INPS
Istituto Nazionale Previdenza Sociale

novembre 2025 – numero 108

WorkINPS *Papers*

The Geography of Child Disability in Italy: New Evidence from Administrative Data

Paola Biasi
Gabriella Conti
Maria De Paola

ISSN 2532 -8565

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Tommaso Nannicini

The Geography of Child Disability in Italy: New Evidence from Administrative Data

Paola Biasi
(Research Department, National Institute of Social Security (INPS) Rome, Italy)

Gabriella Conti
(Department of Economics and Social Research Institute, University College London (UCL); CEPR, CESifo, IFS, IZA)

Maria De Paola
(Research Department, National Institute of Social Security (INPS), Rome, Italy; University of Calabria, Department of Economics, Statistics and Finance, G. Anania; IZA)

The Geography of Child Disability in Italy: New Evidence from Administrative Data

Paola Biasi[a], Gabriella Conti[b]*, Maria De Paola[c]

Abstract: The prevalence and nature of child disability vary considerably across and within countries, reflecting differences in healthcare systems, socioeconomic conditions, and cultural factors. We present new evidence from unique administrative data on child disability in Italy, examining prevalence by geography and age. We analyse how socio-economic and health indicators—at both individual and local level—are associated with the likelihood of disability in children. Consistently with previous literature, our findings reveal significant geographical and socioeconomic disparities in child disability rates, with a complex interplay of family-level characteristics and contextual factors related to the child's immediate living environment.

Keywords: child disability; socioeconomic inequality; Italy

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[a] *Research Department, National Institute of Social Security (INPS). Rome, Italy - paola.biasi@inps.it*
[b] *Department of Economics and Social Research Institute, University College London (UCL); CEPR, CESifo, IFS, IZA - gabriella.conti@ucl.ac.uk*
[c] *Research Department, National Institute of Social Security (INPS), Rome, Italy; University of Calabria, Department of Economics, Statistics and Finance, G. Anania; IZA - m.depaola@unical.it*

This project was realized thanks to the sponsorships and donations in support of the VisitINPS Scholars program. The findings and conclusions expressed are solely those of the authors and do not represent the views of INPS.

Funding declaration: Gabriella Conti has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No. 819752 DEVORHBIOSHIP - ERC-2018COG).

La Geografia della disabilità in Italia: nuove evidenze dai dati amministrativi

Paola Biasi[a], Gabriella Conti[b], Maria De Paola[c]*

Abstract: La prevalenza e la natura della disabilità infantile variano considerevolmente tra i paesi e all'interno degli stessi, riflettendo differenze nei sistemi sanitari, nelle condizioni socio-economiche e nei fattori culturali. Presentiamo nuove evidenze basate su dati amministrativi unici riguardanti la disabilità infantile in Italia, analizzando la prevalenza per area geografica e fascia di età. Esaminiamo in che modo gli indicatori socio-economici e sanitari—sia a livello individuale che locale—siano associati alla probabilità di disabilità nei bambini. In linea con la letteratura precedente, i nostri risultati evidenziano marcate disuguaglianze geografiche e socioeconomiche nei tassi di disabilità infantile, con un'interazione complessa tra le caratteristiche familiari e i fattori contestuali legati all'ambiente di vita immediato del bambino.

Keywords: disabilità infantile, disuguaglianza socioeconomica, Italia

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[a] *Direzione Centrale Studi e Ricerche, Istituto Nazionale della Previdenza Sociale (INPS). Roma, Italia – paola.biasi@inps.it*
[b] *Department of Economics and Social Research Institute, University College London (UCL); CEPR, CESifo, IFS, IZ - gabriella.conti@ucl.ac.uk*
[c] *Direzione Centrale Studi e Ricerche, Istituto Nazionale della Previdenza Sociale (INPS). Roma, Italia; Università della Calabria, Dipartimento di Economia, Statistica e Finanza, G. Anania; IZA - m.depaola@unical.it*

La realizzazione del presente articolo è stata possibile grazie alle sponsorizzazioni e le erogazioni liberali a favore del programma VisitINPS Scholars. Le opinioni e le conclusioni qui espresse sono esclusivamente degli autori e non riflettono necessariamente le posizioni dell'INPS.

Gabriella Conti ha ricevuto un finanziamento dal Consiglio Europeo della Ricerca (ERC) nell'ambito del programma di ricerca e innovazione dell'Unione Europea *Horizon 2020* (grant agreement n. 819752, DEVORHBIOSHIP – ERC-2018-COG).

1. Introduction

Despite improvements in health conditions and medical services, the prevalence of disability among children remains significant (Olusanya et al., 2022). According to Eurostat, in 2017 about 5% of EU families with children had one or more child with a disability, defined as 'some or severe long-standing limitations in usual activities due to health problems'. A similar figure of 4.4% is reported by the European Commission for 2021. The prevalence and nature of child disability vary considerably across European countries, reflecting differences in healthcare systems, socioeconomic conditions, and cultural factors.

In Italy, the pronounced regional economic disparities and its historical north-south divide in economic development, coupled with its diverse demographic makeup, create a complex environment for studying and addressing child disability. On the one hand, Italy's healthcare system, while universal, exhibits regional variations in quality and accessibility (Nuti et al., 2016), potentially impacting the detection, treatment, and support of children with disabilities. Moreover, the country's ageing population and low birth rates may influence resource allocation for children services. On the other hand, Italy has a long-standing commitment to inclusive education for children with disabilities, dating back to the 1970s (Anastasiou et al., 2015). This commitment has been further strengthened following the ratification of the UN Convention on the Rights of Persons with Disabilities; however, the implementation of a substantially progressive legislation has fallen short of the objective of inclusive education prescribed by the CRPD (Ferri, 2017). Additionally, extremely little is known about the prevalence of disabilities in children *before* they enter the formal education system.

This study provides for the first time a comprehensive picture of child disability in Italy, based on unique novel administrative data on child benefit receipts to uncover patterns and associations that can inform policy and practice. By examining the interplay between local economic conditions, family characteristics, and child disability rates, we seek to contribute to the broader European discourse on child health equity and the social determinants of disability.

2. Background & Theory

Child disability is a complex phenomenon influenced by various socioeconomic, environmental, and healthcare factors (Leonard et al., 2022). Previous research has identified several key determinants:

(1) Parental Characteristics: Factors such as parental age, education, and health behaviours during pregnancy have been linked to child disability (Almond, Currie, and Duque, 2018; Wehby, 2014). Additionally, child disability can, in turn, impact family outcomes (Reichman et al., 2008), such as subsequent fertility (Cheung et al., 2025; Wehby and Hockenberry, 2017), maternal employment (Cheung et al., 2025; Powers, 2001).

(2) Socioeconomic Status (SES): Studies consistently show an inverse relationship between family SES and child disability rates (Blackburn et al., 2010; Spencer et al., 2015). The economic costs of childhood disability are substantial (Melnychuk et al., 2018; Shahat and Greco, 2021; Solmi et al., 2018) and can further exacerbate these disparities (Stabile & Allin, 2012).

(3) Early Endowments: In addition to family SES, many studies have also linked the child's early endowments, in particular birth weight, to the incidence of child disabilities (Chaikind and Corman, 1991; Chatterji et al., 2014; Elder et al., 2020).

(4) Geographical Disparities: Regional variations in disability rates have been observed in multiple countries, often correlating with local economic conditions and healthcare quality (Mitra et al., 2013). These disparities can be influenced by differences in disability program implementation and screening processes across regions (Deshpande & Li, 2019).

(5) Healthcare Access: The availability and quality of healthcare services, including early intervention and ongoing support, significantly impact outcomes for children with disabilities (Olusanya et al. 2024). The interaction between health insurance and disability programs for children can also play a crucial role in access to care and long-term outcomes (Levere et al., 2019).

(6) Environmental Factors: Exposure to pollutants, inadequate housing, and other environmental stressors can increase the risk of certain disabilities (Bellinger et al., 2019).

(7) Policies: The design of disability programs and associated policies (e.g. the Supplemental Security Income, SSI) can influence disability identification, treatment, and outcomes for families and children (Guldi et al., 2024; Kubik, 1999; Levere et al., 2024; Sonnander, 2000). Additionally, early preventive interventions such as home visiting programmes targeting first-time disadvantaged mothers have been shown to improve the life chances of disabled children (Kitzman et al., 2018).

(8) Long-term Outcomes: The long-term effects of childhood disability and associated interventions are crucial to consider. Studies have examined the lifetime earnings growth of childhood-onset disabilities (Jeon et al., 2023), the impacts of removing low-income youth from disability rolls (Deshpande, 2016), and the long-term consequences of childhood disability benefit receipt on educational and labor market outcomes (Levere, 2021).

On the basis of this literature, we hypothesize that:

(1) Child disability rates will be higher in regions with lower socioeconomic indicators and poorer healthcare quality.

(2) Family-level socioeconomic status will be negatively associated with child disability rates.
(3) Local economic and healthcare factors will significantly influence disability rates, even after controlling for family-level characteristics.

To date, the literature on disability in Italy has mainly focused on its definition (ISTAT 2010), its operationalization following the capability approach (Biggeri and Bellanca, 2011), the impact of disability on access to work (Addabbo et al. 2014) and the interaction between disability, poverty and low income persistence (Parodi and Sciulli 2008, 2011); few papers on child disability in Italy exist (Balbo and Bolano, 2024, and Di Giulio et al., 2014), and are based on survey data with limited sample sizes and self-reported indicators of disability. This paper significantly expands this literature, capitalising on a newly available administrative resource with official disability certifications, which allows for the first time to map the geography of child disability at national level, and to examine both its family-level and area-level determinants.

