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## **Fellowship profile:**

Customising ANACONDA and  
strengthening the quality of  
mortality data in Brazil

February 2019



*Applying country experiences and knowledge*



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# Fellowship profile: Customising ANACONDA and strengthening the quality of mortality data in Brazil

Between August and September 2017, Ana Cláudia Medeiros de Souza, from the Ministry of Health, Brazil, spent time at the Swiss Tropical and Public Health (Swiss TPH) Institute, University of Basel, to translate into Portuguese the mortality and cause of death assessment tool, ANACONDA. She then came to the University of Melbourne in September 2018 to translate the newly-developed *ANACONDA Mortality Data Quality Assessment Report* template and adapt it for use at the sub-national level in Brazil. This fellowship profile documents Ana's experiences while at Basel and Melbourne, including what she worked on, what new skills she learned, and what impact these resources might have on improving the quality of mortality and cause of death data in Brazil.

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## Country context

The North and Northeast regions of Brazil have the worst health outcomes.

Brazil is an upper-middle income country, with five administrative regions comprised of over 5,500 municipalities, twenty-six states and a Federal District, with a total population of 207.7 million (**Figure 1**).<sup>1</sup> Most of the population lives in urban areas, with São Paulo, Rio de Janeiro and Salvador constituting Brazil's major cities. Of the five regions, the North and Northeast are the poorest and most underdeveloped in the country, with the worst health outcomes. The South and Southeast regions are the wealthiest and have the best health indicators in the country. The Central-West region has intermediate health indicators.<sup>2</sup>

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<sup>1</sup> The World Bank (2018). *Country data: Brazil*. Available at: [data.worldbank.org/country/brazil](http://data.worldbank.org/country/brazil)

<sup>2</sup> United Nations Development Program, Institute of Applied Economic Research and João Pinheiro Foundation. *[Atlas of Human Development in Brazil: collection of articles]*. Brasilia, Brazil: United Nations Development Program; 2015. Available at: <http://www.br.undp.org/content/dam/brazil/docs/IDH/undp-br-PremioAtlasDoDesenvolvimentoHumanoNoBrasil-2016.pdf>

**Figure 1 Map of Brazil (States indicated)**



Source: [https://www.researchgate.net/profile/Niklas\\_Danielsson/publication/303946807/figure/fig2/AS:372849299738626@1465905608419/Regions-and-states-in-Brazil.png](https://www.researchgate.net/profile/Niklas_Danielsson/publication/303946807/figure/fig2/AS:372849299738626@1465905608419/Regions-and-states-in-Brazil.png)

**The CRVS system of Brazil**

Brazil has made great strides to build on the strengths of its CRVS system.

The Civil Registrar and the MoH are key CRVS stakeholders.

In the past four decades, Brazil has made huge efforts to strengthen its civil registration and vital statistics (CRVS) system and improve the skills of its staff. The CRVS system has several identified strengths, including a high level of registration completeness, a long history with physician-coded verbal autopsy (VA) and a strong culture of monitoring the quality of cause of death (COD) data.

Key stakeholders in the CRVS system include the Civil Registrar and the Ministério da Saúde, Brasília (Ministry of Health, Brazil). The Ministry of Health (MoH) maintains two information systems parallel to those of the Civil Registrar to capture births and deaths: the Live Birth Information System (Sistema de Informação sobre Nascidos Vivos, SINASC), with three million reported live births each year, and the Mortality Information System (Sistema de Informação sobre Mortalidade, SIM), with approximately 1.2 million reported deaths each year.

These information systems generally capture more births and deaths than the Civil Registrar system, due to active searches of non-official cemeteries (cemeteries maintained by poor rural communities), notary registry offices, health centres and Brazil’s Family Health Program to pinpoint underreporting of deaths. Linking of the records between health information systems also improves completeness and quality of mortality data.



## Quality of mortality data

Accurate medical certification practices are crucial for Brazil.

Brazil has medium-low quality of mortality data due to poor death certification practices.

Reliable and accurate information on the causes of death in a population is essential for public health decision-making. The accuracy of mortality statistics depends heavily on the quality of cause of death (COD) information in medical death certificates completed by physicians. In large, middle income countries such as Brazil, having high coverage and high-quality medical death certificates are always major challenges.

