

Mapping the Roots of Healthcare Inequalities in Post-Unification Italy. Geographical Accessibility and Territorial Disparities

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Mapping the Roots of Healthcare Inequalities in Post-Unification Italy

Geographical Accessibility and Territorial Disparities

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ABSTRACT

The distribution of healthcare infrastructure has historically influenced health inequalities. Consequently, geographic accessibility — the alignment between facility locations and population distribution — is crucial to mitigating these disparities. In Italy, territorial inequalities have persisted since unification (1861), and have been exacerbated by delayed public health investments. While regional disparities in healthcare infrastructure have often been linked to mortality differences, accessibility remains a neglected issue of study due to data limitations. This study aims to address this gap by using data from the *Inchiesta delle Condizioni Igienico Sanitarie del Regno d'Italia* (1884–1885) to study healthcare access. The study uses a two-dimensional framework, encompassing availability, defined as the number of facilities, and spatial accessibility, which is measured by travel distance and geographic barriers. Adopting an ego-network approach incorporating altitude and distance provides an updated and more sophisticated study of inequalities in access to primary and institutionalized healthcare services, identifying potential origins of persistent inequalities.

Keywords: Healthcare inequalities, Spatial accessibility, Italy, 19th Century, Gravity models

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1 INTRODUCTION

The availability and distribution of healthcare infrastructures and facilities have historically influenced health inequalities within countries. One of the key factors in shaping these inequalities is feasible accessibility — specifically, the geographical location of facilities relative to where populations are distributed. This determines how easily and effectively citizens can reach and use these services.

Geographical and socioeconomic disparities have long been a defining feature of historical national and state-building processes, and Italy is no exception. Following its unification in 1861, the country emerged as a patchwork of regions marked by differences in traditions, culture, and levels of social and economic development. These disparities were also reflected in the characteristics, distribution, and provision of healthcare. Health issues were incorporated into the national political agenda relatively late, despite their importance in shaping the political foundations of the new state. This delay resulted in chronically poor investments in public health, further exacerbating territorial inequalities (Taroni, 2022).

Disparities in healthcare facilities have been linked to the unequal mortality levels between Italian territories at the turn of the 19th century (Della Peruta, 1980). However, what has consistently been neglected in this body of research — partly due to the unavailability of data — is the study of the accessibility of healthcare services relative to the population. The present study addresses this significant gap by providing a comprehensive mapping of accessibility concerning population distribution, while also laying the foundation for future research developments, such as exploring the link between healthcare accessibility and mortality rates.

In this paper, we use information from the *Inchiesta delle Condizioni Igienico Sanitarie del Regno d'Italia*, a survey conducted at the municipality level between 1884 and 1885 to document the hygienic conditions of Italian municipalities and the supply of public healthcare services.

We examine two dimensions of access to healthcare: availability (Guagliardo, 2004; Gulliford et al., 2002) — defined as the number of healthcare infrastructures accessible to an individual — and spatial accessibility, which refers to the travel distance or time between individuals' locations and service points (Guagliardo, 2004). To describe spatial accessibility in the Italian historical context, we employ an ego-network approach, considering geographic distance and physical characteristics such as altitude. We argue that this approach provides new insights into the unequal distribution of healthcare services in post-Unification Italy, offering new tools to understand accessibility challenges in this historical context.

In the ensuing pages, an exposition is furnished of the Italian context in the decades following the Unification in terms of health and living standards. This is followed by a discussion of healthcare policies in the early years of unification, and an overview of the concepts of availability and spatial accessibility to healthcare. The subsequent sections are dedicated to the process of digitalization and the construction of the dataset, followed by a descriptive account of the distribution of healthcare facilities in the Italian territories. In the final section, we discuss the results, together with the potential and limitations of the data for the scientific community.

2 THE ITALIAN CONTEXT IN THE FIRST TWO DECADES POST-UNIFICATION (1861–1885)

2.1 HEALTH AND LIVING STANDARDS

In 1861, the newly formed Kingdom of Italy was a poor and underdeveloped country. Compared to other European countries, Italy had lower living standards and wages (Benini, 1911; Federico et al., 2019), as well as a delay in industrial development (Zamagni, 1993). Italy still exhibited the characteristics of a typical pre-transition mortality regime, with low life expectancy at birth, high levels of infant mortality, and elevated mortality rates (Bellettini, 1987; Caselli, 1990; Pozzi, 2001). The few data available for the first 25 years after Unification (official statistics of causes of death were collected at the national level starting from 1887) show that Italy had the characteristics of a pre-transition mortality regime also in the causes of death, as infectious and bacterial diseases accounted for around

60% of all deaths. Moreover, waves of diseases such as malaria chronically hit different parts of Italy, together with diseases due to bad nutritional intake, such as pellagra, which was concentrated in the North-Eastern regions.

There is a long-lasting debate on the disparities between Italian regions at the time of Unification in 1861, and it has often focused on the gap between Northern and Southern regions (Cafagna, 1989; Ciccotti, 1898; Eckaus, 1961). Recent literature has however suggested that at the time of Unification Italian regions had distinct productive specialization (Felice, 2015), but differences in GDP per capita between the 3 macro-areas of the country (North, Centre and South) were limited and remained stable in the following 30 years (Felice, 2015; Felice, 2019). Even the difference in real wages was quite limited in the first decades following Unification (Daniele & Malanima, 2017), and some data have even shown that the average income was higher in some Southern regions than in some areas in the North (Felice, 2015). Nevertheless, a great Southern disadvantage existed in socioeconomic indicators such as the levels of literacy (A'Hearn & Vecchi, 2017; Atella et al., 2017; Vecchi & Coppola, 2006).

As for differences in health conditions, at the time of Unification the Southern regions displayed higher mortality rates, but analyses at the provincial level show a great level of heterogeneity (Pozzi, 2001). For instance, some areas in the North-East showed higher levels of neonatal mortality compared to the Southern regions (Pozzi, 2001). Also, In the first decades after Unification, Italians' living and health conditions remained largely unchanged (Bellettini, 1987).

Thus, it can be stated that post-Unification Italy was rather a puzzle of multiple countries, than just the collection of two different parts (Felice, 2015). Regional disparities in the economic and health domains widened at the end of 19th century when, in the Northern regions, the process of modern industrialization began (Daniele & Malanima, 2011, 2014; Felice, 2019).

2.2 THE HEALTHCARE SYSTEM

The late 19th-century Italian healthcare system lacked centralization, which set it apart from other Western European countries that were developing unified systems.

