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Immigrants' clusters and unequal access to healthcare treatments

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ABSTRACT

We focus on caesarean sections (C-sections) to examine access to appropriate medical care for immigrants in the Italian tax-funded universal National Health Service. We use a detailed micro-dataset to analyse whether non-native women receive different treatments compared to natives and whether there are differences between groups of non-natives defined by citizenship. For identification, we control for hospital fixed effects and maternal characteristics, and we compare the different groups by exploiting the clustering of non-natives of different nationalities in different urban areas. We find no significant differences between natives and non-natives in terms of C-sections and inappropriate C-sections. However, we do find significant differences between different groups of immigrants. In addition, we find that linguistic and socio-cultural distances are significant drivers of inequalities among non-native women. As language, habits, traditions, and beliefs can affect communication between the woman and the medical staff in many ways, we interpret our findings in terms of the ability to process and understand information between the two parties. In support of this interpretation, we find evidence of a "segregation effect": women linguistically and socio-culturally more distant from Italy experience the greatest difficulties in accessing appropriate care when living in urban areas characterized by the presence of large immigrant communities of the same nationality. Moreover, we find that the role of linguistic and socio-cultural barriers is stronger for first-time mothers and women with non-native partners.

1. Introduction

Inequalities in access to and use of health services are a major concern for policy-makers in many countries. They occur despite recognizing health and healthcare as human rights in various legislations, including international treaties and national constitutions.[1] Inequalities are particularly important for some disadvantaged groups, such as those with low incomes, those with lower levels of education, and those with an immigrant background. They can be explained by various factors, ranging from supply-side factors, such as the spatial distribution of healthcare facilities, to demand-side factors, such as patients' health literacy and ability to process relevant information. Understanding the barriers to equitable access to health services is fundamental to fulfilling constitutional mandates.

This study investigates potential barriers to accessing appropriate medical treatments for immigrants within the Italian National Health Service (NHS, a universal tax-funded healthcare system characterized by a strong orientation toward equality supported by the national Constitution) accounting for the spatial distribution of natives, non-natives, and hospitals providing the treatments. Italy is an interesting case study for at least three reasons. First, there are no formal barriers to access or specific eligibility criteria that discriminate against immigrants in the NHS. All maternal care services required during pregnancy, childbirth, and postnatal care are provided free of charge to all women, regardless of their nationality or legal immigration status. Hence, any difference we may observe in the use of services is not due to any formal

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[1] For instance, art. 32 of the Italian Constitution recognizes that "the Republic safeguards health as a fundamental right of the individual and as a collective interest and guarantees free medical care to those in need." Similar provisions can be found in art. 35 of the EU Charter of Fundamental Rights (Lisbon Treaty): "Everyone has the right of access to preventive health care and the right to benefit from medical treatment under the conditions established by national laws and practices." See, e.g., Matsuura (2023) for further details.

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intentional institutional impediment, making identifying the role of other barriers easier. Second, the number of immigrants who regularly reside in Italy has constantly increased in the last 20 years, and they now represent 8.5% of the total population. However, immigrants are unevenly distributed across regions and even within regions, clustering in urban areas, a choice of location that potentially affects access to medical treatments. Third, the large number of countries of origin recorded for immigrants to Italy creates a large variability that we can exploit in our empirical exercise, studying the heterogeneity in the access to appropriate medical treatments for patients with different social, economic, and cultural backgrounds.

Our focus here is on maternal care and, more specifically, on the choice between natural deliveries and caesarean sections (C-sections), a standard proxy for (in-)appropriateness once controlling for the clinical conditions of the woman. Although the C-section is essential for the health of the woman and the newborn in some clinical cases, the advantages of caesarean versus vaginal delivery for normal, uncomplicated deliveries are still under debate. Caesarean deliveries may be associated with increased maternal mortality, maternal and infant morbidity, complications in subsequent deliveries, and increased financial costs raising concerns about the medical appropriateness of the procedure (e.g., Clark and Silver, 2011; Hyde et al., 2012; Francese et al., 2014). Our aim is twofold. First, we analyse whether non-native women undergo significantly different deliveries than Italian natives. In detail, we ask whether – conditional on several clinical and other observable characteristics – we find a difference in the use of C-sections for Italian women compared to non-natives. Second, we consider differences between different immigrant nationalities and discuss the mechanisms that may explain such differences. We focus on linguistic and socio-cultural barriers (e.g., Guiso et al., 2006, 2009; Caragliu and Nijkamp, 2016; Ginsburgh and Weber, 2020; Desmet et al., 2012; Fisman et al., 2017), as shared language, habits, traditions and beliefs may affect the communication between the woman and the medical staff in different ways. In addition, we exploit the spatial distribution of non-native women (in particular, their municipality of residence) to discuss the robustness of our findings and the mechanisms driving the association between linguistic and socio-cultural characteristics and health outcomes.

Our empirical analysis is based on a detailed micro dataset covering all deliveries within the administrative borders of Piedmont, a large and rich Northwestern Italian region, between 2010 and 2017. Administrative data allows us to retrieve both the citizenship and the country of birth of each woman in the sample. We rely on citizenship to define immigrant women, but results are unaffected by considering the country of birth. We will use the terms 'non-native' and 'immigrant' interchangeably throughout the text for the sake of exposition.

Determining the causal relationship between socio-cultural barriers and non-natives' healthcare access and outcomes is difficult. Our setting has two main threats: the potential self-selection of immigrants into different hospitals and the non-random location of women of different nationalities across the region. Our approach follows three main steps. First, our data include many characteristics of women, such as demographic, socioeconomic, medical, and lifestyle factors. Including all these observables in our specifications allows us to control for several relevant risk factors that may explain the use of C-section rather than the alternative of vaginal delivery (Card et al., 2023). Second, we include in all specifications hospital-level fixed effects that control for self-selection into hospitals (e.g., Battisti et al., 2022; Frattini and Meschi, 2019), absorbing the common time-invariant traits from each hospital. Finally, after controlling for hospital fixed effects and mothers' characteristics, we look at the heterogeneity among all non-nationals, defining immigrant groups according to their nationality. This also allows us to assess the robustness of our results to the clustering of non-natives of different nationalities in specific urban areas characterized by the presence of hospitals and to discuss the external validity of our results (Ottaviano and Peri, 2013; Fernández-Huertas Moraga et al., 2019; Battisti et al., 2022).

We do not find significant differences between natives and non-natives in terms of caesarean sections and inappropriate caesarean sections. However, we do find significant differences in C-sections between different immigrant nationalities. To explain such inequalities, we map the differences between the immigrants' home country and Italy as the host country over different linguistic and socio-cultural dimensions, defining several "distance" measures: linguistic distance to map differences in language (Lang, 1986; Lazear, 1999; Adsera and Pytlikova, 2015), femicides to capture cultural factors related to distance in women's empowerment (Pratle, 2016), civil liberties distance to account for political factors and formal institutions (Alesina and Giuliano, 2015), distance in the level of economic development to consider the role of formal and informal education that may help in overcoming any other barriers (Barro, 2001), and religious distance to interpret the differences in the main religion (Dow and Karunaratna, 2006; Pomeranz et al., 2018; Benjamin et al., 2016). We find that linguistic and socio-cultural distances are significant drivers of inequalities among non-native women. A one standard deviation increase in linguistic distance is associated with a 0.006 increase in the likelihood of a caesarean section and a 0.007 increase in the probability of a low-risk (likely inappropriate) caesarean section. We find similar coefficients for religious distance (0.004–0.005) and even larger coefficients for civil liberties distance (0.01), femicides' distance (0.02), and development differences (0.03), all measures of socio-cultural differences. Our preferred way of rationalising these findings is to think about immigrants' ability to process information and communicate with hospital staff, which deteriorates with increasing linguistic and socio-cultural distance (Grytten et al., 2011; Ye and Yi, 2023).

We conduct additional analyses to identify the mechanisms that can support this interpretation of our results, relying primarily on the uneven spatial distribution of non-native women (Tanis, 2018; Albouy et al., 2021). First, we consider the role of the degree of urbanisation of the residence municipality of the mothers. We then focus on the 'size' of the immigrant community living in the same municipality as the mother-to-be, using information on immigrants from the same country. We find that urban locations and larger immigrant communities exacerbate inequalities in C-sections and inappropriate C-sections when the community is socially and culturally distant from the host country. This evidence suggests the predominance of a "segregation effect," consistent with findings from other countries for various economic outcomes (Dustmann and Fabbri, 2003; Cutler et al., 2008a, 2008b; Danzer and Yaman, 2013, 2016; Fernández-Huertas Moraga et al., 2019): urban locations and larger communities with language, customs and beliefs different from those of the host country are characterised by the highest barriers to accessing appropriate care. This evidence is consistent with the well-documented phenomenon in the immigration literature that assimilation (e.g., learning the language of the host country or, more generally, adopting the culture and values of the host country) is more likely for members of small minorities than for members of large minority groups (Lazear, 1999).

We also find that the role of language and socio-cultural differences in access to appropriate care is greater for first-time mothers and women with non-native partners. Both findings strengthen our interpretation of linguistic and socio-cultural barriers as the main explanations for the observed differences in the use of C-sections among different immigrant nationalities. Personal experience and interpersonal relationships influence the use of health services. They provide a way for individuals to learn how and where to seek medical care (Moscone et al., 2012): social interactions help patients overcome information asymmetries and receive appropriate care. In addition, these interactions are particularly important for individuals from marginalised social groups, who may find it difficult to obtain information and access through more formal channels.

These findings carry at least two implications. First, since we find no evidence of systematic discrimination between natives and non-natives in the case of caesarean sections, the Italian NHS, can be considered quite fair and equitable, at least concerning the specific services relative to maternal and child care. Second, the differences between the nationalities of non-natives, which we explain in terms of linguistic and socio-cultural distance from the host country, call for policies that improve immigrants' ability to process information and communicate with staff, such as the provision of cultural mediators in hospitals, ad hoc training for medical staff, and simplification of administrative procedures.

Our paper contributes to three strands of literature. First, the literature on access to and use of healthcare services points out several potential factors explaining inequalities. Some scholars have already suggested that non-clinical factors, like education and culture, may help explain inequalities in maternal healthcare services between non-native and native women, including C-sections (e.g., Deri, 2005; Jiménez-Rubio and Hernandez-Quevedo, 2011; Wadsworth, 2013; Devillanova and Frattini, 2016). In addition, other studies have found that non-native women experience more difficulties in getting informed on the more appropriate health services through formal channels like official communications from hospitals' administrations (Devillanova, 2008; Gee and Giuntella, 2011; Giuntella et al., 2018; Amaral-Garcia et al., 2022). We contribute to this literature by showing that the non-native status is not essential *per se*. However, it is important because it determines the "distance" (in terms of language and culture) between the immigrant's home country and the destination country. We also show that this distance is even more relevant in urban areas characterised by the presence of large communities of immigrants from the same country of origin, which determines a "segregation effect" that makes the "distance" likely to persist over time.

Second, our study connects with the literature on C-sections. The C-section rate is an indicator commonly used to measure inappropriateness both in the literature (e.g., Gruber et al., 1999 for the US; Francese et al., 2014; Di Giacomo et al., 2017 for Italy) and by policymakers (e.g., annual reports by Italian Health Ministry, WHO surveys). Being a surgical treatment, C-sections show a significant cost differential and are usually better priced than normal deliveries (the appropriate treatment in standard situations). Many empirical studies investigate the reasons why C-section rates are increasing over time. Most studies emphasize supply-side explanations, stressing the role of physicians because of financial incentives for doctors or malpractice pressure (e.g., Currie and MacLeod, 2008; Frakes, 2013; Shurtz, 2014; Amaral-Garcia et al., 2015). Other studies discuss demand-side explanations, with a rising part of consumers determining treatment choice (e.g., Amaral-Garcia et al., 2022). Our contribution here is to highlight an additional factor that may influence C-sections, namely the inability to process and understand information and to communicate properly with medical staff, which links supply and demand.

Finally, our study is closely related to the literature on the role of linguistic and cultural proximity in economics. Similarities in ethnic origin, religion, or cultural proximity have been found to facilitate transactions among economic agents in many different settings, such as trade (Guiso et al., 2006, 2009), the quality of institutions (Alesina and Giuliano, 2015), growth (Tabellini, 2010), or firms' decisions (Ahern et al., 2015; Da Rin et al., 2019). Whether cultural proximity leads to higher or lower quality transactions is mainly an empirical issue (Fisman et al., 2017). Preference for members of the same group may lead to discrimination and, hence, inefficient allocation. Alternatively, similarity may reduce asymmetric information and transaction costs and improve communication. Large information asymmetries characterise the healthcare market. Barriers to information and communication, exacerbated by cultural and linguistic differences, may deteriorate the doctor-patient relationship and worsen health outcomes (Deri, 2005; Ye and Yi, 2023). We contribute to this literature by focusing on a context (maternal healthcare) where information quality is heterogeneous and where information gathering and collaborative decision-making play an important role. We exploit the variability in mothers' citizenship to shed light on the mechanisms linking health outcomes and linguistic and socio-cultural components.

The remainder of the paper is the following. Section 2 provides essential background information about the institutional setting. Section 3 describes the data, while Section 4 presents the empirical strategy. In Section 5, we discuss the results and the mechanisms. Finally, Section 6 reports some concluding remarks and policy implications.

2. Institutional background

The Italian NHS (in Italian, *Servizio Sanitario Nazionale*) is a tax-funded insurance scheme providing universal coverage, essentially free of charge at the point of delivery. The primary funding sources are national taxes, supplemented by regional taxes and co-payments for pharmaceuticals and outpatient care (with co-payments representing a minor share of funding, Di Giacomo et al., 2022). Healthcare policies are a shared responsibility between the Central and the twenty regional governments. According to the Constitutional mandate, while the central government defines framework legislations and sets the essential standards and objectives of the health system, the regional governments are responsible for the organization and the supply of healthcare services (Ferrario et al., 2023).

This paper focuses on Piedmont, one of the twenty Italian regional governments. Piedmont is a large region in north-western Italy with a population of around 4.3 million.[2] The annual number of births was around 35,000 in 2017 (the last year in our dataset), and the crude birth rate (number of live births per 1000 inhabitants) is around 8, slightly lower than the Italian average (8.5) and much lower than the EU (10) and US (12.5) birth rates. It is a wealthy region relative to Italian standards, with an annual average per-capita income of about 30,000 euro. The territory is characterised by a large number of municipalities (about 1100 out of about 8000 for the whole of Italy). However, the size of the municipalities varies greatly, with Turin being by far the largest urban centre, with about 850,000 inhabitants. Non-natives account for around 10% of the total population, a higher proportion than the national average (8.5%). Romania is the largest community, followed by Morocco, Albania, and China.[3]

The relevant national framework legislation for the organization of maternal and newborn health services dates to 2000–2001 when the *"Progetto Obiettivo Materno Infantile"* (literally, "Project targeting mothers and infants," Ministero della Salute, D.M. April 24, 2000 and D.M. February 14, 2001) has become effective. The Project offers the main guidelines for healthy conception, pregnancy, birthing, and postnatal care. In addition, it determines that pregnancy care is part of the "essential levels of care" (in Italian, *Livelli Essenziali di Assistenza*, or LEA), which must be guaranteed to all residents in all regions according to a Constitutional mandate. Since then, a few national decrees and many regional implementation decrees have completed the general requirements of the national law. The regional government in Piedmont complies with these general prescriptions but adopted its own model. One main characteristic is that public hospitals supply all deliveries funded by the NHS. Almost all women residing in Piedmont (around 98%) deliver in a public hospital (including women in our sample). There are 33 public hospitals spread across the regions, and physicians and nurses working in these public hospitals are salaried public employees. All these hospitals are reimbursed through a prospective payment system based on Diagnosis Related Groups (DRG), and financial incentives are expected to play a minor role (Di Giacomo et al., 2017).

Our focus is on deliveries, in particular C-sections. The C-section rate

[2] Although Piedmont is only one of Italy's regions, it is a relevant case study. It has about the same population as the whole of Ireland or a medium-sized US state such as Kentucky or Louisiana.

[3] In our sample, the five largest immigrant groups are from Romania, Morocco, Albania, China, and Nigeria, accounting for 66% of all non-native women.

