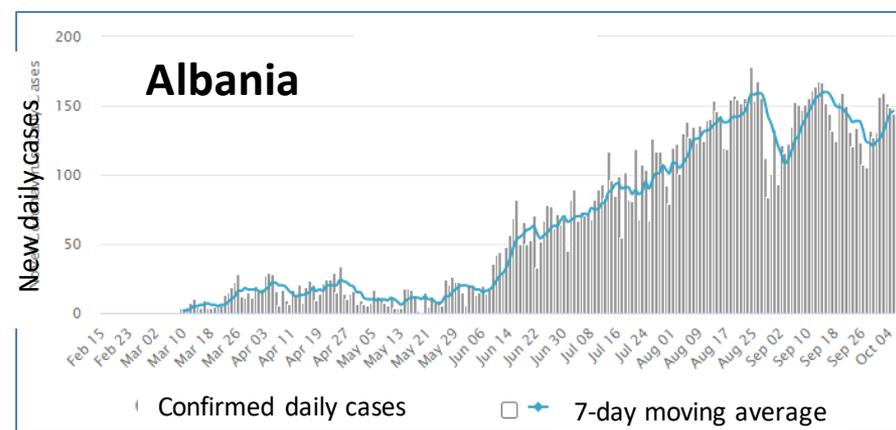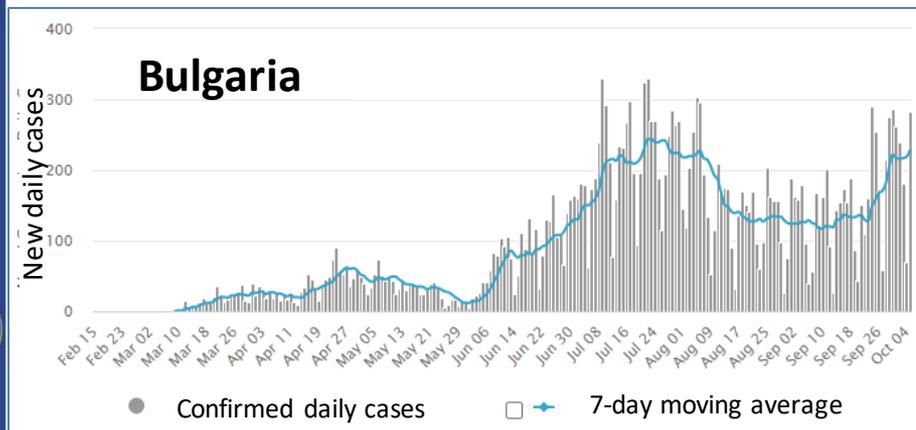
H-UNCOVER: summary

- The first representative, nationwide study in the world using PCR and serological tests to examine contamination and seroprevalence.

- Conducted 50 days after the containment regulations in the course of 2 weeks, well-representing the effect of the containment regulations, provided the foundation of the exit strategy.

- 67.7 % participation, which is outstanding on an international level, multi-channel communication, contacting, the role of fixed and mobile screening sites

- Due to early restrictions, both contamination and seroprevalence are low

- The rate of PCR-confirmed active cases is 0.029%, their estimated number is 2421; the number of seroprevalent persons measured by immunoassay testing is 0.68%, their estimated number is 56 439

- Based on regions: highest value in Budapest (90/10 000 persons), lowest in North-Hungary (45/10 000 persons).

Exit strategy in Central-Eastern Europe: bad examples

Romania

New daily cases — Confirmed daily cases — 7-day moving average

Ukraine

New daily cases — Confirmed daily cases — 7-day moving average

Bulgaria

New daily cases — Confirmed daily cases — 7-day moving average

Albania

New daily cases — Confirmed daily cases — 7-day moving average
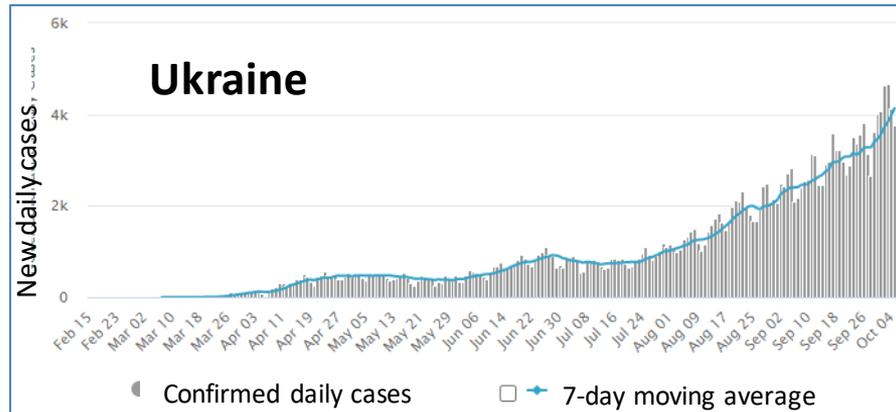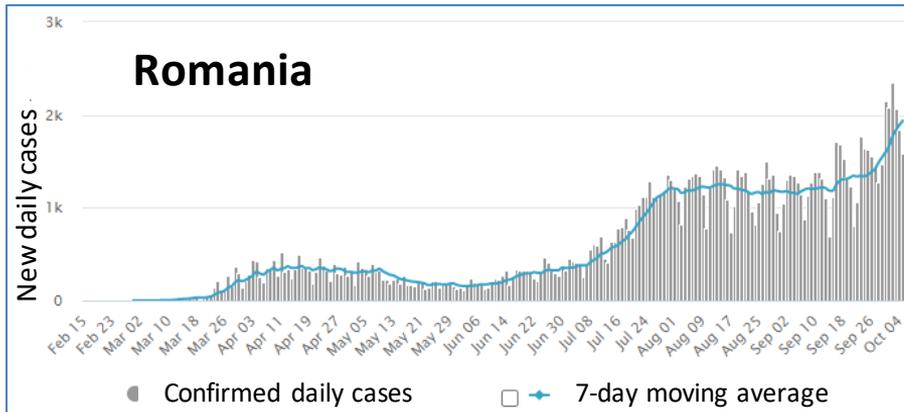
14-day cumulative case number per 100 000 persons in EU/EEA countries and the United Kingdom on 30 September 2020
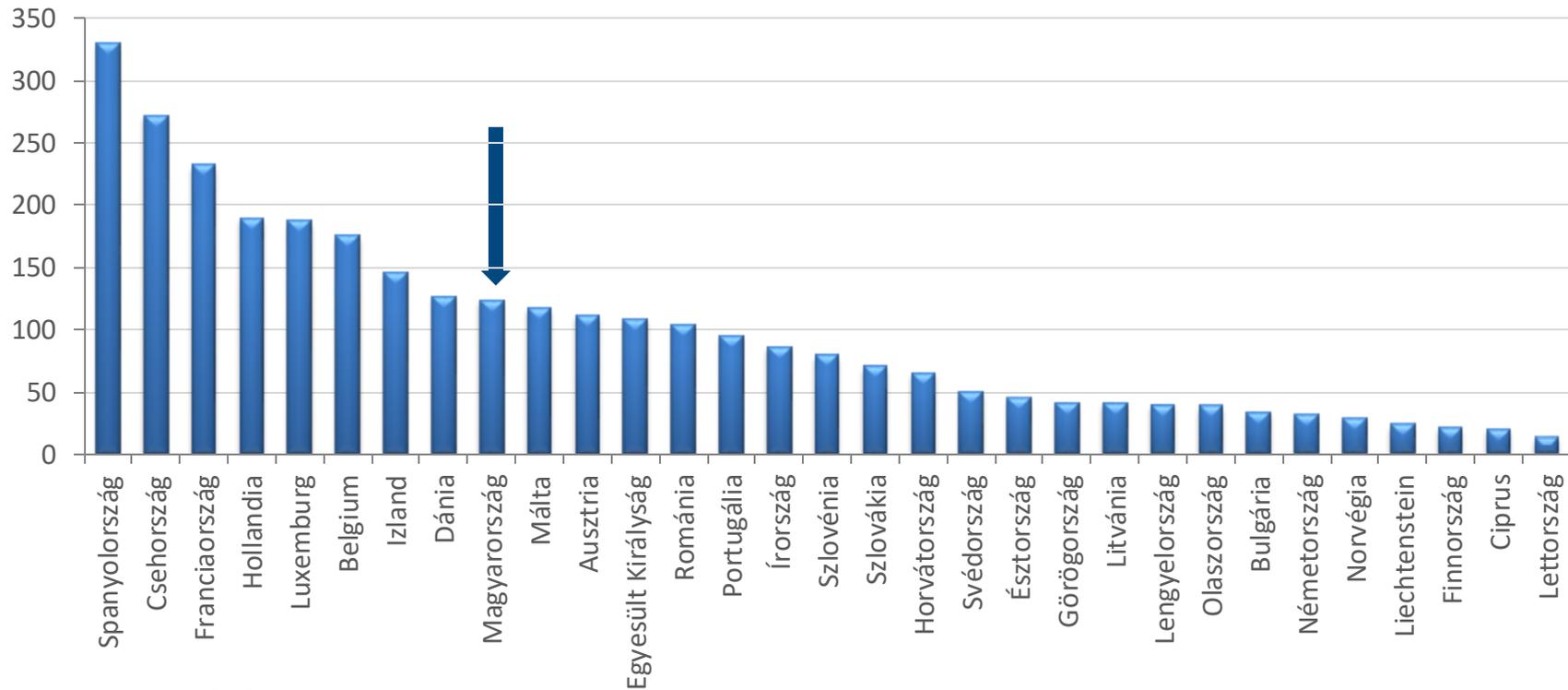
Adatok forrása: ECDC

