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Healthcare Access in Azuay: Analyzing the Offer of Primary Care Physicians in 2018

Acceso a la Atención Médica en Azuay: Análisis de la Oferta de Médicos de Atención Primaria en 2018

Acesso à Saúde em Azuay: Análise da Oferta de Médicos de Atenção Primária em 2018

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■ **Abstract.** Despite a recent increase in the number of physicians, population health indicators associated with Primary Health Care (PHC) objectives in Azuay remain stagnant. The availability and equitable distribution of primary care doctors are critical, as they serve as the first point of contact within the healthcare system and are responsible for addressing the majority of health concerns. This study evaluates the supply and spatial distribution of primary care physicians in Azuay during 2018, compares findings to international standards, and identifies urban-rural disparities. A quantitative, descriptive, cross-sectional analysis was conducted using data from the National Institute of Statistics and Censuses (INEC) through the publicly available dataset Recursos y Actividades de Salud 2018. Results indicate that 56% of the province's primary care physicians were concentrated in Cuenca canton. Cuenca and Girón were the only cantons to meet the World Health Organization's recommended physician-to-population ratio of 23 per 10,000 inhabitants. However, when focusing exclusively on first-level care physicians, no canton met the standard. This reveals both a quantitative shortage and an inequitable distribution of physicians, particularly disadvantaging rural areas. In conclusion, Azuay province experiences a significant shortfall in primary care physicians, coupled with marked disparities in urban versus rural coverage. Targeted strategies are needed to redistribute human health resources and ensure progress toward PHC goals.

Keywords: Primary Health Care, Cross-Sectional Studies, Physicians, Primary Care, Ecuador.

■ **Resumen.** A pesar del reciente aumento en el número de médicos, los indicadores de salud poblacional relacionados con los objetivos de la Atención Primaria de Salud (APS) en Azuay siguen estancados. La disponibilidad y distribución equitativa de médicos de atención primaria es crucial, ya que estos profesionales son responsables de implementar acciones esenciales de APS. Este estudio tuvo como objetivo evaluar la oferta y distribución de médicos de atención primaria en la provincia de Azuay en 2018, comparándolos con estándares internacionales e identificando disparidades en el acceso urbano y rural. Se realizó un estudio cuantitativo, descriptivo y transversal utilizando una base de datos pública del Instituto Nacional de Estadística y Censos (INEC) de Ecuador, titulada "Recursos y Actividades de Salud 2018 - Estadísticas de Salud". Los hallazgos mostraron que el 56 % de los médicos de atención primaria de Azuay estaban concentrados en el cantón Cuenca. Cuenca, junto con Girón, cumplió con el estándar recomendado por la Organización Mundial de la Salud de 23 médicos por cada 10,000 habitantes, lo que demuestra un mayor acceso a los servicios médicos en estas áreas. Sin embargo, se evidenció un déficit general de médicos de atención primaria en Azuay, con brechas significativas que afectan especialmente a las zonas rurales y otros cantones de la provincia. Esta escasez sugiere limitaciones en el cumplimiento de los objetivos de la APS y destaca una distribución inadecuada del personal sanitario entre zonas urbanas y rurales. En conclusión, la provincia de Azuay enfrenta una escasez de médicos de atención primaria, agravada por importantes disparidades en la distribución urbano-rural. Abordar estos

desequilibrios es esencial para alcanzar los objetivos de APS y mejorar los resultados de salud en la población.

Palabras clave: Atención Primaria de Salud, Estudios Transversales, Médicos, Atención Primaria, Ecuador.

Resumo. Apesar do recente aumento no número de médicos, os indicadores de saúde populacional relacionados aos objetivos da Atenção Primária à Saúde (APS) em Azuay permanecem estagnados. A disponibilidade e distribuição equitativa de médicos de atenção primária são cruciais, pois esses profissionais são responsáveis por implementar ações essenciais da APS. Este estudo teve como objetivo avaliar a oferta e distribuição de médicos de atenção primária na província de Azuay em 2018, comparando-os com padrões internacionais e identificando disparidades no acesso urbano e rural. Foi realizado um estudo quantitativo, descritivo e transversal utilizando uma base de dados pública do Instituto Nacional de Estatística e Censos (INEC) do Equador, intitulada "Recursos y Actividades de Salud 2018 - Estadísticas de Salud". Os resultados mostraram que 56% dos médicos de atenção primária de Azuay estavam concentrados no cantão Cuenca. Cuenca, juntamente com Girón, atendeu ao padrão recomendado pela Organização Mundial da Saúde de 23 médicos por 10.000 habitantes, demonstrando maior acesso aos serviços médicos nessas áreas. No entanto, ficou evidente um déficit geral de médicos de atenção primária em Azuay, com lacunas significativas que afetam especialmente as áreas rurais e outros cantões da província. Essa escassez sugere limitações no cumprimento dos objetivos da APS e destaca uma distribuição inadequada dos profissionais de saúde entre as zonas urbanas e rurais. Em conclusão, a província de Azuay enfrenta uma escassez de médicos de atenção primária, agravada por significativas disparidades na distribuição urbano-rural. Abordar esses desequilíbrios é essencial para alcançar os objetivos da APS e melhorar os resultados de saúde da população.

Palavras-chave: Atenção Primária à Saúde, Estudos Transversais, Médicos, Atenção Primária, Equador.

