Colombia Rural Vital

A strategy to strengthening civil registration and vital statistics in rural municipalities and in ethnic communities

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Table of Contents

List of Abbreviations

CRVS	Civil Registration Vita Statistics
CR	Civirl Registration
CRV	Colombia Rural Vital
D4H	Data for Health
VS	Vital Statistics
MSPS	Ministry of Health and Social Protection
DANE	National Stastistics Department
RNEC	National Registry of Civil Status
RUAF-ND	Single Register of Affiliates-Births and Deaths
SmartVA	Smart Verbal Autopsy
SMS	Short Message System
UNICEF	United Nations International Children's Emergency Fund
VA	Verbal Autopsy

Abstract

This case study describes the development and implementation of the Colombia Rural Vital (CRV) strategy developed as part of the Bloomberg Philanthropies Data for Health Initiative. In Colombia, one of the Initiative's aims is to address the systematic underreporting of vital events (births and deaths) in rural areas and ethnic communities that are hard to reach to provide institutional assistance. By doing so, the Colombian government is ensuring that Civil Registration and Vital Statistic (CRVS) services are more equitably accessible to their underserved populations.

The CRV strategy integrates innovative methodologies for the retrieval of vital events such as the systematic crosschecking of institutional databases, the notification of cases through cell phones and the application of automated verbal autopsy (VA) to determine the probable cause of deaths for deaths occurring in the community. In addition, recommendations for CRV strategy scale-up are summarized.

Background

The Colombian government, in partnership with the Data for Health (D4H) Initiative, developed the Colombia Rural Vital (CRV) strategy as a sustainable solution to address the systematic underreporting of vital events (births and deaths). Within the framework of this strategy, Colombia prioritized three Civil Registration and Vital Statistics (CRVS) systems-building interventions: (i) increasing birth and death registration in rural municipalities and ethnic communities, (ii) strengthening the management and quality of vital statistics, and (iii) optimizing CRVS information systems and their interoperability in order to support local civil registration systems in improving the quality and timeliness of birth and death reporting.

Colombian Civil Registration Statistics (CRVS) System

The Civil Registration and Vital Statistics System (CRVS) is an essential public good which, in a well governed modern economy should guarantee that human rights are protected and public services are provided in an efficient and effective manner.

The information generated by the CRVS system becomes the fundamental pillar for ensuring the identity and legal status of Colombians. Additionally, it is an invaluable source of statistical and demographic information that provides data about fertility, birth, morbidity and mortality profiles, as well as about structure and dynamics of the population. In public management, the information provided by the Civil Registration and Vital Statistics system aids in the formulation and evaluation of policies, programs, plans and actions that positively impact citizen's lives.

In 1998, the CRVS system was officially created in Colombia and was defined as two independent subsystems: The Civil Registration (CR) subsystem and the Vital Statistics (VS) subsystem. The CR subsystem gives legal recognition to registered births and deaths. The VS subsystem collects information on births and deaths certified by the health sector.

The entities that make up the CRVS system are:

Process	Entity	Role
Medical certification		The Ministerio de Salud y Protección Social (MSPS) (Ministry of Health and Social Protection) oversees the health sector, and through its health institutions and authorized personnel is in charge of the **medical certification of births and deaths,** and so guarantees coverage and

		quality of registration.
		The Instituto de Medicina Legal y Ciencias Forenses (The Institute of Legal Medicine and Forensic Sciences) is the entity in charge of carrying out the medical legal coroner report. It also issues **certificates of deaths by external causes.**
Civil registration		The Registraduría Nacional del Estado Civil (National Registry for Civil State) is the overseeing entity that promotes and guarantees the civil situation of citizens through standardized identification processes and **civil registration of vital events**: births, deaths, marriage, divorce, adoptions, and annulments, among others.
		The Superintendencia de Notariado y Registro (Superintendency of Notary and Registry) is an entity associated to the Registraduría Nacional del Estado Civil which, through its network of notary public offices, works conjointly in the civil registration of vital events.

