CRVS COUNTRY PERSPECTIVES

Fellowship profile:
Investigating garbage codes to improve mortality statistics in Brazil

May 2018

Applying country experiences and knowledge

Resources available from the University of Melbourne, Bloomberg Philanthropies Data for Health Initiative

CRVS development series

Concise and easily accessible, the CRVS development series form a lasting archive of synthesised evidence and knowledge on strengthening CRVS systems as generated through the Initiative. The content of this series is based on a combination of technical knowledge, country experiences, as well as the scientific literature. The series is intended to stimulate debate and ideas for in-country CRVS policy, planning and capacity building, and promote the adoption of best practice to strengthen CRVS systems world-wide.

CRVS technical outcome series

This series focuses on filling a range of scientific knowledge gaps offering new tools, methods, findings and approaches for CRVS systems and data improvement. The series has a strong empirical focus, reporting on works in progress, particularly for large or complex technical initiatives, or on specific components of projects that may be of more immediate relevance to stakeholders.

CRVS resources and tools

Capacity-building resources and tools are designed to influence and align CRVS processes with established international or best-practice standards and to help countries improve their systems. These resources, which are used extensively in the Initiative's training courses, aim to change practice and ensure countries benefit from such changes by developing critical CRVS capacity among technical officers and ministries.

CRVS country perspectives

CRVS country perspectives describe the capacity-building experiences and successes of strengthening CRVS systems in partner countries, including fellowship reports. The series describes the state of CRVS systems improvement in partner countries and lessons learnt, and provides a baseline for comparison over time and between countries.

CRVS action guides and summaries

Many papers from the development and technical outcome series have accompanying action guides or summaries, which provide a succinct overview of key points and, in the case of action guides, a suggested way forward for countries.

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Suggested citation

Fellowship profile: Investigating garbage codes to improve mortality statistics in Brazil

Between January and February 2018, Raquel Barbosa de Lima, from the Department of Health Situation Analysis, Ministry of Health, Brazil, came to the University of Melbourne to receive support in analysing data from a pilot study that investigated key attributes of deaths with ill-defined and unusable causes of death, and corresponding 'garbage codes'. This fellowship profile document's Raquel's experiences while at Melbourne, including what she worked on, what she learned, and what impact this might have on improving the quality of mortality statistics in Brazil.

> The North and Northeast regions have some of the worst health outcomes and low rates of registration completeness.

Country context

Brazil, a participating Latin-American country in the Bloomberg Philanthropies Data for Health (D4H) Initiative, is an upper-middle income country, with five administrative regions comprised of twenty-six states and a Federal District, with a total population of 207.7 million.[1] Most of the population lives in urban areas, with São Paulo, Rio de Janeiro, and Salvador constituting Brazil's major cities.

According to the *United Nations Human Development Report 2016,[2]* Brazil's Human Development Index (HDI) was classified as 'high' in 2015, with a life expectancy of 76 years.[1] Of the five regions, the North and Northeast are the poorest and most underdeveloped in the country, with the lowest HDI. The South and Southeast regions are the wealthiest and have the best health indicators in the country. The Center-West region has intermediate health indicators.[3]

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1   The World Bank Group. Brazil country data. 2018. Available at https://data.worldbank.org/country/brazil

2   United Nations. Human Development Report 2016: Human Development for Everyone. 2016. Available at http://hdr.undp.org/sites/default/files/HDR2016_EN_Overview_Web.pdf

3   Vasconcelos A, Franca E. Measuring adult mortality in Brazil: improving quality of cause of death data. 2011.

Figure 1 Map of Brazil (States indicated)

Source: Maps of the World, available at https://www.mapsofworld.com/brazil/brazil-political-map.html

The CRVS system of Brazil

Key stakeholders in the Brazil CRVS system include the Civil Registrar (CR) and the Ministry of Health (MoH). Completeness of both births and deaths registered by the CR is very high (above 95 per cent).[4] Although national completeness estimates are high, completeness varies by region, with the North and Northeast regions reporting the lowest levels. A number of measures have been taken to improve registration of vital events including making registration of vital events and the issuance of first certificates free of charge.

The MoH maintains two information systems parallel to those of the CR to capture births and deaths: the Live Birth Information System (SINASC) for births, with three million live births reported annually, and the Mortality Information System (SIM) for deaths, with approximately 1.2 million deaths reported annually.[5] These information systems generally capture more births and deaths than the CR system, due to a number of 'active' processes, such as searches of records from illegal cemeteries, notary registry offices, health centres, and Brazil's Family Health Program to improve under-reporting of deaths. Record linkages between health information systems also improve completeness and quality of mortality data.