INTRODUCTION

The health system fundamentally depends on human resources to maintain and improve the health of the population, for this, it is essential to have a well-organized and adequately distributed workforce. In particular, the availability and distribution of primary care physicians is vital, since they represent the first point of contact for patients within the health system and manage 80% of health-related problems. (1–3)

In response to this, the World Health Organization (WHO) highlights the need for a sufficient density of health professionals to achieve universal health coverage and meet the Sustainable Development Goals (SDG) by 2030 (4,5). However, despite the growing increase in the number of physicians globally and nationally, many countries, including Ecuador, still face concerns and challenges to achieve equitable health coverage, especially in a population that is increasingly aging (6,7)

Several countries track the availability of primary care physicians, which allows them to understand their healthcare workforce (6,8,9). In Ecuador, healthcare workforce data, particularly those related to primary care physicians, lack specificity to differentiate between levels and sectors of healthcare within the public-private system, leading to a lack of knowledge in the distribution of health personnel. Some research based on the number of specialist physicians and general physicians who complete the mandatory year of rural medical service reveals significant imbalances, with a concentration of physicians in urban areas and a shortage in rural regions, leaving the first level of care understaffed (10,11). This disparity limits the effectiveness of health services and undermines progress toward health equity. In addition, Ecuador's mixed public-private health system complicates the assessment of human resources, as not all physicians work toward Primary Health Care (PHC) goals (12,13).

As has been seen, primary health care has been implemented in countless countries, however, the fulfillment and execution of this has been heterogeneous even though its implementation is of vital importance for the population. For example, it has been seen that in Chile a 56% compliance with the objectives of the APS at a national level is reported as a consequence of an increase in the economic budget for this sector, however, despite this, it is seen that there is a poor performance in smaller municipalities with a rural population and a high level of poverty, this leads us to think that the distribution of economic and human resources is not equitable (14). A similar situation is seen in Peru, where the primary care level has a significant

shortage of personnel, also caused by the increase in poverty, since as the percentage of poor population increased, the density of doctors in the departments decreased, and even some primary care centers do not have a doctor to provide care (8).

Other studies have found that in countries like Mexico, the number of doctors per 1,000 inhabitants exceeds the WHO-recommended thresholds, possibly due to policies implemented to increase the supply of doctors. However, a shortage of medical personnel persists in rural areas, suggesting that one of the solutions to this distributive inequality is to provide working conditions that make work in rural areas attractive (15,16). Even the USA, one of the most important economies and where the rates of doctors would be thought to be adequate, suffers from a total lack of doctors in primary care. In 2024, only 24.4% of physicians belong to the primary care specialties of Family Medicine, General Internal Medicine, and Pediatrics, while 50% is considered the ideal proportion (17).

The concern for the correct implementation of primary care based on the equitable distribution of personnel with an emphasis on rural areas is very important. One example of this is a research that highlights that the increase of 10 primary care physicians per 10,000 inhabitants causes a significant increase of 51.5 days in life expectancy, in contrast to the increase of 10 specialist physicians per 10,000 inhabitants that only reported an increase of 19.2 days in life expectancy (18).

Given these challenges, this research aims to describe and analyze the availability and distribution of primary care physicians in Azuay, a province in southern Ecuador. Using data from the National Institute of Statistics and Census (INEC) and focusing on the year 2018, this study assesses whether the current medical workforce meets international population coverage recommendations, set at 23 physicians per 10,000 inhabitants, the rate necessary to ensure compliance with health coverage for 80% of the population and thereby achieve the three health-related Millennium Development Goals (MDGs): reducing infant mortality, improving maternal health, and combating HIV/AIDS and other diseases, such as tuberculosis and malaria (19).

To support this analysis, the research introduces a specific differentiated rate for primary care physicians, which offers a clearer understanding of the province's healthcare workforce. Since 21.03% (7) of doctors in Ecuador are integrated into the private sector, their contribution to achieving the MDGs is undetermined (a key criterion for calculating the rate proposed by the WHO). In contrast, the role of primary care physicians in the public sector is clearly defined, as their work aligns with the priorities of Primary Health Care, which forms the foundation of the healthcare system model in Ecuador. Therefore, it is necessary to calculate a differentiated rate to better characterize the actual availability of doctors.

The data from 2018 was chosen because the population projection was not affected by the COVID-19 pandemic. The pandemic disrupted the upward trend in life expectancy at birth (20). With the completion of the VIII Population Census and VII Housing Census in 2022, The INEC conducted the 2024 Revision of population estimates and projections, incorporating all available demographic data sources up to that year, including the impact of the pandemic. However, the public database Recursos y Actividades de Salud - Estadísticas de Salud is only available up to 2020." (21, 22)

MATERIALS AND METHODS

Study Design

This study adopted a quantitative, descriptive, cross-sectional design to analyze the availability and geographic distribution of first-level healthcare physicians in Azuay Province, Ecuador, during the year 2018. Secondary data was drawn from the public database Recursos y Actividades de Salud 2018 - Estadísticas de Salud, published by the National Institute of Statistics and Censuses (INEC) on March 31, 2020. In addition, the database "Proyecciones Referenciales de Población a Nivel

Cantonal - Parroquial 2018", published by the National Secretariat for Planning and Development (SENPLADES), was used. (21,23)

Study Area

The study population consisted of all public sector physicians providing services at the first level of care within Azuay Province. Data were disaggregated by territorial levels, including canton and parish, to assess spatial distribution. However, for the purposes of this research, the focus was placed on the public sector, specifically the first level of healthcare, which addresses primary care and is responsible for resolving 80% of the population's health problems.

Study Population

The study population comprised public sector physicians working at the first level of healthcare within Azuay. Data were extracted regarding the total number of physicians and their distribution across different territorial levels within the province, including cantons and parishes.

Data Source and Variables

The primary data source was the INEC database, which is publicly accessible. The variables analyzed in this study included:

- Absolute supply of physicians: Total number of physicians available in a given territory.
- Distribution of physicians: Distribution of Physicians by Territorial Level in Urban and Rural Areas.
- Relative supply of physicians: The number of physicians available in a given territory per 10,000 inhabitants, calculated for both total physicians and first-level care physicians.
- Physician availability and need: The Ratio of Available Physicians to Required Physicians.
- Categorization of the supply of doctors: Differentiation of the supply of doctors according to the calculated availability ratio, in oversupply and undersupply.