Transformation - Production Strategic Statistics	DANE	The Departamento Administrativo Nacional de Estadística (DANE) is the entity in charge of transforming data into strategic statistics that include processes like production, standardization and dissemination of vital statistics (births and deaths).

In 2008 and 2009, the MSPS implemented a web-based information system for health facilities to certify live births and deaths online in real-time. This system is called the Registro Único de Afiliados – Nacimientos y Defunciones (RUAF-ND). Birth and death information is exchanged between CRVS stakeholders through RUAF-ND, and DANE uses this information to generate vital statistics and indicators about health determinants to inform social policies.

When it comes to certifying and registering a birth, there are three distinct points of action related to the Civil Registration and Vital Statistics processes:

- Reporting that a birth has taken place.
- Issuing of a live birth certificate. Filling out the antecedent certificate for civil registration and registering statistical information (on paper or in electronic format in the RUAF-ND app).
- Issuing of the civil registration of the birth certificate, through a certificate of antecedents for registration (this document is the link between the civil registration subsystem and the vital statistics subsystem).

When it comes to certifying and registering a death, there are four points of action in the sequence:

- Reporting that a death has taken place.
- Issuing of the death certificate. Processing the certificate of antecedents for civil registration, registering the statistical information (on paper or in electronic format in the RUAF-ND app).

- Issuing of the burial license.
- Issuing of the civil registration of the death through a certificate of antecedents for registration (this document is the link between the civil registration subsystem and the vital statistics subsystem).

It is important to clarify that "natural" deaths are certified by health providing institutions or by authorized professionals. If deaths point in any way towards having been caused by "unnatural" or "external" causes, or if there is lack of clarity about the true causes of death, competence for certification belongs with the Instituto de Medicina Legal y Ciencias Forenses (National Institute for Legal Medicine and Forensic Sciences).

Country Context

Although overall birth and death registration completeness is high in Colombia, there are disparities between urban and rural populations. Over the last 20 years, the Colombian CRVS system has made significant progress in expanding coverage and improving data quality. In 2015, an estimated 87% of births and 83% of deaths were reported in the CRVS system. However, in rural municipalities that are difficult to access, and where, moreover, the population is mainly indigenous and Black, coverage reached 20%. The underreporting of births and deaths is attributed to reporting challenges and delays both in the clinical and community setting. Under registration has serious implications for individuals and their families and for their ability to access services and benefit from legal protection and other rights that are inherent in the establishment of one's legal identity.

A number of studies in Colombia have indicated that, on average, birth registration coverage between 2000-2005 ranged from 84% to 86% (1, 2). By 2013, birth registration coverage in Colombia increased to 87.1% (2). Overall, UNICEF indicated that birth registration coverage in children under the age of five in Latin America and the Caribbean in 2020 was estimated at 94% (3).

In light of these findings, the CRV strategy considered both the existing CRVS system and the prevailing country context to address the systematic underreporting of vital

events in Colombia and ensure that CRVS services are more equitably accessible to their underserved populations. The Colombian government, together with the Data for Health Initiative, assessed the implementation of the CRV strategy as well as the feasibility of scaling-up interventions. The outcomes and recommendations inform the MSPS in scaling these interventions to other rural municipalities.

In the next sections, the pilot assessment methodology, results and recommendations for scale up are summarized.

Methods

Led by the MSPS and local health authorities, and supported by the Data for Health Initiative, the CRV strategy was planned as a one-year demonstration in 14 municipalities to improve the coverage and quality of CRVS information. The strategy engaged communities and leveraged mobile technologies to increase the registration and certification of vital events. These 14 municipalities were selected based on the following criteria:

- More than 70% of the population living in rural areas
- More than 20,000 inhabitants
- A crude death rate of less than 3.5 per 1000 population.
- The presence of ethnic communities in the territory
- Political will at the local level to support implementation of the pilot

A pre-pilot feasibility study was carried out from April to May 2018 in three municipalities to assess local institutional capacity and government commitment to ensure the viability of systems interventions. With the results obtained, the implementation was then carried out in the remaining 11 municipalities from May to June 2018. Table 1 presents the final list of the 14 demonstration municipalities by department.

