Healthcare Spending Inequality: Evidence from Hungarian Administrative Data*

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Abstract

Using administrative data on a random 50% of the Hungarian population, including individual-level information on incomes, healthcare spending, and mortality for the 2003-2011 period, we develop new evidence on the distribution of healthcare spending and mortality in Hungary by income and geography. By linking detailed administrative data on employment, income, and geographic location with measures of healthcare spending and mortality we are able to provide a more complete picture than the existing literature which has relied on survey data. We compute mean spending and 5-year and 8-year mortality measures by geography and income quantiles, and also present gender and age adjusted results.

We document four patterns: (i) substantial geographic heterogeneity in healthcare spending; (ii) positive association between labor income and public healthcare spending; (iii) geographic variation in the strength of the association between labor income and healthcare spending; and (iv) negative association between labor income and mortality. In further exploratory analysis, we find no statistically significant correlation between simple county-level supply measures and healthcare spending. We argue that taken together, these patterns suggest that individuals with higher labor income are in better health but consume more healthcare because they have better access to services.

Our work suggests new directions for research on the relationship between health inequalities and healthcare spending inequalities and the role of subtler barriers to healthcare access.

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1 Introduction

Almost all developed countries have universal health insurance: through public insurance programs or through privately provided social insurance, they give access to healthcare services to their entire population. In most European nations, regardless of income, people have nominal access to the same services, which are typically free at the point of use or come with small copayments. However, there are many reasons why in practice individuals with different incomes may use public services differently. On the one hand, individuals with lower incomes are more likely to be in worse health (Walters and Suhrcke, 2005; Mackenbach et al., 2008; Chetty et al., 2016), suggesting that they may use healthcare services more. On the other hand, there are geographic inequalities in the availability of many services and individuals at different points in the income distribution may have different amounts of social capital or trust in medical providers, suggesting that lower income individuals may use healthcare services less because they have worse effective access (Walters and Suhrcke, 2005; OECD and European Commission, 2014; Cylus and Papanicolas, 2015). In addition to geographic differences in the availability of services, variation in the preferences of patients and physicians can also be important in explaining geographic variation (Skinner, 2011; Finkelstein, Gentzkow and Williams, 2016; Cutler, Skinner, Stern and Wennberg, 2019). How healthcare use varies with income and geography and whether effective access is equitable across geographic regions and the income distribution remain empirical questions even in developed countries with universal social insurance programs.

In this paper, we document inequalities by income and geography in the use of different types of healthcare services and in mortality using administrative data that covers half of the population of Hungary. By linking detailed data on employment, income, and geographic location with measures of healthcare spending and mortality, we are able to provide a more complete picture than the existing literature which has relied on survey data. By using administrative data on employment and income, we have more accurate estimates of earnings from employment and from transfer programs than work relying on survey data. Adminis-
ative data on healthcare spending linked to earnings data allow us to get a full and accurate picture of all publicly financed healthcare spending, which is typically not possible through surveys, both because of possible inaccuracies in self-reports of income and healthcare use but also because it is difficult for individuals to estimate public spending associated with their healthcare use episodes.

We document four main facts. First, there is substantial heterogeneity across geographic regions of Hungary in healthcare spending. In the highest spending county, average outpatient spending is 77%, inpatient spending is 27%, and prescription drug spending is 37% higher than in the lowest spending county. Second, income is broadly positively associated with public healthcare spending both nationally and within geographic units. On average, individuals in the 75th percentile of the national income distribution have 11-17% higher public healthcare spending than individuals at the 25th percentile of the national income distribution. Third, the slope of the association between healthcare spending and income is different across geographic units, or in other words, different areas exhibit different levels of healthcare spending inequality. The difference in total healthcare spending between the top and the bottom decile of the national income distribution is 46% on average across counties; in the least unequal county, this difference is 27%; in the most unequal county, this difference is 70%. Fourth, higher-income Hungarians have substantially lower mortality rates than lower-income Hungarians both nationally and within geographic units. Gender- and age-adjusted 5-year mortality is 0.6 percentage point higher in the lowest decile of the income distribution than in the highest decile. Taken together, these patterns suggest that higher-income Hungarians are in better health but they consume more healthcare relative to their lower-income counterparts because they have better access to services.

