

CURRENT STATE OF CRVS: An Overview

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The main author was Anneke Schmider, with contributions from Irina Dincu and Montasser Kamal (CoE – IDRC, Canada), Debra Jackson (UNICEF), Ed Duffus (Plan International), Anshu Banerjee, Theresa Diaz and Doris MaFat (WHO), Keiko Osaki Tomita and Srdjan Mrkic (UNSD), Tanja Sejersen (UNESCAP), and Yacob Zewoldi (UNECA), Sam Mills (World Bank), Philip Setel (Vital Strategies), and Shaida Badiie (Open Data Watch) .



PURPOSE OF THIS PAPER

For inclusive development and to protect and save lives, every vital event must be recorded.

CRVS systems, in conjunction with other systems, create a foundation for country administration, building the backbone of **inclusive development** through improving citizen participation and access to government and services including health; supporting **social protection**, bridging the gap for the most vulnerable; and creating opportunities for all segments of the population and distribute the dividends of increased prosperity fairly across society¹. At an individual level, civil status registration is essential for people to be able to realize their rights and to assume their obligations as they emerge from the legal relations to which they participate.

Recent momentum for development of CRVS systems—including cross-system linkages to health and identity systems—has been very strong. This background paper documents global knowledge and recent momentum, highlighting progress, gaps, challenges and opportunities over the period 2012–2017. It is a key background document for the Canada IDRC–UNICEF–WHO Global CRVS Conference in Ottawa (27–28 February 2018).

¹ OECD 2017 http://www.oecd.org/inclusive-growth/Policy_Brief_Time_to_Act.pdf



1. CURRENT STATE OF CRVS

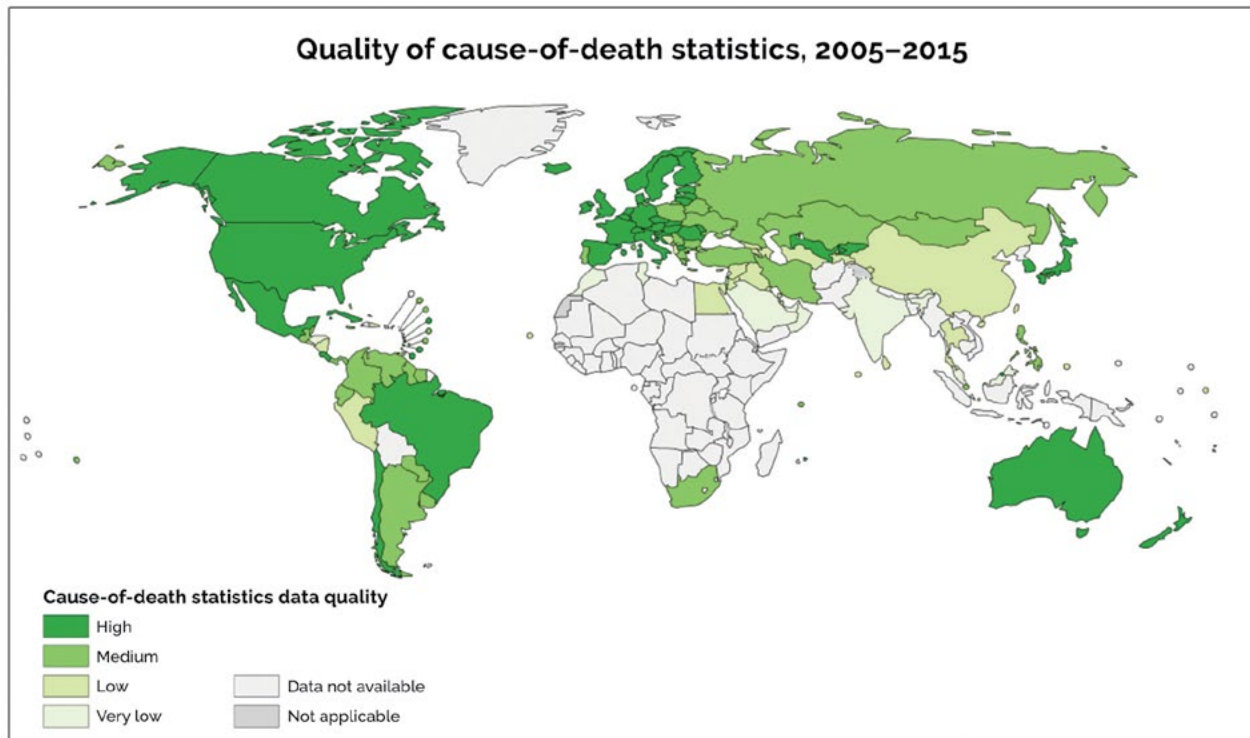
Worldwide, around one-third of all births are not registered, with around half of all deaths going unrecordedⁱ. Combined with the knowledge that more than one billion people do not have a legal identity, this means that many in the world are potentially denied rights, access to services including health and education, and participation in governance and economic development. This disparity is most apparent in low and middle-income countries, and is known as the 'scandal of invisibility'ⁱⁱ.

Strengthening civil registration systems is acknowledged as the way to establish fundamental human and civil rights; and major efforts and commitments are underway to strengthen CRVS systems, particularly in Africa, Asia and the Pacific countries and regions through regional and global initiatives. Regional and global momentum to improve the status of CRVS systems, including significant country commitment and action, has been only relatively recent. While efforts have focused largely on improvement of CRVS systems for births, deaths, causes of death, marriage, and divorces, acknowledged within the approach is recognition that there is mutual benefit in strengthening systems such as health and ID systems in tandem.

The issue of low reporting across the spectrum of vital statistics is demonstrated by the continuing low levels of reporting for deaths and causes of death, including deaths of women and children. Few low- and middle-income countries produce cause-of-death statistics of sufficient quality to guide public health decision-making. Only 49 countries — representing 20 percent of the world's population—produce high-quality death data, most in Europe and the Americas. 73 countries lack any deaths data (Figure 1).

Yet there is emerging progress known in some countries. Ghana, United Republic of Tanzania and Kenya have all sought to improve the collection routinely cause-of-death information on deaths that occur in health facilities in their health management information system. Although such data are not nationally-representative, the early stage production of data is considered an effective means to build data capacity within the country.

