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DATA FOR HEALTH INITIATIVE

CRVS COUNTRY PERSPECTIVES

Fellowship profile:
Country-specific adaptation of a SmartVA DHIS2 integration module for Sri Lanka

February 2019

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.

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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.

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CRVS country perspectives describe the capacity building experiences and successes of strengthening CRVS systems in partner countries, including fellowship reports. The series serves to describe the state of CRVS systems improvement in partner countries, lessons learnt, and provide 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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Fellowship profile: Country-specific adaptation of a SmartVA DHIS2 integration module for Sri Lanka

Between July and September 2018, Chamika Senanayake, from the Ministry of Health, Nutrition and Indigenous Medicine (MoHNIM), came to the University of Melbourne to receive support in developing a SmartVA DHIS2 integration platform that would streamline all manual CRVS data flow processes into a single automated process in Sri Lanka. This fellowship profile documents Chamika's experiences whilst at Melbourne, including what he worked on, what he learned, and what impact this might have on strengthening CRVS in Sri Lanka.

Country context

Sri Lanka has some of the highest social indicators in South Asia.

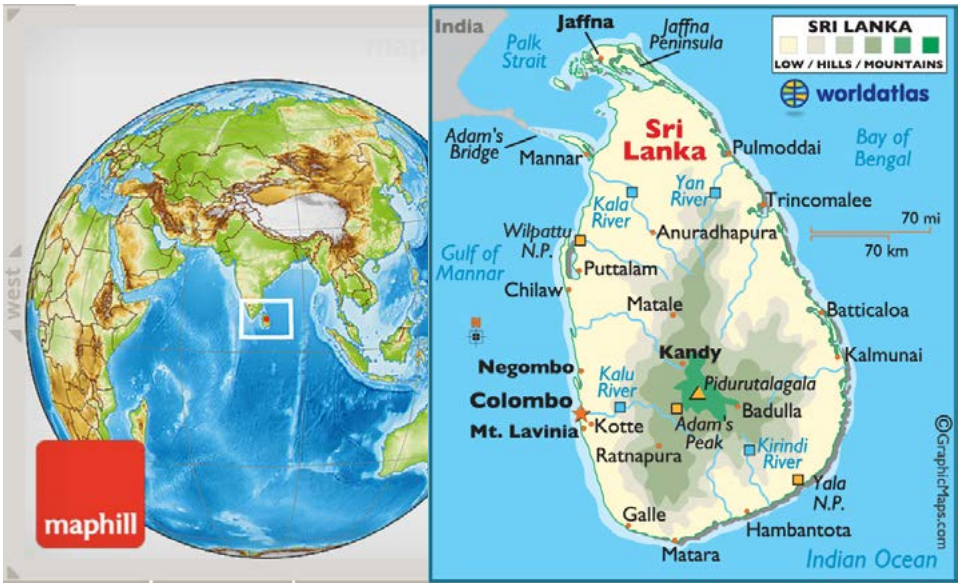
Sri Lanka, a participating country in the Bloomberg Philanthropies Data for Health (D4H) Initiative, is a lower middle-income country of nine administrative provinces and twenty-five districts, with a population of 21.4 million people.[1] Sri Lanka is transitioning from a predominantly rural-based economy to a more urbanised one as manufacturing and services industries grow.

Sri Lanka has made significant strides in its socioeconomic and human development indicators,[1] with the United Nations Human Development Report 2016 classifying the country's Human Development Index (HDI) as 'high' in 2015.[2] Social indicators rank among the highest in South Asia, comparing favourably with other middle-income countries.[1] Sri Lanka's national poverty headcount ratio has declined down to 4.1 percent in 2016 from 15.3 percent in 2006/7, with extreme poverty remaining rare and concentrated in some geographical pockets.[1]

1 The World Bank Group. Sri Lanka country data. 2018. Available at https://www.worldbank.org/en/country/srilanka/overview

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

Figure 1. Map of Sri Lanka



Source: Adapted from Maphill, available at http://www.maphill.com/atlas/8n00-80e45/maps/physical-map/, and World Atlas, available at https://www.worldatlas.com/webimage/countrys/asia/lgcolor/lkcolor.htm

The CRVS system of Sri Lanka

Sri Lanka has high birth and death completeness rates.