The lack of coordination in healthcare services was further exacerbated by the presence of a variety of funding institutions, including municipalities, the Catholic Church, philanthropic organizations, and mutual aid societies. A cornerstone of the Italian pre-unification healthcare system were the *Opere Pie*, religious charities that provided a wide range of services for the poor and the needy such as hospitals and health-related organizations such as maternity houses, asylums, and founding homes (Taroni, 2022). However, these institutions lagged in hiring doctors and adopting the emerging medical standards of the late 19th century, remaining more focused on charity than on medical treatment (Colombo & Molinari, 2022; Frascani, 1982; Taroni, 2022). As a result, Italian hospitals lagged in the transition towards modern and more efficient management compared to other European countries. For instance, in the 1880s just around 4.6% of deaths happened in Italian hospitals, while it reached 30% in Sweden in the same years (Colombo & Molinari, 2022).

More broadly, hospitals in Italy were unevenly distributed across the country. The vast majority were in the Northern and Central regions, primarily concentrated in major cities, which housed 54% of the nation's hospital beds. Urban hospitals were also bigger, averaging 239 beds each, while rural hospitals had just 25 beds on average (Raseri, 1878).

The provision of primary care was different. Medical doctors were numerous in Italy in the 1870s; contemporaries estimated a ratio of approximately 1 doctor for every 1,620 inhabitants (Raseri, 1878). Southern regions had more doctors than the North, although each doctor covered a larger territorial area in the South (Frascani, 1982; Raseri, 1878).

Besides, it is relevant to delineate the standard of medical practice. In late 19th-century Italy, the qualification of a doctor did not necessarily imply the completion of a medical degree. This phenomenon can be attributed to the weak and delayed process of institutionalization and professionalization of the medical discipline in Italy, which was indeed happening in many European countries in the same period (Frascani, 1982). Moreover, there was a limited perception of the social status of doctors, particularly in rural and non-urban regions, where the concept of a physician was often conflated with that of a practitioner of both popular and agricultural medicine (Frascani, 1982). This is exemplified by the figure of the *medico condotto*, who was regarded more as the guardian of sanitary hygiene than a proper

medical doctor. Medici condotti were directly paid by the municipality and were often an underpaid category, predominantly located in rural areas (Cosmacini, 2005). In such areas, the role of these medical professionals extended beyond the mere treatment of individuals, often encompassing the fulfillment of social functions and the provision of healthcare for the entire community. This entailed addressing the social determinants influencing health outcomes (Cosmacini, 2005; Taroni, 2022) rather than health itself. Such peculiar configuration is tested also by the fact that, according to a sanitary regulation from 1874, the status of medico condotto could be granted upon the successful completion of a diploma program in dentistry, callistership, or phlebotomy (Cosmacini, 2005). Conversely, private doctors were predominantly located in major cities such as Milan, Naples, Turin and Genoa, where they enjoyed more favorable working conditions (Cosmacini, 2005; Léonard, 1986).

At the end of the 19th century pharmacists were around one-third less than physicians, and they were mostly concentrated in provincial capital municipalities, where the number of pharmacists exceeds that of physicians. It can be thus hypothesized that in the small rural municipalities, both medical and pharmaceutical services were provided by the same person (Raseri, 1878).

Following Italy's Unification, the healthcare system was marked by significant complexity and decentralization. While primary care services were widely available, they often lacked quality. At the same time, modern healthcare infrastructure, including hospitals, remained underdeveloped compared to other European nations.

2.3 HEALTHCARE LEGISLATION

The poor overall health of the population gave rise to a pressing need for intervention in public health issues, particularly among the medical class (Della Peruta, 1980; Taroni, 2022). However, a timely and effective governmental response was notably delayed during the initial 25 years following unification.

Two key pillars characterized the strategy of the first Italian governments. The first is known as "Piedmontization" policy, which identifies the assimilation of the annexed territories into Piedmont's outdated legislation. This approach had significant implications for health legislation, leading to setbacks in regions that had inherited more advanced healthcare systems from previous political regimes.

The second pillar consisted of a body of laws inspired by the laissez-faire economic principles of the late 19th century, which left the full responsibility for the financial implementation of policies to local communities. The Laws for the Administrative Unification of the Italian Kingdom (Law No. 2248 of 20 March 1865) should be understood within this context. These laws left individual municipalities to determine their level of spending without a compensatory mechanism coordinated by the central government. Moreover, the reliance on local charities and municipal funding, coupled with a regressive tax system based on indirect levies such as the grain tax, entrenched inequalities between urban and rural areas.

Such approach resulted in dramatically poor investments in public health. The law instated compulsory municipal expenditures for medical, surgical, and midwifery services for the poor (Taroni, 2022), without direct funding from the central government. Such decentralized systems played a significant role in exacerbating territorial disparities, further hindering the poorest regions' ability to provide adequate healthcare services to their populations. This is reflected in the slow improvements in population's health conditions (Figure 1).

Significant changes began only in 1887 with the introduction of the Crispi Laws. The law of December 22, 1888 (Law No. 5849), titled *On the Organization of Public Health Administration and Assistance in the Kingdom*, marked a crucial turning point. The Public Health and Hygiene Law resolved longstanding debates by rejecting that the state should avoid involvement in healthcare issues, thus recognizing that individuals could not manage their health effectively. The law introduced the essential principle that public hygiene must be enforced and treated as a matter of state.

The reform led to a fundamental restructuring of the health system, overcoming a charity-based system and creating a chain of public intervention. The law entrusted sanitary professionals with the responsibility of public surveillance of territories, and promoted non-pharmaceutical interventions to mitigate the spread of infectious diseases. This shift in approach helped the country to significantly reduce mortality from infectious diseases (Fiore Melacrinis & Rota, 2026), leading Italy into a modern mortality regime.

3 MEASURING ACCESSIBILITY TO HEALTHCARE

Geographical socioeconomic diversity has been integral to Italian national and state building since Unification in 1861. The distribution and provision of healthcare mirrored these disparities, although with a more complicated pattern than commonly expected — as for the distribution of medical doctors, as shown by Raseri in 1878.

The availability and distribution of healthcare infrastructures and facilities have historically influenced health inequalities within countries. One key factor in reducing these inequalities is feasible accessibility — specifically, the geographical location of facilities relative to where populations are distributed. This determines how easily and effectively patients can reach and use these services. In this context, examining the relationship between the location of healthcare facilities and the geographical distribution of populations is crucial for understanding health inequalities within countries (Guagliardo, 2004).

