

## Counting births and deaths 1



# Civil registration and vital statistics: progress in the data revolution for counting and accountability

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New momentum for civil registration and vital statistics (CRVS) is building, driven by the confluence of growing demands for accountability and results in health, improved equity, and rights-based approaches to development challenges, and by the immense potential of innovation and new technologies to accelerate CRVS improvement. Examples of country successes in strengthening of hitherto weak systems are emerging. The key to success has been to build collaborative partnerships involving local ownership by several sectors that span registration, justice, health, statistics, and civil society. Regional partners can be important to raise awareness, set regional goals and targets, foster country-to-country exchange and mutual learning, and build high-level political commitment. These regional partners continue to provide a platform 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. This country and regional momentum would benefit from global leadership, commitment, and support.

### Introduction

In 2007, a *Lancet* Series—Who counts?—drew attention to a global issue of invisibility in which the poorest and most vulnerable people in society are unregistered and uncounted owing to weak civil registration and vital statistics (CRVS) systems.<sup>1–3</sup> The low level of investment to improve CRVS was characterised as “the single most critical development failure over the past 30 years.”<sup>4</sup> When CRVS systems are dysfunctional, decision makers and planners do not have the most basic information they need—about changes in population size, distribution, fertility, and mortality patterns—to inform and formulate economic, social, and health policies and respond adequately to people’s needs for current and future services.<sup>6</sup>

This Series provides new evidence to support the rationale for strengthening of CRVS as a human rights, governance, and development imperative. This first paper describes developments in countries, regionally and globally, and positions CRVS as part of the data revolution called for in the report of the UN Secretary-General’s High-level Panel of Eminent Persons.<sup>7</sup> The second paper presents compelling evidence that strengthening of CRVS is not only important from a statistical perspective, but is a previously underappreciated health and development intervention in its own right.<sup>8</sup> The third paper provides a comparative overview of CRVS system performance in almost 150 counties and territories on the basis of a new Vital Statistics Performance Index, and shows its use for systematic and objective monitoring of CRVS progress worldwide.<sup>9</sup> The final paper makes the case for implementation research and documentation of country experiences to bolster the evidence base for CRVS, and calls for bold global leadership to overcome fragmentation and inefficiency in support of development partners to countries.<sup>10</sup> Together, these papers show that

CRVS is at the cusp of a revolutionary move forwards for individual rights and equity, population and health data, and improved accountability.

### Functions and use of CRVS

Civil registration is an administrative system to record occurrence and characteristics of major vital events (notably, births and deaths).<sup>11</sup> The main function of civil registration is to provide individuals with documentation needed to establish legal identity and family relationships, make claims of nationality, exercise civil and political rights, access services, and participate in modern societies. For children particularly, such documentary evidence of identity helps to protect them from exploitation and hardship.<sup>12</sup> Ability to prove family relationship and status is likewise crucial to women’s empowerment and participation.<sup>13</sup>

Additionally, records of vital events from civil registration are a key source of vital statistics for fertility

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This is the first in a [Series](#) of four papers about counting births and deaths

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### Search strategy and selection criteria

The search strategy included a search of websites of international health and development agencies with mandates covering aspects of civil registration and vital statistics (CRVS), a search of relevant electronic databases (PubMed and Google Scholar), scanning of reference lists from relevant published studies, study of conference proceedings, and direct contacts with technical and in-country experts for references to relevant publications and grey literature.

Preference was given to papers with a focus on low-income and middle-income countries and that addressed CRVS in a systemic way. Exclusion criteria were a reference period before 2000 and the production of vital statistics from sources other than the civil registration system.

**Key messages**

- Country-level and global policy making needs comprehensive, detailed, continuous, and real-time statistics on country levels, and patterns of fertility, population health, and mortality that only universal civil registration and vital statistics (CRVS) systems can provide
- Few low-income and middle-income countries have CRVS systems able to generate statistics for births, deaths, and causes of death covering the whole population at levels of quality and timeliness to meet the needs of policy makers in health and other sectors
- Recognition is growing that functional CRVS systems are a key responsibility of the state and are essential for good governance and improved accountability; in the past decade, many countries have begun ambitious efforts to improve CRVS, often as part of broader efforts to modernise administrative systems such as e-governance
- The potential of innovative approaches, including new information technologies, to enable and accelerate strengthening of CRVS is now starting to be realised, 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
- Development partners at global, regional, and country levels can support country efforts by coordination of their activities, by support of capacity development for data collection, analysis and use, in learning of lessons, promotion of good practices, and development and dissemination of standards, technologies, and methods
- As discussions of the scope and reach of the Sustainable Development Goals approach their conclusion, CRVS must be central to the data revolution, in terms of institutional change, new alliances, collaboration across sectors, and use of data for accountability; the data revolution cannot occur without a complete vital statistics system linked to effective civil registration

and mortality. Functioning CRVS systems provide governments with reliable and up-to-date population and mortality statistics, including causes of death, which enable them to plan, deliver, and monitor effectively health and social development programmes and to track progress towards international commitments such as the Millennium Development Goals and the Sustainable Development Goals. From a statistical perspective, the key characteristics of CRVS—universality of coverage, permanence, and continuity—enable production of real-time data at national and local administrative levels that are crucial to plan and monitor. Such statistics enable the fight against poverty by quantification of outcomes and identification of marginalised groups most in need of services.

