CARDIOLOGY 2025

28th Annual Update on Pediatric and Congenital Cardiovascular Disease

Global Perspectives on Pediatric and Congenital Cardiovascular Health

Néstor Sandoval MD

Fundación Cardioinfantil-La Cardio

Colombia 2025

No conflict of interest or political conflict.

CARDIOLOGY 2025

The 2015 Sustainable Development Goals (SDGs) state that All United Nations Member States have agreed to try to achieve Universal Health Coverage by 2030.

This includes financial risk protection, access to quality essential health care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.
Universal health coverage (UHC) means inclusion and empowerment for all people to access medical care, including treatment and prevention services.

Goal Update.
The proportion of the population not covered by essential health services decreased by about 15% between 2000 and 2021, with minimal progress made after 2015.
In 2021, about four and a half billion people were not covered by essential health services.

state-operated health services

1883

Otto von Bismarck (1815–1898), Chancellor of

Financed by employers and employees through payroll deduction

1917

Nikolai Alexandrovich Semashko (1874–1949), founder of the Soviet health system 1917. *Source: Marxists Internet Archive* Available at: https://www.marxists.

William Henry Beveridge (1879–1963); circa

Socialized model for all citizens . and is financed by the government through tax payments

1947

. Out-of-pocket model

1946-1971

Thomas Clement (Tommy) Douglas (1904–1986);

National Health insurance. Beveridge and Bismarck models..
Cost control by limiting medical services,
patients wait to be treated

Juan Luis Londoño
Colombia 1993

1965

US President Lyndon Baines Johnson

Mixed public-private system and struggles with closing the gap between the insured and the uninsured population (Medicare and Medicaid)(Lindon B: Johnson 1965)

2010

US President Barack Obama (1961) 44th

The Affordable Care Act (ACA). abolish pre-existing condition"

History through the years of the medical health system in LATAM.

- Beginning in the 1930s and 1940s, Bismarck systems were introduced in South American countries for those who were formally employed (informal work).
- 1970s, most countries – starting with Brazil in 1964 –were authoritarian regimes of military dictatorships.
- The 1980s and 1990s brought with them the “debt crisis.” Cuts in public social spending, causing an increase in poverty, inequality and violence.
- During the 1990s, Latin America underwent numerous neoliberal State reforms,
- 1993 2021 one of the best Health system in the world. (Colombia Chile)
- Around the 2000s, left-wing and centre-left governments in many of the countries, expanded social policies and worked to reduce poverty and social inequalities and improve access to health care services for **limited time**

Military dictatorship in SouthAmerica

The typical military dictatorship in Latin America is led by a junta or committee made up of the leadership of the military's general staff.

Artist ,Fernando Botero. Colombia 1973

Brazil, from 1964 to 1985,
Bolivia, between 1964 and 1982,
Paraguay, from 1954 to 1989,
Peru, from 1968 to 1980,
Argentina, between 1976 and 1983,
Uruguay, between 1973 and 1985,
Chile, between 1973 and 1990,
Dominican Republic, from 1930 to 1961,
Ecuador, from 1972 to 1979,
Nicaragua, between 1936 and 1956, (2007-2025)
Venezuela, between 1948 and 1958. (1999-2013; 2013-2025)
→ **Colombia**, between 1953 and 1956,

- Beginning in the 1930s and 1940s, Bismarck systems were introduced in South American countries for those who were formally employed (informal work).
- 1970s, most countries – starting with Brazil in 1964 –were authoritarian regimes of military dictatorships.
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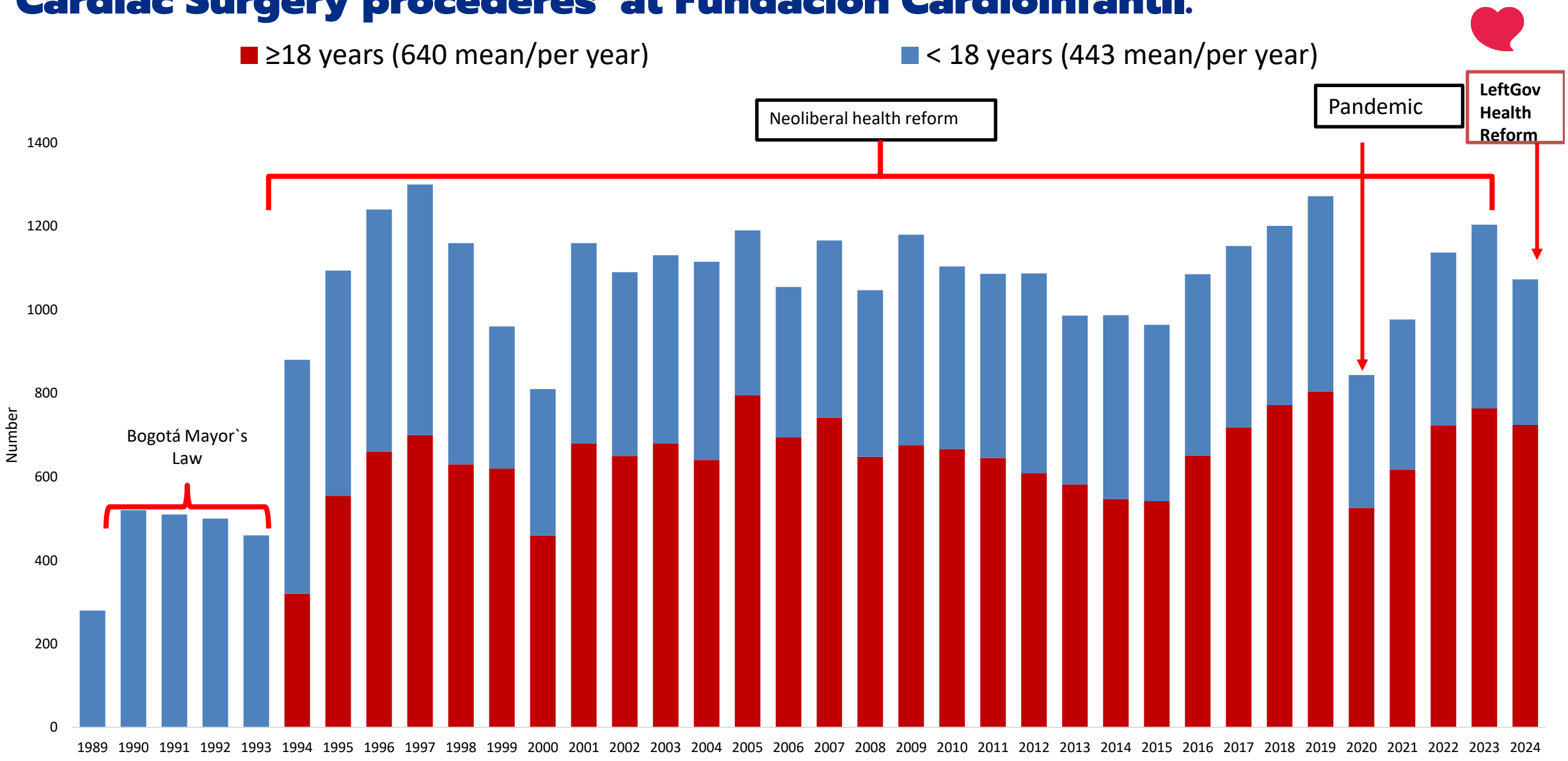
  (Uruguay , Argentina, Chile Colombia)
- Around the 2000s, left-wing and centre-left governments, expanded social policies and worked to reduce poverty and social inequalities and improve access to health care services for **limited time**

Cardiac Surgery procederes at Fundación Cardioinfantil.



