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CRVS country report

Planning and implementation of a paper-based verbal autopsy questionnaire as a complementary data collection method in Solomon Islands

November 2020

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Published by the University of Melbourne, Civil Registration and Vital Statistics Improvement, Bloomberg Philanthropies Data for Health Initiative.

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

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Suggested citation

Kamoriki, B, Ruskin, R, Reeve, M, Chowdhury, M H, Mahesh, P K B. *Planning and implementation of a paper-based verbal autopsy questionnaire as a complementary data collection method in Solomon Islands.* CRVS country reports. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, University of Melbourne; 2020.

Planning and implementation of a paper-based verbal autopsy questionnaire as a complementary data collection method in Solomon Islands

This report describes the implementation of a paper-based verbal autopsy system in Solomon Islands and presents the rationale for its implementation. Further information on verbal autopsy or the Solomon Islands civil registration and vital statistic system can be found on the CRVS Gateway at: https://crvsgateway.info/

Automated verbal autopsy in Solomon Islands

Solomon Islands comprises approximately 1000 islands with a projected population of 700 000 for 2020.[1] The estimated crude death rate is 5.5 per 1000 population.[2] Out of the estimated 3500 to 4000 annual deaths, nearly 75 per cent do not receive a medical certification of cause of death.[3]

Automated verbal autopsies (VAs) were introduced to Solomon Islands through the Bloomberg Philanthropies Data for Health (D4H) Initiative at the University of Melbourne in 2016, in order to explore the causes of death of deaths without a physician diagnosis. The introduction of VA, initially implemented in Guadalcanal and Western provinces before being nationally scaled up in 2018, was one of six targeted interventions for improving the country's civil registration and vital statistics (CRVS) system.

Box 1: What is verbal autopsy (VA)?

Verbal autopsy (VA) is a method for collecting information about an individual's signs and symptoms before their death from their family or next of kin, and interpreting these to diagnose the likely or most probable COD.[4]

The VA process consists of three steps:

1. Setting up an interview by a trained VA staff member at home (or another appropriate place)
2. Conducting a structured interview to collect information on signs and symptoms of illnesses and events that the deceased had before death
3. Interpreting the interview data to diagnose the most probable COD.[5]

1 Solomon Islands- National Statistics Office. Projected population by province 2010 - 2025: Solomon Islands Government; 2020 [Available from: https://www.statistics.gov.sb/statistics/social-statistics/population]

2 Solomon Islands National Statistical Office, Ministry of Finance and Treasury. 2009 Population & Housing Census- National Report ND.

3 Health Information Unit-Solomon Islands. CRVS Quarterly Updates_2nd Quarter 2019. 2019.

4 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.

5 University of Melbourne. *Challenges associated with automated VA training and rollout.* CRVS best-practice and advocacy. Melbourne, Australia: Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, The University of Melbourne; 2018. Available at: https://crvsgateway.info/file/16909/47

In Solomon Islands, nursing staff attached to the two highest levels of provincial health facilities use tablets to collect VA data: in hospitals for deaths on/by arrival only, and in area health centres (AHCs) for community deaths (with the exception of Choiseul and Malaita provinces, where rural health centres [RHCs] also perform VAs). A Provincial Health Information Systems Coordinator is allocated for each of these administrative provinces, overseeing the data management processes and coordinating with the national Health Information System (HIS) Unit, which is responsible for data processing at the central level.

Challenges experienced in routine VA data collection

Owing to geographical, technological and human-resource related challenges, several obstacles have been observed in the system of routine VA data collection in Solomon Islands. Due to the difficulties of arranging transportation of tablets to the HIS Unit in Honiara from many of the provinces, when a tablet's hardware or software malfunctions, significant delays occur in arranging repairs. Transportation of malfunctioning tablets to Honiara is largely unavoidable, as repair facilities are generally not available in the provinces. This has resulted in VAs not being performed for a number of deaths which would otherwise have been eligible to undergo VA interviews, and potentially incurring a selection bias that could affect interpretations of the VA findings.

