



**Bloomberg
Philanthropies**  **DATA FOR
HEALTH INITIATIVE**

CRVS best-practice and advocacy

Essential CRVS processes and actors: Considerations for the Development of OpenCRVS

May 2019



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

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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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Acronyms and abbreviations

BPI	Business Process Improvement
BPM	Business Process Mapping
BPMN	Business Process Mapping Notation
COD	cause of death
CRO	Local Civil Registration Office
CRVS	Civil Registration and Vital Statistics Systems
D4H	Data for Health
EA	Enterprise Architecture
ID	identity
LMICs	low and middle-income countries
LGA	Local Government Authority
MCCD	medical certificate of cause of death
SDG	Sustainable Development Goal
UNSD	United Nations Statistics Division
UN	United Nations
VE	vital event

Introduction

The purpose of this technical report is to present a further analysis of the summary experience of applying system analysis tools to complex systems such as Civil Registration and Vital Statistics (CRVS) systems. As part of Phase 1 of the Bloomberg Philanthropies Data for Health (D4H) Initiative the Swiss Tropical and Public Health Institute (SwissTPH) and University of Melbourne (UoM) have adapted and applied selected Enterprise Architecture (EA) methodology to understand and strengthen the design of CRVS systems in 16 countries. This report is an effort to summarize and catalogue the most essential processes common to most CRVS processes in D4H countries, capturing also the different stakeholders involved and the data elements flowing through the system. This will also serve to illuminate missing processes in countries that do not include these essential elements. This summary is of importance to efforts such as the development of OpenCRVS as it describes the most common processes that countries employ and indicates essential processes that need to be included in OpenCRVS.

Background

The benefits of a robust and reliable CRVS system are well documented.^{1,2} In addition to providing the best feeder document to establish unique identity at birth (a birth certificate),³ CRVS systems are the best source of vital statistics in a country.^{4,5} CRVS systems provide a reliable, continuous and universal flow of information about vital events that can be disaggregated to produce estimates at the local level. Indeed, 67 of the 232 indicators to monitor the SDGs can be effectively measured with a functioning CRVS system.⁶

Despite the fact that all CRVS systems have the same output objectives, each country's system has moved along different paths with differing approaches to governance and policies, and differing accountability to multiple ministries such as justice, security, local government and health. CRVS systems are extraordinarily complex systems that have evolved over decades somewhat differently in each D4H country (Bangladesh, Brazil, China, Colombia, Ecuador, Ghana, India, Indonesia, Malawi, Morocco, Myanmar, Peru, Philippines, Papua New Guinea, Rwanda, Solomon Islands, Sri Lanka, Tanzania, Turkey and Zambia).

Almost all CRVS systems in low and middle-income countries (LMICs) are failing to achieve adequate levels of coverage and quality despite attempting to apply standard methods proven to work well in high-income countries. **This suggests system failures rather than technical failures.** To date, most attempts to improve CRVS systems have been aimed at the technical faults, and have been slow to achieve results. On the other hand, system strengthening has the potential to achieve high-leverage tipping points that could rapidly improve the overall performance of CRVS.

Managing complexity requires that multiple stakeholders work in a coherent way to tackle the challenges in the system. Since 2015, as part of the Bloomberg Data for Health Initiative, Enterprise Architecture (EA) business process mapping (BPM) methodology⁷ has been applied to national CRVS systems for births and deaths in 16 countries across Africa, Asia, Latin America and Oceania. This has facilitated, for the first time in most settings, collaboration among officials from the ministry of health, the civil registration authority, and the national statistics office collectively to identify system process flaws and bottlenecks. With this knowledge, country stakeholders were able to reach consensus on needed actions to ensure that the system tracks the required information from the occurrence of a birth or a death, through its official registration and certification and eventually to its incorporation into the vital statistics system.

The application of BPM in 16 countries showed that BPM is a very flexible tool with multiple purposes. Table 1 shows the uses that were given to BPM in D4H countries until 2017.

1 AbouZahr C, de Savigny D, Mikkelsen L, Setel PW, Lozano R, Lopez AD. Towards universal civil registration and vital statistics systems: the time is now. *The Lancet* 2015; 386(10001): 1407-1418

2 Schmider, A. *Advocating for civil registration: guide to developing a business case for civil registration*. 2010. Herston: The University of Queensland.

3 Dunning C, Gelb A, Raghavan S. *Birth Registration, Legal Identity, and the Post-2015 Agenda*. 2014. Washington: Center for Global Development.

4 AbouZahr C, de Savigny D, Mikkelsen L, Setel PW, Lozano R, Nichols E, Notzon F, Lopez AD. Civil registration and vital statistics: progress in the data revolution for counting and accountability. *The Lancet* 2015; 386(10001):1373-1385.

5 Department of Economic and Social Affairs: *Principles and Recommendations for a Vital Statistics System*. 2014; 19(3). New York: United Nations.

6 Mills S, Abouzahr C, Kim J, Rassekh BM, Sarpong D. *Civil Registration and Vital Statistics (CRVS) for monitoring the Sustainable Development Goals (SDGs)*. 2017. The World Bank.

7 Cobos Muñoz D, de Savigny D: *Process mapping: a tool for visualizing system processes from end-to-end*. In: *Applied Systems Thinking for Health Systems Research: A Methodological Handbook* 1st edn. Edited by de Savigny D, Blanchet K, Adam T. London: McGraw Hill; 2017: 280.



Table 1. Uses of BPM in D4H countries in 2016-2017

Application	Country															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
New insights after training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stakeholder management	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓
Verbal Autopsy intervention integration	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓	✓		✓
Routine process analysis	✓	✓	✓		✓	✓						✓				✓
Managing standard operating procedures	✓	✓						✓		✓		✓				✓
Information technology & digitalising CRVS	✓		✓	✓											✓	
Direct health information system integration	✓		✓	✓		✓		✓								
Supporting legal review	✓			✓	✓	✓										
Sub-national analysis					✓					✓						✓
Performance analysis								✓				✓				
Cause of death certification					✓						✓	✓				
Iris integration										✓						
Comprehensive assessment			✓													
National Identification integration				✓												
Change management												✓				
Cause of death Coding intervention	✓			✓	✓						✓					

Currently, most D4H countries have covered the first phase of their CRVS system analysis. Each country developed a visual description of their core extant CRVS processes using business process mapping notation (BPMN) 2.0 and partially captured information flows within those processes. The next step in the business process improvement (BPI) cycle was to analyse the current CRVS processes and find ways to improve them. As system strengthening initiatives take shape, there is an increasing need for robust methodology to measure and monitor progress in data quality improvements in vital statistics at national and even subnational level.

OpenCRVS

The Africa Programme on Accelerated Improvement of Civil Registration and Vital Statistics (APAI-CRVS) from the United Nations Economic Commission for Africa (UNECA) was created to support countries in their process of strengthening their CRVS systems with a strong focus on digitation opportunities. As part of their “eCRVS Capacity Building Roadmap”, UNECA has developed in collaboration with Plan International an online resource (CRVS Digitization Guidebook⁸) where countries that want to embark in digitizing CRVS processes can access international standards, tools and practical examples. The guidebook follows the enterprise architecture methodology and places a strong emphasis on business process mapping as one of the main steps towards the automation of CRVS processes. Also the criteria for ICT investment for CRVS and eCRVS Knowledge Centre under APAI-CRVS have been developed.