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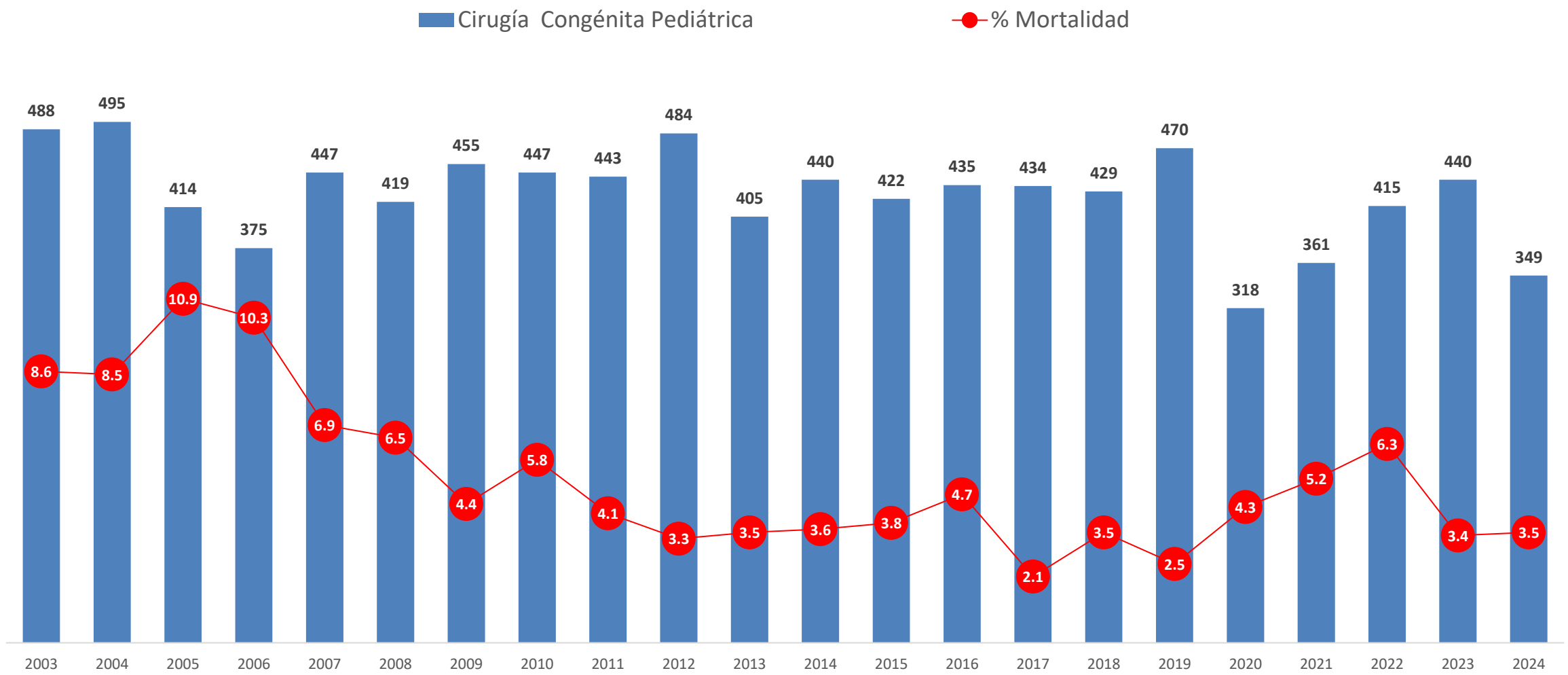
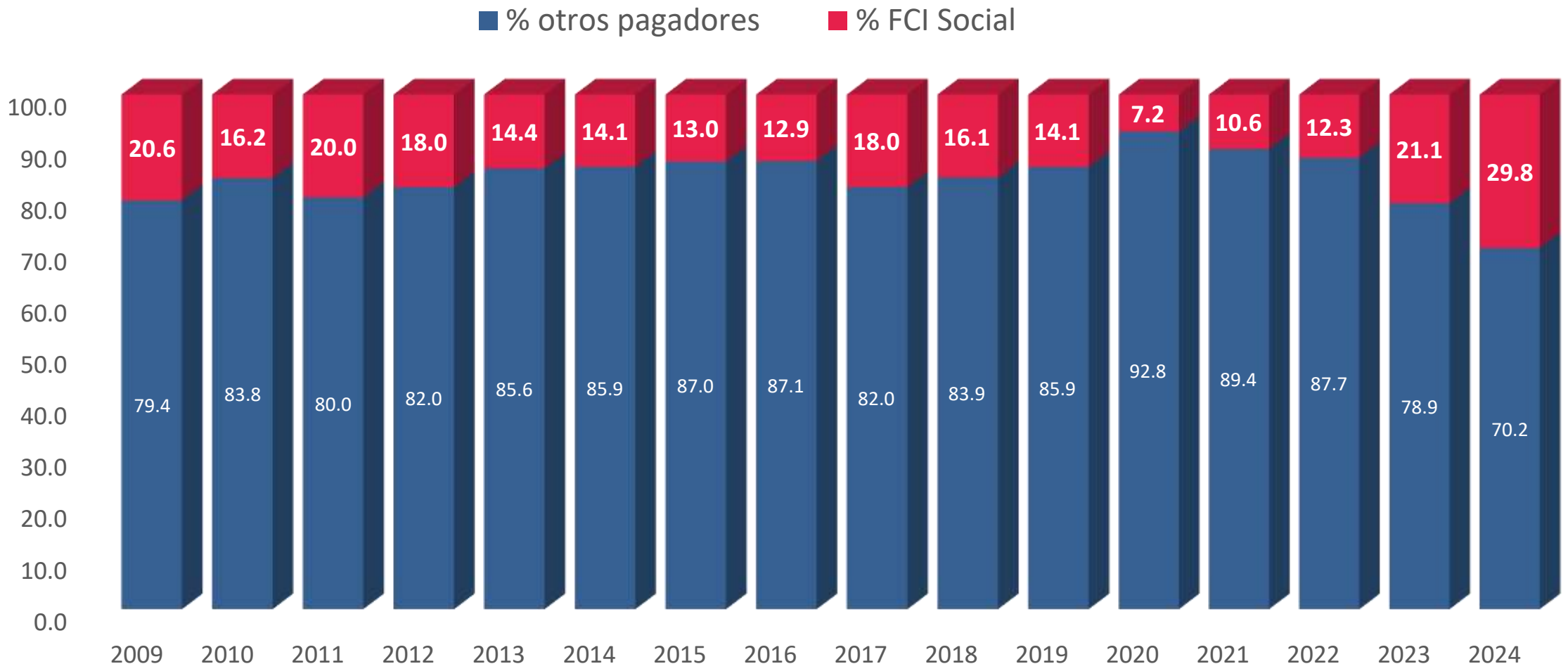
Volume vs % Mortality



Social Responsability program. “Regale una Vida “



Challenges in Access to Quality Care in Children with CHD

1 Limited Resources

Health expenditure by government specially in developing countries.
No specific programs for children with CHD

2 Geographic Barriers

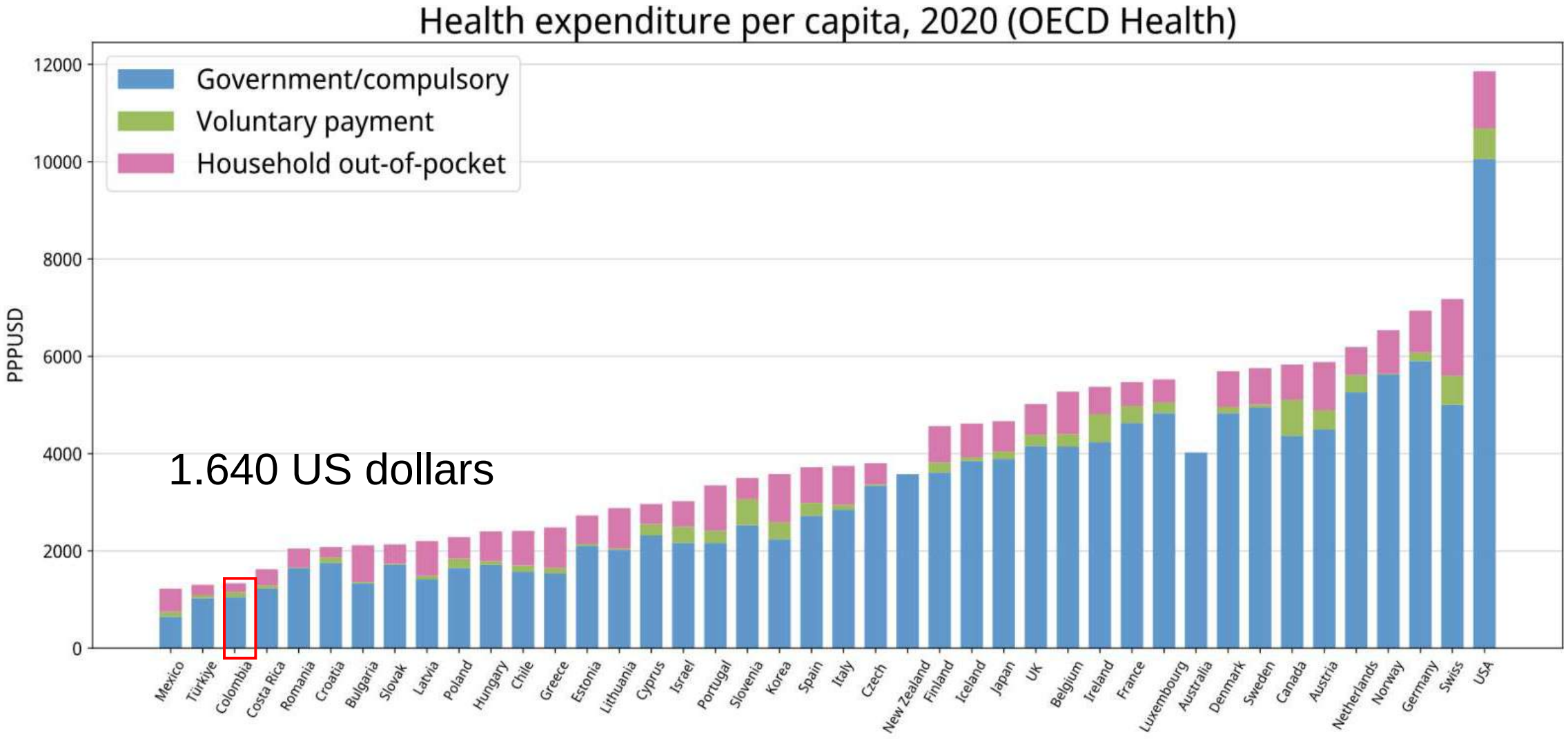
Families often have to travel long distances to access the limited number of pediatric cardiac surgery facilities.