Figure 1. Quality of cause-of-death statistics



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the destination of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Information Evidence and Research (IER), World Health Organization

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2. GLOBAL MOMENTUM 2012–2017

Since 2012, there has been broad global attention on CRVS system development, although work began earlier in many regions and countriesⁱⁱⁱ. This focus has resulted from unique multi-stakeholder partnerships, spanning geographic boundaries, culminating in the securing of the agenda in many global policies and strategies, including in the Sustainable Development Goals. This section overviews key areas of momentum from 2012–2017 for CRVS system development.

Global directions for improving civil registration and vital statistics systems was initiated in the early years of the United Nations, through the development and implementation of *Principles and Recommendations for a Vital Statistics System*, prepared and issued by the United Nations Statistics Division. The current^{iv}, third revision of these principles and recommendations for civil registration and vital statistics, in force since 2014, calls for a holistic interoperability between registration of vital events, production of regular, reliable and accurate vital statistics and the identity management systems, including issuance of biometric documents and identity cards to all. These recommendations are accompanied by handbooks and other training materials that further elaborate on this internationally recommended model for these three functions.

2.1 SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals enshrine CRVS as important to the global development agenda.

CRVS is in fact, a preferred source of data for many of the SDG indicators, with multiple references to CRVS across the SDGs highlighting the benefits of CRVS as a system, providing not only legal identity for individuals, and delivering vital statistics for measuring sustained progress across many differing areas. (Table 1). This is particularly evident in the health goals and targets where well-functioning CRVS systems are fundamental to properly monitor mortality and related indicators^v.

TABLE 1: CRVS ACROSS THE SUSTAINABLE DEVELOPMENT GOALS

GOALS	RELEVANT TARGETS	RELEVANT INDICATORS
GOAL 3 – Ensure healthy lives and promote well-being for all at all ages.	Target 3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	3.1.1 Maternal mortality ratio 3.1.2 Proportion of births attended by skilled health personnel
	Target 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births	3.2.1 Under-five mortality rate 3.2.2 Neonatal mortality rate
	Target 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease 3.4.2 Suicide mortality rate
	Target 3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	3.6.1 Death rate due to road traffic injuries
	Target 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	3.9.1 Mortality rate attributed to household and ambient air pollution 3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services) 3.9.3 Mortality rate attributed to unintentional poisoning

TABLE 1: CRVS ACROSS THE SUSTAINABLE DEVELOPMENT GOALS

GOALS	RELEVANT TARGETS	RELEVANT INDICATORS
GOAL 16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.9: By 2030, provide legal identity for all, including birth registration.	Indicator: 16.9.1 – Proportion of children under 5 years of age whose births have been registered with a civil authority, by age
GOAL 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.19: By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries	Indicator: 17.19.2 Proportion of countries that (a) have conducted at least one population and housing census in the last 10 years; and (b) have achieved 100 per cent birth registration and 80 per cent death registration

2.2 THE GLOBAL STRATEGY FOR WOMEN'S CHILDREN'S AND ADOLESCENT'S HEALTH 2016–2030

The Global Strategy^{vi} articulates the importance of CRVS systems for women and children in many ways. Importantly, the Global Strategy supports CRVS systems as a preferred data source for women's and children's health^{vii}, an important aspect of a statistical package which also includes regular surveys, census and other health information sources (Table below).

- In an important sequence of work, a UNICEF-GAVI-World Bank-WHO report released in 2016 further defined the importance of improvement of using innovations in women's and children's health to improve CRVS systems^{viii}.
- In addition, key modifications to the International Classification of Disease have enabled improvements to cause of death collection for national vital statistics systems^{ix}.

Global Strategy Indicators where CRVS is the preferred source by 2030 ^x	Current sources of data in low- and middle- income countries
Maternal mortality ratio	CRVS, Surveys and specialized studies
Under-5 mortality ratio	CRVS and surveys
Neo-natal mortality rate	CRVS and Surveys
Stillbirth Rate	CRVS, surveys, facility data
Adolescent mortality rate	CRVS, surveys and census
Adolescent birth rate (10-14, 15-19) per 1000 women in that age group	Surveys, CRVS and facility data
Proportion of children under 5 years of age whose births have been registered with a civil authority	CRVS and Surveys

2.3 GLOBAL CRVS INVESTMENT PLAN 2015–2024

The scaling up investment plan, published in 2014, provides a coherent, global effort to ensure all countries have a sustainable civil registration and vital statistics integrated across government and serving the needs of public and private sectors and all citizens of a country.

Released in 2014, the CRVS Scaling Up Plan, funded by the Government of Canada and produced by World Bank with WHO, outlined a central goal that there be Universal civil registration of births, deaths, and other vital events, including reporting cause of death, and access to legal proof of registration for all individuals by 2030. It included global targets for CRVS to 2030, and importantly, introduced sub-targets across CRVS systems including issuing certificates for children, and better recording and investigation of maternal, newborn and child deaths^{xi}.

TARGETS	2020	2025	2030
Births in given year are registered	80%	90%	100%
Children whose births are registered have been issued certificates	70%	85%	90%
Deaths in given year reported, registered, and certified, and investigate	60%	70%	80%
Maternal and newborn deaths reported, registered, and investigate	80%	90%	100%
Deaths in children under 5 reported, disaggregated by age and sex	60%	70%	80%
Cause of deaths in hospitals reliability determined and officially certified	80%	90%	100%
Countries have community assessments of probable cause of death determined by verbal autopsies using international standards.	50%	65%	80%

Recognising the benefits of developing global capacity on CRVS, the World Bank, supported by the Global CRVS group, released the online CRVS systems course in 2017, providing practical tools and approaches to achieving 21st century state-of-the-art CRVS systems that are linked to identity management systems and tailored to local contexts^{xii}. The course is offered in two formats: Basic-Level Certificate Self-Paced CRVS, and Advanced-Level Certificate Facilitated CRVS Course at the World Bank online learning centre^{xiii}.

3. THE CRITICAL IMPORTANCE OF THE PARTNERSHIP

3.1 NEW GLOBAL FINANCING, PARTNERS AND ARCHITECTURE

New partnerships and architecture have emerged since 2012 to support the global CRVS momentum, and to respond to demand from countries for CRVS strengthening.

3.1.1 Canada – Centre of Excellence for CRVS Systems

Housed at Canada's International Development Research Centre (IDRC), the Centre of Excellence is a global resource hub that actively supports national efforts to develop, strengthen, and scale-up civil registration and vital statistics (CRVS) systems. Its role is to facilitate access to technical assistance, global standards and tools, evidence, and good practice.