Our findings contribute to several strands of the literature on health inequality. Our finding of broad geographic variation in healthcare spending in Hungary contributes to an existing literature in Hungary (Orosz, 1990; Nagy, 2010; Fadgyas-Freyler and Korponai, 2016) that uses aggregated data from the national health insurance fund. Using individ-
ual level spending data linked to demographic information and employment outcomes, we are able to present estimates of geographic variation that take into account variation in observable characteristics of the population of different areas.

Our finding that there is a positive association between income and healthcare spending of active workers contributes to an existing international literature (Chen and Escarce, 2004; Morris, Sutton and Gravelle, 2005; Devaux, 2015), including existing studies with a specific focus on Eastern Europe, former communist countries, and the former Soviet Union (Bobak et al., 2000; Balabanova and McKee, 2002; Balabanova et al., 2004). However, we make progress on several dimensions relative to prior studies because we use population-wide administrative data. First, our estimates are much more precise in a statistical sense. The prior literature relies on representative surveys with up to a few tens of thousands of participants. For example, Devaux (2015) uses a survey in which 4,500 Hungarians were interviewed and Morris, Sutton and Gravelle (2005) uses a survey with 50,000 British participants. In contrast, our analytic sample, after implementing a number of restrictions, has over 750,000 individuals. This means that for our reported estimates, standard errors are very small; relative standard errors are typically below 2%. Second, we are able to paint a much more nuanced picture of inequalities. For example, Morris, Sutton and Gravelle (2005) estimate linear probability models of the relationship between income and healthcare use and Chen and Escarce (2004) stratify healthcare use by 5 levels of income. In contrast, we are able to provide non-parametric estimates of average healthcare use by percentile of income. Third, we base our estimates on administrative records of social security expenditures rather than on individual recalls of healthcare use. This means that we can reliably document heterogeneity in all government healthcare expenditures. Fourth, given the richness of our data, we are able to go beyond documenting income differences in healthcare spending and mortality at the national level. In particular, we are able to show that the association between healthcare spending and income and mortality and income can be different in different areas of a country. This analysis is closest in spirit to the analysis presented by Chetty et al.
(2016) who analyze the relationship between income and mortality using tax records, but we analyze healthcare expenditures in addition to mortality.

A related literature studies the role of informal payments in Hungary (Gaál et al., 2011; Baji et al., 2012; Baji, Pavlova, Gulácsi and Groot, 2013) and other transition economies (Thompson and Witter, 2000; Lewis, 2002; Ensor, 2004; Lewis, 2007), as well as the contribution of other factors Lucevic et al. (2019), including financial constraints and waiting lists to unequal healthcare access. This literature has found informal payments and other access barriers to be potential contributors to inequality despite universal coverage. With our data, we are unable to directly speak to the role of these potential mechanisms behind our findings, but our results are certainly consistent with this literature. Nevertheless, we briefly analyze the relationship between some simple supply measures (per capita numbers of hospital beds, physicians and pharmacies) in explaining cross-county spending variation, but uncover no statistically significant relationships at the county level, though we do not have sufficient statistical power to draw firm conclusions at this level of aggregation.

Our findings on the association between income and mortality and on the geographic variation in the strength of this association also contribute to an existing literature that studies inequality in health by income in general (Walters and Suhrcke, 2005; Mackenbach et al., 2008) and mortality inequality in particular (Chetty et al., 2016), including studies with a focus on former communist countries (Leinsalu, 2002; Kalediene and Petrauskiene, 2004; Monden, 2004) and Hungary (Kopp, Árpád Skrabski and Szedmák, 2000). We provide evidence from a country and region where mortality inequality has not been documented in such detail, assessing not only the association of income and mortality but geographic variation in this association. Furthermore, we not only present evidence on mortality inequality but inequality in healthcare spending based on individual data which is a missing piece in the health inequality literature.

The remainder of this paper proceeds as follows. Section 2 provides a brief overview of the Hungarian healthcare system. Section 3 describes the data used in this study. Section
summarizes our analysis. Section 5 presents our results. Section 6 discusses our findings, limitations and open questions. Section 7 briefly summarizes and concludes the paper.