Despite regional differences, there has been great progress in improving the completeness of mortality data, which was around 80 per cent in 2000.<sup>2</sup> However, as many as one-third of deaths are being assigned an unusable or insufficiently specified underlying cause (commonly referred to as 'garbage').<sup>3</sup> In an international review of information systems on mortality and COD statistics, Brazil, despite high completeness of death registration (70–100 per cent), was defined as having medium to low quality of data. This is because the underlying COD is inadequately completed on most of the certificates, with a high proportion of garbage codes (**Box 1**).<sup>4</sup>

### Box 1. What are garbage codes?

Garbage codes (also referred to as insufficiently specified and unusable codes) have no use in informing public health policy, as the related underlying cause of death (UCOD) is too vague or simply impossible.<sup>5</sup> Garbage codes bias the true pattern of mortality in a country, as it is unlikely they would be equally or proportionally distributed across the disease categories used in analysing COD data. Hence, the data will not represent the true health status of the population.

According to the 2010 Global Burden of Disease Study, garbage codes can generally be divided into four categories:

- **Category 1** – causes that cannot or should not be considered as underlying causes of death, such as 'essential primary hypertension' (which should be considered a risk factor) and codes used to describe health services
- **Category 2** – Intermediate causes, such as heart failure, septicaemia and peritonitis
- **Category 3** – Immediate causes, such as cardiac arrest and respiratory failure
- **Category 4** – Insufficiently specified causes within International Classification of Diseases (ICD) chapters. Although these may still allow for aggregation of causes for a category, not including the site of the cancer or the factor that caused the injury, for example, make these causes useless for public health preventions.<sup>6</sup>

3 Ishitani L, et al. [Quality of mortality statistics' information: garbage codes as causes of death in Belo Horizonte, 2011-2013]. *Revista Brasileira de Epidemiologia* 2017; 20(Suppl 1):34-45.

4 Mahapatra et al, on behalf of the Monitoring Vital Events (MoVE) writing group. Civil registration systems and vital statistics: successes and missed opportunities. *The Lancet* 2007; 370(9599): 1653-1663.

5 Mikkelsen L, et al. *Redefining 'garbage codes' for public health policy: report on the expert group meeting, 27–28 February 2017*. CRVS technical outcome series. Melbourne, Australia: University of Melbourne, Civil Registration and Vital Statistics Improvement, and Bloomberg Philanthropies Data for Health Initiative; 2018.

6 Naghavi M, et al. Algorithms for enhancing public health utility of national causes-of-death data. *Population Health Metrics* 2010; 8:9.



ANACONDA is a tool for checking the quality of mortality data.

## Analysis of Causes of National Deaths for Action, ANACONDA

ANACONDA is an easy-to-use electronic tool designed to help users analyse the quality of routine mortality datasets to understand if the data are fit for purpose. ANACONDA is designed around 10 steps, some with numerous sub-steps, that users are advised to follow in sequence. These 10 steps can be grouped into four broad categories:

1. data inputs and general background checks (step 1)
2. mortality data (steps 2–5)
3. COD data (steps 6–9)
4. overall data quality index: VSPI(Q) (step 10).

To diagnose possible problems in the mortality input dataset, ANACONDA performs the following operations/analyses:

- Tabulates and/or graphs the input data in different ways to assess the plausibility of the data based on fundamental demographic and epidemiological relationships.
- Calculates the proportion and type of unusable COD codes that are of limited or no value for public health analysis.
- Compares the input data (or some summary measure of them) to a global source of demographic and epidemiological estimates for the country, or geographic region, to assess consistency.
- Allows users to monitor annual changes in the quality of the dataset through VSPI(Q).

To assess plausibility, the national mortality data for a country are compared with the most recent estimates for that country or a neighbouring region. Most of the comparators are from the GBD study prepared by the Institute for Health Metrics and Evaluation (IHME) in Seattle.<sup>7</sup>

## The fellowship project

Ana is a statistician at the MoH, and her unit is responsible for the SIM and SINASC.

Ana is a statistician. She has completed a specialization course in Policy and Health Care Management and has a master's degree in Public Health Policies. She currently works at the General Coordination of Information and Epidemiological Analysis, MoH, which is responsible for the coordination, supervision and maintenance of the SIM and SINASC information systems. Her unit also provides technical advice to states, municipalities and the Federal District regarding SINASC, SIM and the use of epidemiology to support decision-making for public health; among others.

As part of the D4H Initiative in Brazil, Ana has been involved in many of the interventions, including translating and teaching the ANACONDA course. The aim of Ana's fellowship project was to:

- Translate the ANACONDA tool into Portuguese and, in collaboration with the developers at Swiss TPH, work on improvements to enhance the visual display of outputs
- Modify and translate the *Mortality Data Quality Assessment Report* template developed by the University of Melbourne, for use at the sub-national level in Brazil.