Inclusion and Exclusion criteria

There were no specific inclusion or exclusion criteria applied, as the study used comprehensive population data from the INEC database, which covered all physicians employed in the public sector at the first level of healthcare in Azuay during 2018.

Data Collection and Analysis

Data was collected from the INEC database and processed using Python, SPSS software and the geographic information system software Quantum GIS. The analysis involved calculating proportions, rates, and ratios to assess the distribution and adequacy of physician availability across different cantons and parishes within Azuay. The key metrics included:

- **Absolute supply of physicians:** Total number of physicians available in a given territory.
- Distribution of physicians: Percentage of physicians by territorial level.
- **Relative supply of physicians:** The rate of physicians per 10,000 inhabitants for each territorial level.
- **Differentiated physician rate:** A specific rate was calculated for first-level care physicians, referred to as the "differentiated rate," which allowed for a more targeted analysis of physician distribution at the primary care level.
- **Healthcare deficit:** The deficit was calculated by comparing the actual number of physicians with the recommended number based on WHO guidelines. The ratio of available physicians to the required physicians (referred to as the availability ratio) was calculated for each territorial level.

The relative supply was obtained by calculating the physician-to-population ratio per 10,000 inhabitants for each territorial level. First, the gross physician rate (considering all physicians) was calculated, followed by the rate of first-level care physicians (referred to as the differentiated rate) to establish differences between the number of physicians in each rate and to obtain the ratio between both figures (referred to as the availability ratio):

Calculation of the differentiated rate (T_1) of first-level care physicians in the public sector:

$$T1 = \frac{M_d}{P} x\ 10000 \quad (1)$$

where:

Md = available number of first-level care physicians in the public sector

P = population of the corresponding territorial level

Calculation of the necessary number of first-level care physicians (M_n) in the public sector to meet the recommended physician rate:

$$M_n = \frac{TxP}{10000} (2)$$

where:

T = recommended rate (23)

P = population of the corresponding territorial level

Calculation of the availability ratio (R) between available and necessary physicians:

$$R = \frac{M_d}{M_n} (3)$$

Territories were categorized into three groups based on the availability ratio:

- **Oversupply (R > 1):** Territories with a surplus of physicians.
- **Adequate supply (R = 1):** Territories with an adequate number of physicians.
- **Undersupply (R < 1):** Territories with a deficit of physicians.

Ethical Considerations

The data used in this study were obtained from public sources, and no personal or sensitive information was utilized. Therefore, the study did not involve any direct ethical concerns or conflicts of interest.

RESULTS

Total Number and Distribution of Physicians in Azuay Province

In 2018, a total of 1,854.7 physicians were reported in the province of Azuay. The majority (78.93%) of these physicians were concentrated in the Cuenca canton, while the remaining 21.07% were distributed among the other cantons of the province (Table 1). The cantons of Camilo Ponce Enríquez, Gualaceo, and Sigsig accounted for 2.26%, 3.77%, and 3.50% of the total physician population, respectively, whereas El Pan, Guachapala, and Oña had the lowest physician counts, each contributing less than 1% of the total.

TABLE 1. TOTAL NUMBER OF PHYSICIANS IN THE PROVINCE OF AZUAY AND ITS CANTONS, 2018.

Territorial level		
Provinces	**N°**	**%**
Azuay	1854,7	100
Cantons	**N°**	**%**
Camilo Ponce Enríquez	42	2,26
Chordeleg	13	0,70
Cuenca	1463,95	78,93
El Pan	5	0,27
Girón	36	1,94
Guachapala	4	0,22
Gualaceo	70	3,77
Nabón	36	1,94
Oña	7	0,38
Paute	39,75	2,14
Pucará	16	0,86
San Fernando	6	0,32
Santa Isabel	42	2,26
Sevilla de Oro	9	0,49
Sigsig	65	3,50

Source: database "Recursos y Actividades de Salud 2018 - Estadísticas de Salud"

Distribution of First-Level Care Physicians

A total of 554.7 physicians were identified as working in the first level of care. Similar to the overall distribution, a significant majority (56.01%) of these physicians were concentrated in Cuenca.

TABLE 2. TOTAL NUMBER OF PRIMARY CARE PHYSICIANS IN THE PROVINCE OF AZUAY AND ITS CANTONS, 2018.

Territorial level		
Provinces	**Total number of first level physicians**	**%**
Azuay	554,7	100
Cantons	**N°**	**%**
Camilo Ponce Enríquez	27	4,87
Chordeleg	13	2,34
Cuenca	310,7	56,01
El Pan	5	0,90
Girón	12	2,16
Guachapala	4	0,72
Gualaceo	38	6,85
Nabón	30	5,41
Oña	7	1,26
Paute	26	4,69
Pucará	16	2,88
San Fernando	6	1,08
Santa Isabel	17	3,06
Sevilla de Oro	4	0,72
Sigsig	39	7,03

Source: database "Recursos y Actividades de Salud 2018 - Estadísticas de Salud"

The cantons of Gualaceo (6.85%) and Nabón (5.41%) followed in terms of physician representation, whereas El Pan, Guachapala, and Oña had the fewest physicians providing primary care services (Table 2).

Public vs. Private Sector Distribution

In the province of Azuay, 78.97% of all physicians worked in the public sector, while the private sector accounted for the remaining 21.03%.

In the public sector, 23.62% of doctors are first-level, whereas in the private sector, this figure drops to 2.15% (Figure 1).