Funded by Global Affairs Canada and IDRC, the Centre of Excellence works in close collaboration with the Global Financing Facility, a key financing platform of the UN Secretary General's Global Strategy for Women's, Children's and Adolescents' Health (2016–2030). The Centre of Excellence contributes directly to this work by enabling countries to develop strong CRVS components in the investment cases they submit to the Global Financing Facility. It will also support the countries' implementation of investment cases to ensure comprehensive and sustainable CRVS systems, leading to better data, improved health planning, and healthier populations.

<https://crvssystems.ca/>

3.1.2 Global Financing Facility

Working in more than 25 countries, and housed at the World Bank, the Facility was launched in July 2015 in support of the Every Woman Every Child multi-stakeholder partnership movement, and the Sustainable Development Goals. Weaknesses in CRVS systems are acknowledged as having direct effects for women and children's health, and following on from the Global CRVS Scaling Up plan released by the World Bank, Canada and WHO, CRVS systems are a specific area of focus for the Global Financing Facility, supported by a \$100m investment from the Government of Canada.

<http://www.worldbank.org/content/dam/Worldbank/document/HDN/Health/GFFExecutiveSummaryFINAL.pdf>

3.1.3 Bloomberg Philanthropies Data for Health Initiative

The Bloomberg Philanthropies Data for Health Initiative is a four-year, \$100m investment that aims to support governments in 20 low- and middle-income countries around the world in strengthening their health data and data use, including improving CRVS systems. Much of

the Data for Health CRVS-related support focuses partnering with governments to improve the registration and certification of deaths and causes of death and the use of innovations to bring CRVS systems in line with international best practice recommendations.

In addition to direct country support, the Initiative has produced numerous technical publications on many aspects of CRVS housed at the CRVS Knowledge Gateway (<https://crvsgateway.info>). Data for Health also works to support in-country data use and impact, ensuring that crucial public health data, including from CRVS, is used in the program prioritization and policy decision-making process. The operating principles of the Initiative are: country leadership and ownership; capacity building; and a commitment to sustainability. Data for Health is co-funded by Bloomberg Philanthropies and the Australian Department of Foreign Affairs and Trade.

3.2 REGIONAL PARTNERS AND ARCHITECTURE

Regional partners and programmes are a remarkable aspect of the CRVS momentum. Regional partners raise awareness, set regional goals and targets, foster country-to-country exchange and mutual learning, and build high-level political commitment, and have continued to provide a platform over time through which country stakeholders, development partners, and technical experts can share experiences, develop and document good practices, and propose innovative approaches to tackle CRVS challenges^{xiv}.

Regional programmes for CRVS exist in most regions across the world, including the Eastern Mediterranean, Latin Americas, Africa and Asia-Pacific. This section highlights two regional case studies in Asia-Pacific and Africa.

3.2.1 The Asian and Pacific CRVS Decade (2015–2024)

At the 2014 Ministerial Conference on Civil Registration and Vital Statistics (CRVS) in Asia and the Pacific, Governments adopted the Ministerial Declaration to 'Get Every One in the Picture' and proclaimed the 'Asian and Pacific CRVS Decade'. The Ministerial Declaration outlines the commitment of governments to achieve the shared vision that, by 2024, all people in Asia and the Pacific will benefit from universal and responsive civil registration and vital statistics systems that facilitate the realization of their rights and support good governance, health, and development and lays out the following goals:

- Goal 1: Universal civil registration of births, deaths and other vital events;
- Goal 2: All individuals are provided with legal documentation of civil registration of births, deaths and other vital events, as necessary, in order to claim identity, civil status and ensuing rights;
- Goal 3: Accurate, complete and timely vital statistics (including on causes of death), based on registration records, are produced and disseminated.

In addition to the three goals, Governments committed to the implementation of the Regional Action Framework for Civil Registration and Vital statistics in Asia and the Pacific composed of 15 nationally set targets, a set of principles and outlines eight implementation steps for countries to complete. The Regional Action Framework reflects the urgent need to improve CRVS systems in the Asia and the Pacific.

Three years after the Ministerial Conference, there has been significant but mixed progress among the countries in the Asia-Pacific region:

- At least 26 countries in Asia and the Pacific have established national CRVS coordination mechanisms, with more countries planning to do so over the coming year.
- At least 16 countries in Asia and the Pacific have developed national CRVS strategies, with more countries planning to do so over the coming year.

Tracking Progress in Asia Pacific

Most births in the region are registered, but there are still millions of children and adults who have not had their birth registered. Most countries have set ambitious targets for improving birth registration during the CRVS Decade. Completeness of birth registration is difficult for many countries to assess; emphasizing the barriers in measuring and attaining the Sustainable Development target on legal identity for all.

Death registration is particularly challenging, and many countries will not be able to achieve universal death registration within the CRVS Decade. Only 11 of the 37 reporting countries have set targets of 100% completeness for death registration and cause of death certification. Improvements on the certification of cause of death is needed in many countries in the region. Several baseline reports submitted for the CRVS Decade in 2015/2016 highlighted that causes of death are not currently routinely recorded.

The region shows wide variation in the production of vital statistics based on registration records: some countries are already disseminating timely and accessible statistics on births, deaths, and causes of deaths, while others aim to do this by the end of the CRVS decade. The use of registration records as the main source for statistics on the causes of death is a challenge for several countries, that primarily rely on household surveys, resulting in less timely data and difficulties in analyzing patterns for subgroups or specific geographical areas.

Important for assessing country progress is the tracking of each individual country's improvement from a baseline point. In 2015/2016, 37 countries in Asia and the Pacific submitted their baselines for the CRVS Decade. The baseline reports analyzed the status of countries' CRVS systems against the 15 targets under the Regional Action Framework. Countries also reported on their 15 national targets for the CRVS Decade and highlighted which of these they have already achieved, and which would demand substantial work, support, and resources to be achieved. Worth noting is that setting national targets could be a cumbersome process demanding high level endorsement within governments.

3.2.2 Implementation of the Africa Programme on Accelerated Improvement of Civil Registration and Vital Statistics Systems

Since 2010, African Ministers have paid close attention to the development of civil registration and vital statistics systems. Following a Ministerial call for action in 2010, Ministers subsequently called for countries to undertake comprehensive assessments and develop costed action plans supported by the regional civil registration and vital statistics core group. The third Ministerial session in 2015, covered various technical aspects of civil registration and vital statistics systems, such as the use of information and communications technology, cause-of-death information, vital statistics and linkages with national identity cards, as well as the importance of such systems for upholding human rights.