Epidemic situation in Austria, the Czech Republic, and Hungary
The epidemic curve cannot represent the actual epidemic situation in every country
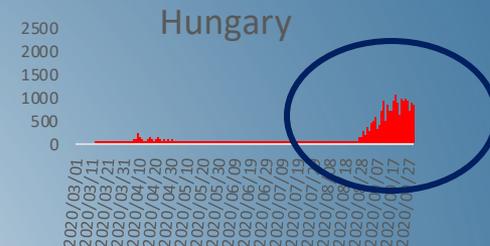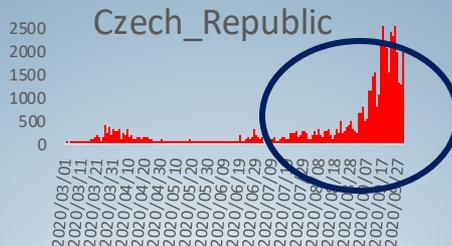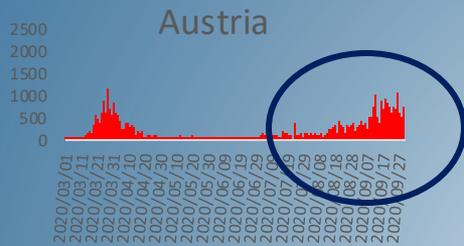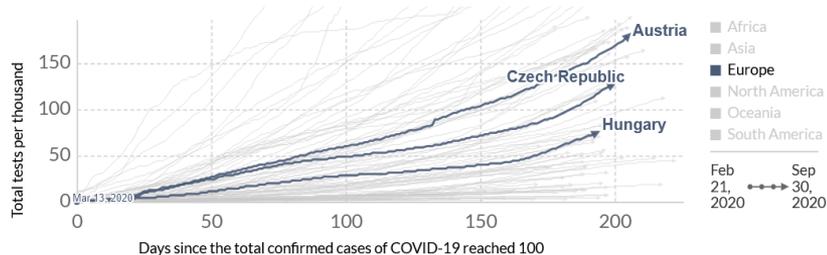
Source: Official data collated by Our World in Data, European CDC – Situation Update Worldwide
Note: Comparisons of testing data across countries are affected by differences in the way the data are reported. Details can be found at our Testing Dataset page.
OurWorldInData.org/coronavirus • CC BY
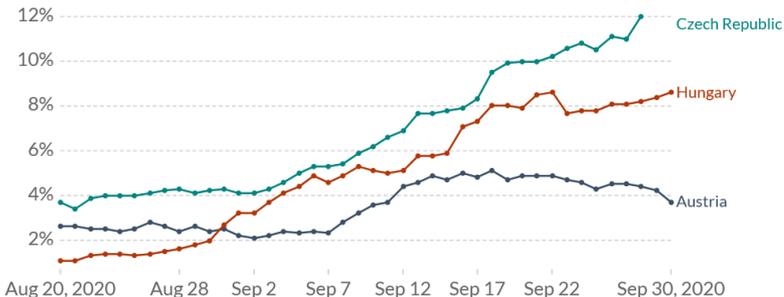
Source: Official data collated by Our World in Data
Note: Comparisons of testing data across countries are affected by differences in the way the data are reported. Daily data is interpolated for countries not reporting testing data on a daily basis. Details can be found at our Testing Dataset page
OurWorldInData.org/coronavirus • CC BY

Since the low point on week 25 (15-21 June), the average number of daily reported COVID-19 cases has been increasing for 14 weeks in Hungary.
The slow growing trend started to show on the epidemic curve 4 weeks after lifting the containment regulations
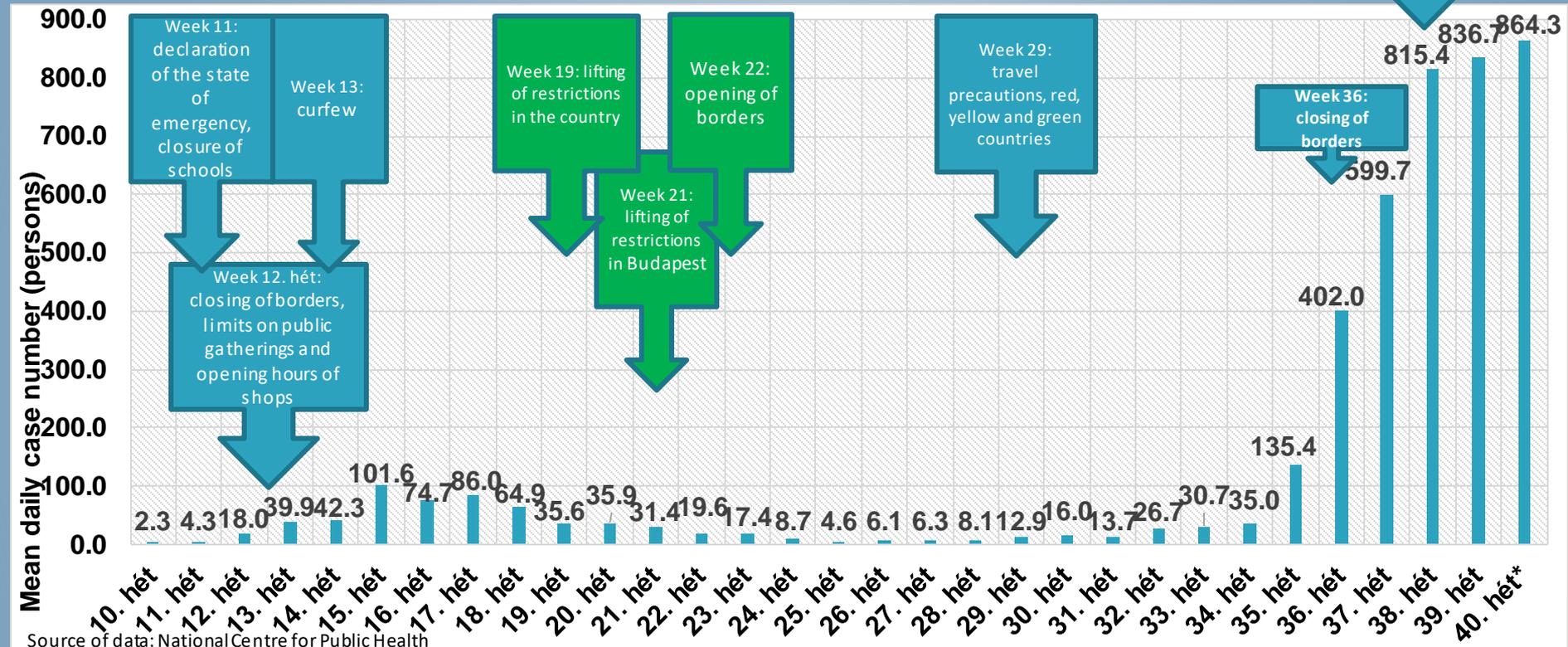
Week 38: tightening on mask wearing, closing of clubs at 23:00