Two dimensions of access are prevalent in the healthcare literature (Guagliardo, 2004; Gulliford et al., 2002). First, *availability* reflects the sheer number of healthcare infrastructures accessible to an individual. Empirically, provider-to-population ratios (or supply ratios) are the most common and straightforward method for measuring availability. They are calculated by considering the number of available healthcare resources (such as doctors or hospital beds) relative to the population in a specific geographic area. These ratios are useful for macro-level comparisons between regions and for identifying underserved areas but do not account for patient movement across geographic boundaries or the actual distance or travel impedance to providers.

To overcome such limitations, measures of *spatial accessibility* can be of use. Such methods include measuring travel impedance to the nearest provider, which is more suitable for rural contexts but less effective in urban settings, where supply options are more varied and closer (Guagliardo, 2004). More advanced approaches combine accessibility and availability, such as gravity models (Hansen, 1959; Reilly, 1931), which consider provider capacity and travel impedance, weighting accessibility based on distance and the availability of alternatives. However, gravity models can be complex to understand and apply, requiring empirical estimates of distance decay coefficients and adjustments for population demand. An improved version of these models includes a demand factor that distributes population pressure like the supply distribution. Despite challenges in their implementation, these approaches provide a more accurate description of spatial accessibility, especially in complex urban contexts.

Adopting a spatial accessibility approach is particularly useful for studying the Italian context at the turn of the 19th century. Indeed, most Italian municipalities had small populations and frequently lacked healthcare infrastructure. However, they could have access to healthcare services in neighboring villages or travel to the bigger cities, which might act as gravity centers. For instance, *medici condotti* were assigned from neighboring towns in case the municipality did not have any. Thus, accounting for territorial continuity can be useful to draw a more comprehensive picture of the distribution of healthcare facilities. To the best of our knowledge, such empirical effort has not been made in the Italian case, except for the relation of Enrico Raseri on the medical staff in Italy presented at the Parliament in 1878. In his work, Raseri underlined how differences in sheer distributions were less evident once accounting for factors such as population density and concentration (Raseri, 1878). However, he just had access to data at the province level, together with less sophisticated techniques to consider the geographical distance between municipalities.

4 THE DATASET: SOURCES AND GEO-LOCALIZATION

We use digitized data from the *Indagini sulle condizioni igieniche e sanitarie*, a survey on hygienic and health conditions conducted between 1884 and 1885 across all Italian municipalities. Following an outbreak of malaria in 1884, the need to understand the sanitary and hygienic conditions of Italians became urgent for governors, who organized a survey to be sent to all municipalities to collect this information. The questionnaire was composed of 103 questions regarding geographical and climatic aspects, characteristics of houses and roads, and a range of sanitary infrastructures such as sewers, water systems, and cemeteries. Additionally, there was a count of sanitary personnel, such as medical doctors and midwives, and information about vaccinations. Questionnaires were sent to majors, who had to fulfill them by themselves or with the help of experts who could contribute (medical

doctors, public officers, etc.). The information provided by the majors was then checked by the central authorities. Some issues about the accuracy of the information provided and the quality of the data were raised shortly after the collection of the data (Frascani, 1980), but it provided a wide range of information on the socio-sanitarian conditions of Italian municipalities. The original document can be found and downloaded in the Istat online library (<https://ebiblio.istat.it/SebinaOpac/resource/relazione-generale/IST00010891>).

We focus on variables measuring the presence of healthcare facilities that could be physically reached by individuals (see Table 1). We use variables counting the number of doctors (both *condotti* — public doctors — and private), the number of drugstores, the number of beds in care institutions (general hospitals, mental health hospitals, pediatric hospitals) and residential care facilities (facilities for the homeless, nursing homes, maternity homes, children's homes and facilities for disabled people). To account for the dimension of municipalities, we use information on population in 1881, which is provided by the survey itself.

We also exploit the available geographic information accounting for each municipality's altitude, for which we also retrieved the geographical coordinates with reversed geocoding procedures.¹ Figure 1 shows the geographic distribution in the Italian territory of geo-localized municipalities. Overall, our data provides a good coverage of Italian municipalities at the time. After listwise deletion of cases with missing healthcare and geographical variables, we have complete information on 7,647 municipalities.

Table 1 *Healthcare variables*

	Health Indicators	Description
1	Drugstores	Number of drugstores per municipality
2	Public doctors	Number of doctors "in condotta"
3	Private doctors	Number of private doctors
4	Care institutions	Number of beds in care institutions in the municipality
5	Residential care facilities	Number of beds in residential care facilities in the municipality

Source: *Indagini sulle condizioni igienico-sanitarie, 1885*.

Figure 1 *Geolocalization of municipalities in the dataset*



Source: *Indagini sulle condizioni igienico-sanitarie, 1885*.

1 We used the `opencagegeo` command in Stata.

To validate our results, we rely on the 1881 Census, which records occupational data for the Kingdom of Italy. A limitation of this source is that it does not provide individual records for all municipalities; while provincial capitals are listed separately, data for other municipalities are reported in aggregate form. Consequently, we utilize provincial-level data, specifically focusing on "Category XII" (health professions). For each province, we calculate the share of healthcare workers relative to the total working population. Finally, we analyze the distribution of these shares by showing the mean and variance across macro-areas (North, Center, and South — including the Islands).

5 METHODOLOGY

Our analytical approach follows two steps. First, we provide a descriptive account of the availability of healthcare variables by macro areas (North, Center, South).² In the second step, we address the issue of accessibility, considering not only the resources available within each municipality, but also those in surrounding areas based on a spatial criterion. We employ a gravitational model based on an ego-network approach (Guagliardo, 2004; Piovani et al., 2018), linking each municipality to all other municipalities in Italy.

In calculating the rates for each healthcare variable and municipality, we integrate values from all other municipalities, weighting them inversely proportional to the distance, to prioritize closer municipalities. The resulting values are adjusted for each municipality's population and normalized per 1,000 inhabitants, yielding a measure of healthcare supply per 1,000 inhabitants. We further account for altitude as an additional factor by weighting values by the absolute altitude difference between municipalities and distinguishing between uphill and downhill routes. For instance, traveling from a municipality at 1,000 meters above sea level to one at 100 meters is less demanding than the reverse, and this asymmetry is reflected in our calculations.