Success Factor 1: Political Commitment and Country Action

The political commitment of Ministers has proved crucial for securing political commitment and ensuring leadership at the highest level. Today Governments are providing leadership in the development of civil registration and vital statistics systems through a more coordinated approach, backed by capacity-building and technical and normative support from the regional civil registration and vital statistics core group.

Much progress has been made thanks to the Africa Programme on Accelerated Improvement of Civil Registration and Vital Statistics Systems. There has been sustained political commitment at the country level, with Governments showing leadership and taking ownership of the process of strengthening their respective civil registration and vital statistics systems.

- To date, 28 countries have conducted assessments of their civil registration and vital statistics systems, while 21 have completed comprehensive assessments and 7 countries have carried out rapid assessments.
- A total of 25 countries have developed strategic improvement plans and some have begun to implement them.
- A further 16 countries have at least initiated the process of conducting comprehensive assessments.
- Governments are also increasingly committed to funding their own civil registration and vital statistics improvement plans, decreasing their dependence on external assistance.

Success Factor 2: Regional Tools and Capacity

Important to this progress has been the regional capacity-building and tools which have been specifically developed to support the programme of work:

- **Tools:** Supporting guidance and tools have been developed for use by countries, including comprehensive assessment tools and guidelines, strategic planning guidelines, a guidebook on digitizing civil registration and vital statistics, a template and guidelines for

the development of vital statistics reports, a manual for trainers on the production of vital statistics from civil registration records, a strategy on mortality statistics in Africa, and a practical guide on death registration and cause-of-death information processes.

- **Capacity Development:** A series of five Africa Symposia for Statistical Development (ASSD) have been held with a focus on civil registration and vital statistics. In addition, many training workshops on various aspects of civil registration and vital statistics have been held to train civil registration and vital statistics experts as part of capacity-building efforts in the region.
- **Regional and Country Technical Support:** A critical step for building sustainable capacity in Africa was the development of a pool of regional civil registration and vital statistics experts. These experts, trained in all aspects of CRVS, including the use of comprehensive assessment and planning tools, have been helping countries to undertake assessments and develop national action plans. These experts have also trained many national civil registration and vital statistics officials, resulting in in-country knowledge transfer.
- **Sub-regional needs:** Given the special legal and technical requirements of French-speaking African countries, a regional support group on civil registration and vital statistics for French-speaking countries was established in early 2015. The establishment of the group has proved extremely successful, as since its creation 11 French-speaking countries have approached the regional civil registration and vital statistics core group for support in carrying out civil registration and vital statistics assessments and planning.
- **Cross-sectoral synergy:** There has been increased engagement and involvement of the health sector in improving birth and death registration coverage in Africa. A much-needed focus on cause of death improvement was agreed by African countries post-Ebola with the development of an African technical strategy aligned with the CRVS programme principles.

Further Regional Information

Global CRVS Group	https://unstats.un.org/unsd/demographic/crvs/globalcrvs.html
Africa	APAI-CRVS http://www.apai-crvs.org/
Asia-Pacific	CRVS in Asia and the Pacific: 'Get in the Picture' http://www.getinthepicture.org/
Latin Americas	XIV Meeting of the Latin American and Caribbean Council for Civil Registration, Identity, and Vital Statistics. http://clarciev.com/es/evento/xiv-encuentro-del-consejo-latinoamericano-y-del-caribe-de-registro-civil-identidad-y-estadisticas-vitales-clarciev-2/

4. THE ROLE OF DIGITAL INNOVATION TO STRENGTHENING CRVS SYSTEMS

Digital innovation is of critical importance for future development of CRVS systems. While CRVS systems in many high income and middle-income countries have been transformed using digital technologies, the discussion about possibilities for digital development in low income countries have been unfocussed and fragmented. This section aims to address this issue by compiling available information for use in future planning, since there is available information on digital innovations for CRVS systems, overviewed here, which is important for considering future development.

4.1 NECESSARY LEGAL AND REGULATORY FRAMEWORKS AND REVIEW

A strong legal and regulatory framework aligned with best practices is fundamental to a successful CRVS system. Experience has shown that many countries have outdated or even antiquated CRVS laws that can stifle innovations such as the digitization of CRVS systems, the adoption and use of verbal autopsy, linkages to emerging national identity management systems, and other improvements necessary to develop a 21st century CRVS systems.

Governments that conduct systematic legal and regulatory review² of their CRVS systems against current best practices are better able to identify actionable recommendations for reform. In several countries, this comprehensive legal review has yielded a wealth of important reforms. Although legislative reform can sometimes be a lengthy process, many important changes can be accomplished through the regulatory process through the issuance of ministerial orders or new standard operating procedures. In Tanzania, for example, the review supported the drafting of a new Births and Deaths Registration bill; in Rwanda, it has led to the issuance of several ministerial decrees paving the way for implementation of improvements and innovations; and in Bangladesh, a review was conducted to set the stage for the establishment and strengthening of the Office of the Registrar General. For those wishing to access examples of CRVS laws and regulations, an online repository will soon be available at www.CRVSLaws.org.

² Vital Strategies and the Global Health Advocacy Incubator (Data for Health Initiative), *Civil Registration and Vital Statistics (CRVS) Legal and Regulatory Review Tools and Methodology*, New York:2017.

4.2 EXPERIENCE AND DESIGN ISSUES: CONSIDERING THE EVIDENCE

Since 2012, there has been an emerging body of more systematic work on the potential use and practicality of technological or digital innovation for CRVS systems. A series of three reports prepared by the University of Oslo in 2013^{xv} highlighted digital development opportunities for CRVS, along with risks and challenges.

A first report considering the impact of the MOVE-IT program overviewed the experiences and impact of innovation, scale and learning challenges accompanying the trial of new technologies in low- and middle-income settings, funded through the MOVE-IT programme. This analysis found that the importance of creating scale can be one of the key drivers for technology innovation, and accordingly, that strong programme logic should drive the system strengthening efforts, rather than the fact that a new technology is now available^{xvi}.

In a second report considering m-health and e-health opportunities, innovation for CRVS was first defined as one where, using technology, a new way of working, or a new way of doing existing work, is possible. Important characteristics of innovation were also identified for CRVS systems—principally that innovations were scalable, able to scale across one setting to others, and survive after the initial seed funding has been used^{xvii}.