In November 2014, Sri Lanka committed fully to UNESCAP's Regional Action Framework on CRVS covering the period of 2015-2024, an action representing not only a high-level political commitment to civil registration and vital statistics (CRVS)-strengthening, but also recognition of the essential value CRVS systems offer for health and social policy- and decision-making.[3] Sri Lanka has a well-established CRVS system dating back to the British colonial period, with birth, death, and marriage registration remaining a firmly established practice.[4] This is reflected in high birth and death completeness rates, which sit at 97 and 100 percent respectively.[3]

Cause of death data in Sri Lanka needs improvement.

There are a few areas in need of improvement, however, as indicated in assessments of the CRVS system carried out in 2009. These assessments described the CRVS system as 'functional but inadequate', and highlighted the need for improvement in the quality and validity of cause of death (COD) data.[5] These weaknesses in COD data mean that the mortality statistics produced by the CRVS system (which rely on accurate COD data) are also low in quality, resulting in the country's low Vital Statistics Performance Index (0.36 in 2006) (**Box 1**). In short, this means that the Ministry of Health lacks access to accurate, reliable COD data for evidence-based health policy and planning purposes.

3 Sri Lankan Ministry of Health, Nutrition and Indigenous Medicine & Registrar General's Department. Sri Lanka Ministry of Health, Nutrition and Indigenous Medicine: Bloomberg Data for Health Initiative Work Plan. Unpublished; 2016.

4 Gaminrathra KHW. Trends in causes of death in Sri Lanka: 1971-1979, Colombo, Sri Lanka: Population Information Centre, Ministry of Plan Implementation; 1984.

5 Gamage et al. Assessing the production, quality and use of national vital statistics: a case study of Sri Lanka. 2009. www.uq.edu.au/hishub

Box 1. The Vital Statistics Performance Index

The Vital Statistics Performance Index (VSPI) is a summary measure of the performance of vital statistics systems in generating reliable mortality data. VSPI scores range from 1 (excellent) to 0 (very poor). It includes six dimensions of system performance as measured through:

- Quality of cause of death reporting
- Quality of age and sex reporting
- Internal consistency
- Completeness of death reporting
- Level of cause-specific detail
- Data availability/timeliness.[6]

Some incentives for registration are entrenched in legislation.

The Ministry of Health, Nutrition and Indigenous Medicine (MoHNIM) is a central institution in Sri Lanka's health system.[3] Working alongside the MoHNIM is the Registrar General Department (RGD), which was established in 1867 and, is responsible for registering vital events – like births and deaths – and for overseeing all delegated government personnel engaged in registration.[7] Death registration incentives are also entrenched in legislation, where the Birth and Death Registration Act of 1954 mandates that Sri Lankan citizens must register a death before a burial or cremation can lawfully take place.[6] Government-managed cemeteries also request a death certificate (including a stated COD) from the family before lawfully proceeding with burials or cremations.

Several factors have contributed to the high completeness of death registration.

As vital event registration has become decentralised, district and divisional authorities control registration procedures. This means that families can obtain death certificates from their local village Registrar of Births and Deaths at no cost given that the family provides proof of death. In the case of health facility deaths, proof of death is in the form of a death declaration from a hospital. In the case of community deaths, proof of death is in the form of death notification completed by the Village Officer (*Grama Niladhari*).[6,8] The RGD also tasks the Additional District Registrars to monitor that all deaths – hospital and community – in their district are registered with the local Registrar of Births and Deaths.[6]

In short, the following factors have contributed to the impressive high level of death registration completeness in Sri Lanka: the availability and accessibility of the Registrar of Births and Deaths throughout Sri Lanka, the ability for families to obtain death certificates at no cost combined with laws against burial or cremation with death certificates – and enforcement of this law by government-run cemeteries – and the retrieval of COD data by the RGD.

