THE UNIVERSITY OF MELBOURNE

Bloomberg Philanthropies

DATA FOR HEALTH INITIATIVE

IMPROVING CAUSE OF DEATH INFORMATION

Introducing automated verbal autopsy: Responding to technological and transcultural adaptation challenges

CRVS Development Series

August 2017

Target audience

Government policy-makers, in-country CRVS staff, CRVS partners, medical professionals and teaching institutions, health-related ethicists and legal experts, academic institutions.

Description

Concise and easily accessible, the *CRVS Development Series* form a lasting archive of synthesised evidence on topics related to CRVS systems and data strengthening. The content of this series is based on a combination of international standards and guidelines, Bloomberg Philanthropies Data for Health Initiative technical knowledge, country (and comparative country) experience, 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.

Other products available from the Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies Data for Health Initiative:

Resources and Tools

Capacity-building *Resources and Tools* are designed to assist countries improve their systems and to influence and align CRVS practice with established international or best practice standards. These resources, which are used extensively in Bloomberg Philanthropies Data for Health Initiative training courses, aim to both change practice and ensure countries benefit from such changes, by developing critical CRVS capacity among technical officers and ministries.

CRVS Technical Outcome Series

The 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 Country Stories

CRVS Country Stories describe the capacity building experiences and successes of strengthening CRVS systems in partner countries. The series serves to describe the state of CRVS systems improvement in partner countries, lessons learnt, and provides a baseline for comparison over time and between countries.

CRVS Roadmaps for Action

CRVS Roadmaps for Action present a succinct overview of the wide-spectrum of common issues and challenges in CRVS systems and provide a suggested way forward for countries. This series is intended to inform health system dialogue in and between countries and a range of development partners.

Acknowledgements

Hafiz Chowdhury, Sonja Firth, Gulshan Ara Khanom, Rajitha Lakmali Jayasuriya, Avita Streatfield, Claire Brolan, University of Melbourne. Joan Sara Thomas, Martin Bratschi, Philip Setel, Vital Strategies.

Published by the Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies Data for Health Initiative

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

+61 3 9035 6560
CRVS-info@unimelb.edu.au
mspgh.unimelb.edu.au/dataforhealth

Made possible through funding from Bloomberg Philanthropies
www.bloomberg.org

Abbreviations

BD4H	Bloomberg Philanthropies Data for Health Initiative
COD	cause of death
CSMFs	cause-specific mortality fractions
CRVS	civil registration and vital statistics
IT	information technology
LMICs	low- and middle-income countries
MCCOD	medical certification of cause of death
PHMRC	Population Health Metrics Research Consortium
VA	verbal autopsy
WHO	World Health Organization

Purpose of this paper

This CRVS Development Series paper explains what verbal autopsy (VA) and automated VA is, as well as identifies and discusses some of the challenges associated with the introduction of automated VA data collection. The specific challenges that this paper focuses on relate to those that might potentially arise during the translation and transcultural adaptation of the questionnaire and technological challenges related to non-Roman (Latin) scripts. This paper can therefore serve as a useful resource for governments and partner agencies, especially in low- and middle-income countries, looking to implement VA on a digital tablet or smartphone to be used by community-based health workers such as midwives and health assistants.

Key points

- Accurate medical certification of cause of death is key for producing reliable mortality data, which health departments need for evidence-based policy and planning efforts.
- In many countries, however, most deaths occur away from hospitals, in the home or in areas without physicians, or in health facilities with limited diagnostic capacity. It is important countries ensure these deaths are captured and do not go unreported.
- It is also important these types of deaths have a medically certified cause, even if they are registered. But when people die outside of hospitals, it can be difficult to know what they died from.
- To help overcome this information gap, the *Bloomberg Philanthropies Data for Health Initiative* is offering a comprehensive training and support package to countries wishing to implement automated VA.
- VA is a method for determining the most likely cause of death based on information collected from care-givers or family members about the signs and symptoms experienced by the deceased in the period before he or she died.
- Countries taking steps to up-skill health workers in how to use digital tablets or mobile phone devices to collect VA data, especially in rural areas, might come across challenges around
    - Health worker use of the digital tablet
    - Digitising local script into android devices
    - Language and translation issues
    - Transcultural adaptation
- A range of strategies exist to prevent these challenges from arising, including
    - Configuring tablets with keyboards in the local language
    - Ensuring smartphones used for automated VA data collection are able to display Unicode-supported scripts
    - Ensuring a thorough translation process of the VA questionnaire
    - Comprehensive training of VA interviewers
    - Supervision, support and monitoring of VA interviewers

Summary of content

What is verbal autopsy (VA)?