Table 1. Demonstration municipalities by department

Cesar	Cauca	Magdalena	Putumayo
Chimichagua La Paz	Balboa Bolívar Buenos Aires Caldono Cajibío Guapí Silva Toribio	Ariguaní Pueblo Viejo Santa Ana	Orito

The CRV strategy engaged local actors to create CRVS coordination mechanisms and formed committees in seven of the demonstration municipalities to improve the medical certification of births and deaths and to work with the civil registrar so that death certificates could be issued by authorized non-physician health personnel. Vital statistics committees were also formed to coordinate activities among actors within the CRVS system that certify and register births and deaths. These actors include health secretariats, mayor's offices, health service institutions, the police, the civil registrar and mortuaries. Ninety-three percent of municipalities did not have committees and only three of the 14 demonstration municipalities had established formal committees.

A web-based platform was designed for receiving SMS messages and paper-based reports for registering and certifying vital events for community settings. Community leaders, religious leaders, police officers, notaries, traditional birth attendants and community health workers reported these events. The platform uses mobile phone SMS messaging to collect information, and activates a cascade of actions to verify events, provide referrals, and collect more information. This includes an automated method to assign the most likely cause of death in cases where there has been no medical attendance of the deceased. This method, called "verbal autopsy" (see section on Automated Verbal Autopsy below) can be reliably used to determine cause of death patterns at the community level.

Once the SMS notification is received, an alert is then sent to a designated health official at the municipal health center to verify the vital event. Alternate reporting mechanisms (i.e., paper-based, or verbal reports) were also established in remote areas where there is no cell phone service. Information from these alternate reporting mechanisms is later entered into the CRV platform, which allows for vital events to be retrospectively reported. Vital events are managed according to the steps outlined in Table 2.

Table 2. Reporting flow for births and deaths

Births	Deaths
1. Receipt of report 2. Assignment to local health official 3. Verification of birth in the community 4. Vital statistics data collection 5. Institutional transfer 6. Birth entered into RUAF-ND	1. Receipt of report 2. Assignment to local health official 3. Verification of the death in the community 4. Vital statistics data collection 5. Verbal autopsy conducted 6. Institutional transfer 7. Assign a probable cause of death 8. Death entered in RUAF-ND

Findings

The findings from the CRV strategy interventions include: births and deaths recovered in both health care facilities and in communities from 2017 to 2019; quality assurance activities that estimated the percent of births recovered by the CRV strategy in the community and that were crosschecked in institutional databases (DANE and RUAF-ND) from 2017 to 2019; and an assessment of the quality of probable cause of death information using the data collected by the automated verbal autopsy.

Births and deaths recovered in the clinical setting

Between 2017 and 2018, 204 births and 62 deaths occurred in the clinical setting that had not been entered in RUAF-ND, and 100% of these cases were effectively recovered in 2019.

Table 3. Births and deaths recovered in the clinical setting 2017-2018*

Type of Vital Event	2017	2018	Total
Births	204	0	204
Deaths	57	5	62
Total missing	216	5	266

*IPS-Health Provider Institutions

Births and deaths recovered in the community setting

Births recovered in the community setting are presented in Tables 4 and 5. Between 2017 and 2019, a total of 400 births were recovered and entered in RUAF-ND in the community setting accounting for 87.3 % of cases that were detected and reported through the CRV strategy. The main source of information for capturing unreported births in 2017 was through institutional verification (i.e., police inspections, notaries and registrars).