2 Background

In this section, we highlight some important features of the Hungarian healthcare system. We refer the reader to Gaál et al. (2011) for an in-depth overview. The Hungarian healthcare system is a single-payer system, where services are financed from health insurance contributions and government subsidies that are paid from general revenues. The system is administered by a centralized agency, the National Health Insurance Fund Administration (NHIFA). The vast majority of individuals—employees, the unemployed, pensioners and recipients of various government benefits—are automatically insured. Employers are obligated to pay social insurance contributions for their employees. To remain insured, individuals who do not belong to any of the automatically covered categories are required to pay a monthly fee for health insurance coverage. Those with low incomes are exempt from the health insurance fee.

The majority of healthcare services, including both outpatient and inpatient care, do not require co-payments, although informal payments are common for a wide range of services (Gaál, Evetovits and McKee, 2006). People may opt for using private care, and in our data, we only observe public spending. In our study period, private care was common only in a limited set of specialties, e.g., dental care and gynecology. To use private care, patients have to pay fees out-of-pocket, private insurance being virtually nonexistent. A key feature of the Hungarian system is that prescription drugs have high out-of-pocket costs relative to other developed countries. Out-of-pocket prescription drug costs constitute 2% of final household consumption, the second highest share among OECD countries after Mexico (OECD, 2017). Out-of-pocket costs for prescription drugs depend on the amount of subsidies from the NHIFA which varies greatly across products. On average, patients have to cover slightly less than
half of the price of a prescription drug and the rest is paid by the NHIFA. Importantly, as discussed in Section 3, we are able to observe both spending by the NHIFA and out-of-pocket spending for prescription drugs in our data.

Despite almost universal health insurance coverage, differences in effective access to healthcare remain. According to Eurostat (2019), 22.5% of the population reported unmet healthcare needs in 2014. 13.8% reported unmet needs due to financial reasons, 12.8% due to waiting lists and 2.6% due to distance or transport. Lucevic et al. (2019) report even higher rates of unmet healthcare needs. For instance, they find that 24.2% of individuals with medical problems had unfilled prescription due to costs. Unmet needs are more prevalent among the less educated (Eurostat, 2019) and those with lower income (Lucevic et al., 2019).

3 Data and sample

We use administrative data from Hungary, covering years 2003-2011 on a random 50% sample of the 2003 population of individuals aged 5-74. The data was created by linking administrative data from the Hungarian tax authority, the pension fund, the health insurance fund, the labor office, and the education authority. The linked dataset is under the ownership of the Central Administration of National Pension Insurance, the National Health Insurance Fund Administration, the Educational Authority, the National Tax and Customs Administration, the National Labour Office, and the Pension Payment Directorate of Hungary. The data used were processed by the Institute of Economics, Centre for Economic and Regional Studies of the Hungarian Academy of Sciences. The data is a 50% random sample in order to comply with privacy regulation. The sample was drawn by the National Health Insurance fund of Hungary, inclusion in the sample was determined based on birthdays, hence the sample is effectively random. The dataset covers 4,601,999 individuals. Our analytic sample (described below) has on average 767,480 individuals in each year.
Health expenditures are observed on the annual level. We have information on the annual public expenditures on specialist outpatient care and inpatient care, and prescription drugs. For prescription drugs, we can also observe out-of-pocket spending. All health expenditure measures are winsorized at 99% of their respective distributions. We observe mortality at the monthly level. An important limitation is that location data (city and county of residence) is only available in 2003 and is not updated subsequently. Cross-county migration can be approximated from 10-year census data. Over the 10-year period between 2001 and 2011, approximately 15% of the population moved between counties (Lakatos, L. Rédei and Kapitány, 2015). The income variable we use includes all employment-based income and excludes public transfers.

We restrict the sample to individuals aged 18-55, who earn at least the minimum wage each month and do not receive any public transfers (pension, unemployment benefit, or maternity payment). We do so to guard against a certain form of “reverse causality”: individuals who are out of the labor force because they are sick would appear to have low earnings and high healthcare utilization, but these patterns are not informative about the longer-term relationship between earnings and healthcare spending. We relate the current year’s healthcare expenditures to the previous year’s income percentile, and we restrict the sample further to those who spent zero days on sick-leave the previous year. This restriction ensures that sick leave spells (hence lower earnings) do not influence the income distribution.

When calculating mortality rates, we use the year 2003 sample with the above restrictions. The sample is then further restricted to those who spent zero days on sick-leave in 2003, again to avoid that sick leave spells influence the income distribution.

The variables used in the main analysis are listed in Table A1 in the Appendix.