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 (COD).[1] The principal purpose of a VA is to describe the cause composition of mortality through the estimation of cause-specific mortality fractions (CSMFs).

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/events that the deceased suffered before death; and
3. Interpreting the interview data to diagnose the most probable COD.

Why is VA important?

- COD information is critical for countries and their partners to know for effective health policy, planning and resource allocation. Gaps in mortality data create major obstacles towards understanding and addressing public health concerns.[2] VA is an important means to support generation of policy-relevant information on CSMFs in a population.
- In countries seeking to improve their civil registration and vital statistics (CRVS) systems, VA is the only practical alternative to medical certification of cause of death (MCCOD), particularly in communities where a large proportion of deaths occur outside of health facilities.[3]
- Countries can use VA to categorise causes of death, and for identifying social and health systems failures related to these causes.

[1] De Savigny et al. Integrating community-based verbal autopsy into civil registration and vital statistics (CRVS): system-level considerations. *Global Health Action.* 2017;10:1272882.
[2] AbouZahr C. Verbal autopsy: who needs it? *Population Health Metrics*. 2011;9:19.
[3] Sankoh O, Byass P. Time for civil registration with verbal autopsy. *The Lancet*. 2014;2:e693-e694.

- VA 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/reliability to MCCOD in hospitals.[4]
- VA provides an excellent vehicle in which to improve understanding around access to health systems and social exclusion.[5]

Introduction of VAs will depend on a careful analysis of, and response to, the structure and capacity of peripheral health and statistical services in a country. In making decisions about in the introduction of VAs into settings with limited resources, three broad criteria relating to efficiency, effectiveness and cost, will need to be taken into account by countries.

Why use electronic VA data collection?

In many countries, most deaths occur away from hospitals, in the home or in areas without doctors, or in health facilities with limited diagnostic capacity. It is important countries ensure these deaths are captured and do not go unreported; especially for generating accurate and reliable mortality data. Large-scale application of VA, however, will raise a number of challenges, of which three include:

1. Quality and detail of the VA questionnaire used;
2. Method of analysing VA questionnaire data to reach a probable COD;[6]
3. Sound information technology (IT) systems to ensure timely access and use of COD data by relevant government agencies for planning and resource mobilisation.

In the past, VA questionnaire data was generally analysed by expert medical practitioners who had knowledge of the local context. In paper format, this method was costly and slow if human resources were unavailable. The reliability of this approach also suffered from observer bias. In addition, physician-certified VA is time consuming, taking doctors away from focusing on essential health service delivery. This can be especially problematic in resource poor settings.[7]

In response, automated methods of analysing VA questionnaire data have been developed. Automated methods are as reliable as physicians in diagnosing COD from VA interviews, are largely costless, can easily recognise symptom patterns in the data and correctly associate them with the most probable underlying COD.[8]

[4] Hernández et al. *Population Health Metrics*. 2011;9:38.
[5] D'Ambruoso et al. *The Lancet.* 2017;5:e20-e21.
[6] Garenne M. Prospects for automated diagnosis of verbal autopsies. *BMC Medicine*. 2014;12:18.
[7] Joshi et al. How much does a verbal autopsy based mortality surveillance system cost in rural India? *PLoS One*. 2015;10:e0126410.
[8] Zhao et al. Use of Smartphone for Verbal Autopsy: Results from a Pilot Study in Rural China. *Asia Pacific Journal of Public Health.* 2016:28(7);601-610.