3. Data and Methods

We conduct our analyses using a range of administrative archives provided by the Italian National Institute of Social Security (INPS). More precisely, we use novel data from a universal child benefit known as the Universal Child Allowance (UCA), introduced in 2022 and targeted at all families with minor children, dependent adult children[1] up to the age of 21 and dependent children with disabilities without age limits. The economic support offered to families is based on their economic conditions, as assessed through the Equivalent Economic Situation Indicator (ISEE, Indicatore di Situazione Economica Equivalente).[2] The monthly allowance ranges from a minimum of about €57 (granted in cases where no ISEE has been submitted or where the ISEE value exceeds €45,574,96 per year) to a maximum of about €199,4.[3] Families with disabled children receive an additional benefit, the amount of which depends on the severity of the child's impairment: mild impairment, severe impairment, or lack of self-sufficiency.[4] UCA applicants are hence required to declare both the status and the degree

[1] Those attending school or professional training courses, degree courses, unemployed and looking for work through public employment services, involved in universal social services, or employed with a total income of less than 8,000 euros per year.
[2] The ISEE is calculated on the basis of household income and real estate and financial assets, and is adjusted for family composition through an equivalence scale that accounts for household size, the presence of members with disabilities, and housing costs such as rent.
[3] All values are in 2024 Euros.
[4] For disabled children, the benefit has no age limits, and disabled children over 21 are granted the same allowance as minor children, based on the ISEE value. The benefit is indexed to inflation, and for 2025 the disability supplement amounts to an increase up to €109,07 in case of severe disability, and up to €97,68 for mild disability. In situations of non-self-sufficiency, a supplement of €120.56 is granted.

of disability for each child. The criteria for determining the degree of disability are outlined in the ISEE regulation, where applicants indicate the institution that issued the certification along with the certificate reference.

The assessment of the disability status is very complex[5] and the process involves several public authorities: first, the General Practitioner issues a medical certificate that citizens use to apply to the National Social Security Institute (INPS) to start the certification process; then, local health authorities (ASL) evaluate the case and provide the relevant information to INPS; finally, the INPS medical office examines the request, and either accepts or rejects it.[6] Three distinct degrees of disability are recognized:

(1) mild disability (law 118/71), which applies to individuals with persistent difficulties in performing age-appropriate tasks and functions;
(2) severe disability (laws 449/1997 and 388/2000), which pertains to individuals experiencing serious and ongoing limitations in age-appropriate tasks and function;
(3) not self-sufficient (law 508/88), which includes individuals who, due to physical or mental conditions, are unable to perform daily life activities independently and therefore require continuous assistance.

Even if some disabilities may be diagnosed later, and that barriers such as stigma, burdensome procedures, or lack of awareness may discourage families from claiming benefits, disability certification is not only required to access the AUU additional allowance, but also acts as a gateway to a broader set of support schemes—such as healthcare-related benefits and fiscal relief. Given their magnitude, these benefits are significant even for relatively affluent households. For instance, people with disabilities and their families can benefit from tax incentives for the purchase of vehicles, including a 19% personal income tax (IRPEF) deduction and a reduced VAT rate of 4%. In addition, the *indennità di frequenza* is an Italian social benefit provided by INPS to minors with disabilities or health conditions that limit their abilities. It is intended to support their access to education and rehabilitation by helping families cover the costs of attending school or therapeutic centers. The allowance is means-tested, paid monthly, and granted only if the child regularly attends school or recognized rehabilitation programs. This provides families with a strong incentive to obtain certification, which likely mitigates some of the take-up concerns and enhances the completeness of

[5] Currently, the system is undergoing a reform process that aims to simplify the procedure and reduce the number of actors involved, centralising the competences within INPS, which will therefore maintain the entire 'chain' in the future.

[6] A rejection does not permanently exclude the applicant. They may appeal the decision through legal channels if they believe it to be unfounded, or they may submit a new application if there are changes in their health condition or if new medical evidence becomes available.

the data.

Unfortunately, the UCA dataset does not provide information about the age at which the disability was first certified, implying that we can neither track the age of onset, nor can we observe changes in disability status over time. On the other hand, while many existing studies rely on survey data[7] with sample sizes that limit subgroup-specific analyses, our data has the advantage of covering the entire population, allowing for a comprehensive description of child disability patterns across diverse demographics, regions, and socioeconomic contexts. Additionally, we are able to link the UCA dataset with employer-employee records, which provide additional information on parental income prior to their child's birth: this allows us to assess the family's economic situation before any potential impact from the child's disability.

As of December 2024, there were 268,158 UCA applications for disabled children aged 18 or younger, representing 3.29% of all applications. We can compare this figure with that reported by the Italian National Institute of Statistics (ISTAT) in 2021, of 301,897 school-enrolled children with disabilities. Part of the discrepancy might be explained by the fact that the ISTAT figure includes students over 18 who may still be in secondary education, as well as children not eligible for, or not applying to, UCA — for example, those whose parents are not residents of Italy or have not lived in the country for at least two years. Indeed, the alignment between the ISTAT data and the UCA data improves when we focus on younger children: specifically, the ISTAT data reports 112,713 disabled children attending primary school in 2021 (last year available), while the UCA dataset records 108,115 disabled children aged 5 to 11 (and so likely to attend primary school). This close alignment enhances our confidence that the UCA dataset provides the most reliable available source on child disability in Italy, based on certified diagnoses, even though—as with any administrative register—some underreporting or delayed recognition of cases may persist.

Given that the take-up of the Universal Child Allowance (UCA) is highest among younger children and decreases with age[8], we focus our analysis on children born between 2015 and 2024, i.e. of ages 0 to 10: for this age group, the UCA application rate is approximately 95%, making it a reliable proxy for births in Italy during this period. In this way, we can provide a comprehensive overview of children under 10 who were officially certified as disabled by 2024, the most recent year

[7] Such as those from the Italian National Statistics Office (ISTAT, *Aspects of Daily Life*, AVQ) and the European Union Statistics on Income and Living Conditions (EU-SILC).

[8] This trend reflects both the recent introduction of the benefit in 2022 and the greater incentive for parents of young children to apply, as eligibility continues until the child reaches adulthood once the initial application is made.

for which we have UCA data. Our analytical sample amounts to almost 4 million records from UCA recipients, with approximately 105,322 disabled children aged 0-10.

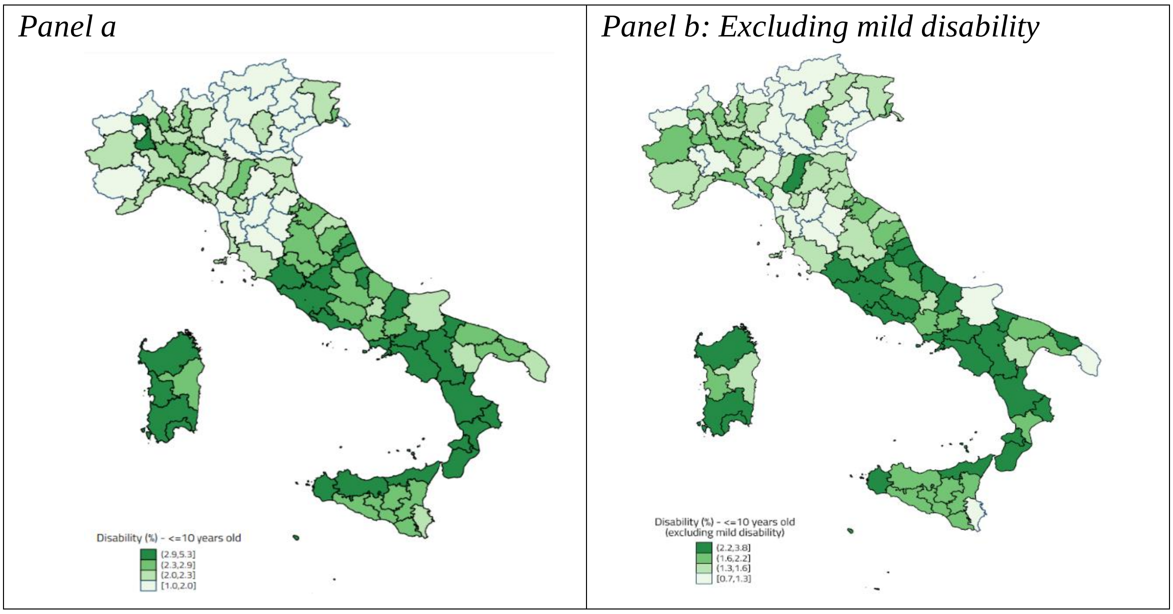
Our analysis proceeds as follows. We first provide some descriptive aggregate graphical evidence of geographical inequalities in child disability, overall and by age; in addition, we investigate the relationship between prevalence of disability and indicators of local socio-economic and health conditions. Then, we provide individual-level descriptive evidence of disparities by socioeconomic status and income. Finally, we employ multivariate regression techniques, to examine family- and local-level correlates of child disability.

4. Results

Geographical Inequalities. We first present maps showing the prevalence of child disability at the province level; our measure is the number of UCA applications for disabled children below the age of 10 over the total number of UCA applications (for children below the age of 10). Consistently with our first hypothesis (i.e. that higher disability rates are associated with worse socioeconomic indicators at the regional level), we find a higher concentration of child disability in the central and southern regions of Italy (Figure 1, panel a); this pattern holds also when we consider the more severe forms of disabilities (Figure 1, panel b).

We then split the sample in children of different age groups (see Figure 2), to investigate possible age patterns in the emergence of these divides. We find that the north-south geographical divide is only partly present by age 3 (Panel a), becomes more visible at ages 4 and 5, and then much starker when the children attend primary school (Panels b and c). This pattern could be rationalized in two ways: firstly, in the southern regions, due to the poorer functioning of the health system, disabilities might be detected with delay, implying that what is shown in our data underestimates the true prevalence. Alternatively, it could be that there are truly fewer significant differences in disability rates between north and south during early childhood, and that disparities emerge later as a result of worse conditions in the south, whose effects cumulate over time. In order to try and distinguish between these two hypotheses, in Panels d-e-f of Figure 2 we focus only on children with severe disabilities or who are not self-sufficient, as these cases are less likely to be detected with delay. The figures show that the same patterns hold for these categories: among children under the age of 4, the prevalence of severe disability shows less geographical concentration; in contrast, for older age groups, a more distinct north-south divide emerges. This suggests that poorer economic and environmental conditions and limited health resources in certain areas may contribute to widening geographical disparities in disability prevalence.

Figure 1. Disability prevalence for children <10 years of age, by province.