Table 4. Births recovered in the community setting through active community search
from 2017 to 2019

	2017	2018	2019*	Total
Detected and reported cases	23	155	81	259
Cases identified as duplicates or discarded due to inconsistencies	11	2	2	15
Cases potentially recovered in the community	11	153	79	243
Cases not recovered	2	11	0	13

	2017	2018	2019*	Total
Cases recovered and entered in RUAF-ND	9	139	40	188
Percentage of effectively recovered cases**	82%	91%	51%	77%

*Data cutoff date June 30th, 2019

**Percentage calculated on the bases of cases recovered and entered in RUAF-ND / cases potentially

recovered in the community

Table 5. Births recovered in the community setting, through active institutional search,

from 2017 to 2019

	2017	2018	2019*	Total
Detected and reported cases	215	0	0	215
Cases identified as duplicates or discarded due to inconsistencies	0	0	0	0
Cases potentially recovered in the community	215	0	0	215
Cases not recovered	3	0	0	3
Cases recovered and entered in RUAF-ND	212	0	0	212
Percentage of effectively recovered cases**	98.6%	N/A	N/A	98.6%

* Data cutoff June 30th 2019
**Percentage calculated based on cases recovered and entered in RUAF-ND / cases potentially recovered in the
community
Community cases sourced in active institutional search are events detected in institutions or by personnel in the civil
registration subsystem to be channeled towards the health sector for medical certification issuing in the RUAF-ND

Between 2017 and 2019 a total of 401 deaths were detected and reported, 203 (50.6%)

through active community search (i.e, community leaders, social actors and health

promoters) and 198 (49.4%) through active institutional search. Of total deaths that took place in the community, 55.4% were finally entered into the RUAF-ND, tables 6 and 7.

Table 6. Deaths retrieved in the community context through active community search, between 2017 and 2019

	2017	2018	2019	Total
Detected and reported cases	26	147	30	203
Cases identified as duplicates or discarded due to inconsistencies	22	17	0	41
Cases potentially recovered in the community	4	130	30	164
Cases not recovered	1	30	20	51
Cases recovered and entered in RUAF-ND	3	100	7	137
Percentage of effectively recovered cases**	75%	77%	23.3%	83.5%

Sources: 2017   DANE-Official database December 2018/RUAF-ND-Cutoff date April16, 2019
        2018   DANE-Preliminary base- Cutoff date December 31, 2018 / RUAF- Cutoff date: April16 2019 2019
                DANE – Not available/RUAF-ND-Cutoff date April 16, 2019

Table 7. Deaths retrieved in the community context through active institutional search from 2017 to 2019

	2017	2018	2019*	Total
Cases detected and reported	155	43	0	198
Cases identified as duplicates or dismissed due to inconsistencies	1	0	0	1
Cases potentially recovered in the community	154	43	0	197
Cases not recovered	97	37	0	134

Cases recovered and entered into the RUAF-ND	57	6	0	63
Percentage of cases effectively recovered**	38%	61%	NA	32%

* Data cutoff date June 30th, 2019
** Percentage calculated on the bases of cases recovered and entered into the RUAF-ND / cases potentially recovered in the community setting
Community cases sourced in active institutional search are events detected in institutions or by personnel in the subsystem of civil registration to be channeled towards the health sector or for the issuance of the medical certificate in the RUAF-ND

Births and deaths recovered by quality assurance activities

A key component of the CRV strategy includes quality assurance activities to cross-check institutional databases. Analyses were conducted of RUAF-ND preliminary database, and of the final DANE published database. It is important to bear in mind that the differences in these databases, specifically for 2017, stem from the fact that DANE recorded events with its own vital facts app, and these were not certified in RUAF-ND, and were still being certified on paper. In 2018, entering the physical birth and death certificates was undertaken by the Health Territorial Entities. As a result of this comparison, the proportion of missing births yet to be uploaded into RUAF-ND was identified through a merging of databases. This brought to light an administrative under registration that was impacting birth rate information completeness in pilot municipalities.

The percentage of births recovered by the CRV strategy in the community is presented in Table 8. In 2017, 6.5% of all community births in pilot municipalities were recovered and published in the official DANE database, and 8.9 % of all community births were recovered and certified in the RUAF-ND app. For 2018, 7.1% and 8.2 % of the community births were validated and recovered in the official DANE databases and uploaded in the RUAF-ND database, respectively.

