



Leiden University
Medical Center

Excess mortality during the Covid-19 epidemic:

- (1) **vulnerable groups and long-term effects**
- (2) **a closer look at vulnerable groups**

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Research group and working lines



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Mobility

Vaccine
Dynamic
model

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Methods – unique model (all variables)

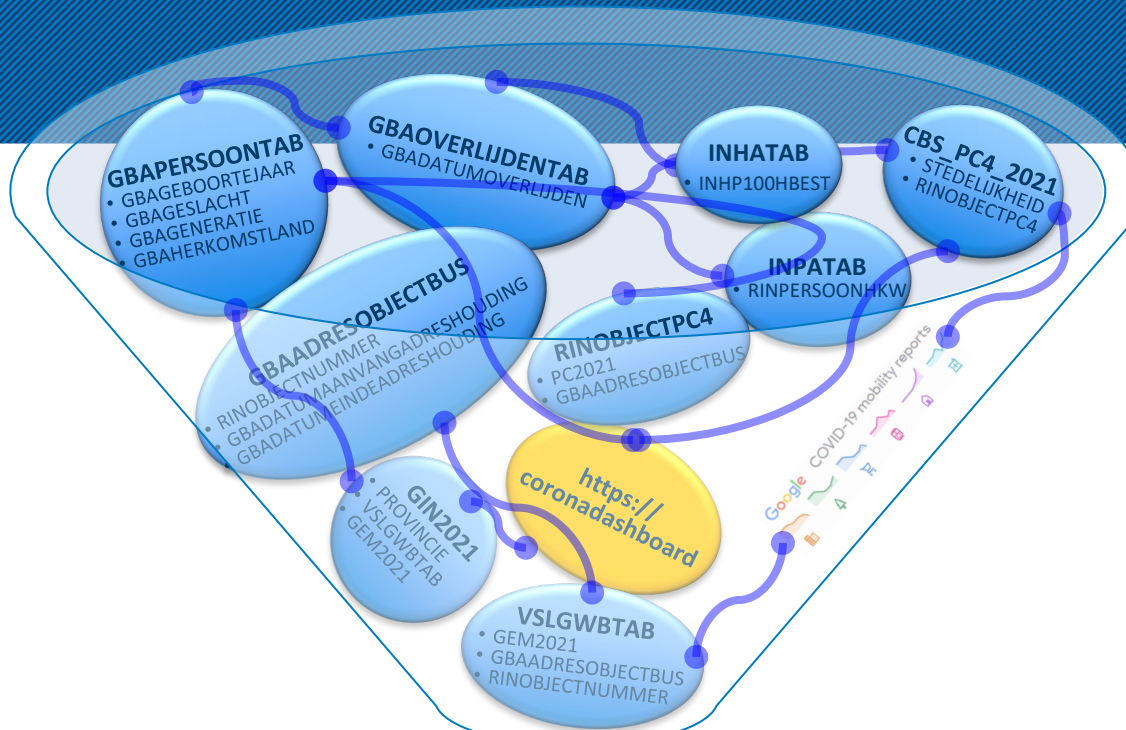
Outcomes: incidences rate of mortality 2020 and 2021 reference 2019