Week 11: declaration of the state of emergency, closure of schools

Week 13: curfew

Week 19: lifting of restrictions in the country

Week 22: opening of borders

Week 21: lifting of restrictions in Budapest

Week 29: travel precautions, red, yellow and green countries

Week 36: closing of borders

Week 12. hét: closing of borders, limits on public gatherings and opening hours of shops

Mean daily case number (persons)

900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0

2.3 4.3 18.0 39.9 42.3 101.6 74.7 86.0 64.9 35.6 35.9 31.4 19.6 17.4 8.7 4.6 6.1 6.3 8.1 12.9 16.0 13.7 26.7 30.7 35.0 135.4 402.0 599.7 815.4 836.7 864.3

10. hét 11. hét 12. hét 13. hét 14. hét 15. hét 16. hét 17. hét 18. hét 19. hét 20. hét 21. hét 22. hét 23. hét 24. hét 25. hét 26. hét 27. hét 28. hét 29. hét 30. hét 31. hét 32. hét 33. hét 34. hét 35. hét 36. hét 37. hét 38. hét 39. hét 40. hét*

Source of data: National Centre for Public Health

On week 39 (21-27 Sept.) the mean daily case number was 836.7, which means a merely 2.6% increase in comparison with the mean number of newly registered cases from the previous week. (week 38: 815.4 persons).

Confirmed COVID-19 cases based on the date of confirming infection, Hungary, 01 Oct. 2020

Risk: due to the running out of testing capacities, the laboratory-confirmed daily case number cannot follow the actual epidemic situation anymore.

1st wave 2nd wave

All confirmed cases (04 March-30 Sept.): **27 309**   All mortalities: **781**
Confirmed cases on 30 Sept.: **850**   Mortalities on 30 September: **16**
(earlier data)
Past 7 days: **6 111** new cases
Past 14 days: **12 143**

■ megerősített COVID-19 eset   ▬ 3 napos mozgóátlag

Source of data: National Centre for Public Health

Weekly distribution of COVID-19 cases according to the laboratories in Hungary, 01 Oct. 2020
Medical schools are the nation's sentinels

Legend: Magánlabor, Egyetem, Kórház, NNK

fertőzés igazolásának hete

Source of data: Nation Centre for Public Health

*based on case number on the first 3 days of wekk 40
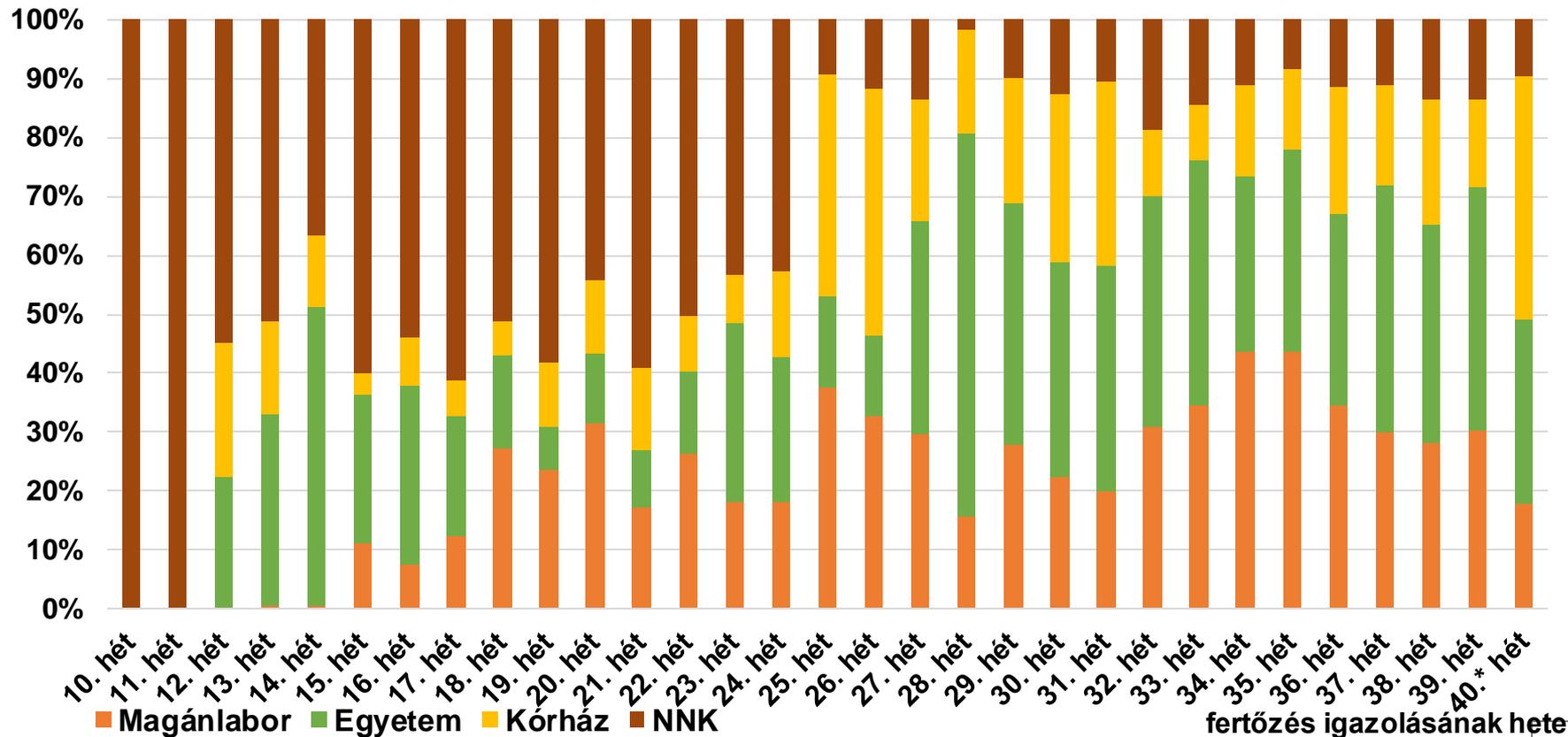
COVID-19 proportionate mortality ratios of European countries (mortalities/1million inhabitants)

COVID exit/1M	országok
Over 250	**Belgium (870), Spain (696), UK (625), Italy (597), Sweden (582), France (497), Netherlands (380), Ireland (367), North Macedonia (371), Moldova (349), Montenegro (303), Bosnia and Herzegovina (277), Romania (271)**
249-100	**Switzerland (240), Luxembourg (204), Portugal (200), Israel (198), Russia (150), Albania (141), Germany (115), Bulgaria (124), Denmark (112), Ukraine (105)**
Under 100	**Belarus (93), Malta (93), Hungary (91), Austria (92), Serbia (87), Czechia (77), Slovenia (76), Croatia (75), Poland (74), Finland (62), Norway (51), Estonia (50), Greece (41), Lithuania (37), Iceland (29), Latvia (21), Cyprus (20), Slovakia (10)**

H-UNCOVER: further plans

- 2 more cross-sectional studies are planned until 1 May 2021, which will have an interface of 1500 persons with the population of the first sampling

- Before nationwide vaccination, we will survey the current contamination and seroprevalence in order to assess the severity of the second wave,

- Knowing the country's state of infection is indispensable for issuing or suspending the appropriate restrictions

Thank you for your support and cooperation...

- **Participating inhabitants**
- Mayors, notaries
- National Ambulance Service
- Police Force
- Water Rescue Services of Hungary
- NCPH and GPs
- National and local media outlets
- ITM

...to be continued!

H-UNCOVER
ORSZÁGOS SZŰRŐVIZSGÁLAT

Számítunk Önre!
Együtt legyőzhetjük a COVID-19 járványt.
Segítsen, hogy segíthessünk!

