# The situation of congenital heart surgeries in Brazil

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The prevalence of congenital heart disease (CHD) is between 8 and 10 children per 1000 live births. Thus, it is estimated that 28,846 new cases of CHD emerge in Brazil each year. For about 20% of the cases that are related to less complex defects and those with discrete hemodynamic repercussions, the cure is spontaneous.

The average number of cardiovascular surgeries for CHD that are necessary in Brazil is of the order of 23,077 procedures per year, including newborn babies with CHD and cases requiring reoperations. In 2002, 8,092 procedures were actually performed thereby giving a deficit of 65%, with the greatest shortfalls seen in the Northern and Northeastern regions (93.5% and 77.4%, respectively) and the least problems experienced in the Southern and Central Western regions (46.4% and 57.4%, respectively) as illustrated in Table 1.

Table 1. Distribution of Congenital Heart Disease Surgeries in Brazil - 2002

| | | | Necessary surgeries | | | | Surgeries performed | | | | Deficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Live births | CHD 9/1000 | Total | Govern 86.1% | Private 0,4 % | Plans 13,5 % | Govern (*) | Private (**) | Plans (**) | Total | Nº | % |
| North | 290,546 | 2,615 | 2,092 | 1,801 | 8 | 282 | 119 | 0 | 17 | 136 | 1,956 | 93.5 |
| Northeast | 925,681 | 8,331 | 6,665 | 5,738 | 27 | 900 | 1,278 | 2 | 226 | 1,506 | 5,159 | 77.4 |
| Southeast | 1,306,113 | 11,755 | 9,404 | 8,097 | 38 | 1,270 | 3,387 | 26 | 576 | 3,989 | 5,415 | 57.6 |
| South | 450,181 | 4,052 | 3,241 | 2,791 | 13 | 438 | 1,480 | 3 | 264 | 1,747 | 1,494 | 46.4 |
| Central West | 232,587 | 2,093 | 1,675 | 1,442 | 7 | 226 | 660 | 2 | 52 | 714 | 961 | 57.4 |
| Brazil | 3,205,108 | 28,846 | 23,077 | 19,869 | 93 | 3,116 | 6,924 | 33 | 1,135 | 8,092 | 14,985 | 65 |

Source: DATASUS, Brazilian Health Ministry
(*) Data relating to 2002
(**) Estimated from documents of the Integrated System of Cardiovascular Surgery (2000/2001)

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These procedures are distributed according the type of medical assistance, private patients (0.4%), health plans (13.5%) and government social security (86.1%), highlighting the dependence on government investment.

The early treatment of CHD prevents substantial hospitalizations owing to complications of the disease, as well as providing a better quality of life for the patients. It is well known that 50% of CHD sufferers should undergo surgery within the first year of life. Thus, 11,539 new procedures should be performed every year in Brazil. As the public sector absorbs 86.1% of the cases, there is a deficit of 80.5%. The situation is more critical in the Northern and Northeastern regions of Brazil with incidences of 97.5% and 92%, respectively, as demonstrated in Table 2.

Table 2. The necessity of congenital heart surgery in the first year of life – 2002

| Region | Average | Need of surgeries (50%) | Government funded 86,1% | Surgeries performed | Deficit | Deficit % |
|---|---|---|---|---|---|---|
| North | 2,092 | 1,046 | 901 | 22 (*) | 879 | 97.5 |
| Northeast | 6,665 | 3,333 | 2,870 | 228 (*) | 2,642 | 92.0 |
| Southeast | 9,404 | 4,702 | 4,048 | 948 (*) | 3,100 | 76.6 |
| South | 3,241 | 1,621 | 1,396 | 549 (*) | 847 | 60.6 |
| Central West | 1,675 | 838 | 722 | 201 (*) | 521 | 72.2 |
| Brazil | 23,077 | 11,539 | 9,936 | 1,938 (*) | 7,998 | 80.5 |

(*)Source: DATASUS, Brazilian Health Ministry

The number of babies with CHD was estimated using the number of births and the percentage of live births per 1000 inhabitants as is demonstrated in Table 3. These data enable planning, for each state, the ideal number of surgical procedures.

The average investment of the government through its health care programs for the treatment of CHD from 1999 to 2002 was 45,152,715.33 Brazilian Reals (Table 4).

Thus, the deficit of public investment in Brazil in respect to 2002 when there were investments of 47,736,793.74 Brazilian Reals was 96,596,501.91 Brazilian Reals, the equivalent of 66.9%. The greatest deficits were in the Northern (94.2%) and Northeastern (81.7%) regions. The monthly subsidiary of 8,049,708.49 Brazilian Reals distributed in the regions, as shown in Table 5 would balance the treatment of CHD.