Plan International, as a next step in the roadmap, is planning to create an open source CRVS platform, **OpenCRVS**, which compliments these global assets within the capacity building roadmap. This platform will provide countries with a standardized CRVS software option to support the system requirements defined through the use of the CRVS-DGB. OpenCRVS is a potential game-changer, providing a software platform which is cost-effective and suitably flexible to be used in different country contexts. Currently there is no freely available CRVS software package that provides the functionality specified within the UN standards and with the safeguards to ensure that personal data is transferred and stored in a secure and confidential manner.

One critical step in the development of OpenCRVS is to define a core set of processes, business requirements and rules that could respond to a wide range of CRVS system implementations in countries. In practical terms, this means to analyse business processes in different countries and to find a minimum set of activities and sub-processes that could be customized by countries. The work done so far on BPM in D4H countries by SwissTPH is an incredibly useful resource for this exercise. We have already mapped 4 CRVS core processes in 14 countries on three different continents. There is no such repository of CRVS system’s operations available anywhere else. A comparative analysis of these maps and their sub-processes would be a major step to find this “common ground” of CRVS processes among countries.

Rationale











There is a pressing need and emerging technical opportunities in some D4H countries to digitize their CRVS operations. An open source, free to acquire and customizable solution could be a turning point to streamline their processes and to improve the performance of the overall system. Digitizing CRVS processes opens the window for the integration of several existing data sources with information about death events (currently paper based systems) into a single data warehouse. This information could then be used as a form of notification that would trigger registration of the vital event.

The work done with EA BPM within D4H is also an incredibly rich resource for the development of Open CRVS. The amount of knowledge gained with regards to core CRVS processes and system’s requirements such as variance in notification steps in D4H countries provides a unique opportunity to identify the minimum set of activities and operations in CRVS systems that go across countries and regions. With the development of OpenCRVS in mind, this report presents an effort to summarize the essential CRVS processes across three elements: **(1) stakeholders involved in each step of the process; (2) activities common among the different countries; and (3) data requirements for CRVS processes.** The Ten CRVS milestones framework is used to present the results for each component.⁹

⁸ African Development Bank for the African Programme for the Accelerated Improvement of Civil Registration and Vital Statistics (APAI-CRVS). CRVS Digitisation Guidebook. 2019. Available at <http://www.crvs-dgb.org/en/>

⁹ Cobos Muñoz D, Abouzahr C, de Savigny D. The ‘Ten CRVS Milestones’ framework for understanding Civil Registration and Vital Statistics systems. *BMJ Global Health* 2018;3:e000673.

BPMN symbols and notation

Symbol	Description
	Each swim lane represents one stakeholder involved in the process. All activities, decision points or event located in one line are implemented or made by this actor.
	Represents an atomic activity that cannot be further disaggregated.
 Start Event	Event that trigger the chain of activities of the process. Usually there is only one start event for one process
 End Event	It represents that a specific path in the process ends in this point.
 Interm. Event	Events that occur within the sequence of activities of a process
	Shows the sequence flow of tasks, gateways and events in a process
 Excl. Gateway	Breaks the flow of activities in two or more mutually exclusive paths based on a condition
 Paral. Gateway	Represents two concurrent tasks or paths in a process.
 Database	Show where data and information is stored in the process (either paper based or electronic)
 Data object	Represents an exchange of information

Adapted from Bizagi instructional material (www.bizagi.com)

Core elements of essential CRVS processes

Notification

Definition: The capture and onward transmission of minimum essential information on the fact of birth or death by a designated agent or official of the CRVS system using a CRVS authorized notification form (paper or electronic) with that transmission of information being sufficient to support eventual registration and certification of the vital event.

The notification of vital events was the least consistent essential sub-process across D4H countries and varied between events occurring in health facilities or in the community. For events that occurred in a health facility, it is usually the health staff that is responsible for notifying the event. For births, some countries have a specific birth notification form but it usually is enough having the proof of the delivery in the health facility or the vaccination card of the child. The family uses that document as a proof of birth at the civil registration office.

Deaths in health facilities are usually notified using an adapted version of the International Form of Medical Certificate of Cause of Death (WHO 2016). This form is usually filled by the last attending physician and, in most of the cases, given to the family. It is rare that the Medical Certificate of Cause of Death (MCCD) is sent directly to the civil registration office.

The notification of births or deaths that occurred in the community usually starts with the family declaring¹⁰ the vital event to either a health facility or to a designated local government authority (LGA). Some LGAs keep a record where they collect information about the vital event and, in the case of a death event; they are usually in charge of issuing the burial permits. LGA officials usually issue a notification form that is not standard across the country and can go from a letter addressed to the civil registration office, to an affidavit with a detailed description of the circumstances of the event (sometimes used for deaths in the community). In most cases, the family receives some form of notification form to take to the civil registration office.

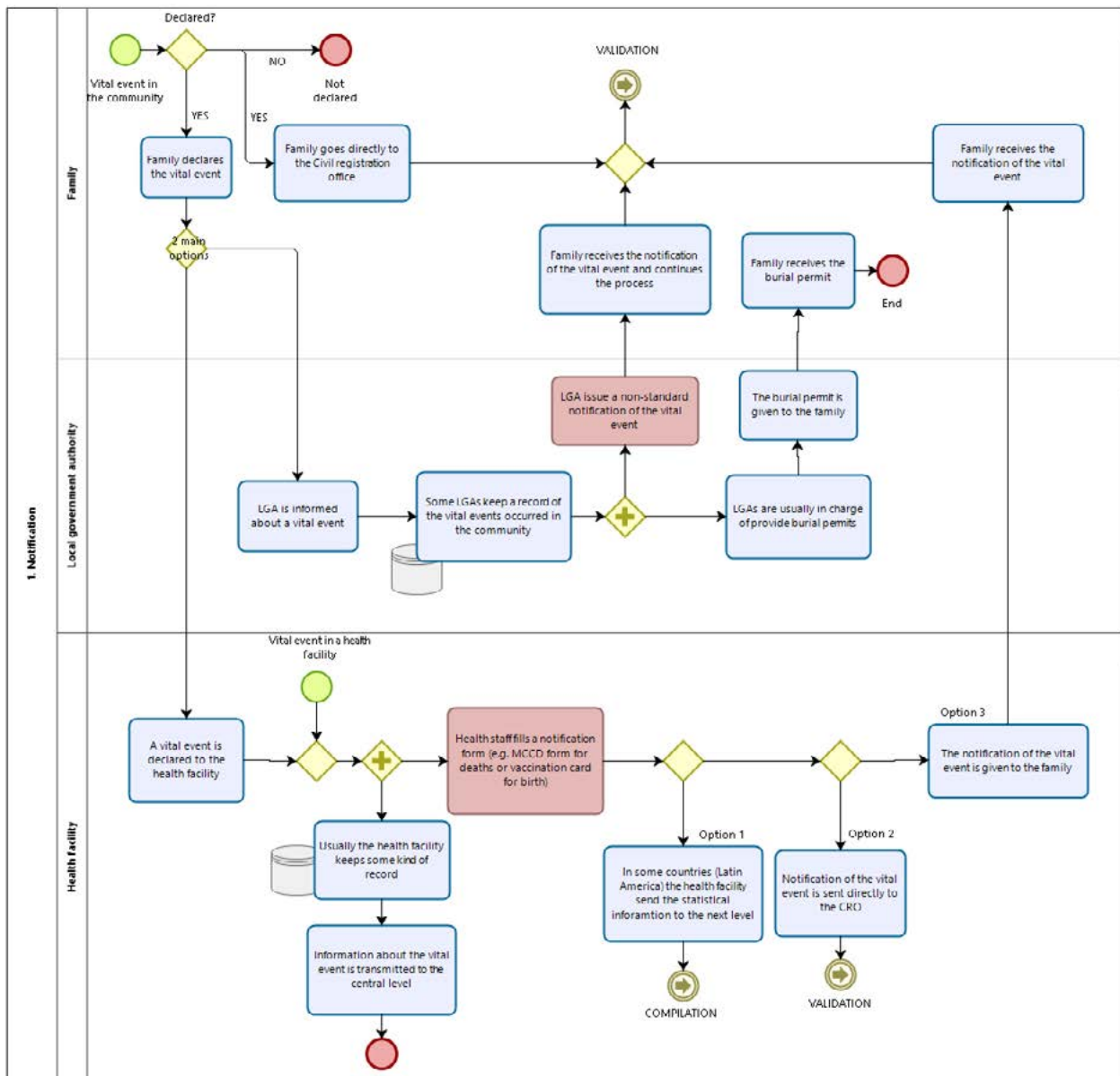
¹⁰ Families usually act as informants or declarants of the vital events. The UNSD principles and recommendations for Vital statistics differentiate them from the notifier: "The individual appointed by the local registrar to act as intermediary between the local registrar and the informant in providing all the information on and all the characteristics of an event that is to be legally registered by the local registrar"