3 Socioeconomic Disparities

Patients from low-income backgrounds may struggle to afford the necessary treatments, leading to disparities in healthcare access.

“Out of pocket expenditure in moderate to severe CHD

1


Health expenditure per capita, 2020 (OECD Health)
Government/compulsory
Voluntary payment
Household out-of-pocket
PPPUSD
12000
10000
8000
6000
4000
2000
0
1.640 US dollars
Mexico
Türkiye
Colombia
Costa Rica
Romania
Croatia
Bulgaria
Slovak
Latvia
Poland
Hungary
Chile
Greece
Estonia
Lithuania
Cyprus
Israel
Portugal
Slovenia
Korea
Spain
Italy
Czech
New Zealand
Finland
Iceland
Japan
UK
Belgium
Ireland
France
Luxembourg
Australia
Denmark
Sweden
Canada
Austria
Netherlands
Norway
Germany
Swiss
USA


América del Sur
Mapa físico
Mar Caribe
Llanos
Macizo de Guayana
Isla de Marajó
Amazonia
Caatinga
Meseta de Borborema
Meseta Diamantina
Meseta de Mato Grosso
Los Andes
Titicaca
Altiplano andino
Macizo brasileño
Chaco
Océano Pacífico
Pampa
Río de la Plata
Mesetas patagónicas
Chiloé
Océano Atlántico
Malvinas
Tierra del Fuego
EOM
elordenmundial.com

Challenges in Access to Quality Care in Children with CHD

4 Migration

Migration can affect health systems in many ways, including through the health of migrants and the communities that receive them

5 Corruption

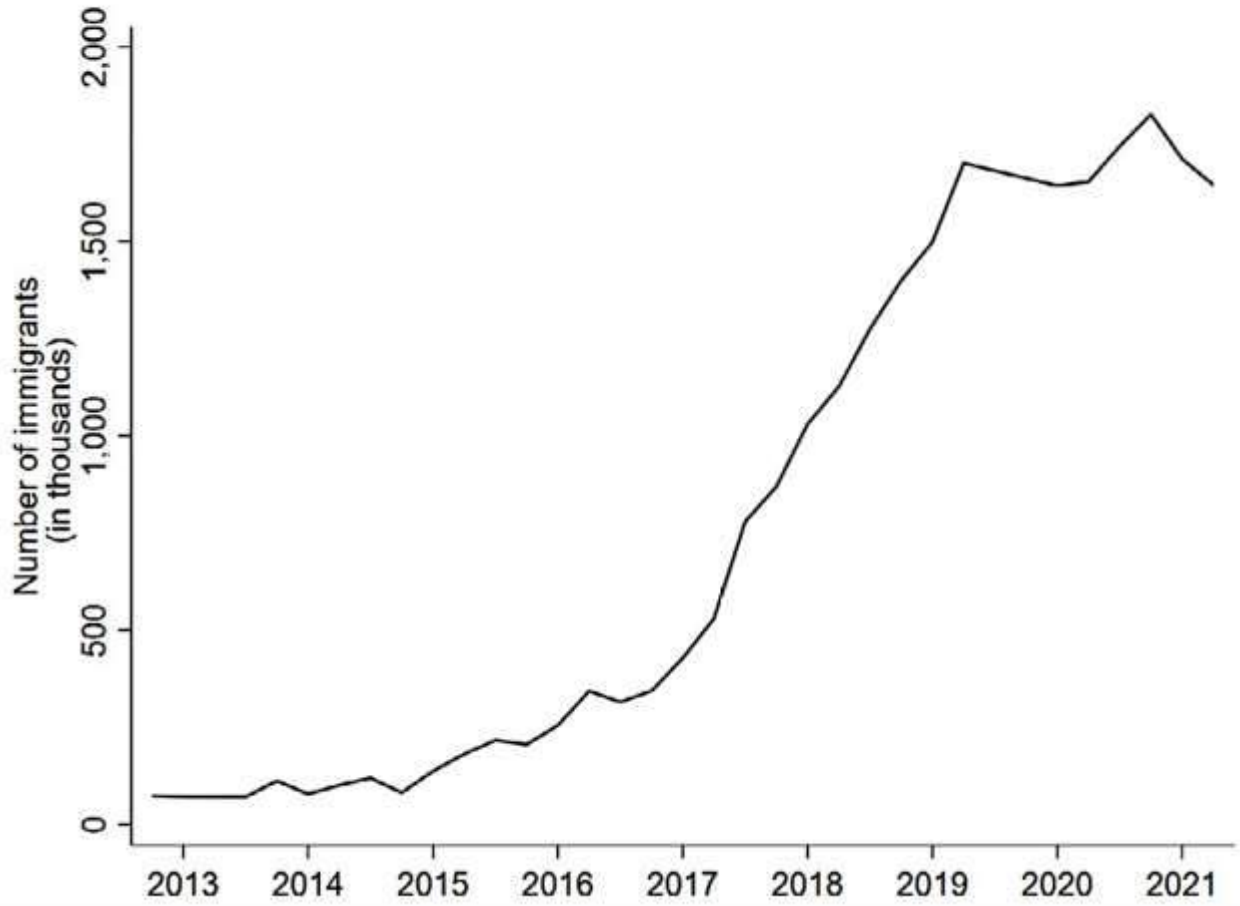
Health systems are particularly susceptible to corruption due to:

- large amounts of resources,
- information asymmetry.
- large number of actors.
- System complexity and fragmentation.
- Globalized nature of the supply chain for drugs and medical devices.

Migration

Colombia hosts the highest population of migrants and refugees from Venezuela, with over 2.8 million people

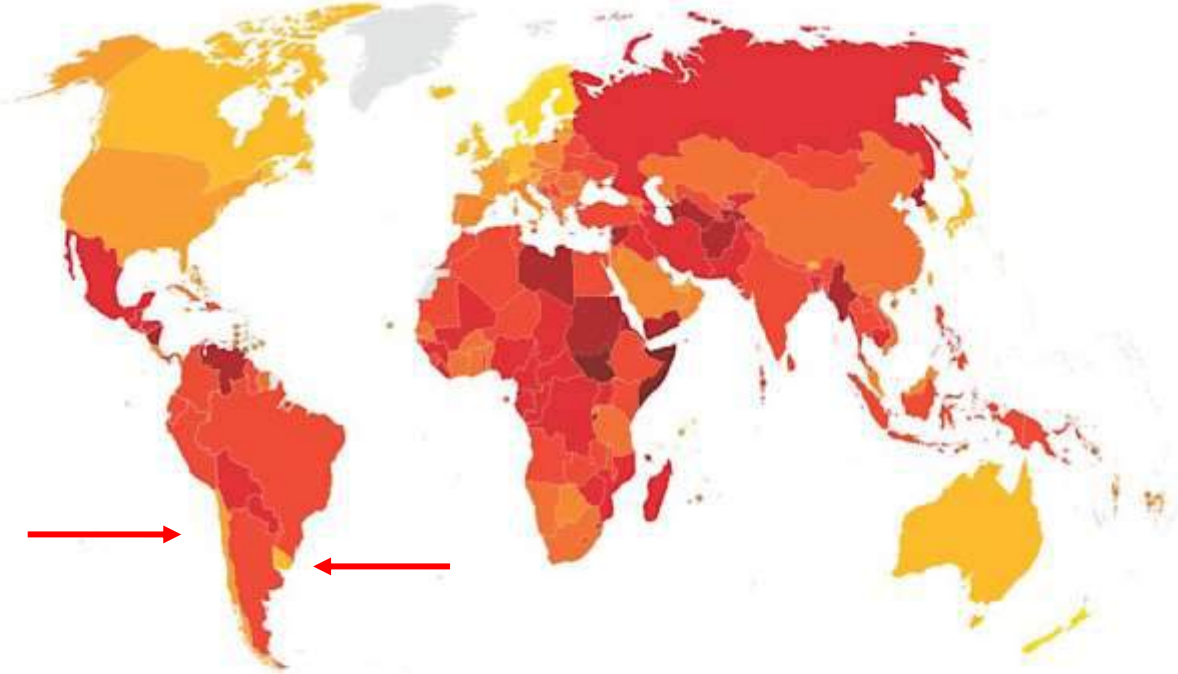
Figure 1: Stock of Venezuelan immigrants in Colombia



TRANSPARENCY INTERNATIONAL
the global coalition against corruption

CORRUPTION PERCEPTIONS INDEX 2024

The perceived levels of public sector corruption in 180 countries/territories around the world.



