

# Primary care doctors retirements in the context of an ageing population in Italy

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*Parole chiave:* Assistenza primaria; numero di pazienti; invecchiamento della popolazione; pensionamenti dei medici di medicina primaria; risorse sanitarie

## Abstract

**Background.** Ongoing shortages in primary care doctors/primary care paediatricians and increasing healthcare needs due to ageing of the population represent a great challenge for healthcare providers, managers, and policymakers. To support planning of primary healthcare resource allocation we analyzed the geographic distribution of primary care doctors/primary care paediatricians across Italian regions, accounting for area-specific number and age of the population. Additionally, we estimated the number of primary care doctors/primary care paediatricians expected to retire over the next 25 years, with a focus on the next five years.

**Study design.** Ecological study.

**Methods.** We gathered the list of Italian general practitioners and primary care paediatricians and combined them with the data from the National Federation of Medical Doctors, Surgeons and Dentists. Using data from the National Institutes of Statistics, we calculated the average number of patients per doctor for each region using the number of residents above and under 14 years of age for general practitioners and primary care paediatricians respectively. We also calculated the number of residents over-65 and over-75 years of age per general practitioner, as elderly patients typically have higher healthcare needs.

**Results.** On average the number of patients per general practitioner was 1,447 (SD: 190), while for paediatricians it was 1,139 (SD: 241), with six regions above the threshold of 1,500 patients per general practitioner and only one region under the threshold of 880 patients per paediatrician. We estimated that on average 2,228 general practitioners and 444 paediatricians are going to retire each year for the next five years, reaching more than 70% among the current workforce for some southern regions. The number of elderly patients per general practitioner varies substantially between regions, with two regions having >15% more patients aged over 65 years compared to the expected number.

**Conclusions.** The study highlighted that some regions do not currently have the required primary care workforce, and the expected retirements and the ageing of the population will exacerbate the pressure on the already over-stretched healthcare services. A response from healthcare administrations and policymakers is urgently required to allow equitable access to quality primary care across the country.

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## Introduction

In Italy, primary care medicine is funded by the National Health Service (“Servizio Sanitario Nazionale”, SSN) and is provided by general practitioners (“medici di medicina generale”, GPs) and primary care paediatricians (“pediatri di libera scelta”, PLSs). All citizens are registered with a GP or a PLS, and the switch from PLS to GP usually occurs when patients are aged between 6 and 14 years of age (1).

GPs and PLSs are the first point of contact for patients, playing a crucial role in providing appropriate healthcare, especially for individuals with chronic conditions. Additionally, GPs and PLSs provide preventive healthcare and contribute in reducing the number of unnecessary specialist visits, diagnostic investigations and Emergency Department (ED) visits, increasing the efficiency and appropriate use of healthcare resources (2).

In order to guarantee high-quality care, the current legislation and the national collective contract of Italian GPs allow a maximum of 1,500 registered patients per GP, with some exceptions, and recommending 1,000 patients per GP as the optimal number (3,4). Similarly, the current legislation and the national collective contract of PLSs allow a maximum of 880 registered children per PLS, with the optimal number being 600 per PLS (1).

To address the shortage of primary care doctors and to guarantee primary care to the entire population, some regions and Local Healthcare Trusts (“Aziende Sanitarie Locali”, ASLs) raised the limit of registered patients (5,6). Primary care doctors are eligible for retirement at age of 68, but they can choose to prolong their working activity for the SSN up to age 70 (7). The recent law n. 14/2023 extended the possibility to work for the SSN up to age of 72, until the end of 2026, in response to the current shortage of physicians (8).

The burden of care faced by primary care doctors is primarily related to the ageing population and the high prevalence of multi-morbidity, defined as the simultaneous presence of two or more chronic diseases (9,10). The increase in the average age of the Italian population, caused by a reduced fertility rate (11) and a lengthening of life expectancy (12), will continue to lead to a rising primary care burden in the future years (13).

Reports by Healthcare Organizations at regional, national and international level, have highlighted the shortage of GPs and PLSs in Italy, attracting a large media attention (14–16). The National Agency for Regional Healthcare Services (“Agenzia Nazionale

per i Servizi Sanitari Regionali”, AGENAS) pointed out that between 2019 and 2021 the number of primary care doctors has decreased in many Italian regions and in the country overall. A negative balance between new GPs and newly retired GPs is expected in many regions and in the entire nation by 2025, with a loss of more than 3,600 GPs (17). The Italian Public Accounts Observatory (“Osservatorio Italiano dei Conti Pubblici”) published a report in 2021, declaring that in 2019 every Italian GP had an average of 1,408 registered patients, slightly below the European average (1,430), which is however strongly conditioned by eastern European countries, with a much higher ratio (18).

The aim of this ecological study was to analyze the characteristics of primary care doctors currently working in Italy, considering regional differences and expected retirements over the next few years, to support future staffing needs estimates.

## Methods

We used all the data available on the website of the National Federation of Medical Doctors, Surgeons and Dentists (“Federazione Nazionale degli Ordini dei Medici, Chirurghi e Odontoiatri”, FNOMCeO) which contains an entry for every physician working in Italy. The dataset was updated on January 4, 2023. We also downloaded the list of GPs and PLSs working in Italy from each regional and national healthcare trust website and combined them. Every website is updated at different time periods, so we reported the data as available in each site (details in Supplementary Table 1).

The two datasets were then merged, trying to match as many fields as possible (including first name, last name, birthdate, and birthplace). We used the list of GPs and PLSs to integrate the FNOMCeO dataset with information on the job title (GP, PLS, other), the region and, when available, the province of work for every physician.