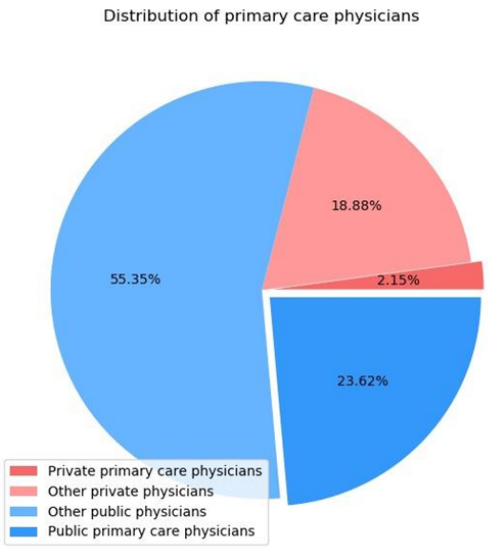

Figure 1. Distribution of doctors in the province of Azuay, according to the private and public sectors, 2018.

Urban vs. Rural Distribution

The data revealed a significant disparity between urban and rural areas in terms of physician distribution. While urban areas had a higher concentration of physicians, rural areas were underserved. This was particularly evident in the distribution of first-level care. Although the number of first-level physicians is similar in both rural and urban areas (290 in urban areas and 264 in rural areas), in rural parishes, they make up almost 100% of the medical workforce, whereas in urban parishes, they account for only one-fifth of all physicians. As a result, rural areas face a relative shortage of doctors (Figure 2).

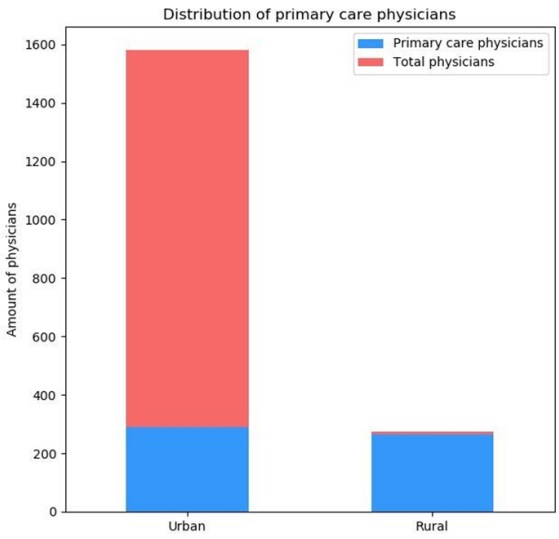

Figure 2. Distribution of doctors in the province of Azuay, according to parishes, 2018.

Physician Availability relative to Population

In Cuenca, the gross physician rate was 23.8 per 10,000 inhabitants, but the differentiated rate dropped to 5.1 per 10,000 inhabitants. Similarly, in Girón, the gross rate was 27.5 per 10,000 inhabitants, while the differentiated rate was 9.2 per 10,000 inhabitants.

The overall rates both gross (16.5) and differentiated (11) also fail to meet the desired objective (Table 3). Regarding physician availability, the data show that only the cantons of Cuenca and Girón met the World Health Organization (WHO) recommendation of 23 physicians per 10,000 inhabitants, indicating an oversupply of doctors.

However, when considering only first-level care physicians (referred to as the differentiated rate), no canton in Azuay met the WHO recommendation (Table 4)."

Healthcare Deficit and Physician Shortage

The deficit of physicians was calculated by comparing the actual number of physicians in each canton to the WHO-recommended physician density of 23 per 10,000 inhabitants. The results indicated a significant deficit in first-level care physicians across all cantons.

The availability ratio (R), defined as the ratio of available physicians to the recommended number, confirmed that all cantons exhibited an under-supply of first-level care physicians, with none reaching the WHO target (Table 4).

TABLE 3. GROSS AND DIFFERENTIATED RATES OF PHYSICIANS IN AZUAY PROVINCE, 2018

Cantons	Gross rate per 10000 inhab		Differentiated rate per 10000 inhab	
	N°	x	N°	x
Camilo Ponce Enríquez	16,0		10,3	
Chordeleg	8,8		8,8	
Cuenca	23,8		5,1	
El Pan	16,0		16,0	
Girón	27,5	16,5	9,2	11,0
Guachapala	10,5		10,5	
Gualaceo	14,5		7,9	
Nabón	20,9		17,4	
Oña	17,3		17,3	

Paute	13,8		9,0	
Pucará	15,1		15,1	
San Fernando	14,4		14,4	
Santa Isabel	14,3	16,5	5,8	11,0
Sevilla de Oro	13,3		5,9	
Sigsig	21,6		13,0	

Source: database "Recursos y Actividades de Salud 2018 - Estadísticas de Salud"

TABLE 4. PHYSICIAN AVAILABILITY RATIO (R) AND CATEGORIZATION OF FIRST-LEVEL CARE SUPPLY IN THE CANTONS OF AZUAY PROVINCE, 2018.

