

Socio-economic influences on county-level differences in COVID-19 incidence during the second wave in Germany



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Objective

During fall and winter 2020/2021, before vaccines became available, Germany experienced a severe second wave of COVID-19, characterised by three distinct *phases*:

- I. exponential growth (5 Oct to 5 Nov 2020)
- II. high plateau (6 Nov to 6 Dec 2020),
- III. decline (12 Jan to 12 Feb 2021).

We investigated whether county-level incidence (cases per 100,000 inhabitants; “**cases/100k**”) in the three phases could be predicted by the following *socio-economic characteristics*:

- Population Density (inhabitants/km²; “**popDens**”),
- Household Size (mean number of persons per household; “**hhSize**”),
- Living Space (m²/inhabitant; “**livSpace**”),
- Disposable Income (EUR/inhabitant; “**income**”),
- Education Level (percentage of inhabitants with university-entrance qualification; “**Abitur**”).

Methods

Data were extracted from publicly available sources [1, 2]. For each phase, we computed a robust linear regression model with popDens, hhSize, livSpace, Abitur, and income as predictor variables for cases/100k. Analyses were performed using statistical software R and the “robust” package.

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Results

Table 1: Robust regression of COVID-19 incidence in Phase I.

	popDens	hhSize	livSpace	Abitur	income
beta	0.17	0.41	−0.22	−0.10	0.20
p	<0.001	<0.001	<0.001	0.056	<0.001
R ² = 0.44; multiple R ² = 0.32; F = 45.50; p = <0.001					

Table 2: Robust regression of COVID-19 incidence in Phase II.

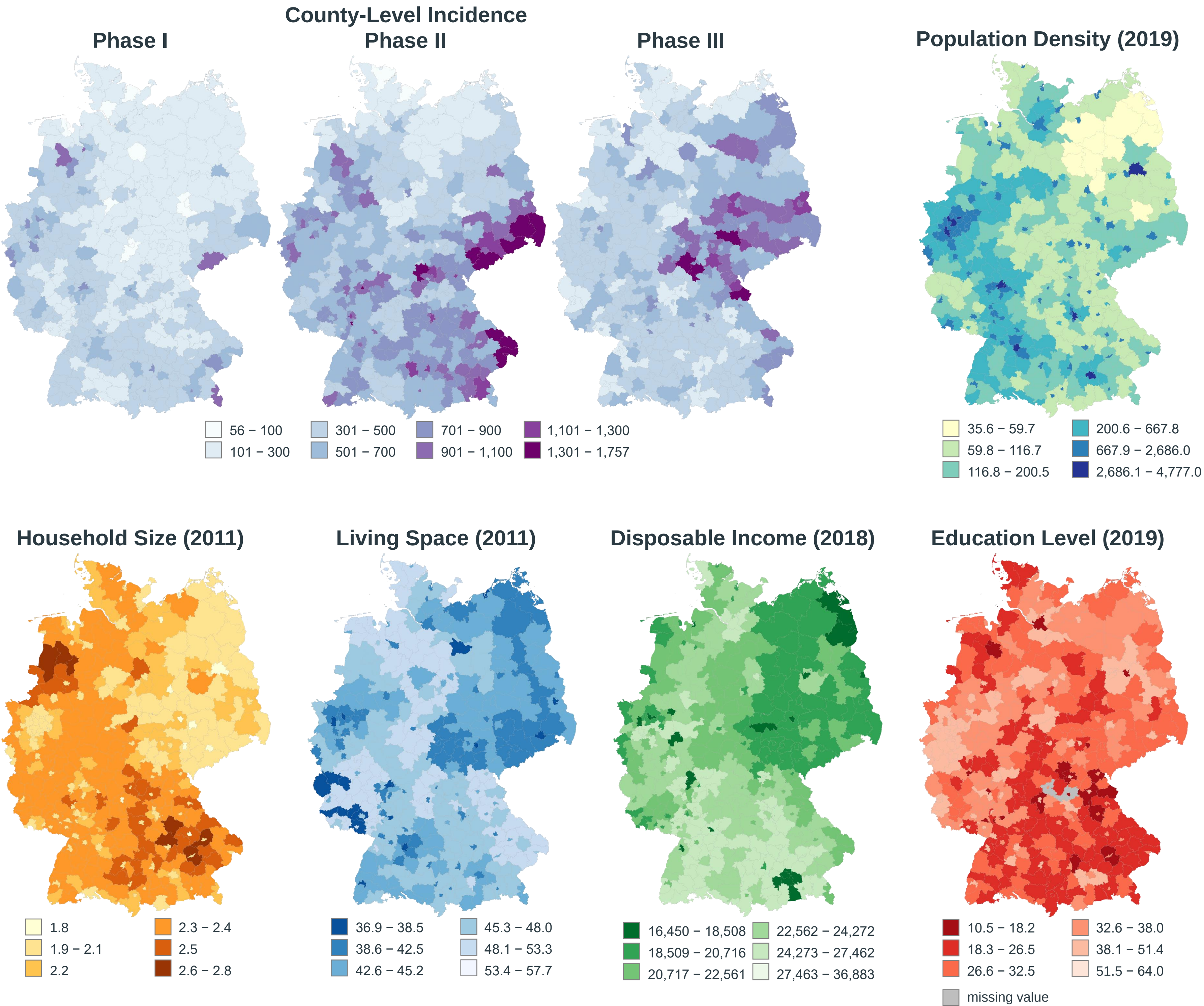
	popDens	hhSize	livSpace	Abitur	income
beta	0.12	0.39	−0.24	−0.15	0.15
p	<0.001	<0.001	<0.001	0.002	<0.001
R ² = 0.33; multiple R ² = 0.26; F = 32.14; p = <0.001					

Table 3: Robust regression of COVID-19 incidence in Phase III.

	popDens	hhSize	livSpace	Abitur	income
beta	−0.06	−0.14	−0.21	−0.11	−0.16
p	<0.001	0.031	<0.001	0.052	<0.001
R ² = 0.18; multiple R ² = 0.08; F = 8.45; p = 0.118					

Conclusions

- In phase I and II, counties with higher **popDens** and greater **hhSize**, but also more disposable **income**, experienced a higher incidence; this relationship was reversed in phase III.
- Independent of the phase, counties with less average **livSpace** suffered a higher incidence.
- **Abitur** was a weak predictor of COVID incidence.



References:

1. Robert-Koch-Institut 2021. COVID-19 Datenhub. Available at: https://npgco-corona-npgeo-de.hub.arcgis.com/datasets/dd4580c810204019a7b8eb3e0b329dd6_0/explorer?showTable=true. Accessed on: 23.05.2021.
2. Statistische Ämter des Bundes und der Länder 2021. Regionalatlas Deutschland. Available at: <https://regionalatlas.statistikportal.de/>. Accessed on: 01.09.2021.