In Figure 3, we start investigating the relationship between local economic conditions and disability prevalence by examining some key indicators. As measures of local socio-economic conditions, we use the local employment rate[9] and an indicator of socio-economic vulnerability, constructed by the Italian National Institute of Statistics (ISTAT) – both aggregated at the province level for the year 2011[10]; as indicators of local health system quality, we use an index of avoidable mortality (for people aged 0-74), the rate of infant mortality, both at the province level for the year 2019, the number of beds available in high-care wards for ordinary inpatient treatment, in both public and private healthcare facilities, expressed per 10,000 inhabitants and the percentage of hospital discharges carried out in regions other than that of residence on the total discharges of residents in the region. Data refer only to inpatient discharges for "acute" care (excluding hospitalizations of "spinal unit", "functional rehabilitation", "neuro-rehabilitation", "long-term care").[11]

Figure 3 presents seven province-level maps showing quartile distribution of (1) the prevalence of children with disabilities (Panel a, same as Figure 1a), (2) the local employment rate (Panel b), (3) the ISTAT index of social and economic vulnerability (Panel c), (4) the avoidable

[9] We use the municipal employment rate in 2011, aggregated at the Labour Market Area level. The rate refers to the working-age population (individuals aged 15–64).

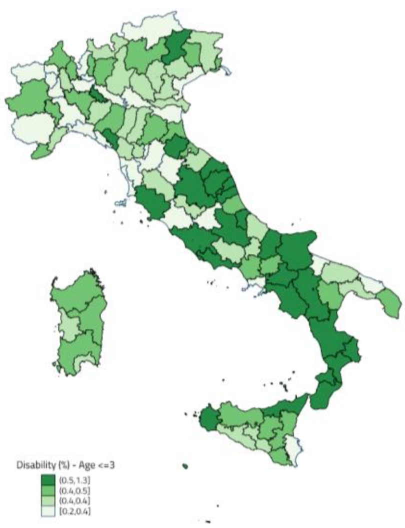
[10] The *Indice di Vulnerabilita' Sociale e Materiale (IVSM)* is a composite indicator of economic and social vulnerability computed at the municipal level, here aggregated at the province level. This index ranges from 70 to 130; 100 corresponds to the national mean; its components are based on 2011 Italian Census. Source: https://ottomilacensus.istat.it/fileadmin/download/Indice_di_vulnerabilit%C3%A0_sociale_e_materiale.pdf

[11] Our measures of health system quality are only available at the province level; however, given the organization of the health system, it is unlikely to find significant variability at the municipal level.

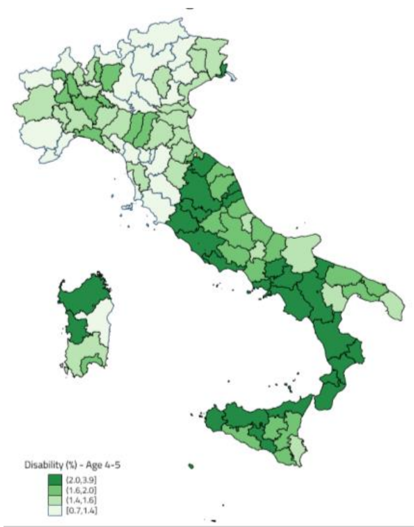
mortality index (Panel d), (5) the infant mortality rate (Panel e); (6) hospital beds per inhabitants (Panel f) and (7) Hospital patient emigration (Panel g); in these maps, darker shading indicates higher values for the indicators of interest. The patterns of shading are very similar and suggest that provinces with higher disability rates tend to have lower employment rates, and higher socioeconomic vulnerability, avoidable mortality, and infant mortality.

Figure 2. Disability prevalence, by province and age group

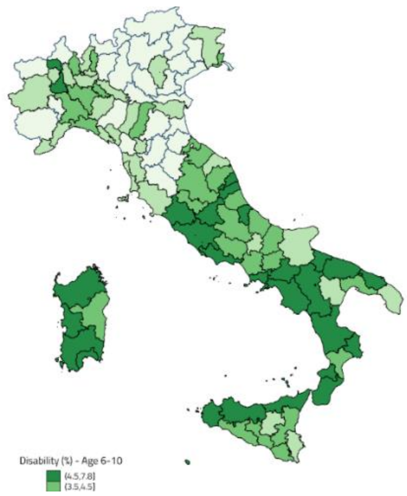
Panel a: Age <=3



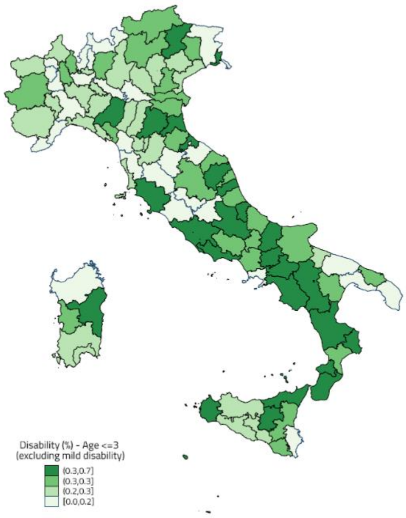
Panel b: Age 4-5



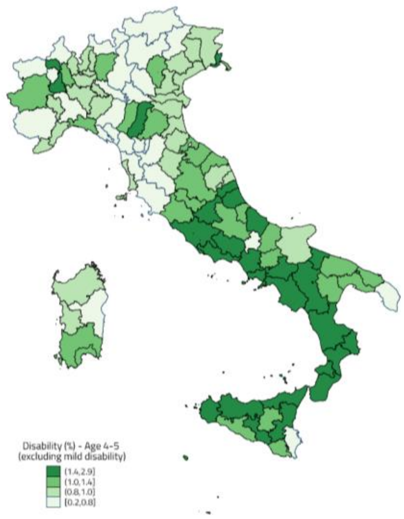
Panel c: Age 6-10



Panel d: Age <=3
Excluding mild disability



Panel e: Age 4-5
Excluding mild disability



Panel f: Age 6-10
Excluding mild disability

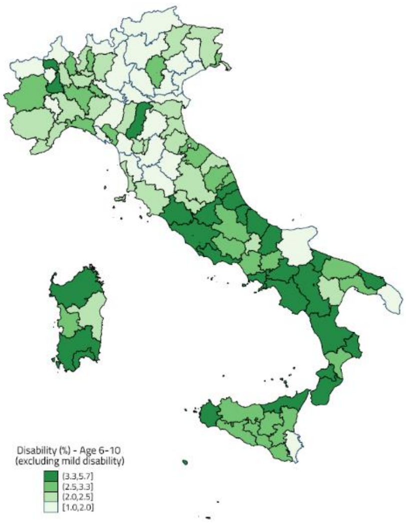
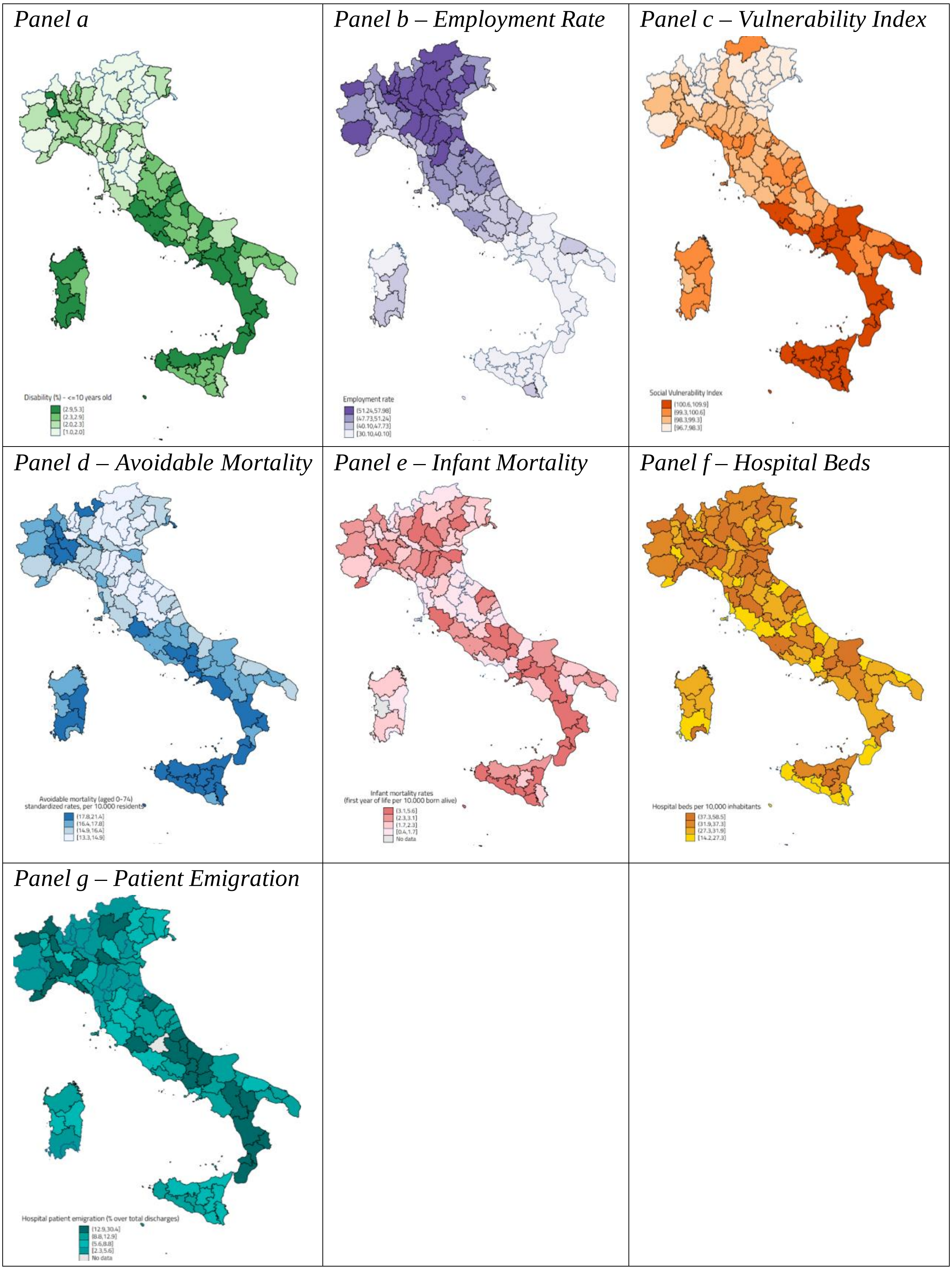
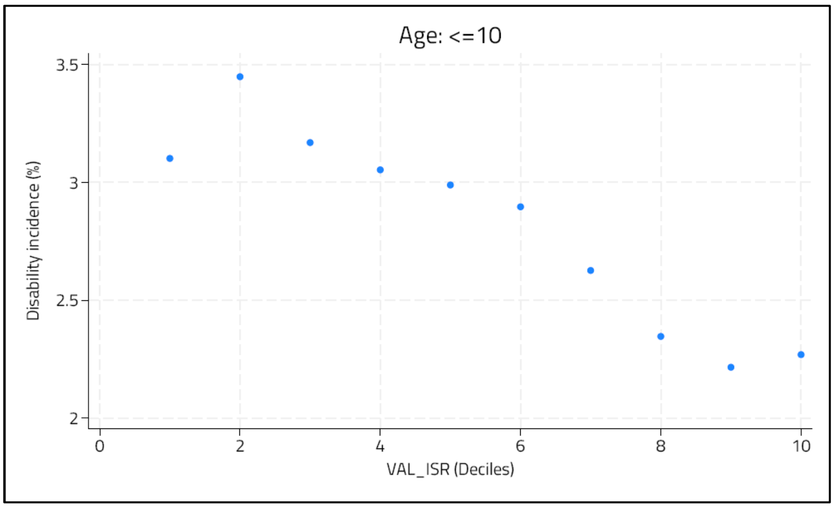