Stakeholders involved in the notification process can be seen in Table 2.

Table 2: Stakeholders involved in the notification process

Stakeholder	Function/ description
Family	Usually, triggers the registration process and serves as the channel to transmit the information among the different institutions.
Local government authority	Volunteers or government employees with a low salary in charge of most administrative matters at the community level. They provide burial permits and vital event notifications for events that occurred in the community.
Health facility	Public health facilities with a pre-defined catchment area. They can have a physician or another clinician as the head. For death events doctors are usually in charge of filling the MCCD form and this document is given to the family. For births, the midwife or the vaccination officer fills the birth notification form.

Figure 1 Notification process





Validation

Definition: The act by which a relevant authority confirms that all necessary documentation to prove the vital event is correct and the registration process can continue.

The validation of the vital event after it is notified is not standard and sometimes not even present in CRVS processes. Although the regulatory environment in most countries requests that vital events should be validated by a relevant authority before they are registered, this is not consistently done within countries.

Usually, the local civil registration office (CRO) is responsible for validating the vital event by scrutinizing the supporting documents provided by the family. However, given the variation in the notification process in some countries with non-standard processes, CROs apply different rules or define their own requirements. For instance, while some countries require the cause of death to register a death, many local civil registration offices accept notification forms as 'valid' without this data to avoid missed opportunities in registering deaths.

Countries with digital systems have integrated some rules to validate the vital event in their electronic system. Checks such as validating the identity of the deceased or the informant using the national ID card, or the validation of the notifier (e.g. physician certifying the event) are some of the methods used.

The validation process in some countries comprises an additional step before families can apply for registration at the civil registration office. The vital event must be validated in an intermediate institution and this will issue a separate document certifying their validation. This intermediate institution could be a higher instance in the health system (e.g. district health office) or some local government authority.

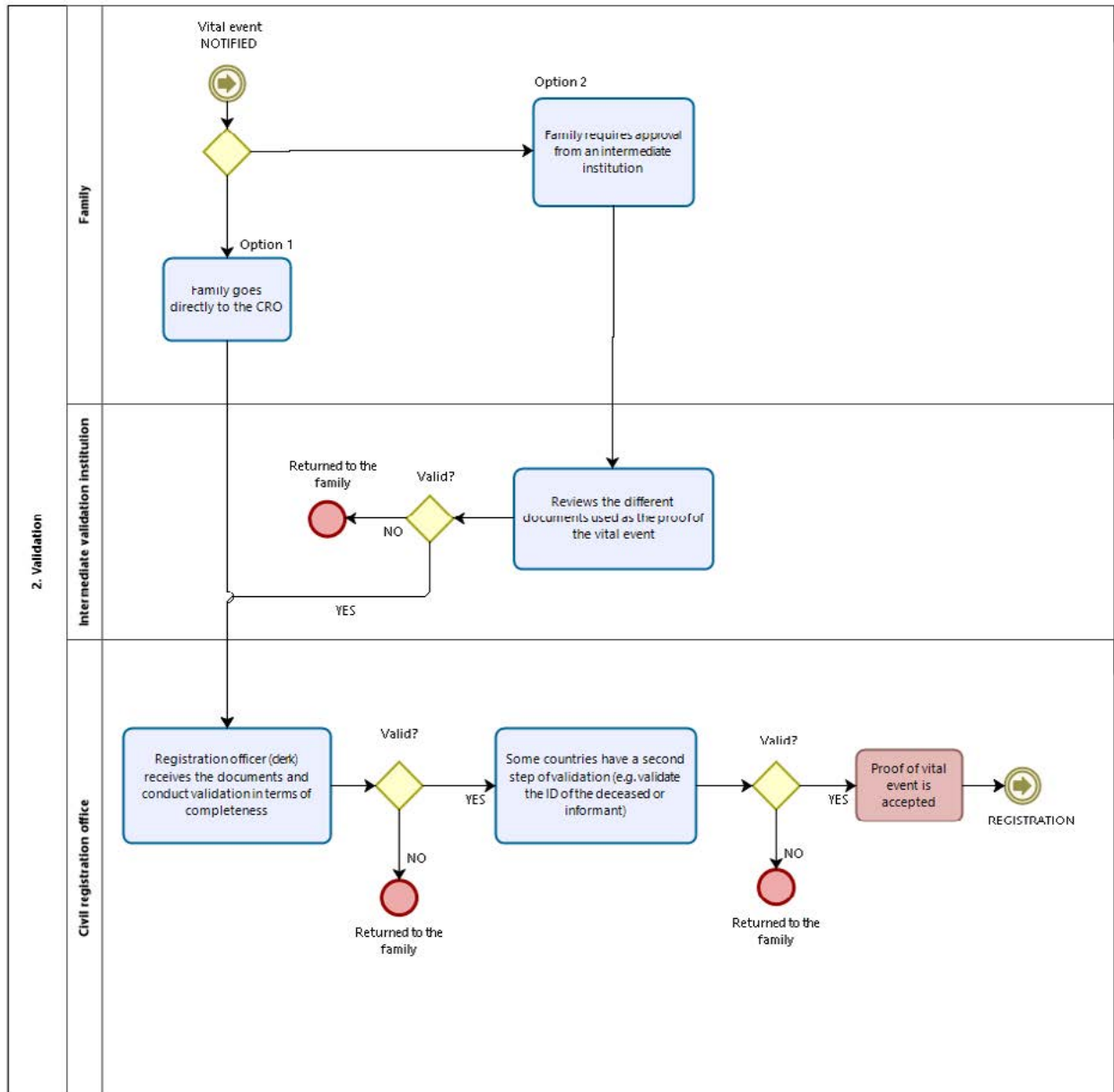
In some countries, the local registrar is the person responsible for the final validation of the document brought by the family.

