

Disparities Affecting Organ Donation Rates in Chile

Pablo Pérez Castro, MD, MPH, FACS,^{1,2,3} Delia Muñoz, RN, MSc,¹ María Trinidad González, MD,¹ Magdalena Vera, MD, MSc,⁴ and Ana Maria Muñoz, MD, MSc²

Organ transplantation represents a life-saving procedure for patients with end-stage organ failure.¹ The demand for organ and tissue donation has increased substantially, and waiting times have increased considerably.² Clearly, low numbers of organ donors represent a critical public health concern.

At the same time, expanding organ donation is challenged by the limited number of suitable donors amid the ever-growing demand from potential recipients. Global efforts have been made to address this challenge through the implementation of diverse strategies, including the implementation of opt-out organ donation systems,³ donation after circulatory death,⁴ and an increased acceptance of marginal donors. However, those strategies have thus far not been able to meet the ever-increasing demand.⁵

The success of organ donation is usually measured by the annual deceased donation rate per million population (dpm).⁶ Chile exhibits one of the lowest organ donation rates compared with other Latin American countries. According to the latest reports, the dpm rate for 2021 stood at a meager 7.4 dpm⁷ when compared with global leaders in organ donation, including Spain (49.61 dpm) and the United States (36.8 dpm).⁸

Chile has a one-of-a-kind geography with the world's largest north-south extension⁹ (Figure 1). The country's capital Santiago is located in the center, whereas regions far to the north or south are challenged by geographical disparities when compared with more central regions¹⁰—a widely discussed centralism issue. These regional

discrepancies may also decidedly impact the rates of organ donation throughout the nation.

For patients requiring kidney transplants, Santiago offers many options with 6 public and 8 private transplant centers located in the city. Patients can access an additional 7 transplant centers throughout the country. However, there are significant geographic disparities with no transplant center in northern regions. For those living in the southern regions, 4 transplant hubs can be found at varying distances of 122, 256, 499, and 680 km from Santiago.

One of the most controversial topics in Chile regarding organ donation are the low organ donation rates in peripheral regions in addition to low organ donation rates in private sector hospitals.

GEOGRAPHIC DISPARITIES

Based on the 2017 Chilean National Census¹¹ and data listed on the “Yo dono vida” website with transplants performed between 2010 and 2021,⁷ we calculated organ donor rates (per million habitants) by geographical region using the number of donors as the numerator,¹² and the region's population in the 2017 census as the denominator¹³ based on data from public and private healthcare institutions.

The percentage of people that have private insurance has declined and shifted toward the public insurance, partly due to discussions focusing on implementing a universal healthcare system¹⁴ (700 000 people switched just in 2023¹⁵). We estimate that approximately 20% of the population is currently privately insured and used the estimate of donors from private institutions as the numerator.¹⁶

The “Red Nacional de Procuramiento de Organos y Tejidos” document (2019) assessed the number of hired nursing staff and physician hours.

GEOGRAPHIC DISPARITIES IN ORGAN DONATION

Relevant differences between Chile's *capital* and the *regions* appear obvious (Table 1). The overall 10-y average national organ donation rate was 5 dpm. In a more detailed analysis, donation rates of peripheral regions were 4.77 dpm compared with 8.67 dpm in Santiago. Of relevance, the annual organ donation rate was 82% higher in Santiago than in other areas of the country ($P < 0.001$).

In addition to geographic disparities, Chile is challenged by vast differences in organ donation rates

Received 31 October 2023.

Accepted 31 October 2023.

¹ Transplant Center, Facultad de Medicina, Clínica Alemana-Universidad del Desarrollo, Chile.

² Faculty of Medicine, Universidad de Chile, Chile.

³ Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD.

⁴ Faculty of Medicine, Pontificia Universidad Católica de Chile, Chile.

The authors declare no funding or conflicts of interest.

P.P. participated in research design, writing the article, performing the research, and data analysis. D.M. participated in research design and writing the article. M.T.G. and A.M.M. participated in writing of the article. M.V. participated in the writing the article and data analysis.