Figure 3. Disability prevalence by province and local socio-economic conditions



Family-Level Inequalities. Our second hypothesis posits that households with higher incomes have a lower probability of having a child with a disability. To test this second hypothesis, we use a component of the ISEE called the Indicator of Income Situation (*Indicatore Situazione Reddituale*, *ISR*) to measure family economic status: this represents the household's income not adjusted to account for the presence of disabled family members (the ISEE instead is adjusted for it). We then plot the prevalence of disability by income decile in Figure 4:[12] indeed, we notice a higher prevalence of disability at lower income deciles, with a decline from a peak of approximately 3.5% at the second decile to around 3% at the fourth decile (corresponding to an average income of 14 and 24 thousand euros, respectively) - a stable prevalence until the sixth decile (corresponding to an average income of 35 thousand euros), and a further reduction to less than 2.5% at the tenth decile.

Figure 4. Disability prevalence by deciles of Indicator of Income Situation (ISR)

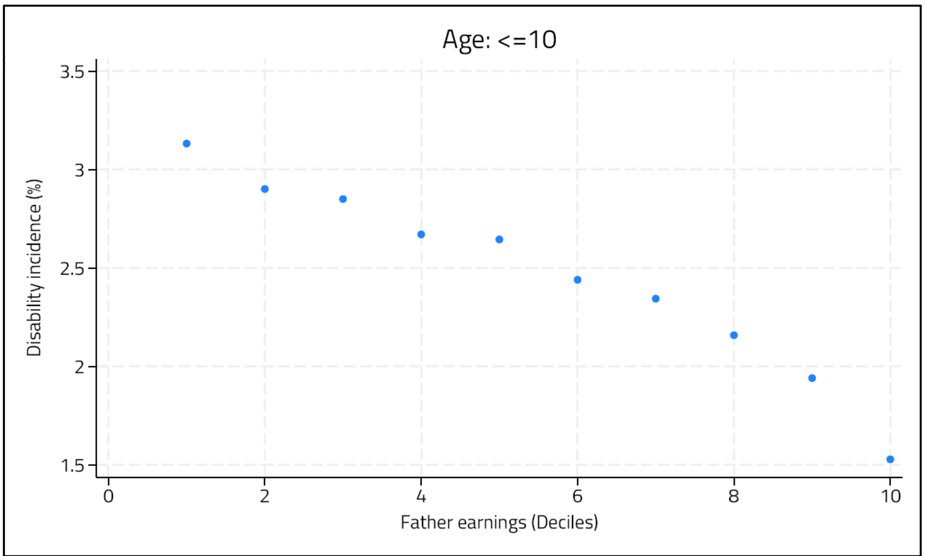


When studying the relationship between socioeconomic conditions and disability prevalence, it is however important to consider that having a disabled child might, in turn, reduce family wealth and income (see Balbo et al 2024, Leiter et al, 2004, Lu and Zuo, 2010). This introduces the possibility of reverse causality, as the costs associated with raising a disabled child might reduce the available household income. To address this potential issue, we match the UCA data with the universe of labor contracts from the UNIEMENS module that all Italian firms in the non-agricultural private sector

[12] UCA applications where the ISEE value was not reported are not considered in the graphical analysis (607,774 individuals that represent about 15,47% of the sample). These typically involve applications from wealthier families who would receive the same benefits amount regardless of whether they present the ISEE. Under current legislation, households with an ISEE above €45,575, or those that do not submit an ISEE, are entitled only to the minimum fixed allowance, which in 2024 amounts to about €57 per dependent minor child. As a result, wealthier households have little incentive to file the ISEE, given the time required and the absence of financial gains. Consistently, evidence from the 2023 INPS Annual Report (pp. 316-317) indicates that the likelihood of applying for the UCA without submitting the ISEE increases with parental earnings, based on an analysis restricted to parents employed in the non-agricultural private sector. Among households that do not report the ISEE value, only 1.18% have a child with a disability, which is much lower compared to households that do report the ISEE.

with at least one employee have to fill and communicate to INPS: this allows us to observe parental gross earnings before the birth of each child for individuals employed in the private sector; in addition, since in Italy the main earner is typically the father, we use the father's earnings from the year prior to the birth of the first child as our measure of family economic condition. As shown in Figure 5, consistently with our hypothesis, we find that the prevalence of child disability is higher in families with lower pre-birth earnings: more specifically, we find a prevalence higher than 3% in families with father's pre-birth earnings at the first decile, smoothly declining to less than 2% at the tenth decile. This suggests that socioeconomic conditions may indeed play a role in disability prevalence independently of the economic impact of caring for a disabled child: for example, due to poorer living conditions, riskier habits, reduced access to healthcare, and less prenatal diagnostic testing. This interpretation is supported by the fact that the negative correlation between child disability and parental earnings persists also when we restrict the sample to the most severe cases (Appendix Figure A1 and A2).[13]

Figure 5. Disability prevalence by deciles of father pre-birth income



An additional factor contributing to this pattern might be the fact that higher socioeconomic status parents seek less formal recognition of disability for fear of stigma[14] or societal discrimination against

[13] Very similar results are obtained when we narrow the analysis further, excluding both mild and severe disabilities, and focusing on disability that results in non-self-sufficiency.
[14] We believe this mechanism—if it exists—is unlikely to substantially affect our results. In fact, the inverse relationship between income and disability prevalence persists even when we restrict the analysis to more severe cases. In such cases, the potential cost of non-certification, whether in terms of financial support or access to services, would likely discourage underreporting, particularly among families with greater resources and awareness.

disabled individuals, while economically disadvantaged parents, who require financial assistance to meet the needs of their disabled child, are more likely to pursue disability recognition.

Regression Results. We next investigate the association of parental characteristics and local conditions with the likelihood of disability among children under 11 years of age, by means of a Linear Probability Model, where the outcome variable is a dummy variable which takes the value of one if the UCA recipient is a disabled child and zero otherwise. Our model includes the following independent variables: (a) child gender and age, to account for the fact that disabilities are more prevalent among boys, and that certain health-related disabilities may not manifest at birth but later in childhood; (b) mother's and father's ages at the time of their child's birth and second-order polynomial terms for both, as many studies indicate that certain types of disabilities are more prevalent with older parents and to account for potential nonlinear relationships; (c) binary indicators for non-Italian mothers and for non-Italian fathers; (d) family size; (e) the ISR indicator or alternatively annual earnings of the father or mother in the year prior to childbirth (for those employed in private sector only) as proxy for family socioeconomic conditions; (f) a binary indicator equal to one for children residing in the southern-central part of the country, and zero otherwise, to account for the North-South divide; (g) the employment rate and the economic vulnerability indicator developed by the Italian National Institute of Statistics (ISTAT) at the municipality level, to account for local economic conditions; (h) four health and health care indicators: an index of avoidable mortality and infant mortality rates at the province level, hospital beds per 10,000 inhabitants, measured at the province level, and hospital patient out-region emigration as percentage of total discharges (at the province level). Finally, in additional analyses, we include controls for number and average duration (in days) of sick events of mothers and fathers, measured at the year before the birth of the child to account for family health background.[15] Parental illness is measured in the year prior to the child's birth, allowing us to capture pre-existing health conditions rather than consequences of the child's health status. Standard errors are clustered at the level of the municipality level.[16]

[15] Since this information is only available for a subset of the population, including it in the main specification would significantly reduce the sample size and risk introducing selection bias toward families with at least one of the parents working as employee in the non-agricultural private sector. Parental sick leave (duration) is defined as the average number of sick leave events (or their duration) across mothers and fathers. When information is missing for one parent, we assign the number of events recorded for the partner for whom data are available. Father's sick leave and mother's sick leave, instead, are measured exclusively on the events pertaining to each parent. Depending on the measure adopted, information is missing for approximately 27% to 55% of the population of interest.

[16] Very similar results are obtained when standard errors are clustered at the province level (results not reported but available upon request).

Starting from an initial dataset of 4,106,628 observations of the Universal Child Allowance (UCA) for children up to 10 years old, we select an estimation sample including observations for which information on variables (a)-(d) is available, [17] resulting in the final sample detailed below.

Table 1 presents the descriptive statistics of the variables used in our analysis. The full sample consists of 3,927,461 individuals, of whom 100,065 (about 2.5%) have a child with a disability. Among these, 28.4% have a child with a mild disability, 31.4% with a severe disability, and 40.2% with a non self-sufficient child.

The estimation results are presented in Table 2, where we present results obtained gradually introducing different set of controls. In column 1 we only introduce individual-level indicators (measured at the time of the UCA application, unless otherwise stated); in column 2 we introduce a binary indicator for living in the South; in column 3 and 4 we add local-level socioeconomic and health indicators, respectively; in columns 5-7, we add controls for average duration and number of sick leave events (for both parents, and for fathers and mothers separately, respectively), as proxy for family health background.