Stakeholders involved in the validation process can be seen in Table 3.

Table 3 Stakeholders involved in validation process

Stakeholder	Function/ description
Family	Usually, triggers the process at the CRO by bringing the notification form.
Registration officer	Volunteer or paid position at the local civil registration office that usually acts as a clerk for compiling all the required documents and checking for their completeness.
Registrar	A civil servant with the authority to validate, register and certify the vital event.

Figure 2 Validation process



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Registration

Definition: The act of formally registering an event at a civil registration office. At this point, the details of the event are entered into the official civil register by the registrar.

The registration of the vital event is quite consistent across countries. Once the documents presented as the proof of the vital event have been validated, the registrar fills the information required for registration in the Registry. This record can be paper or digital and captures different information in different countries.

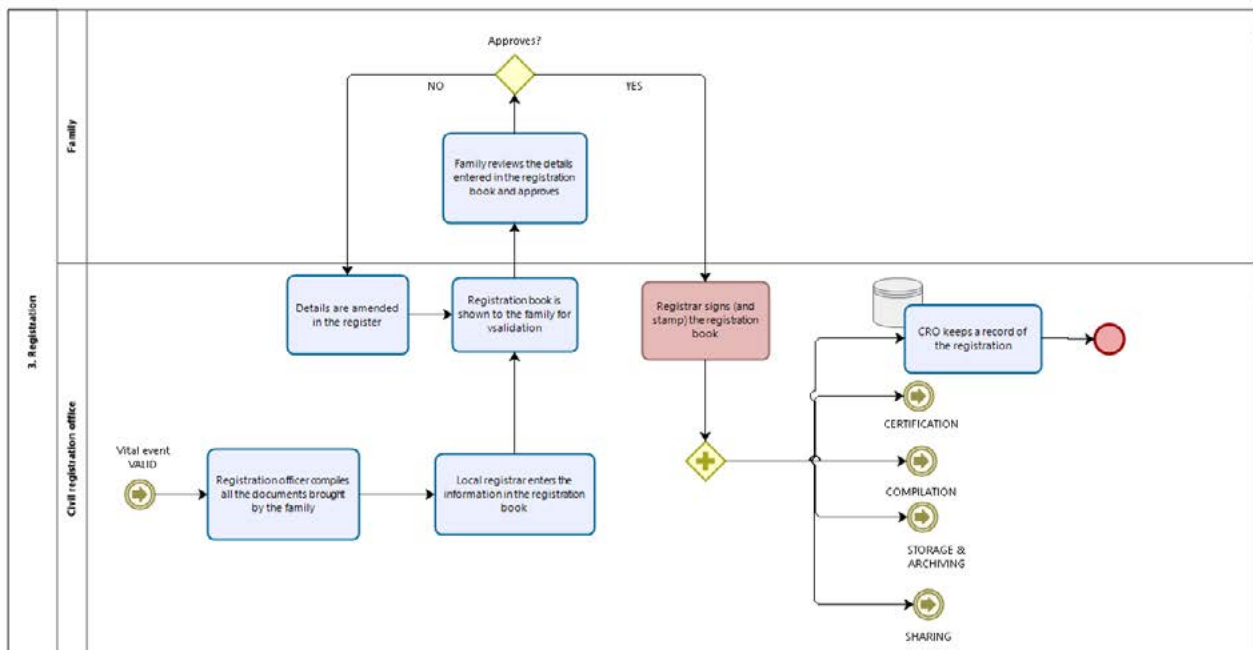
Before the registrar signs the registration record making it official, the family or informant must approve the details entered in the register. Once the registration process is complete, four different sub-processes are triggered:

1. Certification of the vital event
2. Sharing of information
3. Storage and archiving of the information
4. Compilation of vital statistics.

Table 4 Stakeholders involved in registration process

Stakeholder	Function/ description
Registrar	A civil servant with the authority to validate, register and certify the vital event.

Figure 3 Registration process



Certification

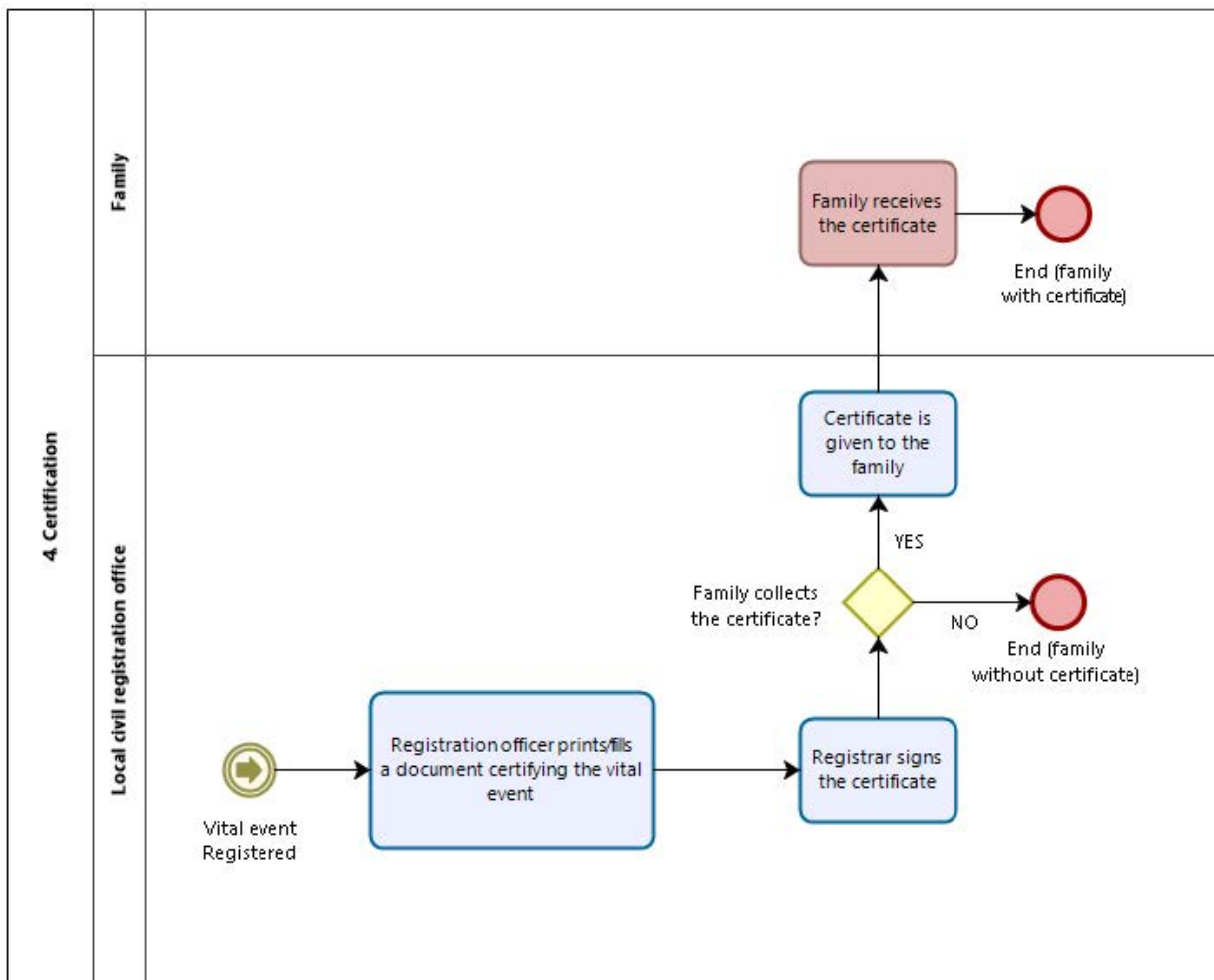
Definition: The issuance by the civil registrar of a legal document certifying a birth or death.

