Regional Differences in Morbidity Across Germany: A Cross-State Comparison Using Hospital Data

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Background

- To support health policy decisions, it is becoming increasingly important to assess the burden of disease in the population and to understand regional differences.

- Morbidity is a health indicator that measures the frequency of disease cases in a specific population group over a defined period.[1]

Objective

- The aim of the study was to investigate the presence of regional differences in morbidity across geographic regions in Germany.

Methods

- Retrospective hospital data from the German Institute for the Hospital Remuneration System (InEK) from 2019 to 2023 were used.[2]

- Aggregated data were investigated at federal state level and stratified by geographic region (East, Northwest, Southwest).

- Primary and secondary inpatient diagnoses (4-digit ICD-10-GM codes) were utilized.

- Comorbidity scores (updated Charlson Comorbidity Index [uCCI]) per 1,000 capita were calculated based on diagnosis data.

- Significance of regional differences was assessed with a negative binomial mixed-model.

- For effect strength estimation, risk ratios (RR) adjusted for average age, sex distribution, city state status, outpatient physicians per 1,000 capita and gross domestic product (GDP) per capita were calculated.

- Data for demographics and other covariates were obtained from the Federal Statistical Office (DESTATIS)[3] and the German Medical Association (Bundesärztekammer).[4]

Limitations

- Comorbidity scores (uCCI) should have been approximated, as these were calculated based on aggregated rather than individual diagnosis data.

- Although certain covariates were considered in the model, other important factors (e.g., education level, distance to major healthcare centers) may have not been included.

Conclusions

- Although attempts have been made to equalize regional differences in the 35 years since the reunification of the Federal Republic of Germany and the German Democratic Republic, Eastern Germany still lags behind other regions of the country.

- Based on hospital data, Eastern Germany shows significantly higher morbidity compared to the Northwest and Southwest of Germany.

- Respective differences and the associated burden of disease must be considered when refining the healthcare system and inpatient capacities.

References

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Results

Comorbidity scores by geographic region

- Across all years, the East had the highest comorbidity scores, ranging from 381.1 in 2019 to 327.7 in 2023 (**Figure 1**).

- Lowest comorbidity scores were observed for the Southwest, ranging from 277.4 in 2019 to 231.8 in 2023.

- A downward trend was observed over time.

Figure 1. CCI points per 1,000 capita by geographic region and year
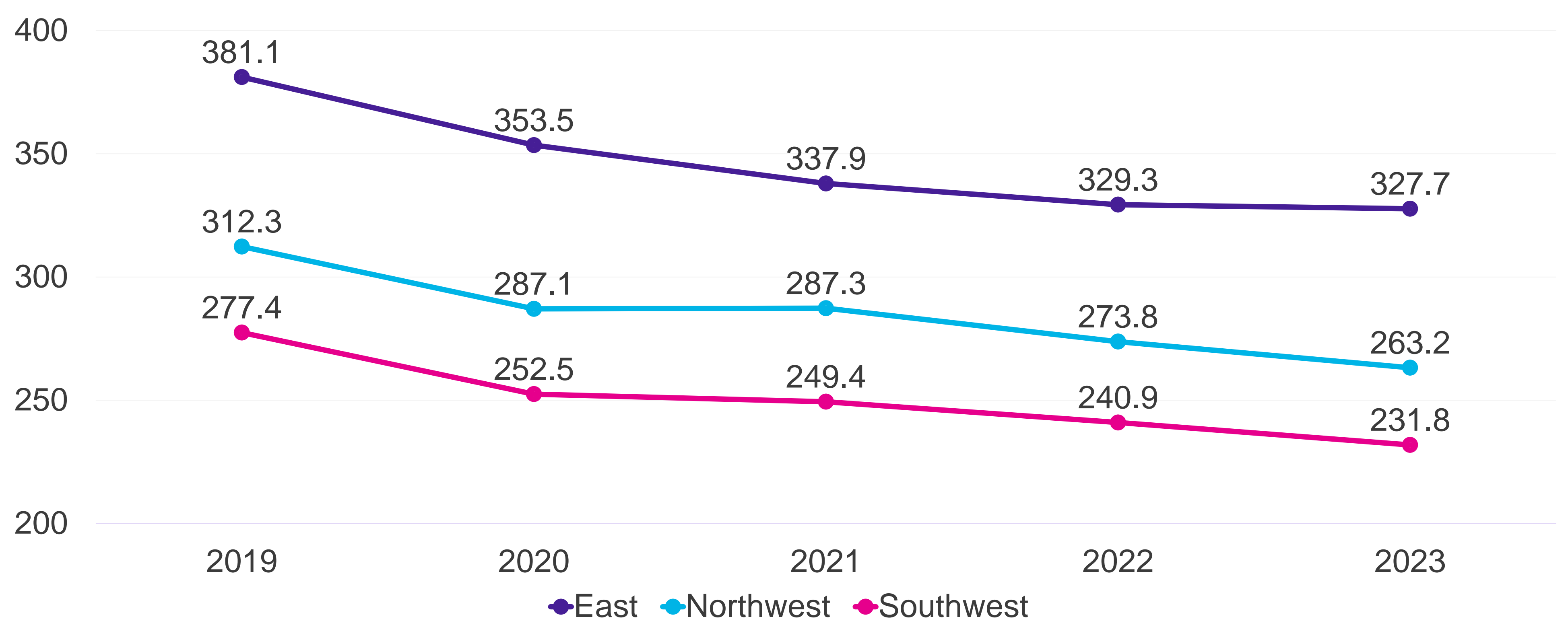
- With an adjusted RR of 0.85 (95%-CI: 0.72-0.98), the Northwest had significantly lower scores compared to the East (z=-1.989, p=0.047) (**Figure 2**).