This reasoning can be formalized in Equation (1), which we apply to each variable of interest.

$$Spatial\ health\ supply_i = \frac{\sum_j \left(\frac{Health\ dimension_j}{(D_{ij}) * (1 + \frac{|\Delta_{ij}|}{h_{scale}})} \right)}{Population_i} * 1000 \quad (1)$$

Where:

- $Spatial\ health\ supply_i$ is the ratio of the supply of healthcare variable for the municipality i
- $\sum_j$ is the sum for all municipalities j
- $Health\ supply_j$ is the value of the variable in municipality j
- D_{ij} is the geodetic distance between locations i and j
- $|\Delta_{ij}|$ is the absolute value of the altitude difference between i and j
- h_{scale} is a scaling factor that defines the relative significance of altitude differences compared to distance. For instance, setting $h_{scale} = 1000$ implies that a 1,000-meter altitude difference increases the penalty by a factor of 2.
- $Population_i$ is the population of municipality i
- 1,000 is a scale factor to make results comparable between municipalities.

It is important to highlight that the gravity measure is normalized by the population of the focal territorial unit i . This normalization produces a per capita value, ensuring meaningful comparisons across territories with different population sizes. To enhance interpretability, normalized rates are categorized into tertiles.

This approach retains key features of classical gravitational models, such as the positive relationship between interaction intensity and resource availability and the inverse relationship with distance

² In the label "South" we include both Southern regions and the main Islands (Sicilia and Sardegna).

(Guagliardo, 2004). Moreover, it also introduces further modifications. Notably, the "mass" of the focal unit does not directly factor into the gravity calculation; instead, the population is employed solely for normalization. Additionally, the model aggregates contributions from all connected units, making it particularly effective in contexts where a focal unit interacts with multiple others, such as assessing the accessibility of healthcare services in a specific area.

The key advantage of this approach is that it overcomes pitfalls arising from the arbitrary selection of boundaries at municipal or higher geographic levels, which can mask underlying spatial patterns. By doing so, we avoid a priori assumptions: each municipality is linked to all others, with connections weighted by the distance between ego and alter.

Despite these advantages, our gravity models have some limitations; for instance, we could not include in the models controls about the presence of roads and railways, which could enhance the accuracy of the indicators. Further research should try to overcome this limitation by collecting and adding such information.

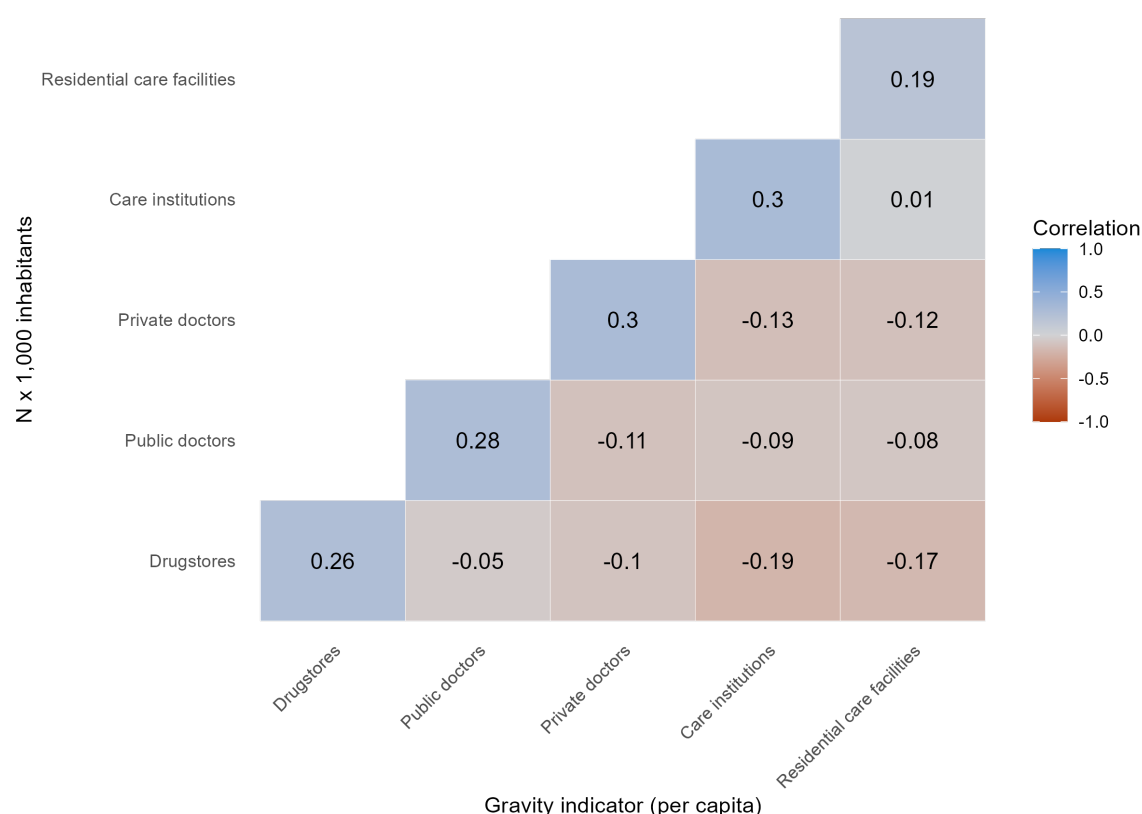
6 RESULTS

6.1 AVAILABILITY OF HEALTHCARE

Availability and accessibility are not synonymous. A municipality may exhibit high availability while being surrounded for kilometres by areas with very limited resources. In this study, we aim to capture this spatial dimension by utilizing availability data as a starting point. To account for availability, Table 2 reports summary statistics of healthcare measures per 1,000 inhabitants across all municipalities, disaggregated by macro-area (North, Center, and South). The results reveal substantial heterogeneity across different healthcare dimensions and across geographic areas. Comparing the North and the South, municipalities in the North were, on average, exposed to fewer physicians and drugstores but had a greater number of hospital facilities. This suggests that the South was not necessarily lagging the North; rather, it exhibited distinct patterns of healthcare provision.