We unequivocally matched 40,933 (96.3%) primary care doctors, while for the remaining 1,594 physicians this was not possible, mainly due to homonyms and name transcription errors in the FNOMCeO dataset or in the list of primary care doctors.

From 40,933 primary care doctors, 172 entries were excluded due to lack of medical registration number, because they unsubscribed or their license was revoked, and nine entries were excluded as their medical license was temporarily suspended. The final analyses included a total of 40,752 medical doctors.

We examined differences between GPs and PLSs, described the age and gender distribution, overall and by Italian regions. We also evaluated the concordance between both province and region of work and province and region of birth, as well as the concordance between both province and region of work and province and region of Order registration, respectively. Moreover, we analyzed the number of resident population per GP and PLS (hereafter patients per GP and patients per PLS), a proxy indicator of the number of registered patients per GP and PLS, calculated as resident population in the region ( $\geq 14$  years and  $< 14$  years of age per GP and PLS respectively). Then we estimated the expected number of retirements, calculated as the number of physicians who are turning 68 during the year of analysis, for each year over the next 25 years among the entire nation and over the next five years for each region. In such analyses, in order to produce estimates based on the total number of primary care doctors, we also considered the number of GPs and PLSs that were not matched and applied the age distribution of their matched colleagues.

The Italian territory was divided in the following geographic areas: north, including the north-eastern and north-western regions, centre, and south, including the two major islands.

To evaluate between-group differences, we used ANOVA for the continuous variables and chi-squared test for the categorical ones. Student's t test for independent samples was used in the post-hoc analysis.

P-values  $< 0.05$  were considered statistically significant. The Holm-Bonferroni method was applied to counteract the problem of multiple comparisons that occurred in the post-hoc analysis.

Analyses were conducted using Python v. 3.10.9 and the following libraries: pandas v. 1.5.3, scipy

v. 1.10.1, statsmodels v. 0.13.5, matplotlib v. 3.7.1, seaborn v. 0.12.2. The library italy-geopop v. 0.6.2 was used to retrieve geographical and demographic data, as it includes data from 2022 from the National Institute of Statistics ("Istituto Nazionale di Statistica", ISTAT).

## Results

Among the 40,752 Italian primary care doctors, there were 34,348 (84.3%) GPs and 6,404 (15.7%) PLSs. On average PLSs were older than GPs (mean age 58.3 vs. 56.8 years,  $p < 0.001$ ). PLSs were more frequently women than GPs (71.1% vs. 43.9%,  $p < 0.001$ ) (Tab. 1).

The lists contained the job province information for 20,740 primary care doctors. Province of work and province of Order registration were concordant in 91.6% of cases (Cramer's  $V = 0.929$ ); the region of work, available for all primary care doctors, matched the region of Order registration in 97.4% of the cases (Cramer's  $V = 0.963$ ).

We analysed the distribution by age classes for GPs and PLSs (Fig. 1A and 1B respectively). For both groups the majority were aged 64-67 years, followed by 60-63 years. We assessed gender differences, calculated on a subset of primary care doctors not eligible for retirement (GP  $n = 29,994$ , PLS  $n = 5,868$ ), by age class and working region for both GPs and PLSs and they all resulted statistically significant ( $p < 0.001$ ) (Fig. 1C and 1E for GPs; 1D and 1F for PLSs). We found differences in the frequency distribution of female GPs between Italian geographic areas (north 50.1%, centre 49.5%, south 41.2%) with statistically significant differences between the north and the

Table 1. Characteristics of primary care physicians registered in Italy.

	GPs (n=34,348 or 84.3%)		PLSs (n=6,404 or 15.7%)		p-value
	N (%)	Min-Max	N (%)	Min-Max	
Age (years) Mean (SD)	56.8 (11.9)	24 - 83	58.3 (9.3)	27 - 79	$< 0.001$
Graduation age (n=34,342) (years) Mean (SD)	27.8 (3.6)	21 - 63	26.0 (2.0)	22 - 47	$< 0.001$
Sex (F)	15,063 (43.9%)		4,551 (71.1%)		$< 0.001$
Birth province same as registration	23,494 (68.4%)		4,039 (63.1%)		$< 0.001$
Birth region same as registration	26,993 (78.6%)		4,953 (77.3%)		$< 0.001$

GP: general practitioner ("medico di medicina generale"), PLS: primary care paediatrician ("pediatra di libera scelta"), N: number of, SD: standard deviation, F: female