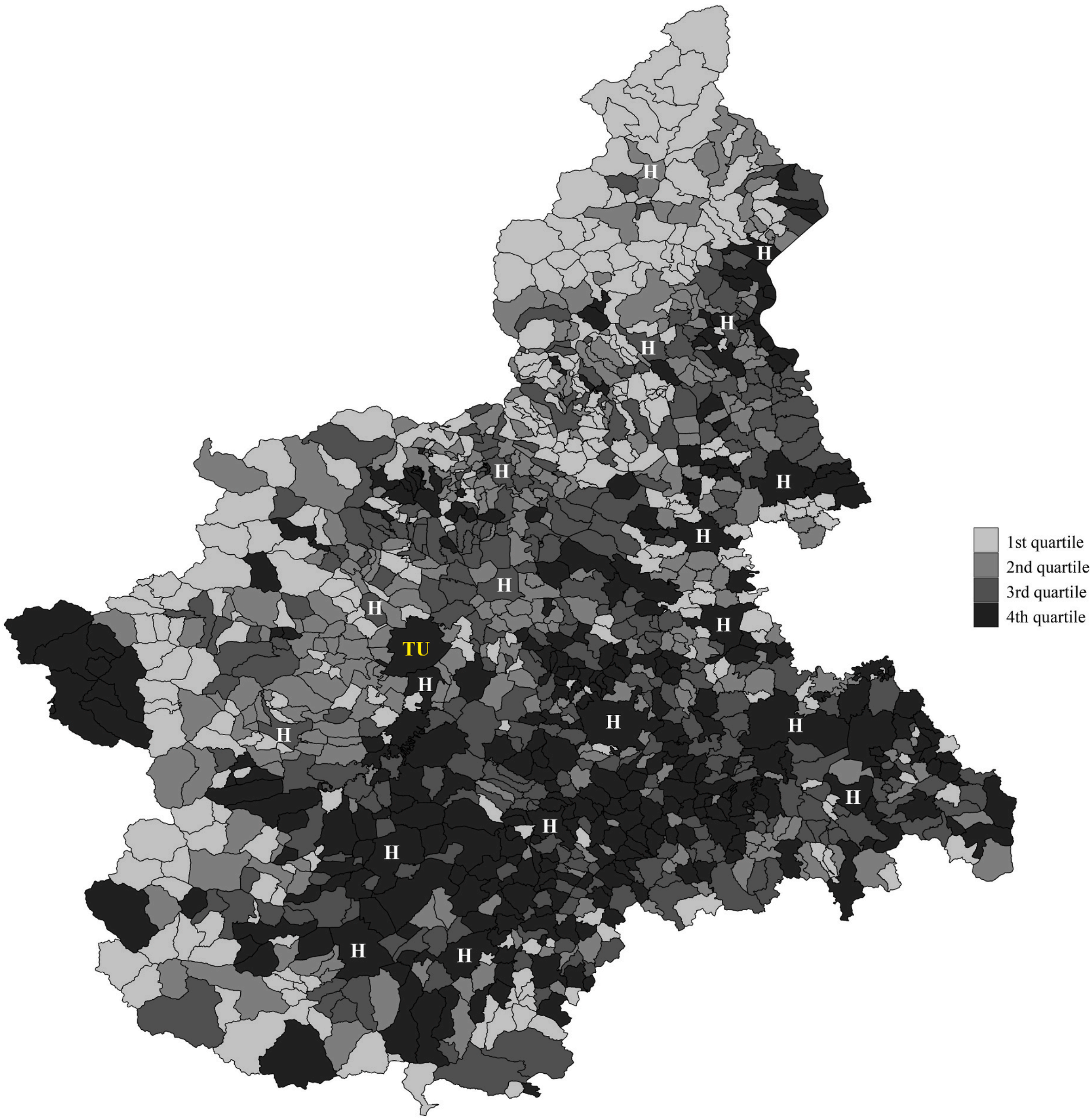

Fig. 1. Municipalities by quartiles of the share of non-native residents in the population of the municipality in 2017.
Notes: H is for a municipality with a maternity ward. The municipality with the the label TU indicates Turin, the region's capital, which has four hospitals. For all other municipalities, H means one hospital. 1st quartile is for a share of the non-native population less than 3.74 percent. 2nd quartile is for a percentage of the non-native population between 3.74 and 5.96 percent. 3rd quartile is for a share of the non-native population between 5.96 and 9.02 percent. Finally, the 4th quartile is for a percentage of the non-native population higher than 9.02 percent. Source: Istat.

is one indicator of the quality of perinatal healthcare. While C-section is an essential and lifesaving surgery, it is associated with a higher risk of mortality and morbidity for women and newborns when inappropriate (WHO, 2015). International guidelines no longer set specific C-section target rates, and they suggest focusing on each woman's needs in pregnancy and childbirth. Accordingly, the Italian Ministry of Health recommends enhancing the role of health professionals and their commitment to protecting assisted persons and strengthening women's active participation in decisions about pregnancy and childbirth. However, over the last few decades, the share of caesarean sections in total births at national level has remained almost unchanged at a high level (33% in 2000 vs. 31% in 2021), with considerable territorial differences between the twenty regions. According to available evidence (e.g., Francese et al., 2014), the adoption of C-sections is explained by clinical factors (e.g., an increase in the age of mothers at first delivery), incentives provided by DRG tariff regulation, but also political economy factors (like the ability to finance healthcare services with own regional resources or the personal characteristics of incumbent politicians). In Piedmont, the C-section rate is below the national average (26% in 2021), and this rate has been relatively stable over the last twenty years: from 27% in 2000 to 29% in 2010, 28% in 2015, and 27% in 2020. There were no regional guidelines or policy changes regarding C-sections during the period under study.

3. Data and variables

3.1. Sample definition

Our main data source is the CEDAP (Certificato di assistenza al parto, literally Delivery Certificate) administrative archive. The Ministry of Health introduced the delivery certificate in 2001, leaving the data management to regional governments. The archive allows homogeneous, comparable, and high-quality statistical data on all births occurring in public and private hospitals or other facilities (e.g., midwifery units, birth centers, and home births) on the Italian territory. The midwife or doctor who attended the birth is responsible for completing the form within ten days of the birth. The certificate is compulsory and contains a rich set of information about the socio-demographic characteristics of the parent(s), the course of the pregnancy, the labor, the childbirth, and the newborn health status, with some regional differences in the availability of additional non-compulsory information (like the Robson score).

We obtained microdata from the Regional Government's Department of Health for all women who gave birth within the administrative borders of the Piedmont region between 2010 and 2017 in a public hospital. The data cover around 98 percent of all births within the region. Information on home births (0.2 percent of total births) and deliveries in private hospitals (1.8 percent of total births) is unavailable.

From the population of women delivering in a public hospital (264,700 observations, of which 27.3% are non-natives), we exclude women not resident within the administrative borders of the region and for whom we do not have information on citizenship (we exclude 8,631 women giving birth in Piedmont who do not live in the region, and 85 women without the citizenship information). Next, we focus on term deliveries (those between the 37th and 41st gestational weeks) to avoid complicated preterm and late-term deliveries that may impact our estimates (preterm deliveries are 19,367, while late-term deliveries are 6,276).[4] Finally, we exclude women for whom data on the relevant medical conditions and socio-economic status are unavailable (64 observations). Our observational unit is a single woman giving birth, and the final sample consists of 230,277 women, of which 26.7% are non-natives. As for the definition of immigrant, the literature relies on citizenship or the country of birth. Both measures have pros and cons (Borjas, 2014). We observe both in our sample, and the results barely change when using one instead of the other. In our empirical analysis, we rely on citizenship, which the mother declares at the hospital admission for delivery. One main drawback of our data is that we do not observe the immigrant arrival year or the length of stay in Italy. These factors may explain the differences between natives and non-natives in the use of healthcare services. However, immigration to Italy is a recent phenomenon, and most immigrants have short spells of stay (e.g., Istat, 2018). We will discuss this issue further below in Section 5.2.

Using census data, Fig. 1 shows the share of all non-native residents in all municipalities in the region in 2017. Dark grey (white) municipalities are those with the highest (lowest) presence of non-native residents. The distribution of non-natives shows a high degree of spatial correlation, with a large presence in urban areas equipped with a hospital and a minor presence in scarcely populated mountain areas (with some exceptions likely related to tourism around the municipality of Sestriere, a well-known mountain resort). The letter 'H' in Fig. 1 indicates the presence of a hospital with a maternity unit, and the label *TU* marks the city of Turin, the regional capital, where there are four hospitals with a maternity unit. The mountains (the Alps and the Apennines) surround Piedmont on three sides, forming a natural border with Valle d'Aosta and Switzerland to the North, France to the West, and Liguria to the South. The Po Valley extends to the East, where Piedmont borders Lombardy and Emilia-Romagna. Between 2014 and 2016, approximately 4,300 women resident in Piedmont (around 4% of the regional births annually) gave birth in other regions, while approximately 2,200 women from other regions gave birth in Piedmont (around 2% of the regional births). The most significant movements are with bordering Italian regions, especially Lombardy and Liguria, those better connected with Piedmont (Assessorato della Sanità, Piedmont Region, 2018). Unsurprisingly, interregional mobility is quite limited in size and geographical scope for deliveries.

We further investigate the spatial distribution of native and non-native mothers, using the information available in our data on the municipality of residence of all mothers at the time of delivery. First, we observe that the hospitals are located in urban areas, but the urban hierarchy of the region is dominated by the city of Turin, with a population (in 2019) of 857,910 units, representing 19.90% of the total population of Piedmont; the population of the second largest city (Novara) is much smaller (103,287 units). According to this hierarchy, we define three different subsamples according to the proximity of the mother's municipality to hospitals with a maternity unit: (i) women living in a municipality within a 15-min drive of the nearest hospital; (ii) women living in a municipality with a hospital; and (iii) women living in the municipality of Turin. We will use these subsamples in the empirical strategy section to test the robustness of our results to any differences in potential access to treatment across spatial units. Second, to uncover the mechanisms behind our results, we test the association between urbanisation and immigrant health outcomes by comparing patients living in Turin with those from other municipalities. Finally, we consider the size of the immigrant community of the women in the mother's municipality of residence (defined by the number of migrants of the same nationality) to analyse the mediating role of immigrant communities.

3.2. Variables definitions and summary statistics

We consider C-section as an alternative to vaginal delivery to study inequalities in (appropriate) treatments between natives and non-natives. The first outcome measure is a simple C-section dummy (*CS*): a binary variable equal to one if delivery occurred by a C-section and zero for vaginal birth. As C-sections are usually considered to measure inappropriateness, we also exploit information on the Robson classification to define a second outcome variable: a Low-Risk C-section dummy (*LR-CS*).[5] The Robson classification was created to identify

[4] The distribution of native and non-native women is relatively even across term, preterm and late term births, with a slightly higher proportion of non-natives among preterm and late term births. Non-native women account for 29% of all preterm births and 30% of late term births. Preterm babies need to be cared for in special or intensive care units, and only a fraction (about one third) of maternity units offer special services tailored to the needs of preterm babies. In addition, the use of C-section is higher for preterm births (53% of cases in our sample) and lower for late term births (20%) than for term births, due to the special medical conditions.

[5] We do not have any further information about the type of C-section. Typically, a C-section procedure can be an elective C-section, i.e., an operation scheduled well before labor begins, or an emergency C-section, i.e., a surgery performed before or during labor due to unexpected problems for the mother or fetus. However, anecdotal evidence shows that most C-sections (75–80% of all C-section procedures) in Piedmont are elective (Assessorato della Sanità, Piedmont Region, 2018).

Table 1
Summary statistics for the dependent variables and the main explanatory variables.

Panel A. Dependent variables: sample averages

	In observed sample			In the area of origin
	CS (%)	**LR-CS** (%)	N. observations	Average CS rate
Area of origin of the woman				
Italy	27.9	14.2	168,851	–
Africa	34.4	16.8	4614	5.0
Americas	31.5	15.3	5406	39.3
East Mediterranean	26.4	10.6	15,806	32.9
Europe	21.9	10.8	31,337	25.7
South-East Asia	30.9	16.4	1298	15.8
Western Pacific	19.7	8.4	2965	26.6
Overall	27.1	13.5	230,277	21.1

Panel B. Main explanatory variables: sample averages

Area of origin of the woman	Africa	Americas	East Mediterr.	Europe	South-East Asia	Western Pacific
Language-Dist (index 0–100)	99.55	60.56	94.84	72.73	92.43	99.76
Femicides-Dist (N. per 100,000 inhabitants)	4.41	3.42	0.0004	1.07	1.62	0.24
Civil Liberties-Dist (index 1–7)	1.82	0.87	2.20	0.34	1.56	3.32
Development-Dist (Euro per capita)	24,742	17,223	22,607	16,434	23,776	20,111
Religious-Dist (index 0–10)	4.89	1.88	9.08	3.23	9.05	3.38

Notes: The area of origin of the woman follows the classification of regions by the World Health Organization (2021). In particular, the *East Mediterranean region (EMR)* includes Afghanistan, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen. *Africa* includes all African countries that do not enter the East Mediterranean region. The *South-East Asian region (SEAR)* encompasses Bangladesh, Bhutan, North Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, and Timor-Leste. In the *Western Pacific region* (WPR), there are Australia, Brunei, Cambodia, China, Cook Islands, Fiji, Japan, Kiribati, Laos, Malaysia, Marshall Islands, Micronesia, Mongolia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, South Korea, Tonga, Tuvalu, Vanuatu, Vietnam. *Americas* include Noth, Central, and South American countries. *Europe* includes all countries that enter none of the other WHO regions, and we also exclude Italy, the host country. In the last column of panel A, data on average CS rates are from Betran et al. (2021).

clinically relevant groups of pregnant women.[6] The classification consists of ten mutually exclusive groups defined according to several obstetric conditions: infant presentation, number of previous deliveries, past C-sections, delivery week, twin pregnancy, etc. Women are classified at the time of hospital admission for childbirth. Women classified in Robson groups 1 to 4 are at low risk of having a C-section (Card et al., 2023). In line with this definition, our binary variable *LR-CS* equals one if the C-section occurred in a mother classified in Robson groups 1 to 4, and zero otherwise.

The main explanatory variables for inequalities in the use of services are linguistic and socio-cultural distance measures computed between the women's country of origin and Italy. In our sample, we have 114 nationalities that we exploit to collect distance measures varying with the mother's citizenship.

The linguistic distance from Italian (*Language-Dist*) is an index ranging from 0 (no difference) to 100 (highest distance), obtained from Adsera and Pytlikova (2015). In particular, we use the Linguistic Proximity Major index, which measures the linguistic proximity using the language spoken by most people within the country to define the difference. We also experimented with alternative linguistic distance measures,[7] and the results did not qualitatively change.

We consider four measures of socio-cultural distances. First, we look at the difference in the number of femicides per 100,000 inhabitants between the mother's country of origin and Italy (*Femicides-Dist*). The data come from the World Bank database and are measured in 2010, the starting year of our dataset. There are long-term determinants and cultural norms that may explain and maintain gender inequality and violence (Tur-Prats, 2019; González and Rodríguez-Planas, 2020). There is also evidence that socio-cultural models linked to patriarchal masculine habits and beliefs are associated with gender violence (Heise and Kotsadam, 2015), and our distance measure should capture cultural factors related to women's status, gender inequality, and gender-related norms (Pratle, 2016). Second, we use the difference in the civil liberties index produced by Freedom House (2023), also measured in 2010 (*Civil-Liberties-Dist*). The Civil Liberties score is defined on a 1–7 scale, where one represents the highest degree of freedom, and seven is the smallest. This measure allows us to account for differences in political factors and formal institutions (Alesina and Giuliano, 2015). Third, we construct a measure of the level of development as the difference in GDP per capita between the country of origin of the mother and Italy (*Development-Dist*), obtained from the World Bank database and measured in 2010. This distance in the level of economic development allows us to consider the role of formal and informal education that may help overcome any other barriers (Barro, 2001). Finally, we introduce the religious identity (*Religious-Dist*), which is measured as the difference in the major religion (any religion to which more than 20% of the

[6] See Robson (2001). The 10 Groups Classification (also known as the TGCS Ten Groups Classification System or the Robson Classification) is a complete perinatal classification for all women giving birth. The system classifies all women admitted for delivery into one of 10 mutually exclusive and fully inclusive groups based on a few basic obstetric variables (WHO, 2017). In group 1 we find nulliparous women with a singleton cephalic pregnancy, gestational age greater than 37 weeks in spontaneous labor. In group 2 we find nulliparous women with a single cephalic pregnancy, gestational age greater than 37 weeks who had labor induced. In group 3, multiparous women without previous CS, with a single cephalic pregnancy, weeks of gestation greater than 37 in spontaneous labor. In group 4, multiparous women without a previous CS, with a single cephalic pregnancy, weeks of gestation greater than 37 who had labor induced. In group 5, all multiparous women with at least one previous CS, with a single cephalic pregnancy, weeks of gestation greater than 37. In group 6, all nulliparous women with a single breech pregnancy. In group 7, all multiparous women with a single breech pregnancy, including women with a previous CS. In group 8, all multiparous women, including those with previous CS. In group 9, all women with a single transverse or oblique pregnancy, including women with previous CS. Finally, in group 10, all women with a single cephalic pregnancy and a gestational age of less than 37 weeks, including women with previous CS.