In summary, automated VA methods (such as through the use of a digital tablet) have clear advantages over VA questionnaires in paper form that rely on physician review:

- Reducing or eliminating data entry costs and data entry errors
- Speeding up dataset production and analysis
- Reducing or eliminating missing or invalid data from VA questionnaire forms (by using real-time logic checks and preventing the interviewer from skipping relevant unanswered questions)
- Speeding up the interview process (by using automated skip patterns)
- Cost-effective approach
- Easily and rapidly deployed in the field
- More consistent, accurate and reliable approach

What are some of the challenges associated with automated VA training and roll-out?

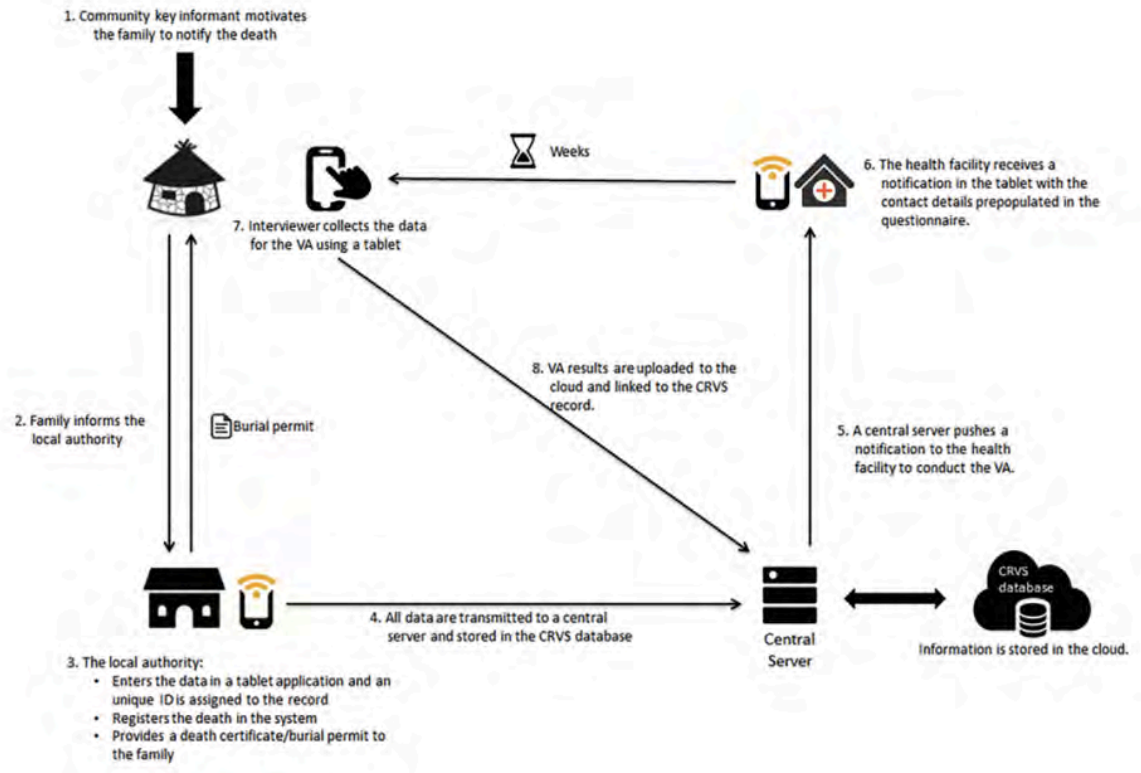
There are a number of challenges facing countries in rolling-out automated VA. Medical certification and VAs should both be linked to the notification and registration of deaths through a country's CRVS system. Thus the first overarching challenge for countries, at the macro level, relates to broader governance and system-level considerations, including ensuring national commitment to overall CRVS systems strengthening. For instance, a National CRVS Committee (or sub-committee), through co-ordinating CRVS process mapping exercises, must conceptualise and consider how VA (including automated VA) could be best integrated into the country's CRVS system moving forward (see **Figure 1**).[9]

A second challenge facing countries in rolling-out automated VA will be to ensure sound IT systems are in place at all levels of the system. By introducing automated VA, policy-makers - often for the first time - will have access to reliable information on patterns of mortality and COD for rural, remote and community deaths. However, this COD data will only be useful for policy-makers if governments can access it at a population level through sound IT systems. Thus countries must ensure supportive IT systems and IT support staff for effective integration of VA data.