Table 2 *Summary statistics of healthcare variables by macro area (by 1,000 inhabitants)*

Macro Area	Variable	Mean	SD	Min	Max
North	Public doctors	0,03	0,06	0	2,00
	Private doctors	0,01	0,04	0	1,19
	Drugstores	0,02	0,04	0	1,00
	Care institutions	0,08	0,61	0	32,91
	Beds in residential care facilities	0,03	0,20	0	8,81
Center	Public doctors	0,06	0,03	0	0,34
	Private doctors	0,01	0,02	0	0,20
	Drugstores	0,04	0,03	0	0,18
	Beds in care institutions	0,17	0,42	0	6,37
	Beds in residential care facilities	0,03	0,12	0	1,58
South	Public doctors	0,04	0,09	0	4,00
	Private doctors	0,03	0,06	0	2,00
	Drugstores	0,05	0,07	0	3,00
	Beds in care institutions	0,03	0,16	0	4,39
	Beds in residential care facilities	0,02	0,13	0	2,53

Figure 2 *Heat plot of healthcare variables*

Source: *Indagini sulle condizioni igienico-sanitarie, 1885*.

Figure 2 displays correlations of measures of availability (as the number of a given service per 1,000 inhabitants) with distance-weighted measures. Correlations in the diagonals are modest, averaging around 0.30, which confirms that the two approaches do not necessarily capture the same dimensions of healthcare supply. Notably, the relatively higher correlation observed for residential care facilities and care institutions serves as a useful benchmark, since these services are less spatially dispersed and therefore less sensitive to distance weighting, resulting in greater alignment between availability measures and gravity-based measures.

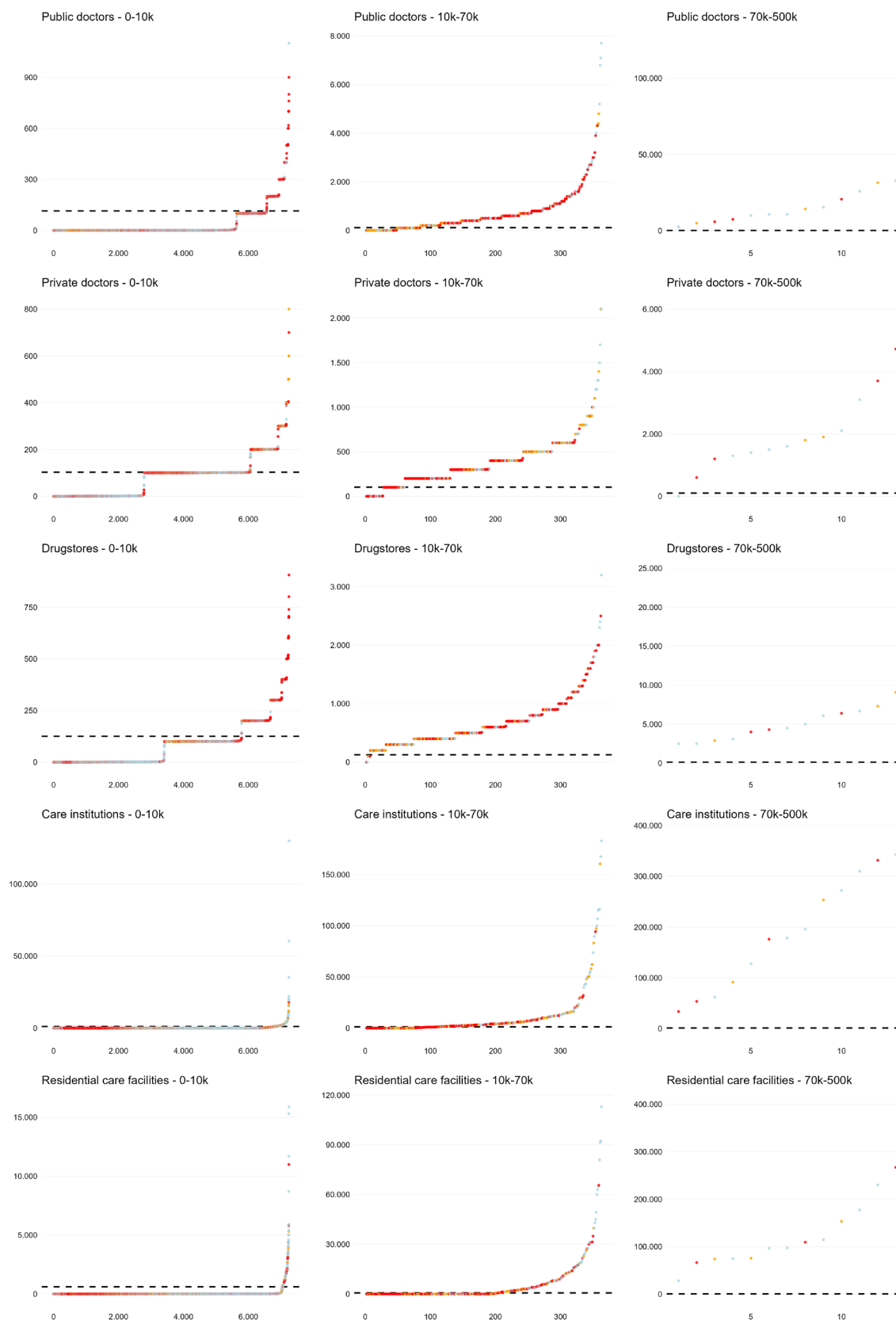
Figure 3 shows the distribution of healthcare gravity indicators by service type and municipality size (0–10k, 10k–70k, 70k–500k), disaggregated by macro-area (North in blue, Center in orange, South in red). Values are ranked along the distribution and compared to the mean (dashed line).

For public doctors (*medici condotti*), the South (red) exhibits a more compressed distribution in small municipalities but a more pronounced upper tail than other areas, indicating greater heterogeneity and more instances of high accessibility. In medium-sized municipalities, the South tends to lie in the upper part of the distribution, while the North and Center are more concentrated around intermediate values. In large municipalities, territorial differences narrow, although the South still shows some higher extreme values.

Regarding private doctors, the pattern is similar but more attenuated. In small and medium municipalities, the South again shows a more pronounced upper tail, indicating that while many municipalities have low accessibility, some reach high levels. In large municipalities, differences between areas diminish substantially.

For drugstores, differences between macro-areas are limited across most of the distribution in small municipalities, with the exception of higher values in the Southern upper tail. In medium-sized municipalities, greater dispersion emerges in the South, which shows higher values compared to the North and Center. In large municipalities, differences decrease, though the South maintains a slight predominance at the upper end of the scale.

Figure 3 *Number of healthcare services by municipality size and area*



Notes: The dashed line represents the national average in municipalities of the current size.

Source: Indagini sulle condizioni igienico-sanitarie, 1885.