Table 8. Estimate of the effects of birth recovered by the CRV Strategy

	2017	2018	2019
Total births DANE reported in 14 demonstration municipalities	2,361	1,909	N/A
Total births RUAF-ND database reported in 14 demonstration municipalities	2,379	2,009	501
% community births recovered through the CRV strategy (certified into RUAF-ND)	8.9%	8.2%	9.0%
% community births recovered through the CRV strategy (published in DANE)	6.5%	7.1%	N/A

Sources: 2017   DANE-Official database December 2018/RUAF-ND-Cutoff date April16, 2019
               2018   DANE-Preliminary base- Cutoff date December 31, 2018/RUAF-ND Cutoff date: April16 2019
               2019   DANE – Not available/RUAF-ND-Cutoff date April 16, 2019

Estimates were also generated to examine the impact of underreporting of deaths. Total deaths recovered through the CRV strategy are presented in Table 9. For the year 2017, of total deaths that took place in demonstration municipalities, 1% was retrieved by the strategy and included in the DANE official report, and 6.8% of those deaths in the community were uploaded into the RUAF-ND; for the year 2018, percentages correspond to 5.8% and 11.9%, respectively. These differences are due to the fact that DANE publishes with a cutoff date (one year after the year of validity) while the RUAF-ND is an administrative record that is kept open.

Table 9. Estimate of the effect of recording deaths in RUAF-ND and DANE bases

	2017	2018	2019
Total deaths DANE reported in 14 demonstration municipalities	796	798	N/A
Total deaths RUAF-ND reported in 14 demonstration municipalities	885	962	341
% community deaths recovered through the CRV strategy (reported in RUAF-ND)	6.8%	11.9%	6.2%

% community deaths recovered through the CRV strategy (reported in DANE)	1.0%	5.8%	N/A

Sources: 2017   DANE – Official database December 2018 / RUAF- April 16, 2019
           2018   DANE –December 31, 2018/RUAF –May 31, 2019
   2019   DANE – Not available/RUAF- May 31, 2019

Automated Verbal Autopsy

A key component of the CRV strategy involved administering verbal autopsies to estimate the probable cause of death. In 2017, 361 interviewers and supervisors were trained to conduct verbal autopsy interviews (vital interviews). For each death, a health worker visited the family to conduct a verbal autopsy (VA) interview using a tablet, and then that person uploaded the data to a cloud database. The information was captured using the Smart-VA tool, which applies the Tariff algorithm to assign probable cause of death based on population level data. From 2018 to 2019, a total of 222 deaths were investigated through VA. The algorithm has a total of 46 possible diagnoses combining sets of signs and symptoms, and 29 probable causes of death were assigned. The most frequent causes of death assigned by the automated software were chronic respiratory diseases (26%), followed by cerebrovascular accident (23.1%), other communicable diseases (18.5%), coronary ischemic disease (17.7%), and indeterminate causes (11.5%). Of the deaths recovered through a VA, the majority corresponded to women (60%) and people over 50 years of age (83%).

Verbal autopsies were subsequently reviewed by a physician to also assign a clinical diagnosis based on the information collected in the vital interview. Comparative analyses of the estimated cause of death generated by VA and physician assigned cause of death are presented in Figure 1. The results suggest there is a moderate level of consistency between SmartVA and physician assigned diagnosis.