- Similarly, the Southwest had significantly lower scores (z=-2.63, p=0.008) and an adjusted RR of 0.74 (95%-CI: 0.59-0.93).

- Other significant covariates were year (z=-216.71, p<0.002), outpatient physicians per 1,000 capita (z=-2.72, p=0.006), GDP per capita (z=3.42, p<0.001), and city state status (z=2.25, p=0.024).

Figure 2. Negative binomial mixed model, risk-ratios
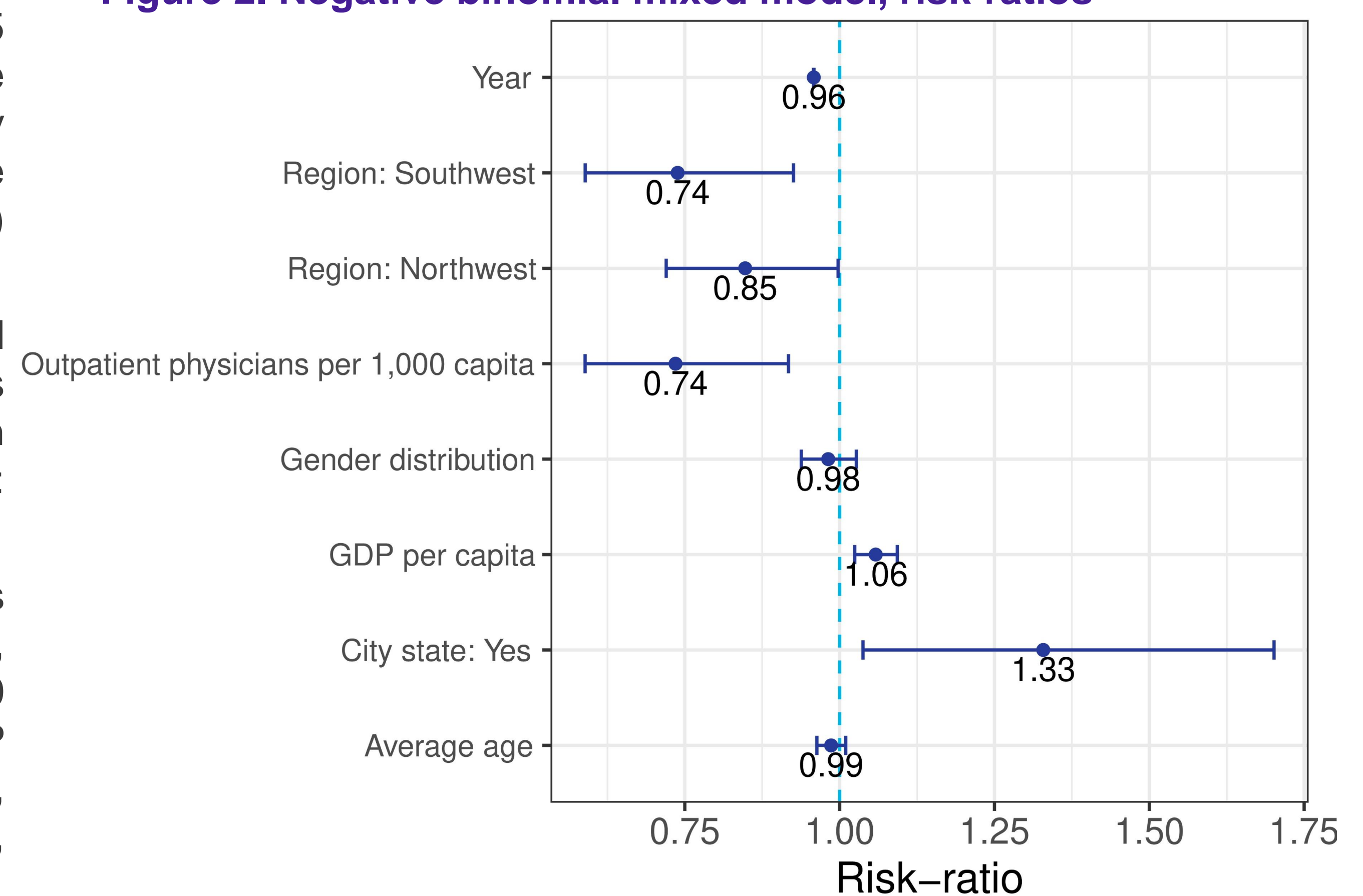
Comorbidity scores by federal state

- Comorbidity scores by German federal states from 2019 to 2023 are shown in **Figure 3**.

- Lowest comorbidity scores across all years were calculated for the federal state Hesse (240.5 in 2019 and 210.0 in 2023).

- Highest comorbidity scores across all years were calculated for the federal state Bremen (462.0 in 2019 and 409.7 in 2023).

Figure 3. CCI points per 1,000 capita by federal state and year