Correspondence: Pablo Pérez Castro, MD, MPH, FACS, Transplant Center, Facultad de Medicina, Clínica Alemana-Universidad del Desarrollo, Av Vitacura 5951, Santiago, Chile. (pperezc@alemana.cl).

Copyright © 2024 Wolters Kluwer Health, Inc. All rights reserved.

ISSN: 0041-1337/20/1083-579

DOI: 10.1097/TP.0000000000004898

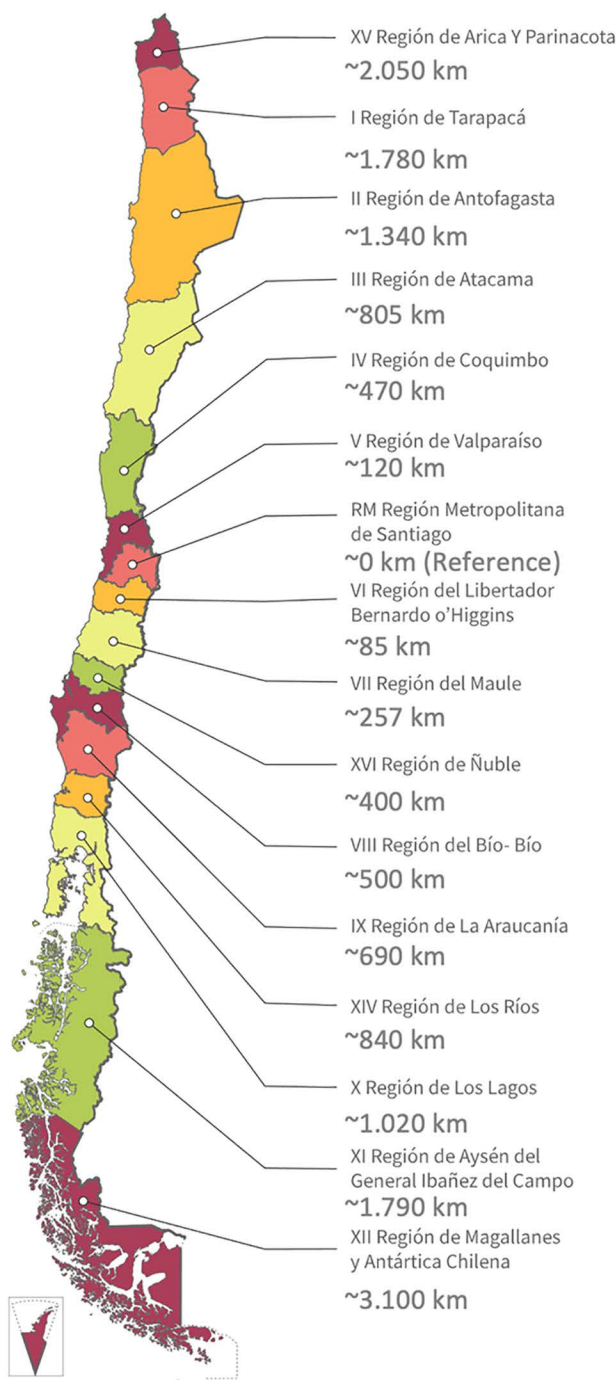


FIGURE 1. Map of Chile indicating approximate distances to the northern and southern regions using Santiago as a reference point.

between public and private institutions (6 dpm in public versus 0.91 dpm in private institutions, $P < 0.01$; Table 2).

The estimated 10-y average for organ donation was 6.5 times higher in public compared with private institutions. Nevertheless, when assessing these differences in the capital Santiago, differences between private and public institutions were less pronounced (10.37 versus 8.24 dpm, respectively).

There were also significant differences in terms of staffing. Calculating the number of full-time organ procurement

nurses and physicians (44h/wk) by region and million inhabitants based on publicly available data (Table 3). We observed a national average of 4.2 full-time procurement nurses and 0.22 full-time procurement physicians per million inhabitants with significantly higher numbers of full-time procurement nurses in regions compared with Santiago (4.08 versus 2.17, respectively).