We start by describing the column 1 results. We find that child age is positively associated with the probability of having a disability, albeit at a decreasing rate (the relationship between age and the probability of disability reaches its peak at approximately 13.83 years). A U-shaped relationship is observed for the mother's age, which might be due to the increased risk of genetic conditions with older mothers on the one hand, and poorer socioeconomic conditions or riskier health behaviours present among very young mothers on the other. Appendix Figure A3 shows the probability of child disability predicted at different values of mothers' age, separately for individuals living in the northern and in the southern regions. We find that the probability of child disability for mothers living in the southern part of the country is 2.7/2.6 when they were between 15 and 20 years old at the birth of their child (2.4/2.2 for those living in the northern part); this probability subsequently decreases with increasing maternal age, reaching a minimum at around 24 years old. Beyond age 25, the trend reverses, showing an increasing probability, especially after age 40: this trend likely reflects the fact that, as the mother's age increases, so does the risk of genetic biological conditions that can lead to disability (Frick, 2021). The age of the father, instead, seems to have a smaller association with the probability of having a disabled child than the age of the mother.

[17] We imputed the ISR value when it was not available, based on the observed amount of UCA. Specifically, if UCA was equal to or greater than €199 (i.e., the maximum base support), we imputed an ISR value of €0. If UCA was below €199, we imputed an ISR value of €45,575. Results (available upon request) remain qualitatively unchanged when these observations are excluded from the analysis. Results (available upon request) remain qualitatively unchanged when these observations are excluded from the analysis.

Appendix Figure A4 plots the probability of child disability, separately for fathers living in the South and in the North, for different values of their age. It shows that the probability of having a disabled child steadily increases with age, but the strength of this association is weaker, both in terms of statistical significance and in terms of magnitude of the relationship (for instance, for fathers aged 40, the probability of child disability is 2.6 and 2.9 for those living in the North and in the South, respectively, while for mothers of the same age these values rise to 3 and 3.29).

We also find that male children have a higher probability of disability compared to their female counterparts, a difference that may be partly explained by the higher prevalence of neurodevelopmental disorders, such as autism spectrum disorders, among boys.[18] Having a parent with a foreign background presents mixed results, maternal foreign background is generally positively associated with the outcome, whereas paternal foreign background shows a more inconsistent relationship. Higher family income (as measured by the ISR) is negatively correlated with the probability of having a disabled child: an increase of 1,000 euros in ISR is associated with a 0.0002 decrease in the probability of disability: given that the mean probability of disability for children aged 0-10 is 0.025, this represents a 0.8% reduction.[19]

Our estimates indicate that families with more than one child are, on average, less likely to have a child with a disability compared to families with a single child. The pattern may reflect selection effects, for example, parents of children with disabilities might be less likely to have additional children, or other unobserved family characteristics correlated with both fertility decisions and disability risks.

Conditional on these family-level characteristics, living in the South (column 2) is associated with a 0.006 p.p. higher probability that a child is disabled – pointing to the importance of context-level, in addition to individual-level factors. Indeed, when we add indicators of local economic conditions to our model (column 3), we find that the local poverty level (as measured by a vulnerability index provided by ISTAT) is positively and statistically significantly associated with the probability of child disability, that the employment rate exhibits a negative association with it, and that the 'South' coefficient loses statistical significance - suggesting that the previously observed north-south divide is largely explained by socio-economic factors.

Finally, when we include indicators of local health conditions (column 4), we find that: the rate of avoidable mortality is positively and significantly associated with the probability of child disability, while the infant mortality rate shows no significant association with it; the coefficient on

[18] See for instance Loomes et al. (2017) or https://www.autismspeaks.org/autism-statistics-asdm
[19] A smaller coefficient equal to 0.0001 is obtained in specification (7).

hospital beds is not statistically significant at conventional levels, while that on hospital patient emigration is. This result is consistent with our broader findings, suggesting that mere quantity-based measures of hospital infrastructure may be less relevant than factors related to healthcare quality and accessibility in shaping health outcomes this reinforces the argument that disadvantaged territories, such as the South, face compounded barriers to care, likely contributing to higher disability prevalence.

Finally, the results displayed in columns 5-7 show that past parental health conditions—as proxied by sickness episodes for the mother and the father, or both—are indeed significant predictors of the probability of having a disabled child. Importantly, however, their inclusion does not substantially affect the significance or magnitude of the other key variables in the model: this suggests that, while family health background plays a role, the economic and contextual mechanisms we focus on remain robust and independently relevant.[20]

We find very similar results when, instead of the family ISR, we include fathers' (Appendix Table 1) or mothers' (Appendix Table 2) earnings in the year preceding childbirth (only for individuals employed in the private sector).

In summary, our analysis shows that both family socio-economic background and local economic and health factors influence the probability of having a disabled child: on the one hand, children from more affluent families tend to have lower probabilities of being disabled; on the other hand, families living in areas with lower employment rates, higher poverty levels, and lower access to healthcare services have a higher likelihood of having a disabled child[21].

[20] We conducted a Shapley-Owen decomposition of the model's R^2 (which is 0.014), grouping covariates into specific subgroups, to better assess the relative contribution of individual versus local-level factors. The decomposition reveals that 89.9% of the explained variance is attributable to demographic characteristics (such as the child's age and gender, the mother's and father's age at the child's birth, and the parental foreign background). Family income-related variables (such as ISR and number of children in the household) account for 4.5%. Local economic factors (vulnerability index, employment rate, and the South dummy) explain 2.7%, while local healthcare system characteristics contribute the remaining 2.9%. These results highlight that most of the explained variation stems from individual and family-level characteristics, particularly demographic factors. Local economic and healthcare variables have a more modest, though still relevant, influence. This can be easily seen by the fact that the R^2 is barely affected by the inclusion of the local-level variables. At the same time, the low overall R^2 (0.014) suggests that a large share of the variation in child disability prevalence remains unexplained, likely due to unobserved factors—highlighting the complexity of the issue. Nevertheless, the decomposition helps clarify the policy implications, underscoring the need to address individual-level factors while also considering local economic and healthcare conditions.
We also estimated a model replacing our provincial-level measures of local conditions with province fixed effects. The R^2 increases only marginally to 0.016, suggesting that while local-level variables play a modest role in explaining the probability of child disability, they provide an adequate representation of meaningful differences across provinces.

To further gauge the importance of socio-economic characteristics, we include an additional analysis focusing on single mothers and fathers (Table 3). While we do not explicitly observe marital status, we define a single parent as an individual for whom, for each child, no other parent is indicated in the AUU application. This proxy may not perfectly capture all single-parent situations, so the results should be interpreted with appropriate caution. Specifically, we estimate models including a binary indicator for single-parent status to assess whether being a single parent is associated with a higher probability of child disability. Columns 1-3 estimate models including maternal characteristics, while Columns 4-6 focus on paternal variables.

As shown in columns 1 to 3, regardless of the set of controls or sample selection, [22] the results indicate that single motherhood is positively and statistically significantly associated with child disability. Single fatherhood (columns 4 to 6) also tends to be positively associated with child disability, although the coefficient is smaller than that for single motherhood and does not reach statistical significance.[23] Overall, these findings suggest that the burden of single parenthood weighs more heavily on mothers, likely reflecting differences in caregiving responsibilities, economic vulnerability, and access to support networks. Additionally, fathers may be less likely to legally recognize or remain involved with children with disabilities, which could further contribute to the observed asymmetries.

In Table 4 in order to understand if family and local factors equally predictive in North and South, we examine whether the influence of observed family and local characteristics differ across these areas. Our analysis reveals some interesting patterns: while certain factors are similarly predictive in both regions, others exhibit distinct effects, suggesting regional heterogeneity. More specifically, child demographic factors, such as age and being male, exhibit a more pronounced association with disability prevalence in the South compared to the North. The stronger association of age may reflect challenges in the early detection of disabilities in the South, potentially due to limited access to paediatric healthcare or diagnostic services during critical developmental periods. We also find that family background exerts a stronger influence on child disability outcomes in the South compared to the North. In particular, higher family income is more strongly associated with a reduced probability of child disability in the South. Larger family size is negatively associated with the likelihood of child disability in both southern and northern regions. Interestingly, having a parent with a foreign background in the South is linked to a lower reported prevalence of disability relative to the North. This counterintuitive finding likely reflects barriers to accessing or utilizing diagnostic

[22] Column 2 re-estimate the baseline specifications in column 1 using the restricted sample used in columns 3.
[23] Column 4 re-estimate the baseline specifications in column 3 using the restricted sample used in columns 5.

and support services among immigrant families in the South, resulting in under-detection or under-reporting of disabilities; an alternative explanation could be different migration selection patterns between the two macroareas.

The results for contextual variables reveal a more nuanced regional pattern. The Vulnerability Index exhibits a stronger association with child disability in the North compared to the South, and Avoidable Mortality is statistically significant only in the North (columns 3 and 4). Conversely, Hospital patient emigration is significant in the South but not in the North (columns 5 and 6). Notably, higher employment rates show opposite associations across the two regions: they are negatively correlated with disability prevalence in the North, but positively correlated in the South. The difficulty in interpreting these coefficients lies in the fact that the positive associations can reflect both changes in the underlying prevalence of disability (e.g. for vulnerability, avoidable mortality, infant mortality, hospital patient emigration) and detection routes (e.g. employment rate in the South). The positive association in the South may reflect that higher employment coincides with improved access to healthcare and diagnostic services, resulting in greater detection and reporting of disabilities, even if the underlying prevalence of health conditions remains unchanged. The differences observed between the South and North, based on separate model estimations, are statistically significant, as confirmed by our fully interacted model including interaction terms between the South dummy and all explanatory variables (results non reported and available under request).

These findings are further supported by models that incorporate family health background, specifically controls for the mother's and father's health status prior to the child's birth. The results show no statistically significant regional differences in the relationship between parental health and child disability, while the associations observed for other family characteristics and local factors remain robust (results not reported and available upon request).