Another challenge, **which is the focus of this *CRVS Development Series paper***, relates more specifically to the problems that arise due to the translation and transcultural adaptation of the questionnaire, especially for languages with a non-Roman (Latin) script. This challenge is both cultural and technological in nature and needs to be overcome to ensure VA questionnaires can be used on a tablet in all countries looking to obtain accurate information on the cause of community deaths.

[9] D Cobos Muñoz and D de Savigny (2017) Process mapping and modelling: A tool for analysing and driving health systems change. In. D de Savigny, K Blanchet and T Adam (eds). *Applied Systems Thinking for Health Systems Research: A Methodological Handbook.* Open University Press, McGraw Hill Education: London, UK.

Figure 1: Integrating automated VA data collection into a CRVS system, example flow diagram[1]



Source: de Savigny et al (2017)

Challenges in the training and operational roll-out of automated VA

How the training and roll-out of automated VA will occur will depend on each individual country-context, and government policy, planning, guidance and overview. Some countries might prefer to utilise a 'Training of trainers' approach, where a small group of health staff known as 'Master Trainers' (for example) are trained on automated VA by VA specialist technicians, with the Master Trainers then going onto train a cluster of VA in-country interviewers. Another training approach may involve training the VA interviewers directly.

An overview of topics that should ideally be covered in automated VA interviewer training are in **Box 1**. Field testing is always recommended.

Box 1: Recommended topics covered in automated VA interviewer training[10]

*What is CRVS and why is it important?
*What is automated VA (e.g. SmartVA)?
*Overview of the Population Health Metrics Research Consortium (PHMRC)[11] Shortened VA Questionnaire
**Interviewers' understanding of the translated questions
**Interviewer techniques, such as interaction with respondents (including how to build relationships and rapport with respondents, handle potential issues, obtain adequate answers to questions)
*General instructions on automated VA digital tablet use (or mobile phone use) for administering the VA questionnaire, as well as basic trouble-shooting solutions
*Role-playing of scenarios to simulate interviews
*Field practice sessions

The *Bloomberg Philanthropies Data for Health Initiative* (BD4H) has identified a number of potential challenges that may arise for countries in their training and roll-out of automated VA. These challenges have been identified by BD4H specialist VA technicians and in-country CRVS partners.

We have divided these potential challenges into four categories:

1. Health worker use of the digital tablet
2. Digitising local script into android devices
3. Language and translation issues relating to the VA questionnaire
4. Transcultural adaptation issues

Potential challenge 1: Health worker use of the digital tablet

VA interviewers who lack experience in using android devices will likely need close supervision and support from their supervisors as they grow more comfortable using digital tablets and other digital devices to conduct VA. Additional time may be needed to invest in the training of VA interviewers who do lack previous exposure to android technology.

Potential challenge 2: Digitising local script into android devices

A number of countries - such as Bangladesh, Sri Lanka and Myanmar - do not use a Roman (Latin) written script; each have local languages with unique scripts. VA specialist

[10] University of Melbourne. *SmartVA Interviewers Manual.* 2017. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.
[11] The PHMRC is a multinational group of researchers established with the aim of comparing the performance of various automated methods in correctly diagnosing the cause of death from verbal autopsies. The research also included assessing the comparative performance of doctors versus automated methods, including the tariff method. For more information on PHMRC, please see: http://www.healthdata.org/population-health-metrics-research-consortium-phmrc

technicians and their in-country partners might subsequently experience issues around ensuring that digital tablets in such locations are able to properly display the translated VA questionnaire in the country's respective script, and for the VA interviewer to in turn be able to type responses to questions into the tablet in the same language.

Issues may also similarly arise relating to digitising written script on smartphones used for VA interviews.

