

Summary: Innovative approaches to strengthen the capture and quality of mortality data in Brazil

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Background

Brazil has implemented several measures to improve the registration of vital events. Although national registration completeness estimates are high, completeness varies by region. Further, the quality of cause of death (COD) data needs improvement, with 30 per cent of all deaths in 2013 attributed to an insufficiently defined or unusable code (often referred to as 'garbage codes').¹ Factors contributing to the poor quality of mortality data include geographic barriers to certifying COD for rural populations and poor medical certification in some areas. As a result, the Ministry of Health (MoH) continually holds the improvement of the quality of COD data as a top priority.

The Government of Brazil partnered with the Bloomberg Philanthropies Data for Health (D4H) Initiative to develop a series of research-based interventions to improve the quality and efficiency of capturing COD data. This paper summarises the activities implemented which aimed to improve the quality of COD data by reducing the use of garbage codes.

Strengthening the collection of cause of death data to decrease the use of garbage codes

In 2016, a pilot study found that most garbage codes on death certificates were due to ill-defined conditions, and unspecified or ill-defined cardiovascular diseases. The codes came mainly from hospital records rather than from records of home deaths. The study also found that it was often feasible to reassign the garbage code to an appropriate underlying COD by performing a medical records review.

Given the success of the 2016 pilot study, the project was expanded in 2017 to 60 cities, aiming to reclassify the underlying COD for at least 70 per cent of the death certificates investigated in hospitals with the highest percentage of garbage codes.² Three activities were implemented as part of this expanded project:

1. Developing a new garbage code study protocol to evaluate death certificates
2. Training doctors on correctly filling out death certificates
3. Assessing the accuracy of mortality data from forensic institutes.

Activity 1: Developing a new garbage code study protocol

As well as expanding the scale of the project, the new garbage code study protocol improved upon the methods used in the pilot study by randomly selecting medical records. In order to avoid a potential selection bias (where hospital records that are easily available are the ones selected for investigation), medical records associated with garbage-coded deaths were selected randomly for review.

Additionally, the re-classified cause of death was certified using the concept of three levels of evidence to certify the reclassified causes of death as: definitive, probable or possible, based on methods from Serina et al and the gold standard clinical diagnosis criteria they developed.³

Finally, a hospital-specific investigation form and an instruction manual were developed to help the researchers, medical certifiers, coders and vigilance team involved in the investigation.

1 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.

2 While all cities are aiming to reclassify 100 per cent of garbage codes, the lower limit of 70 per cent was chosen to avoid over-penalising larger cities, who have a higher proportion of garbage codes, but fewer health professionals to review the medical certificates.

3 Serina P. et al. A shortened verbal autopsy instrument for use in routine mortality surveillance systems. *BMC Medicine* 2015; 13:302.

Activity 2: Training doctors on correctly filling out death certificates

The 2016 pilot study showed that around 90 per cent of garbage codes were reassigned to more specific underlying CODs after analysing hospital records. This indicates that hospitals could provide the tools for diagnosis, but the physicians were not adequately trained to correctly complete the death certificate.⁴

In Brazil, it is a legal requirement for physicians to complete a death certificate. However, the records are often of low quality. The quality of the death certificate depends on:⁵

- The physicians being trained properly on medical certification
- How long the physicians have been practicing
- The time dedicated to completing the certificate
- The diagnostic support available in clinical settings.

The first intervention as part of this activity was a standardised lecture that provided information to physicians about the main garbage codes used in Brazil and the steps to correctly fill out the medical death certificate. The physicians were also given practical exercises. The MoH developed a handbook for the training, and the Brazilian Medical Council was suggested as an educational resource.⁶

However, the effectiveness of the training must also be evaluated, which was the aim of the second intervention. To verify the effectiveness of these training activities, the quality of death certificates filled out by the physicians before and at least three months after the training, were compared. Two independent investigators classified the quality of each medical death certificate, using an assessment tool developed by the University of Melbourne⁷ and modified to incorporate the social demographic data physicians have to include in the Brazilian medical death certificate. Each medical death certificate was scored from 0 to 10, according to the 10 error types outlined in the tool.