Barriers to collecting VAs in communities that were distant from the AHCs were also observed, even if these communities had a lower level health facility nearby. Due to problems with power supply, mobile internet coverage and mobile voice network coverage, concurrently supporting the use of tablets in facilities below the level of AHCs is technically difficult in many provinces. Additionally, few deaths actually occur in these smaller facilities, making use of tablets for VA uneconomical. In order to capture VAs in these areas, trained nurses from AHCs were instructed to carry out VA interviews in these localities as part of their regular supervisory visits to lower level facilities. However, due to transportation and telephone communication difficulties between facilities and the community, and the limited time available for interviews during supervisory visits, these nurses were unlikely to be able to interview the next of kin of a deceased person during a supervisory visit unless the interview took place within the health institution or the next of kin lived nearby.

As a result of the inherent challenges, a notable percentage of VA interviews had been conducted by interviewing a secondary source rather than the next of kin, typically a nurse at the lower level facility who attended the deceased before death or who had received an account of the manner of death from the next of kin. However, the average quality of VAs using the nurse as a secondary informant was substandard due to the delay between the death and the VA interview, and the non-standardised manner of collecting and recording data at the time of death which might later be used for VA. VAs submitted from these sources often had 'unknown' as responses to many questions and frequently missed vital information about the decedent, such as age. In addition to the problems with VA interview quality, there were limitations in VA coverage; nurses at lower level facilities who heard of a community death frequently did not collect enough data to be able to inform the completion of a VA interview at a later date, particularly if they were unaware what information was required for a verbal autopsy.

Rationale for a complementary paper-based method

In some settings in Solomon Islands, an informal paper-based version of the VA interview had been used on occasion by peripheral nurses to aid note-taking and recall for responding to an automated VA at a later time. The printed format used in these settings, however, had not been customised or pre-tested, and it was unknown whether this practice improved the quality of VA data.

It was hypothesised that the development of a formal tested paper-based VA system to feed into the existing automated VA system would improve the quality of VA data derived from nurses as secondary or even primary informants, at least in comparison to a system relying on informal note-taking or recall alone. It was also hypothesised that deploying a paper-based VA questionnaire at lower level health facilities might increase the coverage of VAs, both by prompting nurses at these facilities to initiate interviews and by increasing the efficiency of the secondary informant interview during supervisory visits.

Benefits and risks

Potential disadvantages and risks of using a paper-based data collection system were reviewed. These included a lack of features such as constraints, automated skips, and error checking; all of which are available in the tablet-based questionnaire and which greatly improve data quality. In addition, even though the number of pages of the paper VA would be kept to a minimum, the cost of printing was considered to be potentially prohibitive in some settings.

Despite the evident challenges, the introduction of paper-based VAs was an attempt to formalise a system that was already partly in use. Furthermore, the ultimate digitisation of paper-based VA data imposes most of the checks and constraints present in primary data collection on a tablet, although it does require a robust follow-up system for those conducting the digitisation to identify and address any errors made by primary data collectors. It was hypothesised that in the context of the Solomon Islands, the risks to quality posed by using a paper-based system would be outweighed by the gains in quality by supporting good recall by secondary informants, and in providing an opportunity to expand coverage to community deaths in more remote locations.

Given the potential benefits, it was decided to pilot the paper-based VA questionnaire in selected locations across Solomon Islands as a complementary method of data collection for automated VA analysis.

Preparing the paper-based VA questionnaires

The question-structure, including the skip patterns of the Population Health Metrics and Research Consortium (PHMRC) short-set VA questionnaire, was reviewed by technical experts at the University of Melbourne in collaboration with team members from the Solomon Islands.

Three sets of paper questionnaires (one each for adult, child and neonatal age-categories) were prepared. Images used in the digital version to assist identification of clinical signs were prepared as a separate printed sheet, to be given to each data collector. The sound-clip on "grunting", which is playable in the digital questionnaire, was provided as an audio file to be copied into the mobile phone of the data collector. Compactness was prioritised in formatting to reduce printing costs.

Examples of different question options explored in the pre-testing are shown in **Figures 1a** to **1e**.

Figure 1a: Options for table border formatting

Table lines option A

Was he/she ever told by a health professional that he or she ever suffered from one of the following?