Potential challenge 3: Language and translation issues relating to the VA questionnaire

Accurately translating the content of the VA questionnaire from English into a country's respective language (or languages) can be challenging. In-country field testing is thus important because it is often during this testing phase that language and 'meaning' challenges come to light. Issues usually arise over the accurate translation of particular medical terminology and disease conditions or symptoms. Issues of translation and interpretation are context-specific, and can be quite complex, for instance:

- The English-language word or term may not have an equivalent in the country's language – this is often the case for medical terminology;
- Local community members might in fact be more familiar with the English words (i.e. 'diabetes' or 'stroke') than their translated version;
- In some languages, there might not be the equivalent of absolute 'yes' or 'no' responses, but the response will be contextual to the question asked;
- Some languages are difficult to write informally, which is challenging because VA is supposed to be conducted using informal language to facilitate easy and clear communication with community members.

VA interviewers might also be required to paraphrase or give additional explanation for words or phrases on the VA questionnaire that remain unclear to the respondent. This has implications for the standardisation of the VA interview, where different interviewers might use different methods to explain symptoms or conditions.

Also, while English is widely spoken in many non-English language speaking countries, especially within the medical community or among Ministry of Health officials at the national level, this is not necessarily the case for staff (i.e. community-based midwives and public health supervisors) located at more local health facilities. And, it may be these very staff responsible for conducting the VA interview.

Training of the VA Master Trainers, therefore, might require the use of an experienced interpreter to ensure that all aspects and content of the automated VA training are fully comprehended. Moreover, the VA questionnaire, automated VA manuals, training slides and materials will need to be translated via a forward-translation and back-translation process (**Box 2)**, with revisions required when there are changes to those materials due to updates to questionnaires or training methods.

Potential challenge 4: Transcultural adaptation challenges

When introducing into a new country, region or district a VA information collection process, *and* an automated VA information collection process, adaptation challenges are bound to arise.[12] A number of these linguistic and technological adaptation challenges have already been raised so far in this paper. However, cross-cultural or transcultural adaptation challenges will very likely emerge, as the new automated VA instrument is adapted for use in a specific new environment. The sensitive nature of the VA interview itself in different socio-cultural settings needs to be acknowledged.[13] This is because each country and culture has unique values, organisational and beliefs systems. Bereaved respondents are also vulnerable to emotional distress, which the VA interview or the timing of that interview might exacerbate.[14] Other potentially sensitive factors that need to be borne in mind by the VA interviewer include the *type* or *underlying cause of death* (i.e. if the death is perceived by the community as having 'stigma' attached), gender-related and blame issues, and crime-related deaths.

Box 2: Forward-translation and back-translation and cognitive testing – Process of translation and adaptation of instruments suggested by the World Health Organization (WHO)[15]

"The aim of this process is to achieve different language versions of the English instrument that are conceptually equivalent in each of the target countries/cultures. That is, the instrument should be equally natural and acceptable and should practically perform in the same way. The focus is on cross-cultural and conceptual, rather than on linguistic/literal equivalence. A well-established method to achieve this goal is to use forward-translations and back-translations"[14]

Forward-translation

The translator should preferably be a health professional, or have much experience in translating medical or health-related documents. The translator's mother tongue should be the primary language of the target product, but they also require a strong knowledge of English and English speaking-culture. In addition, translators familiar with VA terminology and data collection processes should ideally be given this task. Emphasis in the forward-translation should be on conceptual and cultural equivalence and not linguistic equivalence.

[12] Herdman et al. A model of equivalence in the cultural adaptation of HRQoL instruments: the universalist approach. *Quality of Life Research*. 1998;7(4):323-335.
[13] Gouda et al. "Whenever they cry, I cry with them": Reciprocal relationships and the role of ethics in a verbal autopsy study in Papua New Guinea. *Social Science and Medicine*. 2016;163:1-9.
[14] Brolan et al. A time to mourn: cultural considerations and community preferences for verbal autopsy in Vietnam. *Vietnam Journal of Public Health.* 2014;2(1):4-12.
[15] World Health Organization (WHO). *Process of translation and adaptation of instruments*. 2017. Available online: http://www.who.int/substance_abuse/research_tools/translation/en/#

Translators need to use natural and acceptable language when translating the VA questionnaire, aiming to engage the broadest public audience.