Cantons	Total physicians		First-level physicians.	
	R	Categorization	R	Categorization
Camilo Ponce Enríquez	0,70	Undersupply	0,45	Undersupply
Chordeleg	0,38	Undersupply	0,38	Undersupply
Cuenca	1,04	Oversupply	0,22	Undersupply
El Pan	0,70	Undersupply	0,70	Undersupply
Girón	1,19	Oversupply	0,40	Undersupply
Guachapala	0,46	Undersupply	0,46	Undersupply
Gualaceo	0,63	Undersupply	0,34	Undersupply
Nabón	0,91	Undersupply	0,76	Undersupply
Oña	0,75	Undersupply	0,75	Undersupply
Paute	0,60	Undersupply	0,39	Undersupply
Pucará	0,66	Undersupply	0,66	Undersupply
San Fernando	0,63	Undersupply	0,63	Undersupply
Santa Isabel	0,62	Undersupply	0,25	Undersupply
Sevilla de Oro	0,58	Undersupply	0,26	Undersupply
Sigsig	0,94	Undersupply	0,56	Undersupply

Source: database "Recursos y Actividades de Salud 2018 - Estadísticas de Salud"

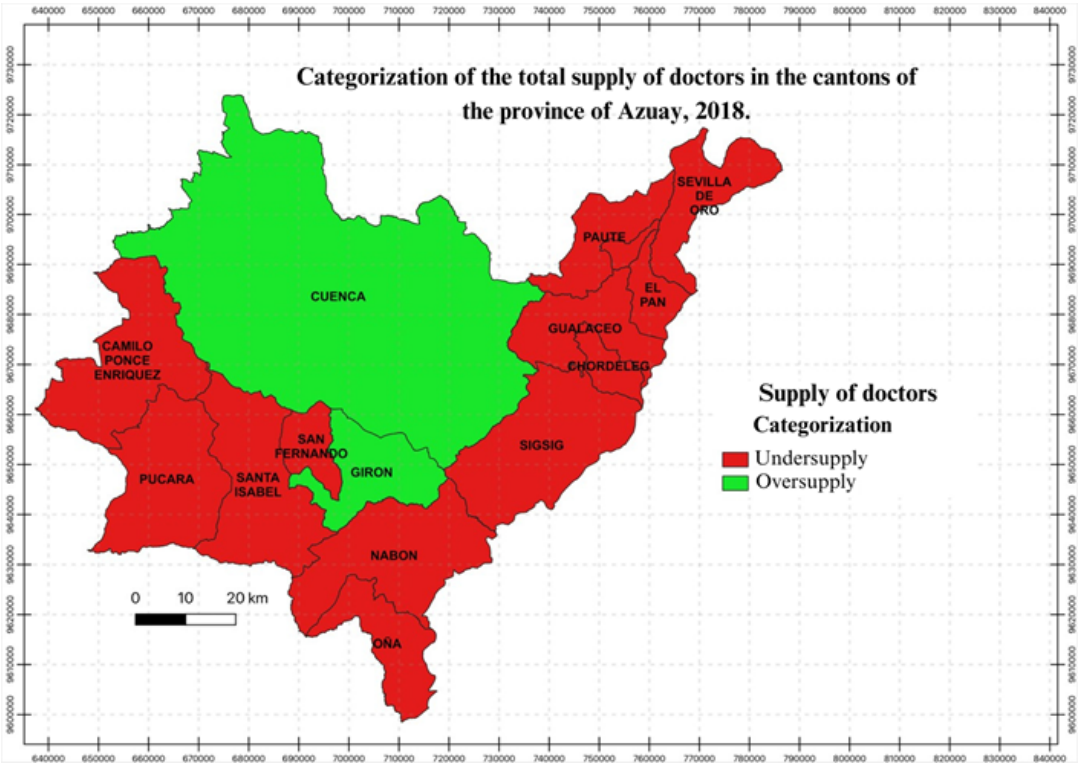

Figure 3. Categorization of the total supply of doctors in in the cantons of Azuay, 2018

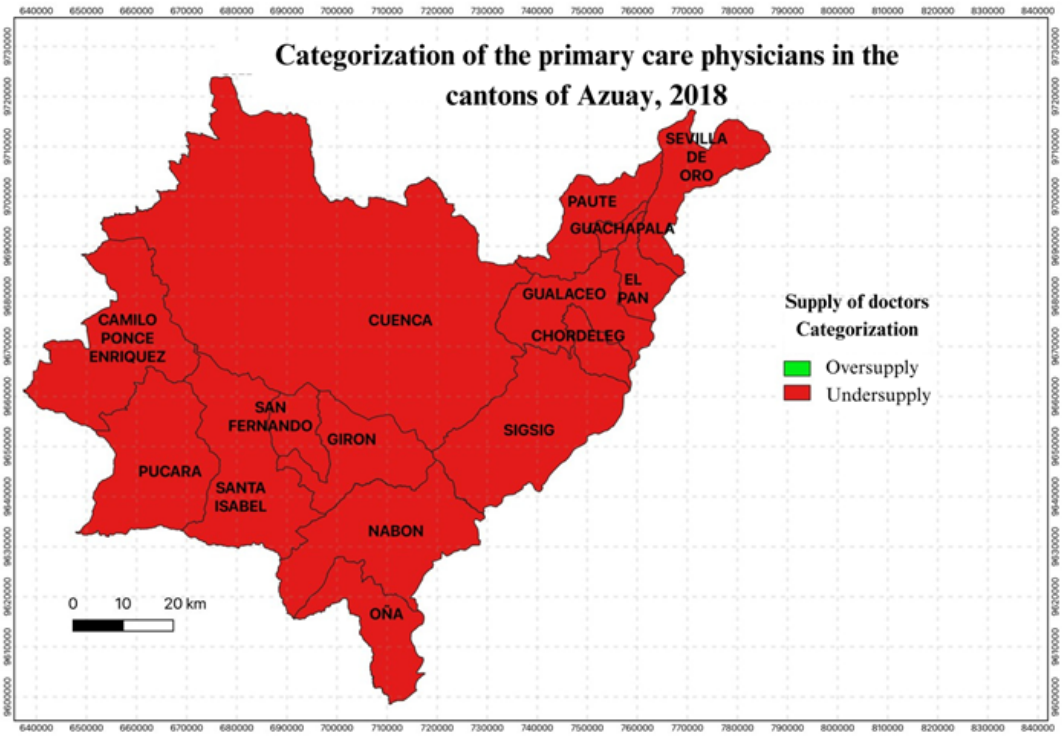

Figure 4. Categorization of the primary care physicians in the cantons of Azuay, 2018

TABLE 5. PHYSICIAN NEEDS AND GAPS TO ACHIEVE THE RECOMMENDED RATE, BOTH GROSS AND DIFFERENTIATED, IN AZUAY PROVINCE, 2018.

