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CRVS Fellowship profile

Analysing the quality of
cause of death data in Shanghai

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

CRVS course prospectuses

These resources outline the context, training approach, course content and course objectives for the suite of CRVS trainings delivered through the Bloomberg Philanthropies Data for Health Initiative. Each course focuses on a specific CRVS intervention or concept, and is designed to support countries to strengthen their CRVS systems and data.

CRVS Fellowship reports and profiles

The CRVS Fellowship Program aims to build technical capacity in both individuals and institutions to enhance the quality, sustainability and health policy utility of CRVS systems in Fellows' home countries. *Fellowship reports* are written by Fellows as a component of the program, and document, in detail, the research outcomes of their Fellowship. *Fellowship profiles* provide a summary of Fellows' country context in relation to CRVS, an overview of the Fellowship experiences, the research topic and the projected impact of findings.

CRVS analyses and evaluations

These analytical and evaluative resources, generated through the Initiative, form a concise and accessible knowledge-base of outcomes and lessons learnt from CRVS initiatives and interventions. They report on works in progress, particularly for large or complex technical initiatives, and on specific components of projects that may be of more immediate relevance to stakeholders. These resources have a strong empirical focus, and are intended to provide evidence to assist planning and monitoring of in-country CRVS technical initiatives and other projects

CRVS best-practice and advocacy

Generated through the Initiative, CRVS best-practice and advocacy resources are based on a combination of technical knowledge, country experiences and scientific literature. These resources are 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 worldwide.

CRVS country reports

CRVS country reports describe the capacity-building experiences and successes of strengthening CRVS systems in partner countries. These resources describe the state of CRVS systems-improvement and lessons learnt, and provide a baseline for comparison over time and between countries.

CRVS technical guides

Specific, technical and instructive resources in the form of *quick reference guides*, *user guides* and *action guides*. These guides provide a succinct overview and/or instructions for the implementation or operation of a specific CRVS-related intervention or tool.

CRVS tools

Interactive and practical resources designed to influence and align CRVS processes with established international or best-practice standards. 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.

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Melbourne School of Population and Global Health
Building 379
207 Bouverie Street
Carlton, VIC 3053
Australia

CRVS-info@unimelb.edu.au
www.mspgh.unimelb.edu.au/dataforhealth

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Author

Dr Chen Jun, Department of Vital Statistics, Shanghai Putuo District Center for Disease Control and Prevention .

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Fellowship profile: Analysing the quality of cause of death data in Shanghai

From January to March 2019, Dr Chen Jun from the Department of Vital Statistics at the Shanghai Putuo District Center for Disease Control and Prevention (SCDC) undertook a Civil Registration and Vital Statistics (CRVS) Fellowship at the University of Melbourne (UoM), analysing the quality of cause of death data in Shanghai, China. This profile provides an overview of country context in relation to CRVS, and documents Chen Jun's personal fellowship experiences and outcomes and the broader impact her Fellowship might have on improving the quality of mortality data in Shanghai.

Country context

The CRVS system of Shanghai

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Related resources and readings

Country context

Shanghai is the most populous city in the world, and China the most populous country.

An upper-middle income country with a population of around 1.4 billion, China is the world's most populous country, with nearly 60% of its population living in urban areas.¹ According to China National Human Development Report 2016, China has made impressive progress in human development over recent decades, as reflected in improvements in key indicators like poverty reduction, income, health, education, and socio-political participation.²

Located on the eastern coast of China, Shanghai is composed of 16 districts, and its population of about 24 million makes it the most populous city in the world.³ Of its total population, 14 million are registered permanent residents, whilst 10 million are a 'floating population' - migrants residing in Shanghai for less than 6 months who are ineligible for permanent resident registration.⁴

Shanghai is one of two cities participating in the Bloomberg Philanthropies Data for Health (D4H) initiative, with the aim of improving its civil registration and vital statistics (CRVS) system.

1 The World Bank Group. China country data. 2019. Available at <https://data.worldbank.org/country/china>

2 United Nations Development Programme (UNDP). China National Human Development Report 2016: Social Innovation for Inclusive Human Development. Beijing, China; Development Research Center of the State Council of China: 2016.