Back-translation

Once translated, the VA questionnaire should be translated back to English by an independent translator. Preferably, the back-translator's mother tongue is English and he/she has no knowledge of the questionnaire. As in the forward-translation, emphasis in the back-translation should be on conceptual rather than literal translations. Discrepancies or problematic words or phrases that do not correctly or completely capture the concept should be brought to the attention of the appropriate organisation and further translation work engaged in, until a satisfactory translated version is achieved.

Pre-testing and cognitive interviewing

It is necessary to pre-test the instrument on the target population. Each module or section should be fully tested, and there are a number of different methodologies that can be applied.[16]

What action can be taken to support smooth automated VA roll-out, especially in countries that do not have a Roman (Latin) written script?

Recommendation 1: Pre-empting issues with non-English language scripts

The ability of android devices to both read and respond in different scripts has implications for the script used in the translation of the VA questionnaire and uploaded onto the tablet. The Unicode-supported version of all scripts should be uploaded onto tablets during the tablet preparation phase, which will help ensure that digital tablets are able to display local scripts properly.

- Configuring tablets with **keyboards in the local language** is also best practice. When tablets are being prepared, IT staff should upload the Unicode keyboard of the script being used so that VA interviewers can type responses in the local language
- **Smartphones** being used for automated VA should also be able to display Unicode-supported scripts. This means that VA interviewers need to be provided with newer models of smartphones that support Unicode. Governments should consider standardising a set of minimum specifications for smartphones (such as android version 2.0 and above)

Recommendation 2: Thorough translation process of the VA questionnaire

Countries planning to use automated VA would benefit from investing in a thorough translation process of the automated VA questionnaire. This process should preferably involve a forward translation and back-translation process, as well as cognitive pre-testing

[16] Please see an example in Recommendation 2, below.

with different stakeholders including front-line workers to ensure that the lay terms used are easily understood and acceptable to both VA interviewers and respondents. Pre-test respondents should include individuals representative of those who will be administered the questionnaire. The translation should be updated following field test observations and discussions with the VA interviewers. Accuracy and quality of the translation should be reviewed and updated as needed in the early stages of automated VA implementation. Where appropriate, include the English term for medical conditions or symptoms side-by-side with the local translation of the term.

Recommendation 3: Comprehensive training of VA interviewers

Skilful training is essential to ensure that where language issues exist, VA interviewers are able to provide adequate and standard explanations around medical terminology. This will entail a comprehensive session involving question-by-question review of the VA questionnaire, and an emphasis on areas of particular concern in each country that have arisen from previous trainings and practice. A medical dictionary of common terms and symptoms should be developed and used during the training. This dictionary should be updated as additional language issues come to light. VA interviewers should be encouraged to refer frequently to this dictionary as well as the VA Interviewer manual – which explains how to ask each question – to ensure they are confident in explaining all questions in the VA questionnaire. Comprehensive training on how to best explain difficult questions to respondents will increase standardisation among interviewers. Dialect differences also need to be taken into consideration. VA interviewers should also receive cultural or context-specific training in relation to potential transcultural adaptation challenges they may experience in administering the VA questionnaire to bereaved family members. Encourage VA interviewers to be flexible – for instance, to recognise when it might be best practice to ensure a female VA interviewer is interviewing a female respondent.