Table 3. Congenital Heart Surgery Deficits by State

| Region | Live births | Congenital heart disease 9/1000 | Surgeries needed | Responsibility government 86.1% | Surgeries performed government | Deficit SUS/year | Deficit SUS/month | Corrected deficit SUS/month 89.2% |
|---|---|---|---|---|---|---|---|---|
| **North** | **360,808** | **3,247** | **2,597** | **2,236** | **119** | **2,117** | **176** | **157** |
| Rondônia | 35,405 | 319 | 255 | 219 | 0 | 219 | 18 | 16 |
| Acre | 14,696 | 132 | 106 | 91 | 0 | 91 | 8 | 7 |
| Amazonas | 86,824 | 781 | 625 | 538 | 7 | 531 | 44 | 39 |
| Roraima | 10,582 | 95 | 76 | 66 | 0 | 66 | 5 | 5 |
| Pará | 168,617 | 1,518 | 1,214 | 1,045 | 89 | 956 | 80 | 71 |
| Amapá | 13,118 | 118 | 94 | 81 | 0 | 81 | 7 | 6 |
| Tocantins | 31,566 | 284 | 227 | 196 | 23 | 173 | 14 | 13 |
| **Northeast** | **1,068,792** | **9,619** | **7,694** | **6,626** | **1,278** | **5,348** | **446** | **398** |
| Maranhão | 135,861 | 1,223 | 978 | 842 | 76 | 766 | 64 | 57 |
| Piauí | 61,130 | 550 | 440 | 379 | 185 | 194 | 16 | 14 |
| Ceará | 191,934 | 1,727 | 1,382 | 1,190 | 305 | 885 | 74 | 66 |
| Rio Grande do Norte | 54,925 | 494 | 395 | 340 | 75 | 265 | 22 | 20 |
| Paraíba | 76,109 | 685 | 548 | 472 | 57 | 415 | 35 | 31 |
| Pernambuco | 157,417 | 1,417 | 1,133 | 976 | 359 | 617 | 51 | 46 |
| Alagoas | 77,029 | 693 | 555 | 478 | 50 | 428 | 36 | 32 |
| Sergipe | 44,094 | 397 | 317 | 273 | 65 | 208 | 17 | 15 |
| Bahia | 270,293 | 2,433 | 1,946 | 1,676 | 106 | 1,570 | 131 | 117 |
| **Southeast** | **1,432,683** | **12,894** | **10,315** | **8,881** | **3,387** | **5,494** | **458** | **408** |
| Minas Gerais | 341,012 | 3,069 | 2,455 | 2,114 | 786 | 1,328 | 111 | 99 |
| Espírito Santo | 60,396 | 544 | 435 | 374 | 52 | 322 | 27 | 24 |
| Rio de Janeiro | 283,220 | 2,549 | 2,039 | 1,756 | 230 | 1,526 | 127 | 113 |
| São Paulo | 748,055 | 6,732 | 5,386 | 4,637 | 2,319 | 2,318 | 193 | 172 |
| **South** | **477,539** | **4,297** | **3,438** | **2,960** | **1,480** | **1,480** | **123** | **110** |
| Paraná | 187,348 | 1.686 | 1,349 | 1,161 | 777 | 384 | 32 | 29 |
| Santa Catarina | 101,717 | 915 | 732 | 631 | 104 | 527 | 44 | 39 |
| Rio Grande do Sul | 188,474 | 1,696 | 1,357 | 1,168 | 599 | 569 | 47 | 42 |
| **Central West** | **244,757** | **2,202** | **1,762** | **1,518** | **660** | **858** | **71** | **63** |
| Mato Grosso do Sul | 40,937 | 368 | 295 | 254 | 143 | 111 | 9 | 8 |
| Mato Grosso | 57,700 | 519 | 415 | 358 | 49 | 309 | 26 | 23 |
| Goiás | 95,662 | 861 | 689 | 593 | 413 | 180 | 15 | 13 |
| Distrito Federal | 50.458 | 454 | 363 | 313 | 55 | 258 | 21 | 19 |
| **BRAZIL** | **3,584,579** | **32,259** | **25,806** | **22,221** | **6,924** | **15,297** | **1,274** | **1,136** |

Table 4. Frequency and investment in congenital heart surgery 1999/2002

| YEAR | 1999 | 2000 | 2001 | 2002 | Mean |
|---|---|---|---|---|---|
| Frequency | 6,315 | 6,799 | 7,063 | 6,924 | 6,775 |
| Investment | 47,460,786.56 | 39,462,882.04 | 45,950,398.96 | 47,736,793.74 | 45,152,715.33 |