MIÉRT JÖJJÖN EL, HA MEGHÍVÓT KAP?

Megtudhatja, hogy fertőzött vagy átesett-e már a betegségen.

A szűrés ingyenes, de nem adhatja át másnak a lehetőséget.

1 vizsgált személy családján kívül legalább 500-1000 honfitársunkat képviseli, ezért mindnyájunk érdeke, hogy Ön is éljen a lehetőséggel.

Részvételével valós információt szerezhetünk a betegség hazai kiterjedéséről.

A mintavételi pont közel van lakóhelyéhez, szükség esetén házhoz megyünk.

A mintavétel fájdalommentes és teljesen biztonságos.
Vigyázunk Önre!

Most az Ön segítségére van szükség ahhoz, hogy együtt legyőzzük a járványt.

Ha kérdése van a vizsgálattal kapcsolatban: +36 80 808 200

A vizsgálatsorozatot a hazai orvosegyetemek szakemberei végzik el a Központi Statisztikai Hivatal által kiválasztott reprezentatív lakossági mintán.
https://semmelweis.hu/koronavirus/

PÉCSI TUDOMÁNYEGYETEM

DEBRECENI EGYETEM

ORSZÁGOS REPREZENTATÍV COVID-19 SZŰRŐVIZSGÁLAT
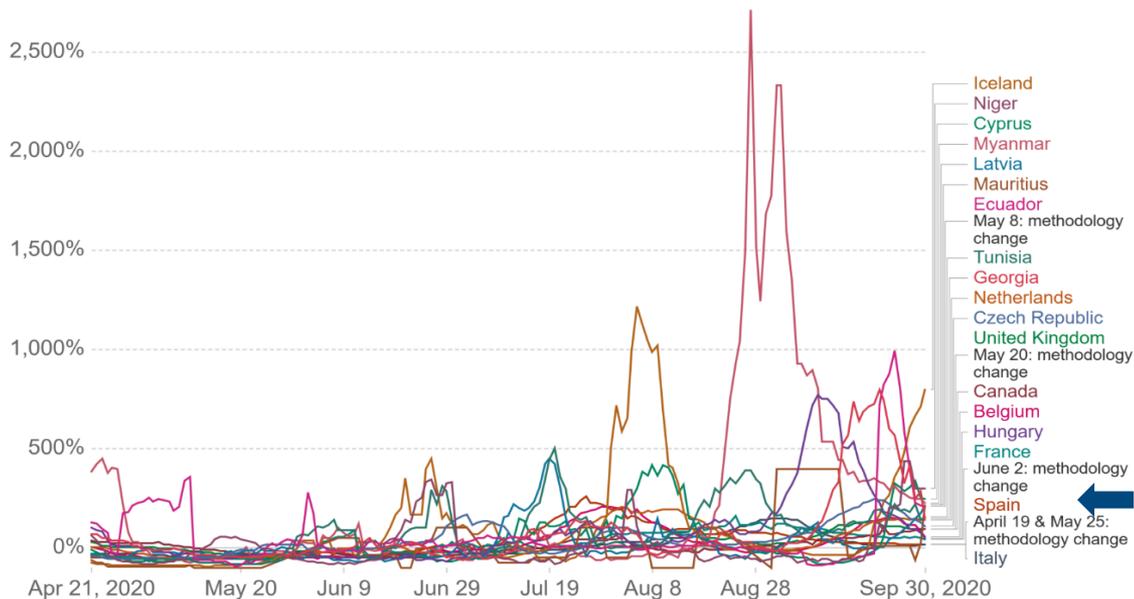
Biweekly change in confirmed COVID-19 case numbers in countries showing the greatest increase and some other countries

Biweekly change in confirmed COVID-19 cases

The biweekly growth rate on any given date measures the percentage change in the number of new confirmed cases over the last 14 days relative to the number in the previous 14 days.

Our World in Data

Iceland
Niger
Cyprus
Myanmar
Latvia
Mauritius
Ecuador
May 8: methodology change
Tunisia
Georgia
Netherlands
Czech Republic
United Kingdom
May 20: methodology change
Canada
Belgium
Hungary
France
June 2: methodology change
Spain
April 19 & May 25: methodology change
Italy

Source: European CDC – Situation Update Worldwide – Last updated 30 September, 10:05 (London time)
OurWorldInData.org/coronavirus • CC BY

Country	Biweekly change in confirmed COVID-19 case numbers on 30 Sept.
Island	798%
Niger	300%
Cyprus	246%
Mianmar	226%
Latvia	217%
Mauritius	217%
Ecuador	209%
Tunesia	156%
Georgia	149%
The Netherlands	140%
Czech Republic	110%
United Kingdom	94%
Canada	94%
Belgium	54%
Hungary	46%
France	43%
EU	36%
Italy	16%

Cofirmed COVID-19 cases: epidemic curves in some EU countries
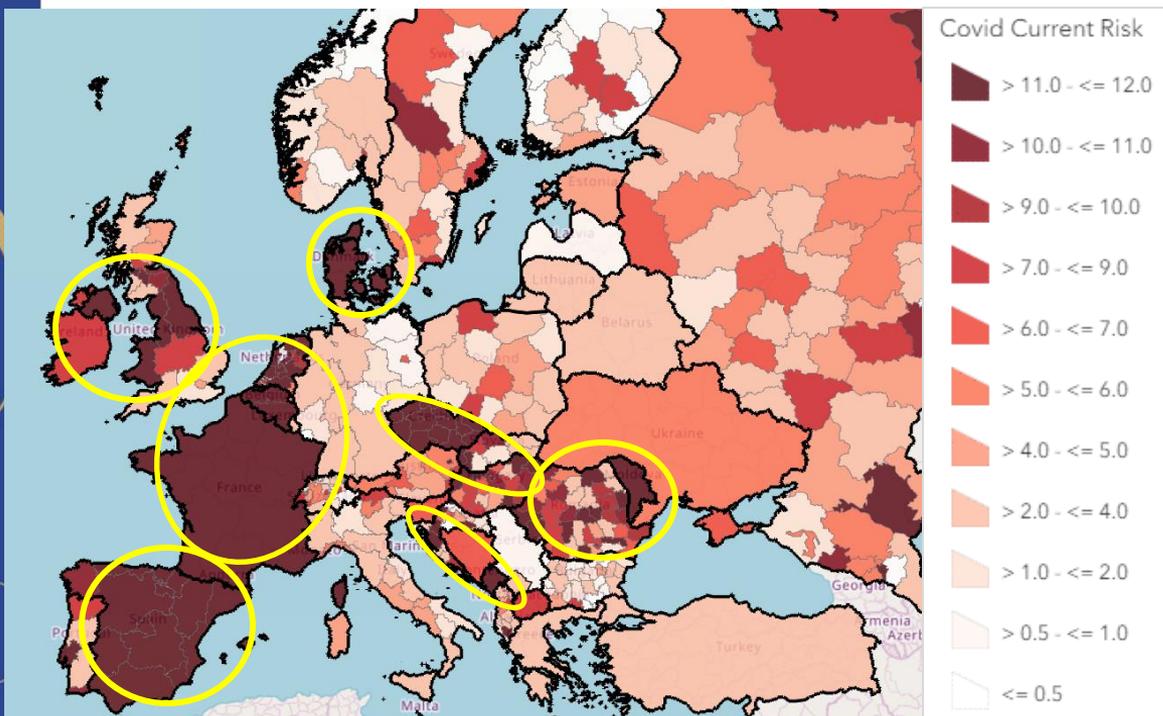## (30 Sept. 2020)