Once the vital event is registered, a registration officer fills a separate form (birth or death certificate) transcribing the details entered in the registration book. This document is then signed by the registrar and given to the family.

Table 5 Stakeholders involved in certification

Stakeholder	Function/ description	Present in most countries?
Family	Receives the vital event certificate.	YES
Registration officer	Volunteer or paid position at the local civil registration office that fills the details in the certificate of the vital event.	YES (in different forms)
Registrar	A civil servant with the authority to validate, register and certify the vital event	YES

Figure 4 Certification process



Sharing of information

Definition: All activities in which some information about the individual event is shared with other systems (e.g. National ID).

D4H countries are moving towards the integration of their civil registration system with the wider ID environment and the health sector. Currently, there are several initiatives to share civil registration information with other institutions such as the national ID system or the health sector. However, these activities were not mapped in this report due to their limited scope (some regions in the country) or because they are at the early stages of implementation.

Storage and archiving

Definition: Activities where all or part of the information captured about the VE is stored either digitally or in paper.

There are multiple instances where information about the VE is stored and archived. Most D4H countries have a central archive where a copy of the registration book is stored (either in paper or digitally). This central archive is usually in the capital and hosted by the civil registration authority. Some decentralized countries maintain the storage of the registers locally by law. However, they also have a national repository with a copy of the registration book.

Table 6 shows the institutions that keep a copy of the key documents related to the registration and certification of vital events.

Table 6 Stakeholders that keep a copy or the original of the notification form, the registration book or the certificate of the vital event

Institution	Notification form	Registration book	Certificate of the event
Health facility	YES	NO	NO
Local government authority	Not consistently	NO ¹¹	NO
Cemetery	Not consistently	NO	NO
Intermediate validation institution	YES	NO	NO
Civil registration office	YES	YES	YES
Sub-national level CRO	NO	Not consistently	NO
Sub-national level health sector	YES	NO	NO
National civil registration authority	YES	YES	Not consistently
National health system	YES	NO	NO
National statistics office	NO	NO	NO

¹¹ If the local government authority is responsible for registration (e.g. Tanzania) they may keep a copy of the register book

Compilation to the dissemination of vital statistics

Compilation definition: The process of condensing and summarizing information on vital events by classifying and tabulating the data within categories or groups in order to produce vital statistics according to a predetermined tabulation program.

Data quality definition: A standardized systematic set of controls and checks to assess the quality of vital statistics.

Generation definition: Activities where national or regional vital statistics are produced (excluding productions of reports for administrative purposes).

Dissemination definition: Timely publication of an annual national vital statistics report on births and deaths disaggregated by age, sex and sub-national region, including numbers, completeness (coverage) rates, with trends and patterns of leading causes of death, in a public repository accessible to the different users.

There are two main models to compile the vital statistics in D4H countries. In most countries, the information used to generate the vital statistics is recorded in local civil registration offices and transmitted through the channels of the civil registration authority.

However, some Latin American countries split the legal sub-process of registration from the compilation of the vital statistics at the health facility level. Once the vital event has been certified by a health professional, the notification form is completed. Usually, the notification form is designed in two parts, one that can be used for registration with all the legally mandated information requirements; and a second part (usually anonymised) with the statistical information. The legal part on the notification form is given to the family to continue the registration process and the statistical part is sent through health sector channels to the national level.

The information collected at the local level (either in the health sector or in the civil registration sector) is sent through the standard reporting channels to the national level. It usually requires the participation of sub-national offices where some kind of validation (checking the completeness of the forms) is conducted.

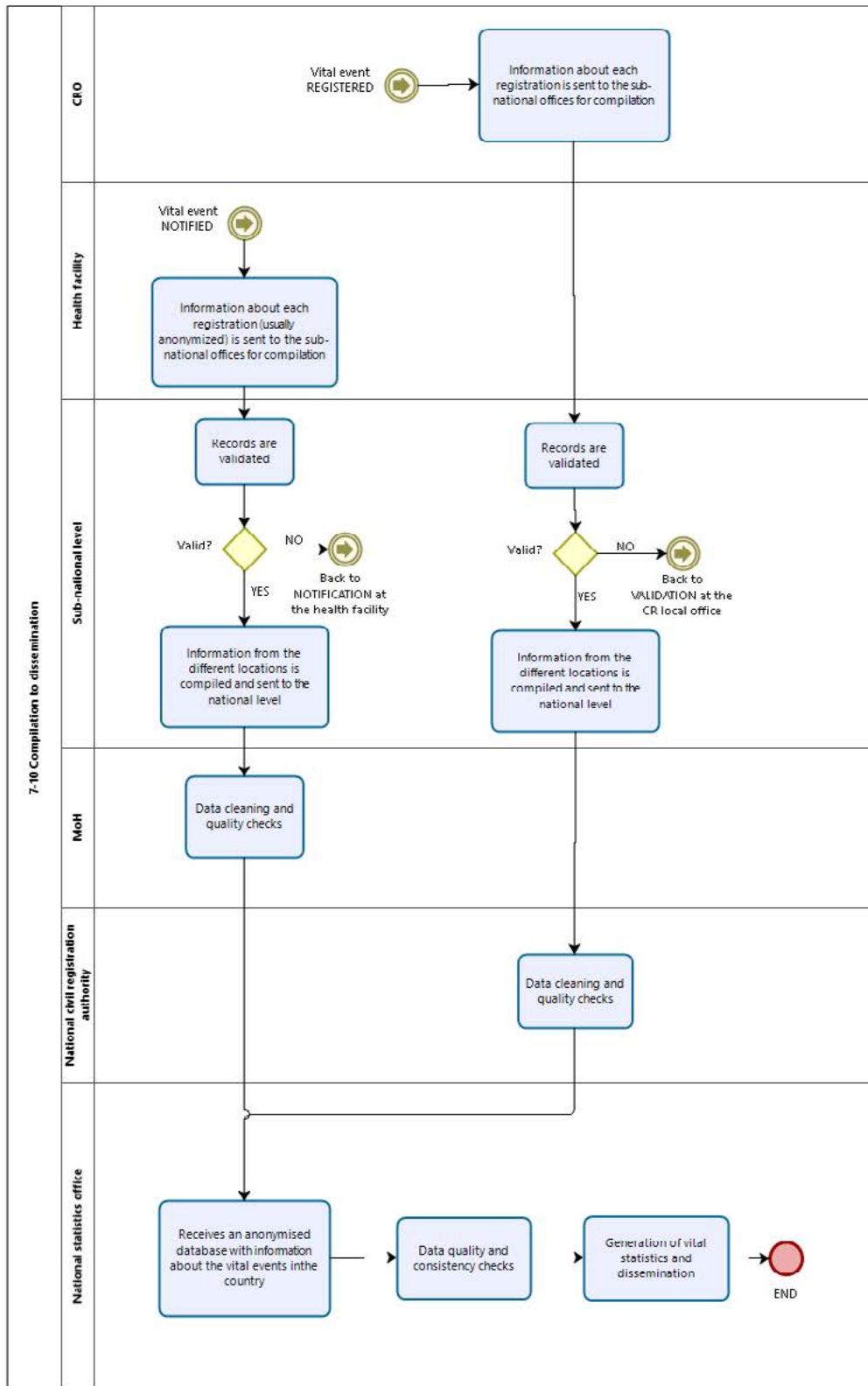
Once the information from all regions is at the national level, the database with the raw data is cleaned and some verifications and tests for consistency are performed. Although all countries mapped a step where the quality of the data compiled is assessed and improved, it was difficult to get accurate information about the type of checks performed or if these are done in a systematic way. This activity is either done by the health sector/civil registration authority directly on the main database, or by the National Statistics Office in an anonymised database shared with them.