Cantons	Need Relative to Recommended Rate (23 per 10000)	Physician Gap for Gross Rate	First-Level Physician Gap for
Camilo Ponce Enríquez	60,4	18,4	33,4
Chordeleg	34,0	21,0	21,0
Cuenca	1413,4	-50,5	1102,7
El Pan	7,2	2,2	2,2
Girón	30,1	-5,9	18,1
Guachapala	8,8	4,8	4,8
Gualaceo	111,1	41,1	73,1
Nabón	39,6	3,6	9,6
Oña	9,3	2,3	2,3
Paute	66,1	26,4	40,1
Pucará	24,4	8,4	8,4
San Fernando	9,6	3,6	3,6
Santa Isabel	67,4	25,4	50,4
Sevilla de Oro	15,5	6,5	11,5
Sigsig	69,2	4,2	30,2
TOTAL	1966,1	111,5	1411,4

Source: database "Recursos y Actividades de Salud 2018 - Estadísticas de Salud"

For instance, in Camilo Ponce Enríquez, there was a shortfall of 33.4 physicians for first-level care, and Chordeleg had a deficit of 21 physicians (Table 5).

Total offer of doctors vs. primary care physicians in Azuay

The supply of doctors in most of the cantons of Azuay is poor, with the exception of Cuenca and Girón, where there is an oversupply of doctors, exceeding the rate recommended by the WHO of 23 doctors per 10,000 inhabitants, largely attributable to the fact that it is one of the most urbanized areas of the province. (Figure 3).However, it should be noted that despite the oversupply of doctors, the number of professionals offering their services at the primary level of care is poor throughout the province (Figure 4).

DISCUSSION

Physician Distribution and Healthcare Disparities in Azuay

The supply of doctors in the province of Azuay is mainly concentrated in the public sector, with less than half of these professionals working in primary care. Most are located in Cuenca, the capital, and in urban parishes, creating a disparity with rural areas, which remain underserved.

The results showed that 85% of the total supply of doctors is concentrated in urban parishes while the rest of the doctors are located in the rural area, with these results we see how the rural sector is vulnerable in terms of health care. The study found that the overall supply of doctors deviates significantly from the World Health Organization (WHO) recommended standard of 23 doctors per 10,000 inhabitants, revealing a deficit of around 6% for the total number of doctors and 72% for primary care doctors in Azuay. This shortage is particularly acute in Cuenca, despite having the largest population.

A similar example to our research is the 2017 study on the distribution of health resources in Mongolia, which revealed significant disparities in the distribution of doctors between rural and urban areas. The study found a notably higher concentration of doctors in urban and suburban regions. Even in more developed countries, where the number of doctors exceeds the recommended threshold, the inefficient distribution of medical staff leads to inadequate healthcare provision. (6,8,17,24) Within the country, although there have been no studies focused on general physicians at the first health level, other studies that analyzed the distribution have found inequities with a high concentration of staff in urban areas where the quality of life and professional opportunities are better, which gives us greater support about the results obtained in our study (10).

The categorization of the physician deficit highlights significant inequalities between territorial levels; consequently, it was found that in Azuay only two cantons (Cuenca and Girón) exceed the threshold of the minimum number of professionals recommended by the WHO, in relation to the total number of physicians which contrasts the results related to the first level of care.

Therefore, the proposal to calculate a gross rate and another differentiated rate of doctors, contributes to the understanding of reality by separating the populations of professionals with the criteria of sector and level of belonging. In this context, the average of 16.5, within the gross rate and the average of 11.0, for the differentiated rate, reaffirms the inequity of the offer, to the detriment of the first level of care.

Although the province operates a mixed health system, in which the public sector plays a dominant role, the study reveals a critical mismatch between health policies that promote primary care and the current distribution of professionals, concluding that to achieve the target recommended by the WHO, at least 1,966 primary care physicians are needed to cover the needs of the population. This significant mismatch poses challenges, especially in rural areas, where primary care is much needed.

Implications for Primary Healthcare (PHC)

Addressing physician shortages and maldistribution requires comprehensive and multifaceted policy interventions. First, incentive programs could be introduced to encourage physicians to practice in underserved rural areas. Countries such as Australia have successfully implemented financial and non-financial incentives, such as student loan forgiveness, housing subsidies, and professional development opportunities, to attract health professionals to remote regions (25).

In addition, strengthening telemedicine and mobile health units could help mitigate the immediate impacts of physician shortages in rural areas. These strategies have been successfully implemented in other countries with similar health care challenges, providing access to health care to remote populations while reducing the need for permanent health care infrastructure, although some of these remote strategies have limitations that are being addressed by conducting training on technological literacy (26,27).

Ecuador's Ministry of Public Health could also consider investing in community-based health care models that rely on community health workers (CHWs) and nurses to deliver essential PHC services, particularly in rural areas where physician shortages are most acute.

Although different strategies such as those mentioned above can be proposed in order to reduce inequality, their implementation will be difficult. Mainly due to the economic crisis that the country is going through, in which budget cuts and poor allocations are greater every year, causing part of the money not to be allocated to the area that corresponds to it (28). This also influences the fact that the infrastructure of the medical centers in rural areas are less equipped compared to urban areas, posing a greater challenge for the doctor to work without the necessary equipment for care.