$\log([rate = \text{number of events/person-year}]) =$

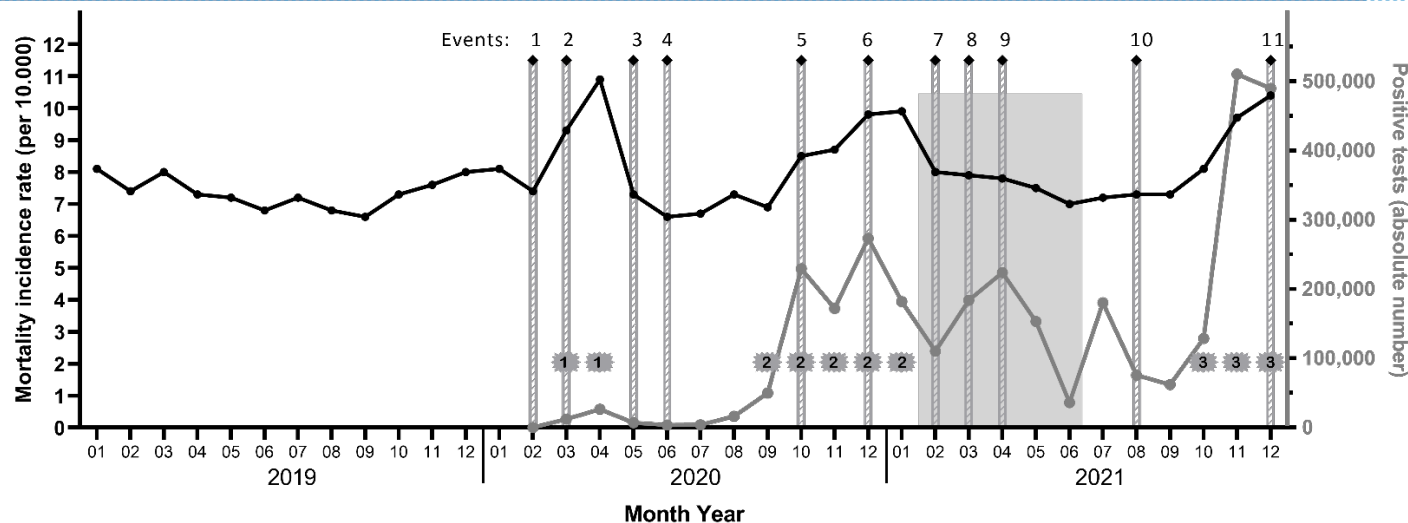
$$\begin{aligned} & \beta_{cons} \\ & + \beta [Month] \\ & + \beta [Age] \\ & + \beta [Female] + \beta [Male] \\ & + \beta [Native] + \beta [1^{st} Gen] + \beta [2^{nd} Gen] \\ & + \beta [q1] + \beta [q2] + \beta [q3] + \beta [q4] + \beta [Institutional Household] + \beta [children] + \beta [unknown] \\ & + \beta [2019 = \text{reference}] + \beta [2020] + \beta [2021] \end{aligned} \quad \left. \begin{array}{l} \text{Month} \\ \text{Age} \\ \text{Sex} \\ \text{Immigration background} \\ \text{Household income} \\ \text{Year} \end{array} \right\} \text{ \{results in categories 20y/5y\} }$$

Notes: 1. All analyses are done using CBS data in CBS environment
2. Person-years are updated per month

Data



Results



◆ Events

■ COVID-19 peaks

■ Vaccinations (major campaign)