As a supplementary data source, we use county level annual statistics of healthcare supply indicators from the T-STAR municipal statistical system of the Central Statistical Office of Hungary. The variables we use are the per capita numbers of hospital beds, physicians and pharmacies in a given county in a given year.
4 Methods

Using our main analytic sample described in Section 3, we compute mean spending by counties and income bins. In our national analyses, we use income percentiles, while in our county-level analyses we aggregate to deciles for statistical power.

In our analyses, we provide plots and maps of the geographic distribution of healthcare spending for three types of spending (outpatient, inpatient, prescription drugs). We also show plots of the distribution of spending across percentiles of the national income distribution, aggregating to deciles when showing within-county variation. Finally, we show similar plots of 5-year and 8-year mortality, both nationally and within counties. All plots are adjusted for gender and age. The adjustment is made in two steps: first, we regress the spending and mortality indicators on gender and 1-year age bins and calculate the residuals; second, we add the residuals to the mean spending which we use as the adjusted measure. When analyzing within-county spending and mortality patterns, we use deciles of the national income distribution. This means that points in the cross-decile spending and mortality comparisons for different counties reflect the same level of income, but each decile may have a different number of individuals in different counties.

To analyse if counties rank similarly in terms of outpatient, inpatient and prescription drug spending, we calculate the rank-rank correlation (Spearman’s rho) across these indicators. To do so, we rank the counties according to the three types of per capita healthcare spending, and calculate the correlation coefficients across these ranks.

We also conduct a variance decomposition of spending variation across the 2,000 county \times percentile cells (20 counties \times 100 income percentiles). In this exercise we ask, how much variance would be reduced if (a) spending were the same across income percentiles in a county, (b) we let everyone in the same income percentile have the same spending.

To investigate if the availability of healthcare services drive our results, we correlate the county level per capita numbers of hospital beds, physicians and pharmacies with the healthcare spending measures. Also, to check if higher healthcare spending is associated with
lower mortality, we correlate the county level mortality and healthcare spending measures. Since such a county level analysis is subject to limitations (lack of statistical power), we do not report detailed results but briefly summarize the findings in Section 6.

5 Results

5.1 Summary statistics

Table A1 in the Appendix shows that individuals in the analytic sample are on average higher earners and about 4 years older than individuals in the full sample, while the gender composition is similar. Outpatient expenditures are similar in the two samples, while inpatient and Rx spending are on average lower in the analytic sample than in the full sample. Importantly, the analytic sample faces significantly lower short-term mortality risk, which is perhaps not surprising since we are limiting to active and relatively healthy workers.

5.2 Healthcare spending

Figure 1 shows mean expenditures in the three categories (outpatient, inpatient, prescription drugs) by county over years 2004-2011. We observe substantial heterogeneity across counties. In the highest spending county, average outpatient spending is 77% (4,855 HUF, with 300 HUF ≈ 1 EUR), inpatient spending is 27% (1,704 HUF), and prescription drug spending is 37% (6,324 HUF) higher than in the lowest spending county. Interestingly, it appears that there is variation in the ranking of counties by type of spending. While Eastern and Southern counties are broadly the highest spending counties in each category, the correlation is less than perfect. The rank-rank correlation (Spearman’s rho) of outpatient and inpatient spending is $\rho = 0.39$, while for inpatient and prescription drug spending it is $\rho = 0.53$, and for outpatient and prescription drug spending it is $\rho = 0.23$. One area that stands out as being different on different measures of spending is Budapest. The capital, which is the most populated and wealthiest area of the country almost tops the outpatient spending
distribution and is almost at the top of the prescription drug spending distribution, but is in the middle of the inpatient spending distribution.

Figure 2 shows the distribution of expenditures in the three categories (outpatient, inpatient, prescription drugs) across percentiles of (previous year’s) income. Income is positively associated with public healthcare spending. Age- and gender-adjusted outpatient spending is 13% (1,163 HUF, with 300 HUF ≈ 1 EUR), inpatient spending is 17% (1,278 HUF), and prescription drug spending is 11% (2,321 HUF) higher on average at the 75th percentile of the national income distribution than at the 25th percentile. Age- and gender-adjusted outpatient spending is 34% (2,596 HUF), inpatient spending is 33% (2,089 HUF), and prescription drug spending is 27% (5,702 HUF) higher on average at the 90th percentile of the national income distribution than at the 10th percentile. Visual inspection suggests that the slope of the spending-income relationship decreases as we go higher in the distribution. Going from the first to the second decile of the national income distribution is associated with a 7% increase in outpatient spending, 17% increase in inpatient spending, and 5% increase in prescription drug spending. Going from the fourth to the fifth decile, the respective increase is only 3%, 4%, and 3% for the three categories.