3 Shanghai Economic and Social Development Statistical Bulletin 2016. Available from: <http://www.stats-sh.gov.cn/sjfb/201702/293816.html>

4 Shanghai Centre for Disease Control. Bloomberg Philanthropies Data for Health Initiative Work Plan. Unpublished; 2017.



The CRVS system of Shanghai

The SCDC surveillance system is responsible for collecting birth and death data.

China's Center for Disease Control and Prevention (CDC) works with the central government to coordinate the country's public health system at several levels: provincial, municipal, and district.⁵ The Shanghai Municipality Center for Disease Control (SCDC) surveillance system covers all districts in Shanghai and is responsible for health data collection as well as the birth and death registry.⁶

The SCDC system is fully computerised and electronically records vital events, such as births and deaths, in real-time.⁴ Over 98% of births occur in hospitals in Shanghai, where, upon delivery, birth certificates are issued to parents who then take the certificate to the local police station to register the birth.⁷

For deaths, physicians complete death certificates for deaths that occur both at home and in-hospital using the International Form of Medical Certificate of Cause of Death, with death data sent electronically to the SCDC within 72 hours of the death occurrence.⁴ When a death occurs at home, family members notify the local Public Security Office, Civil Affairs Office, and Community Health Centers (CHC). CHC physicians then conduct a variant of a verbal autopsy (VA) (**Box 1**) interview via a 20-minute structured interview with the decedent's family members, and where possible, conduct a medical record review to conclude probable cause of death (COD).⁴

Box 1. What is verbal autopsy (VA?)

Verbal autopsy 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 COD.⁸ 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. Studies suggest that VA can provide population-level COD data similar in quality and reliability to MCCOD in hospitals.⁹

Gaps in the SCDC system include missing information on home deaths.

Although the SCDC surveillance system is efficient and functional, there are still several areas of uncertainty. Some vital events, particularly amongst infant, elderly, and 'floating' populations, go unreported.^{4,6} Efficient death registration amongst the 'floating' population is a challenge, meaning that death registration in Shanghai is likely to be incomplete.⁴ Moreover, a high proportion of deaths occur at home (about 35%), for which COD accuracy is difficult to determine.⁶ Approximately six percent of deaths with a COD have an ill-defined cause.⁴

5 Wang LD, Wang Y, Yang GH, Ma JQ, Wang LP, Qi XP. China Information System for Disease Control and Prevention. National Bureau of Asian Research: Center for Health and Aging. Available at <http://pacifichealthsummit.org/downloads/HITCaseStudies/Functional/CISDCP.pdf>

6 The University of Melbourne. *CRVS country overview: Shanghai*. CRVS action guides and summaries. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, The University of Melbourne; 2016. Available at https://crvsgateway_info.myudo.net/file/9760/136

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

9 Hernández B, Ramírez-Villalobos D, Romero M, et al. Assessing quality of medical death certification: concordance between gold standard diagnosis and underlying cause of death in selected Mexican hospitals. *Population Health Metrics* 2011; 9:38.



Improving mortality data

The SCDC is determined to improve the quality of mortality statistics.

The SCDC and other stakeholders have demonstrated a strong commitment to improving the quality of mortality statistics generated by the surveillance system, as well as the accurate analysis of vital statistics data. D4H together with SCDC, the Department of Public Security, the Department of Civil Affairs, and the Department of Family Planning have discussed and selected a suite of interventions and trainings aimed at improving the quality of mortality data as well as the skills and capabilities of coders and other SCDC staff who are responsible for the collection, coding, analysis, and dissemination of mortality data.⁴

A key focus of Shanghai’s CRVS improvement strategy is to increase the quality of mortality statistics generated by the surveillance system.⁴ Focusing on the quality of mortality statistics will help to ensure that the surveillance system captures high-quality data for deaths occurring in health facilities, and will enhance the reliability of COD data by improving the quality of medical certification of cause of death for facility-based deaths (**Box 2**).

Box 2. What is medical certification of cause of death?