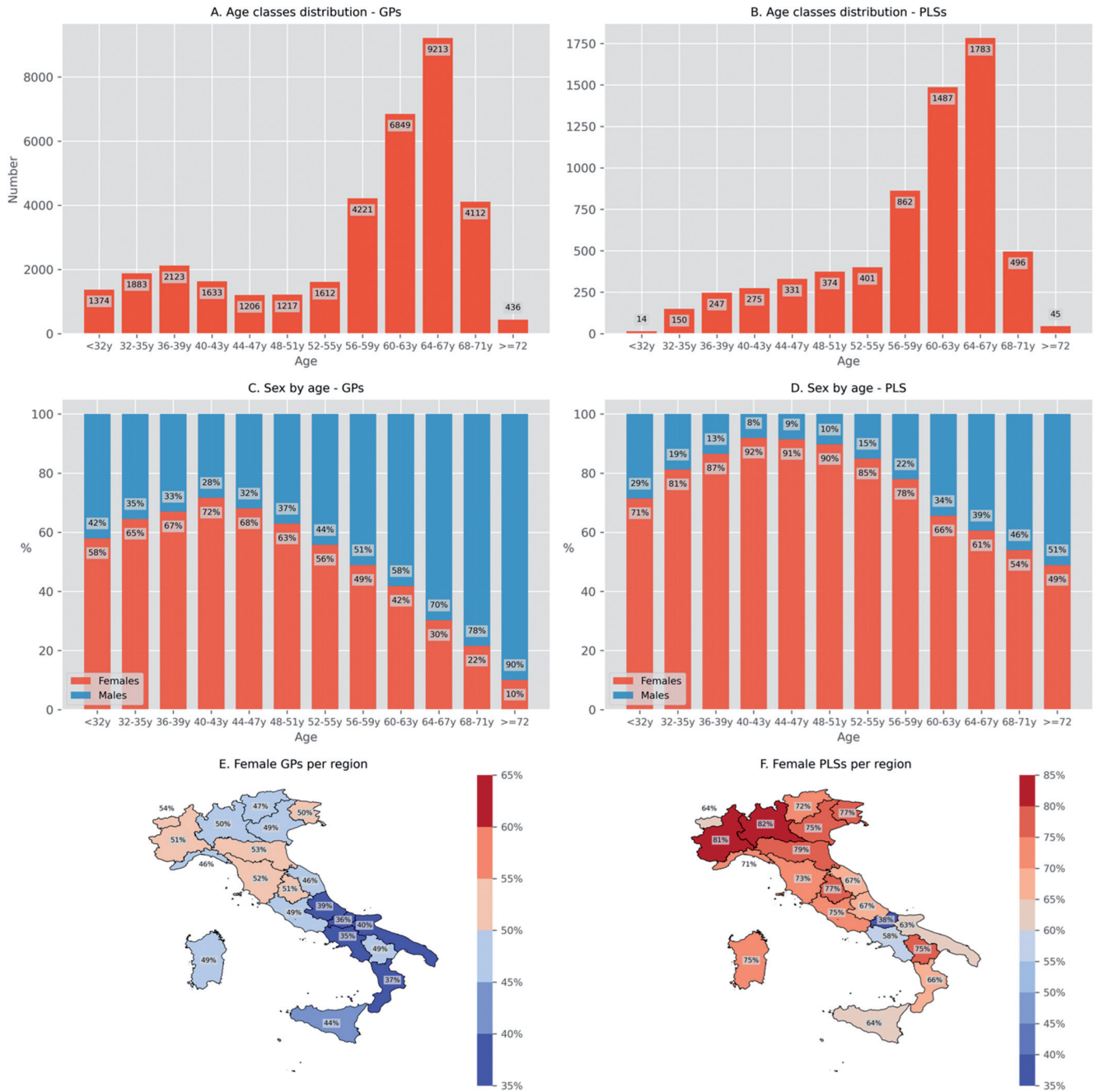


Figure 1. Age classes distribution, sex distribution by age class and sex distribution by region for GPs and PLSs  
 GP: general practitioner (“medico di medicina generale”), PLS: primary care paediatrician (“pediatra di libera scelta”)

south and between the centre and the south ( $p=0.001$ ,  $p=0.022$ , respectively).

On average the number of patients per GP was 1,447 (SD: 190) (Fig. 2A). The region with the highest number of patients per GP was Puglia (1,879), followed by Calabria (1,717). The number of patients per GP did not differ by geographic areas ( $p=0.111$ ). Puglia was also the region with the highest number of older patients per GP, both patients over-65 and

over-75 (Fig. 2B and 2C). We also estimated the expected number of over-65 and over-75 patients per GP using the Italian demographic age class distribution and 1,500 as the number of patients per GP. We then represented the percentage of variation between expected and observed values. The regions with the highest percentage of variation were Puglia, Basilicata and Calabria for the over-65 and Puglia, Liguria and Friuli-Venezia Giulia for the over-75. On average the