[7] In particular, we also adopt the Levenshtein distance developed by the Max Planck Institute for Evolutionary Anthropology, and the Dyen linguistic proximity measure proposed by Dyen et al. (1992).

population claim an affiliation) in 2005 between Italy and the country of citizenship of the mother (Dow and Karunaratna, 2006). Besides potentially implying preemptive refusal of C-sections (e.g., Pomeranz et al., 2018), religion is closely associated with culture, attitudes, and norms, and a high distance in religious beliefs may increase conflicts, misunderstandings, and transaction costs (Benjamin et al., 2016; Iyer, 2016).

To ease interpretation, we standardize all distance measures, rescaling them with a mean of zero and a standard deviation of one. Table A1 in the Appendix details all variables' definitions and sources.

Table 1 reports summary statistics for the dependent variables and our main explanatory variables. In Panel A, average caesarean section (*CS*) and average low-risk *CS* (*LR-CS*) rates are 27.9% and 14.2%, respectively, among native women. We find high variability among non-native women, depending on their area of origin (classified according to the WHO list of world macro-regions).[8] The lowest average *CS* rates are for Western Pacific and European women (19.7% and 21.9%, respectively). The highest rates are for American and African women (31.5% and 34.4%, respectively). The share of low-risk *CS* follows a similar pattern. In the last column of Panel A in Table 1, we also report the average C-section rates in the respective areas of origin for comparative purposes. These data are obtained from Betran et al. (2021) and refer to 2018. The lowest *CS* rates are in Africa (5%), while the highest are in America (39%). We find no association between the *CS* rate we observe in our sample and that of the country of origin of non-native women. This evidence suggests that the share of C-sections observed in Italy for different nationalities is not influenced by the prevalence of this procedure in the country of origin (affected by local medical practices).

In Panel B of Table 1, we report the average distance measures. Linguistic distance is larger for both African and Western Pacific (mainly Chinese) women and smaller for both American (mainly South American women speaking Spanish or Portuguese) and European women. Distance in femicides is considerable for African and American women, while Civil-Liberties distance is high for women from Western Pacific and East Mediterranean countries. Development distance is large for all women: most immigrants to Italy are economic immigrants (Mariani et al., 2023), and immigration mainly involves flows from low-income countries (OECD, 2022). Finally, the Religious distance is highest for East-Mediterranean and South-East Asian countries.

To summarize information and find countries exhibiting similar patterns in the distribution of distance measures, we also perform a cluster analysis using a k-means algorithm based on Euclidean distances. We identify three clusters of countries. Results are reported in Table A2 in the Appendix. The table shows, for each cluster, the mean of each distance measure. Cluster 1 includes 23 countries (out of the available 114), characterized by relatively high distance in language and low distances in socio-cultural factors from Italy. These are mainly medium- and high-income countries whose differences from Italy are mainly in the language. We label Cluster 1 as the group of countries *"far in language, close in culture."* The second cluster is marked by a lower linguistic distance when compared to Cluster 1 and, at the same time, a higher distance in all the other four domains. The 32 countries of this group are mostly Eastern European and South American nations. We label Cluster 2 as the group of countries *"close in language, far in culture."* Finally, Cluster 3 is characterized by the highest distances from Italy across all five categories identified and is labeled *"far in language and culture."* We exploit the three clusters, introducing the corresponding set of dummy variables in some specifications as an alternative to the distance measures.

In all specifications, we also include the medical, lifestyle, demographic, and socio-economic covariates affecting the individual probability of a C-section (e.g., Grytten et al., 2011; WHO, 2015; Amaral-Garcia et al., 2022; Card et al., 2023). In particular, we include information on the type of birth (twin birth, breech birth), a dummy variable for a high risk of a C-section,[9] whether the woman experienced diseases in pregnancy (i.e., a pathological pregnancy, like the presence of diabetes, eclampsia, hypertension, placental defects, and mental health condition), the presence of other pathologies (asthma and allergies), alcohol consumption and smoking during pregnancy, and the weight of the newborn at birth. We also control for previous births, previous C-sections, previous miscarriages, and previous hospital admissions during pregnancy. Finally, we include the mother's demographic and socio-economic characteristics: age, education level, employment status, marital status, and whether the father is a national of Italy. We further exploit some of these variables in the estimation strategy to uncover the potential mechanisms behind our main findings.

Table A1 in the Appendix provides a detailed description of all the characteristics of the women in the sample, while Table A3 shows some summary statistics. Immigrant women are younger, less educated, and less often employed than Italian native women. In addition, non-native women report slightly more pathological conditions during pregnancy than natives (24.5% for non-native vs. 22.6% for native women), a characteristic probably linked to lower adherence to prenatal care (Di Giacomo et al., 2022).

4. Empirical strategy

Our empirical strategy follows two steps: first, we consider the whole sample of women, natives, and non-natives; second, we focus on the sample of non-native women only to explore differences across immigrants from different countries.

The first specification for the probability of observing a C-section (*CS*) or a low-risk C-section (*LR-CS*) is the following linear probability model[10]:

$$Prob(Y)_{iht} = \alpha_0 + \alpha_1 N_i + X_i'\gamma + \pi_h + \pi_t + u_{iht} \tag{1}$$

where the subscript i is for a woman delivering in hospital h, in year t. Y is alternatively *CS* or *LR-CS*, while N_i is a dummy variable equal to one if the woman i is non-native and zero otherwise. In some specifications, we substitute the dummy N_i with a set of dummy variables mapping the WHO world macro-regions. Vector X collects a complete list of covariates describing demographic and socio-economic characteristics (age, education, occupational and marital status, citizenship of father) and medical and lifestyle characteristics (pathological conditions, type of birth, asthma, allergies, previous deliveries, previous C-sections, previous miscarriages, hospital admissions during pregnancy, high-risk Robson group, the newborn weight at birth, alcohol, and cigarettes consumption) of woman i that may affect the probability of a C-section procedure (Grytten et al., 2011; WHO, 2015; Amaral-Garcia et al., 2022; Card et al., 2023). In the specification, we also introduce fixed effects for the hospital where the delivery occurs (π_h), and for the year of delivery (π_t). Standard errors are clustered at the municipality level (where the woman resides) and the year of delivery to account for any dependence within the same municipality-year.

[8] The WHO regions are six: the African Region, the Region of the Americas, the Eastern Mediterranean Region, the European Region, the South-East Asia Region, and the Western Pacific Region.

[9] The high-risk Robson dummy variable equals one if the mother is classified in a Robson group equal to or greater than five. This variable is only included in specifications where CS is the dependent variable.

[10] Estimates are fully consistent when the probability of observing a C-section or a low-risk C-section is modelled using a probit regression rather than a linear probability model. The linear probability model tends to approximate well the average marginal effects derived from logit or probit models (Angrist and Pishke, 2009; Wooldridge, 2010). In the following sections, we report the results from the linear probability model, which is widely used in the literature (Buchmueller et al., 2006; Boschma et al., 2017; Borck and Schrauth, 2021). Probit estimates are reported in the Appendix, Table A5.

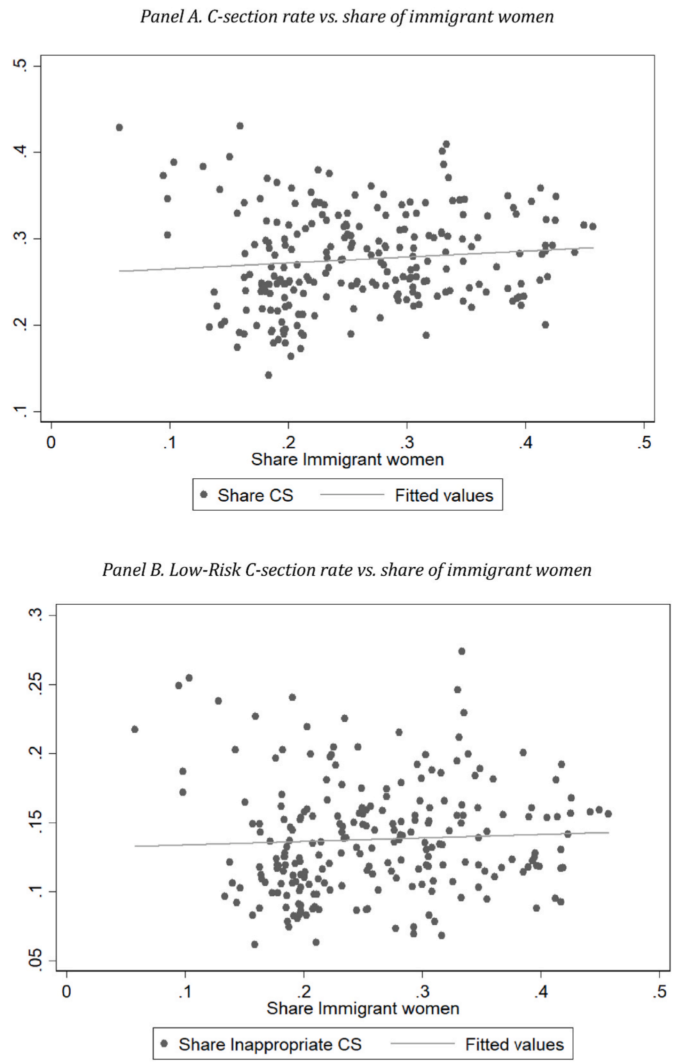

Fig. 2. Plot of the share of C-sections and Low-Risk C-sections against the share of immigrant women at the hospital-year level.

The main objective of this first specification is to understand if there are any differences in C-section procedures between native and immigrant women. This comparison offers several potential insights about disparities across nationalities or whether C-section procedures are more likely among women from particular geographical areas. In addition, we will test the robustness of our findings by considering subsamples of women defined in terms of different urban areas (considering the proximity to a hospital with a maternity unit, see section 3.1) and the choice of public or private practice for antenatal care.

In the second step, we only focus on the subsample of non-native women, for whom we can better exploit the variability in women's nationalities. We want to test whether "distances" between the country of origin and the host country along several linguistic and socio-cultural factors can explain the observed differences in C-sections. We model again the probability of observing a caesarean section (*CS*) or a low-risk caesarean section (*LR-CS*) using a linear probability model[11]

$$Prob(Y)_{icht} = \beta_0 + \beta_1 Distance_c + X_i'\delta + \lambda_h + \lambda_t + \varepsilon_{icht} \quad (2)$$

where the subscript i is for a woman from the country of origin c, delivering in hospital h, in year t. We are interested in the role of the five distance measures to the host country ($Distance_c$), which we introduce in turn in Equation (2).

In addition to Equation (2), we consider a further specification that exploits the set of dummy variables that group countries into three clusters (Cluster 1, Cluster 2, and Cluster 3), which are obtained from the cluster analysis on the five distance measures discussed in section 3:

$$Prob(Y)_{icht} = \theta_0 + \theta_1 Cluster2_c + \theta_2 Cluster3_c + X_i'\rho + \eta_h + \eta_t + \mu_{icht} \quad (3)$$

In Equations (2) and (3), we include the same set of controls (vector X) for the socio-economic status and the medical and lifestyle characteristics of woman i included in Equation (1). The terms λ_h in Equation (2) and η_h in Equation (3) capture a set of hospital fixed effects. The terms λ_t in Equation (2) and η_t in Equation (3) capture a set of year-of-delivery fixed effects. Standard errors are clustered at the municipality level and at the year of delivery to account for any dependence within the same municipality-year.

We are primarily interested in the sign and the size of the coefficients β_1 in (2) and θ_1 and θ_2 in (3), i.e., the role of distances in explaining the C-section procedures. Two main issues threaten identification: firstly, the self-selection of women into hospitals; secondly, the endogeneity of the location decision in terms of residential choice.

Non-native women may self-select into hospitals with higher C-section rates. Evidence suggests that hospital characteristics (e.g., available specialized resources, urban location, delivery volumes, etc.) may be associated with C-section rates (Gibbons et al., 2010; Card et al., 2023). If hospitals with high *CS* rates differ in quality from hospitals with low *CS* rates, and women are not randomly distributed between the two types of hospitals, this may confound our results.

Fig. 2 plots the share of *CS* (panel A) and *LR-CS* (panel B) at the hospital-year level against the percentage of non-native women. We find a slightly positive relationship (significant at the ten percent level in Panel A and not statistically significant in Panel B), which disappears when hospital fixed effects are included. This is preliminary evidence that there is no sorting of non-native women across hospitals according to the hospital's C-section rate. The most likely explanation for this finding is that most women deliver in the nearest hospital. In our sample, around 75% of women deliver at the nearest hospital, a percentage consistent with other studies (e.g., Phibbs et al., 1993; Currie and MacLeod, 2017; Card et al., 2023). In all regressions, we include hospital and year fixed effects to control for systematic variation in hospital characteristics.

The endogeneity of the location decision may also bias our results. Non-native women are not randomly assigned across municipalities over the regional territory: favourable labour market conditions, good overall quality of services, and well-developed transport and telecommunications infrastructures are among the factors driving the residential choice of migrants' families. Moreover, the importance of these factors is likely to be heterogeneous across different groups of migrants, depending, for instance, on the specific characteristics of the local labour market or the presence of communities from the same country of origin of non-native women. If these heterogeneous (and unobserved) factors of attraction are associated with any heterogeneities in the quality of healthcare services locally provided, then the estimates of the coefficients for our "distance" measures may be biased. We alleviate this issue in two ways (Battisti et al., 2022). First, our main specifications in (2) and (3) include controls for a large number of maternal characteristics available in our data, as well as hospital and year fixed effects, which can absorb systematic differences in the quality of health services across hospitals and over time. Second, we exploit the spatial distribution of non-native women across the regional territory by estimating equations (2) and (3) on the full sample of non-native women and on the subsamples defined in terms of proximity to a maternity unit to account for differences in potential access to hospital services across spatial units (Wang et al., 2016; Fernández-Huertas Moraga et al., 2019; Perucca et al.,

[11] Probit estimates are reported in the Appendix, Table A17. See also footnote 10 for a discussion.

Table 2
Regression results for *CS* and *LR-CS*: whole sample of native and non-native mothers.

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-native	−0.006*	−0.003		
	(0.003)	(0.003)		
Africa			0.050***	0.058***
			(0.008)	(0.007)
Americas			0.023***	0.020***
			(0.006)	(0.005)
East Mediterranean			−0.006	−0.001
			(0.004)	(0.004)
Europe			−0.019***	−0.016***
			(0.003)	(0.003)
South-East Asia			0.046***	0.046***
			(0.012)	(0.010)
Western Pacific			−0.035***	−0.028***
			(0.006)	(0.005)
Constant	−0.086***	−0.064***	−0.089***	−0.068***
	(0.009)	(0.009)	(0.009)	(0.009)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	230,277	230,277	230,277	230,277
R-squared	0.368	0.093	0.368	0.095

Notes: OLS estimates for Equation (1). Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the CS specifications in columns (1) and (3)), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

2019). If the results are robust across these subsamples, then the endogeneity of the location decision does not bias our results.

5. Results

In this section, we present our findings. We start with the differences between natives and non-natives, then explore the differences between different nationalities of immigrants, and finally investigate the possible mechanisms.

5.1. Native vs. non-native women

Table 2 reports the estimates of Equation (1) based on the full sample of native and non-native women.[12] The estimated coefficient for non-natives is always negative but marginally statistically significant for *CS* and not significant for *LR-CS* (columns (1) and (2) of Table 2). This result suggests that there are no differences between native and non-native women in the use of C-sections and inappropriate C-sections once individual risk factors, socio-economic status, and fixed effects are controlled for.