Finally, we examined the role of family and local socio-economic conditions on the severity of disability. We estimated the same models used in the previous analysis, but this time with a binary outcome variable equal to one when the child has a severe disability resulting in a lack of self-sufficiency and zero for those with milder forms. As reported in Table 5, the findings largely confirm the patterns observed for the overall probability of having a child with a disability, indicating that the same underlying factors influence not only the likelihood of disability but also its reported severity. We find that child age has a concave effect, with severity increasing at younger ages but flattening out as children grow older. Father's age at childbirth follows a U-shaped pattern, with higher risks at very young or older paternal ages. While maternal age is significantly associated with the overall prevalence of child disability (as shown in Table 2), it has no significant association with disability severity. This suggests that while the timing of motherhood may affect the likelihood of having a child with a disability, it is not associated with whether the condition is mild or severe. In contrast, family size shows associations of opposite sign: larger families are linked to a lower overall prevalence of disability, yet among households with disabled children, they are more likely to experience more severe forms. This pattern likely reflects a combination of selection (parents of children with disabilities may be less likely to have additional children) and resource dilution (once a disability is present, larger families may struggle more to provide sufficient care, increasing the severity burden). Foreign background of either parent is associated with a lower likelihood of very severe disability, possibly reflecting reporting or diagnostic differences. Higher household income is also negatively associated with the probability of having a disabled child. Local conditions also matter: children living in more vulnerable areas or in territories with higher infant mortality and greater "health emigration" are more likely to face very severe disability, underlining the role of socioeconomic and health system disparities.

5. Discussion and Conclusions

We have provided a novel analysis of the geography of child disability in Italy, using newly available registry data. Our analysis has revealed significant geographical and socioeconomic disparities in child disability rates, with a complex interplay of family-level and province-level factors. While the relationships that we have uncovered should not be interpreted as causal (due to both the cross-sectional nature of our data and potential unmeasured confounding factors), the consistency of our results with previous literature and their robustness to various specifications underlines their potential importance and the need for further investigation.

Our findings have several important policy implications. First, resources and interventions should be prioritized to regions with higher disability rates, particularly in southern Italy. Efforts to improve both socioeconomic and environmental conditions, and healthcare quality and accessibility, especially in underserved areas, could help reduce geographical disparities in disability rates: this might include increasing the number of specialized healthcare providers in underserved regions or implementing telemedicine programs to improve access to care. Furthermore, enhancing programs for early disability detection and intervention, particularly in economically disadvantaged areas, may help mitigate long-term impacts: early intervention has been shown to significantly improve outcomes for children with disabilities, making this a crucial area for policy focus. Additionally, strengthening economic support for low-income families may help reduce the impacts of child disabilities: learning from successful initiatives in other countries could inform the development of more effective policies and interventions in Italy.

In conclusion, this study provides valuable insights into the geography of child disability in Italy, highlighting the critical role of both family and local-level factors. By addressing these disparities through targeted policies and interventions, Italy can work towards ensuring better health outcomes and opportunities for all children, regardless of their socioeconomic background or place of residence. The complex nature of child disability necessitates a multifaceted approach, combining targeted interventions, economic support, healthcare improvements, and early detection programs to create a more equitable landscape for all children in Italy.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Disability	3,927,461	0.025	0.158	0	1
Mild	100,065	0.284	0.451	0	1
Severe	100,065	0.314	0.464	0	1
Non Self-Sufficiency	100,065	0.402	0.49	0	1
Child age	3,927,461	5.288	2.85	0	10.005
Son	3,927,461	0.514	0.5	0	1
Father age (at childbirth)	3,927,461	36.138	6.311	14	60
Mother age (at childbirth)	3,927,461	32.631	5.486	14	60
Father foreign background	3,927,461	0.191	0.393	0	1
Mother foreign background	3,927,461	0.215	0.411	0	1
ISR - thousands euro	3,927,461	35.41	21.015	0	598.728
1 child	3,927,461	0.318	0.466	0	1
2 children	3,927,461	0.496	0.5	0	1
3 children	3,927,461	0.144	0.351	0	1
4 children and more	3,927,461	0.042	0.2	0	1
Vulnerability index	3,915,791	100.478	3.57	91.119	119.64
Employment rate (LMA)	3,879,912	45.824	7.891	24.92	60.77
South	3,927,461	0.356	0.479	0	1
Avoidable mortality (aged 0-74)	3,879,263	16.56	2.132	13.3	21.4
Infant mortality rates	3,871,764	2.502	0.949	.4	5.6
Hospital beds per 10,000 inhabit	3,879,263	32.951	6.488	14.2	58.5
Hospital patient emigration	3,870,834	8.112	4.877	2.3	30.4
Mother's sick leave (average duration)	1,776,165	2.941	5.186	0	235
Mother's sick leave (events)	1,776,165	1.456	2.483	0	147
Father's sick leave (average duration)	2,346,994	2.006	4.172	0	243
Father's sick leave (events)	2,346,994	1.011	2.18	0	126

Table 2: Individual and local economic conditions as determinants of child disability

	(1) Disability	(2) Disability	(3) Disability	(4) Disability	(5) Disability	(6) Disability	(7) Disability
Child age	0.0078***	0.0078***	0.0078***	0.0078***	0.0080***	0.0082***	0.0074***
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Child age^2	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0003***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Son	0.0170***	0.0170***	0.0171***	0.0171***	0.0166***	0.0169***	0.0150***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0007)
Father age (at childbirth)	-0.0003**	-0.0003**	-0.0003*	-0.0003*	-0.0003	-0.0002	-0.0004*
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Father age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000**	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Mother age (at childbirth)	-0.0018***	-0.0017***	-0.0016***	-0.0016***	-0.0018***	-0.0017***	-0.0017***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Mother age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Father foreign background	-0.0012**	0.0002	0.0006	0.0007	0.0016***	0.0005	0.0036***
	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0005)
Mother foreign background	0.0008*	0.0020***	0.0023***	0.0023***	0.0031***	0.0024***	0.0038***
	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
ISR – thousands euro	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
2 children	-0.0054***	-0.0058***	-0.0060***	-0.0059***	-0.0054***	-0.0057***	-0.0050***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
3 children	-0.0038***	-0.0045***	-0.0048***	-0.0048***	-0.0038***	-0.0042***	-0.0027***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)
4 children and more	-0.0034***	-0.0043***	-0.0047***	-0.0046***	-0.0041***	-0.0051***	-0.0004
	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0010)
South		0.0062***	0.0004	0.0011	0.0013	0.0012	0.0003
		(0.0012)	(0.0020)	(0.0016)	(0.0017)	(0.0017)	(0.0018)
Vulnerability index			0.0007***	0.0006***	0.0007***	0.0006***	0.0008***
			(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Employment rate			-0.0002***	0.0001	0.0000	0.0001	0.0001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Avoidable mortality (aged 0-74)				0.0009**	0.0010***	0.0010***	0.0012***
				(0.0004)	(0.0004)	(0.0004)	(0.0004)
Infant mortality rates				0.0003	0.0001	0.0002	-0.0001
				(0.0003)	(0.0003)	(0.0003)	(0.0003)
Hospital beds per 10,000 inhabitants				0.0001	0.0001	0.0000	0.0001
				(0.0001)	(0.0001)	(0.0001)	(0.0001)
Hp patient emigration (% tot. discharges)				0.0003***	0.0003***	0.0003***	0.0003***
				(0.0001)	(0.0001)	(0.0001)	(0.0001)
Parental sick leave (average duration)					0.0001***		
					(0.0000)		
Parental sick leave (events)					0.0007***		
					(0.0000)		
Father's sick leave (average duration)						0.0002***	
						(0.0000)	
Father's sick leave (events)						0.0008***	
						(0.0001)	
Mother's sick leave (average duration)							0.0002***
							(0.0000)
Mother's sick leave (events)							0.0009***
							(0.0001)
Observations	3,927,461	3,927,461	3,879,745	3,862,516	2,870,875	2,309,117	1,744,695
Disability (mean)	0.025	0.025	0.025	0.025	0.024	0.025	0.022
R^2	0.013	0.014	0.014	0.014	0.014	0.015	0.013

Note: Table presents coefficients from linear probability models. Standard errors clustered at the level of the municipality in parentheses. $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

Table 3: Individual and local economic conditions as determinants of child disability - single parents

	(1) Disability	(2) Disability	(3) Disability	(4) Disability	(5) Disability	(6) Disability
Child age	0.0079***	0.0072***	0.0074***	0.0078***	0.0080***	0.0082***
	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0003)	(0.0003)
Child age^2	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Son	0.0174***	0.0151***	0.0151***	0.0170***	0.0168***	0.0168***
	(0.0006)	(0.0007)	(0.0007)	(0.0006)	(0.0006)	(0.0006)
ISR – thousands euro	-0.0002***	-0.0001***	-0.0001***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
South	0.0010	0.0000	0.0003	0.0011	0.0009	0.0012
	(0.0017)	(0.0019)	(0.0018)	(0.0016)	(0.0017)	(0.0017)
Vulnerability index	0.0006***	0.0008***	0.0008***	0.0006***	0.0006***	0.0006***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Employment rate	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Avoidable mortality (aged 0-74)	0.0009**	0.0012***	0.0012***	0.0009**	0.0010***	0.0010***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Infant mortality rates	0.0003	-0.0001	-0.0001	0.0002	0.0002	0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Hospital beds per 10,000 inhabitants	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Hp patient emigration (% over total discharges)	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***	0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Mother age (at childbirth)	-0.0016***	-0.0019***	-0.0019***			
	(0.0002)	(0.0002)	(0.0002)			
Mother age (at childbirth)^2	0.0000***	0.0000***	0.0000***			
	(0.0000)	(0.0000)	(0.0000)			
Mother foreign background	0.0027***	0.0056***	0.0057***			
	(0.0005)	(0.0004)	(0.0004)			
2 children	-0.0062***	-0.0051***	-0.0051***	-0.0064***	-0.0061***	-0.0062***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
3 children	-0.0048***	-0.0023***	-0.0022***	-0.0054***	-0.0048***	-0.0050***
	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
4 children and more	-0.0046***	0.0001	0.0002	-0.0053***	-0.0053***	-0.0056***
	(0.0007)	(0.0010)	(0.0010)	(0.0007)	(0.0007)	(0.0007)
Single mother	0.0066***	0.0077***	0.0077***			
	(0.0009)	(0.0012)	(0.0012)			
Mother's sick leave (average duration)			0.0002***			
			(0.0000)			
Mother's sick leave (events)			0.0009***			
			(0.0001)			
Father age (at childbirth)				-0.0005***	-0.0004**	-0.0004**
				(0.0001)	(0.0002)	(0.0002)
Father age (at childbirth)^2				0.0000***	0.0000***	0.0000***
				(0.0000)	(0.0000)	(0.0000)
Father foreign background				0.0015***	0.0013**	0.0016***
				(0.0005)	(0.0006)	(0.0005)
Single father				0.0011	0.0036	0.0037
				(0.0016)	(0.0024)	(0.0024)
Father's sick leave (average duration)						0.0002***
						(0.0000)
Father's sick leave (events)						0.0008***
						(0.0001)
Constant	-0.0715***	-0.0948***	-0.0965***	-0.0896***	-0.0961***	-0.0981***
	(0.0272)	(0.0352)	(0.0353)	(0.0273)	(0.0287)	(0.0289)
Observations	3,981,738	1,785,112	1,785,112	3,909,367	2,333,948	2,333,948
Disability (mean)	0.026	0.022	0.022	0.025	0.025	0.025
R^2	0.014	0.013	0.013	0.014	0.014	0.015