Source of data: https://www.ecdc.europa.eu/en
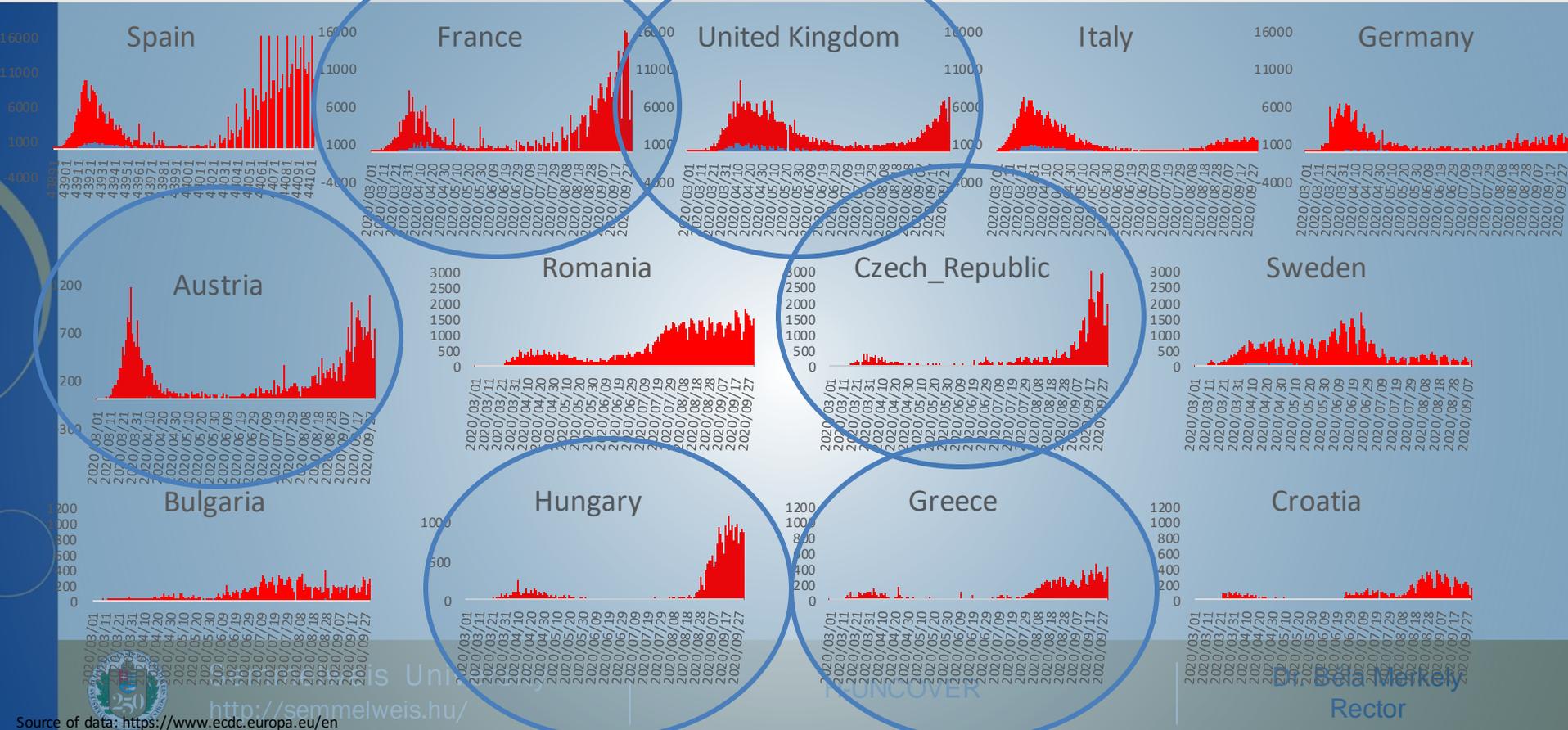
COVID-19 epidemic curves in Central Europe until 30 Sept. 2020
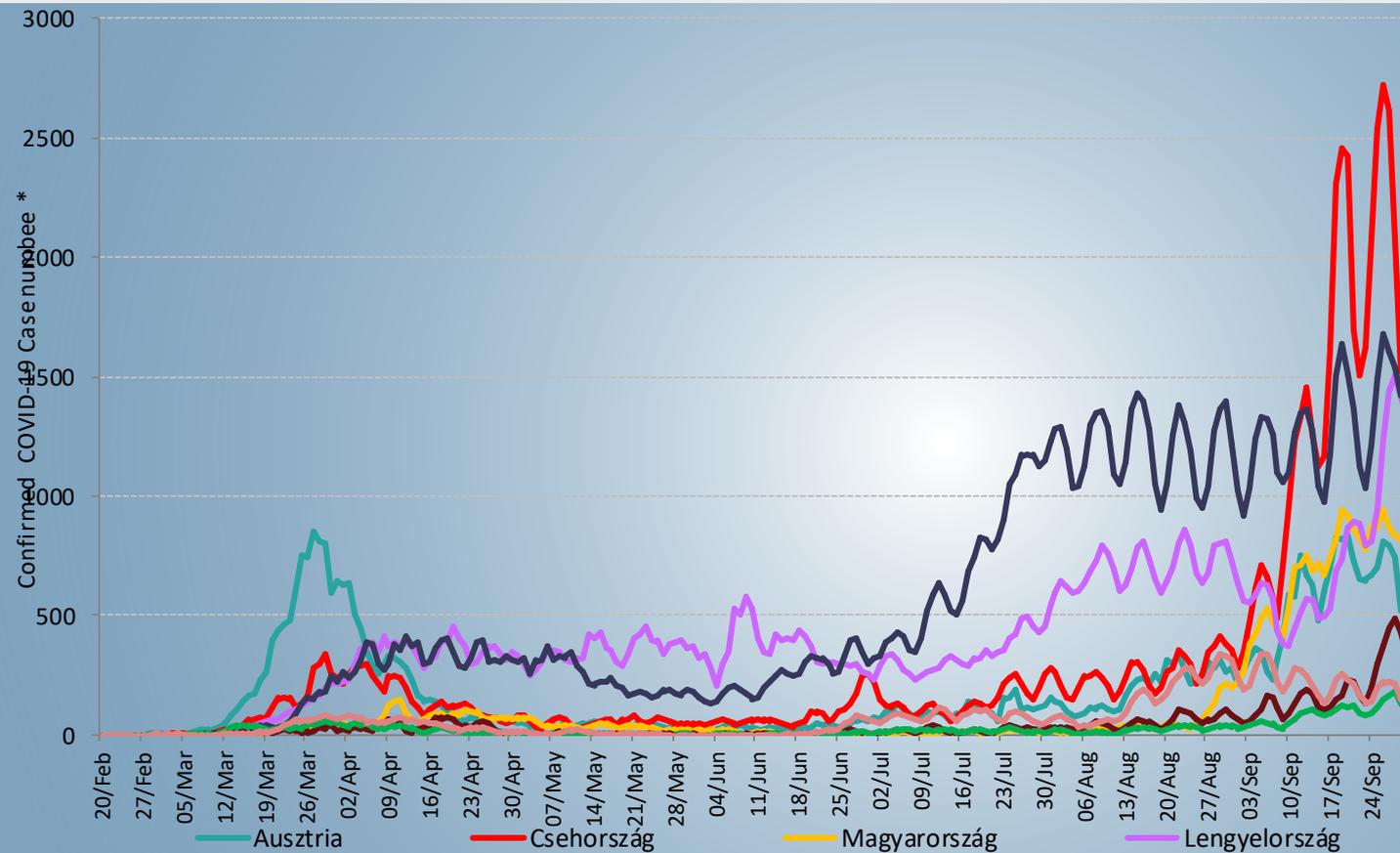
- In **Romania, Poland** and **Slovakia** the 3-day moving average is again showing an increase.

- In the **Czech Republic,** based on last week's data, significant leaps can be noticed.

- In **Croatia,** the decreasing trend continues.

- In **Hungary** and **Austria** the rate of case number growth has slowed down.