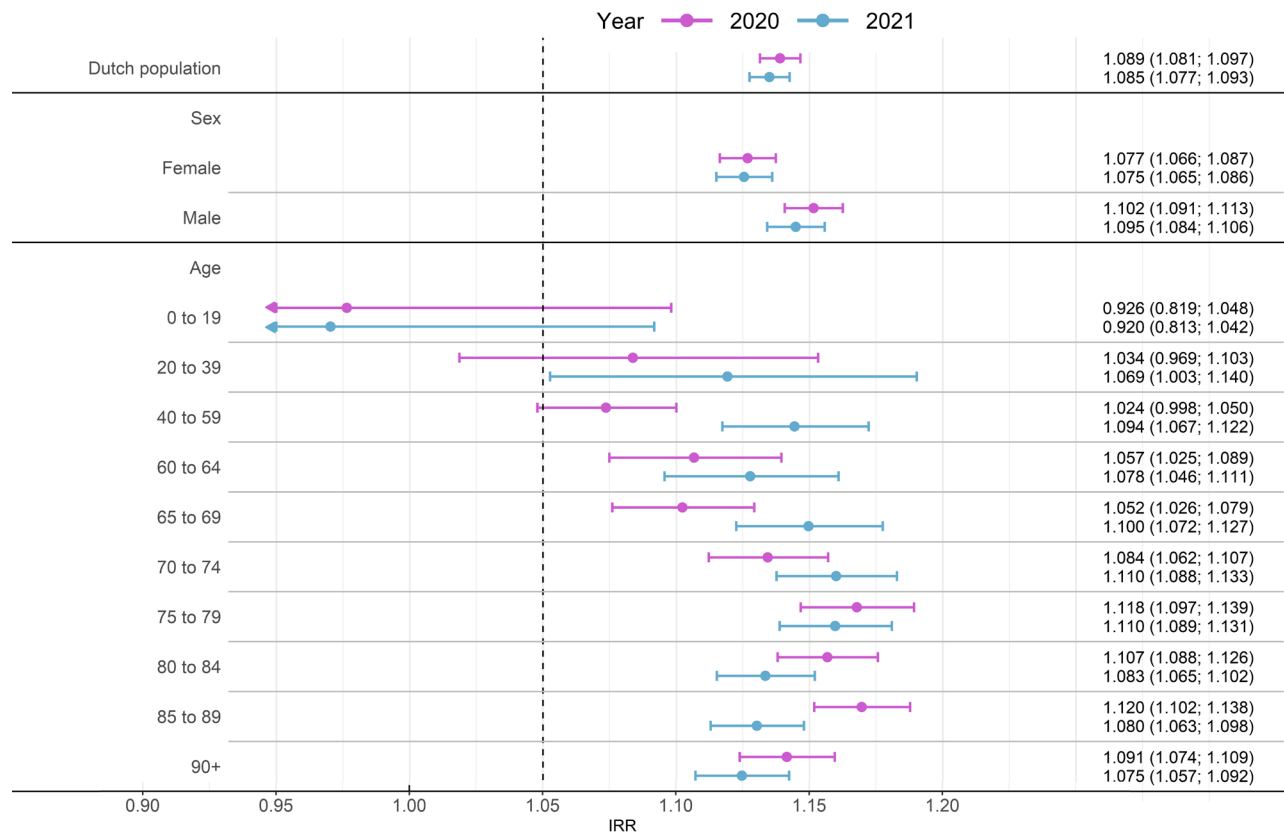
— Mortality incidence rate (left side y-axis)

— Positive tests (right side y-axis)

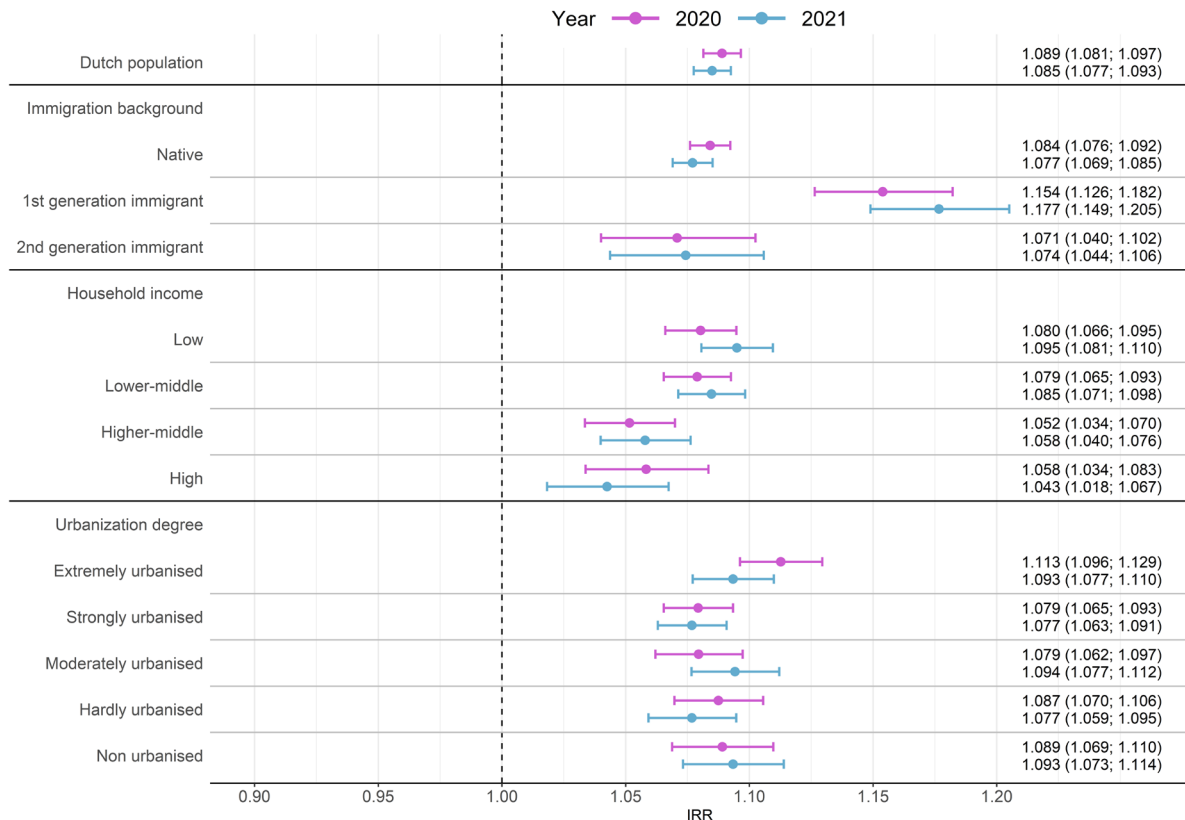
◆ Events:

1. February 2020.....Confirmation of the first COVID-19 patient in the Netherlands
2. March 2020.....First lockdown (schools, day-care and hospitality)
3. May 2020.....Partial lockdown relaxation (schools, day-care)
4. June 2020.....Lockdown relaxation (hospitality)
5. October 2020.....Partial lockdown (hospitality)
6. December 2020...Second lockdown (gyms and non-essential stores, online schooling)
7. February 2021.....Partial lockdown relaxation (primary schools, day-care)
8. March 2021.....Partial lockdown relaxation (secondary schools)
9. April 2021.....Lockdown relaxation (hospitality and non-essential stores)
10. August 2021.....Lockdown relaxation (secondary schools and universities)
11. December 2021...Third lockdown (schools, day-care)

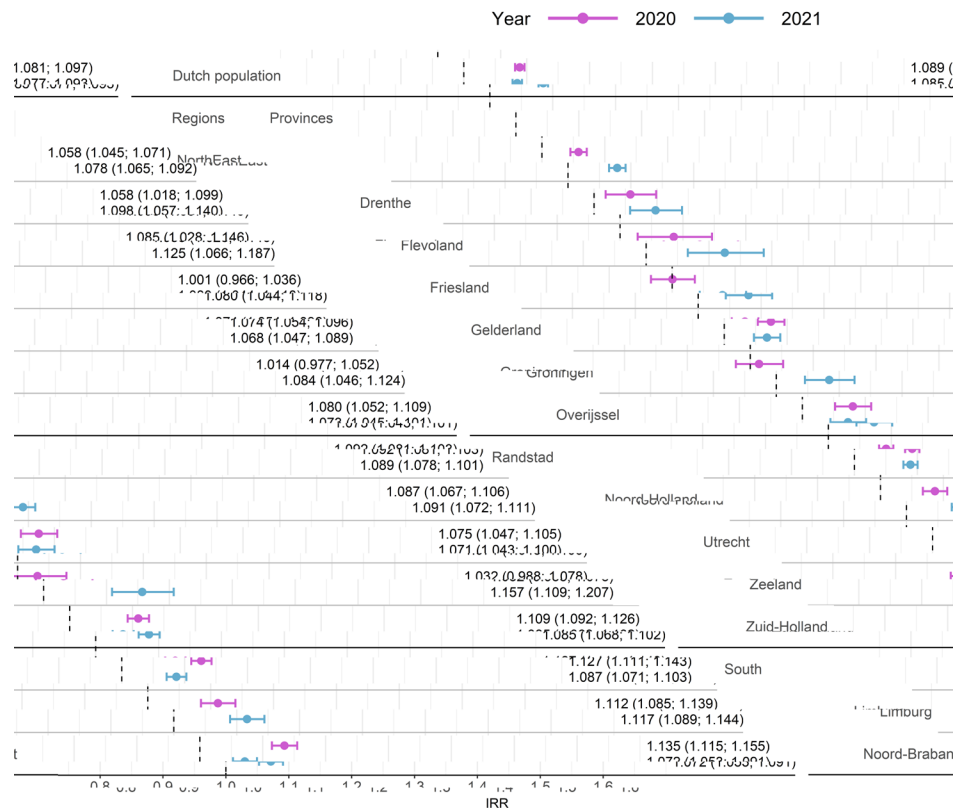
All-cause excess mortality: incidence-rate ratios (IRR)