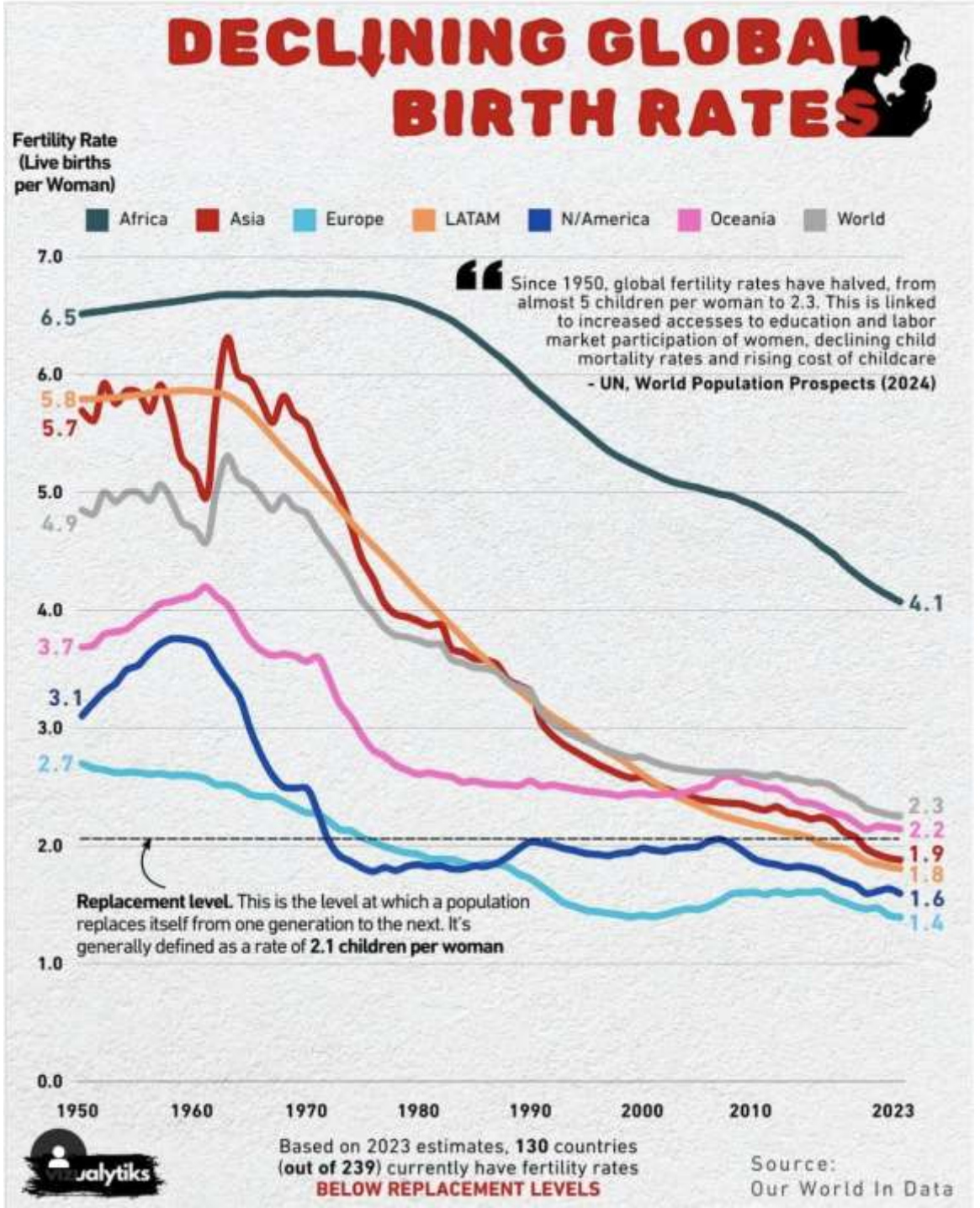
SCORE	COUNTRY/TERRITORY
90	Denmark
88	Finland
84	Singapore
83	New Zealand
81	Luxembourg
81	Norway
81	Switzerland
80	Sweden
78	Netherlands
77	Australia
77	Iceland
77	Ireland
76	Estonia
76	Uruguay
75	Canada
75	Germany
74	Hong Kong
72	Bhutan
72	Seychelles
71	Japan
71	United Kingdom
69	Belgium
68	Barbados
68	United Arab Emirates
67	Austria
67	France
67	Taiwan
65	Bahamas
65	United States
64	Israel
64	Korea, South
63	Chile
63	Lithuania
63	Saint Vincent and the Grenadines
62	Cabo Verde
60	Dominica
60	Slovenia
59	Latvia
59	Qatar
59	Saint Lucia
59	Saudi Arabia
58	Costa Rica
57	Botswana
57	Portugal
57	Rwanda
56	Cyprus
56	Czechia
56	Grenada
56	Spain
55	Fiji
55	Oman
54	Italy
53	Bahrain
53	Georgia
53	Poland
51	Mauritius
50	Malaysia
50	Vanuatu
49	Greece
49	Jordan
48	Namibia
49	Slovakia
47	Armenia
47	Croatia
46	Kuwait
46	Malta
46	Montenegro
46	Romania
45	Benin
45	Côte d'Ivoire
45	Sao Tome and Principe
45	Senegal
44	Jamaica
44	Kosovo
44	Timor-Leste
43	Bulgaria
43	China
43	Moldova
43	Solomon Islands
42	Albania
42	Ghana
41	Burkina Faso
41	Cuba
41	Hungary
41	South Africa
41	Tanzania
41	Trinidad and Tobago
40	Kazakhstan
40	North Macedonia
40	Suriname
40	Vietnam
39	Colombia
39	Guyana
39	Tunisia
39	Zambia
38	Gambia
38	India
38	Maldives
37	Argentina
37	Ethiopia
37	Indonesia
37	Lesotho
37	Morocco
36	Dominican Republic
35	Serbia
35	Ukraine
34	Algeria
34	Brazil
34	Malawi
34	Nepal
34	Niger
34	Thailand
34	Turkey
33	Belarus
33	Bosnia and Herzegovina
33	Laos
33	Mongolia
33	Panama
33	Philippines
33	Sierra Leone
32	Angola
32	Ecuador
32	Kenya
32	Sri Lanka
32	Togo
32	Uzbekistan
31	Djibouti
31	Papua New Guinea
31	Peru
30	Egypt
30	El Salvador
30	Mauritania
28	Bolivia
28	Guinea
27	Eswatini
27	Gabon
27	Liberia
27	Mali
27	Pakistan
26	Cameroon
26	Iraq
26	Madagascar
26	Mexico
26	Nigeria
26	Uganda
25	Guatemala
25	Kyrgyzstan
25	Mozambique
24	Central African Republic
24	Paraguay
23	Bangladesh
23	Congo
23	Iran
22	Azerbaijan
22	Honduras
22	Lebanon
22	Russia
21	Cambodia
21	Chad
21	Comoros
21	Guinea-Bissau
21	Zimbabwe
20	Democratic Republic of the Congo
19	Tajikistan
17	Afghanistan
17	Burundi
17	Turkmenistan
16	Haiti
16	Myanmar
15	Korea, North
15	Sudan
14	Nicaragua
13	Equatorial Guinea
13	Eritrea
13	Libya
13	Yemen
12	Syria
10	Venezuela
9	Somalia
8	South Sudan