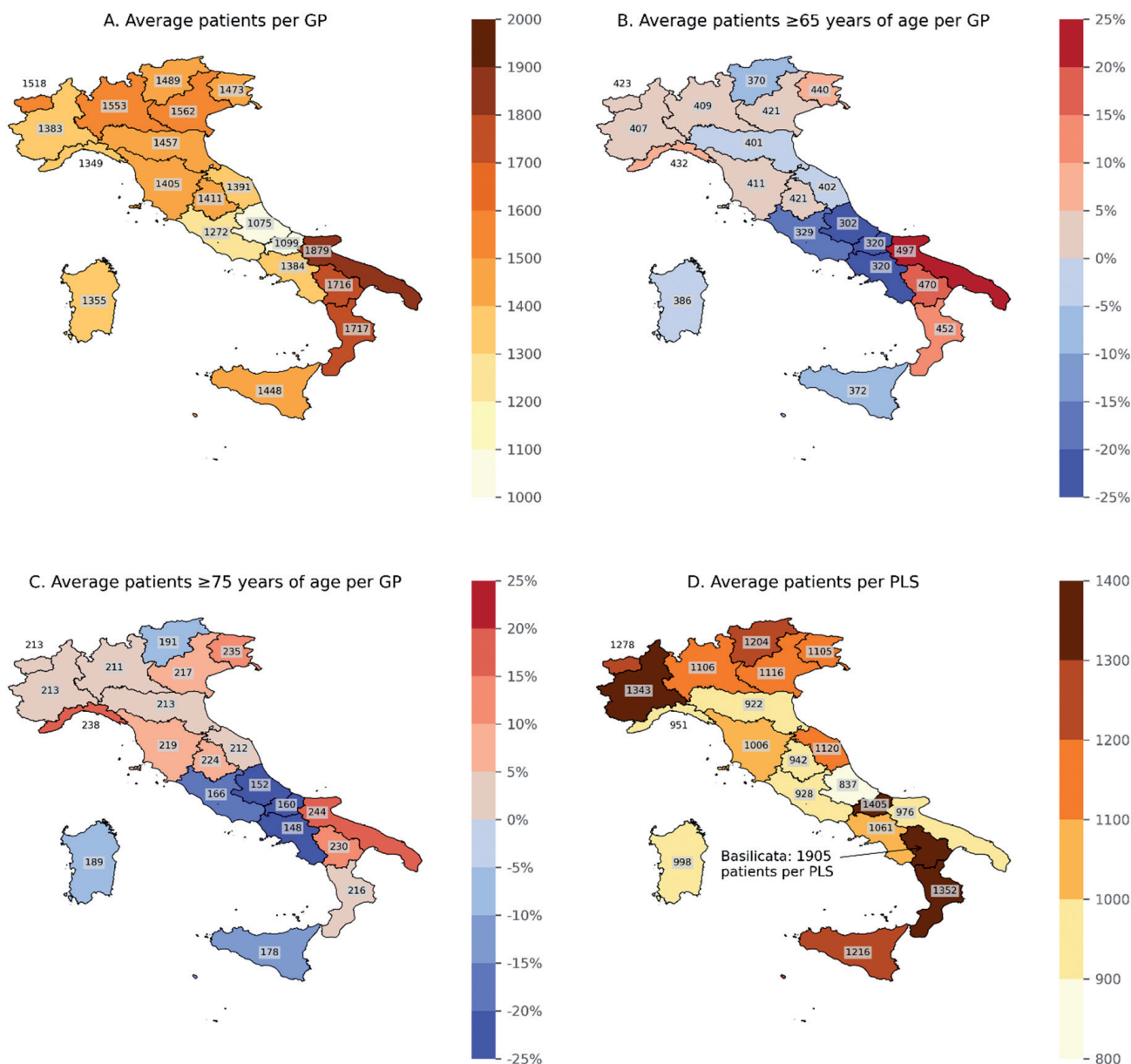


Figure 2. Average patients, average patients ≥65 years (with percentage variation from the expected value), average patients ≥75 years (with percentage variation from the expected value) per GP and average patients per PLS  
 GP: general practitioner (“medico di medicina generale”), PLS: primary care paediatrician (“pediatra di libera scelta”)

number of patients per PLS was 1,139 (SD: 241) (Fig. 3D). The region with the highest number of children per PLS was Basilicata (1,905), followed by Molise. The number of children per PLS did not differ between geographic areas ( $p=0.123$ ).

We estimated the expected retirements between 2023 and 2047, a 25-year span (Fig. 3A). In the next

five years, until 2027, there will be on average 2,228 retirements each year, with a peak of 2,540 in 2024; this will be followed by a decreasing trend during the subsequent years, and it will settle to 305 on average from 2038. We calculated the percentage of GPs that already turned 68 before 2023 and were therefore eligible for retirement (Fig. 3B). The regions with