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4   Ministry of Health. *Brazil Ministry of Health: Bloomberg Data for Health Initiative Work Plan*. Unpublished; 2016.
5   Ibid

All deaths in Brazil are required to be medically certified by a physician and coded to the ICD-10.

The MoH is the principal agency responsible for capturing and publishing cause of death data. All deaths in the country are legally required to have medical certification of cause of death by a physician using the International Form of Medical Certificate of Cause of Death, mortality coding is in accordance with the International Classification of Diseases and Related Health Problems, 10th revision (ICD-10),[6] and nearly 100 per cent of deaths captured by the MoH information system have a medically certified cause of death.

In 2015 (based on data from 2012), an international study concluded that Brazil's Vital Statistics Performance Index (VSPI) is "high" and that Brazil produces good quality but not excellent mortality data;[7] with substantial disparities in completeness and quality of data at the sub-national level. In 2013, deaths with an unusable or ill-defined cause collectively represented 34 per cent of all deaths (**Box 1**).[8]

A garbage code has no use in informing public health policy.

Box 1: How do garbage codes affect mortality data?

The use of ill-defined and unusable (often referred to as 'garbage') codes to classify causes of death can threaten the utility of mortality data. A garbage code has no use in informing public health policy, as the related underlying cause of death is too vague or simply impossible for the specific age and sex group of the deceased. Garbage codes include any code that:

■ cannot, or should not, represent an underlying cause of death – for example, septicaemia, senility, or headache

■ represents a symptom or condition that belongs in some other part of the sequence of events leading to death

■ insufficiently specifies a cause of death.

Garbage codes bias the true pattern of mortality in a country, given that they are unlikely to be proportionally distributed across the disease categories used in analysing cause of death data. As such, the data will not represent the true health status of the population.[9]

A top priority of the MoH is to reduce the number of deaths assigned to a garbage code.

Addressing garbage codes

The MoH considers the improvement of COD data – specifically, reducing deaths with unusable or ill-defined causes coded to 'garbage codes' – as one of its top priorities. Deficiencies in the quality of mortality data are due to a variety of factors: a quarter of deaths in Brazil occur outside of health facilities (where it is difficult to ascertain the most probable underlying cause of death), geographic barriers to certification for rural populations that do not have access to physicians, and poor medical certification in some areas.

6   World Health Organization. *International Statistical Classification of Diseases and Related Health Problems, 10th revision, vol. 2, 10th edn*. Geneva, Switzerland: WHO; 2016.

7   Mikkelsen L, et al. A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. *Lancet* 2015; 386:1395-1406

8   França E, et al. Ill-defined causes of death in Brazil: a redistribution method based on the investigation of such causes. *Public Health Practice* 2014; 48(4):671-681.

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

Applying country experiences and knowledge

The Ministry continuously monitors cause of death data and investigates deaths with a garbage code.

In response, the MoH continuously monitors cause of death data and employs several strategies to improve data quality. Coding of death certificates is done manually as well as using an automated coding system designed specifically for Brazil. In cases where the two methods yield different causes of death, a specialist committee determines the appropriate underlying cause. Deaths that are assigned a 'garbage code' are investigated by the MoH using a combination of autopsy, medical records reviews, and physician-certified verbal autopsy (PCVA) (**Box 2**). In line with their commitment to improving mortality statistics, the MoH has set a target of reducing garbage codes to 10 per cent by 2020, initially focusing on those codes related to causes of death with the highest potential to impact policy and allocation of resources.[10]

Box 2: What is verbal autopsy?

Verbal autopsy (VA) is a method for collecting information about an individual's signs and symptoms prior to their death from their family or next of kin, and interpreting these to diagnose the likely or most probable cause of death.[11] The principal purpose of a VA is to describe the cause composition of mortality through the estimation of cause-specific mortality fractions (CSMFs). Verbal autopsy also serves as a cost-effective tool for filling the gaps in mortality data.

The VA process consists of three basic steps:

1. Setting up an interview by a trained VA staff member at the household level (or other appropriate place).

2. Conducting a structured interview to collect information on signs and symptoms of illnesses, and events that the deceased suffered before death.

3. Interpreting the interview data to diagnose the most probable cause of death (either by physicians or computer algorithms).

The aim of Raquel's fellowship project was to analyse data from a pilot study investigating the characteristics of deaths assigned a garbage code.

The fellowship project

As a key member of the Department of Health Situation Analysis at the Ministry of Health, Raquel is committed to improving the quality of data on causes of death in Brazil. Her fellowship project involved reviewing and analysing the data produced from a critical study in Brazil – a pilot study in seven cities that investigated the factors contributing to garbage codes, why such cases occur, and difficulties faced by teams working with cause of death data.