Challenges in Access to Quality Care in Children with CHD

6 Fewer newborns with CHD and more adults with CHD

Decreased fertility rate and consequently fewer live births

DECLINING GLOBAL BIRTH RATES



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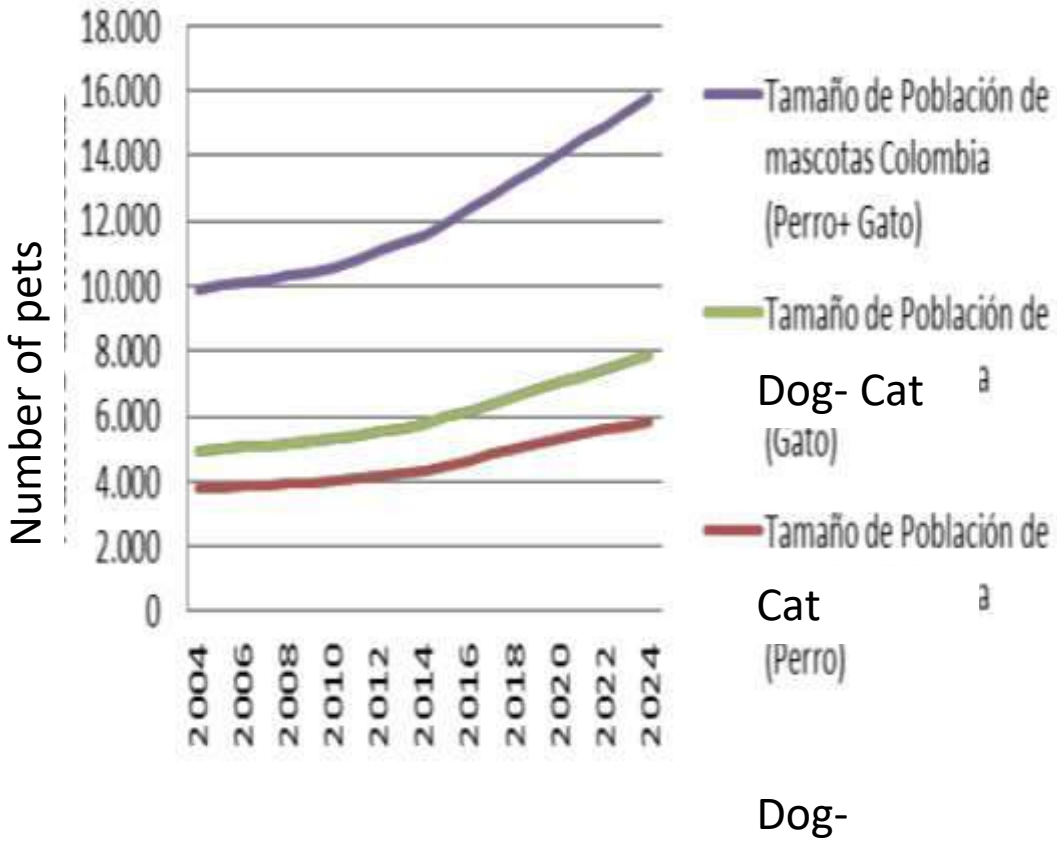
Pet market growth (Cat or Dog)



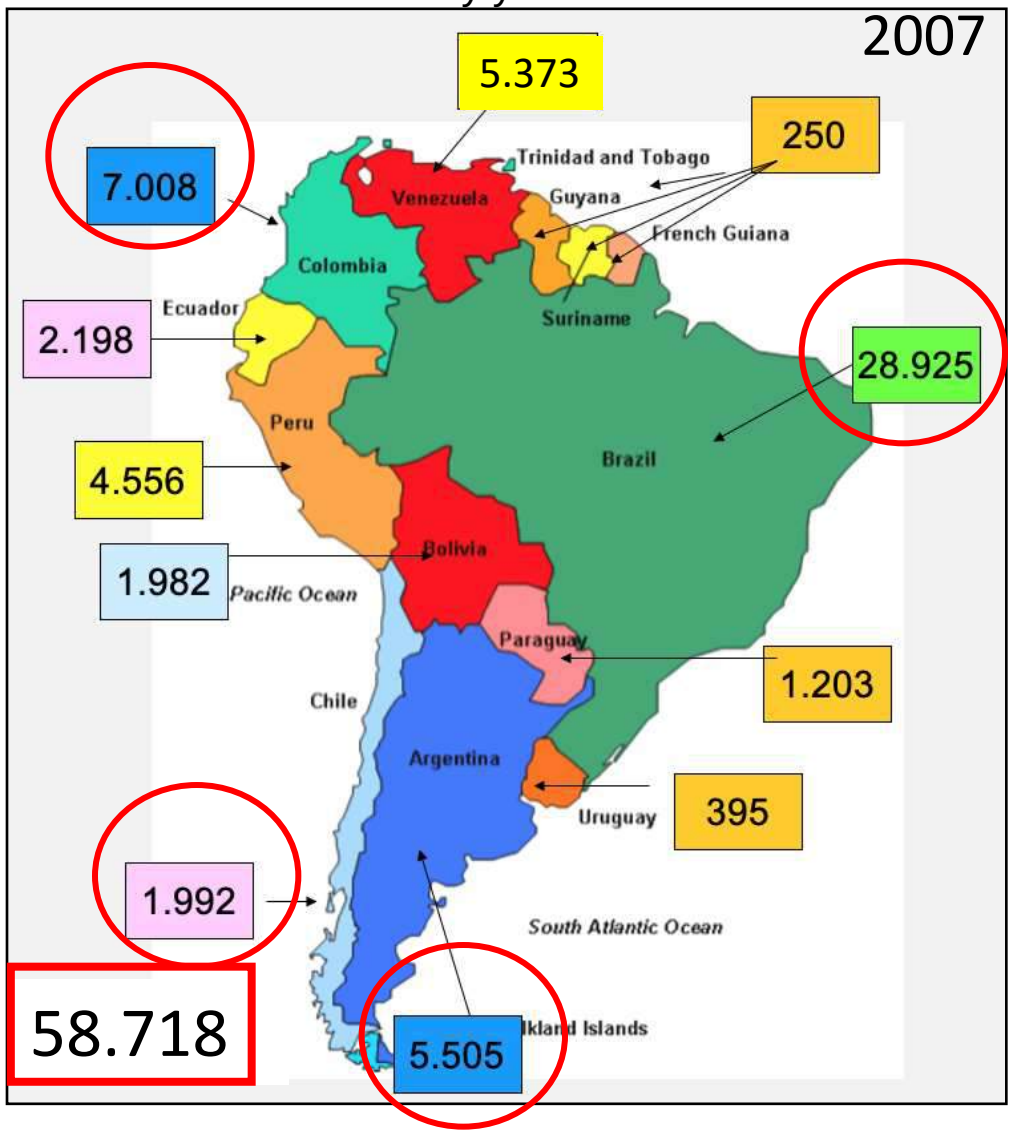
In Colombia 67% of households have at least one pet, which amounts to 4.4 million families.

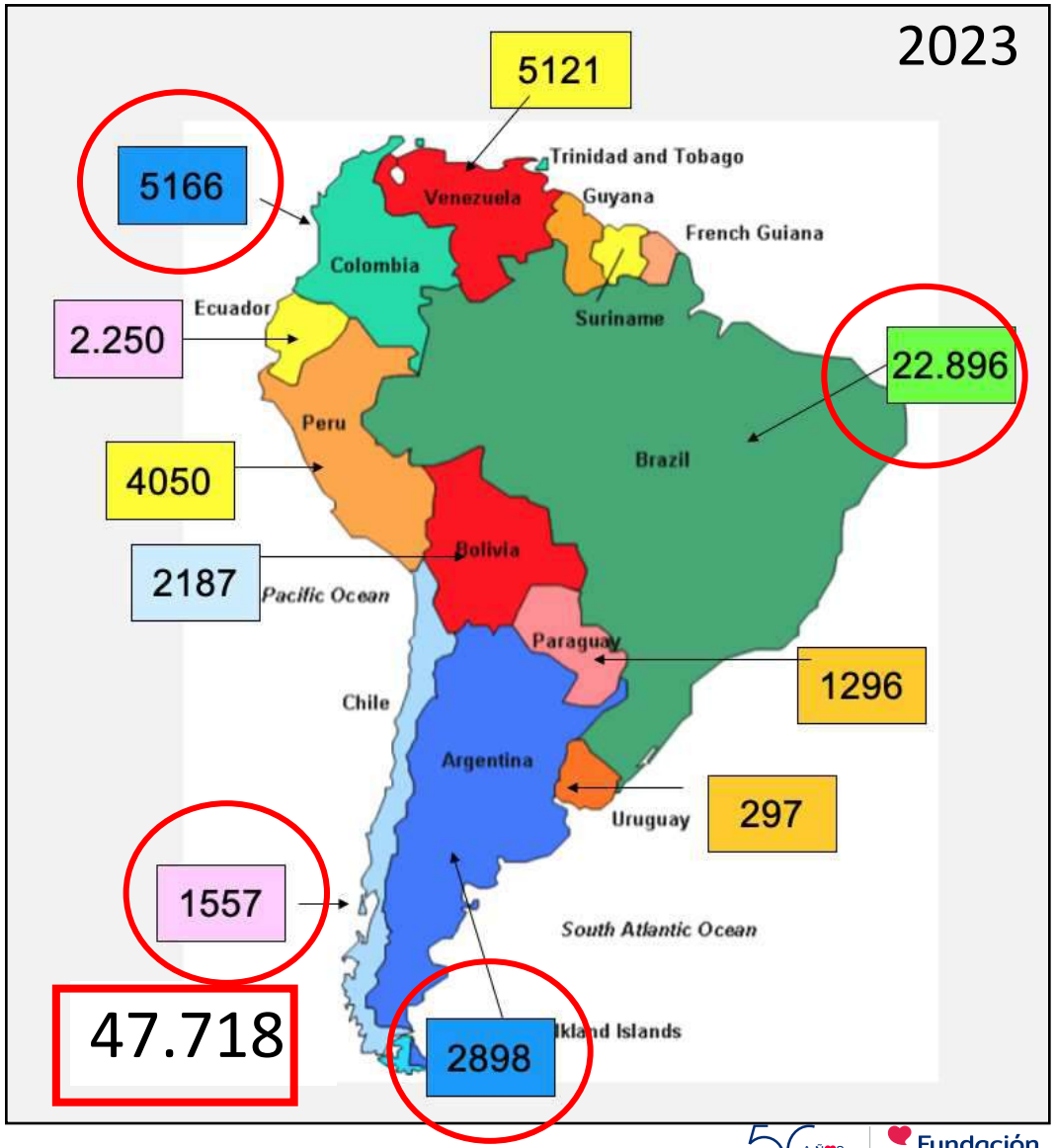
Number and variation in livebirths in Colombia Total

In Colombia, livebirths have been reduced by 43.6% over the last 10 years

SOUTH AMERICA Annual birth average with CHD
= (ABA – IMR) x 0.009-0.008

New children with CHD every year





Health situation in the Americas. Basic Indicators PAHO 2007 2023 Regional office WHO

Challenges in Access to Quality Care in Children with CHD

7 Lack of training

There are several limitations to training in pediatric cardiac surgery, heart team globally, including a lack of centers, limited access, and training barriers.