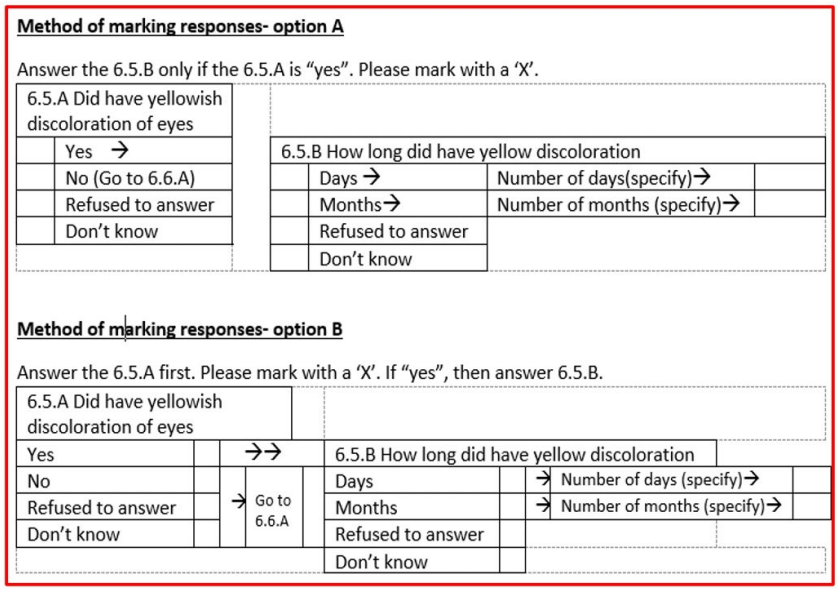
5.6 Asthma (please mark with a 'X')	Yes	
	No	
	Refused to answer	
	Don't know	

Table lines option B

Was he/she ever told by a health professional that he or she ever suffered from one of the following?

5.6 Asthma (please mark with a 'X')	Yes	
	No	
	Refused to answer	
	Don't know	

Figure 1b: Options for method of marking the responses



Method of marking responses- option A

Answer the 6.5.B only if the 6.5.A is "yes". Please mark with a 'X'.

6.5.A Did have yellowish discoloration of eyes	
	Yes →
	No (Go to 6.6.A)
	Refused to answer
	Don't know

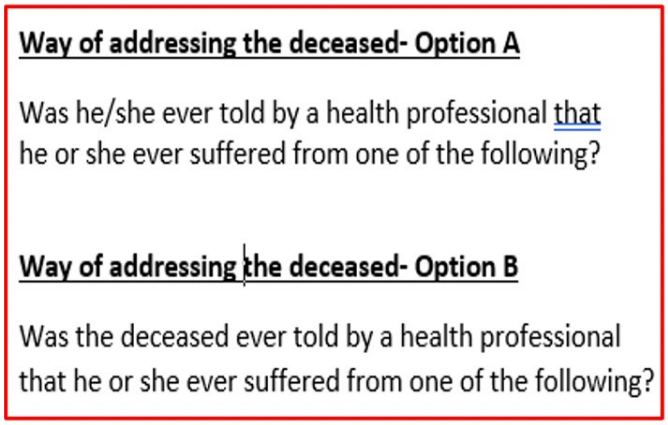
6.5.B How long did have yellow discoloration		
	Days →	Number of days(specify)→
	Months→	Number of months (specify)→
	Refused to answer	
	Don't know	

Method of marking responses- option B

Answer the 6.5.A first. Please mark with a 'X'. If "yes", then answer 6.5.B.

6.5.A Did have yellowish discoloration of eyes				6.5.B How long did have yellow discoloration			
Yes		→→		Days		→	Number of days (specify)→
No		→	Go to 6.6.A	Months		→	Number of months (specify)→
Refused to answer				Refused to answer			
Don't know				Don't know			

Figure 1c: Options for methods of addressing the deceased



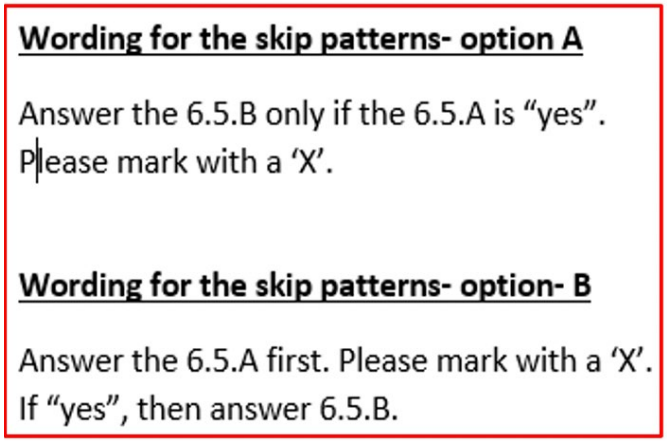
Way of addressing the deceased- Option A

Was he/she ever told by a health professional that he or she ever suffered from one of the following?