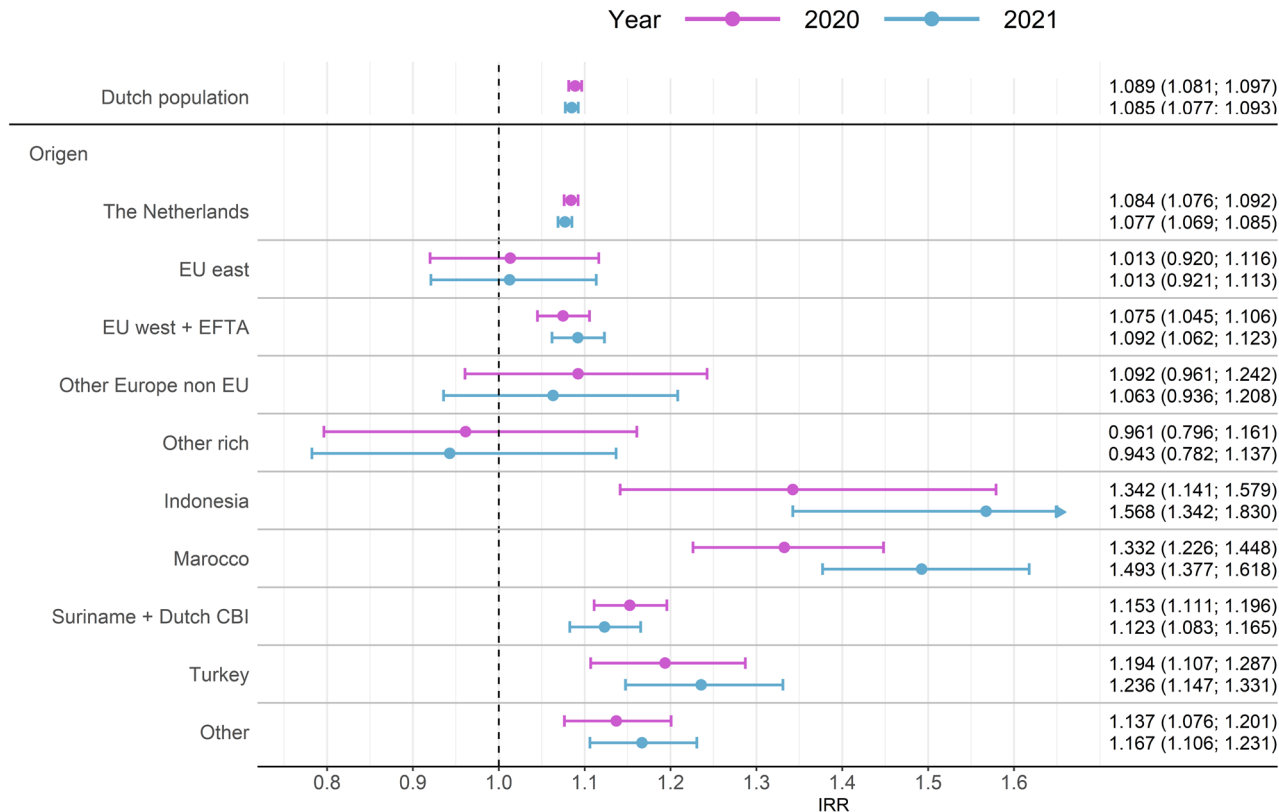
All-cause excess mortality: incidence-rate ratios (IRR)