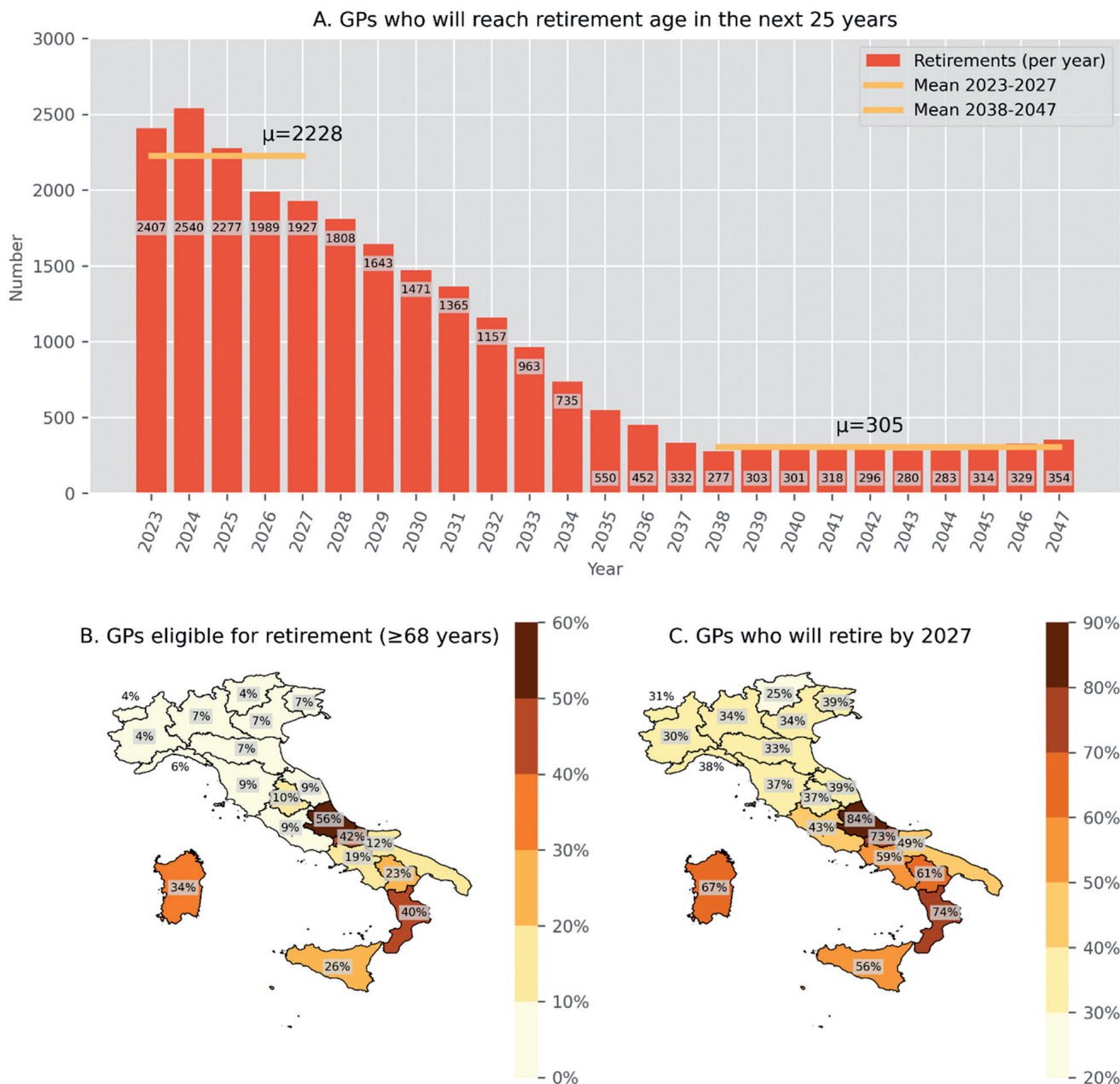


Figure 3. Retirements in the next 25 years for GPs, GPs already eligible for retirement and expected retirements by 2027 by region GP: general practitioner (“medico di medicina generale”),  $\mu$ : mean

the highest value were Abruzzo (56.0%) and Molise (41.8%). The regions with the lowest value were Valle d' Aosta (4.3%) and Piemonte together with Trentino-Alto Adige (4.4%). We found a statistically significant difference in the percentage of GPs that were eligible for retirement across Italian regions ( $p < 0.001$ ), with a north-south gradient (north 5.8%, centre 9.4%, south 31.6%).

The percentage of GPs that will turn or have already turned 68 by the end of 2027, five years from now, will span from 84.1% of Abruzzo to 25% of Trentino-Alto Adige (Fig. 3C).

The expected retirements for PLSs in the next five years will be 444 PLSs per year on average; this will be followed by a decreasing trend, and they will be 85 on average after 2038 (Fig. 4A). We calculated the percentage of PLSs who already turned 68 before 2023 (Fig. 4B). There was a statistically significant difference in the employment of PLSs eligible for retirement between Italian geographic areas (north 3.6%, centre 7.6%, south 20.4%,  $p = 0.002$ ), with north vs. south being significantly different ( $p = 0.002$ ). The percentage of PLSs that will turn or have already turned 68 by the end of 2027, five years from now, will span from 81.8% of Abruzzo to 26.4% of Trentino-Alto Adige (Fig. 4C).

We also calculated the number of GPs and PLSs who decided to extend their activity from 68 years of age to 70. In this analysis, we focused on the northern and central regions of Italy, for which the lists of primary care doctors were more updated (GP  $n = 17,998$ , PLS  $n = 3,281$ ). The number of doctors aged 68 and 69 were 682 (3.8%) and 397 (2.2%), respectively, for GPs, while for PLSs they were 88 (1.4%) and 46 (0.7%).

## Discussion

The study provides an overview of primary care doctors characteristics across Italian regions, accounting for the number and age distribution of the resident population. The findings highlighted that currently six regions, both in the northern and southern areas of the country, have an average number of patients per GP exceeding the threshold of 1,500. Overall, the average number of patients per PLS is 1,139, with only one region under the threshold of 880 patients per PLS. The study estimated that a large number of primary care doctors are expected to retire in the next five years (2,228 GPs and 444 PLSs every year on average), reaching more than

70% of retirements among the current workforce for some southern regions. The analysis also emphasized that the number of elderly patients, who typically have higher healthcare needs, varies substantially between regions, with two southern regions (Puglia and Basilicata) having >15% of patients aged over 65 years.

Insights into the geographic distribution of ageing populations, combined with data on the estimated large number of primary care doctors retiring over the coming years in some regions, can inform healthcare planners, aimed at reducing the pressure on already stretched services and allowing equitable access to quality care across the country.

The average number of residents per GP, which is in line with previous reports of 1,408 residents per GP for the year 2019, with a continuous increase compared to past years (18), highlights a heterogeneous picture across Italian regions. The region with the highest number of residents per GP is Puglia; while Abruzzo and Molise are the regions with the lowest number of residents per GP, they are the regions with the highest number of GPs eligible for retirement. The number of over-65 patients per GP varies substantially across regions due not only to the different number of primary care doctor workforce, but also due to a different demographic distribution. Our data show that the peak of retirements for GPs will occur during the year 2024, followed by a decrease in the number of retirements. This phenomenon will particularly concern southern regions, where the percentage of workforce retirement often exceeds 50%, and up to 84% in Abruzzo. Critical situations have been highlighted due to GPs' retirements and the impossibility of finding replacements or successors. Costa et al. described the activation of a territorial facility of primary care assistance where the local ASL couldn't find new GPs to replace those who retired. Thanks to nursing and administrative support it was possible to deliver care for more than 6,200 patients with a relatively small number of doctors (19). For PLSs, the largest age class is 64-67 years and, together with 60-63 years, it represents more than 50% of the Italian PLSs current workforce. Therefore, a big wave of retirements is expected also for PLSs in the next few years. In this case, a temporarily solution could be to facilitate the transition of patients to GPs.