We further investigate the role of immigrant status by introducing a set of dummy variables classifying the different nationalities into world macro-areas (columns (3) and (4) of Table 2). As mentioned above, these macro-areas are defined according to the WHO regional classification, and the excluded group is the Italian citizenship. There are clear heterogeneous patterns among the non-natives' different nationalities. In

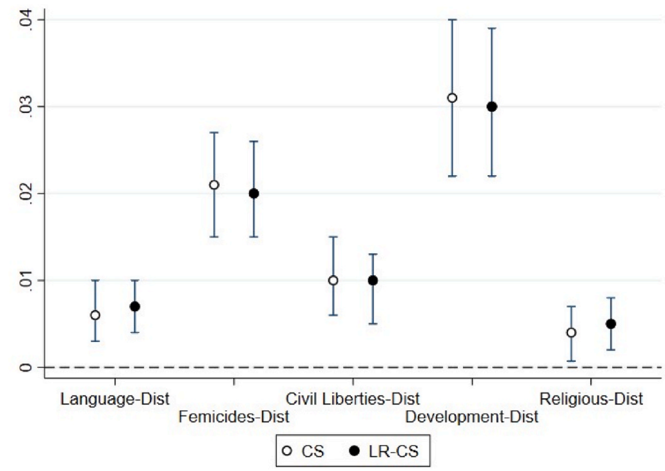

Fig. 3. Regression results for *CS* and *LR-CS*: coefficients for linguistic and socio-cultural distances in the sample of immigrant women.
Notes: OLS estimates for Equation (2), with dependent variable *CS/LR-CS*. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. All linguistic and socio-cultural distances are standardized to have zero mean and standard deviation equal to one. Standard errors are clustered at the level of municipality-year.

particular, women from Africa, South-East Asia, and America are more likely to have *CS* and *LR-CS* than Italian women. On the other hand, women from Western Pacific countries and Europe are less likely to have *CS* and *LR-CS*. Although the groups differ in size (see Table 1), these differences are highly statistically significant and merit further investigation.

Before moving on, we examine the robustness of these results along two margins: the proximity to a hospital with a maternity unit, taking into account the non-random location choice of immigrants across different urban areas, and the choice of a private gynaecologist as an alternative to the free public service. First, we re-estimate the same model on three subsamples of women living in municipalities close to a hospital, with a hospital, or in the municipality of Turin (Tables A6, A7, and A8 in the appendix). For all three subsamples, we broadly confirm our basic results. While the non-native dummy is insignificant, the macro-regional world dummies are statistically significant and show a large variability in immigrants' areas of origin. If anything, the coefficients are less precisely estimated for the Turin municipality, probably due to the smaller sample size.

We then estimate Equation (1) on the two subsamples of women who used public or private prenatal care (Tables A9 and A10 in the Appendix). Prenatal care consists of a certain number of doctor or midwife appointments (at least one per month), a set of pregnancy tests (e.g., ultrasound scans or amniocentesis), and medical checks and tests (e.g., blood and urine tests). While a woman usually goes to a hospital for scans and tests, appointments with a midwife or a doctor can be scheduled in a public facility or a private practice. However, while public prenatal care is provided entirely free of charge, women who choose to use private services have to pay for them. The distribution of non-natives between users of public and private services clearly reflects this feature: the number of women opting for public prenatal care in our sample is 94,098: 52% are non-natives, while 48% are natives. Conversely, the number of women using private services is 136,179:

[12] Full estimates, including controls for maternal socio-economic status and medical history, are presented in the Appendix, Table A4. The corresponding probit estimates are reported in the Appendix, Table A5.

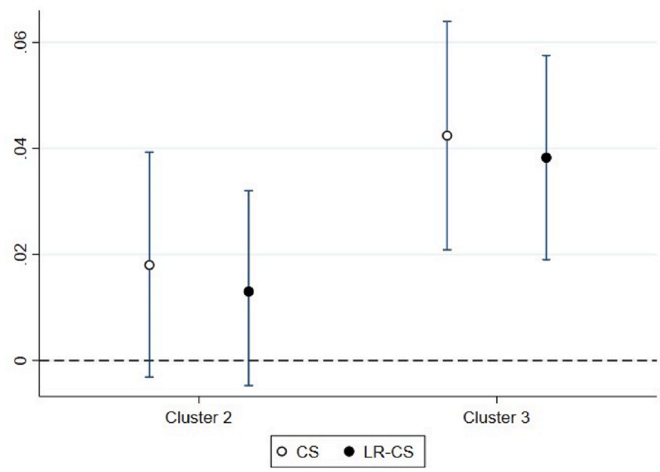

Fig. 4. Regression results for *CS* and *LR-CS*: coefficients for cluster dummy variables in the sample of immigrant women.
Notes: OLS estimates for Equation (3), with dependent variable *CS/LR-CS*. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. We identify three clusters of countries by cluster analysis based on a k-mean algorithm. Cluster 1 includes 23 countries "far in language, close in culture." The second cluster comprises 32 countries "close in language, far in culture." Finally, Cluster 3 (59 countries) is characterized by the highest distances from Italy across all the five categories identified, and it is labeled "far in language and culture." The shown coefficients refer to the set of dummy variables built using the clusters, with Cluster 1 as the base category. Standard errors are clustered at the level of municipality-year.

10% are non-natives, and 90% are natives. We argue that native and non-native women using public/private services have more similar socio-economic conditions and are, therefore, more comparable.[13] Estimates confirm baseline results, and in both groups of women, we find significant differences across macro-regional world dummies.

5.2. The role of linguistic and socio-cultural distances

Given the heterogeneity of migrants by nationality, we now investigate the role of linguistic and socio-cultural distances as potential drivers of these differences. We thus estimate Equations (2) and (3) on the sample of non-native women only. Since distance measures are highly correlated, we introduce them individually in the model. Estimated coefficients and their 95% confidence intervals are shown in Fig. 3.[14] As distance measures have been standardized to have zero mean and a unitary standard deviation, coefficients are directly comparable. First, all distance measures increase the probability of a *CS* and *LR-CS*: a higher linguistic distance, a higher difference in femicides, civil liberties, level of economic development, and religious distance are all significantly associated with higher probabilities of both *CS* and *LR- CS*. Second, the *Development-Dist* measure has the largest impact on the probability of a *CS* and *LR-CS*: one standard deviation increase in the distance increases the likelihood of a *CS* and a *LR-CS* procedure by about 0.03 ppt. The coefficients for the *Femicides-Dist* (coefficient equal to 0.02 for both *CS* and *LR-CS*), the *Civil-Liberties Dist* (coefficient equal to 0.01 for both *CS* and *LR-CS*), the *Language-Dist* (coefficient equal to 0.006 for *CS* and 0.007 for *LR-CS*), and the *Religious-Dist* (coefficient equal to 0.004 for *CS* and 0.005 for *LR-CS*) follow, with smaller sizes.

We further explore the role of differences between the immigrants' country of origin and Italy by using the classification of countries produced by the cluster analysis on the five distance measures presented in Section 3. Fig. 4 shows the coefficients for the Clusters 2 and 3 dummy variables (with Cluster 1 as the reference category) obtained from estimating Equation (3).[15] For Cluster 3, which represents countries linguistically and culturally distant from Italy, we find a higher and significant probability of *CS* and *LR-CS* compared to Cluster 1. The coefficients are positive but imprecisely estimated for Cluster 2, representing countries that are linguistically close but culturally distant from the host country.

To explore the robustness of our findings, we re-estimate Equations (2) and (3) on the three sub-samples defined in Section 3.1. This analysis is performed to see if immigrants' location decisions across different urban areas affect our results. Results are robust across the different areas (Figures A1 and A2 in the Appendix). All distance measures confirm positive and significant coefficients. Clusters 2 and 3 have positive coefficients, and Cluster 3 is also significant at standard levels for both *CS* and *LR-CS* specifications. The magnitudes and significance levels are quite stable across the different sub-samples: on average, greater linguistic and socio-cultural distances are associated with a higher probability of *CS* and *LR-CS* procedures, as in the model estimated on all municipalities.

5.3. Mechanisms

Results in section 5.2 suggest that larger distances in terms of language and socio-cultural factors explain the observed inequalities in appropriate birth deliveries among immigrants. However, these distance measures can only provide an intuition of why this is the case: we claim that larger distances imply larger difficulties in communicating and interacting with the medical staff, hence inducing a higher probability of incurring a C-section (even inappropriate). A direct test in this direction would be to control for women's language skills and length of stay in Italy. Unfortunately, this information is not available in our data. However, to further support the interpretation of linguistic and socio-cultural distance as a barrier to effective communication between expectant mothers and health professionals, we consider four different factors that may influence communication and interaction: the level of urbanisation of the municipality of residence, the size of the immigrant community of the same nationality as the woman, previous childbirth experience and the nationality of the partner.

5.3.1. The degree of urbanisation

First, we consider the level of urbanisation of the municipality where the woman lives. Urbanisation can have both positive and negative effects on the ability to interact and communicate with health professionals. On the one hand, extensive literature has shown that living in large cities implies an urban wage premium. The existence of this premium has been demonstrated for immigrant workers in general (e.g., Glaeser and Maré, 2001; Eckert et al., 2022) but also for immigrant women, who are more likely to find employment and earn higher wages in large cities than in rural areas (e.g., Xing et al., 2022). These findings

[13] In the group of women using public prenatal care, we find a lower proportion of women with a university degree and a higher proportion of women with only compulsory education, both for Italians and for immigrants. We also find a lower proportion of working women in the group using public prenatal care.

[14] Full estimates, including controls for the mother's socioeconomic status and medical history, are included in the Appendix, Tables A11-A15. The corresponding probit marginal effects estimates are reported in the Appendix, Table A17.

[15] Full estimates, including controls for the mother's socioeconomic status and medical history, are included in the Appendix, Table A16. The corresponding probit marginal effects estimates are reported in the Appendix, Table A17.

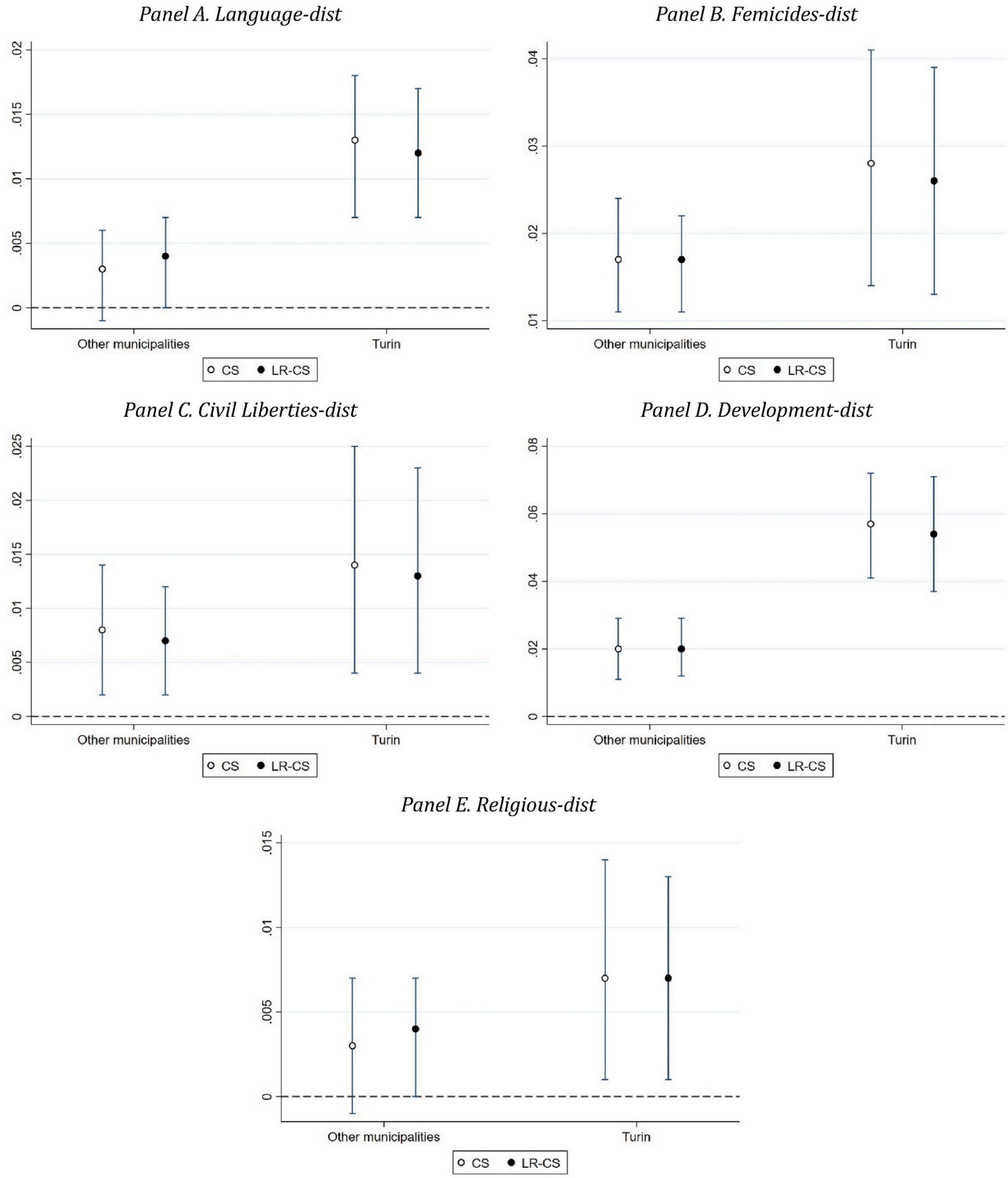

Fig. 5. Regression results for *CS* and *LR-CS*: coefficients for linguistic and socio-cultural distances by municipality of residence (Turin vs other municipalities).
Notes: OLS estimates for Equation (2), with dependent variable *CS/LR-CS*. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. All linguistic and socio-cultural distances are standardized to have zero mean and standard deviation equal to one. Standard errors are clustered at the level of municipality-year.

support the idea that urban immigrants are relatively better off than rural ones. Because of the higher income compared to their rural counterparts, the immigrant population living in large cities has easier access to better services and information. It follows that the importance of linguistic and socio-cultural distance as a driver of differences in health care is likely to be smaller for urban immigrants, as better economic prospects make individuals less dependent on their local community.

On the other hand, large cities are settings characterised by the highest levels of economic and social inequality between individuals. First and foremost, urban income inequality is determined by skill inequality, which in turn is affected by the immigration of (on average) less skilled workers than the natives (Glaeser et al., 2009). Moreover, several studies have found that in large urban areas, minorities (and hence immigrants) tend to be spatially segregated both voluntarily (Ihlanfeldt and Scafidi, 2002) and involuntarily (Anas, 2002). This

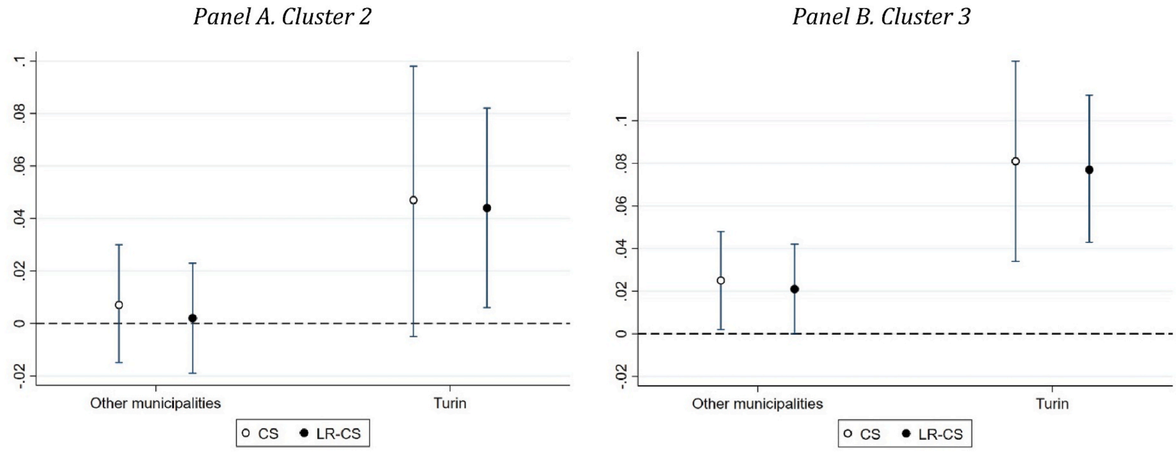

Fig. 6. Regression results for *CS* and *LR-CS*: coefficients for cluster dummy variables by municipality of residence (Turin vs other municipalities).
Notes: OLS estimates for Equation (3), with dependent variable *CS/LR-CS*. The regression includes hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors are clustered at the level of municipality-year.

means that in large cities, immigrant communities tend to be more spatially concentrated and segregated from the native population compared to rural areas. This segregation may prevent women from integrating with the local community, creating instead a close environment in which cultural practices of the country of origin are more likely to persist (Lazear, 1999). Thus, for urban immigrants, linguistic and socio-cultural distance is likely to be more important in determining differences in health care, as minority status within the city and subsequent segregation make individuals more dependent on their local community.