Once the database is clean, the national statistics office generates the vital statistics report and publishes it in different forms (paper report, online data, ad hoc reports...). Some countries conduct some form of matching among different databases containing information about vital events (usually health sector notification database and civil registration records) aiming to get a more complete set of vital statistics.

Table 7 Stakeholders involved in processes between compilation and dissemination of VS

Stakeholder	Function/ description
Local civil registration office	Send individual-level data to the sub-national offices
Health facility	Send individual-level data to the sub-national offices
Sub-national health and CR offices	Validate and channel the information received from the local offices to the next level.
National civil registration authority	Compiles information from all geographical areas in the country, clean the database (some countries) and provide information to the NSO
Ministry of Health	Compiles information from all geographical areas in the country, clean the database (some countries) and provide information to the NSO
National Statistics Office	Responsible for the generation of the vital statistics and the dissemination of the results

Figure 5 Dissemination processes



Data elements captured in CRVS processes

The forms, records and reports used in the CRVS systems were collected in three D4H countries: Ghana, Peru and Bangladesh. We conducted a thorough review of these and catalogued all data elements that were collected in each document. We identified 150 data elements recorded in the different forms in D4H countries.

Further detail of these forms and description by country is included in the Annex.

The guiding principles from the UN for vital statistics¹² propose the basic and most essential data elements to be captured for the registration of vital events. They propose a total of 58, 36 and 60 data elements for birth, death and foetal death events respectively (Table 8). There are 31 unique core data elements that should be used to register births, deaths and foetal deaths and they are gathered from the decedent, the newborn, or the informant. The list of core elements can be seen in 9.

Table 8 Number of data elements for each category proposed in the UN principles and recommendations for vital statistics

Data elements	Core information	Additional information	Total
Death			
Characteristic of the event	9	5	14
Characteristics of the decedent	8	14	22
Total	17	19	36
Foetal death			
Characteristics of the event	6	6	12
Characteristics of the father	5	11	16
Characteristics of the foetus	1	5	6
Characteristics of the mother	12	14	26
Total	24	36	60
Live birth			
Characteristic of the event	8	1	9
Characteristics of the father	7	10	17
Characteristics of the mother	17	13	30
Characteristics of the newborn	2		2
Total	34	24	58
Grand Total	75	79	154

¹² United Nations Statistics Division. Fundamental Principles of Official Statistics (A/RES/68/261 from 29 January 2014). Available at <https://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx>



Table 9 Core data elements to be collected for the registration of births, deaths and foetal deaths

	Death		Foetal death			Live birth				
	Event	Decedent	Event	Father	Foetus	Mother	Event	Father	Mother	Newborn
Age		YES		YES		YES		YES	YES	
Attendant at birth							YES			
Birth order or parity						YES			YES	
Cause of death	YES									
Certifier	YES									
Child born in wedlock									YES	
Children born alive to mother during her lifetime						YES			YES	
Date of birth		YES		YES		YES		YES	YES	
Date of last previous live birth						YES			YES	
Date of marriage						YES			YES	
Date of occurrence	YES		YES				YES			
Date of registration	YES		YES				YES			
Duration of marriage						YES			YES	
Duration of residence in usual place									YES	
Educational attainment								YES	YES	
Foetal deaths to mother during her entire lifetime						YES			YES	
Interval since last previous live birth						YES			YES	
Locality of occurrence	YES		YES				YES			
Locality of residence		YES		YES		YES		YES	YES	
Marital status		YES						YES	YES	
Place of occurrence	YES		YES				YES			
Place of registration	YES		YES				YES			
Place of usual residence		YES		YES		YES		YES	YES	
Place of usual residence of the mother		YES								
Place/country of birth									YES	
Sex		YES			YES					YES
Type of birth							YES			
Type of certification	YES									
Urban/rural occurrence	YES		YES				YES			
Urban/rural residence		YES		YES		YES		YES	YES	
Weight at birth										YES



Findings from D4H countries

This section presents some of the most relevant findings of the comparative analysis of CRVS processes for birth and death events of 16 countries in Africa, Asia and Latin America. Although CRVS systems have very similar outcomes in different countries (e.g. provide reliable and timely vital statistics), the processes that each country have put in place to produce them vary considerably from country to country, and even among regions within a country. They are framed by the legal environment around civil registration, fragmented in their design and with multiple stakeholders involved.

Notification is often poorly specified, highly variable in design, or even missing completely from standard operating procedures, forms and requirements. Only four of the 16 countries have an official document of the government where the notification process and requirements is described in some way. The minimum information requirements for notifying events are not clear in most of the countries. Although most countries have some sort of notification form, the information collected is highly variable.

The notification of vital events is passive from a CRVS system perspective in most of the countries. It heavily relies on the family to follow a tortuous process of up to four instances of contacts with the system to provide the necessary documents to register an event, and up to six to get a certificate of the vital event. Typically, when someone dies in the community, the family must inform the closest local authority in their area of residence. This official will issue either a non-standardized form to the family (most cases) or acknowledge verbally the occurrence of the event (notification step). Any of them could be used to bury the deceased in a significant number of countries. If the family wants to pursue registration (not the case for many families in low resource settings) they need to travel to the nearest civil registration office and sometimes also to the nearest health facility. The certification of the vital event is one of the primary incentives for the family to register events. Although it is a service free to the user in most countries it requires sometimes a significant number of steps (bureaucracy) and opportunity costs for the family that could be translated in terms of indirect cost and time. Even if the family reaches the civil registration office to register the death, getting a certificate of the vital event would require some other steps in the process.