The national governments tried to address the problem of retirements introducing the possibility for doctors to work for the SSN up to age 72 (8). The current study cannot fully evaluate the effectiveness of this measure but, considering that currently the

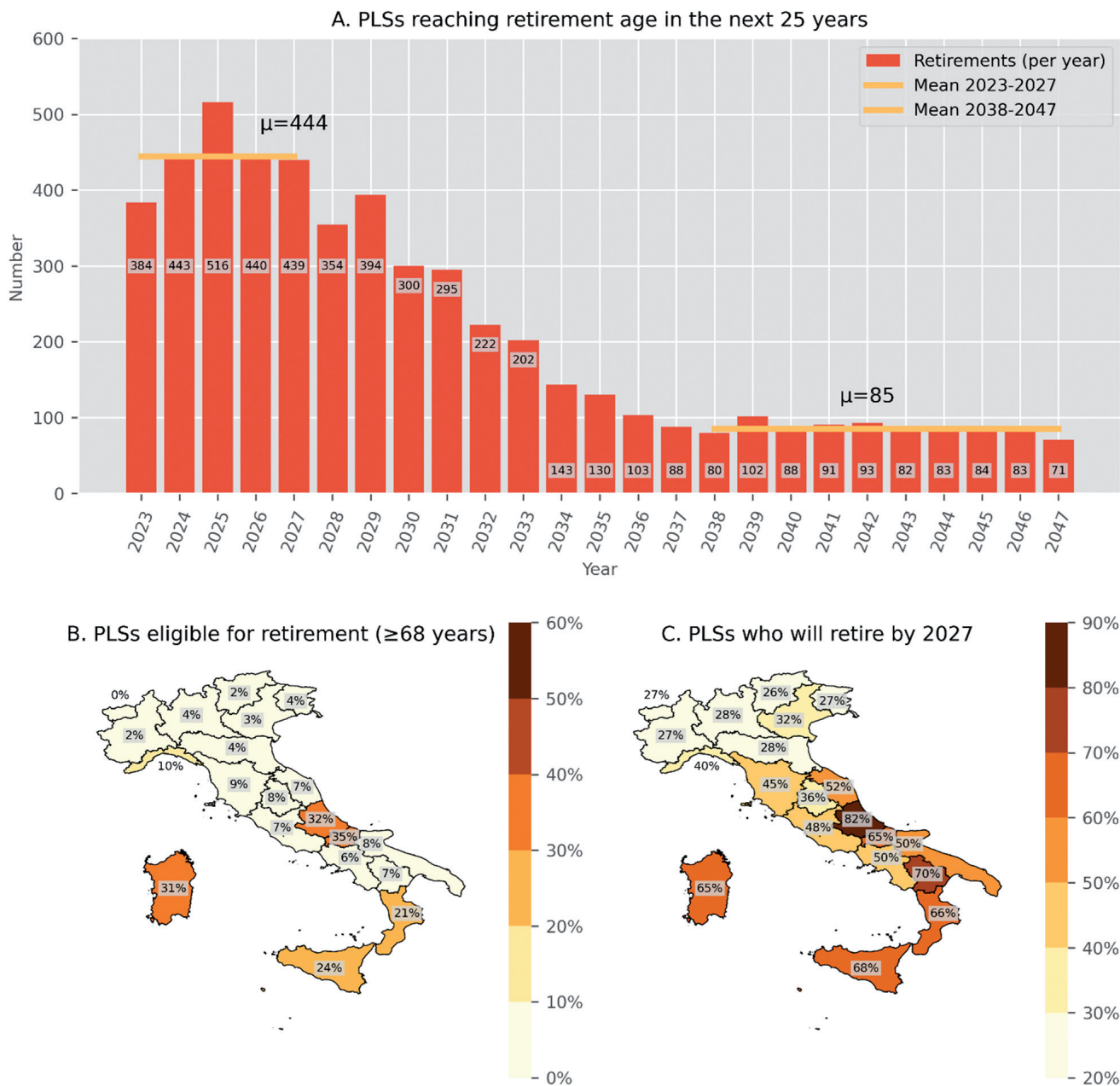


Figure 4. Retirements in the next 25 years for PLSs, PLSs already eligible for retirement and expected retirements by 2027 by region PLS: primary care paediatrician (“pediatra di libera scelta”),  $\mu$ : mean



percentage of doctors choosing to continue working after age 68 is only 6% for GPs and 2% for PLSs, we believe this measure can only have marginal benefits. Our data is not comparable with the AGENAS report about primary care doctors, due to the different time frame of analysis and the different method adopted by AGENAS for the calculation of the expected retirements, i.e. 70 years of age. However, the expected deficit of approximately 3,600 general practitioners that they calculated appears an under-estimation, as our data show that most doctors choose not to extend their activity. Moreover they calculated the number of new GP entries as the number of scholarships available for GP training courses, assuming all available scholarships will be assigned, and no dropouts during the three-year course, which are unlikely (17).

In addition to the retirement wave, primary care medicine will have to face the problem of ageing populations and multi-morbidity. As reported in the National Plan of Chronic Diseases (Piano Nazionale delle Cronicità), a substantial increase in the proportion of people aged over-65 years is expected, from the current value of 23.8% to 27.6% (corresponding to approximately 17.6 million people) in 2032 (13). In the region Emilia-Romagna, in the year 2016, the prevalence of multi-morbidity was 61.0% in the over-65-year-old age class and 72.5% in the over-80. Multi-morbidity was responsible for increased use of healthcare resources, accounting for approximately 89.0% of home care assistance (assistenza domiciliare integrata) (20). Thus, even assuming equal numbers of patients, a greater share of older populations entails a greater workload for GPs, with substantial differences between regions. A GP working in Puglia has on average 497 over-65-year-old patients, a 23.1% excess compared to the expected numbers, and 195 more than colleagues working in Abruzzo, the region with the lowest value (302 per GP, -25.1% than the expected). This, combined with the expected retirements, suggests a critical situation with serious repercussions on primary care in southern Italy.