Piedmont is an ideal case study to test which of the two effects of urbanisation prevails. As already mentioned, the region's urban hierarchy is dominated by the city of Turin (about 850,000 inhabitants in 2019), the regional capital, followed by much smaller urban centers (Novara, hosting slightly more than 100,000 inhabitants; Alessandria with about 90,000, and Asti with about 70,000). The non-native population is also over-represented in Turin, where 30 percent of Piedmont's immigrants live. We then re-estimate the models in Equations (2) and (3) on two sub-samples: one including the non-native mothers living in Turin and the other made up of those living in other municipalities. Comparing the coefficients of linguistic and socio-cultural distance in the two sub-samples allows us to understand whether urbanisation wage premium or segregation effects prevail. If the former prevail, this would imply that the overall positive association between socio-cultural distances and the occurrence of *CS* and *LR-CS* is less intense for non-native urban residents than for rural ones. The opposite would be the case if segregation effects predominate.

Fig. 5 shows the estimated coefficients and confidence intervals for the two groups of non-native mothers, those living in Turin and those living in other municipalities, again using the linguistic distance and the four socio-cultural distances. Higher linguistic and socio-cultural distances are associated with a higher probability of *CS* or *LR-CS*, especially for the non-natives living in Turin. At the same time, the relationship is smaller (and loses statistical significance for some distance measures) when considering mothers living in less urbanised areas.

In Fig. 6, we repeat the analysis using the clusters of nationalities. Mothers in Cluster 2 living in Turin are more likely to have *LR-CS*. This is not the case for their counterparts living in less urbanised municipalities. In the case of Cluster 3, the magnitude of the coefficients is greater for those living in the regional capital. Thus, the location in the largest urban center exacerbates inequalities in *CS* and *LR-CS* when the community is socially and culturally distant from the host country. This evidence points to the predominance of an urban segregation effect (Cutler et al., 2008a, 2008b; Danzer and Yaman, 2013, 2016; Dustmann and Fabbri, 2003).[16]

5.3.2. *The size of the immigrant community*

To further support our previous findings, we also consider the size of the immigrant community of women. Again, we can have two opposite effects: on the one hand, the size of the national community can play a mediating role, as non-native women are more likely to share information with people of the same nationality (Figlio et al., 2015). It follows that non-native women living in communities with a higher number (or density) of immigrants from the same country may be more likely to share information about access to healthcare and treatment during pregnancy and childbirth. On the other hand, larger communities can "protect" women from assimilation by creating a close environment in which cultural practices of the country of origin are more likely to persist (Lazear, 1999).

We then use (i) the number of people of the same nationality living in the same municipality as the woman and (ii) the density of immigrants from the same country of origin per square kilometre in the woman's municipality in the year when the delivery occurs to classify immigrant communities into two groups: those below and those above the median number/density in our sample. The main source of these data is the Italian census provided by the Italian National Statistical Institute (Istat). We then re-estimate the models in equations (2) and (3) on the two sub-samples: large communities (those with a number/density of non-natives of the same nationality as the mother higher than the median number/density of non-natives in our sample) and small communities (those with a number/density of non-natives lower than the median number/density of non-natives in our sample).

Fig. 7 reports the estimated coefficients and the confidence intervals for the two groups of communities: above and below the median number of non-natives (on the left of each panel) and above and below the median density (on the right of each panel) using, in turn, the linguistic distance and the four socio-cultural distances. We find that the

[16] We also estimated equations (2) and (3) on a different sub-sample. Instead of the municipality of Turin, we considered the whole metropolitan area of Turin, which includes 14 municipalities adjacent to the capital. The estimation results are fully comparable results in magnitude and significance to those for the municipality of Turin.

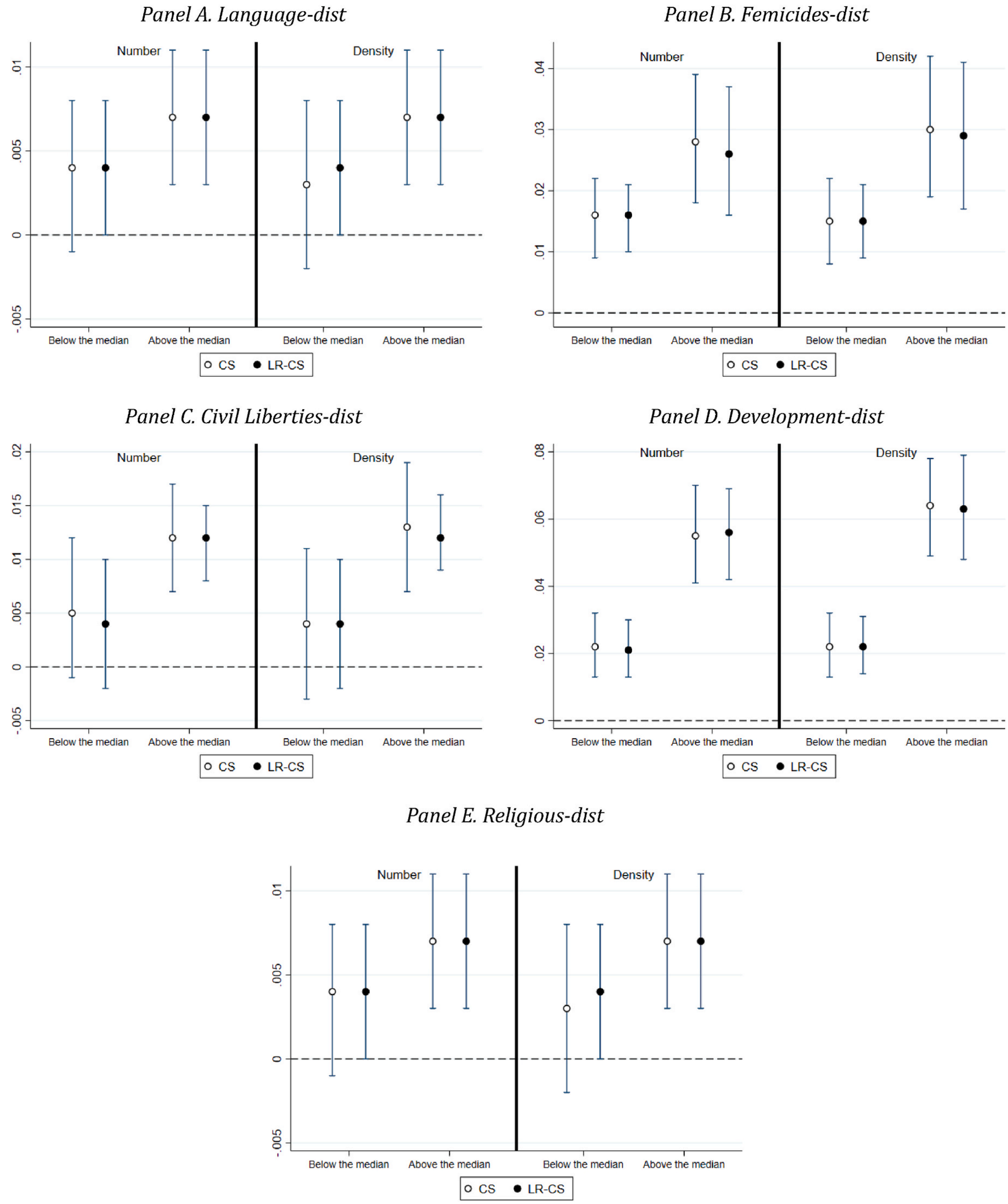

Fig. 7. Regression results for *CS* and *LR-CS*: coefficients for linguistic and socio-cultural distances by number and density of immigrants from the same country of origin of the mother.
Notes: OLS estimates for Equation (2), with dependent variable *CS/LR-CS*. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. All linguistic and socio-cultural distances are standardized to have zero mean and standard deviation equal to one. Standard errors are clustered at the level of municipality-year.

probability of a *CS* or *LR-CS* increases with distance, especially for communities above the median. Indeed, the coefficients for linguistic distance and those for the difference in femicides, civil liberties, development, and religion are always positive. However, the magnitude of the coefficients (and their statistical significance) is much greater when the size of the community (number or density of immigrants of the same nationality within the same municipality of the mother-to-be) is above the median. In Fig. 8, we replicate the analysis using the clusters of nationalities based on distances. We find that the size of the community matters for both Clusters 2 and 3. The coefficients' magnitude (and

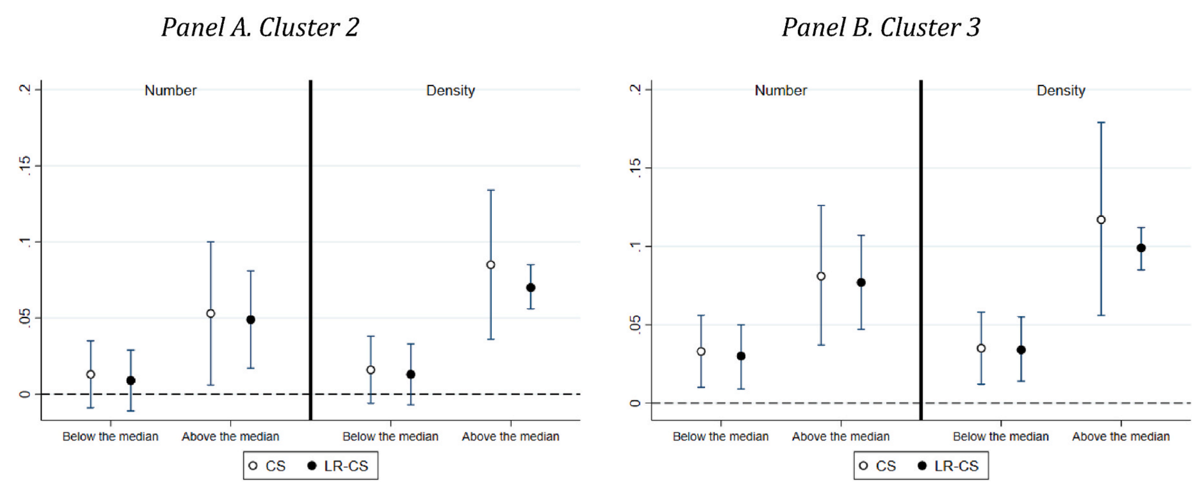

Fig. 8. Regression results for *CS* and *LR-CS*: coefficients for cluster dummy variables by number and density of immigrants from the same country of origin of the mother.

Notes: OLS estimates for Equation (3), with dependent variable *CS/LR-CS*. The regression includes hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors are clustered at the level of municipality-year.

statistical significance) is larger for communities above the median than for communities below the median, and all the effects are larger for immigrants in Cluster 3. Hence, inequalities in *CS* and *LR-CS* worsen when the community is large and far from the host country in terms of both language and culture.

This evidence further indicates a "segregation effect" (Cutler et al., 2008a, 2008b; Danzer and Yaman, 2013, 2016; Dustmann and Fabbri, 2003). Linguistic and socio-cultural distances are associated with more C-sections and inappropriate C-sections. However, we find even worse outcomes if the community is large, all else equal. Those large communities, distant from the host country in terms of language and socio-cultural factors, may also result as highly isolated compared to smaller communities (Musterd, 2005; Lamanna et al., 2018), hence supporting our interpretation of language and culture as barriers to effective communication with the medical staff.

This result is consistent with previous works documenting the occurrence of what is sometimes labeled as the "isolation paradox": larger social support and more frequent social interactions, but constrained within one's national communities in the host countries are associated with worse rather than better health outcomes (Bilecen and Vacca, 2021). One possible explanation is that social networks may be a source of difficulties and limitations for non-natives. Conflicts, obligations, and social controls within the community may deteriorate health outcomes, appropriateness, and access to health services, triggered by a segregation process that is stronger as the community size increases, all else equal.

5.3.3. The experience of women in deliveries

We then compare first-time mothers (nulliparous) with women who have had one or more previous births (multiparous). If communication with staff is important in determining the choice between caesarean section and vaginal delivery (Amaral-Garcia et al., 2022), we might expect it to be less important for experienced women, who already know what to do and what to expect, even if they do not understand the medical staff. To compare women who are as similar as possible in terms of medical conditions, we exclude from both the nulliparous and multiparous samples all twin pregnancies, breech pregnancies, and women who have had a previous C-section. The idea is to exclude any risk factors that might influence the likelihood of C-section and to have women who are similar in terms of observables to disentangle the role of experience.

Fig. 9 shows the coefficients and confidence intervals for linguistic and socio-cultural distances. Distance measures have a positive effect on the likelihood of a *CS* or *LR-CS*. However, the magnitude is larger and always statistically significant only for less experienced women at their first birth. Fig. 10 shows the estimation results for the cluster variables, separately for the two groups of nulliparous and multiparous women. We find no significant differences between cluster 1 and cluster 2 countries for *CS* and *LR-CS*. Conversely, for mothers from Cluster 3 countries, that is, those linguistically and socio-culturally distant from the host country, we still find a higher probability of *CS* and *LR-CS* than women in Cluster 1. Moreover, the magnitude of the effect is larger for less experienced first-time mothers. This finding is consistent with the expectation that mothers' health outcomes and treatments will differ according to their previous experience of childbirth and supports the interpretation that communication and interaction with staff matter, all else equal.

5.3.4. Partnering with a national of Italy

Finally, we investigate the role of the partner, distinguishing between women whose partner is a native Italian and those whose partner is also a non-native. Again, if communication and interaction are important, we should expect a different effect between the two groups. Fig. 11 shows the coefficients for the linguistic and the five socio-cultural distances estimated separately for the two subsamples of women. We find that the point estimates of the coefficients are generally larger and always statistically significant for non-native fathers. In Fig. 12, we repeat the analysis of the two sub-samples, including the dummy variables for the country clusters. We find no remarkable differences in the probability of *CS* and *LR-CS* when the father is Italian. Conversely, in the sub-sample of non-native fathers, we find slightly significant differences between clusters 2 and 1, and even larger and statistically significant differences for cluster 3 compared to cluster 1.