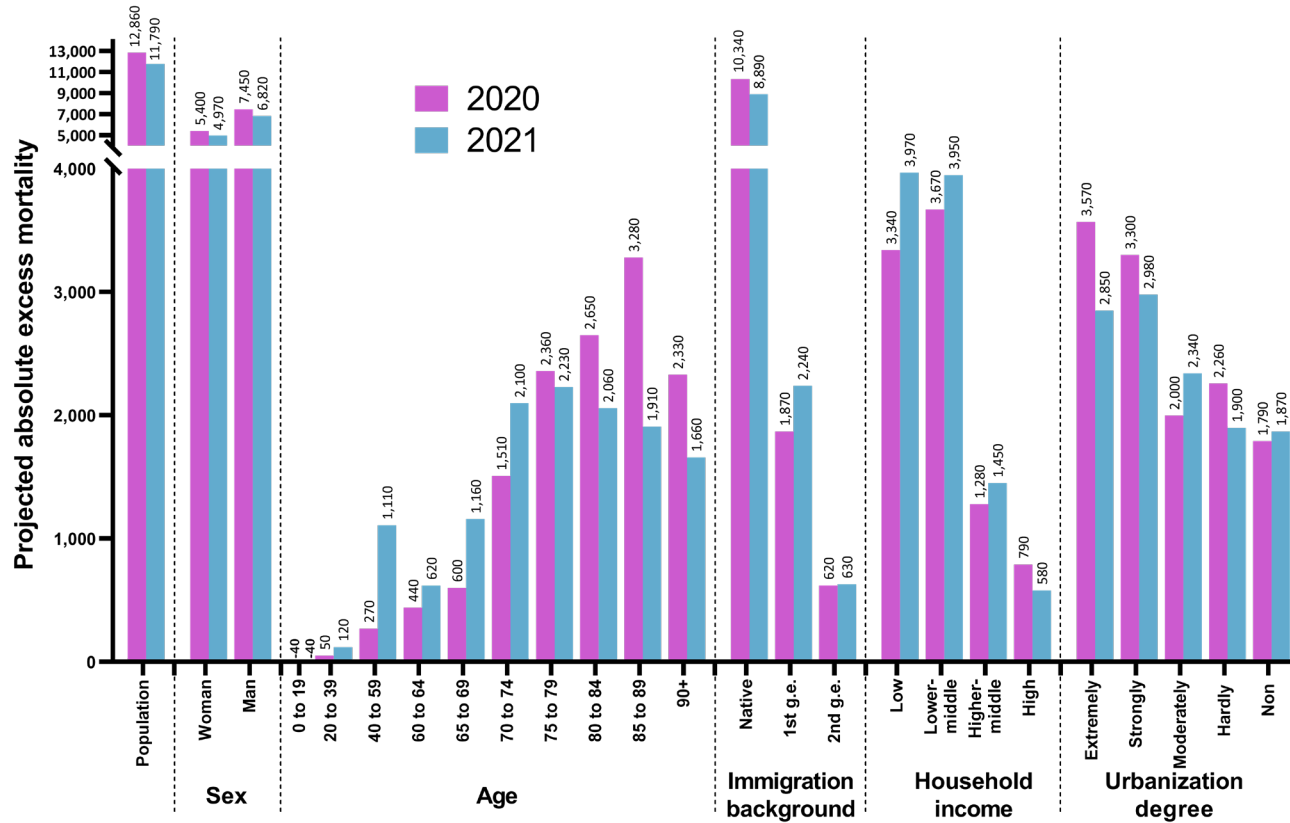
Provinces and regions



Immigration background (1st and 2nd generation)



Results in perspective – Absolute mortality



Other projects

Thank you for your attention