In Figure 3 we explore within-county heterogeneity in spending by income. In these figures, we plot mean spending (with 95% confidence interval) in each of the categories by county against national wage deciles. That is, the figures show (1) the difference in spending between two individuals who have similar income but live in two different counties and (2) the difference in spending between two individuals who make different incomes but live in the same county. They also allow us to investigate whether the spending-income relationship has a different slope in different areas. The three counties that we show in the figures are the 2nd (Győr-Moson-Sopron), 11th (Szabolcs-Szatmár-Bereg), and 18th (Budapest) counties, by the average rank in the three spending distributions (outpatient, inpatient, prescription drug). They also represent a geographically heterogeneous group of counties, one county from the Eastern region (Szabolcs-Szatmár-Bereg), one from the Western region (Győr-
Moson-Sopron), and one county from the central region (Budapest). Data for every county is available online from AUTHORS’ WEBSITE.

The first insight from these figures is that the national relationship between income and healthcare spending we documented in Figure 2 also exists within counties. It is also apparent that both the level of spending at the same income decile and the slope of the spending-income relationship is different across counties. The difference in the level of spending across counties at the same income decile suggests that the cross-county spending differentials documented in Figure 1 are not purely driven by cross-county income differences. For example, as we report above, mean outpatient spending is 77% higher in the highest spending county relative to the lowest spending county. This spending difference between the highest and lowest county by outpatient spending exists across the income distribution: it is 80% at the 25th percentile of the national income distribution and 83% at the 75th percentile. But the spending-income slope is quite different across the two counties: while in the lowest spending county, outpatient spending is 22% higher at the 75th percentile than at the 25th percentile, in the highest spending county the same difference is 15%. Similar patterns exist for other types of spending and other counties. Some of the figures show the spending distributions crossing: this means that below a certain point in the income distribution, one county spends more on average, while above that point the other county does.

The results of the variance decomposition indicate that if we eliminated cross-percentile variation, variance in outpatient spending would be reduced by 35%, while variance in inpatient and prescription drug spending would be reduced by 84% and 77%, respectively. If we eliminated cross-county variation, variance in outpatient spending would be reduced by 71%, variance in inpatient spending by 47%, and variance in prescription drug spending by 43%. These results suggest that variation in outpatient spending is much more driven by geographic differences relative to variation in inpatient and prescription drug spending, while variation by income is much more important for inpatient and prescription drug spending relative to outpatient spending.
5.3 Mortality

The top panel of Figure 4 shows mean 5-year and 8-year mortality rates by income decile, adjusted for age and gender (due to the adjustment, some of the calculated mortality rates shift slightly below zero at the top income categories). Income is negatively associated with mortality. 5-year mortality is 0.6 percentage points higher in the bottom decile than in the top decile (0.6% versus approximately 0%), and 8-year mortality is 2 percentage points higher in the bottom decile than in the top decile (2% versus approximately 0%). These results are in line with the expectation that lower-income individuals would have worse health and therefore higher mortality. They suggest that, as expected, health differences by income cannot explain healthcare spending differences by income.

In the bottom panel of Figure 4, we show within-county heterogeneity in mortality rates by income. In these figures, we plot mean mortality (with 95% confidence interval) against national wage deciles. This means that—parallel to Figure 3 for healthcare spending discussed above—we are able to show the relationship between income and mortality, the difference in overall mortality rates across counties and differences in the mortality-income relationship across counties. These figures show that there are important differences in average mortality across counties. They also suggest that the negative mortality-income relationship exists within geographic units as well. We think that given our limited time window and wide standard errors differences across counties in the relative strength of the mortality-income relationship are hard to interpret. These figures provide evidence that the within-county positive slope of healthcare spending relative to income (Figure 3) cannot be attributed to health differences by income. Indeed, higher-income individuals are on average healthier than lower-income individuals.
6 Discussion

In this paper, we presented evidence on geographic variation and variation by income in healthcare spending and mortality in Hungary. We document substantial geographic heterogeneity and find that there is a positive relationship between labor income and public healthcare spending. To our knowledge, this is the first paper documenting variation in social insurance healthcare spending by income using detailed administrative data. We are able to develop a more nuanced picture than previous research, but many open questions remain.