Current COVID-19 risk (CCR/Covid Current Risk)
Product of the incidence rate (IR) and the specific incidence (SI)

Covid Current Risk

	> 11.0 - <= 12.0
	> 10.0 - <= 11.0
	> 9.0 - <= 10.0
	> 7.0 - <= 9.0
	> 6.0 - <= 7.0
	> 5.0 - <= 6.0
	> 4.0 - <= 5.0
	> 2.0 - <= 4.0
	> 1.0 - <= 2.0
	> 0.5 - <= 1.0
	<= 0.5

Where has the risk of the spreading of COVID-19 increased? (i.e., on a scale of 0 to 12 it is over a value of 4)

On country-wide areas:

- Spain, France, Malta, Montenegro, Moldova, North-Macedonia, Bosnia-Hercegovina, Ukraine, Denmark, Belgium, Czech Republic, Slovenia, Ireland, The Netherlands

In certain regions of a country:

- Hungary, Croatia, United Kingdom, Sweden, Romania, Poland

Semmelweis University
http://semmelweis.hu/

Source: Joint Research Center (23 Sept. 2020)
H-UNCOVER
https://webcritech.jrc.ec.europa.eu/modellingoutput/cv/eu_cv_region/eu_cv_region_comb.htm

Dr. Béla Merkely
Rector

# Epidemic risk assessment (Hungary, 01 Oct. 2020, 07 a.m.)

Specific incidence (SI): the daily mean value of case numbers in the past 7 days per 100.000 inhabitants

Incidence rate (IR): how many times is the case number from last week more than that of the previous week?

Source of data: National Centre for Public Health
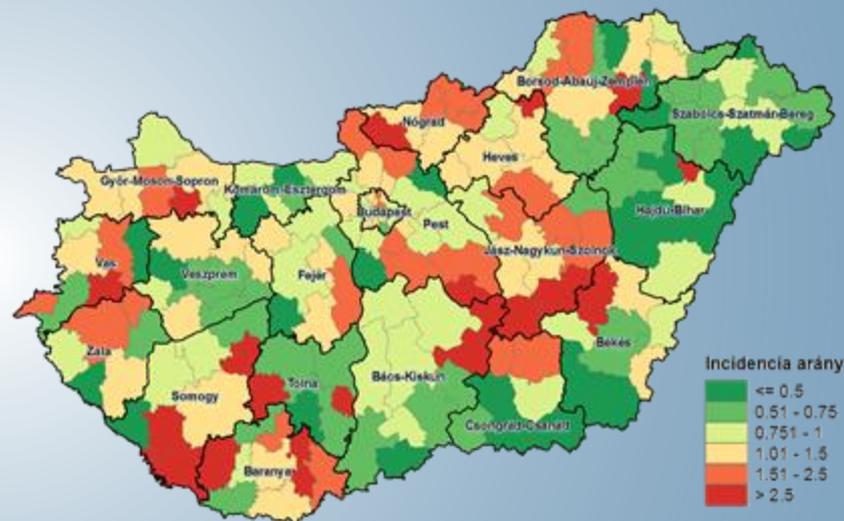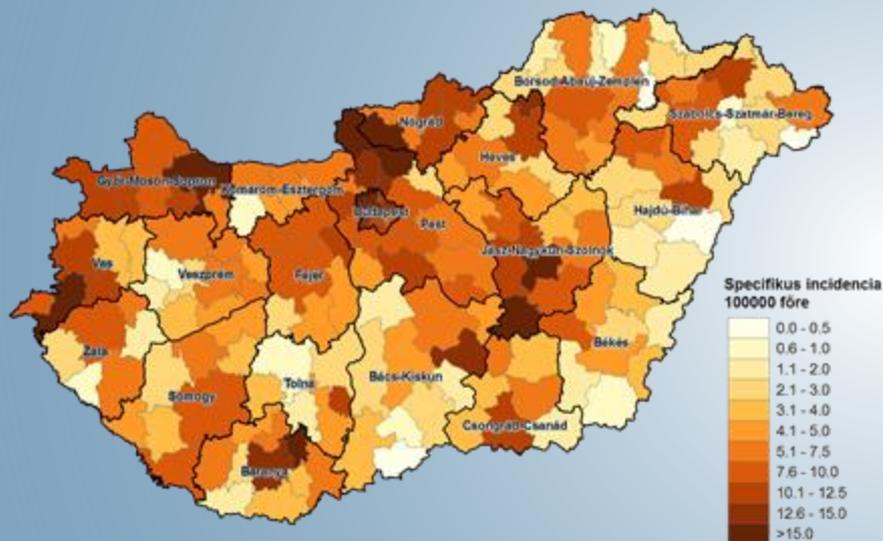
# Weekly distribution of COVID-19 cases based on age groups
2nd difference in comparion with the Spring wave of the epidemic: the vast majority of new cases are from younger age groups (Hungary, 01 Oct., 07 a.m.)
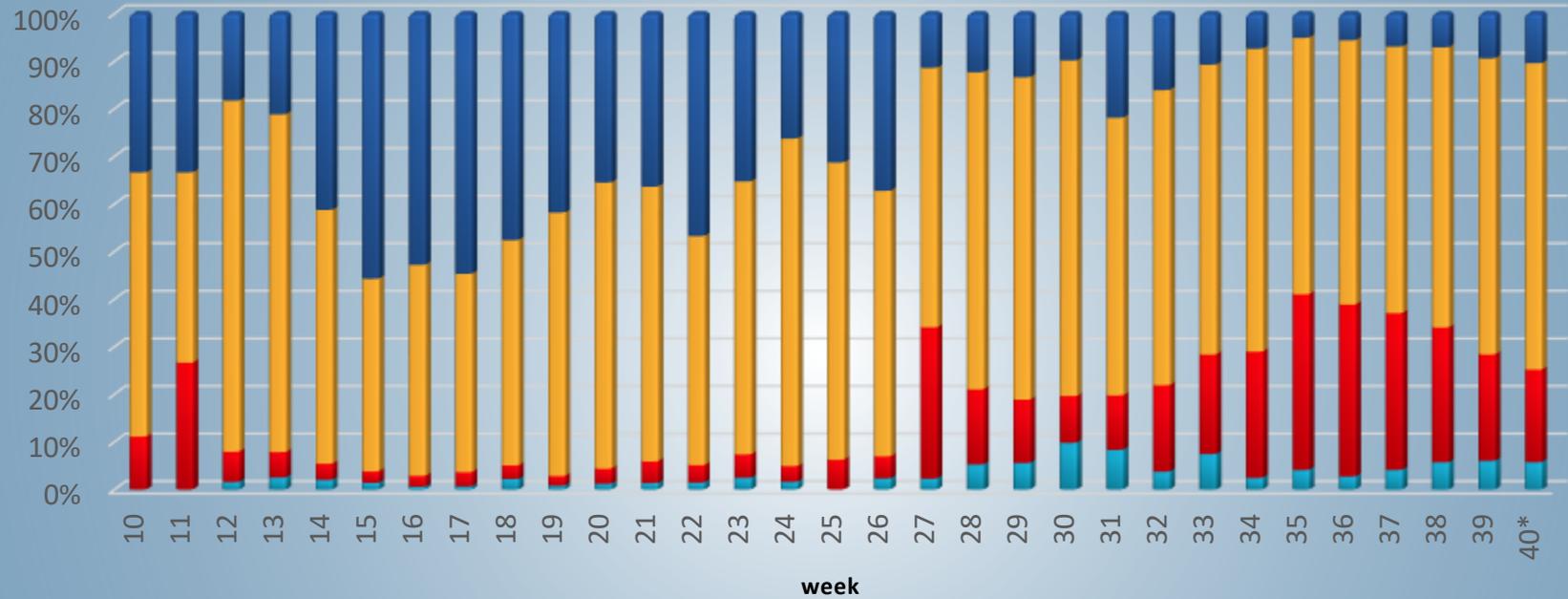
* Data are available on the first three days of week 40.