Note: Table presents coefficients from linear probability models. Standard errors clustered at the level of the municipality in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Individual and local economic conditions as determinants of child disability - macroareas

	(1) North	(2) South	(3) North	(4) South	(5) North	(6) South
Child age	0.0066***	0.0098***	0.0066***	0.0098***	0.0066***	0.0098***
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Child age^2	-0.0002***	-0.0003***	-0.0002***	-0.0003***	-0.0002***	-0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Son	0.0151***	0.0205***	0.0152***	0.0205***	0.0152***	0.0205***
	(0.0009)	(0.0005)	(0.0009)	(0.0005)	(0.0009)	(0.0005)
Father age (at childbirth)	-0.0006***	-0.0000	-0.0006***	0.0001	-0.0006***	0.0001
	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)
Father age (at childbirth)^2	0.0000***	0.0000	0.0000***	0.0000	0.0000***	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Mother age (at childbirth)	-0.0016***	-0.0018***	-0.0014***	-0.0018***	-0.0014***	-0.0018***
	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)
Mother age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Father foreign background	0.0019***	-0.0068***	0.0023***	-0.0068***	0.0024***	-0.0068***
	(0.0004)	(0.0010)	(0.0004)	(0.0010)	(0.0004)	(0.0009)
Mother foreign background	0.0038***	-0.0035***	0.0041***	-0.0034***	0.0041***	-0.0036***
	(0.0004)	(0.0009)	(0.0004)	(0.0009)	(0.0004)	(0.0009)
ISR – thousands euro	-0.0001***	-0.0003***	-0.0001***	-0.0003***	-0.0001***	-0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
2 children	-0.0054***	-0.0068***	-0.0054***	-0.0069***	-0.0054***	-0.0070***
	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0002)	(0.0004)
3 children	-0.0051***	-0.0044***	-0.0049***	-0.0045***	-0.0050***	-0.0047***
	(0.0004)	(0.0006)	(0.0004)	(0.0006)	(0.0004)	(0.0006)
4 children and more	-0.0068***	0.0001	-0.0067***	-0.0001	-0.0068***	-0.0003
	(0.0008)	(0.0011)	(0.0008)	(0.0011)	(0.0008)	(0.0011)
Vulnerability index			0.0024***	0.0005***	0.0021***	0.0005***
			(0.0007)	(0.0001)	(0.0005)	(0.0002)
Employment rate (LMA)			-0.0005***	0.0003***	-0.0002	0.0004***
			(0.0001)	(0.0001)	(0.0001)	(0.0001)
Avoidable mortality (aged 0-74)					0.0015***	-0.0000
					(0.0004)	(0.0004)
Infant mortality rates					-0.0000	0.0011***
					(0.0003)	(0.0004)
Hospital beds per 10,000 inhabitants					-0.0000	0.0000
					(0.0001)	(0.0001)
Hp patient emigration (% total discharges)					-0.0000	0.0002**
					(0.0001)	(0.0001)
Observations	2,529,051	1,398,410	2,481,911	1,397,834	2,472,148	1,390,368
Disability (mean)	0.023	0.030	0.023	0.030	0.023	0.030
R^2	0.012	0.017	0.013	0.017	0.013	0.017

Note: Table presents coefficients from linear probability models. Standard errors clustered at the level of the municipality in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Individual and local economic conditions as determinants of child disability – severity

	(1) Non Self-Sufficiency	(2) Non Self-Sufficiency
Child age	0.0637***	0.0604***
	(0.0058)	(0.0061)
Child age^2	-0.0028***	-0.0026***
	(0.0004)	(0.0004)
Son	-0.0060	-0.0061
	(0.0045)	(0.0045)
Father age (at childbirth)	-0.0058***	-0.0054**
	(0.0021)	(0.0022)
Father age (at childbirth)^2	0.0001**	0.0001**
	(0.0000)	(0.0000)
Mother age (at childbirth)	-0.0035	-0.0027
	(0.0026)	(0.0026)
Mother age (at childbirth)^2	-0.0000	-0.0000
	(0.0000)	(0.0000)
Father foreign background	-0.0605***	-0.0288***
	(0.0078)	(0.0067)
Mother foreign background	-0.0542***	-0.0307***
	(0.0063)	(0.0072)
ISR - thousands euro	-0.0022***	-0.0013***
	(0.0002)	(0.0001)
2 children	0.0501***	0.0420***
	(0.0039)	(0.0040)
3 children	0.0886***	0.0735***
	(0.0053)	(0.0052)
4 children and more	0.1162***	0.0988***
	(0.0093)	(0.0083)
Vulnerability index		0.0065***
		(0.0021)
Employment rate (LMA)		-0.0020
		(0.0016)
South		0.0125
		(0.0223)
Avoidable mortality (aged 0-74)		-0.0003
		(0.0044)
Infant mortality rates		0.0090**
		(0.0040)
Hospital beds per 10,000 inhabitants		-0.0005
		(0.0010)
Hospital patient emigration (% over total discharges)		0.0054***
		(0.0009)
Observations	100,065	98,393
Non self-sufficiency (mean conditioned on disability)	0.402	0.402
R^2	0.039	0.051

Note: Table presents coefficients from linear probability models. Standard errors clustered at the level of the municipality in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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Appendix

Figure A1. Disability prevalence by deciles of ISR (excluding mild disability)

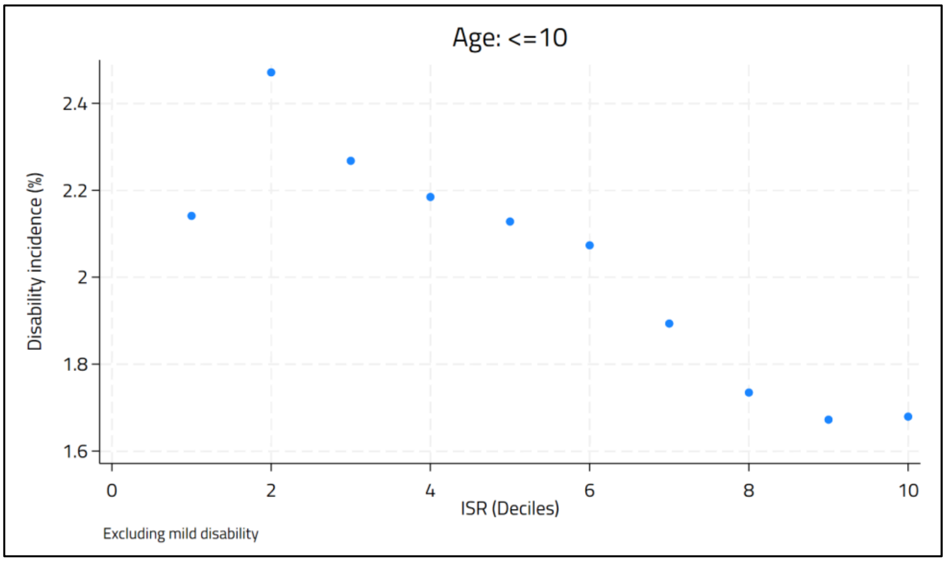

Figure A2. Disability prevalence by deciles of father pre-birth income (excluding mild disability)

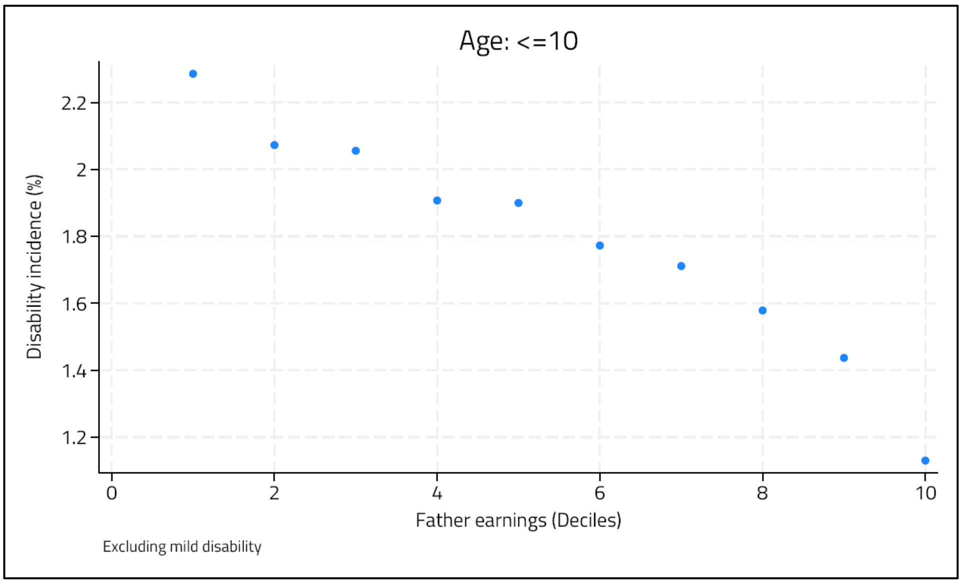

Figure A3: Predicted probability of child disability by mothers' age and geographical area