Likewise, another challenge to face are the living conditions offered by the urban area, since it offers more opportunities for development, better living conditions, educational centers and security. Lastly, and possibly one of the most important barriers is the salary disparity. Medical professionals in urban areas tend to earn higher salaries, as they have opportunities to work in both the public and private sectors. In contrast, rural areas offer lower wages due to weaker local economies.

Limitations

This study has several limitations that should be acknowledged. First, it relied on secondary data from the INEC database, which, while comprehensive, may not fully capture the dynamic changes in physician distribution after 2018. The study also focused exclusively on public sector physicians, leaving out those working in the private sector who may contribute to the overall healthcare delivery system in Azuay. Furthermore, the analysis was limited to quantitative measures of physician availability and did not assess the quality of care or patient outcomes, which are equally important in evaluating healthcare effectiveness.

Finally, while the study provides valuable insights into physician distribution at the first level of care, it does not address other critical factors influencing healthcare access, such as infrastructure quality, medical supplies, and patient transportation, which are crucial elements of a functioning healthcare system, particularly in rural areas.

CONCLUSIONS

This study highlights the critical shortage of first-level care physicians in Azuay, underscoring the stark disparities between urban and rural regions. In Cuenca, the physician density is 23,8 per 10,000 inhabitants, but for primary care physicians, this rate drops significantly to 5.1, revealing a pressing need for 1102,7 additional first-level care physicians to meet the WHO's recommended threshold.

To address this, targeted policy interventions are needed, including redistributing healthcare resources, offering incentives for rural practice, and strengthening community-based healthcare and telemedicine services. Future research should explore the long-term impacts of these shortages on health outcomes, and develop more nuanced strategies for mitigating healthcare inequities in Ecuador.

Beyond Azuay, these findings have broader implications for national healthcare planning. Future research should extend this methodology to other provinces to identify patterns of physician distribution at different territorial levels. Sharing these findings with national health authorities will be crucial for informing policy development aimed at addressing healthcare inequities. Additionally, assessing the effectiveness of existing policies, such as rural service requirements and cooperation agreements (MSP-CONAGOPARE), can provide valuable insights for optimizing physician distribution. Policymakers can leverage this evidence to design targeted interventions, such as strengthening rural medical training programs, improving working conditions in underserved areas, and utilizing digital health solutions to bridge accessibility gaps.

Comparative studies across different regions and international contexts can further guide the development of effective workforce deployment models, which along with regular data collection

will be essential for monitoring workforce dynamics and developing policies to ensure future strategies effectively address disparities and adapt to changing population needs.

Author Contributions

Conceptualization, S.M. T.L and M.J ; methodology, S.M. T.L and M.J .; analysis, S.M. T.L and M.J ; research, S.M. and T.L..; resources, S.M. and T.L..; initial draft, T.L.; revision, S.M. T.L and M.J All authors have reviewed and consented to the published manuscript.

Institutional Review Board Statement

Ethical review and approval were not required for this study, as the data used for the research are public, and there are no implications that would infringe on the rights of private individuals. The authors and the director of this work declare that they have no conflicts of interest.

Informed Consent Statement

Consent was not required as the data used for the research is public, and there are no implications that would infringe on the rights of private individuals.

Data Availability Statement

The data supporting the findings of this study are publicly available and can be accessed through the INEC (National Institute of Statistics and Censuses) database. The dataset used in this study, titled "Recursos y Actividades de Salud 2018 - Estadísticas de Salud," is freely accessible to the public. Researchers can obtain the data through the official INEC website. The data used in this study covers the total number of physicians employed in the public sector at the first level of healthcare in Azuay during 2018.

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Conflicts of Interest

The authors declare no conflicts of interest related to the research.

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References

1. Molina-Marím G, Oquendo-Lozano T, Rodríguez-Garzón S, Montoya-Gómez N, Vesga-Gómez C, Lagos-Campos N, et al. Gestión del talento humano en salud pública. Un análisis en cinco ciudades colombianas, 2014. Rev Gerenc Polít Salud. 2016;15(30):108–25; doi: 10.11144/Javeriana.rgyps15-30.gtsp
2. Díaz C. Revisión de temas fundamentales en sistemas de salud . Rev Med Inst Mex Seguro Soc. 2018;56(3):295–304.
3. Rojas Torres IL, Gil Herrera R. Primary Health Care strategies in five Latin American Countries . AVFT - Arch Venez Farmacol y Ter [Internet]. 2023 [cited 2025 Feb 13];40(7); doi: 10.5281/zenodo.5752274
4. Organización Mundial de la Salud. La salud en la Agenda 2030 para el Desarrollo Sostenible. 69a Asam Mund LA SALUD WHA6911 Punto 132 la Asam Mund la Salud. 2016;11:1–7.
5. ONU. Agenda 2030 y los Objetivos de Desarrollo Sostenible Una oportunidad para América Latina y el Caribe Gracias por su interés en esta publicación de la CEPAL. Publicación de las Naciones Unidas. 2018. 43 p.
6. Ikesu R, Miyawaki A, Kobayashi Y. Physician Distribution by Specialty and Practice Setting: Findings in Japan in 2000, 2010 and 2016. Tohoku J Exp Med [Internet]. 2020 [cited 2025 Feb 13];251(1):1–8; doi: 10.1620/tjem.251.1
7. Instituto Nacional de Estadísticas y Censos INEC. Actividades y Recursos de Salud - RAS 2020 [Internet]. 2020. Available from: https://www.ecuadorencifras.gob.ec/actividades-y-recursos-de-salud/
8. Enrique Oyola García A. Desigualdad en la distribución de médicos en el Perú. Rev Cuba Salud Publica [Internet]. 2021;47(1):1–16. Available from: https://revsaludpublica.sld.cu/index.php/spu/article/view/1447