■ 0-14   ■ 15-24   ■ 25-64   ■ 65+

week

Source of data: National Centre for Public Health

The mean value of the ages of new cases is increasing.
(Hungary, 01 Oct. 2020, 07 a.m.)
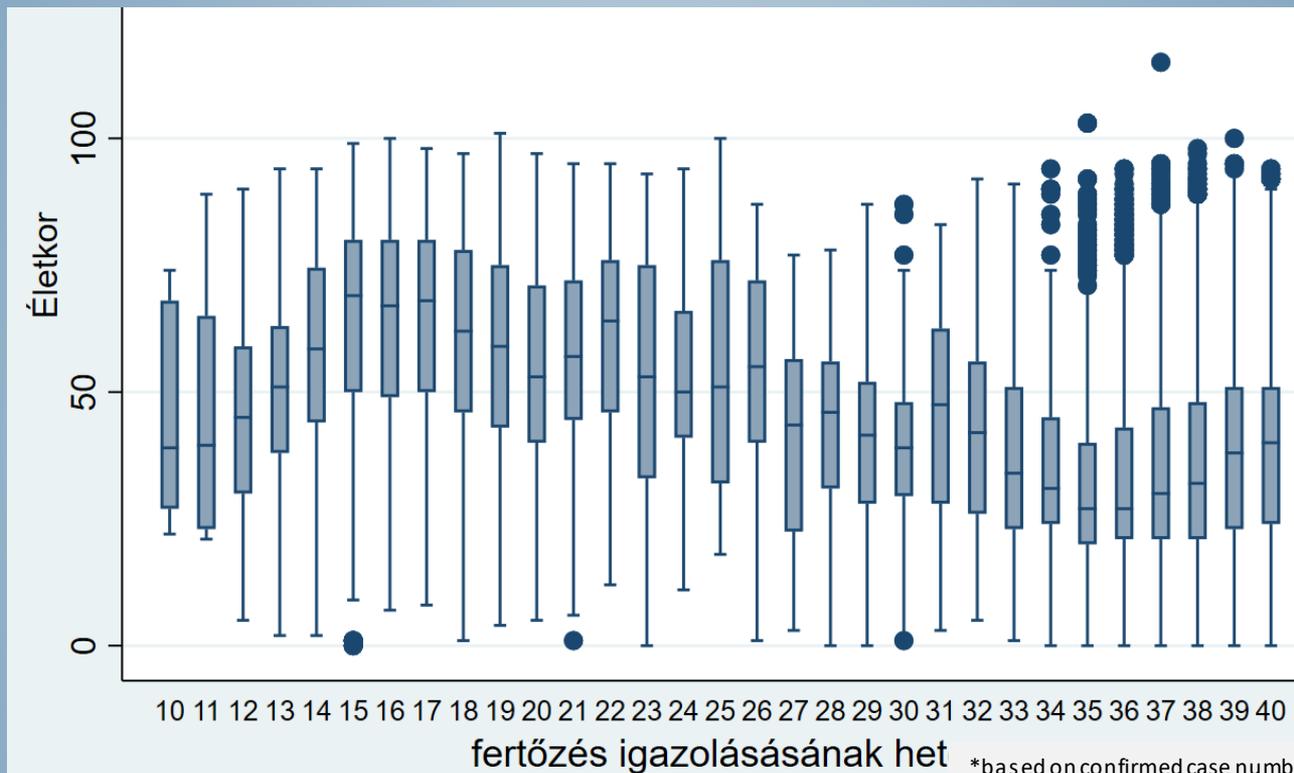
*based on confirmed case number on the first 3 days of week 40

Median age on week 15 (6-12 Apr.): 69 years, week 37: 30 years, week 39: (21-27 Sept.): 38 years, on week 40* (28-30. Sept.), median age continued to increase, reaching 40.
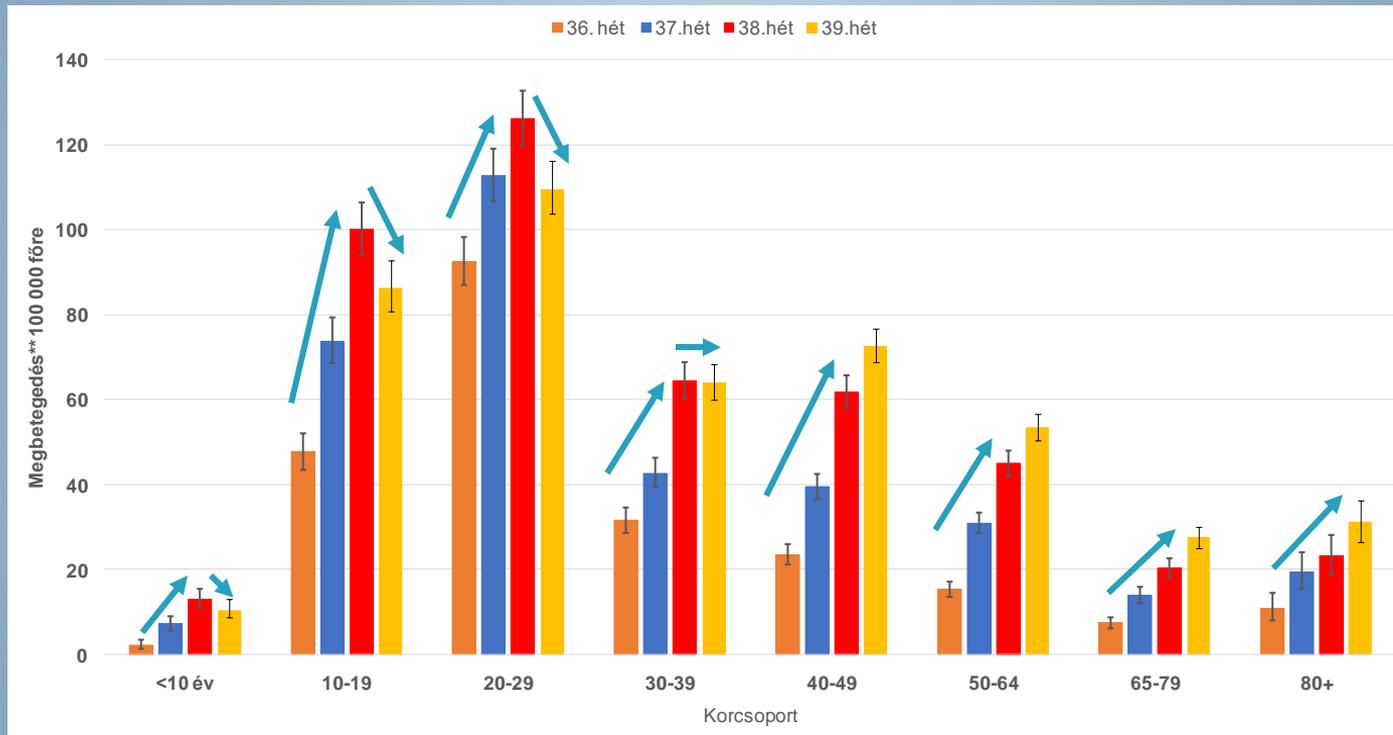
Between weeks 36 and 39, the age-specific COVID-19 case rate** in the 40+ age group increased (Hungary, 01 Oct. 2020 07 a.m.)

Week 36 2020 (31 Aug. 2020-06 Sept., N= 2814 persons)

Week 37 2020 (07 Sept. 2020-13 Sept., N= 4198 persons)

Week 38 2020 (14 Sept. 2020-20 Sept., N= 5708 persons)
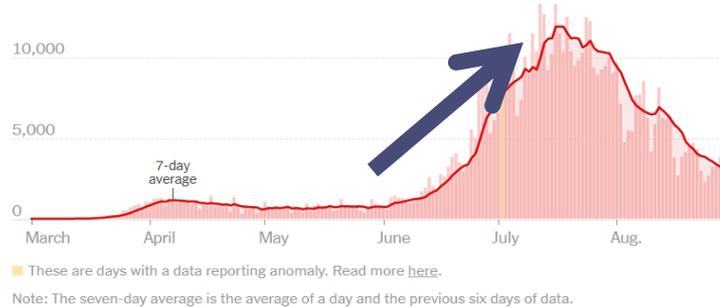
Week 39 2020 (21 Sept. 2020-27 Sept., N= 5856 persons)
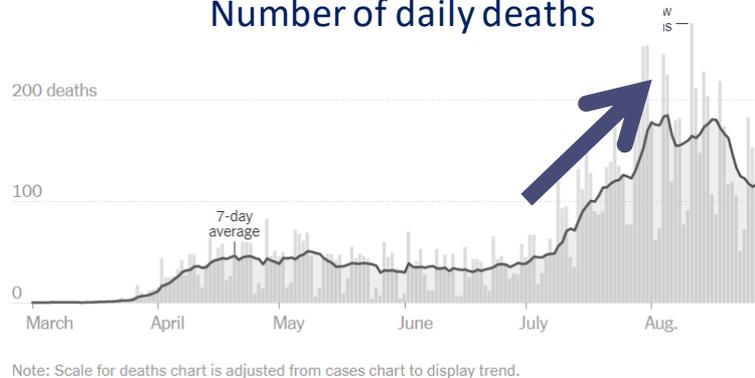
**in 100 confirmed cases of COVID-19

The infection is spreading among the youth? Florida!