SUMMARY AND CONCLUSIONS

Geographic disparities in organ donation rates represent a pressing issue in Chile, with potential explanations including variations in healthcare infrastructure, funding, and challenges in transportation logistics.

Regions have the broadest difference in organ donation rates between public and private institutions, with private institutions providing only a fraction of the donors. Because most private institutions in peripheral regions are small-volume hospitals, one possible explanation is that institution size and complexity may play a pivotal role in the efficacy of organ procurement efforts.

Further examination of the data supports the vital role played by organ procurement nursing professionals in positively influencing organ donation rates; this may be due to a more personalized approach and an overall higher availability at times when consent for organ donation is required. A lack of efficient communication with donor families, delays, and issues with the neurological determination of death, requiring a neurologist or neurosurgeon to confirm the diagnosis, or logistic problems in mobilizing organ procurement teams may be some of the explanations for not capturing suitable organs.

Overall, geographic differences in organ donation in Chile emphasize on the need for comprehensive public policy changes to address these disparities, mainly focusing on geographic-specific educational campaigns in regions, facilitating access to diagnose neurological determination of death in a timely manner, addition to providing support for organ procurement teams while strengthening local procurement teams.

REFERENCES

1. CDC. Key facts. Available at <https://www.cdc.gov/transplantsafety/overview/key-facts.html>. Accessed August 11, 2023.
2. Lewis A, Koukoura A, Tsianos G-I, et al. Organ donation in the US and Europe: the supply vs demand imbalance. *Transplant Rev.* 2021;35:100585. [Epub October 1, 2020] doi: 10.1016/j.trre.2020.100585.
3. Rudge CJ. Organ donation: opting in or opting out? *Br J Gen Pract.* 2018;68:62–63. doi: 10.3399/bjgp18X694445.
4. Manara AR, Murphy PG, O'Callaghan G. Donation after circulatory death. *Br J Anaesth.* 2012;108(Suppl 1):i108–i121. doi: 10.1093/bja/aer357.
5. Caplan AL. Finding a solution to the organ shortage. *CMAJ.* 2016;188:1182–1183. doi: 10.1503/cmaj.151260.
6. Stogis S, Hirth RA, Strawderman RL, et al. Using a standardized donor ratio to assess organ procurement organizations. *Health Serv Res.* 2002;37:1329–1344.
7. Yo Dono Vida. Ministerio de Salud. Available at <https://yodonovida.minsal.cl/statistics/public/show/14>. Accessed August 11, 2023.
8. Gómez MP, Irazábal MMJ, Manyalich M. International Registry in Organ Donation And Transplantation (IRODAT)—2019 worldwide data. *Transplantation.* 2019;104:S272.
9. CountryReports. Chile geography, maps, climate, environment and terrain from Chile. Available at <https://www.countryreports.org/country/Chile/geography.htm>. Accessed August 11, 2023.

10. Oru Fogar. Chile: between centralism and regionalization. Available at <https://www.regionsunies-fogar.org/en/media-files/opinion-articles/146-chile-between-centralism-and-regionalization>. Accessed August 11, 2023.
11. GHDx. Chile Population and Housing Census 2017. Available at <https://ghdx.healthdata.org/record/chile-population-and-housing-census-2017>. Accessed August 11, 2023.
12. Yo Dono Vida. Ministerio de Salud. Available at <https://yodonovida.minsal.cl/statistics/public/show/12>. Accessed August 11, 2023.
13. Censo Instituto Nacional de Estadística. Available at <http://www.ine.cl/censo>. Accessed August 11, 2023.
14. Gattini C, Morales JP. Pertinencia y factibilidad de reforma para crear un sistema universal de salud en Chile. *Revista Panamericana de Salud Pública*. 2023;47:1.
15. Financiero D, Arvelo, J I / I M C. *Fonasa recibe 700 mil nuevos beneficiarios en un año con una creciente migración desde las isapres* | *Diario Financiero*. Available at <https://www.df.cl/empresas/salud/fonasa-recibe-700-mil-nuevos-beneficiarios-en-un-ano-con-una-creciente>. Accessed August 11, 2023.
16. Estadísticas. *Biblioteca digital. Superintendencia de Salud. Gobierno de Chile*. Available at https://www.supersalud.gob.cl/documentacion/666/articulos-14195_recurso_3.xls. Accessed August 11, 2023.