- The report noted that, although CRVS systems are multisectoral, naturally requiring linkages with other systems such as health, research, population registers, CRVS information systems did not tend to support multisectoral linkages, implying that significant proportions of birth and death events being recorded in other systems were not recorded in CRVS systems, and that for citizens, duplicate effort was required. Agencies lost the opportunity of being able to correlate their figures and mutually strengthen their respective information systems, and the national ability to aggregate for improved vital statistics was lost^{xviii}.
- This report noted that 'data warehousing', by design, could encourage more integrative thinking; however, the report also noted that principles of enterprise architecture—which consider issues of technology, data and business requirements in a holistic manner—were often not used, hindering systems working together. This report made a final, important, point that financing for CRVS and health projects often did not include the explicit design in a systems context, and so there was little ability to experiment and learn about how technologies can strengthen CRVS systems built in to projects^{xix}.

The overarching themes of design—integration of systems, business process streamlining, automation of processes and inclusion of innovation—were articulated also in a final report on the design principles for CRVS systems^{xx}. This report argued that modernization of the CRVS systems involved more than just technological fixes. Rather, it advocated that CRVS systems must be conceptualized and designed as parts of larger architectures, a point crucial for their good functioning and for the quality of the data they hold. Design principles were developed for CRVS systems, including:

- **At the strategic level:** establish CRVS as a public good; and establish institutional incentives to keep the CRVS information system updated and of good quality.
- **At the operational level:** Establish a holistic approach to CRVS design which includes all existing CR and VS events; establish the business relationships of identified information flows necessary to generate high quality data in a sustainable way; and develop the technical approach for operationalization of these relationships, using tactics of integration and interoperability, aligning legal frameworks^{xxi}.

4.3 BENEFITS OF INTEROPERABILITY WITH THE HEALTH SECTOR

Over 2012–2017, a strong theme emerged related to the mutual strengthening benefits of CRVS and health interoperability. The strongest theme has been that innovations in the health sector—especially those for maternal and child health—can be used to strengthen CRVS systems^{xxii}. This theme was extended in a report from 2017, which identified several opportunities for more systematic digital approaches to be shared by the health sector to strengthen CRVS systems, including pregnancy tracking, which extends services data collection across pregnancy, childbirth and through a child's early health sector experiences (such as immunization), and so provides opportunities to notify births, and records maternal, newborn and child deaths. The report noted several current opportunities to explore improved digital development between the health sector and CRVS sectors^{xxiii}.

4.4 RECOMMENDED ROADMAP FOR DIGITAL DESIGN AND INNOVATION

In an online article published in 2015, technology was noted as having the potential to provide transformative improvements in CRVS systems based on its ability to ensure universal coverage (meaning no one is left behind), to standardize and streamline registration processes, to ensure system interoperability and provide secure storage. This article noted that, since ICT would likely constitute a substantial cost and a significant proportion of CRVS investments, there was a need for developing countries to have unbiased, high quality technical assistance on effective planning, implementation and on-going use of ICT for CRVS needs^{xxiv}.

The article further argued that, although there was huge potential for using technology to strengthen CRVS systems, the current capacity to implement well designed, scalable and sustainable systems as weak, resulting in notable risks, including failure of technology projects, resulting in CRVS systems that are not fully scalable, sustainable, flexible and interoperable, and technology solutions will not provide the necessary data protection, security and confidentiality to safeguard personal data hence may fail to deliver on rights based objectives^{xxv}. The article outlined an eCRVS capacity building roadmap, to help move countries from limited capacity to more independent and effective implementation of eCRVS, highlighted in the table below.

1. Common CRVS Digitation Guidelines	Create guidelines and reusable design templates to simplify the implementing of ICT, building on CRVS principles and recommendations, enterprise architecture and existing international standards. These have since been completed by the African Programme for the Accelerated Improvement of CRVS, supported by Plan International.
2. Criteria for smart ICT investment in CRVS	Define mandatory deliverables and criteria for smart investment in ICT, based on outputs of the CRVS Digitisation Guidelines, which can be reviewed and assessed before ICT investments for CRVS are made.
3. Develop an eCRVS open source platform	Design and assemble an eCRVS platform that supports the generic processes and functions of CRVS, which can be made freely available to countries. This work has been completed by Plan International, in conjunction with global and regional partners, particularly in Africa
4. Reference eCRVS implementations	Demonstrate the effectiveness of the guidelines and reusable design templates through best practice references.
5. Create an eCRVS knowledge centre and reference group	Create an online knowledge centre and dedicated reference group to support countries in the implementation of eCRVS.

5. FUTURE OPPORTUNITIES, GAPS, AND CHALLENGES

Assessing progress and momentum over the period 2012–2017, there remain many gaps and challenges related to scaling CRVS systems for best effect.

5.1 OPPORTUNITIES TO IMPROVE OPERATIONAL RESEARCH

There is a lack of documentation using formal operational research outlining country success in scaling CRVS systems; and while there is emphasis on the mutual benefits between systems such as CRVS, health and ID systems, operational research into how countries have benefitted from this cross-system development is also inadequate. As such there is little advice for countries at present as to how to manage existing or emerging technology pressures, or guidance on cross-system coordination and interoperability for best effect. However, the emerging use of business process mapping within CRVS systems, championed by the Swiss Tropical Health Institute and showcased in this conference, shows great potential for the ongoing improvement and management of CRVS systems.

5.2 THE POTENTIAL FOR MODERN DATA ANALYSIS

Data is usually considered an output of a CRVS system, yet in evidence-based design, data can be regarded also as an input. Data (or lack of data) from a CRVS system can tell us about where coverage is weak, and hence where attention is needed in systems design. There is little in the literature about how countries can use incomplete data from systems for analysis and for strengthening systems, or how modern data analysis techniques could be used to strengthen vital statistics systems and reporting. Hence, there is an opportunity to better consider modern data analysis for its role in improvement of CRVS systems.

Vital statistics systems in many low- and middle-income countries have been traditionally weak, and there is an overreliance on use of estimates for reporting. While this may suit broad analytical purposes, it will not deliver the needed benefits at citizen level which accrue from legal identity acquired through registration of births, deaths and marriages, for example.