8 Globalization and Partnership.

Technology and Artificial Intelligence

Pediatric cardiac surgery in South America

Table I. Demographic and Descriptive Data of the Population/Pediatric Cardiovascular Surgery Ratio in South America

Country	Population[a]	Born Alive per Year[a]	No. of New Surgeries Required per Year[b]	No. of Surgeries Performed per Year[b]	No. of Surgeons[b]	No. of Cities[b]	No. of Centers[b]	PCVC per Million	No. of Surgeries per Million
Brazil	191 791 000	3 697 000	20 247	8113	83	46	81	2.3	42
Colombia	46 156 000	890 000	4905	2434	24	8	20	2.3	52
Argentina	39 531 000	696 400	3853	3000	31	8	10	3.9	76
Peru	27 903 000	586 000	3189	600	8	1	2	13.9	21
Venezuela	27 657 000	597 800	3293	871	15	4	7	3.9	31
Chile	16 635 000	251 000	1394	1200	9	1	3	5.5	73
Ecuador	13 341 000	281 000	1538	215	7	2	5	2.6	16
Bolivia	9 525 000	262 000	1387	250	6	3	3	3.1	26
Paraguay	6 127 000	153 000	842	116	5	1	4	1.5	19
Uruguay	3 340 000	50 500	277	220	6	1	2	1.6	73
Guyana	2 500 000	32 000	175	—	1	1	1	2.5	—
Total	384 506 000	7 496 700	41 100	17 019	195	76	138	2.7	44

PCVC = pediatric cardiovascular center.
[a] Source: World Health Organization report, 2007.[16]
[b] Source: Group of pediatric cardiovascular surgeons in South America.

2434
2115

Sandoval N et al. World Journal for Pediatric and Congenital Heart Surgery 2010 1: 321

Current Status of Training and Certification for Congenital Heart Surgery Around the World: Proceedings of the Meetings of the Global Council on Education for Congenital Heart Surgery of the World Society for Pediatric and Congenital Heart Surgery

Christo I. Tchervenkov, MD, Claudia Herbst, MD, Jeffrey P. Jacobs, MD , Zohair Al-Halees, MD, Frank Edwin, MD Joseph A. Dearani, MD, Kirsten Finucane, MD, Nestor Sandoval, MD , George E. Sarris, MD , Jose Fragata, MD Hafil B. Abdulgani, MD, Miguel Arboleda, MD, Emile A. Bacha, MD, David J. Barron, MD, Pedro Becker, MD Drissi Boumzebra, MD, Jorge Cervantes, MD, Adel Elgamal, MD, Morten H. Helvind, MD, Krishna S. Iyer, MD Marcelo B. Jatene, MD, Tae-Gook Jun, MD, James K. Kirklin, MD, Christian Kreutzer, MD, Cheul Lee, MD Attilio A. Lotto, MD, Valdano Manuel, MD , Bohdan Maruszewski, MD, Hani Najm, MD, David Overman, MD Budi Rahmat, MDDarshan Reddy, MD, Kisaburo Sakamoto, MD, Piya Samankatiwat, Sivakumar Sivalingam, MD, James D. St. Louis, MD, Giovanni Stellin, MD, Elizabeth H. Stephens, MD, PhD Justin T. Tretter, MD , Nguyen Ly Thinh Truong, MD, James S. Tweddell, MD, Vladimiro Vida, MD Susan Vosloo, MD, Hao Zhang, MD, Bistra Zheleva, and Richard A. Jonas, MD

goal of assessing current training and certification and ultimately establishing standardized criteria for the **training, evaluation, and certification** of congenital heart surgeons around the world.

Table 1. The Status of Pediatric and Congenital Cardiac Surgical Training in Several Countries in Latin America

Argentina	• Three pediatric cardiac surgery training centers • Residency and Fellowship program supported by the National Cardiac Surgery Society and the Health Ministry • Four-year program—no requirement of prior training in General Surgery or Adult Cardiac Surgery • Certification controlled by the Health Ministry
Brazil	• Seven pediatric cardiac surgery training programs • Residency and Fellowship program supported by individual institutions • National Society supports Adult Cardiac Surgery training programs • Pediatric Cardiac Surgery training programs are one- or two-year programs, requiring prior training in Adult Cardiac Surgery • No certification for Pediatric Cardiac Surgery
Chile	• Two Pediatric Cardiac Surgery Training programs (Universidad de Chile and Universidad Católica de Chile) • Pediatric Cardiac Surgery is a two-year program, requiring previous training in General Surgery, Adult Cardiac Surgery, or General Pediatric Surgery • Certification is required to practice cardiac surgery and is controlled by an autonomous National Medical Specialities Committee.
Colombia	• One Pediatric Cardiac Surgery training center in a single institution in the process of accreditation by the Universidad del Rosario and supported by the Ministry of Education and Colombian Medical College • Duration of Pediatric Cardiac Surgery training is 1.5 years, with the requiring prior training in General Surgery (four years) and Adult Cardiac Surgery (two to three years)
Mexico	• Two Pediatric Cardiac Surgery Fellowship Programs endorsed by the Universidad Nacional Autónoma de Mexico (UNAM). • Program A requirements: prior General Pediatric Surgery. • Duration: Three years • Program B requirements: prior Adult Cardiac Surgery • Duration: One year • The National Council for Thoracic Surgery is Certification Council that is endorsed by the national health authorities. The certification must be validated every five years
Peru	• The Instituto Nacional Cardiovascular, National Medical Resident Council and National Superintendence of Higher University Education. • In 2019—Residency of Pediatric Cardiovascular Surgery was initiated. • General Surgery and Cardiac Surgery training required prior to training in pediatric heart surgery

World Journal for Pediatric and Congenital Heart Surgery 2021, Vol. 12(3) 394-405

Pediatric Cardiac Surgery training LATAM

México ❄
Guatemala ❄
Dominican Republic ❄
Honduras ❄
Costa Rica ❄
El Salvador ❄
Nicaragua ❄
Panamá ❄
Puerto Rico ❄
Jamaica ❄
Trinidad y Tobago
Haiti ❄

Brazil
Chile
Colombia
Argentina
Uruguay

Peru ❄
Venezuela ❄
Ecuador ❄
Bolivia ❄
Paraguay ❄
Aruba
Bonaire
Curazao
Guyana ❄
Surinam
French Guiana

(Established and short or long Missions from US or EU ❄)

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CARDIOLOGY 2025

Recommendations for developing effective and safe paediatric and congenital heart disease services in low-income and middle-income countries: a public health framework

Babar S Hasan,1 Areesh Bhatti, Shazia Mohsin,1 Paul Barach, Eltayeb Ahmed, Sulafa Ali, Muneer Amanullah,1 Annette Ansong, Tahmina Banu, Andrea Beaton, Ralph Morton Bolman III, Bruna Cury Borim, John P Breinholt, Edward Callus,1 Massimo Caputo,Marcelo Cardarelli, Tomas Chalela Hernandez, Ulisses Alexandre Croti,1Yayehyirad M Ejigu, Kathleen Fenton, Anu Gomanju, Ashraf S Harahsheh , Peter Hesslein,26 Chris topher Hugo-Hamman,27 Sohail Khan,28 Jacques Kpodonu,29 Raman Krishna Kumar,30 Kathy J Jenkins,31 Kokila Lakhoo,32 Mahim Malik,33 Sanjiv Nichani,34,35 William M Novick,36,37 David Overman,38,39 Alexis Palacios-Macedo Quenot,40 Ceeya Patton Bolman,13 Dorothy Pearson,25 Vijayakumar Raju,41 Shelagh Ross,25 Nestor F Sandoval,42 Gary Sholler,43 Rajesh Sharma,44 Fenny Shidhika,45 Sivakumar Sivalingam,46 Amy Verstappen,47 Dominique Vervoort ,48 Liesl J Zühlke,49,50,51 Bistra Zheleva 26