6 Phillips DE, Lozano R, Naghavi M, et al. A composite metric for assessing data on mortality and causes of death: the vital statistics performance index. Population Health Metrics 2014; 12:14.

7 University of Melbourne. Sri Lanka: Strengthening the quality and availability of mortality statistics, CRVS country perspectives. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, The University of Melbourne; 2018.

8 Sri Lanka Birth and Death Registration Act of 1954. An Act to amend and consolidate the law relating to the registration of births, deaths and still-births. Part V Registration of Deaths and Still-births in certain areas.

Automated verbal autopsy

The MoHNIM and RGD's goal of improving the quality of mortality statistics depends on reducing the amount of unusable COD data for community deaths through introducing automated verbal autopsy (VA), also known as SmartVA, to ascertain the probable cause of death (**Box 2**).

Box 2. What is verbal autopsy?

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 cause of death (COD).[9] 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.[10]

The VA process consists of three steps:

1. Setting up an interview by a trained VA staff member at the household level (or another 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 COD (historically, this was done by physicians, however automated methods are now widely available).

Because physician-certified VA can be time-consuming and costly, particularly in settings where physicians may not be available, automated methods of analysing VA questionnaire data have been developed. These methods often use a digital tablet and have several clear advantages over VA questionnaires in paper form, from reducing data entry errors to speeding up the interview process.[11]

Public health midwives conducted SmartVA interviews.

In late 2016, a pilot phase of SmartVA interviews began in three districts with distinct sociodemographic characteristics and anticipated mortality profiles. Within the three districts, VA interviewers collected data in seven selected MoHNIM areas. Public health midwives (PHMs) were selected as best-placed to conduct the interviews given their crucial role in the primary health care system covering every village in the country. PHMs' routine home visits and community knowledge also made them ideal candidates for SmartVA roll-out. PHMs are supervised by physicians serving the role of Medical Officer of Health.[8]

As part of this initial phase, a link had to be established between the Additional District Registrars and the MoHNIM to facilitate a monthly transfer of names of local households in which a death has occurred. This information is necessary to prompt a VA interview. The Development Officer at the MoHNIM then held the responsibility of obtaining the list of deaths from the Additional District Registrars, allocating the deaths to PHMs for VA follow-up, and verification of administrative data and completed VAs.[8]

9 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.

10 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.

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.

Although the word 'automated' may suggest otherwise, numerous technical processes have to be completed manually before CSMFs of a given dataset are generated. For example, all VA interview data collected on the server database must first be downloaded as a CSV (comma-separated) file, and then run through an analytical tool, in order to generate CSMF graphs.

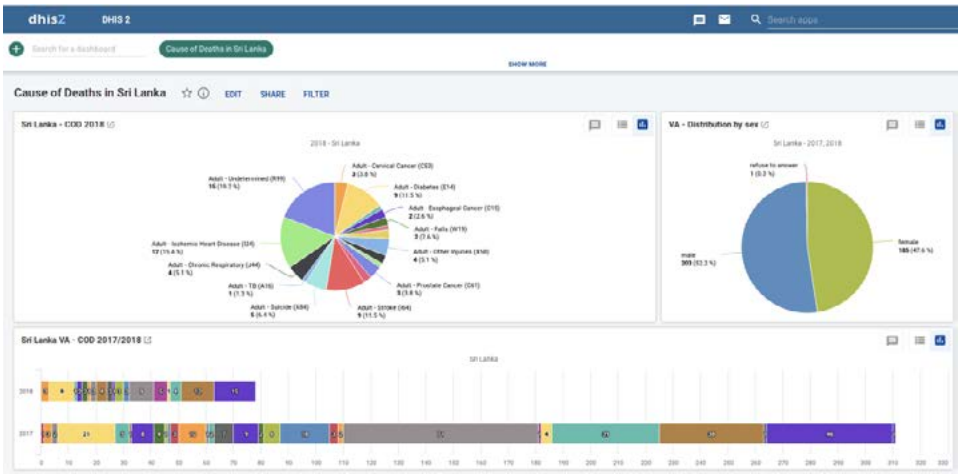
The fellowship project

The aim of Chamika's fellowship was to develop a country-specific adaptation of an integrated SmartVA DHIS2 platform.