6. Concluding remarks

In this paper, we study inequalities in accessing (appropriate) healthcare treatments between natives and immigrants in the Italian NHS, a universal tax-funded healthcare system. We focus on maternal care and, particularly, on C-sections, a standard measure for

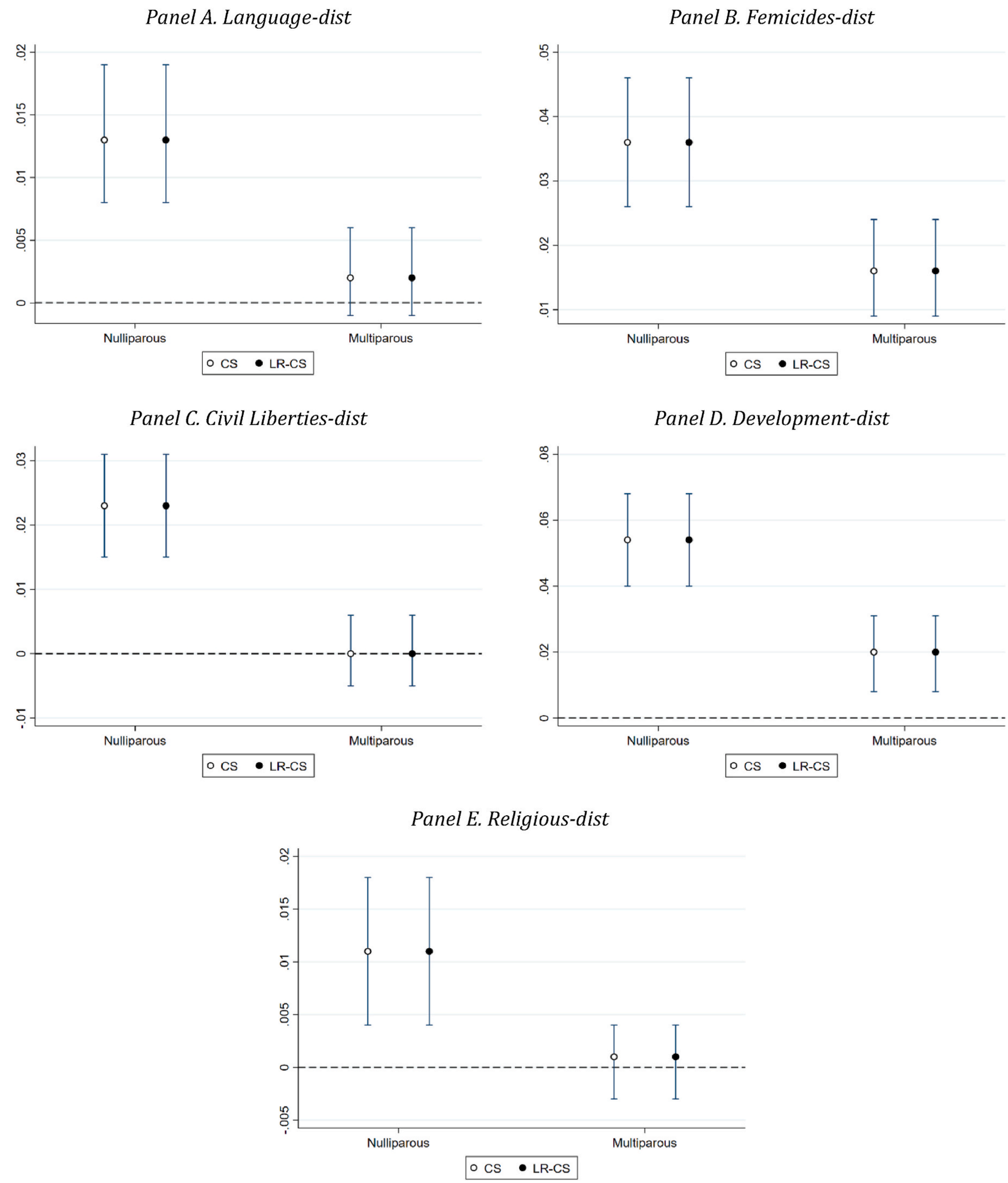

Fig. 9. Regression results for *CS* and *LR-CS*: coefficients for linguistic and socio-cultural distances for nulliparous and multiparous mothers.
Notes: OLS estimates for Equation (2), with dependent variable *CS/LR-CS*. We exclude from all samples twin pregnancies, breech pregnancies and women who have had a previous C-section. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., high-risk Robson groups (only for the *CS* specifications), past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) socio-economic characteristics of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. All linguistic and socio-cultural distances are standardized to have zero mean and standard deviation equal to one. The number of observations is approximately 27,000 in the sample of nulliparous women and around 34,000 in the multiparous sample. The number of observations changes slightly with the type of distance, which is not always available for all nationalities. Standard errors are clustered at the level of municipality-year.

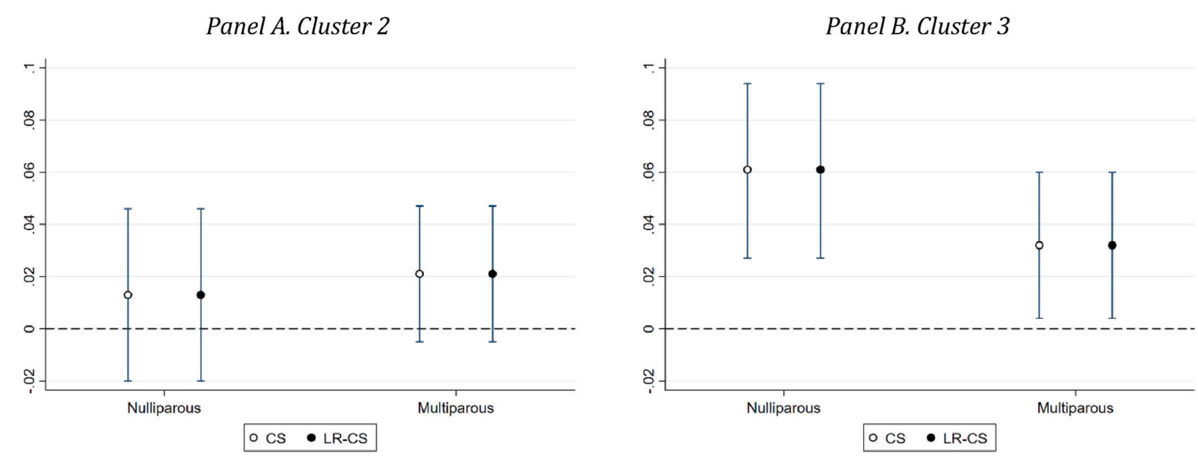

Fig. 10. Regression results for *CS* and *LR-CS*: coefficients for cluster dummy variables for nulliparous and multiparous mothers.
Notes: OLS estimates for Equation (3), with dependent variable *CS/LR-CS*. We exclude from all samples twin pregnancies, breech pregnancies, and women who have had a previous C-section. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) medical conditions of the mother related to pregnancy, i.e., high-risk Robson groups (only for the CS specifications), past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) socio-economic characteristics of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors are clustered at the level of municipality-year.

inappropriateness once controlling for clinical characteristics of the mother and the delivery. The analysis is based on a unique administrative dataset on all deliveries in Piedmont, one of Italy's largest and wealthiest regions. Piedmont is characterised by a clear urban hierarchy (with Turin, the regional capital, by far the largest urban center) and by an extended network of public hospitals with a maternity unit, also covering small urban centers.

Overall, we do not find differences between native and non-native women in using C-sections and inappropriate C-sections, once controlling for individual risk factors, socio-economic status, hospital, and year fixed effects. However, we find clear heterogeneous patterns across the different nationalities of the non-natives. We then test whether several linguistic and socio-cultural "distance" measures between the country of origin and Italy as the host country can explain the observed differences in C-sections across migrants. We find that these factors are significant drivers of the differences across immigrant women.

We finally discuss a possible mechanism to explain our findings: larger linguistic and socio-cultural distances make it harder for migrants to connect and communicate with the medical staff, thereby increasing the likelihood of having a C-section (even an inappropriate one). Unfortunately, we are unable to control for women's language skills and length of stay in Italy. However, to support our interpretation of distance as a barrier to effective communication between mothers-to-be and the staff, we propose four indirect tests: the location choice of non-native mothers in urban vs non-urban municipalities, the size of the immigrant community of the woman's same nationality in the same municipality, the woman's previous childbirth experience, and the partner's nationality. We find that living in an urban area, in the presence of a large community of migrants of the same nationality, exacerbates the role of linguistic and socio-cultural distance, suggesting a "segregation" effect. Large communities in large urban centers prevent migrants from integrating with natives. In addition, we find that having previous childbirth experiences and a native partner reduce the need for effective communication and the likelihood of having a (inappropriate) C-section.

While all these four tests point in the same direction, the inability to control for language skills and the time of arrival in Italy of migrant women does not allow us to rule out an alternative supply-side explanation, namely the potential role played by supply-induced demand: An extensive literature shows that hospitals prefer C-sections compared to vaginal deliveries because of the higher DRG payments (e.g., Gruber et al., 1999; Di Giacomo et al., 2017; De Luca et al., 2021). This price incentive can be better exploited in the presence of immigrants, with larger linguistic and socio-cultural distances relative to Italy. We argue that including hospital fixed effects should partially account for time-invariant hospital preferences for C-sections. At the same time, we recognise that, within our dataset, it is not possible to fully disentangle the role of supply-induced demand effects from the role played by difficulties in communicating and interacting with the medical staff. The best way to interpret our result is for distance measures to reflect difficulties in the interaction between the patient and the medical staff, linking demand- and supply-side effects.

These findings have important policy implications. Since inequalities in C-section rates are related to the inability to communicate, there is a need to make communication between immigrants and medical staff more effective. Providing cultural mediators in hospitals, ad hoc training for medical staff, simplifying administrative procedures, and teaching migrants the host country's language are examples of tools that can improve immigrants' ability to process information and communicate more effectively with staff.

CRediT authorship contribution statement

Marina Di Giacomo: Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **Giovanni Perucca:** Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **Massimiliano Piacenza:** Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **Gilberto Turati:** Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

Original publication

We declare that no prior or duplicate publication or submission elsewhere of any part of the work has been included in the manuscript.

Ethics

We declare that no ethical issues are involved in the production of this manuscript.

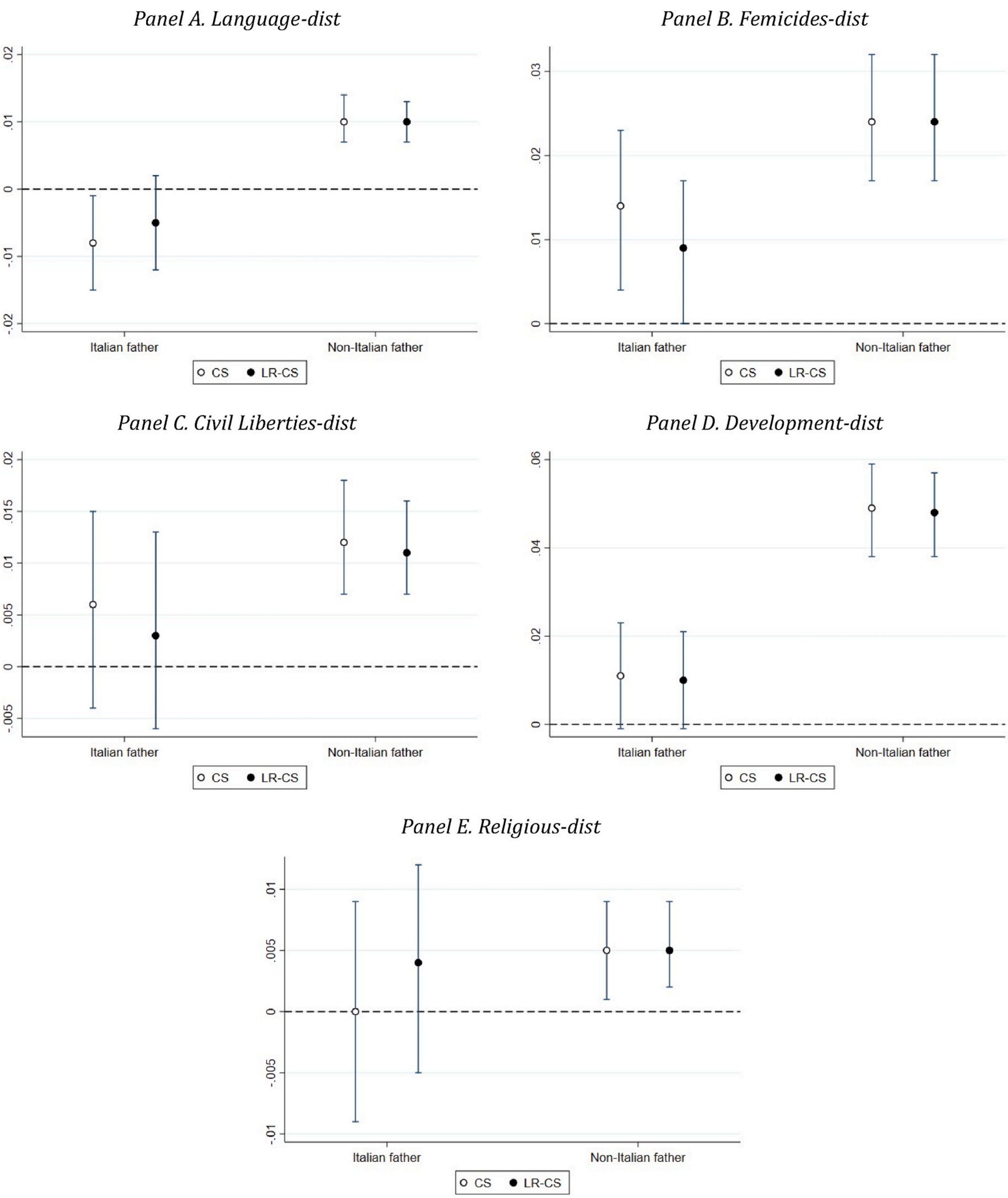

Fig. 11. Regression results for *CS* and *LR-CS*: coefficients for linguistic and socio-cultural distances for newborns with native and non-native fathers.
Notes: OLS estimates for Equation (2), with dependent variable *CS/LR-CS*. All regressions include hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status. All linguistic and socio-cultural distances are standardized to have zero mean and standard deviation equal to one. The number of observations is approximately 11,000 in the sample of native fathers and around 50,000 in the non-natives sample. The number of observations changes slightly with the type of distance, which is not always available for all nationalities. Standard errors are clustered at the level of municipality-year.

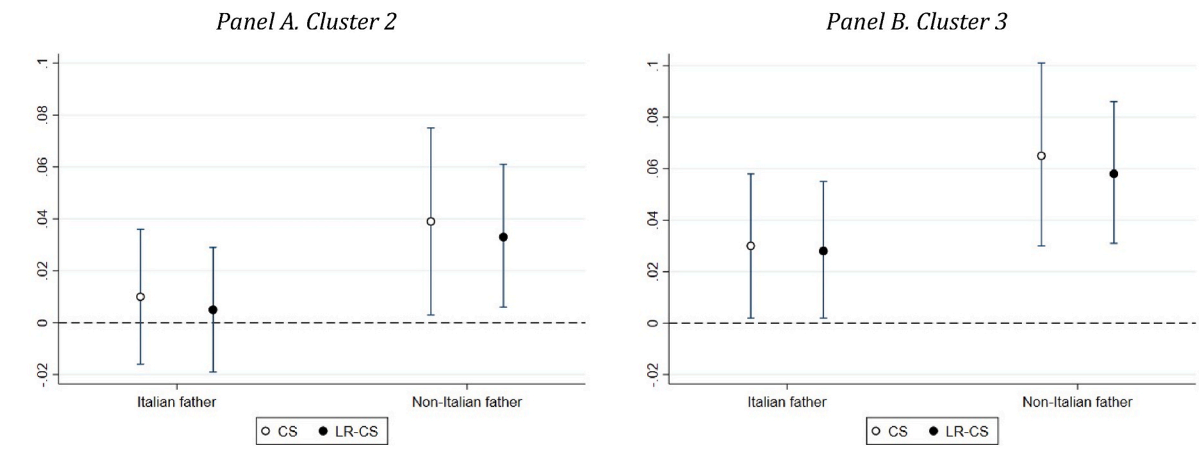

Fig. 12. Regression results for *CS* and *LR-CS*: coefficients for cluster dummy variables for newborns with native and non-native fathers.
Notes: OLS estimates for Equation (3), with dependent variable *CS/LR-CS*. The regression includes hospital fixed effects, year fixed effects, and mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, high-risk Robson groups (only for the *CS* specifications), past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status. Standard errors are clustered at the level of municipality-year.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Marina Di Giacomo reports financial support was provided by European Commission. Gilberto Turati reports financial support was provided by Università Cattolica del Sacro Cuore. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table A1
Description of variables

VARIABLE NAME	DESCRIPTION AND SOURCES
Dependent variables	
CS	Binary variable equal to one if a birth with caesarean section occurred. Source: Cedap
LR-CS	Binary variable equal to one if a birth with caesarean section occurred and the mother’s Robson class is lower than or equal to four. Source: Cedap
Main explanatory variables	
Non-native	Dummy equal to one if the mother has non-Italian citizenship. Source: Cedap
Dummies for macro-areas	We observe the nationality of all women. These nationalities are grouped according to the six macro-area regional territories by the World Health Organization (WHO): African region (AFR), American region (AMR), South-East Asian region (SEAR), European region (EUR), Eastern Mediterranean region (EMR), Western Pacific region (WPR). Source: Cedap and WHO.
Language-Dist	An index that measures the distance between the first official language of the mother’s country of origin and the Italian language. It ranges from 0 (no difference) to 100 (highest distance). Source: Adsera and Pytlikova (2015).