<sup>7</sup> For more information, see <http://www.healthdata.org/gbd>

Ana's translated version of the template can be used at the sub-national and national levels.

To provide participants with a tangible output from ANACONDA training workshops and develop a practical resource that countries can use as part of routine monitoring and evaluation, a Mortality Data Quality Assessment Report template was developed, based on the 10 steps used in ANACONDA.

As well as providing valuable comments on the draft version of the report template, including several enhanced tables and graphs, Ana translated the template into Portuguese. The template has also been modified for use at the sub-national level, or to compare national data over time.<sup>8</sup>

## Reflections: take home lessons

Anyone can use ANACONDA to look for errors in their data.

### The utility of ANACONDA

Ana reflected on how ANACONDA is a simple tool to use, meaning that anyone can use it to identify errors and inconsistencies in their data. While much work has been done on reducing poorly determined 'R codes', Ana commented how the tool is able to highlight other challenges, such as reducing the use of codes that have little use in policy.

The translated version of ANACONDA can be used across all Brazilian States.

### Translating ANACONDA makes it more accessible

After completing the first phase of her fellowship, Ana returned to Brazil and shared the translated version of ANACONDA with colleagues during the meeting on *Strengthening the quality of information on causes of death in Brazil*, held in October 2017.<sup>9</sup> Ana commented how, following ANACONDA's translation into Portuguese, the States in Brazil will not only be able to use it more easily, but will also be able to understand what the tool offers them. This is especially important in Brazil as it is the States who will be responsible for acting and improving the quality of mortality and cause of death data.

The template will be useful for routine activities of States and municipalities.

### The new template can be used routinely

After translating and modifying the *Mortality Data Quality Assessment Report* template, Ana also shared this resource in a new meeting held in November 2018. Ana noted that the use of this report template in routine activities of the States and municipalities will result in better descriptions and interpretations of ANACONDA results. This will in turn shape local strategies for improving the quality of mortality data, especially in regard to completeness and underlying cause of death data.<sup>10</sup>

<sup>8</sup> A copy of the translated template is available at <https://crvsgateway.info/Building-CRVS-capacity-and-skills--88> ('ANACONDA - Relatório de avaliação da qualidade dos dados sobre mortalidade').

<sup>9</sup> Meeting report available at <https://crvsgateway.info/file/7181/2341>

<sup>10</sup> A copy of the full report, which provides a detailed description of the health situation and mortality profile for each state and the Federal District, including key outputs from ANACONDA, is available at <http://svs.aids.gov.br/dantps/centrais-de-conteudos/publicacoes/saude-brasil/saude-brasil-2018-analise-situacao-saude-segundo-perfil-mortalidade-estados-brasileiros-distrito-federal.pdf> (in Portuguese).



## Benefits for CRVS system development in Brazil

ANACONDA can pinpoint areas in need of improvement as Brazil strengthens its CRVS system.

Throughout her fellowship, Ana did crucial work that will allow her Brazilian colleagues to make use of ANACONDA to a fuller extent. For a large and diverse country such as Brazil, it is key that CRVS stakeholders are able to use tools like ANACONDA to highlight exactly the areas that need more attention and improvement. It is through efforts like Ana's fellowship that will assist Brazil in improving the quality of mortality information, providing decision-makers with accurate, timely information to guide health policy and program decisions.



## Related resources and products

### University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Library

<https://crvsgateway.info/library>

*CRVS country overview: Brazil.* CRVS summaries.

*Fellowship profile: Investigating garbage codes to improve mortality statistics in Brazil.* CRVS development series.

*Guidance for assessing and interpreting the quality of mortality data using ANACONDA.* CRVS resources and tools.

*Improving vital statistics for informed policy: The importance of data quality.* CRVS development series.

*Intervention: Medical certification of cause of death.* CRVS summaries.

*Intervention: Mortality coding.* CRVS summaries.

### University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Learning Centre

<https://crvsgateway.info/learningcentre>

Topic 4: Cause of death in CRVS.

Topic 6: CRVS tools – ANACONDA mortality data quality assessment tool.

### University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Courses

<https://crvsgateway.info/courses>

Analysis of Causes of (National) Deaths for Action.

Medical certification of cause of death.

The program partners on this initiative include: The University of Melbourne, Australia; CDC Foundation, USA; Vital Strategies, USA; Johns Hopkins Bloomberg School of Public Health, USA; World Health Organization, Switzerland.

Civil Registration and Vital Statistics partners:



## For more information contact:

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