**The challenges countries face**

Many low-income and middle-income countries do not have adequate CRVS systems that cover the entire population, register and certify all births and deaths with associated key characteristics, and consolidate this information into vital statistics. Worldwide, one in three children aged 5 years or younger have not had their births registered and so do not exist officially.<sup>14</sup> An estimated two-thirds of deaths are never registered and are therefore not counted in the vital statistics system; more than half of WHO member states obtain either no data for mortality and cause of death, or obtain data of such poor quality that they are of little value for public health policy and planning.<sup>15,16</sup>

Many reasons exist for this poor state of affairs. Although most countries have legislation requiring births and deaths to be reported to local registration offices, the law might be incomplete, out-of-date, and poorly enforced. The dual nature—legal and statistical—of CRVS systems adds substantial complexity to implementation. Typically, the CRVS system comprises several, often poorly linked, subsystems under the responsibility of different government ministries, such as home affairs, justice, population, statistics, or health. The non-governmental sector, such as religious entities, non-governmental organisations (NGOs), community-based organisations, and civil society likewise have parts to play. NGOs often monitor quality of service provision, especially for the poor and for minority groups.<sup>17</sup> Effective coordination and a timely flow of information between different organisations is necessary to ensure quality of legal documentation and of resultant vital statistics.

Additionally, performance of the CRVS system depends on the extent to which individuals and families collaborate in the process of registration. People might not be aware of the need to register, and registration facilities might be inaccessible owing to physical, economic, or sociocultural barriers. For poor and marginalised individuals, the putative advantages of registration have little meaning compared with the day-to-day challenges to put food on the table, find shelter, and ensure personal security. Efforts to strengthen CRVS systems should be cognisant of the complex economic and social cultural circumstances that are obstacles to registration, take action to remove obstacles such as distance and costs, and introduce positive incentives, including access to services and benefits. CRVS should be seen as a service to the people rather than an imposition by the authorities, and should foster trust between the state and society.

In most countries, births are more likely to be registered than deaths, mostly because the perceived benefits of birth registration to families are more direct and immediate than those of death registration. In India, for example, death registration coverage is 66% compared with more than 80% for births.<sup>18</sup> Birth registration can be increased through links with the

health sector and use of health service contact points, such as maternity care and immunisation, as opportunities for notification of vital events to registration authorities. In South Africa, birth and death registration have been greatly improved by location of registration facilities in hospitals and health centres and provision of mobile registration units in remote areas.<sup>19</sup> This provision helped to reduce the proportion of late birth registrations from more than 70% of total registrations during 1996–2000 to less than 30% in 2010–11.<sup>20</sup> Death registration can be increased through links with mortuaries and institutions responsible for issuance of burial or funeral permits. In Egypt, death registration coverage is almost complete because a death certificate is needed to obtain a burial permit.<sup>21</sup> Enforcement of registration law is crucial: in many countries, inadequate supervision and availability of unlicensed cemeteries resulted in a substantial number of deaths being missed in the CRVS system.<sup>22</sup>

Children are often not registered shortly after birth, but only when the certificate is needed for a specific purpose such as school enrolment. Such late registration is especially pervasive in Bangladesh, Mozambique, Nepal, and Rwanda, but less pronounced in Philippines and Vietnam (figure).<sup>14</sup> By contrast, coverage in Pakistan is low across all age groups. Although from the child's perspective, late registration is better than no registration, the practice is associated with overall under-registration of births and unreliable vital statistics. Late registration likewise results in under-reporting of child deaths (particularly in the early neonatal period); because neither birth nor death is recorded, child mortality is seriously underestimated. Late registration can be reduced by increased involvement of health facilities in the registration process. In Mexico, for example, after involvement of the Ministry of Health in birth certification in 2008, late registration decreased by 10% overall, with a reduction of more than 15% in some states (Lozano R, unpublished).