The great concordance found between province and region of work and province and region of Order registration respectively suggests that the latter are a good proxy indicator of the place where doctors carry out the professional activity.

Our study has some limits. The lists of GPs and PLSs were not consistently updated, which might have influenced some of the findings. The number of residents per doctor is assumed to be a valid proxy for the number of patients registered with a primary care doctor, but the aggregated average value does

not provide information about the between-doctor variability, considering that doctors can also limit the number of registered patients. Furthermore, accuracy of some data sources could not be verified and could be influenced by lists being out of date or affected by errors (e.g. 1,905 children per PLS in Basilicata). More studies would be needed to gain insights into the willingness of doctors to extend their working activity up to 70 or 72 years. Moreover, the quality of primary care medicine does not depend solely on the number of primary care doctors, but also on other aspects that must be assessed through other indicators.

Healthcare planning after estimating the required personnel has been less than optimal in the last years. Now the time has come to find solutions for dealing with the ongoing and expected personnel shortage and the increasing complexities in primary care needs. Surely investing in the administrative and nursing support can help primary care doctors providing care to more patients. Creating groups of doctors (medicina di gruppo), supported by healthcare administrations, is recommended. The National Recovery and Resilience Plan funded by the European Union also encourages this with the development of Community Health Centres (Case Della Comunità), which include administrative and nursing support for primary care doctors, potentially increasing the number of patients per GP.

Considering that six years of university plus three to five years of specialization are necessary to train primary care doctors, planning should take demographic trends of the population at a national and regional level into account. Moreover, it's important to identify factors that may prevent new graduates from choosing primary care medicine and strengthen the appeal of the profession among medical graduates.

The number of patients over-65 and over-75 per GP could be used, together with the overall number of patients, to better estimate the workload of GPs and establish new limits for the maximum number of registered patients, in order to guarantee a high-quality assistance.

## Conclusions

The study provided an overview of primary care doctors characteristics across Italian regions, highlighting that some regions do not currently have the workforce needed to provide primary healthcare to all citizens, while respecting the limit of 1,500 patients per GP. The expected number of retirements

and the ageing population will exacerbate the situation of already over-stretched healthcare services. A response from regional healthcare administrations and policymakers is urgently required to allow equitable access to quality primary care across the country.

## Riassunto

### *Pensionamenti dei medici di assistenza primaria e invecchiamento della popolazione in Italia*

**Introduzione.** La carenza di medici nelle cure primarie (medici di medicina generale e pediatri di libera scelta) e l'aumento della domanda di prestazioni sanitarie dovuta all'invecchiamento della popolazione pone una grande sfida per manager e coordinatori dell'assistenza primaria. Per supportare la pianificazione dell'allocatione di risorse nelle cure primarie abbiamo analizzato la distribuzione geografica regionale dei medici delle cure primarie, considerando il numero di residenti e la loro età. Inoltre abbiamo stimato il numero di pensionamenti attesi nei prossimi 25 anni, con un focus particolare sui prossimi cinque anni.

**Disegno dello studio.** Studio ecologico.

**Metodi.** Abbiamo recuperato la lista dei medici di medicina generale e pediatri di libera scelta attivi in Italia e l'abbiamo combinata con i dati della Federazione Nazionale degli Ordini dei Medici Chirurghi e Odontoiatri. Usando i dati dell'Istituto Nazionale di Statistica abbiamo calcolato il numero medio di pazienti per medico per ciascuna regione, utilizzando il numero di residenti di età maggiore e minore di 14 anni per i medici di medicina generale e per i pediatri rispettivamente. Abbiamo inoltre calcolato il numero di residenti con più di 65 e 75 anni per medico di medicina generale dal momento che i pazienti più anziani tipicamente hanno necessità assistenziali maggiori.

**Risultati.** Mediamente il numero di pazienti per medico di medicina generale era 1447 (DS: 190) mentre per i pediatri di libera scelta era 1139 (DS: 241), con sei regioni oltre il limite di 1500 pazienti per medico e solo una regione al di sotto del limite di 880 pazienti per pediatra. Abbiamo stimato che in media 2228 medici di medicina generale e 444 pediatri di libera scelta raggiungeranno l'età pensionabile ogni anno nei prossimi cinque anni, superando il 70% della forza lavoro corrente per alcune regioni del Sud Italia. Il numero medio di pazienti anziani per medico di medicina generale varia considerevolmente tra le regioni, con due regioni che hanno >15% in più di pazienti di età maggiore di 65 anni per medico rispetto al valore atteso.

**Conclusioni.** Lo studio ha evidenziato come alcune regioni non abbiano la forza lavoro necessaria per erogare l'assistenza primaria e come l'invecchiamento della popolazione accentuerà la già elevata pressione sui servizi sanitari. È urgentemente richiesta una risposta da parte degli amministratori e dei policy maker che permetta di introdurre strategie volte a mantenere l'accesso a cure primarie di qualità in tutto in territorio nazionale.

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**Supplementary Table 1.** Date of update of the lists of GPs and PLSs provided by regions or national health trusts.