The most important question is what causes the geographic and income differences in healthcare spending. The broader literature on geographic variation in public programs (where prices are not a primary driver of spending variation since they are set administratively) in other countries has considered the role of supply and demand factors (Skinner, 2011; Finkelstein, Gentzkow and Williams, 2016; Cutler, Skinner, Stern and Wennberg, 2019). Demand factors include variation in patient preferences, while supply factors include physician preferences but also potentially differences in access.

We think that in our context, access may play an important role, as has been suggested by some of the existing quasiexperimental literature in Hungary (Elek, Váradi and Varga, 2015; Bíró and Elek, 2019; Elek, Molnár and Váradi, 2019; Lucevic et al., 2019). Although there is almost universal health insurance coverage in Hungary, user fees, waiting lists and geographical distance may still cause heterogeneities in the access to care, as is also documented by empirical studies on unmet needs (Lucevic et al., 2019). Informal payments may also play a role, though the literature has only established their prevalence not their role in unequal access in Hungary (Gaál et al., 2011; Baji et al., 2012; Baji, Pavlova, Gulácsi and Groot, 2013) and other transition economies (Thompson and Witter, 2000; Lewis, 2002; Ensor, 2004; Lewis, 2007). In our analysis, one piece of evidence comes from geographic heterogeneity. We find that county means of outpatient and prescription drug spending are positively correlated with county level average wages, while the same correlation is nega-
tive for inpatient spending. This finding suggests that individuals in the poorer counties are on average in worse health, but have limited access to outpatient specialist care and to prescription drugs. Related to this, we find that when decomposing spending variation into a geographic and an income-related component, the geographic component is much more important for outpatient care, while the income component is much more important for inpatient care. Also, the Spearman’s correlation coefficient indicates relatively weak relation between how a county ranks in terms of inpatient, outpatient and prescription drug spending. Another suggestive pattern is the positive relationship between income and spending: higher income individuals likely have better access even to publicly provided care (in line with previous international evidence) even though they are likely to be of better health. This is supported by our mortality results: we uncover a negative income gradient for mortality.

It should be noted that we found no statistically significant correlation at the county level between simple supply measures (number of hospital beds, number of physicians, number of pharmacies) and healthcare spending. Similarly, we found no statistically significant correlation between life expectancy at the county level and our spending measures. These results should be interpreted with caution, since we do not have much statistical power using county-level observations. But one interpretation may be that instead of pure supply-side factors, information, connections, and patient preferences could play a role in explaining cross-county differentials. This would be in line with the finding that there are substantial within-county gradients in healthcare utilization which cannot be explained by cross-county variation in supply measures.

Our approach of using administrative data, has some limitations and drawbacks too. Most importantly, we do not have information on health status and we do not have nuanced measures of healthcare use. It is important to note that our sample is limited to full-time workers who do not receive public transfers. In some sense this sample limitation helps us guard against a form of reverse causality: individuals who are out of the labor force because they are sick would appear to have low earnings and high healthcare utilization and confound
the patterns that are related to other factors. But this also means that our study is applicable to active workers, rather than to the entire population. A key limitation of our work is that we observe healthcare spending, but not health. It is quite likely that health needs differ across the income distribution. To the extent that health needs are negatively correlated with income, that is lower-income individuals need more healthcare, our estimates of inequalities are lower bounds for inequities. This is what our finding of a negative association between mortality and income suggests, albeit mortality is a crude measure of health status. Our mortality measures are themselves limited since we can only observe mortality for an 8-year period.

We think that further research could take two principal directions. First, using more detailed health data, including data on diagnoses and treatments, researchers should be able to better understand the role of health inequalities in explaining spending patterns, as well as the consequences of spending variation for health outcomes. Such data would also shed light on the specific types of treatments that cause variation. Second, in order to isolate the causal relationship between access and spending, researchers should rely on quasiexperimental variation in the availability of various forms of care.