Figure 1. Comparison of probable cause of death estimated by the verbal autopsy algorithm and physician assigned
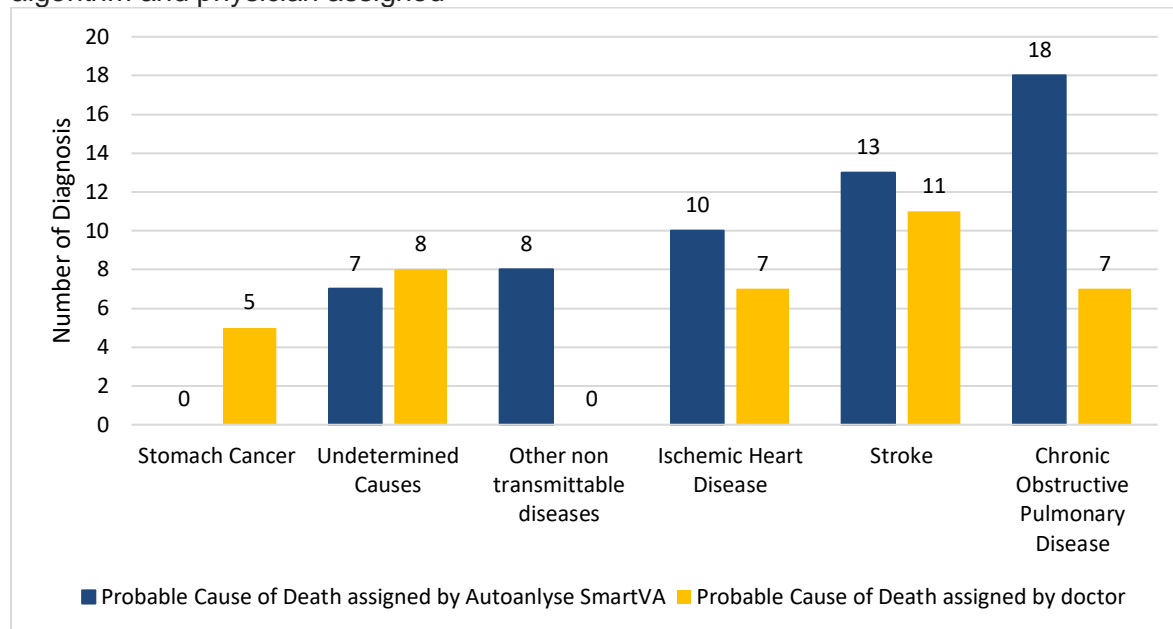
Conclusions

As of 2020, over 628 community leaders, health officials, and clinicians have been trained to use the CRV platform to report births and deaths. Overall, 422 births and 182 deaths were recovered in 2017 and 2018. Coverage of birth registration in the intervention municipalities increased by 8.9 percentage points in 2017, and 8.2 percentage points in 2018. Coverage of death registration increased by 6.8 percentage points and 11.2 percentage points, respectively.

The CRV strategy has highlighted the need for systems-level interventions to identify unreported deaths, in the clinical and community setting, and to shine a light on mortality patterns in rural municipalities that are disproportionately indigenous and Black. The strategy has been adopted as part of the routine activities of local hospitals within the 14 municipalities that participated in the initial implementation; two of the participating local health authorities (covering nine municipalities) have allocated resources to ensure the continuity of technical assistance.

Considerations for Scaling

In addition to quantitative findings, feasibility and observational assessments revealed additional considerations for scaling the CRV strategy. The implementation of the strategy in rural municipalities encountered challenges related to community participation and to institutional organization. The interventions were more effective in those institutions that had community-based health programs to reach rural populations because they have logistical and financial resources and the dedicated human talent to perform these tasks. Key recommendations for CRV scaling include:

- Fuller institutionalization is required, along with ensuring that trained and sustained human resources are dedicated to the system's operation and management.
- CRV program implementation should establish a technical team to guide the process of learning and improvement, the technical aspects of implementation and the dissemination of data and learning.
- While systems interventions have improved registration and certification in demonstration municipalities, there is still a need to identify and address demand-side barriers that cause under registration within each municipality and across sectors to develop a specific and tailored action plan.
- Local vital statistics committees should be established. They play a key role in ensuring data quality and engaging with community leadership structures to promote access to civil registration services.
- To strengthen vital statistics committees, it is essential to establish or enhance interinstitutional agreements to facilitate collaboration at the national and local level.

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