When considering care institutions, territorial differences become more pronounced. In small and medium municipalities, the South shows a strong concentration of low values but also a very pronounced upper tail, signalling high internal inequality. In large municipalities, the South clearly displays the highest levels across the entire distribution, diverging significantly from the North and Center.

A similar pattern emerges for residential care facilities. In small and medium municipalities, the South is characterized by a highly asymmetric distribution with several high-value outliers. In large municipalities, the South dominates the upper part of the distribution, while the North and Center remain at more moderate levels.

Overall, the figure highlights a non-uniform pattern across macro-areas: the South is not systematically disadvantaged in terms of gravity-based supply, but instead exhibits greater variability and higher extreme values, especially for care and residential facilities. This suggests a more unequal distribution of accessibility in the South, with the coexistence of highly served areas and others that are much less accessible. By contrast, the North and Center appear more homogeneous and concentrated around the mean.

6.2 ACCESSIBILITY TO HEALTHCARE

Figure 4 presents the spatial distribution of healthcare accessibility in Italy in 1885 based on gravity indicators. The visualization uses a tertile-based classification: orange dots represent municipalities in the lowest tertile, grey dots those in the middle tertile, and light blue dots those in the highest tertile.

Overall, the maps reveal regional disparities shaped by economic, geographic, and infrastructural factors. The distribution of drugstores, public and private doctors, and clinics reflects contrasting patterns across Northern, Central, and Southern Italy, as well as the Islands, offering insights into the challenges of healthcare provision during this period.

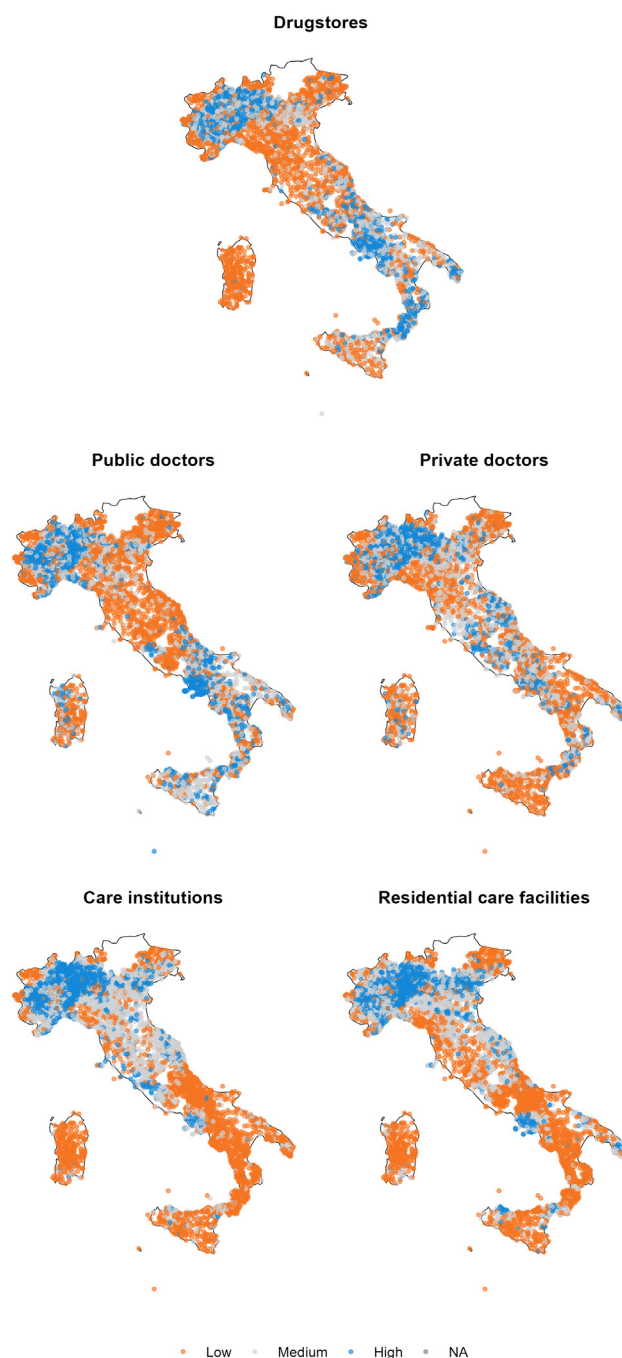
The upper map, depicting the distribution of drugstores, shows a relatively uneven spread of pharmaceutical services. High access is prominent in the North-West, namely Piedmont and Lombardy. Central Italy displays medium to low access. Surprisingly, southern Italy, including Campania, Calabria, Apulia, and parts of Sicily, exhibits notable areas of medium and high access. In contrast, Sardinia predominantly experiences low access, likely due to its lower population density and geographic isolation.

The left-map in the second row highlights the distribution of public doctors, revealing a concentration of high access in southern Italy. Regions such as Campania, parts of Apulia, Calabria, and parts of Sicily have better access to public doctors than areas in the North-East and Center. Central Italy generally exhibits low access, particularly in Marche and Umbria, while Lazio shows a relatively strong presence of medium and high access, largely driven by the city of Rome.

The right-map in the second row, focusing on private doctors, highlights a contrast with the distribution of public doctors. Private medical practitioners are predominantly concentrated in Northern and Central Italy, particularly in regions such as Lombardy, Emilia-Romagna, and Tuscany. Except for Campania, Southern Italy displays predominantly low access, with medium levels of access observed only in a few areas such as Apulia and parts of Campania. Sardinia shows an almost complete absence of private doctors, while Sicily exhibits limited access, reflecting significant economic and social barriers to private healthcare in these regions. The reliance on private doctors is concentrated in wealthier and more urbanized areas, where populations are better able to afford private care, underscoring the broader socio-economic disparities affecting the South.

The map of the distribution of care institutions (left in third row) further underscores these disparities. They are mostly concentrated in Northern and Central Italy, particularly in urbanized and industrialized areas, while Southern Italy predominantly is characterized by low access to such infrastructures. Sardinia stands out for its uniformly low access to private clinics, consistent with its historical isolation and underdevelopment. In contrast, public healthcare institutions show a particularly limited presence in Southern Italy. Regions such as Calabria and Apulia have far fewer care facilities, highlighting the challenges of providing institutionalized healthcare in areas with inadequate infrastructure. While care facilities are more evenly distributed in the North and parts of the Center, Southern Italy remains underserved in this dimension, with the partial exception of Campania. This pattern emphasizes the reliance on public doctors to fill the healthcare gap in these regions. A similar trend emerges for residential care facilities, revealing a pronounced North–South divide.