Activity 3: Assessing the accuracy of mortality data from forensic institutes

Interpersonal violence is a major public health problem in Brazil, representing the second highest COD and the sixth highest reason for hospital admissions. Homicides and traffic accidents are the main causes in Brazil, whereas suicides and deaths in armed conflicts predominate in the rest of the world.⁸ Despite decreasing in absolute numbers, deaths due to violence still occur at alarming rates, and have risen from seventh to second place as one of the leading underlying CODs in Brazil between 1990 and 2015.⁹

The lack of information about the circumstances and injuries resulting in death is a limiting factor for analysing mortality due to violence in Brazil. To correctly identify violent deaths, the flow of information is from hospitals and police departments, to forensic institutes, to health departments.

Since the 1990s, studies of official statistics on external CODs have warned of the questionable quality of medical death certificates. These studies cite coroner behaviour as the main factor contributing to this poor quality – they only record the nature of the trauma or injury that led to death (such as blunt trauma or hemorrhage), without referring to the true or presumed underlying COD. The World Health Organization defines the true underlying COD as the ‘type of accident or violence that caused the injuries that led to death’. The coroners do not transcribe data about the violent event, although this information is generally available.¹⁰

This activity set out to determine the proportion of garbage codes reclassified during 2014 after the databases of the forensic institutes and the Police Department in the State of Rio de Janeiro were linked. Researchers evaluated all the underlying CODs defined as garbage codes from coroner-issued medical death certificates from the State of Rio de Janeiro in 2014. They defined garbage codes as all deaths grouped in the ICD-10 R codes (Chapter 18), unspecified accidents, external causes of undetermined intent and other causes of violent death.

A deterministic data linkage was performed on deaths for external causes of undetermined intent and natural deaths of undetermined cause between the Health Information System, the Forensic Institute, Civil Police, Urgent Mobile Care Service, and press databases.¹¹

4 Marinho F, et al. *Investigation of garbage codes to improve cause-of-death statistics in Brazil: results of a pilot study in seven cities* (abstract). 28th International Population Conference; Cape Town, South Africa; November 2017.

5 Laurenti R, Mello Jorge MHPd. *[The death certificate]* São Paulo, Brazil: Conselho Regional de Medicina do Estado de São Paulo; 2015.

6 Brazil. Ministério da Saúde, Conselho Federal de Medicina. *A declaração de óbito, documento necessário e importante (Série A. Normas e Manuais Técnicos) [Death certificate: necessary and important document]*. (Série A. Standards and Technical Manuals); Brasília, Brazil: Ministério da Saúde; 2006. Available at: http://svoi.fmrp.usp.br/documentos/declaracao_obito.pdf

7 Rampatige R, et al. *Assessing the quality of death certificates: guidance for the rapid tool. CRVS resources and tools*. Melbourne, Australia; Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, University of Melbourne; 2018.

8 Reichenheim M, et al. Violence and injuries in Brazil: the effect, progress made, and challenges ahead. *The Lancet* 2011; 377(9781):1962-1975.

9 França EB, et al. Cause-specific mortality for 249 causes in Brazil and states during 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Population Health Metrics* 2017; 15:39.

10 Mello Jorge MHPd. [Present situation of official statistics related to death from external causes]. *Revista de Saúde Pública* 1990; 24(3):217-223.

11 Souza ERD, et al. [Quality of information on violence: a way to build citizenship]. *Informare - Cadernos do Programa de Pós-Graduação em Ciências da Informação*, Rio de Janeiro, 1996; 2(1):104.

Of the 13,916 deaths from external causes, deaths from causes of undetermined intent dropped from 5,836 (41.9%) to 958 (6.9%). Among 2,069 deaths from indeterminate natural causes, 222 (10.7%) were reclassified to external causes. There was an increase in mortality due to transport accidents (93.0%), aggressions (71.6%), legal intervention (744.7%), self-inflicted injuries (112%) and other accidents (29.9).¹²

Approximately two-thirds of the deaths occurring at health facilities, home or on a public highway were able to be reclassified to a correct underlying COD and corresponding ICD-10 code (**Figure 1**). A similar pattern was seen when the certificates were analysed according to age group (**Figure 2**).