Source: DATASUS, Brazilian Health Ministry

Table 5. Distribution of Investments in Congenital Heart Surgery 2002

| Region | Need card. Surg | Govern (86,1%) Govern | Surg made Govern | Def. Surg Govern | % Def. Govern | Need of invest 0 to 1 year 50% (R$ 7,733.51) | Need of invest 1 to 4 years 50% (R$ 6.794,25) | Forecasted invest. | Valor invested | Deficit of annual invest. | Deficit of monthly invest. | % Deficit of Invest. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North | 2,092 | 1,801 | 119 | 1,682 | 93,4 | 6,964,025.76 | 6,118,222.14 | 13,082,247.89 | 756,024.28 | 12,326,223.61 | 1,027,185.30 | 94.2 |
| Northeast | 6,665 | 5,739 | 1,278 | 4,461 | 77,7 | 22,191,306.95 | 19,496,100.39 | 41,687,407.33 | 7,641,428.78 | 34,045,978.55 | 2,837,164.88 | 81.7 |
| Southeast | 9,404 | 8,097 | 3,387 | 4,710 | 58,2 | 31,309,115.24 | 27,506,521.14 | 58,815,636.37 | 23,129,559.86 | 35,686,076.51 | 2,973,839.71 | 60.7 |
| South | 3,241 | 2,791 | 1,480 | 1,311 | 47 | 10,792,113.21 | 9,481,375.89 | 20,273,489.09 | 11,952,197.14 | 8,321,291.95 | 693,441.00 | 41.0 |
| Central west | 1,675 | 1,442 | 660 | 782 | 54,2 | 5,575,860.71 | 4,898,654.26 | 10,474,514.97 | 4,257,583.68 | 6,216,931.29 | 518,077.61 | 59.4 |
| Brazil | 23,077 | 19,870 | 6,924 | 12,946 | 65,2 | 76,832,421.87 | 67,500,873.80 | 144,333,295.65 | 47,736,793.74 | 96,596,501.91 | 8,049,708.49 | 66.9 |

Source: DATASUS, Brazilian Health Ministry

About 20.4% of CHD patients are treated in the adult phase. The data in Table 6 demonstrate that the costs with surgical treatment vary according to the age of the patient.

For under 1-month-old babies, the mean cost is 8,275.06 Brazilian Reals and is related to the prevalence of diseases associated to high morbidity.

Between 5 and 12 years, the costs diminish to as little as 6,246.53 Brazilian Reals. It is important to remember that congenital heart diseases in this age range present with lesser complexity and repercussions, a fact that can be attributed to the natural evolution of the diseases, with patients with more complex defects not surviving to an older age.

Table 6. Frequency and cost of Congenital Cardiovascular Surgeries/age group – 2002

| Age group | Freq. | % | % by age group | Cost (R$) | Cost (R$) per surgery |
|---|---|---|---|---|---|
| under 01 month | 574 | 8.3 | 79.6 | 4,749,886.68 | 8,275.06 |
| 01 month to 01 year | 1,364 | 19.7 | | 10,237,367.54 | 7,505.40 |
| 01 to 04 years | 1,818 | 26.3 | | 12,351,938.55 | 6,794.25 |
| 05 to 12 years | 1,329 | 19.2 | | 8,301,637.11 | 6,246.53 |
| 13 to 18 years | 426 | 6.2 | | 2,728,331.76 | 6,404.53 |
| 19 to 40 years | 808 | 11.7 | 20.4 | 5,221,806.78 | 6,462.63 |
| 40 to 80 years and | 605 | 8.7 | | 4,145,825.32 | 6,852.60 |
| older | 6,924 | 100.0 | 100.0 | 47,736,793.74 | 6,894.40 |
| Total | | | | | |

Source: DATASUS, Brazilian Health Ministry

The variations in the frequencies from 1999 to 2002 in cardiovascular surgery, pacemaker, hemodynamics and pediatric cardiovascular surgery were 12.3%, 40.8%, 78.1% and 9.6%, respectively. In the same period investments presented a percentage variation in cardiovascular surgery (54.8%), pacemakers (136.9%), hemodynamics (122.7%) and pediatric cardiovascular surgery (0.6%) as can be seen in Table 7.

Table 7. Variations in frequencies and investments 1999/2002

| Procedure | % Frequency | % Investment |
|---|---|---|
| Cardiovascular surgery | 12.3 | 54.8 |
| Pacemakers | 40.8 | 136.9 |
| Hemodynamics | 78.1 | 122.7 |
| Pediatric cardiovascular surgery | 9.6 | 0.6 |

Source: SAS, Brazilian Health Ministry

In 1999 the mean cost for each CHD cardiovascular surgery was 7,515.60 Brazilian Reals and by 2002 this cost was 6,894.40 Reals, that is a drop of -8.3%.

Using an official inflation index (IPCA index - IBGE) as a base for calculation for the re-composition of investments in the CHD sector during the years 1999, 2000, 2001, 2002 and 2003, increases of 8.9399%, 5.97433%, 7.67326%, 12.53033% and 7.21644% respectively would be necessary, that is 11,271.72 Brazilian Reals per operation. It is important to point out that during this period there was an evolution of medicines and equipment (new technology) making this deficit even more pronounced in the investment in the area of pediatric surgery.

After discussing these data with an official in the Brazilian Health Ministry, the Services for More Complex Assistance in Pediatric Cardiovascular Surgery were created.

These services will be registered with one service for every 800 thousand inhabitants with ages less than 18 years. Thus, it is expected that there will be around 90 services for CHD in the country.

Also a Brazilian Register of Cardiovascular Surgery was created, with a special section for CHD, which should provide analysis of the quality of the services, as well as the possibility of resizing the sector.

The growth in the number of procedures depends basically on the investment, soon an individual analysis will be defined based on this study.

**** US dollar equivalent to 3.1 Brazilian Reals at publication (25/06/2004)***