Region	Frequency of update, distribution method, date of the list used in the study (day/month/year)	
	GPs	PLSs
Piemonte	Continuous update, website, 23/05/2023	
Valle d'Aosta	Continuous update, website, 23/05/2023	
Lombardia	Continuous update, website, 23/05/2023	
Trentino-Alto Adige	Continuous update, website, 23/05/2023	
Veneto	Continuous update, website, 23/05/2023	
Friuli-Venezia Giulia	Continuous update, website, 23/05/2023	
Liguria	Continuous update, website, 23/05/2023	
Emilia-Romagna	Continuous update, website, 23/05/2023	
Toscana	Continuous update, website, 23/05/2023	
Umbria		
ASL Umbria 1	Continuous update, website, 23/05/2023	Continuous update, website, 23/05/2023
ASL Umbria 2	Periodic update, Excel tables	Periodic update, Excel tables
District of Terni	13/04/2023 <sup>1</sup>	26/01/2023 <sup>1</sup>
District of Foligno	23/05/2023 <sup>1</sup>	14/03/2023 <sup>1</sup>
District of Spoleto	06/04/2023 <sup>1</sup>	24/02/2021 <sup>1</sup>
District of Narni e Amelia	02/05/2023 <sup>1</sup>	04/01/2023 <sup>1</sup>
District of Orvieto	07/02/2023 <sup>1</sup>	17/01/2022 <sup>1</sup>
District of Valnerina	03/04/2023 <sup>1</sup>	03/02/2023 <sup>1</sup>
Marche	Continuous update, website, 23/05/2023	
Lazio	Continuous update, website, 23/05/2023	
Abruzzo	Continuous update, website, 23/05/2023	
Molise		
District of Campobasso	Periodic update, website, 11/2018 <sup>1</sup>	
District of Isernia	Periodic update, pdf table, 10/2018 <sup>1</sup>	
District of Termoli-Larino	Unknown (list requested to the Public Relations Office), pdf table, unknown <sup>2</sup>	
Campania	Periodic update, website, 20/12/2022	Periodic update, website, 20/12/2022
Puglia	Continuous update, website, 23/05/2023	
Basilicata		
Lagonegrese and Senesese	Continuous update, Word table	Continuous update, Word table (12/12/2022) <sup>1</sup>
Val D'Agri	15/12/2022 <sup>1</sup>	
Potenza and Potentino	24/11/2022 <sup>1</sup>	
Vulture, Melfese and Alto Bradano	16/01/2023 <sup>1</sup> 13/09/2022 <sup>1</sup>	
Calabria		
ASP Cosenza	Periodic update, website, 23/05/2023	Periodic update, website, 23/05/2023
ASP Catanzaro	Periodic update, website, 26/04/2023	Periodic update, website, 26/04/2023
ASP Crotona	Periodic update, pdf table, unknown <sup>2</sup>	Periodic update, pdf table, unknown <sup>2</sup>
ASP Reggio Calabria	Periodic update, pdf table, unknown <sup>2</sup>	Periodic update, pdf table, unknown <sup>2</sup>
ASP Vibo Valentia	Periodic update, website, 19/05/2020	Periodic update, website, unknown <sup>2</sup>

Region	Frequency of update, distribution method, date of the list used in the study (day/month/year)	
	GPs	PLSs
Sicilia		
ASP Agrigento	Periodic update, pdf tables	Periodic update, pdf tables
District of Agrigento	09/05/2023	22/09/2021
District of Bivona	29/05/2023	30/11/2022
District of Canicatti	03/01/2023	03/01/2023
District of Casteltermini	06/09/2021	27/03/2017
District of Licata	07/07/2022	27/03/2017
District of Ribera	20/02/2023	27/03/2017
District of Sciacca	14/02/2023	27/03/2017
ASP Caltanissetta	Periodic update, website, 22/09/2021	Periodic update, website, 01/10/2019
ASP Catania	Periodic update, pdf table, 13/04/2023	Periodic update, pdf table, 13/04/2023
ASP Enna	Periodic update, Excel table, unknown <sup>2</sup>	Periodic update, Excel table, unknown <sup>2</sup>
ASP Messina	Periodic update, website, unknown <sup>2</sup>	Periodic update, website, unknown <sup>2</sup>
ASP Palermo	Periodic update, pdf table, 12/05/2021	Periodic update, pdf table, 12/05/2021
ASP Ragusa	Periodic update, website, unknown <sup>2</sup>	Periodic update, website, unknown <sup>2</sup>
ASP Siracusa	Periodic update, pdf table, 01/12/2018	Periodic update, pdf table, 01/12/2018
ASP Trapani	Periodic update, pdf table, unknown <sup>2</sup>	Periodic update, pdf table, unknown <sup>2</sup>
Sardegna		
ASL Sassari	Continuous update, website, 23/05/2023	
ASL Olbia	Continuous update, website, 23/05/2023	
ASL Nuoro	Continuous update, website, 23/05/2023	
ASL Lanusei	Continuous update, website, 23/05/2023	
ASL Oristano	Continuous update, website, 23/05/2023	
ASL Sanluri	Continuous update, website, 23/05/2023	
ASL Carbonia	Continuous update, website, 23/05/2023	
ASL Cagliari	Continuous update, website, 23/05/2023	

ASP: national health trust (Azienda Sanitaria Provinciale), ASL: national health trust (Azienda Sanitaria Locale), GP: general practitioner, PLS: primary care paediatrician (pediatra di libera scelta), 1: date of update deducted by the file name, 2: date of update not reported and not deductible.

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