9. Winkelmann J, Muench U, Maier CB. Time trends in the regional distribution of physicians, nurses and midwives in Europe. BMC Health Serv Res. 2020 Oct 12 [cited 2025 Feb 13];20(1):1–15; doi: 10.1186/s12913-020-05760-y
10. Rodriguez A, Romero-Sandoval A, Sandoval BA, Romero N. Medical specialist distributions in Ecuador: a geographical and temporal analysis of data from 2000 to 2017. BMC Health Serv Res [Internet]. 2022 Dec 1 [cited 2025 Feb 13];22(1):1–12; doi: 10.1186/s12913-022-08056-5
11. Romero-Alvarez D, López-Cevallos DF, Torres I. Doctors for the people? The problematic distribution of rural service doctors in Ecuador. Health Policy Plan [Internet]. 2023 Aug 2 [cited 2025 Feb 13];38(7):851–61; doi: 10.1093/heapol/czad040
12. Ministerio de Salud Pública del Ecuador. Manual del Modelo de Atención Integral de Salud - MAIS. Tercera Ed. Ministerio de Salud Pública, Viceministerio de Gobernanza y Vigilancia de la Salud; 2018. 211 p.
13. Witt GFV, Ronquillo MCJ, Bravo EMG, Rodríguez P de las MW. Desafíos y problemas de la salud pública en Ecuador. Rev Cient Investig Actual del mundo las ciencias [Internet]. 2023 Apr 15 [cited 2025 Feb 13];7(2):10–21; doi: 10.26820/reciamuc/7.(2).abril.2023.10-21
14. Moraga-Cortés F, Bahia TC, Prada CA. Gasto em atenção primária à saúde em dois governos do Chile pós-ditadura. Cad Saude Publica [Internet]. 2021 Apr 7 [cited 2025 Feb 13];37(3):e00244719; doi: 10.1590/0102-311X00244719
15. César Montañez-Hernández JI, Alcalde-Rabanal JI, Reyes-Morales HI, Reyes Morales Av Universidad H, Maria S. Factores socioeconómicos y desigualdad en la distribución de médicos y enfermeras en México. Revisata de Saúde Pública. 2020;54(58):1–12.
16. Ramonfaur D, Gómez-Dantés O. Mexico's physician shortage: struggling to bridge the gap. Lancet Reg Heal - Am [Internet]. 2025 Jan 1 [cited 2025 Feb 13];41; doi: 10.1016/j.lana.2024.100966
17. Hoffer EP. Primary Care in the United States: Past, Present and Future. Am J Med [Internet]. 2024 Aug 1 [cited 2025 Feb 13];137(8):702–5; doi: 10.1016/j.amjmed.2024.03.012
18. Basu S, Berkowitz SA, Phillips RL, Bitton A, Landon BE, Phillips RS. Association of Primary Care Physician Supply With Population Mortality in the United States, 2005-2015. JAMA Intern Med [Internet]. 2019 Apr 1 [cited 2025 Feb 13];179(4):506–14; doi: 10.1001/jamainternmed.2018.7624
19. Organización Mundial de la Salud. Informe sobre la salud en el mundo - Colaboremos para la salud. Ginebra; 2006.
20. Original A, Reyes / P, Paredes M, Reyes P, Paredes Chicaiza M, Domínguez G, et al. Exceso de mortalidad durante la pandemia de COVID-19 en Ecuador. Respirar [Internet]. 2024 Mar 1 [cited 2025 Feb 20];16(1):45–58; doi: 10.55720/respirar.16.1.5
21. Instituto Nacional de Estadísticas y Censos (INEC). Recursos y Actividades de Salud – Información Histórica | [Internet]. INEC. Available from: https://www.ecuadorencifras.gob.ec/recursos-y-actividades-de-salud-informacion-historica/
22. Instituto Nacional de Estadísticas y Censos (INEC). Proyecciones poblacionales 2010 – 2020 [Internet]. INEC. Available from: https://www.ecuadorencifras.gob.ec/proyecciones-poblacionales-2010-2020/
23. SENPLADES - INEC. Proyecciones referenciales de población a nivel Parroquial 2010-2020 | Sistema Nacional de Información [Internet]. 2020. Available from: https://sni.gob.ec/proyecciones_poblaci/proyecciones-referenciales-de-poblacion-a-nivel-parroquial-2010-2020/
24. Erdenee O, Paramita SA, Yamazaki C, Koyama H. Distribution of health care resources in Mongolia using the Gini coefficient. Hum Resour Health. 2017 Aug 29;15(56); doi: 10.1186/s12960-017-0232-1
25. Australian Government. Workforce Incentive Program Practice Stream Guidelines – 1 October 2024. 2024.
26. Gobburi RK, Olawade DB, Olatunji GD, Kokori E, Aderinto N, David-Olawade AC. Telemedicine use in rural areas of the United Kingdom to improve access to healthcare facilities: A review of current evidence. Informatics Heal [Internet]. 2025 Mar 1 [cited 2025 Feb 20];2(1):41–8; doi: 10.1016/j.infoh.2025.01.003
27. Iqbal A, Anil G, Bhandari P, Crockett ED, Hanson VM, Pendse BS, et al. A Digitally Capable Mobile Health Clinic to Improve Rural Health Care in America: A Pilot Quality Improvement Study. Mayo Clin Proc Innov Qual Outcomes [Internet]. 2022 Oct [cited 2025 Feb 20];6(5):475; doi: 10.1016/j.mayocpiqo.2022.08.002
28. Guarderas M, Andina U, Bolívar S, Quito SE. Gasto público en salud en Ecuador: ¿cumplimos con los compromisos internacionales? Estud la Gestión Rev Int Adm [Internet]. 2021 Feb 9 [cited 2025 Feb 20];(9):237–54. Available from: https://revistas.uasb.edu.ec/index.php/eg/article/view/2585/3305

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