Geographic and Socioeconomic Variation in Healthcare: Evidence from Migration

Péter Elek¹,², Anita Győrfi³, Nóra Kungl³, Dániel Prinz⁴

¹HUN-REN Centre for Economic and Regional Studies ²Corvinus University of Budapest ³Vienna Graduate School of Economics ⁴World Bank

9th World Congress of the International Microsimulation Association, 2024, Vienna

10 January, 2024
Motivation

• **Socioeconomic differences** in health and healthcare use even in developed countries
  • Low-income groups have **worse health** (e.g. in life expectancy)
  • **Effective access** may differ across groups
    • 27% of patients with low level of education reported unmet needs for healthcare (Eurostat, 2019)

• **Large geographic variation** in healthcare use across all types of systems
  • Per capita utilization difference in the highest vs. lowest spending area is e.g. 84% in the US and 53% in Hungary
District-level healthcare spending in Hungary

Outpatient spending

Inpatient spending

Drug spending
Sources of regional variation

- **Main sources of variation**
  - **Patient share** (demand side)
    - health status
    - preferences
  - **Place share** (supply side)
    - capacities (number of physicians, equipment)
    - physicians’ belief, practice style
    - local climate and local economic conditions

- **Decomposition: using moves across districts**

- **Policy implications**
  - High place share suggests inefficiencies in the supply of health care
  - Heterogeneity: understanding the sources can help to target policies
• Sources of **regional variation** in healthcare utilization using mover identification

• Sources of **socioeconomic differences** in healthcare utilization
  - **Supply-side**: *Brekke et al.* (2018), *Chen and Lakdawalla* (2019), *Martin et al.* (2020); *Turner et al.* (2022)
• Single-payer system with universal coverage, which is free at the point of use (apart from pharmaceuticals).

• Primary care:
  • Provided by law at place of residence or nearby

• Specialist outpatient care:
  • Available in almost all district centres

• Inpatient care:
  • Available in half of district centres, but county seats provide higher level of services

• Prescribed pharmaceuticals
A random 50% sample of the 2003 population of Hungary for years 2009–2017 (approx. 5 million people)

Matched administrative dataset on healthcare and labour market variables

- **Demography**: Gender, age, occurrence and time of death, district of residence
  - 197 districts in Hungary (with approx. 50,000 population on average)

- **Healthcare**:
  - **Outpatient care** (by specialties): number of visits & spending
  - **Inpatient care** (by specialties): number of days & spending
  - **Prescribed pharmaceuticals** (ATC categories): number of prescriptions and spending

- **Labour market**: labour force status, earnings, pensions
• Definition: county of residence changed exactly once in 2010-2016
• Age at time of move: 30-79
• Excluding Budapest-agglomeration moves
\[ E(y_{it}) = \exp (\alpha_i + \gamma_{j(i,t)} + \tau_t + x_{it} \lambda) \]

- \( y_{it} \): health care utilization of individual i in period t
- \( \alpha_i \): individual i effect
- \( \gamma_{j(i,t)} \): district j effect
- \( \tau_t \): time effect.

- We choose an exponential specification because of the nature of the variables (count or spending data with many zeros).
Estimation: difference-in-differences

• Identification depends on the presence of movers.
• $t_i^0$: time of move for individual $i$, $o(i)$ the origin, $d(i)$ the destination district
• Then the equation can be written into a difference-in-differences-type framework:

$$E(y_{it}) = \exp(\alpha_i' + \tau_t + \mathbb{I}_{t \geq t_i^0} \times \theta \times \Delta_i + x_{it} \beta)$$

• where $\Delta_i = \log \bar{y}_{d(i)} - \log \bar{y}_{o(i)}$ is the log difference of average utilization of the destination and origin district
• $\theta$, the place share, is the parameter of interest.
• Besides the above DiD-type analysis, we also estimate event study versions:

\[ E(y_{it}) = \exp \left( \alpha_i' + \tau_t + \sum_{k=-5}^{k=4} \theta_k \times \mathbb{I}_{\{k=t-t_0\}} \times \Delta_i + x_{it} \beta \right). \]

• The models are estimated with fixed-effects Poisson regression.
Event-study results: outpatient care

Outpatient Visits

Outpatient Spending
Place shares ($\theta$) from DiD estimation

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outpatient care</td>
<td>Inpatient care</td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td>Frequency</td>
<td>0.659***</td>
<td>0.0136</td>
<td>0.183***</td>
</tr>
<tr>
<td></td>
<td>(0.0316)</td>
<td>(0.148)</td>
<td>(0.0397)</td>
</tr>
<tr>
<td>Spending</td>
<td>0.659***</td>
<td>0.252</td>
<td>0.305*</td>
</tr>
<tr>
<td></td>
<td>(0.0298)</td>
<td>(0.191)</td>
<td>(0.170)</td>
</tr>
<tr>
<td>Observations</td>
<td>266,290</td>
<td>128,271</td>
<td>257,731</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

**Note:** Difference-in-differences estimates of place effects. Controls include calendar year fixed effects and gender – age group interactions. For each utilization type, the first row shows a measure of frequency and the second row shows spending. Frequency measures are outpatient visits, inpatient days, and number of prescriptions.
95% CIs of $\theta$, estimated on subgroups
Possible mechanisms

• Place share is higher among low-ses people
  • which is not driven by differences in health (no difference by health status).

• Supply-side constraints may include:
  • **Capacity constraints** may affect some patients disproportionately
  • Quality of physician-patient communication
  • Unconscious bias and discrimination
We study how **district-level observables** affect healthcare use.

- Part of the endogeneity can be removed by observing movers.

We estimate fixed-effects Poisson regressions

\[
E(y_{it}) = \exp(\alpha_i + z_{j(i,t)}\eta + x_{it}\lambda)
\]

where \(z_{j(i,t)}\) is a vector of observable district characteristics

- healthcare capacities (outpatient hours, hospital beds)
- geography (distance from county seat)
- socioeconomic conditions (average taxable income)
Movers react strongly to changes in outpatient capacities
  • even stronger effects for women and low-ses patients

Substitution between inpatient and outpatient care
• **Place effects** account for 66% of the variation in outpatient spending, 31% in drug spending, while do **not** play a role in inpatient spending.

• There is **heterogeneity** in outpatient place shares:
  • 65-78% for low-income groups, and
  • 23-55% for high-income groups.

• Positive association between district-level outpatient spending and **capacities**
  • stronger for female and low-income groups.

• Effective access is not universal, and there are inefficiencies on the supply side.
Thank you for your attention!