A great risk of the increasing spreading of the virus among the youth: with time it can also reach other age groups.

Number of new daily cases

15,000 cases

10,000

5,000

0

March   April   May   June   July   Aug.

These are days with a data reporting anomaly. Read more here.

Note: The seven-day average is the average of a day and the previous six days of data.

Number of daily deaths

200 deaths

100

0

March   April   May   June   July   Aug.

Note: Scale for deaths chart is adjusted from cases chart to display trend.

The increase in the number of deaths showed a 5-week delay in comparison with the increase in the new daily cases.
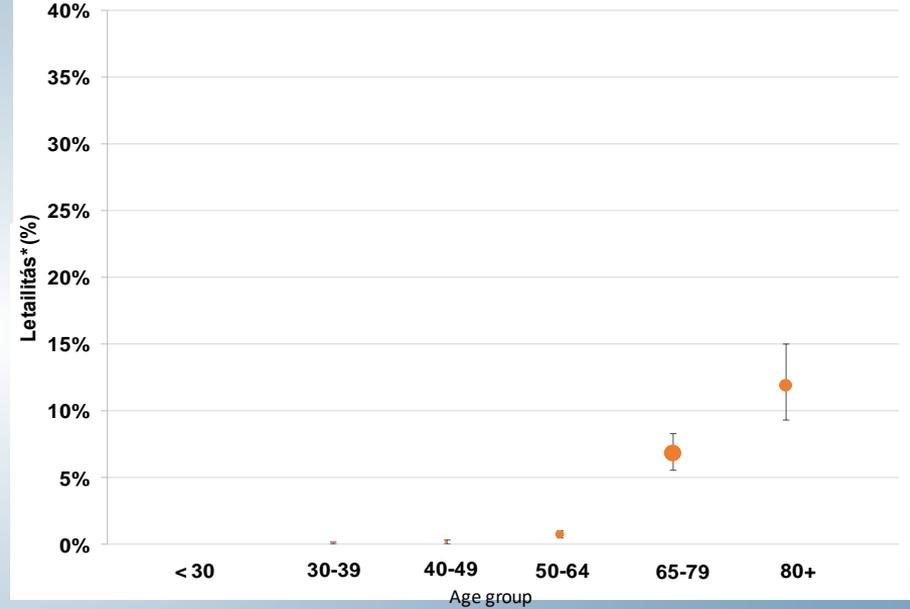
Source: The New York Times

Age-specific COVID-19 lethality*
(Hungary, 01 October 2020, 07 a.m.)

until week 10-25 2020 (04 March 2020- 21 June, N= 595 persons)

until week 26-40 2020 (22 June 2020-30 September, N= 186 persons)**
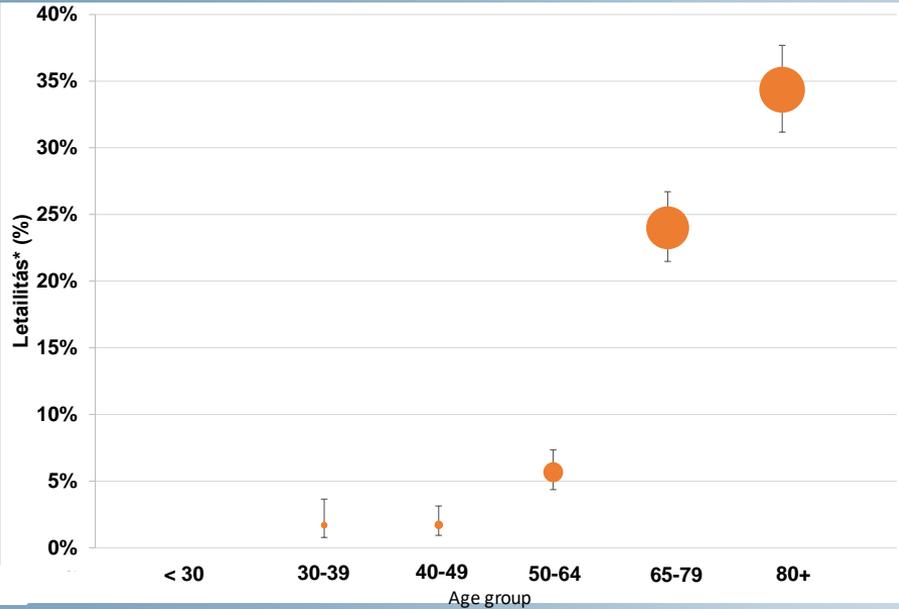
*based on 100 confirmed COVID-19 cases

** data are available for the first three days of week 40

Source of data: National Centre for Public Health

Organising of shifts, groups, schedules (reducing the number of contacts)

Rearranging the physical space

Retracability of contacts
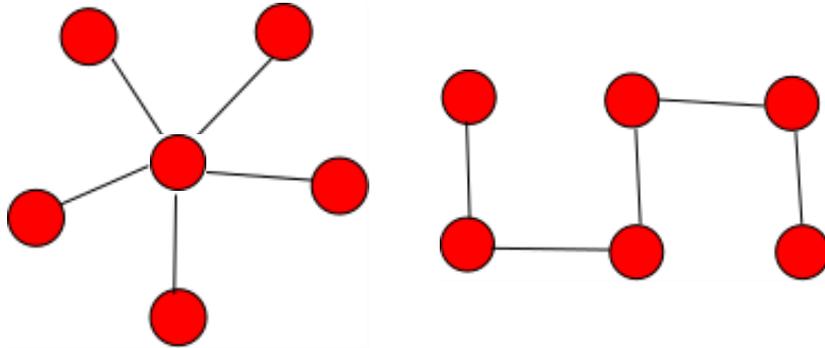
Extending of PCR screening (symptomatic people, contacts, those with a high infection risk, those affected through their professions, patients)
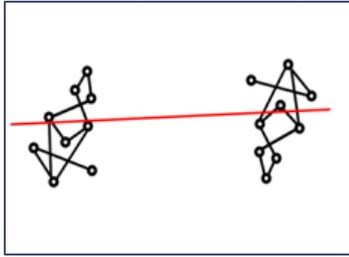
Wearing a mask (80%)

Hand hygiene

Social distancing

with the permission of Gergely Röst

What kind of contact-reducing strategies can be considered in schools? Every school should find their own method, fitting the needs of their institution!
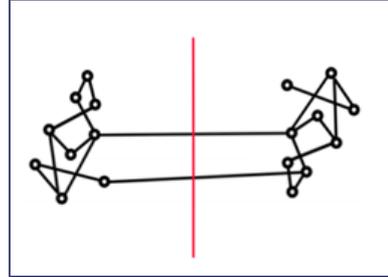
Contact reduction	→	Social distancing	→	Personal protection: mask + adequate hand hygiene

1. Reduce risky, close contacts in the classroom

- Dividing the classes
- Contact bubbles
- Social distancing
- Installing hand sanitizer dispensers
- Suspending of communal singing in closed spaces
- Wearing a mask during classes
- As many outside classes as possible (not only PE!)

2. Reduce risky, close contacts between classes

- Alternating weekly rotation (week A, week B, morning, afternoon, etc.)
- Shifting of breaks between classes
- Eliminating migration between classrooms
- Organising several time frames for school cafeteria use and lunchbreaks
- Wearing a mask between classes, too, etc.

Authentic and convincing risk communication based on professional expertise continues to be crucial!

- Authentic communicators and setting an example

- Instead of fear and passivity, building on awareness raising and the involvement of the public

- Emphasizing that no one is to be blamed for the spreading of the virus

- Addressing the youth: they are much needed in the protection, we should build on them

- Explaining the risks, shifting emphases towards individual and commual responsibility, protecting ourselves and others

- Let us persuade our fellow citizens to cooperate!

Official opening of the academic year,
Benedictine Secondary School of Pannonhalma, 30 August 2020