Registration and certification processes are usually well described in some sort of registration act, law or regulation. The requirements to register an event are well defined as well as the deadlines for registration or the different scenarios around the vital event (e.g. natural deaths, delayed registrations, deaths with no contact with the health system).

Storage of the information about the vital events is usually fragmented in the different levels of the system (local, regional and national) and across different institutions. The median number of databases with vital events information that can be found in countries is five with a minimum of two and a maximum of eight. It is frequent that the original record of the registration of the vital event is stored in the local civil registration office that registered them. However, countries have very different designs of their storage system with little common among them. They vary according to their administrative levels, the degree of digitalization of the system, and the number of institutions involved in the collection and transmission of the information. One element that several countries have in common is the fragmentation of the storage system with up to eight independent databases in one of the countries.

Once statistics are compiled in the central level, in less than half of the countries there is a structured sub-process to routinely assess the quality of the vital statistics. Even countries that have in their design some form of quality assessment of vital statistics, it is poorly described in the process map, and not very well known by most stakeholders but the national statistics office.



Missing guidance

The deep comparative analysis of CRVS processes across 16 countries led to the Ten CRVS Milestones Framework which in turn has been used to assess where missing guidance is prevalent. For example, the comparative analysis of CRVS processes for births and deaths exposed a number of limitations in the design of CRVS systems that hinder their performance. Although each CRVS system operates in a different way, the use of the Ten CRVS Milestones framework helps systematize the analysis across countries and enabled identification of common strengths and common challenges in the systems. It also allows comparison of practices among different countries and alignment with the standards provided by the global CRVS community.^{5,8,13,14} Below are some of the conclusions of this analysis showing where practice diverges from the requirements and where there is no clear guidance at the global level:

- The **notification of vital events** is one of the least consistent sub-processes across countries. The stakeholders involved vary from country to country (even among different locations in a country) and some countries do not even have a standard operating procedure for how to notify a vital event.¹⁵ At the global level, there is a paucity of guidance for countries on the international standards for notification data elements. Notification as a step is not even mentioned in the Principles and Recommendations for Vital Statistics Systems from United Nations Statistics Division (UNSD)⁵ or other UN guidance. At the country level, it is difficult to find regulations or SOPs describing how the notification of vital events should be done or which institution or individual is entitled/responsible to notify vital events;
- Most CRVS systems **rely on the family to register vital events**. Families must have multiple interactions with different stakeholders of the system to register the event or to get a document certifying its occurrence. Countries moving towards the integration of the different sub-systems (civil registration, health sector, national ID) will reduce the burden on the family. The global recommendations for the registration of vital events require an informant (family) to declare the vital event with the support of some proof of birth or death. As we saw in the standard process, this proof can only be obtained in either the health sector or from the local government authority;
- The **validation of the vital event**, although present in all countries as a sub-process, is not consistent across countries or even among different locations within a country. Least developed CRVS systems do not have written procedures to support their local civil registration offices in the validation process. It is also difficult to find global recommendations on what should be the minimum requirements to validate a vital event;
- **Registration and certification** of the vital event by civil registrars was quite consistent across countries and with the global recommendations;
- Some of the Latin American countries present a significant divergence from the global recommendations with regards to **the compilation of vital statistics**. The UN Principles and Recommendations for Vital Statistics Systems from UNSD states: *“The critical source of vital statistics are records of vital events derived from civil registration, which refers to the continuous gathering of information on all relevant vital events occurring within the boundaries of a country or a well-defined area within a country”*.⁵ However, these countries have vital statistics that are calculated from the records in the health system and not from registered vital events.
- The **storage of vital records** is fragmented and there are not clear consistency checks among the different databases in multiple countries. Although the global recommendations are clear about the ideal storage system and minimum requirements for archiving vital event records, this is not consistently applied in several countries.
- With regards to **the assurance of the quality of vital statistics**, there is a wealth of guidance and global standards to assess and to improve the quality of vital statistics. However, several countries included in this study, did not conduct any of these activities in a routine and systematic way.

The above points summarize the most egregious deficiencies seen in this analysis. Global efforts for CRVS performance improvement will need to review the global guidance provided to countries to specify and standardize where appropriate the requirements for the Ten Milestones. Country level efforts will need to review the local national status of these points and seek ways to address them. At the same time, cognizant of these deficiencies, the development of OpenCRVS may provide an opportunity to help countries systematize remedial efforts where needed.

¹³ Mikkelsen L, Phillips DE, Abouzahr C, Setel PW, de Savigny D, Lozano R, Lopez AD: A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. *The Lancet* 2015, 386(10001):1395-1406.

¹⁴ United Nations: Handbook on Civil Registration and Vital Statistics System: Management, Operation and Maintenance, Revision 1. In. Edited by Mrkic S, Cobos MI, vol. 3rd Draft. New York: United Nations Statistics Division; 2017.

¹⁵ Cobos Muñoz D, de Savigny D. Where there is no physician: improving the notification of community deaths. CRVS technical outcome series. Melbourne, Australia: University of Melbourne, Civil Registration and Vital Statistics Improvement, Bloomberg Philanthropies Data for Health Initiative; 2018.

Annex 1. Data elements in CRVS processes

ID	Data element	Section
1	Condition of identification	New-born/deceased details
2	Full name	New-born/deceased details
3	ID type	New-born/deceased details
4	ID number	New-born/deceased details
5	Hometown	New-born/deceased details
6	Sex	New-born/deceased details
7	Citizenship	New-born/deceased details
8	Residence address	New-born/deceased details
9	House/Road	New-born/deceased details
10	Village/Area/Town	New-born/deceased details
11	Union/Ward	New-born/deceased details
12	Post Office	New-born/deceased details
13	Post Code	New-born/deceased details
14	Upazila/Thana	New-born/deceased details
15	District	New-born/deceased details
16	Marital Status	New-born/deceased details
17	Name of marital partner	New-born/deceased details
18	Level of formal education attained	New-born/deceased details
19	Type of health insurance	New-born/deceased details
20	Religion	New-born/deceased details
21	Occupation	New-born/deceased details
22	Type of occupation	New-born/deceased details
23	Ethnic Group	New-born/deceased details
24	Father's name	Family/informant details
25	Father's occupation	Family/informant details
26	Father's religion	Family/informant details
27	Father's citizenship	Family/informant details
28	Father's age	Family/informant details
29	Father's type of ID	Family/informant details
30	Father's ID number	Family/informant details
31	Father's address	Family/informant details
32	Father's level of education	Family/informant details
33	Father's occupation	Family/informant details
34	Father is in gainful employment	Family/informant details
35	Mother's name	Family/informant details
36	Mother's citizenship	Family/informant details
37	Mother's age	Family/informant details
38	Mother's ID number	Family/informant details
39	Mother's marital status	Family/informant details
40	Mother's number of children currently alive	Family/informant details
41	Mother's a number of abortions and born dead	Family/informant details