(*continued on next page*)

Table A1 (*continued*)

VARIABLE NAME	DESCRIPTION AND SOURCES
Femicides-Dist	The difference in the number of femicides per 100,000 inhabitants between the mother's country of origin and Italy, the host country. The two countries are different if this distance is large. Data refer to 2010. Source: World Bank
Civil Liberties-Dist	The difference in the civil liberties index between the mother's country of origin and Italy, the host country. We use the civil liberties rating from 1 (maximum civil liberties) to 7 (minimum civil liberties). Italy has a civil liberties rating equal to 2. The difference ranges between −1 (very similar civil liberties) and 5 (very different civil liberties protection). Data refer to 2010. Source: Freedom House
Development-Dist	The difference in per capita GDP between the mother's country of origin and Italy, the host country. The smaller this difference, the closer the countries are in terms of development level. Data refer to 2010. Source: World Bank
Religious-Dist	The religious distance index is based on three scales: the difference between the dominant religions of Italy and the mother-to-be's country, the incidence of the Italian dominant religion (catholic) in a non-native mother's country, and the incidence of the non-native mother's country dominant religion in Italy. The index scores from 0 (no religious differences) to 10 (maximum religious differences). Data refer to 2005. Source: Dow and Karunaratna (2006). Data available at http://dow.net.au/?page_id=35
Mother controls (medical conditions and socio-economic characteristics)	
First child	Dummy equal to one if the mother had no previous children. Source: Cedap
Twin pregnancy	Dummy equal to one if the woman carries a twin pregnancy. Source: Cedap
Breech birth	Dummy equal to one if the baby is born bottom first instead of head. Source: Cedap
High-risk Robson	Dummy equal to one if the Robson iclass associated with the patient is higher than four. Source: Cedap
Past C-sections	Dummy equal to one if the woman experienced a C-section in the past. Source: Cedap
Past miscarriage	Dummy equal to one if the woman had at least one miscarriage in the past. Source: Cedap
Pathologies	Dummy equal to one if the mother experienced severe medical problems during the pregnancy. Source: Cedap
Asthma	Dummy equal to one if the woman had asthma during the pregnancy. Source: Cedap

VARIABLE NAME	DESCRIPTION AND SOURCES
Mother controls (medical conditions and socio-economic characteristics)	
Allergies	Dummy equal to one if the woman experienced allergies during the pregnancy. Source: Cedap
Alcohol	Dummy equal to one if the woman declares drinking alcohol during the pregnancy. Source: Cedap
Smoke	Dummy equal to one if the woman declares smoking during the pregnancy. Source: Cedap
Hospital admissions	Dummy equal to one if the woman experienced at least one hospital admission during the pregnancy. Source: Cedap
Newborn weight	Weight of the child (kg). Source: Cedap
Age 18–24	Dummy equal to one if the age at conception is in the 18–24 range. Source: Cedap
Age 25–29	Dummy equal to one if the age at conception is in the 25–29 range. Source: Cedap
Age 30–34	Dummy equal to one if the age at conception is in the 30–34 range. Source: Cedap
Age 35+	Dummy equal to one if the age at conception is equal to or above 35. Source: Cedap
Low education	Dummy equal to one if the woman completed compulsory school or has no education. Source: Cedap
Medium education	Dummy equal to one if the woman completed high school. Source: Cedap
High education	Dummy equal to one if the woman has a university or higher degree. Source: Cedap
Employment status	Dummy equal to one if the woman is employed. Source: Cedap
Marital status	Dummy equal to one if the woman is married. Source: Cedap
Native father	Dummy equal to one if the father of the newborn is Italian-native. Source: Cedap

Table A2
ANOVA on the measures of distance between Italy and the countries identified in the cluster analysis

	Language-Dist	Femicides-Dist	Civil Liberties-Dist	Development-Dist	Religious-Dist	N. countries (N = 114)
Cluster 1	90.418	1.435	0.802	−8818.691	3.164	23
Cluster 2	84.468	2.188	2.651	12,152.364	2.869	32
Cluster 3	91.899	4.136	3.065	23,614.488	5.213	59
F-test	2.91*	44.92***	7.36***	316.28***	10.10***	

The table reports group means. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table A3
Summary statistics for mother controls: sample averages

Variable	Non-native	Native	Total
First child	0.438	0.538	0.512
Twin pregnancy	0.006	0.006	0.006
Breech birth	0.040	0.047	0.045
Newborn weight	3.382	3.281	3.308
Past C-sections	0.127	0.116	0.119
Past miscarriage	0.167	0.173	0.171
Pathologies	0.245	0.226	0.231
Asthma	0.00002	0.00002	0.00002
Allergies	0.00005	0.00016	0.00013
Alcohol	0.016	0.016	0.016
Smoke	0.047	0.079	0.070
Hospital admissions	0.042	0.042	0.042
High-risk Robson	0.162	0.160	0.161
Age 18–24	0.205	0.063	0.227
Age 25–29	0.315	0.195	0.227
Age 30–34	0.285	0.365	0.343
Age 35+	0.195	0.377	0.328

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Table A3 (*continued*)

Variable	Non-native	Native	Total
Low Education	0.454	0.196	0.265
Medium Education	0.364	0.508	0.470
High education	0.108	0.278	0.233
Employment status	0.319	0.772	0.651
Marital status	0.740	0.592	0.632
Native Father	0.180	0.959	0.751

Table A4
Regression results for *CS* and *LR-CS*: sample of Native and non-Native mothers

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-Native	−0.006*	−0.003		
	(0.003)	(0.003)		
Africa			0.050***	
			(0.008)	0.058***
Americas			0.023***	(0.007)
			(0.006)	0.020***
East Mediterranean			−0.006	(0.005)
			(0.004)	−0.001
Europe			−0.019***	(0.004)
			(0.003)	−0.016***
South-East Asia			0.046***	(0.003)
			(0.012)	0.046***
Western Pacific			−0.035***	(0.010)
			(0.006)	−0.028***
First child	0.162***	0.159***	0.162***	(0.005)
	(0.003)	(0.003)	(0.003)	0.159***
Newborn weight	0.013***	0.016***	0.014***	(0.003)
	(0.002)	(0.002)	(0.002)	0.017***
High-risk Robson	0.589***		0.589***	(0.002)
	(0.007)		(0.007)	
Twin pregnancy	−0.056***	−0.168***	−0.057***	
	(0.012)	(0.005)	(0.012)	−0.169***
Breech birth	0.141***	−0.169***	0.141***	(0.005)
	(0.007)	(0.002)	(0.007)	−0.169***
Past C-sections	0.126***	−0.091***	0.124***	(0.002)
	(0.008)	(0.002)	(0.008)	−0.092***
Past miscarriage	0.013***	0.011***	0.012***	(0.002)
	(0.002)	(0.002)	(0.002)	0.011***
Pathologies	0.082***	0.081***	0.081***	(0.002)
	(0.004)	(0.003)	(0.004)	0.080***
Asthma	0.116	0.082	0.115	(0.003)
	(0.161)	(0.161)	(0.161)	0.081
Allergies	0.108	0.106	0.107	(0.162)
	(0.068)	(0.067)	(0.068)	0.106
Alcohol	−0.008	−0.008	−0.008	(0.067)
	(0.007)	(0.006)	(0.007)	−0.008
Smoke	0.012***	0.010***	0.014***	(0.006)
	(0.003)	(0.003)	(0.003)	0.013***
Hospital admissions	0.006	0.008*	0.005	(0.003)
	(0.004)	(0.004)	(0.004)	0.007*
Age 25–29	0.042***	0.041***	0.040***	(0.004)
	(0.003)	(0.003)	(0.003)	0.040***
Age 30–34	0.077***	0.075***	0.075***	(0.003)
	(0.003)	(0.003)	(0.003)	0.072***
Age 35+	0.131***	0.122***	0.128***	(0.003)
	(0.003)	(0.003)	(0.003)	0.119***
Medium Education	−0.018***	−0.016***	−0.017***	−0.015***
	(0.002)	(0.002)	(0.002)	(0.002)
High education	−0.036***	−0.031***	−0.035***	−0.030***
	(0.002)	(0.002)	(0.002)	(0.002)
Employment status	−0.005***	−0.005***	−0.003*	−0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
Marital status	−0.007***	−0.007***	−0.006***	−0.007***
	(0.002)	(0.001)	(0.002)	(0.001)
Native father	0.001	−0.001	−0.001	−0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	−0.086***	−0.064***	−0.089***	−0.068***
	(0.009)	(0.009)	(0.009)	(0.009)
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

(*continued on next page*)

Table A4 (*continued*)

Observations	230,277	230,277	230,277	230,277
R-squared	0.368	0.093	0.368	0.095

Notes: OLS estimates for Equation (1). Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A5
Probit results for *CS* and *LR-CS*: sample of Native and non-Native mothers

	Probit			
Dependent variable	(1)	(2)	(3)	(4)
	CS	**LR-CS**	**CS**	**LR-CS**
Non-native	−0.026*	−0.018		
	(0.014)	(0.015)		
	−0.006*	−0.004		
Africa			0.221***	0.314***
			(0.033)	(0.032)
			0.053***	0.071***
Americas			0.098***	0.108***
			(0.025)	(0.026)
			0.023***	0.022***
East Mediterranean			−0.027	−0.012
			(0.020)	(0.022)
			−0.006	−0.002
Europe			−0.090***	−0.094***
			(0.015)	(0.017)
			−0.020***	−0.018***
South-East Asia			0.206***	0.242***
			(0.048)	(0.049)
			0.049***	0.053***
Western Pacific			−0.188***	−0.193***
			(0.030)	(0.031)
			−0.040***	−0.035***
Constant	−2.191***	−2.209***	−2.207***	−2.235***
	(0.044)	(0.049)	(0.044)	(0.049)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	230,277	230,277	230,277	230,277
Pseudo R-squared	0.311	0.129	0.312	0.131

Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only in the CS specifications), the newborn weight at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. The table reports coefficients, standard errors (in parentheses), and marginal effects (underlined). Standard errors are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A6
Regression results for *CS* and *LR-CS*: sample of Native and non-Native mothers living in municipalities within 15 min of the closest hospital

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-Native	−0.003	−0.001		
	(0.004)	(0.004)		
Africa			0.055***	0.062***
			(0.010)	(0.009)
Americas			0.026***	0.023***
			(0.007)	(0.006)
East Mediterranean			−0.006	0.000
			(0.005)	(0.004)
Europe			−0.018***	−0.015***
			(0.004)	(0.004)
South-East Asia			0.059***	0.053***
			(0.014)	(0.013)
Western Pacific			−0.032***	−0.024***
			(0.006)	(0.005)
Constant	−0.093***	−0.070***	−0.096***	−0.074***
	(0.012)	(0.012)	(0.012)	(0.012)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes

(*continued on next page*)

Table A6 (*continued*)

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Year fixed effects	Yes	Yes	Yes	Yes
Observations	147,544	147,544	147,544	147,544
R-squared	0.367	0.094	0.368	0.096

Notes: OLS estimates for Equation (1). Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only for the CS specifications), the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A7
Regression results for *CS* and *LR-CS*: sample of Native and non-Native mothers living in municipalities with a hospital

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-Native	−0.003	0.000		
	(0.005)	(0.004)		
Africa			0.056***	0.063***
			(0.012)	(0.010)
Americas			0.028***	0.024***
			(0.009)	(0.008)
East Mediterranean			−0.003	0.003
			(0.006)	(0.005)
Europe			−0.020***	−0.016***
			(0.005)	(0.005)
South-East Asia			0.082***	0.073***
			(0.017)	(0.016)
Western Pacific			−0.033***	−0.024***
			(0.007)	(0.006)
Constant	−0.097***	−0.073***	−0.101***	−0.078***
	(0.016)	(0.016)	(0.016)	(0.016)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	93,871	93,871	93,871	93,871
R-squared	0.365	0.096	0.366	

Notes: OLS estimates for Equation (1). Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only for the CS specifications), the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A8
Regression results for *CS* and *LR-CS*: sample of Native and non-Native mothers living in the municipality of Turin

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-Native	−0.004	−0.004		
	(0.009)	(0.009)		
Africa			0.078***	0.076***
			(0.019)	(0.018)
Americas			0.020	0.017
			(0.014)	(0.012)
East Mediterranean			0.004	0.004
			(0.009)	(0.009)
Europe			−0.024**	−0.024**
			(0.009)	(0.010)
South-East Asia			0.108***	0.082**
			(0.028)	(0.030)
Western Pacific			−0.034***	−0.030***
			(0.008)	(0.008)
Constant	−0.038	−0.031	−0.048	−0.040
	(0.067)	(0.054)	(0.067)	(0.055)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	49,702	49,702	49,702	49,702
R-squared	0.361	0.093	0.363	0.096

Notes: OLS estimates for Equation (1). Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only for the CS specifications), the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A9

Regression results for *CS* and *LR-CS*: sample of Native and non-Native mothers using public prenatal care services provided by the NHS

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-Native	0.003	0.004		
	(0.004)	(0.004)		
Africa			0.063***	0.067***
			(0.009)	(0.008)
Americas			0.034***	0.029***
			(0.008)	(0.007)
East Mediterranean			0.006	0.007
			(0.005)	(0.005)
Europe			−0.014***	−0.012***
			(0.004)	(0.004)
South-East Asia			0.052***	0.049***
			(0.013)	(0.012)
Western Pacific			−0.029***	−0.024***
			(0.006)	(0.006)
Constant	−0.061***	−0.045***	−0.069***	−0.054***
	(0.012)	(0.010)	(0.012)	(0.011)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	94,098	94,098	94,098	94,098
R-squared	0.372	0.086	0.374	0.088

Notes: OLS estimates for Equation (1). Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only for the CS specifications), the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A10

Regression results for *CS* and *LR-CS*: sample of Native and non-Native mothers using private prenatal care services.

Dependent variable	(1)	(2)	(3)	(4)
	CS	***LR-CS***	***CS***	***LR-CS***
Non-Native	−0.006	−0.005		
	(0.004)	(0.004)		
Africa			0.044**	0.037**
			(0.018)	(0.016)
Americas			0.016*	0.014*
			(0.010)	(0.009)
East Mediterranean			−0.004	0.003
			(0.012)	(0.010)
Europe			−0.016***	−0.014***
			(0.005)	(0.005)
South-East Asia			0.077***	0.074***
			(0.029)	(0.028)
Western Pacific			−0.037***	−0.026**
			(0.014)	(0.013)
Constant	−0.087***	−0.065***	−0.086***	−0.064***
	(0.012)	(0.012)	(0.012)	(0.012)
Mother controls	Yes	Yes	Yes	Yes
Hospital fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	136,179	136,179	136,179	136,179
R-squared	0.364	0.097	0.364	0.097

Notes: OLS estimates for Equation (1). Mother controls include: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only for the CS specifications), the weight of the newborn at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A11
Regression results for *CS* and *LR-CS*: The role of linguistic distance, sample of non-native women.

Dependent variable	CS	LR-CS
Language-dist	0.006***	0.007***
	(0.002)	(0.001)
First child	0.149***	0.147***
	(0.005)	(0.005)
Newborn weight	0.009**	0.011***
	(0.004)	(0.003)
High-risk Robson	0.560***	
	(0.014)	
Twin pregnancy	−0.038*	−0.121***
	(0.020)	(0.009)
Breech birth	0.185***	−0.141***
	(0.013)	(0.003)
Past C-sections	0.139***	−0.088***
	(0.014)	(0.004)
Past miscarriage	0.012***	0.010***
	(0.004)	(0.003)
Pathologies	0.073***	0.074***
	(0.006)	(0.005)
Asthma	−0.122***	−0.126***
	(0.012)	(0.011)
Allergies	0.137	0.135
	(0.283)	(0.282)
Alcohol	−0.010	−0.011
	(0.013)	(0.012)
Smoke	−0.007	−0.005
	(0.006)	(0.005)
Hospital admissions	0.006	0.009
	(0.008)	(0.009)
Age 25–29	0.037***	0.038***
	(0.005)	(0.004)
Age 30–34	0.077***	0.074***
	(0.004)	(0.004)
Age 35+	0.122***	0.111***
	(0.005)	(0.005)
Medium Education	−0.007**	−0.006**
	(0.003)	(0.003)
High education	−0.025***	−0.025***
	(0.005)	(0.005)
Employment status	0.004	0.002
	(0.003)	(0.003)
Marital status	−0.015***	−0.015***
	(0.004)	(0.003)
Native father	0.009**	0.010**
	(0.005)	(0.004)
Constant	−0.045***	−0.025*
	(0.016)	(0.013)
Observations	60,116	60,116
R-squared	0.385	0.088

Notes: OLS estimates for Equation (2). The regression includes hospital fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A12
Regression results for *CS* and *LR-CS*: The role of femicides distance, sample of non-native women.