Figure 4 *Spatial distribution of gravity indicators*



Source: *Indagini sulle condizioni igienico-sanitarie, 1885*.

7 DISCUSSION AND CONCLUSIONS

In this study, we have explored healthcare provision in Italian municipalities at the end of the 19th century. The data for this study were drawn from the *Indagini sulle condizioni igieniche e sanitarie*, a survey on hygienic and health conditions conducted in the years 1884 and 1885 throughout all Italian municipalities.

The investigation of the geographical distribution of healthcare supply is a crucial endeavor to gain deeper insights into the evolution of territorial inequalities that have been a hallmark of the Italian

nation-building process since 1861. The study focuses on distinct indicators of healthcare supply, encompassing diverse aspects and levels of accessibility, including drugstores and doctors (both public and private), to account for the direct and immediate access to healthcare, as well as care and residential care infrastructures.

This study examines the availability and accessibility of healthcare services. The analysis of availability offers insights into the overall supply and its geographical distribution, while accessibility is assessed through a spatial perspective, considering the characteristics of nearby municipalities that may also be within reach.

Our findings reveal a distinct pattern. Geographical disparities are not particularly pronounced when examining primary care services, such as the availability and accessibility of medical doctors and pharmacies. This uniformity can be attributed to two key factors. First, the presence of professionals like doctors and pharmacists reflects a long-standing tradition in Italian society, where these professions have developed consistently over time. This trend was evident not only in the wealthier northern regions but also in the South. Notably, the city of Naples alone accounted for 8% of the total number of doctors in the country. Second, holding the title of doctor or pharmacist did not necessarily ensure adequate training or competence. This was largely due to the fragmented and inconsistent nature of medical education in Italy at the end of the 19th century.

Importantly, these findings are consistent with evidence from other historical sources (Figure 5). For example, data from the 1881 Census — specifically Census Category XII (health professionals) — reveal similar patterns. Focusing on provinces, due to incomplete municipal coverage of occupational data, the differences between Northern, Central, and Southern Italy appear broadly comparable, both in terms of mean levels and variance.

By contrast, a stark North-South divide emerges when considering the availability and accessibility of long-term care and residential facilities providing professional medical assistance. Within the broader Italian context — characterized by delays in transitioning to modern hospitals in which medical care was the primary function — Southern regions faced significant disadvantages in developing such infrastructure. As a result, the burden of care fell largely on medical doctors, who had fewer resources and less specialized training in long-term care.

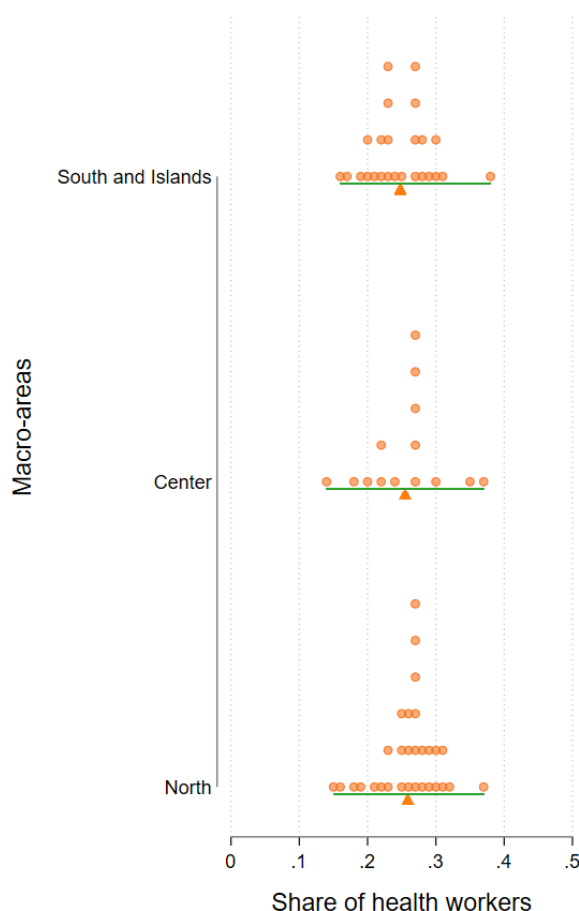
This suggests that the primary driver of healthcare supply inequality was the underdevelopment of complex, modern healthcare structures in certain areas of the country. While the uneven distribution of more advanced healthcare facilities can be traced to historical and traditional differences among Italian regions, this gap likely widened in the decades following Unification due to weak — or, in some cases, nonexistent — healthcare policies. This issue was particularly significant at a time when medical science was becoming increasingly standardized, and hospitals were emerging as central institutions for disease treatment (Colombo & Molinari, 2022).

Moreover, the use of geocoded data at the finest geographical level possible allows the identification of further areas of disadvantage, such as mountain areas (the Alps in the North-West and the Apennine mountains in the Center), and marshy areas in the North-East and Emilia Romagna, thus deepening our understanding of territorial inequalities by enlarging the focus to the traditional North-South divide.

This study provides insights into the geographical and qualitative patterns of the Italian healthcare landscape in the decades following Unification. Our findings regarding the spatial distribution of healthcare supply align with the institutional approach (Acemoglu & Robinson, 2012; Felice, 2015; Sokoloff & Engerman, 2000), which emphasizes the role of political and economic institutions in shaping territorial inequalities. While we find no substantial differences in the diffusion of private healthcare actors, institutional assets — such as residential and care facilities — followed divergent pathways. This divergence likely reflects the long-standing social and institutional traditions of different parts of the country.

Data on healthcare supply derived from the *Inchiesta* can significantly advance our understanding of the history of health and healthcare in Italy at the turn of the 19th century. For instance, information on healthcare accessibility can be linked to municipality-level mortality rates to explore the empirical relationship between supply and health outcomes (Della Peruta, 1980). Furthermore, combining data on healthcare provision with indicators of economic development could facilitate a clearer assessment of their long-term association.

Figure 5 Share of health workers over the total working population at the province level



Source: 1881 Census.