We propose that cardiac surgery capabilities should only be developed at the more advanced levels on hospitals that have an established foundation of cardiology and cardiac surgery services, including screening, diagnostics, inpatient and outpatient care, postoperative care and cardiac catheterisation

public health framework. BMJ Global Health 2023;8:e012049. doi:10.1136/ bmjgh-2023-012049

AEPC webinars | AEPC | Webinars - European Association of … | World University for Pediatric and Co… | Innovations in Pediatric Congenital He… | Events from 16 December 2023 …

Children's Lifeline
Pediatric Cardiac

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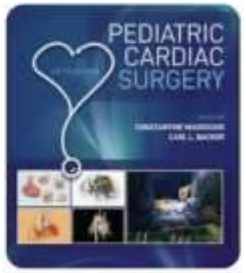
Becker Associates
WUPCHS Website and Education We…



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NPC-QIC
Heart University — NPC-QIC

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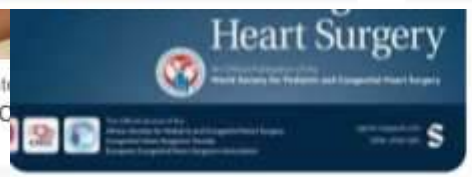
Pediatric Cardiac – C



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World Society for P…
WSPCHS - WSPC…

Academia.edu
PDF) The World Soci…

World Society for Pedi…
WSPCHS - Members…

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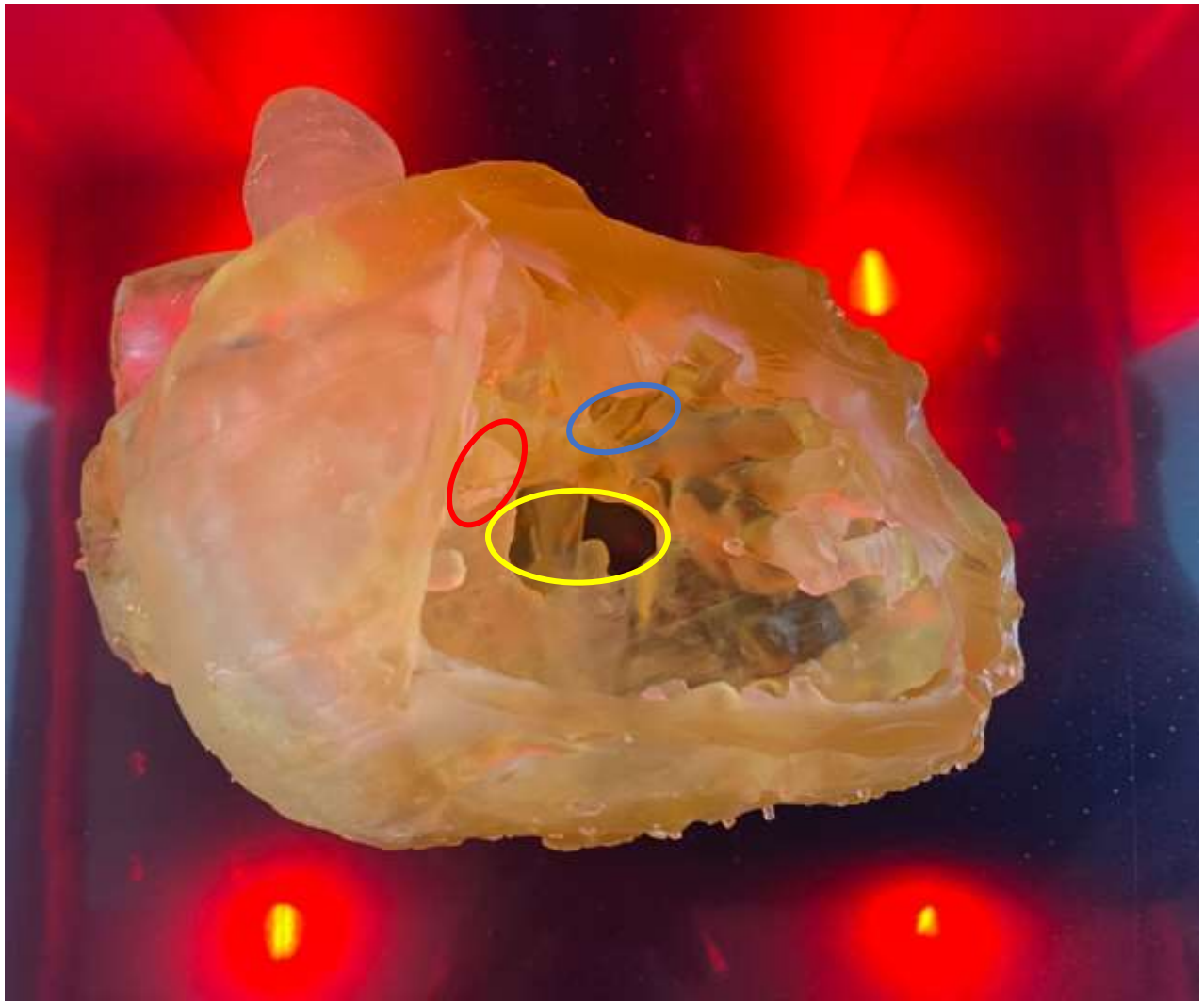
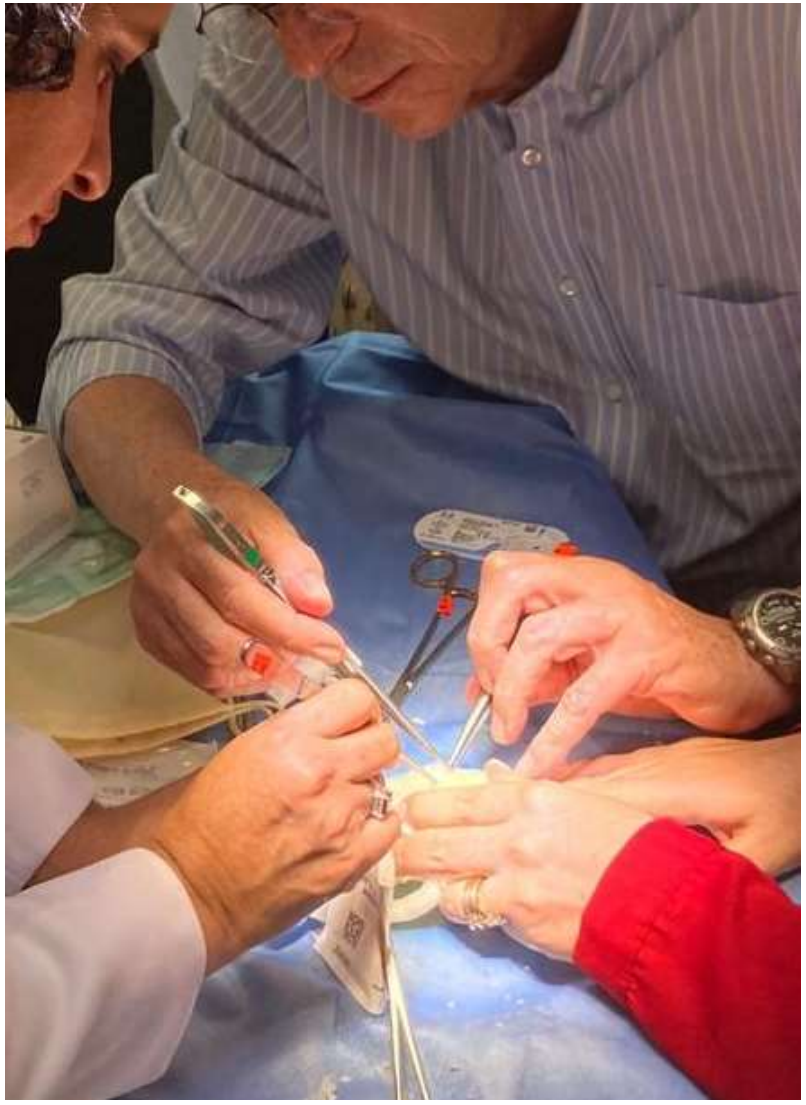
World Society for Pediatric and Congenital Heart Surgery
WSPCHS - World Journal becomes the official journal of CHS…

Shi-Joon Yoo
3 D Sept 2018
curse



Double outlet RV vessels in transposition. (3D printing) and simulation of pre-surgical repair.