Way of addressing the deceased- Option B

Was the deceased ever told by a health professional that he or she ever suffered from one of the following?

Figure 1d: Options for wording of skip patterns



Wording for the skip patterns- option A

Answer the 6.5.B only if the 6.5.A is "yes". Please mark with a 'X'.

Wording for the skip patterns- option- B

Answer the 6.5.A first. Please mark with a 'X'. If "yes", then answer 6.5.B.

Figure 1e: Options for numbering format of questions

Numbering of questions- Option A

Q 6.5.1, Q 6.5.2

Numbering of questions- Option B

Q 6.5.A, Q 6.5.B

Pre-testing

Pre-testing of the drafted questionnaires was conducted over a week in early February 2020 at Vura Nurse Aid Post (NAP) and Good Samaritan Hospital in Tetere. The pre-testing was overseen by the Provincial HIS Coordinator of Guadalcanal, representatives of the HIS Unit and technical staff from the University of Melbourne.

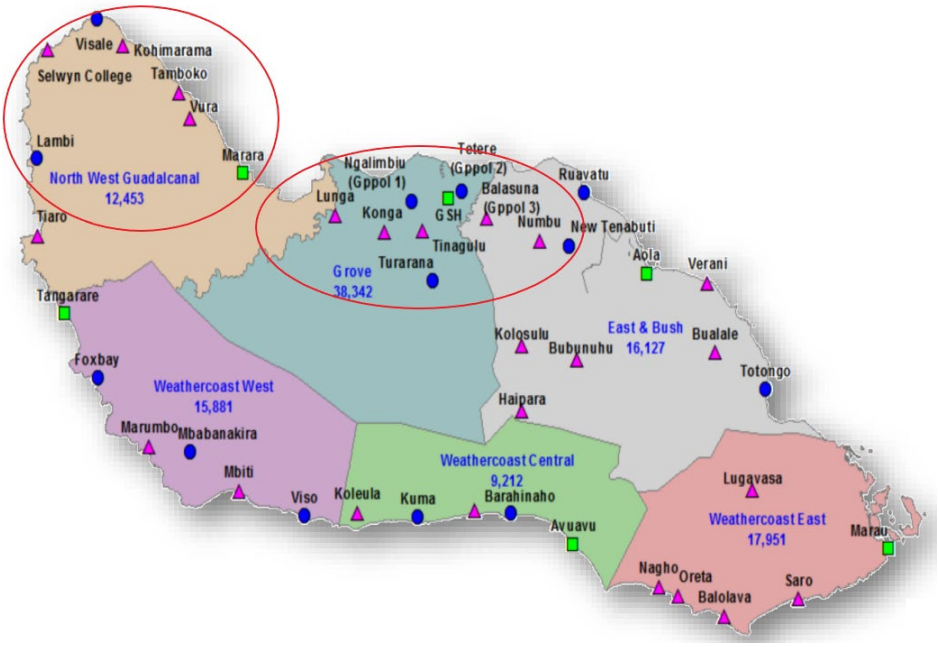
Prior to roll-out to pilot sites, necessary revisions were made to the paper-based versions according to the observations and findings of the pre-testing.

Pilot site selection and roll-out

The selection of sites for the paper-based pilot was decided by the local team members, considering factors such as feasibility of supervision and relative accessibility.

In total, nine facilities within the Guadalcanal province were chosen as the pilot sites: Marara (AHC), Tamboko (NAP), Kohimarara (NAP), Visale (RHC), Selwyn College (NAP), Lambi (RHC), Lunga (NAP), Numbu (NAP) and New Tenabuti (RHC).