7 Conclusions

How healthcare use varies with income and whether effective access is equitable across the income distribution remain empirical questions even in developed countries with universal social insurance programs. In this paper, we documented substantial heterogeneity in healthcare spending across geographic regions of Hungary. We also demonstrated that income is positively associated with public healthcare spending both nationally and within geographic units, while the association between income and mortality is negative both nationally and within geographic units. Our results suggest that access plays an important role in the geographic and income differences in healthcare spending. We believe that the
evidence presented here can be used to motivate policies to decrease geographic inequalities and inequalities by socioeconomic status.

References


Figure 1: Geographic Heterogeneity in Social Security Healthcare Spending

(a) Outpatient Spending

(b) Inpatient Spending

(c) Prescription Drug Spending

Note: Figure displays geographic heterogeneity in three types of healthcare spending across the 20 counties of Hungary. Each of the three panels shows estimates of county-level means. Panel (a) shows outpatient spending, Panel (b) shows inpatient spending, and Panel (c) shows prescription drug spending. County-level means are regression-adjusted for age and gender. The maximum relative standard error of county-level mean estimates is 1.35%. 

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Figure 2: Income Heterogeneity in Social Security Healthcare Spending

(a) Outpatient Spending

(b) Inpatient Spending

(c) Prescription Drug Spending

Note: Figure displays income heterogeneity in three types of healthcare spending across the percentiles of the national income distribution of Hungary. Each of the three panels shows estimates of mean spending by percentile of wage. Panel (a) shows outpatient spending, Panel (b) shows inpatient spending, and Panel (c) shows prescription drug spending. Percentile-level means are regression-adjusted for age and gender. The grey lines show 95% confidence intervals for the percentile-level mean estimates.
Figure 3: Income Heterogeneity in Social Security Healthcare Spending By County

(a) Outpatient Spending

(b) Inpatient Spending

(c) Prescription Drug Spending

Note: Figure displays income heterogeneity in three types of healthcare across counties and deciles of the national income distribution of Hungary. Each of the three panels shows estimates of mean spending by county and decile of the national income distribution. Panel (a) shows outpatient spending, Panel (b) shows inpatient spending, and Panel (c) shows prescription drug spending. County- and decile-level means are regression-adjusted for age and gender. The grey lines show 95% confidence intervals for the decile-level mean estimates.
Figure 4: Income Heterogeneity in Mortality

(a) 5-year Mortality

(b) 8-year Mortality

(c) 5-year Mortality by County

(d) 8-year Mortality by County

Note: Figure displays income heterogeneity in 5-year, and 8-year mortality across counties and deciles of the national income distribution of Hungary. Decile- and county- level means are regression-adjusted for age and gender. The grey lines show 95% confidence intervals for the decile-level mean estimates.
Appendix to Healthcare Spending Inequality:
Evidence from Hungarian Administrative Data

Table A1: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Full Sample, 18-55</th>
<th>Analytic Sample, 18-55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Outpatient Spending (HUF)</td>
<td>9,913</td>
<td>9,305</td>
</tr>
<tr>
<td>Any Outpatient Spending</td>
<td>0.724</td>
<td>0.776</td>
</tr>
<tr>
<td>Mean Inpatient Spending (HUF)</td>
<td>16,752</td>
<td>7,978</td>
</tr>
<tr>
<td>Any Inpatient Spending</td>
<td>0.120</td>
<td>0.076</td>
</tr>
<tr>
<td>Mean Rx (HUF)</td>
<td>16,860</td>
<td>13,037</td>
</tr>
<tr>
<td>Any Rx</td>
<td>0.668</td>
<td>0.727</td>
</tr>
<tr>
<td>Mean Age</td>
<td>36.843</td>
<td>40.787</td>
</tr>
<tr>
<td>Fraction Male</td>
<td>0.505</td>
<td>0.518</td>
</tr>
<tr>
<td>Mean Annual Earnings from Employment (HUF)</td>
<td>985,181</td>
<td>2,511,786</td>
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<tr>
<td>5-year Mortality Rate in 2003</td>
<td>0.01018</td>
<td>0.00387</td>
</tr>
<tr>
<td>8-year Mortality Rate in 2003</td>
<td>0.01909</td>
<td>0.01340</td>
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<tr>
<td>Mean Number of Individuals</td>
<td>2,863,749</td>
<td>767,480</td>
</tr>
</tbody>
</table>

Notes: 300 HUF ≈ 1 EUR.
The data source is the linked administrative data (see Section 3 for details).
All variables originate from the National Health Insurance Fund Administration, except for the earnings measure, which originates from the Central Administration of National Pension Insurance.