3D printed model with suturable material for surgery planning and simulation



"HOST" en Lima
Perú 2023

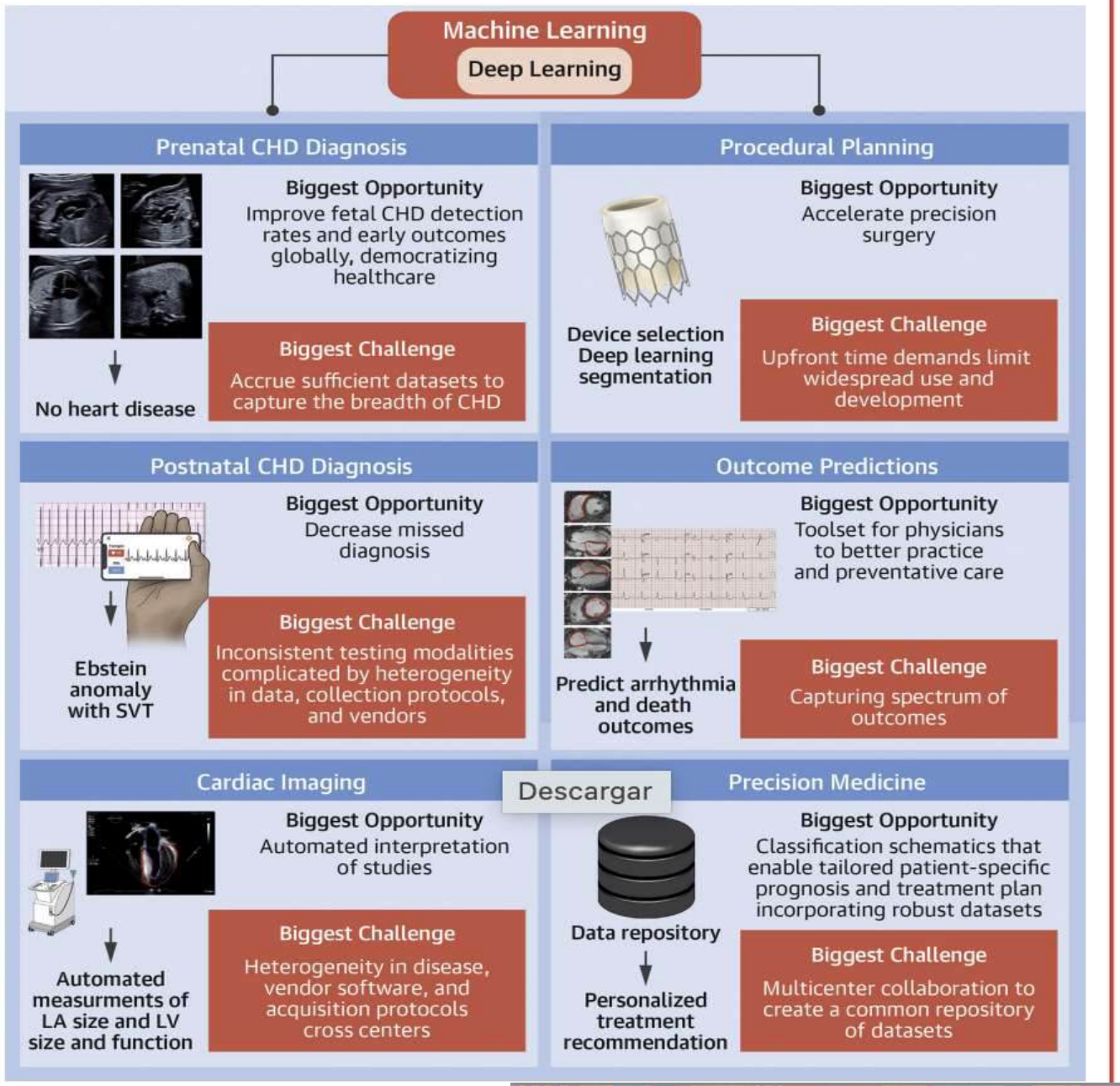
Artificial Intelligence in Congenital Heart Disease

Current State and Prospects

Pei-Ni Jone, MD,[a,*] Addison Gearhart, MD,[b,*] Howard Lei, PhD,[c] Fuyong Xing, PhD,[d] Jai Nahar, MD, MBA,[e] Francisco Lopez-Jimenez, MD,[f] Gerhard-Paul Diller, MD, PhD,[g,h,j] Ariane Marelli, MD, MPH,[j] Laura Wilson, MD,[k] Arwa Saidi, MBBCh,[k] David Cho, MD,[l] Anthony C. Chang, MD, MS, MBA, MPH[c]

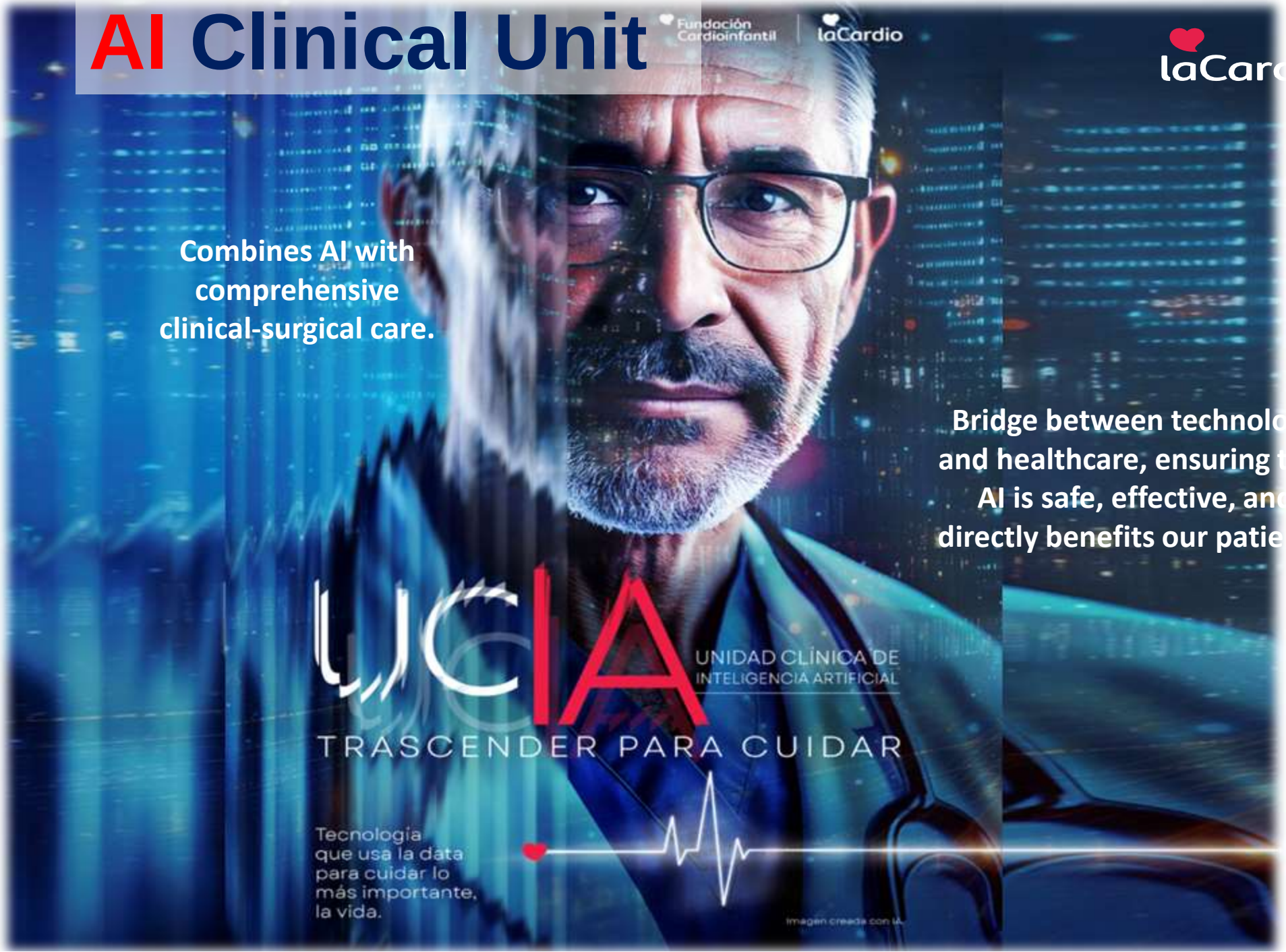
JACC: ADVANCES, VOL. 1, NO. 5, 2022
DECEMBER 2022:100153

CENTRAL ILLUSTRATION Artificial Intelligence Opportunities in Congenital Heart Disease



Descargar

AI Clinical Unit



Combines AI with comprehensive clinical-surgical care.

Bridge between technolo and healthcare, ensuring t AI is safe, effective, an directly benefits our patie

TAKE HOME MESSAGES

- know the current state of our population in LATAM with CHD.
- Identify and recognize problems. (**Database**) (Strategic planning)
- **Promote** health systems to cover more children with CHD
- Need to raise **Health expenditures** to more than five - six percent of GDP.
- Now days more health workers have training not only in cardiology, surgery or nursery but in **administration, leadership and AI**.
- **Global education**
- **Technology** is currently the best learning tool. Webinars, meetings, wet labs, etc., but AI **partnership** can make a big change.


HONORES DE LA CASA
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Muchas gracias