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REFERENCES

- A'Hearn, B., & Vecchi, G. (2017). Education. In G. Vecchi (Ed.), *Measuring wellbeing: A history of Italian living standards* (pp. 175–213). Oxford University Press.
- Acemoglu, D., & Robinson, J. A. (2013). *Why nations fail: The origins of power, prosperity, and poverty*. Crown Currency.
- Atella, V., Francisci, S., & Vecchi, G. (2017). Health. In G. Vecchi (Ed.), *Measuring wellbeing: A history of Italian living standards* (pp. 88–141). Oxford University Press.
- Bellettini, A. (1987). La transizione demografica dopo l'unificazione [The demographic transition after the unification]. In A. Bellettini (Ed.), *La popolazione italiana: Un profilo storico* (pp. 157–219). Einaudi.
- Benini, R. (1911). *La demografia italiana nell'ultimo cinquantennio* [The Italian demography in the last 50 years]. Salviucci.
- Cafagna, L. (1989). *Dualismo e sviluppo nella storia d'Italia* [Dualism and development in Italian history]. Marsilio.

- Caselli, G. (1990). Mortalità e sopravvivenza in Italia dall'Unità agli anni'30 [Mortality and survival in Italy from Unification to the 1930s]. In Società italiana di demografia storica (SIDES) (Ed.), *Popolazione, Società e ambiente. Temi di Demografia storica italiana (secc XVII-XIX)* (pp. 275–310). Clueb.
- Ciccotti, E. (1898). *Mezzogiorno e Settentrione d'Italia* [Southern and Northern Italy]. Sandron.
- Colombo, A., & Molinari, R. (2022). Displacement of death from home to hospital in historical perspective: The case of Italy, 1883–2013. *Journal of Interdisciplinary History*, 53(3), 439–469. https://doi.org/10.1162/jinh_a_01870
- Cosmacini, G. (2005). *Storia della medicina e della sanità in Italia* [History of medicine and health in Italy]. Laterza.
- Daniele, V., & Malanima, P. (2011). Are people in the South less intelligent than in the North? IQ and the North–South disparity in Italy. *The Journal of Socio-Economics*, 40(6), 844–852. <https://doi.org/10.1016/j.socec.2011.08.017>
- Daniele, V., & Malanima, P. (2014). Falling disparities and persisting dualism: Regional development and industrialisation in Italy, 1891–2001. *Investigaciones de Historia Económica - Economic History Research*, 10(3), 165–176. <https://doi.org/10.1016/j.ihe.2013.07.001>
- Daniele, V., & Malanima, P. (2017). Regional wages and the north–south disparity in Italy after the unification. *Rivista di storia economica*, 33(2), 117–158. <https://www.rivisteweb.it/doi/10.1410/88972>
- Della Peruta, F. (1980). Sanità pubblica e legislazione sanitaria dall'Unità a Crispi [Public health and health legislation from Unification to Crispi government]. *Studi storici*, 21(4), 713–759.
- Eckaus, R. S. (1961). The North–South differential in Italian economic development. *The Journal of Economic History*, 21(3), 285–317. <https://doi.org/10.1017/S002205070010292X>
- Federico, G., Nuvolari, A., & Vasta, M. (2019). The origins of the Italian regional divide: Evidence from real wages, 1861–1913. *The Journal of Economic History*, 79(1), 63–98. <https://doi.org/10.1017/S0022050718000712>
- Felice, E. (2015). *Il divario Nord-Sud in Italia (1861–2011): Lo stato dell'arte* [Italy's North–South divide (1861–2011): The state of the art] (Working Paper No. 62209). MPRA. <https://mpra.ub.uni-muenchen.de/62209/>
- Felice, E. (2019). The roots of a dual equilibrium: GDP, productivity, and structural change in the Italian regions in the long run (1871–2011). *European Review of Economic History*, 23(4), 499–528. <https://doi.org/10.1093/ereh/hey018>
- Fiore Melacrinis, F. M. S., & Rota, M. (2026). Public health reforms and the mortality decline in nineteenth-century Italy. *The Economic History Review*, 79(2), 527–554. <https://doi.org/10.1111/ehr.70021>
- Frascani, P. (1980). Medicina e statistica nella formazione del sistema sanitario italiano: L'inchiesta del 1885 [Medicine and statistics in the making of the Italian health system: The 1885 survey]. *Quaderni storici*, 15(3), 942–965.
- Frascani, P. (1982). Il medico nell'Ottocento [Medical doctors in the 19th century]. *Studi Storici*, 23(3), 617–637. <https://www.jstor.org/stable/20565107>
- Guagliardo, M. F. (2004). Spatial accessibility of primary care: Concepts, methods and challenges. *International Journal of Health Geographics*, 3, 1–13. <https://doi.org/10.1186/1476-072X-3-3>
- Gulliford, M., Figueroa-Munoz, J., Morgan, M., Hughes, D., Gibson, B., Beech, R., & Hudson, M. (2002). What does 'access to health care' mean? *Journal of Health Services Research & Policy*, 7(3), 186–188. <https://doi.org/10.1258/135581902760082517>
- Hansen, W. G. (1959). How accessibility shapes land use. *Journal of the American Institute of Planners*, 25(2), 73–76. <https://doi.org/10.1080/01944365908978307>
- Léonard, J. (1986). I medici dell'Ottocento [Medical doctors in the 19th century]. In J. Le Goff (Ed.), *Per una storia delle malattie* (pp. 109–122). Dedalo libri.
- Piovani, D., Arcaute, E., Uchoa, G., Wilson, A., & Batty, M. (2018). Measuring accessibility using gravity and radiation models. *Royal Society Open Science*, 5(9), Article 171668. <https://doi.org/10.1098/rsos.171668>
- Pozzi, L. (2001). *La lotta per la vita: Evoluzione e geografia della sopravvivenza in Italia fra '800 e '900* [The fight for life: Evolution and geography of survival in Italy between the 19th and 20th centuries]. Forum Edizioni.
- Raseri, E. (1878). Il personale sanitario in Italia e all'estero [Healthcare workers in Italy and abroad]. *Annali di Statistica*, II(2), 171–207.
- Reilly, W. J. (1931). *The laws of retail gravitation*. Knickerbocker Press.

- Sokoloff, K. L., & Engerman, S. L. (2000). History lessons. Institutions, factor endowments, and paths of development in the New World. *Journal of Economic Perspectives*, 14(3), 217–232. <https://doi.org/10.1257/jep.14.3.217>
- Taroni, F. (2022). *Health and healthcare policy in Italy since 1861: A comparative approach*. Springer Nature.
- Vecchi, G., & Coppola, M. (2006). Nutrition and growth in Italy, 1861–1911: What macroeconomic data hide. *Explorations in Economic History*, 43(3), 438–464. <https://doi.org/10.1016/j.eeh.2005.04.004>
- Zamagni, V. (1993). *The economic history of Italy, 1860–1990: Recovery after decline*. Oxford University Press.