Chamika's time in Melbourne was focused around the development of a SmartVA DHIS2 integration platform to streamline all manual processes into a single automated process. District Health Information System 2 (DHIS2) is a free and open-source tool used to aggregate statistical data collection, validation, analysis, management, and presentation.[12] DHIS2 can also be used to monitor patient health, disease surveillance, map disease outbreaks, and speed up access to health data for health facilities and government organisations.[8] DHIS2 is currently used in more than 67 countries. Sri Lanka is, however, one of the first countries to pioneer the use of a module integrating DHIS2 and SmartVA.

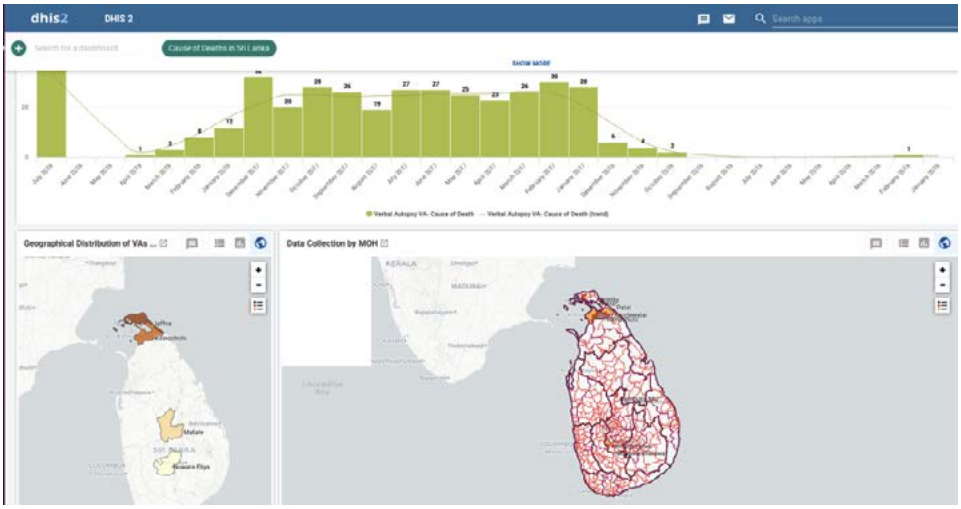
As part of the development of an integration module, user-specific customised DHIS2 dashboards can be created. Dashboards display data such as COD distribution for Sri Lanka in 2018, VA distribution by sex for 2017-18 (see **Figure 2** for an example using sample data). Other dashboards allow for the comparison of VA data collected in 2017-18, and the geographical distribution of the data (**Figure 3**). These dashboards can be customised, shared, and even embedded on websites and updated in real-time. There is the potential for data to be shared across multiple other DHIS2 platforms, whilst maintaining privacy and confidentiality, which would allow countries to integrate VA data with national health systems in a manner that adheres to data exchange standards.

Figure 2. SmartVA-DHIS2 dashboard for Sri Lanka, COD and VA sample data



12 Open Health News. DHIS2 (District Health Information System 2). Open Health Marketplace, 2016. Available at http://www.openhealthnews.com/resources/dhis2-district-health-information-system-2

Figure 3. SmartVA-DHIS2 dashboard for Sri Lanka, VA sample data and distribution



SmartVA DHIS2 integration will streamline CRVS data flow.

Integrating SmartVA and DHIS2 represents a step that will allow users to visualise, analyse, and disseminate data whilst simultaneously monitoring VA data collected in real-time. Chamika believes that the integration module has great potential for streamlining CRVS data flow, providing country-specific dashboards that in turn will allow policymakers to create health interventions based on up-to-date VA data.