5.3 INCLUSIVE DEVELOPMENT AND SOCIAL PROTECTION – A ROLE FOR HUMAN CENTRED DESIGN?

At the centre of CRVS systems improvement is registering the unregistered –those whose vital events are invisible to the system. Human centred design is an approach which can be explored for its potential to inform or improve system design—how to reach remote communities, for example, or register births and deaths of vulnerable populations. Related to this is a need for localized research about non-registration and evidence on how these barriers can be overcome. A few studies exist, but more is needed, particularly in countries that are struggling to register hard-to-reach or marginalized groups.

5.4 GREATER CROSS-SYSTEM DESIGN

A strong theme since 2012 has been the better integration of systems such as health and national ID systems, for the benefit not only of CRVS systems, but for a total benefit across all three systems. There is emerging evidence of the importance of these cross-system initiatives, which will be published in the forthcoming United Nations *Handbook on Civil Registration and Vital Statistics Systems: Management, Operation and Maintenance, Revision 1*.

Guidance on cross-system design is also emerging through the use of Business Process Mapping for CRVS systems. However, while there has been some progress on cross-system design, this has not been articulated fully, nor assessed through operational research.

5.5 ADDRESSING GENDER INEQUALITY IN REGISTRATION

To help achieve gender equality and empower women, it is critical to have data that are reliable, timely, and disaggregated by age and sex. The data must also capture limitations on and inequalities of women's rights, both *de jure* and *de facto*. Only then will data serve to guide better policies and programmes, particularly for the underserved and hard to reach, the overwhelming majority of whom are women and children. Gender inequality in civil registration and vital statistics often starts at birth, continues in marriage and old age, and persists into death, as women's deaths are less likely to be registered. Taken together, this makes it difficult for governments to plan appropriate policies and programs across the life course. And yet, only 25 percent of the world's population lives in countries where more than 90 percent of births and deaths are registered. Most of those countries are high-income countries^{xxvi}.

Gender inequalities are more pronounced when it comes to marriage and divorce registration. While societies have long regulated customs and norms around this vital event—marriage—its transcription into civil law often fails to happen, for reasons sometimes attributed to ignorance of the benefits of marriage registration, economic barriers or others. Marriage (and divorce) registration are effective tools for women's empowerment, and for facilitating access to social benefits and social protection. For example, a marriage certificate is evidence of a woman's ability to legally claim her inheritance rights in the event of a spouse's death, while a divorce certificate facilitates access to a pension, alimony, child support, and a fair share of the assets acquired in the marriage union. While improving birth and death registration tends to be high on the CRVS political agenda, improving marriage registration is often not a priority, making it difficult for women to secure their rights. It is, however, in death registration that women are the most invisible. Less than half of all deaths in the world are registered. Of those deaths that are registered, cause of death information is often not captured. More troubling is that male deaths are more likely to be registered than women. For example, Romesh Silva has found that 65 percent of male deaths are

reported in Morocco in comparison to 35 percent of female deaths³. Death registration is important because it closes an individual's legal identity. Where deaths are not registered, the dead remain legally alive, making it impossible for spouses, children and families to inherit, or for the surviving spouse to legally remarry—depriving them of assets, reducing family income, and increasing poverty. It also artificially inflates a country's population on paper, compromising effective governance and policy planning. Importantly, if the deaths of women and girls go unregistered, it hinders governments' abilities to identify preventable causes of death, and develop targeted policies and programs aimed at reducing the deaths of women or girls.

Further, producing accurate sex-disaggregated mortality statistics becomes an impossible task, because data either do not exist, or are unreliable. This forces countries to rely on modeled data based on surveys, which are not only costly, but depend on sampling, may be compromised by other issues of sex biases⁴, and are not appropriate for monitoring short-term changes. Most importantly, data collection, analysis and interpretation of the surveys considerably delays the programme definition and implementation.

It is critical that CRVS system strengthening programmes that address gender inequality are designed, and special indicators included in the monitoring frameworks. Generating evidence as to the root causes of such inequality and inequity will be critical to help address the issue in LMIC.

5.6 WHICH EMERGING TECHNOLOGIES, AND HOW TO INTEGRATE?

Technology is a commonly promoted tool for improving CRVS systems. However, many pilots are introduced using new technologies which run in parallel or which do not scale for improved CRVS system results^{xxvii}. With artificial technologies, blockchain and other new technologies emerging on top of existing focus on mobile collection and open systems, the challenge will be to explore technologies in a systematic way for the best benefit of this globally-important system.

5.7 FUTURE FINANCING

Canada has made a significant contribution to CRVS momentum since 2012, supporting pilot investment planning in countries, leading with World Bank and WHO the development of a Global CRVS Scaling Up Plan, investing \$100m into the World Banks' Global Financing Facility, focused on country implementation, and establishing the CRVS Centre of Excellence for CRVS Systems.

3 <http://www.un.org/en/development/desa/population/events/pdf/expert/26/presentations/Sesion3/silva-DDMs-slides-2016-11-03.pdf>

4 <http://onlinelibrary.wiley.com/doi/10.1111/j.1740-9713.2016.00899.x/full>

There exist further areas for financing development which can be better explored among traditional and new donors, especially for future system development as part of a global workplan. For example, how and when public-private partnerships could support sustainable system development; and whether innovative financing mechanisms could be harnessed to seed and scale sustainable system innovations for global public good. In addition, how new funding can be made available for research on CRVS systems to help build the knowledge base for in-country and global acceleration of strengthening of CRVS systems.

As part of any future workplan, attention should be paid to financing design, focussed not only on the necessary country investments, but where global investments could be made for the potential benefit all countries.

APPENDIX: Literature Review 2012–2017

Since 2012, there has been an updated focus on improvement to CRVS systems in the international standards, with the United Nations *Principles and Recommendations for a Vital Statistics System, Revision 3* presents international standards for civil registration and vital statistics, including for interoperability with population registers and identity management systems. A further emphasis on system development was published in the World Bank–WHO Global CRVS Scaling Up Plan^{xxviii} which promoted country targets over time for CRVS system improvement. Finally, the 2015 release of the Sustainable Development Goals secured the global focus on CRVS systems as a preferred source of data.

Within this framework, there has been a range of literature published on the improvement of CRVS systems since 2012, as highlighted in this section.

6.1 GENERAL LITERATURE

A series of CRVS-specific academic articles ‘Counting births and deaths’ was published as a series by the Lancet in 2015^{xxix}. Written by a core team of authors, the series covered themes of assessing progress in CRVS system development. Whilst the series did not particularly focus on innovation within the CRVS system, one study argued that, with country-level and global policy making needs comprehensive, detailed, continuous, and real-time data that only universal CRVS can provide, one study argued that there was potential of innovative approaches, including new information technologies, to enable and accelerate strengthening of CRVS, often related to efforts to improve identity management, accelerate efficient data collection and analysis, and increase access to—and efficiency of—service provision to individuals and families^{xxx}.