Figure 2: Map of facilities engaged as pilot sites



Training of data entry operators

Training was provided to supervisors assigned to enter data from the completed paper-based VA questionnaires into the tablet devices for upload to the central electronic database.

Topics covered during the training sessions included: refreshing the concept of VA, rationale behind each VA interview question, and practical smart tablet device-based data entry exercises.

Distribution and sustainability

Questionnaire bundles were prepared for distributed to each of the pilot sites. Each bundle comprised of 300 adult, 90 child and 90 neonatal questionaires, approximately reflecting the relative need for each questionnaire type. It was planned to couple the distribution of these bundles with the Provincial Coordinator's routine supervision visits wherever possible.

Image 1: HIS Data Processing Officer and HIS Coordinator

Several measures were taken to ensure the sustainability of this process, including:

- Requiring participating health facilities to submit an end-of-month performance report to the HIS along with the completed paper-based questionnaires.
- Introduction of a stamp to identify notification forms for deaths that have not undergone a VA. Once COVID-19 related restrictions ease, this will allow for easier identification of deaths for which a VA can be performed.
- Recording both the name of the staff member entering data from the paper-based VAs into the tablet and the nurse who conducted the VA interview, for each SmartVA entry. This allows VAs in the database originating from paper forms to be distinguished from tablet-based VAs, as well as identifying the source of the paper-based VA.

Early findings

As at October 2020, nineteen paper-based VAs have been conducted and added into the electronic database. A most likely specific cause of death has been assigned to eighteen of these nineteen deaths by the SmartVA-Analyze software, with only one being allocated an "undetermined cause". When a suitable sample has been attained the system will be evaluated to assess the quality of data and any impacts on VA coverage.

Informal preliminary qualitative feedback on implementation feasibility obtained from staff members involved in this prcess has been positive, and this pilot roll-out has demonstratated the potential for the SmartVA methodology to be adpated to address contextual challenges. Once the effectiveness of the paper-based questionnaire and its compatibility with SmartVA-Analyze has been demonstrated (following a sample of 250 VAs), there will be sufficient evidence to support roll-out across Solomon Islands.

Conclusion

While a paper-based VA interview is no longer considered best practice in most settings due to the widely documented superiorities of electronic, automated VA, specific factors may make paper-based VA appropriate for use in some settings. The following context-specific factors led to its piloting in lower level facilities in Solomon Islands:

- Infrastructure limitations (power, mobile internet coverage) made deployment of an electronic system to lower level facilities difficult or impossible.
- Small numbers of deaths being recorded per facility, which made deployment of a tablet to each facility highly uneconomical (conversely, for centres with a high volume of interviews, costs of a digital system are significantly offset by savings in paper and printing costs).
- The pre-existence of an informal note-taking or paper VA system, which made it easier to justify formalising this process with a pre-tested questionnaire.
- Use of paper-based VA interviews as a "feed-in" system to digital VAs, rather than a stand-alone paper-based system, enabled retention of most of the advantages in data quality inherent to electronic automated VA. Reducing errors in paper-based VA interviews is likely to depend heavily on the quality of training given to interviewers using the paper questionnaire. During the process of digitising the paper interview through input into a tablet, approaches to reduce errors included:
  - Having the secondary nurse informant involved or available during digitisation to clarify errors, inconsistencies or incomplete information in the paper questionnaire.
  - Ensuring digitisation occurs as soon as possible after the paper-based interview (to reduce recall errors if a secondary informant needs to be consulted about an unclear point).
  - Training tablet users to mitigate copying errors.

This report has described the implementation of a paper-based VA system in Solomon Islands and presented the rationale for its implementation. We make no recommendation about implementation in other contexts, as the decision to implement such a system is highly dependent on many contextual factors. It is hoped, however, that this documentation is a useful illustration of some key considerations in the use of paper-based VA.

For further information about the paper-based VA method implemented in Solomon Islands, please email Bloomberg Philanthropies Data for Health Initiative at the University of Melbourne at: CRVS-info@unimelb.edu.au

Bloomberg Philanthropies DATA FOR HEALTH INITIATIVE

Australian Government
Department of Foreign Affairs and Trade

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CRICOS Provider Code: 00116K

Version: 1120-01