TABLE 1.**Organ donation rates expressed as donors per million habitants in Chile 2010–2022, by geographic region**

Region	Population	No. of donors	Organ donors per million habitants ^a
Northern			
Arica y Parinacota	257 722	4	1.29
Tarapacá	396 697	16	3.36
Antofagasta	709 637	37	4.34
Atacama	318 004	24	6.28
Central			
Coquimbo	858 769	50	4.85
Valparaíso y San Antonio	1 995 538	169	7.05
Region Metropolitana	8 310 984	865	8.67
O'Higgins	1 009 552	76	6.27
Maule	1 153 043	51	3.68
Ñuble	517 060	49	7.89
Southern			
Bío-Bío	1 676 269	106	5.26
Araucanía	1 024 029	46	3.74
Los Ríos	409 559	28	5.69
Los Lagos	902 510	68	6.27
Aysén	108 047	0	0
Magallanes y la Antártica	181 143	12	5.52
Overall	19 828 563	1601	5.0 (average)

^aThis rate represents a 10-y average between 2010 and 2021.

TABLE 2.**Organ donation rate (donors per million habitants) in Chile 2010–2022, stratified by type of healthcare institution and geographic region**

Region	Estimated public institutions population	Estimated private institutions population	Public institution donors	Private institution donors	Public institutions organ donation rate ^a	Private institutions organ donation rate ^a
Northern						
Arica y Parinacota	206 177.6	51 544.4	4	0	1.61	0
Tarapacá	317 357.6	79 339.4	16	0	4.20	0
Antofagasta	567 709.6	141 927.4	37	0	5.43	0
Atacama	254 403.2	63 600.8	24	0	7.86	0
Central						
Coquimbo	687 015.2	171 753.8	50	0	6.06	0
Valparaíso y San Antonio	1 596 430.4	399 107.6	167	2	8.71	0.41
Region Metropolitana	6 648 787.2	1 662 196.8	658	207	8.24	10.37
O'Higgins	807 641.6	201 910.4	76	0	7.84	0
Maule	922 434.4	230 608.6	51	0	4.60	0
Ñuble	413 648	103 412	48	1	9.67	0.80
Southern						
Bío-Bío	1 341 015.2	335 253.8	101	5	6.27	1.24
Araucanía	819 223.2	204 805.8	44	2	4.47	0.81
Los Ríos	327 647.2	81 911.8	28	0	7.12	0
Los Lagos	722 008	180 502	66	2	7.61	0.92
Aysén	86 437.6	21 609.4	0	0	0	0
Magallanes y la Antártica	144 914.4	36 228.6	12	0	6.90	0
Overall	15 862 850.4	3 965 712.6	1382	219	6.0 (average)	0.91 (average)

Estimation of public and private institution population was made based on the percentage of the population with public and private insurance in every region, not on publicly available registries with the bulk data.

^aThis rate represents a 10-y average between 2010 and 2021.

TABLE 3.**Number of full-time (44 h) organ procurement physicians and nurses per administrative region of Chile (per million habitants) between 2010 and 2021**

Region	Organ procurement nurse/million inhabitants	Organ procurement physicians/million inhabitants
Northern		
Arica y Parinacota	3.88	1.94
Tarapacá	2.52	0.34
Antofagasta	2.81	0
Atacama	9.43	0
Central		
Coquimbo	3.4	0.18
Valparaíso y San Antonio	3.5	0.12
Region Metropolitana	2.16	0.12
O'Higgins	3.96	0
Maule	3.46	0.31
Ñuble	5.8	0.48
Southern		
Bío-Bío	4.77	0
Araucanía	1.95	0
Los Ríos	2.44	0
Los Lagos	7.75	0.05
Aysén	0	0
Magallanes y la Antártica	5.52	0
Overall	4.2 (average)	0.22 (average)