In the broader literature, the importance of cross-system linkage emerges as a small sub-theme in the health academic literature. Byass et al 2014, arguing for improvement in mortality data in the pre-Ebola period, argue that in countries with unique personal identification it is possible to cross-link data of different types that relate to the same individuals subject to suitable ethical and confidentiality safeguards^{xxxi}. Silva and Abouzahr note that promising record linkage studies undertaken in high- and middle-income countries to monitor and evaluate the completeness and quality of CRVS data have exploited powerful and accessible machine learning techniques to efficiently and reliably link individual records between different data systems^{xxxii}.

Labrique et al^{xxxiii} note that, while pilot projects have demonstrated how mHealth can alleviate specific health system constraints that hinder effective coverage of health interventions, large-scale implementation or integration of mHealth innovations has been limited by a shortage of empirical evidence supporting their value in terms of cost, performance, and health outcomes; and that governments in low- and middle-income countries face numerous challenges and competing priorities, impeding their ability to adopt innovations.

6.2 REGIONAL AND COUNTRY LITERATURE

Regional and country literature, although greater in number, are sparse in terms of understanding country system improvements which have harnessed innovation and technology for improvement.

In a special edition, The Asia-Pacific Population Journal focussed on CRVS development in 2014, covering CRVS as a development imperative, country lessons in strengthening CRVS systems, human rights and social protection, and a potential research agenda^{xxxiv}.

Within the series, there some focus on innovation and IT, especially reflecting country system improvements. For example, it was noted that several countries in the region had used IT to accelerate progress in CRVS improvements, with Bangladesh incorporating registration of vital events into the "Digital Bangladesh" e-governance scheme, involving multiple sectors, ministries and the private sector with leadership and oversight by the Office of the Prime Minister.

The Philippines was also cited for its approach to IT and CRVS, forming a public-private partnership with an IT company to computerize the civil registration system, with the aim to improve the quality and standard of civil registration activities. The article noted that while innovation and information and communications technology solutions are often implemented to support improvements to CRVS systems, that technology solutions needed to be sustainable, supported by a sound institutional framework and embedded in overall CRVS strategies in order to provide long-term benefits^{xxxv}.

The remaining academic literature is sparse in relation to country progress and experience in improvement of CRVS systems in low and middle-income countries. Focussed on performance and momentum, a study in the Lancet series examined performance of country CRVS systems, noting that the best performing systems were mostly in the European region, the Americas, and Australia, with most low-scoring countries were in the African or Asian regions^{xxxvi}. In other literature, the theme of improvement in birth registration systems emerges. For example, Ghana is recorded as having improved its birth registration, for example, through the incorporation of birth registration into community health care, health campaigns and mobile registration activities which are noted as reducing the indirect costs of birth registration, especially in poorer communities, and increasing registration rates^{xxxvii}. A small-scale study in Tanzania using mobile phone text messaging noted 'encouraging signs' of scalable innovation to accelerate and increase coverage of civil registration, recording vital events information in real time^{xxxviii}.

6.3 HEALTH SPECIFIC LITERATURE

Lopez and Setel^{xxxix} argue that reliable, timely, and relevant information plays an unequivocal role in improving the health of populations, with good, or better, health outcomes influenced by informed health policies and practices, delivered by a health system that makes the most of health resources by maximizing efficiency and promoting greater equality. Well-functioning CRVS systems are argued to have direct benefits for individuals and for policy-making processes that use vital statistics, but also contribute to improved population health outcomes^{xl}.

Described as a 'tool of epidemiology'^{xli}, the health literature has the broadest range of reference to the importance of civil registration and vital statistics, given its importance in studying population health and disease trends. A range of studies in particular areas of health concern—from diabetes to cardiovascular disease—have been released since 2012, focussed on studies undertaken using vital statistics and cause of death data in high income countries.

In contrast, despite their utility for guiding health policy decisions, informing health research priorities, and for monitoring progress with specific disease and injury control strategies, too few low- and middle-income countries have functioning vital registration systems that are fit for purpose^{xlii}. Studies in low or middle-income countries highlighted both the importance and challenge of collecting health data including vital statistics and cause of death.

Two countries which have recorded important mutual strengthening exercises between their health-CRVS and ID systems are Thailand and Korea. Both completed scaled health system approaches using CRVS and national identity systems as the foundation for determining entitlements under new health insurance schemes.

In Thailand, at the time of implementation of a national insurance system, the priority was to categorize all Thai citizens into an insurance scheme. The existence of unique citizen identification number before the Universal Coverage System implementation was important to enabling the rapid and successful implementation of the new insurance system^{xliii}. The National Civil Registration Office in conjunction with the three health insurance schemes now dynamically update the data on a daily basis by adding births, removing deceased citizens, and recording shifts in memberships across the three schemes^{xliv}.

In Korea, the health insurance system also relies on a working relationship with the national ID and CRVS systems. The entitlement to insurance is created at birth. When an infant is born, a request to the National Health Insurance must be made within 14 days of birth, an application which uses the unique identification details for the parent. The NHI receives information about births daily and grants eligibility for the NHI. In the case of a death, a declaration of death is completed and the NHI receives notification and subsequently withdraws the NHI account of the deceased^{xlv}.

Improvement between health and CRVS systems to improve mortality data was also a theme in other parts of the health academic literature. A South African study noting that record linkage for mortality data between HDSS and CR systems is possible and can be useful in identifying predictors for death registration and registration system characteristics that could be improved to achieve more optimal future matching possibilities^{xlvi}. The use of social autopsy methods in conjunction with verbal autopsy methods as part of a CRVS systems was proposed as a means to reduce child and maternal mortality^{xlvi}.

With South African cause-of-death data widely used for estimates of cause-specific mortality in many African countries, a study by Joubert et al^{xlvi}, provided assessment of the improvements the South African mortality data system for demographic and health analysis; noting that there remained a considerable confidence gap for single-cause of death data to inform local health planning, or to fill gaps in sparse-data countries on the continent. This lack of reliability in recording single cause of death represents a persistent challenge for the health sector. For example, a study in Kenya noted the challenge of understanding the magnitude of deaths from road traffic accidents in Kenya and the need for continuous, systematic, and sustainable data collection efforts.