Figure 1 Proportion of external deaths assigned a garbage code, before and after investigation, by locale of death, Brazil, 2014

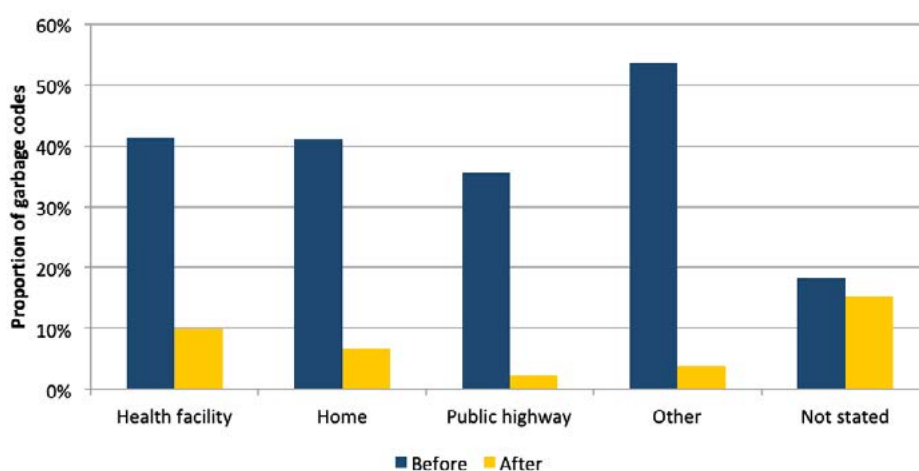
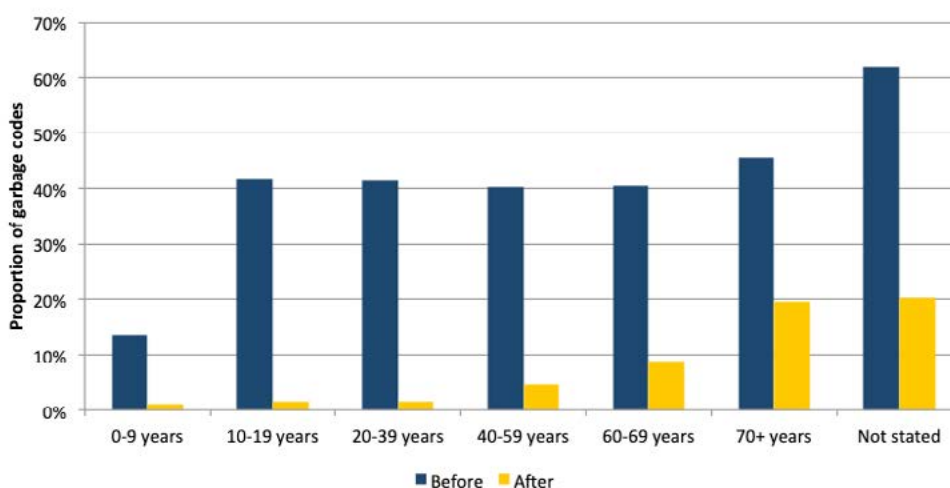


Figure 2 Proportion of external causes of death assigned a garbage code, before and after investigation, by age group of deceased, Brazil, 2014



¹² Lopes et. Al. 2018. "Improvement of data quality on the underlying cause of death from external causes using Health, Public Security and Press sector database linkage in the State of Rio de Janeiro, Brazil, 2014." *Revista Epidemiologia e Serviços de Saúde*, 27(4):e2018058, Brasília.

Conclusion

In Brazil the rates of completeness of birth and death registration are high overall, though there is substantial regional variation. However, the quality of the cause of death (COD) data recorded needs improvement as around one-third of the recorded causes are assigned 'garbage codes' when coded using the WHO ICD-10. Training doctors to correctly fill out medical certificates of death and performing evaluations of records with garbage codes was successful in improving the quality of COD information. Additionally, linking databases from various institutions and investigating deaths for external causes of undetermined intent and natural deaths of undetermined cause improved the quality of data for causes of external deaths and greatly decreased the proportion of external deaths that were assigned an unusable garbage code.

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