When a patient dies in a hospital or health facility, a medical certificate of cause of death (COD) should be completed.¹⁰ The medical death certificate is usually completed by a physician who attended to the patient or a physician who is familiar enough with the patient’s medical history to confidently ascertain the COD.¹¹ To certify a death, the physician must first identify the disease or injury leading directly to death, and then trace back the sequence of events to determine the underlying COD.¹¹

- 10 The University of Melbourne. *Strategies for improving the quality of cause of death data in hospitals*. CRVS development series. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, University of Melbourne; 2017.
- 11 Lomas HD, Berman JD. Diagnosing for administrative purposes: some ethical problems. *Social Science and Medicine* 1983; 17:241-244.
- 6 The University of Melbourne. *Strategies for improving the quality of cause of death data in hospitals*. CRVS development series. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, The University of Melbourne; 2017.
- 7 Lomas HD, Berman JD. Diagnosing for administrative purposes: some ethical problems. *Social Science and Medicine* 1983; 17:241-244.
- 8 de Savigny D, Riley I, Chandramohan D, et al. Integrating community-based verbal autopsy into civil registration and vital statistics (CRVS): System-level considerations. *Global Health Action* 2017; 10:1272882
- 9 Hernández B, Ramírez-Villalobos D, Romero M, et al. Assessing quality of medical death certification: concordance between gold standard diagnosis and underlying cause of death in selected Mexican hospitals. *Population Health Metrics* 2011; 9:38.
- 10 Senanayake, CH. Fellowship profile: Country-specific adaptation of a SmartVA DHIS2 integration module for Sri Lanka. CRVS country perspectives. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, the University of Melbourne and Ministry of Health, Nutrition and Indigenous Medicine, Sri Lanka; 2019.
- 11 University of Melbourne. *Challenges associated with automated VA training and rollout*. CRVS development series. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, The University of Melbourne; 2018.

The CRVS Fellowship project

As manager of the Department of Vital Statistics at the SCDC, Chen Jun plays a key role in birth and death surveillance in the Putuo District of Shanghai, including death data collection and analysis, data quality control, production of reports and policy recommendations, and organisation of MCCOD training for physicians.

Whilst in Melbourne, Chen Jun focused her fellowship project on the analysis of the quality of COD data in Shanghai's Putuo District. She was particularly interested in learning how to make decisions to ascertain underlying COD, given that her role involves checking death certificates for certification errors, and so she learned how to use various methods (from validation metrics of sensitivity to CSMF accuracy) to assess the data quality of underlying COD data from the SCDC surveillance system.

Reflections: take-home lessons

Tools for making decisions on cause of death

Chen Jun remarked that throughout her Fellowship, she learned how to use tools such as decision tables to make decisions on assigning COD - tools she now uses in her daily work. Decision tables tell her which diseases cause other diseases, and thereby, which underlying COD may be most accurate for a particular death.

Importance of death certification training

Chen Jun noted that a key challenge in Shanghai is the various understandings of COD between clinical physicians and coders. If a person dies of pneumonia, she noted, the physician filling in the death certificate may write 'pneumonia' as the COD. However, this means that the underlying COD has not been determined, since there are several diseases - from cancer to diabetes - which may cause pneumonia. Chen Jun believes that training on proper death certification processes can help inform physicians on the importance of ascertaining underlying CODs as part of their routine certification duties.

Sharing knowledge is essential for CRVS improvement

In order to continue making progress on improving the quality of COD data - and CRVS improvement more generally - Chen Jun highlighted the importance of sharing knowledge, observing that only through regular communication between colleagues and peers are CRVS personnel are able to learn from each other's experiences.

Benefits for CRVS system development in Shanghai

As China seeks to optimise its health services to serve its population, improvements in COD data will be critical. Accurate COD data can be used to allocate resources efficiently, ensuring that the country's most prevalent diseases are prevented, managed, and treated. Upon her return to Shanghai, Chen Jun will be able to pass on new knowledge and skills to her colleagues. As this knowledge is shared, and changes implemented, Shanghai will emerge as an example of CRVS improvement for the rest of China.

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:

CRVS-info@unimelb.edu.au
crvsgateway.info

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