Reflections: take-home lessons

Automating a data flow is complex

Chamika emphasised that the automation process was not as simple as it seemed. He noted the difficulty of automating a data flow which was already in operation, requiring many tests to ensure that the automated outputs produced were accurate. Another challenge was customising the integration module for a country-specific environment, given that software set-ups, networks protocols, and server environments vary from country to country. As a result, Chamika learned that adapting the integration module to a specific country – where a data flow already exists – can be a time-consuming process involving trial and error.

Although the automation process was complex, Chamika developed several strategies for addressing challenges.

Addressing complexities

Chamika's fellowship also provided scope for him to develop ways of addressing the challenges. His basic approach included conducting a thorough analysis of existing data flows, i.e. what type of data, where and when the data are generated, where does the data go, and when they should be delivered. This was done so that Chamika could create an automation workflow for the data. Following this analytical phase, Chamika mentioned that research was an important step in the automation process. Researching already-existing patterns of automation can help with creating new ones.

One size does not fit all

SmartVA DHIS2 integration requires consistent, careful troubleshooting and testing.

Implementing the SmartVA DHIS2 integration module will require some maintenance. Chamika stated that a single solution will not work in every instance, and countries may experience some technical drawbacks to do with the module. This means that countries must carry out periodical bug-fixes to ensure that the module performs in all server environments. Given these technical challenges, Chamika emphasised the importance of test-driven troubleshooting – a time-consuming but necessary process. Without proper troubleshooting, for example, a script may continue to run with few or no error messages, but the product will not be as expected. The tester must then review to script to find the faulty code.

Moving forward

As interest in DHIS2 grows, other countries can look to Chamika's project as a blueprint.

Following his fellowship, Chamika submitted his SmartVA DHIS2 integration project at the 3rd Commonwealth Digital Health Conference & Awards. After presenting the project and being assessed by a panel of judges, in October 2018, Chamika was awarded the winner within the category of 'health promotion and health education'.

Chamika looks forward to continuing his work on data-driven health interventions in Sri Lanka. The exponential growth of DHIS2 implementations across the globe means that many countries converge on their interests in adopting DHIS2 as their primary public health platform. The SmartVA DHIS2 integration script represents a step towards allowing CRVS stakeholders to visualise, analyse, interpret, and disseminate VA data whilst monitoring data collection in real-time.

Benefits for CRVS system development in Sri Lanka

Chamika's time in Melbourne was a fruitful one. The experience he gained whilst developing the integration module will be invaluable to the Sri Lankan MOH, and his project represents a great leap forward for CRVS technology. The SmartVA DHIS2 integration module will streamline the flow of CRVS data in Sri Lanka, allowing for data to be aggregated and shared in a timely manner. In short, this module will provide policymakers with timely, reliable COD data which can be used to form evidence-based health interventions and programs.

Related resources and products

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

https://crvsgateway.info/library

Action guide on automated VA training and rollout. CRVS action guide.

Challenges associated with automated VA training and rollout. CRVS development series.

CRVS country overview: Sri Lanka. CRVS summaries.

Developing a mobile app for doctors to improve the recording of cause of death in Sri Lanka. CRVS summaries.

Improving the quality of mortality statistics in Sri Lanka. CRVS summaries.

Intervention: Automated verbal autopsy. CRVS summaries.

SmartVA DHIS2 integration. Video.

SmartVA: Interviewer's manual. CRVS resources and tools.

SmartVA: Technical user guide (V1.0). CRVS resources and tools.

Sri Lanka: Strengthening the quality and availability of mortality statistics. CRVS development series.

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

https://crvsgateway.info/learningcentre

Topic 3: CRVS processes.

Topic 4: Cause of death in CRVS.

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

https://crvsgateway.info/courses

SmartVA.

Further reading

de Savigny D, Riley I, Chandramohan D, Odhiambo F, et al. Integrating community based verbal autopsy into civil registration and vital statistics (CRVS): system-level considerations. *Global Health Action* 2017; 10(1): 1272882.

Flaxman A, Stewart A, Joseph JC, Alam N, et al. Collecting verbal autopsies: improving and streamlining data collection processes using electronic tablets. *Population Health Metrics* 2018; 16:3.

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CDC Foundation
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