ID	Data element	Section
42	Mother's number of children born alive	Family/informant details
43	Mother's number of children born alive and now dead	Family/informant details
44	Birthdate previous child	Family/informant details
45	Mother's number of pregnancies	Family/informant details
46	Mother's live birth order	Family/informant details
47	Mother's literacy	Family/informant details
48	Mother's level of education	Family/informant details
49	Mother's occupation	Family/informant details
50	Mother's address	Family/informant details
51	Family Cell Phone Number (if available)	Family/informant details
52	NID of Deceased, Spouse, Parents (<18 years)	Family/informant details
53	Mother's address	Family/informant details
54	Place of birth	Details of the vital event- Birth
55	Date of birth	Details of the vital event- Birth
56	Time of birth	Details of the vital event- Birth
57	Type of birth	Details of the vital event- Birth
58	Birth condition	Details of the vital event- Birth
59	Pregnancy duration	Details of the vital event- Birth
60	Birth weight	Details of the vital event- Birth
61	Place of delivery	Details of the vital event- Birth
62	Attendant at birth	Details of the vital event- Birth
63	Name of the attendant at birth	Details of the vital event- Birth
64	Address of place of delivery	Details of the vital event- Birth
65	Size of baby	Details of the vital event- Birth
66	Place of death	Details of the vital event – Death
67	Address of place of death	Details of the vital event – Death
68	If Health Centre: Codigo RENAES	Details of the vital event – Death
69	If Health Centre: type	Details of the vital event – Death
70	Date of death	Details of the vital event – Death
71	Time of death	Details of the vital event – Death
72	Age at death	Details of the vital event – Death
73	Cause of death	Details of the vital event - Death
74	Report disease or condition directly leading to death online	Details of the vital event - Death
75	Report chain of events in due order	Details of the vital event - Death
76	State the underlying cause on the lowest used line	Details of the vital event - Death
77	Other significant conditions contributing to death (time intervals can be included in brackets after the condition)	Details of the vital event - Death
78	The time between begin of disease and death	Details of the vital event - Death
79	Hospital name	Details of the vital event - Death
80	Hospital Code	Details of the vital event - Death
81	Admission reg. No.	Details of the vital event - Death
82	Date of admission	Details of the vital event - Death

ID	Data element	Section
83	Time of admission	Details of the vital event - Death
84	Time in the hospital	Details of the vital event - Death in case of pregnancy
85	Hospital	Details of the vital event - Death
86	Duration of disease	Details of the vital event - Death
87	Was surgery performed within the last 4 weeks?	Details of the vital event - Death
88	If yes, please specify the date of surgery	Details of the vital event - Death, Medical data
89	If yes, please specify the reason for surgery (disease or condition)	Details of the vital event - Death, Medical data
90	Was an autopsy requested?	Details of the vital event - Death, Medical data
91	If yes, were the findings used in the certification?	Details of the vital event - Death, Medical data
92	Manner of Death	Details of the vital event - Death, Death
93	If external cause or poisoning:	Details of the vital event - Death, Death
94	In case violent or external cause of death	Details of the vital event - Death
95	Date of Injury	Details of the vital event - Death, Death
96	Please describe how external cause occurred (if poisoning please specify poisoning agent)	Details of the vital event - Death, Death
97	Place of Occurrence of the external cause	Details of the vital event - Death
98	Multiple Pregnancy	Details of the vital event - Death, Fetal or Infant Death
99	Stillborn	Details of the vital event - Death, Fetal or Infant Death
100	If death within 24h specify the number of hours survived	Details of the vital event - Death, Fetal or Infant Death
101	Birth weight(In grams)	Details of the vital event - Death, Fetal or Infant Death
102	Number of completed weeks of pregnancy	Details of the vital event - Death, Fetal or Infant Death
103	Age of mother (years)	Details of the vital event - Death, Fetal or Infant Death
104	If death was perinatal, please state conditions of mother that affected the fetus and newborn	Details of the vital event - Death, Fetal or Infant Death
105	Date of Expulsion / Extraction	Fetal Details of the vital event – Death
106	In case of death during pregnancy, delivery or after	Details of the vital event - Death, in case of death during pregnancy, delivery or after
107	Attended Ante-natal care (ANC)	Details of the vital event - Death, in case of death during pregnancy, delivery or after
108	How many ANC?	Details of the vital event - Death, in case of death during pregnancy, delivery or after
109	Was the deceased pregnant within the past year?	Details of the vital event - Death, For women of reproductive age
110	If yes, was she pregnant	Details of the vital event - Death, For women of reproductive age



ID	Data element	Section
111	Did the pregnancy contribute to the death?	Details of the vital event - Death, For women of reproductive age
112	Qualification of the medical practitioner certifying cause of death	Details of the vital event - Death
113	Signature medical practitioner certifying cause of death	Details of the vital event - Death
114	ID of the medical practitioner certifying cause of death	Details of the vital event - Death
115	Name of the medical practitioner certifying cause of death	Details of the vital event - Death
116	Date of certification of cause of death	Details of the vital event - Death
117	Place of certification of cause of death	Details of the vital event - Death
118	Date of burial	Details of the vital event - Death
119	Place of burial	Details of the vital event - Death
120	Grave Number	Details of the vital event - Death
121	Informant's full name	Registration/Certification details
122	Informant's relationship	Registration/Certification details
123	Informant's ID number	Registration/Certification details
124	Informant's professional ID	Registration/Certification details
125	Informant's professional school	Registration/Certification details
126	Informant's address	Registration/Certification details
127	Informant's signature	Registration/Certification details
128	Informant's source of information	Registration/Certification details
129	Informant's source of information fetus	Registration/Certification details
130	Informant's occupation	Registration/Certification details
131	Full name of coroner	Registration/Certification details
132	Name of court	Registration/Certification details
133	Date of registration	Registration/Certification details
134	Date of Issue	Registration/Certification details
135	Registration number	Registration/Certification details
136	Registry Office	Registration/Certification details
137	Registry Office's address	Registration/Certification details
138	Serial Number in Register	Registration/Certification details
139	Register of deaths	Registration/Certification details
140	Registration District	Registration/Certification details
141	Registrar Name	Registration/Certification details
142	Registrar Signature	Registration/Certification details
143	Registrar's ID	Registration/Certification details
144	Registrar's seal	Registration/Certification details
145	Seal of registrar's office	Registration/Certification details
146	UP secretary	Registration/Certification details
147	Informant's fingerprint	Registration/Certification details
148	Mother's fingerprint	Registration/Certification details
149	Baby's fingerprint	Registration/Certification details
150	Margin	Registration/Certification details



Related resources and products

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Library crvsgateway.info/library

A framework for evaluating national CRVS systems at baseline. CRVS technical outcome series.

Action guide on process mapping for CRVS systems. CRVS action guides.

Maximising synergies between Health observatories and CRVS. CRVS technical outcome series.

Enhancing CRVS system performance through effective legislation. CRVS development series.

Understanding CRVS systems: The importance of process mapping. CRVS development series.

Where there is no physician: Improving the notification of community deaths. CRVS technical outcome series.

Why the Sustainable Development Goal agenda needs strong civil registration and vital statistics systems. CRVS development series.

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Learning Centre crvsgateway.info/learningcentre

Topic 1: Introduction to CRVS.

Topic 2: CRVS governance and architecture.

Topic 3: CRVS processes.

Topic 6: CRVS tools – CRVS system assessment tools; Legal review tools; Process mapping.

University of Melbourne, D4H Initiative, CRVS Knowledge Gateway: Courses crvsgateway.info/courses

Enterprise architecture/business process mapping for countries.

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:



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