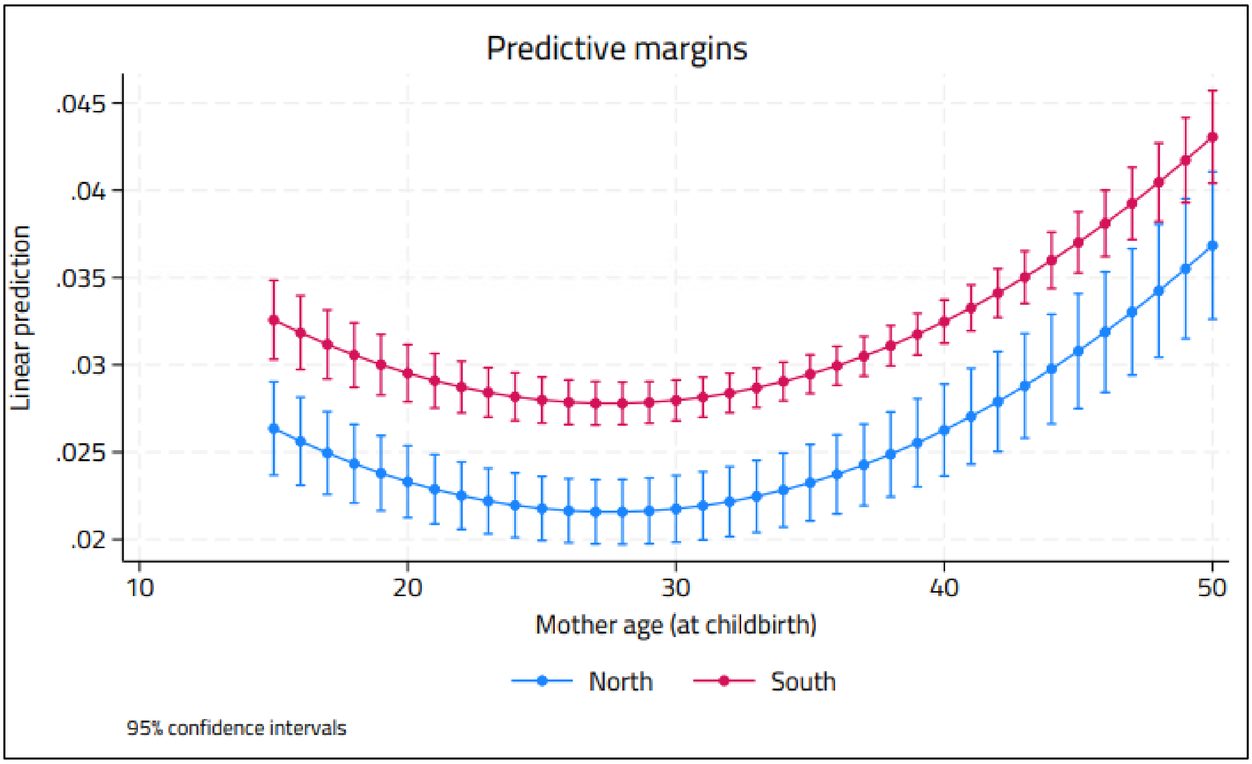

Figure A4: Predicted probability of child disability by fathers' age and geographical area

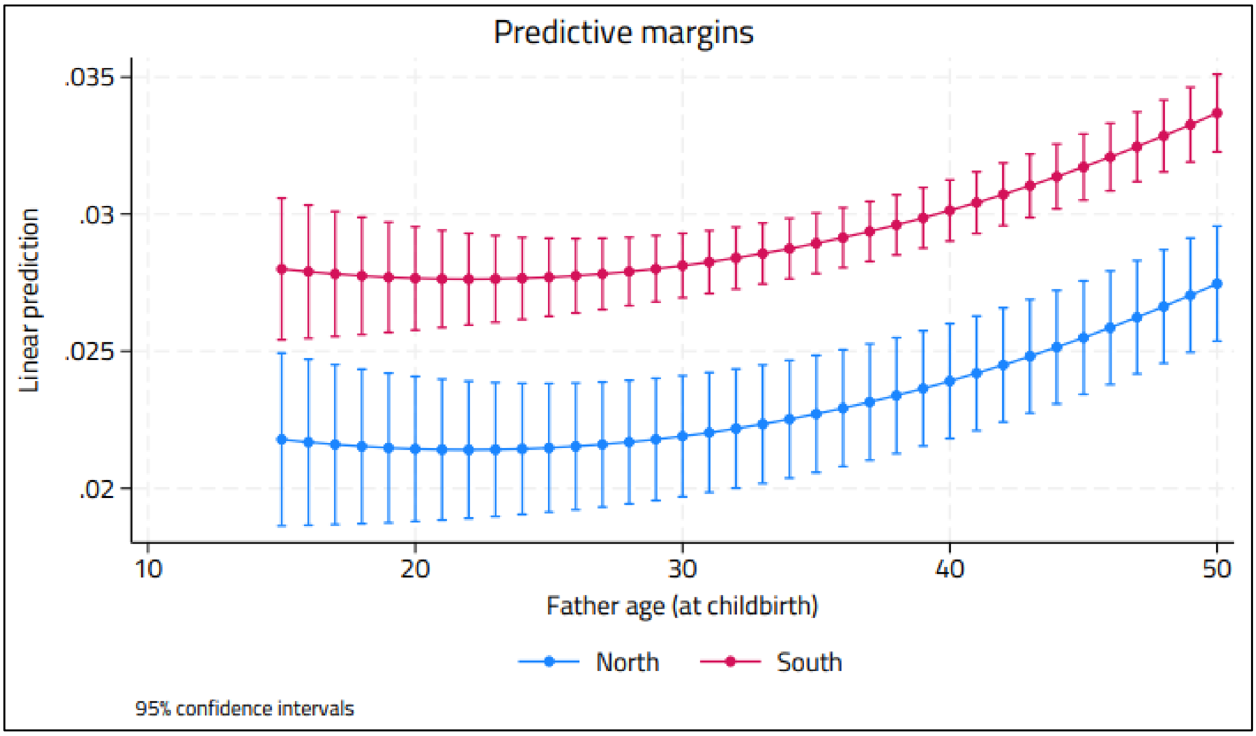

Table A1: Individual and local economic conditions as determinants of child disability – Controlling for father's earnings

	(1) Disability	(2) Disability	(3) Disability	(4) Disability
Child age	0.0076***	0.0077***	0.0077***	0.0080***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Child age^2	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Son	0.0168***	0.0169***	0.0168***	0.0169***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Father age (at childbirth)	-0.0003	-0.0003	-0.0003	-0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Father age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Mother age (at childbirth)	-0.0023***	-0.0020***	-0.0020***	-0.0021***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Mother age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Father foreign background	-0.0008	0.0011*	0.0011**	0.0015***
	(0.0005)	(0.0006)	(0.0005)	(0.0005)
Mother foreign background	0.0018***	0.0032***	0.0032***	0.0035***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Father earnings	-0.0002***	-0.0001***	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
2 children	-0.0053***	-0.0058***	-0.0058***	-0.0057***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
3 children	-0.0035***	-0.0045***	-0.0045***	-0.0043***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
4 children and more	-0.0046***	-0.0055***	-0.0055***	-0.0053***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Vulnerability index		0.0007***	0.0006***	0.0007***
		(0.0003)	(0.0002)	(0.0002)
Employment rate (LMA)		-0.0003***	0.0000	0.0000
		(0.0001)	(0.0001)	(0.0001)
South		0.0008	0.0015	0.0020
		(0.0022)	(0.0018)	(0.0017)
Avoidable mortality (aged 0-74)			0.0010***	0.0010***
			(0.0004)	(0.0004)
Infant mortality rates			0.0003	0.0003
			(0.0003)	(0.0003)
Hospital beds per 10,000 inhabitants			0.0001	0.0000
			(0.0001)	(0.0001)
Hospital patient emigration (% total discharges)			0.0003***	0.0003***
			(0.0001)	(0.0001)
Parental sick leave (average duration)				0.0001***
				(0.0000)
Parental sick leave (events)				0.0007***
				(0.0000)
Observations	2,327,501	2,298,712	2,289,972	2,289,972
Disability (mean)	0.025	0.025	0.025	0.025
R^2	0.013	0.014	0.014	0.014

Note: Table presents coefficients from linear probability models. Standard errors clustered at the level of the municipality in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A2: Individual and local economic conditions as determinants of child disability - Controlling for mother's earnings

	(1) Disability	(2) Disability	(3) Disability	(4) Disability
Child age	0.0068***	0.0069***	0.0069***	0.0073***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Child age^2	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Son	0.0149***	0.0150***	0.0150***	0.0150***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Father age (at childbirth)	-0.0005**	-0.0005**	-0.0005**	-0.0004**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Father age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Mother age (at childbirth)	-0.0019***	-0.0017***	-0.0017***	-0.0017***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Mother age (at childbirth)^2	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Father foreign background	0.0030***	0.0039***	0.0039***	0.0039***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Mother foreign background	0.0022***	0.0033***	0.0033***	0.0035***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Mother earnings	-0.0003***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
2 children	-0.0056***	-0.0056***	-0.0056***	-0.0056***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
3 children	-0.0041***	-0.0041***	-0.0041***	-0.0040***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
4 children and more	-0.0029***	-0.0027***	-0.0027**	-0.0026**
	(0.0010)	(0.0010)	(0.0010)	(0.0010)
South		-0.0010	0.0002	0.0006
		(0.0025)	(0.0019)	(0.0019)
Vulnerability index		0.0010***	0.0009***	0.0009***
		(0.0003)	(0.0002)	(0.0003)
Employment rate (LMA)		-0.0002***	0.0002	0.0001
		(0.0001)	(0.0001)	(0.0001)
Avoidable mortality (aged 0-74)			0.0012***	0.0012***
			(0.0004)	(0.0004)
Infant mortality rates			-0.0001	-0.0001
			(0.0003)	(0.0003)
Hospital beds per 10,000 inhabitants			0.0001	0.0001
			(0.0001)	(0.0001)
Hp patient emigration (%total discharges)			0.0003***	0.0003***
			(0.0001)	(0.0001)
Parental sick leave (average duration)				0.0002***
				(0.0000)
Parental sick leave (events)				0.0007***
				(0.0001)
Observations	1,757,843	1,734,049	1,726,698	1,726,698
Disability (mean)	0.022	0.022	0.022	0.022
R^2	0.012	0.012	0.013	0.013

Note: Table presents coefficients from linear probability models. Standard errors clustered at the level of the municipality in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.