Raquel stressed the importance of knowing not only how to collect data, but how to analyse it. With the University of Melbourne's support, she assessed the results of the study, presented them in the most effective way, and will use the lessons learned to develop strategies for interventions in other parts of Brazil. The fundamental purpose of this project, Raquel added, was to use the information provided by the study to improve Brazil's health status.

Raquel came across a number of surprising findings from the pilot study. Initially, she remarked, she had imagined that the majority of the garbage codes would come from deaths that occurred at home. After reviewing the results, however, she found that the majority of the cases came from hospitals. This is in line with other studies that have shown poor quality of cause of death data from hospitals.[12,13]

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10   Ministry of Health. *Brazil Ministry of Health: Bloomberg Data for Health Initiative Work Plan*. Unpublished; 2016.

11   de Savigny D, et al. Integrating community-based verbal autopsy into civil registration and vital statistics (CRVS): system-level considerations. *Global Health Action* 2017; 10:1272882.

12   Rampatige R, Mikkelsen L, Hernandez B, Lopez AD. Systematic review of statistics on causes of deaths in hospitals: strengthening the evidence for policy-makers. *Bulletin of the World Health Organization 2014*; 92:807-816.

13   Lloyd J, et al. Using national inpatient death rates as a benchmark to identify hospitals with inaccurate cause of death reporting – Missouri, 2009–2012. *Morbidity and Mortality Weekly Report 2017*; 66:19-22.

Another finding that surprised Raquel was the quality of information contained in hospital medical records. Although she had initially thought that garbage codes were due to the poor quality of medical records (or a complete lack of records, in some cases), the pilot study revealed that the records were not only of good quality, but were thorough and detailed, allowing for easier ascertainment of cause of death. This may indicate that the garbage codes are a result of poor certification practices by physicians, rather than poor medical records, however this will need more follow-up.

Reflections: take-home lessons

Importance of pilot studies

When asked about what lessons Raquel learned during her time with the University, she underscored the importance of conducting pilot studies before rolling out any interventions at the national level. A pilot study, she remarked, provides an evidence base for how to introduce interventions within municipalities, identifies activities that should be scaled up nationally, and activities that should be introduced at another time.

Involving local teams

Another lesson was the importance of involving local teams to carry out activities as part of an intervention. Raquel highlighted that it is critical for local actors to take part in pilot studies so that they develop a comprehensive understanding of the process, and are prepared for potential changes to their work processes in the future, as activities implemented as part of pilot studies become part of routine duties.

Moving forward

Regarding her return to Brazil, Raquel stated that her plan was to disseminate the pilot study findings - and what data analysis skills she had learned - with her colleagues as well as other sectors involved. In the future, Raquel hopes that other technicians from the MoH (and later on, professionals from Brazil's individual states) will have the opportunity to travel to Melbourne to learn from the team, as doing so will maintain a comprehensive vision of how cause of death data are steadily improving.

Benefits for CRVS system development in Brazil

The knowledge and experience gained as part of her fellowship will enable Raquel and the Ministry to build a scientific evidence-base to inform plans for national scale-up. Based on results of the pilot, if the MoH decides to extend their routine investigations into garbage codes nationally, the proportion of deaths assigned an ill-defined or unusable cause and garbage code will decline; improving the quality and representativeness of cause of death data, as well as the vital statistics available for policy. Results from the pilot will also be used at a planned stakeholder meeting with State and local governments, who will fund the cost of implementing the system as part of national scale-up, and so need to see the benefits of doing so.

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Related resources and products

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

https://crvsgateway.info/library

CRVS country overview: Brazil. CRVS summaries.

Intervention: Automated verbal autopsy. CRVS summaries.

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

Intervention: Mortality coding. CRVS summaries.

Redefining 'garbage codes' for public health policy: Report on the expert group meeting, 27-28 February 2017. CRVS technical outcome series.

Strategies for improving the quality of cause of death data in hospitals. CRVS development series.

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

https://crvsgateway.info/learningcentre

Topic 1: Introduction to CRVS.

Topic 4: Cause of death in CRVS.

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

https://crvsgateway.info/courses

ICD-10 coding.

Medical certification of cause of death.

SmartVA.

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Further reading

Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380:2095–2128.

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

Sutra S, et al. Evaluation of causes-of-death: which statistics should we rely on, hospital deaths or vital statistics? *Journal of the Medical Association of Thailand* 2012; 95:S262-273.

Teviu EAA, Aikins M, Abdulai TI et al. Improving medical records filing in a municipal hospital in Ghana. *Ghana Medical Journal* 2012; 46:136-141.

World Health Organization. Medical records manual: a guide for developing countries. Geneva, Switzerland: WHO; 2002.

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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:

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