Recommendation 4: Community-level advocacy and awareness raising around VA

In addition to training VA Master Trainers and interviewers, it is important to up-skill communities on the purpose of VA, especially those unaccustomed to the VA process. The objective is for community members to have confidence that VA is a routine process for each death, no family will be singled out for a death, the information gathered will be confidential, and that the purpose of VA is not to examine individual problems or apportion 'blame' for a death, but instead address the health of the community as a whole so that governments can efficiently allocate resources for health and *improve* community well-being. This awareness-raising step is essential to ease any community suspicion of VA interviewers' motives and how the VA data will be used.[17]

Recommendation 5: Supervision and monitoring of VA interviewers

VA is not new, but automated VA is new. As such, interviewers need close supervision, monitoring and support in these initial stages. Countries would be wise to invest in routine supervision and reporting systems to ensure that VA interviewers receive guidance and

[17] Gouda et al. New challenges for verbal autopsy: considering the ethical and social implications of verbal autopsy methods in routine health information systems. *Social Science and Medicine.* 2017;184:65-74.

feedback on how they conduct VA. This will also enhance overall monitoring and evaluation efforts for a quality VA program.

Recommendation 6: Research

As for addressing the cultural and social barriers related to automated VA, as well as the content and timing of VA questionnaire implementation, countries should consider engaging in **formative research activities** on cultural sensitivity and community members' responses to certain questions. Relevant cultural, epidemiological and administrative considerations need to be taken into account by research teams.[18] These research activities will more likely be qualitative in nature, and can importantly provide key insight into potential barriers to accurate data collection and ways VA interviewers could appropriately respond to and navigate these barriers. Findings from such studies could also be implemented into training programs. Community based participatory research on VA could also serve as an important vehicle for community advocacy, awareness and sensitivity around VA.

Recommendation 7: Frequent follow-up from technical partners and building local IT knowledge and capacity

In the early stages of automated VA training and roll-out, many countries will likely need to collaborate with external technical partners that specialise in CRVS and VA. Without ongoing communication, in-country capacity-building and follow-up among countries and their technical partners (especially in-country, local technical partners and stakeholders), it will be difficult to ascertain whether VA training efforts are fruitful, technological or transcultural adaptation challenges relating to automated VA data collection have been identified and reasonably overcome, and whether the resulting COD data is reliable and of sufficient quality.

[18] Baiden et al. Setting international standards for verbal autopsy. *Bulletin of the World Health Organization.* 2017;85(8):570-571.

Bloomberg Philanthropies Data for Health Initiative also run courses on implementing automated VA:

For more information please contact: CRVS-info@unimelb.edu.au

Related resources and products from the Bloomberg Philanthropies Data for Health Initiative:

- University of Melbourne. *Automated verbal autopsy methods: SmartVA. CRVS development series.* 2017. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

- University of Melbourne. *SmartVA Interviewers Manual.* 2017. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

- University of Melbourne. *SmartVA Facilitators Guide.* 2017. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

- University of Melbourne. *SmartVA Technical User Manual*. 2017. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

- University of Melbourne. *Automated Verbal Autopsy (VA)* [*Summary Flyer*]. 2016. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

Recommended further reading:

- Serina et al. A shortened verbal autopsy instrument for use in routine mortality surveillance systesm. *BMC Medicine*. 2015;13(1):302.

- Serina et al. Improving performance of the Tarriff Method for assigning causes of death to verbal autopsies. *BMC Medicine*. 2015;13(1):291.

***Disclaimer: No recommendations or advice given in this paper constitute or should be viewed or treated as legal advice by any individual or agency. These are the opinions of the authors alone.**

Bloomberg Philanthropies

DATA FOR HEALTH INITIATIVE

Australian Government
Department of Foreign Affairs and Trade

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:

Vital Strategies

CDC FOUNDATION
Helping CDC Do More, Faster

THE UNIVERSITY OF MELBOURNE

For more information, contact:

E: CRVS-info@unimelb.edu.au

W: mspgh.unimelb.edu.au/dataforhealth

CRICOS Provider Code: 00116K

Version: 0817-01

Copyright
© Copyright University of Melbourne July 2017.
The University of Melbourne owns the copyright in this publication, and no part of it may be reproduced without their permission.

Disclaimer
The University of Melbourne has used its best endeavours to ensure that the material contained in this publication was correct at the time of printing. The University gives no warranty and accepts no responsibility for the accuracy or completeness of information and the University reserves the right to make changes without notice at any time in its absolute discretion.

Intellectual property
For further information refer to: www.unimelb.edu.au/governance/statutes