Dependent variable	CS	LR-CS
Femicides-dist	0.021***	0.020***
	(0.003)	(0.003)
First child	0.148***	0.146***
	(0.005)	(0.005)
Newborn weight	0.009**	0.011***
	(0.004)	(0.003)
High-risk Robson	0.558***	
	(0.014)	
Twin pregnancy	−0.037*	−0.121***
	(0.020)	(0.009)
Breech birth	0.186***	−0.141***
	(0.013)	(0.003)
Past C-sections	0.139***	−0.089***
	(0.014)	(0.004)

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Table A12 (*continued*)

Dependent variable	CS	LR-CS
Past miscarriage	0.011***	0.010***
	(0.004)	(0.003)
Pathologies	0.072***	0.074***
	(0.006)	(0.005)
Asthma	−0.110***	−0.114***
	(0.012)	(0.011)
Allergies	0.128	0.126
	(0.292)	(0.291)
Alcohol	−0.014	−0.014
	(0.013)	(0.012)
Smoke	−0.008	−0.007
	(0.006)	(0.005)
Hospital admissions	0.005	0.008
	(0.009)	(0.009)
Age 25–29	0.035***	0.036***
	(0.004)	(0.004)
Age 30–34	0.074***	0.071***
	(0.004)	(0.004)
Age 35+	0.121***	0.109***
	(0.005)	(0.005)
Medium Education	−0.009***	−0.009***
	(0.003)	(0.003)
High education	−0.027***	−0.028***
	(0.005)	(0.005)
Employment status	0.001	−0.000
	(0.003)	(0.003)
Marital status	−0.009***	−0.009***
	(0.003)	(0.003)
Native father	0.005	0.006
	(0.005)	(0.004)
Constant	−0.037**	−0.018
	(0.015)	(0.013)
Observations	59,997	59,997
R-squared	0.386	0.090

Notes: OLS estimates for Equation (2). The regression includes hospital fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A13
Regression results for *CS* and *LR-CS*: The role of civil liberties distance, sample of non-native women.

Dependent variable	CS	LR-CS
Civil Liberties-dist	0.011***	0.009***
	(0.002)	(0.002)
First child	0.150***	0.148***
	(0.006)	(0.005)
Newborn weight	0.008**	0.011***
	(0.004)	(0.003)
High-risk Robson	0.559***	
	(0.014)	
Twin pregnancy	−0.040*	−0.122***
	(0.020)	(0.009)
Breech birth	0.185***	−0.141***
	(0.013)	(0.003)
Past C-sections	0.139***	−0.088***
	(0.014)	(0.004)
Past miscarriage	0.012***	0.010***
	(0.004)	(0.003)
Pathologies	0.073***	0.074***
	(0.007)	(0.005)
Asthma	−0.123***	−0.126***
	(0.012)	(0.011)
Allergies	0.136	0.135
	(0.284)	(0.283)
Alcohol	−0.010	−0.011
	(0.013)	(0.012)
Smoke	−0.007	−0.006

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Table A13 (*continued*)

Dependent variable	CS	LR-CS
	(0.006)	(0.005)
Hospital admissions	0.007	0.010
	(0.008)	(0.009)
Age 25–29	0.037***	0.038***
	(0.005)	(0.004)
Age 30–34	0.078***	0.074***
	(0.004)	(0.004)
Age 35+	0.123***	0.112***
	(0.005)	(0.005)
Medium Education	−0.007**	−0.007***
	(0.003)	(0.003)
High education	−0.025***	−0.025***
	(0.005)	(0.005)
Employment status	0.004	0.002
	(0.003)	(0.003)
Marital status	−0.015***	−0.014***
	(0.003)	(0.003)
Native father	0.011**	0.012***
	(0.004)	(0.004)
Constant	−0.046***	−0.027**
	(0.016)	(0.013)
Observations	59,895	59,895
R-squared	0.385	0.089

Notes: OLS estimates for Equation (2). The regression includes hospital fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A14
Regression results for CS and LR-CS: The role of economic development distances, sample of non-native women.

Dependent variable	CS	LR-CS
Development-dist	0.031***	0.030***
	(0.005)	(0.004)
First child	0.149***	0.147***
	(0.005)	(0.005)
Newborn weight	0.008**	0.011***
	(0.004)	(0.003)
High-risk Robson	0.561***	
	(0.014)	
Twin pregnancy	−0.037*	−0.120***
	(0.021)	(0.009)
Breech birth	0.184***	−0.141***
	(0.013)	(0.003)
Past C-sections	0.137***	−0.089***
	(0.014)	(0.004)
Past miscarriage	0.012***	0.010***
	(0.004)	(0.003)
Pathologies	0.073***	0.074***
	(0.006)	(0.005)
Asthma	−0.132***	−0.135***
	(0.012)	(0.011)
Allergies	0.136	0.135
	(0.283)	(0.282)
Alcohol	−0.011	−0.011
	(0.013)	(0.012)
Smoke	−0.006	−0.004
	(0.006)	(0.005)
Hospital admissions	0.006	0.010
	(0.008)	(0.009)
Age 25–29	0.036***	0.037***
	(0.005)	(0.004)
Age 30–34	0.076***	0.073***
	(0.004)	(0.004)
Age 35+	0.122***	0.111***
	(0.005)	(0.005)
Medium Education	−0.005*	−0.005*
	(0.003)	(0.003)
High education	−0.019***	−0.019***
	(0.005)	(0.005)
Employment status	0.006*	0.004

(*continued on next page*)

Table A14 (*continued*)

Dependent variable	CS	LR-CS
	(0.003)	(0.003)
Marital status	−0.016***	−0.015***
	(0.003)	(0.003)
Native father	0.016***	0.017***
	(0.005)	(0.004)
Constant	−0.055***	−0.036***
	(0.016)	(0.014)
Observations	59,267	59,267
R-squared	0.387	0.090

Notes: OLS estimates for Equation (2). The regression includes hospital fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A15
Regression results for *CS* and *LR-CS*: The role of religious distance, sample of non-native women.

Dependent variable	CS	LR-CS
Religious-dist	0.004**	0.005***
	(0.002)	(0.001)
First child	0.154***	0.152***
	(0.006)	(0.006)
Newborn weight	0.008**	0.010***
	(0.004)	(0.003)
High-risk Robson	0.551***	
	(0.014)	
Twin pregnancy	−0.041*	−0.124***
	(0.022)	(0.009)
Breech birth	0.185***	−0.144***
	(0.013)	(0.003)
Past C-sections	0.148***	−0.089***
	(0.015)	(0.005)
Past miscarriage	0.010***	0.010***
	(0.004)	(0.004)
Pathologies	0.073***	0.073***
	(0.007)	(0.006)
Asthma	−0.124***	−0.128***
	(0.013)	(0.012)
Allergies	0.133	0.129
	(0.284)	(0.282)
Alcohol	−0.009	−0.012
	(0.014)	(0.012)
Smoke	−0.014**	−0.012**
	(0.006)	(0.006)
Hospital admissions	0.006	0.011
	(0.009)	(0.009)
Age 25–29	0.036***	0.037***
	(0.005)	(0.005)
Age 30–34	0.076***	0.073***
	(0.005)	(0.005)
Age 35+	0.122***	0.110***
	(0.005)	(0.005)
Medium Education	−0.009***	−0.009***
	(0.003)	(0.003)
High education	−0.026***	−0.027***
	(0.006)	(0.005)
Employment status	−0.000	−0.001
	(0.003)	(0.003)
Marital status	−0.015***	−0.015***
	(0.003)	(0.003)
Native father	0.011**	0.011**
	(0.005)	(0.004)
Constant	−0.046***	−0.020
	(0.016)	(0.014)
Observations	52,263	52,263
R-squared	0.381	0.090

Notes: OLS estimates for Equation (2). The regression includes hospital fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A16
Regression results for *CS* and *LR-CS*: The role of clusters, sample of non-native women.

Dependent variable	CS	LR-CS
Cluster 2	0.018*	0.013
	(0.011)	(0.009)
Cluster 3	0.042***	0.038***
	(0.011)	(0.010)
First child	0.155***	0.152***
	(0.006)	(0.006)
Newborn weight	0.007*	0.010***
	(0.004)	(0.003)
High-risk Robson	0.556***	
	(0.014)	
Twin pregnancy	−0.045**	−0.124***
	(0.023)	(0.010)
Breech birth	0.184***	−0.142***
	(0.014)	(0.004)
Past C-sections	0.141***	−0.090***
	(0.015)	(0.005)
Past miscarriage	0.011***	0.010***
	(0.004)	(0.004)
Pathologies	0.074***	0.075***
	(0.007)	(0.006)
Asthma	−0.130***	−0.134***
	(0.013)	(0.012)
Allergies	0.137	0.133
	(0.280)	(0.278)
Alcohol	−0.009	−0.012
	(0.014)	(0.012)
Smoke	−0.006	−0.004
	(0.006)	(0.006)
Hospital admissions	0.005	0.010
	(0.009)	(0.009)
Age 25–29	0.036***	0.037***
	(0.005)	(0.005)
Age 30–34	0.076***	0.072***
	(0.005)	(0.005)
Age 35+	0.121***	0.108***
	(0.006)	(0.005)
Medium Education	−0.005	−0.004
	(0.003)	(0.003)
High education	−0.022***	−0.022***
	(0.006)	(0.005)
Employment status	0.003	0.002
	(0.003)	(0.003)
Marital status	−0.012***	−0.012***
	(0.004)	(0.003)
Native father	0.015***	0.015***
	(0.005)	(0.004)
Constant	−0.079***	−0.051***
	(0.021)	(0.018)
Observations	50,245	50,245
R-squared	0.384	0.091

Notes: OLS estimates for Equation (3). Omitted cluster category is Cluster 1. The regression includes hospital fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the level of municipality-year. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A17
The role of linguistic and socio-cultural distances and the clusters: Linear Probability Model (LPM) and Probit marginal effects estimates.

	LPM		Probit	
	CS	LR-CS	CS	LR-CS
Language-dist	0.006***	0.007***	0.008***	0.005***
	(0.002)	(0.001)	(0.008)	(0.008)
Femicides-dist	0.021***	0.020***	0.027***	0.017***
	(0.003)	(0.003)	(0.013)	(0.014)
Civil Liberties-dist	0.011***	0.009***	0.009***	0.007***
	(0.002)	(0.002)	(0.011)	(0.012)
Development-dist	0.031***	0.030***	0.040***	0.025***
	(0.005)	(0.004)	(0.022)	(0.026)
Religious-dist	0.004**	0.005***	0.005**	0.003***

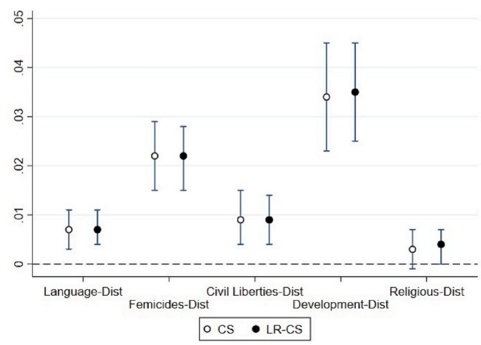
(continued on next page)

Table A17 (*continued*)

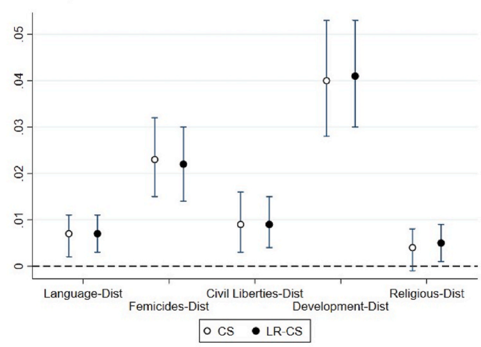
	LPM		Probit	
	CS	LR-CS	CS	LR-CS
	(0.002)	(0.001)	(0.008)	(0.008)
Cluster 2	0.018*	0.013	0.020	0.008
	(0.011)	(0.009)	(0.050)	(0.054)
Cluster 3	0.042***	0.038***	0.052***	0.027***
	(0.011)	(0.010)	(0.051)	−0.056

Notes: The table reports results from equations (2) and (3), i.e., the estimated marginal effects (for probit, we hold the other regressors at their means) associated with the linguistic and socio-cultural distances and the countries' clusters. All the estimated models include mother controls: a) *medical conditions* of the mother related to pregnancy, i.e., first child, twin pregnancy, breech birth, past C-sections, past miscarriage, pathologies in pregnancy, asthma in pregnancy, allergies in pregnancy, alcohol in pregnancy, smoking in pregnancy, hospital admissions in pregnancy, high-risk Robson groups (only in the CS specifications), the newborn weight at birth; b) *socio-economic characteristics* of the mother, i.e., age class (18–24, 25–29, 30–34, +35), education level (low, medium, high), employment status, marital status, whether child's father is native. Standard errors (in parentheses) are clustered at the level of municipality-year. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Panel A. Municipalities within 15 minutes of the nearest hospital



Panel B. Municipalities with a hospital



Panel C. Municipality of Turin

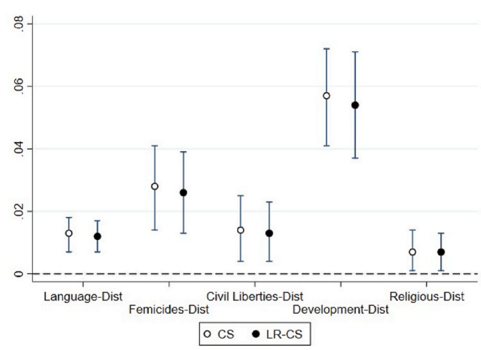
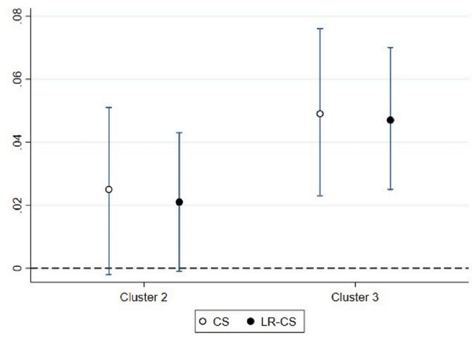
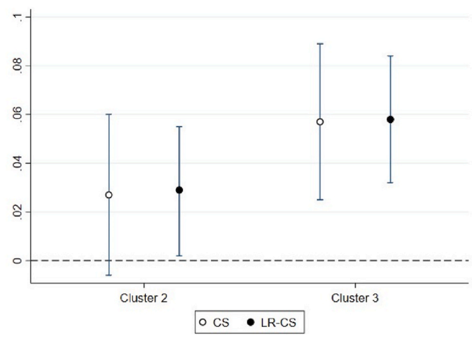


Fig. A1. Regression results for *CS* and *LR-CS*: The role of linguistic and socio-cultural distances for different spatial units, sample of non-native women.

Panel A. Municipalities within 15 minutes of the nearest hospital



Panel B. Municipalities with a hospital



Panel C. Municipality of Turin

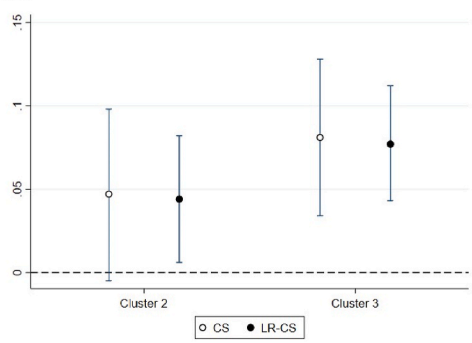


Fig. A2. Regression results for *CS* and *LR-CS*: The role of clusters for different spatial units, sample of non-native women.

Data availability

The authors do not have permission to share data.

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