6.4 GREY LITERATURE

In contrast to the academic literature, there is greater range of information available in the grey literature noting innovations and improvements in country systems.

Brazil was noted as a country which has made significant progress in developing its CRVS system in conjunction with its health sector, establishing civil registry units in maternity hospitals and provided hospitals with a small payment incentive to register births, and expanding to electronic registration^{xliv}. In Bolivia, digitalization of the information contributed to faster compilation of the information and better quality control; and in Mexico and Panama, the focus on better technology in civil registries enhanced the timeliness of the serviceⁱ.

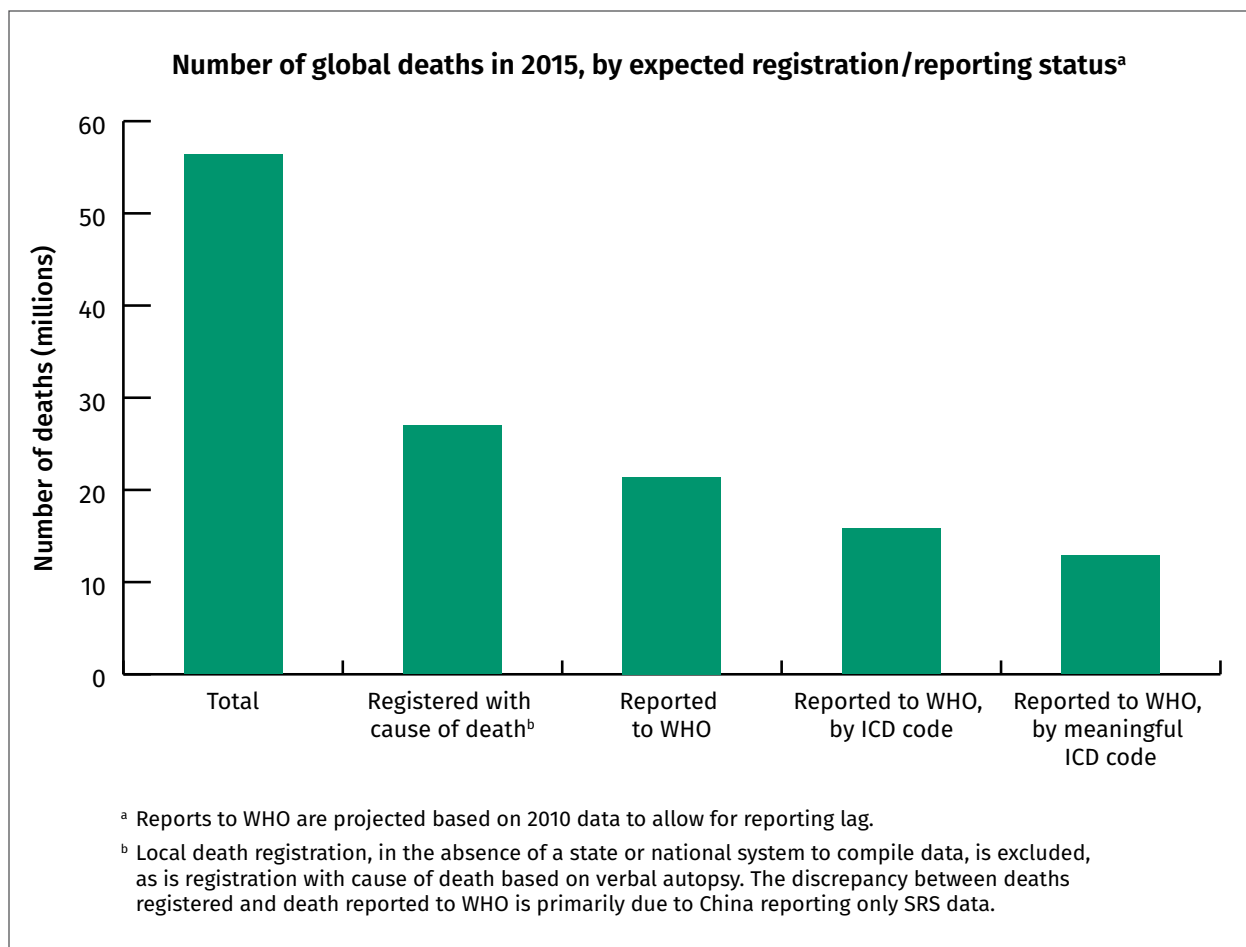
South Africa also has made major improvements in birth registration, and substantial improvements to death registration after the process was made a compulsory step before burial. Certification on the cause of death has improved following the training of certifying officials in hospitals as well as the introduction of an automated coding systemⁱⁱ. Cape Verde computerized the entire CRVS system during 2007 and 2008, enabling biometric enrollment and massive registration of births, especially in the remote, previously inaccessible areas of the country, and issuing birth certificates online. Mobile stations and enrollment kits have been installed in all major hospitals in the country^{lii}.

Innovation and improvements were a feature of a report of improving CRVS data for women's and children's health across the continuum of care^{liii}, which recommended that the two systems seek improvements jointly by:

- Undertaking joint assessments and business process mapping should be prioritized to foster a shared understanding of how to operationalize links between CRVS systems and the RMNCAH continuum of care.
- Development joint technology systems so that transformative improvements in both systems can be achieved by streamlining and extending registration coverage, integrating data from multiple systems, securely storing data at scale, all in a cost-effective way.
- Improving data collection forms and methods, implementing data management protocols for information sharing; developing joint capacities, and improving implementation research^{liv}.

Global reporting also began to highlight data analysis issues. An ongoing issue is the loss of data from the vital statistics data process. From a public health perspective, especially for women and children's health, deaths data is a necessary source of information for monitoring mortality by cause, age and sex. The 2014 Ebola outbreak showed that, across the health information spectrum, it is crucial for to develop initiatives both at national and global level to achieve universal registration of deaths, advocate for medical certification of the cause of death, improve the quality of the information on cause-of-death coded to ICD and the reporting and use of such information. Yet, reporting of vital events in some areas is critically low. For example, out of the 56 million deaths that occur in the world in 2015, nearly half were registered in a national death registration system with information on cause of death. However, only 21 million were reported to the World Health Organization. Of these, only 13 million deaths have specific cause of death as coded to the International Classification of Diseases (ICD) that are meaningful for public health purposes (Figure x).

Figure x. From registration to reporting: potential data loss^{lv}



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