Even when most deaths are registered, to ensure that cause of death is correctly ascertained can be difficult. Accurate medical cause-of-death certification might be compromised when physicians do not have the skills to complete the international standard death certificate.<sup>23,24</sup> Unreliable cause-of-death statistics also result from inadequate capacity for statistical coding according to the International Classification of Diseases (ICD).<sup>25</sup>

When deaths that occur outside the health system are reported, cause of death is sometimes identified by lay officials who do not have the necessary medical acumen, training, and knowledge to do so correctly.<sup>26</sup> This issue leads to high proportions of ill-defined causes of death that are of little use for public health decision making.<sup>27,28</sup> Although death can be reported by families, lay people, or the police, only a medically trained person can reliably diagnose the underlying disease or injury that

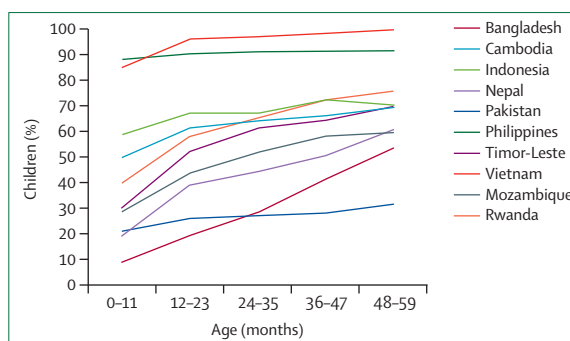


Figure: Percentage of children aged less than 5 years whose births are registered by age (months)

Data from the United Nations Children's Fund.<sup>14</sup>

led to death. When hospital cause-of-death data are amalgamated with lay-reported causes, the resulting death distribution does not reliably show the cause-of-death pattern of the population.<sup>29,30</sup> Verbal autopsy is the only viable alternative method to identify population-level causes of death, but has not been widely implemented outside research settings.<sup>31,32</sup>

### Growing momentum

Although trend data suggest small improvements of quality of reported mortality statistics and of birth registration coverage (appendix),<sup>14</sup> overall progress has been described as “disappointing and excruciatingly slow”.<sup>33</sup> Despite this pessimistic assessment, change is beginning to occur, with valuable lessons emerging from country initiatives and growing regional and global momentum.

### Countries seize the moment

Countries that have embarked on CRVS improvement initiatives in the past decade include Albania,<sup>34,35</sup> Bangladesh,<sup>36</sup> Brazil,<sup>37</sup> Egypt,<sup>38</sup> Fiji,<sup>39</sup> India,<sup>18</sup> Jordan,<sup>40</sup> Kazakhstan,<sup>17</sup> Mozambique,<sup>41</sup> Philippines,<sup>42,43</sup> South Africa,<sup>18,44</sup> and Sri Lanka.<sup>45</sup> Several countries, including Afghanistan, Botswana, Cambodia, Ethiopia, Laos, and Yemen, with support from regional development partners, are in the process of completion of national CRVS assessments and formulation or implementation of improvement plans.<sup>46</sup> Many countries in the Pacific region are working to modernise their CRVS systems, with support of partners through the Pacific Vital Statistics Action Plan.<sup>47,48</sup>

Although some countries are in the early stages of CRVS improvement, others are well advanced and have achieved substantial results. In India, for example, birth registration coverage increased from less than 60% in 2001 to more than 80% in 2010. Death registration coverage likewise improved, although evidence exists that progress has slowed since 2007 (appendix).<sup>18</sup> Whatever the level of development of the CRVS system, valuable experiences exist from which to learn. One of these lessons is to ensure

See Online for appendix

**Panel 1: Ten lessons learned from Fiji's approach to strengthening of civil registration and vital statistics (CRVS)**

The experience of Fiji is a unique opportunity for other nations to learn from success stories, challenges, and adversities, and apply these lessons to their own circumstances

- 1 Ensure country ownership of strengthening of CRVS
- 2 Identify country CRVS champions to drive the process forwards and maintain momentum
- 3 Conduct a rapid assessment of CRVS systems, but ensure country ownership of the process, and engage the right stakeholders
- 4 Involve development partners to provide technical support and assist with planning
- 5 Engage stakeholders and establish a CRVS committee to foster collaboration, communication, and documentation of processes, and ensure strong leadership and senior management support
- 6 Establish guidelines and processes to share data and knowledge between agencies, and ensure data and knowledge are shared
- 7 Identify country strengths and quick wins, and build on these
- 8 Strengthen technical elements of the CRVS system alongside broader systemic issues
- 9 Advocate and increase awareness of the importance of CRVS systems and the relevance and use of the vital statistics they produce
- 10 Ensure information produced by CRVS systems is used for policy making

that the legislative underpinnings for CRVS systems are appropriate and up-to-date. Several countries, including Afghanistan, Albania, Bangladesh, India, and Pakistan have introduced legislative and administrative reforms designed to improve civil registration.<sup>17</sup>

Another lesson learnt is the need to build links across sectors. In Fiji, collaboration between ministries was crucial to development of the national CRVS plan (panel 1).<sup>39</sup> The importance of integration of birth registration into the health sector at the local level has been highlighted in several projects.<sup>49</sup> In the Philippines, for example, work with medical training institutions and health professionals to improve cause-of-death ascertainment is a key component of the national improvement plan (appendix).<sup>18</sup> Projects in Kenya, Malawi, Morocco, and Zambia focus on strengthening of links between civil registrars and the health sector.<sup>50</sup>

Countries with low registration have introduced interventions to overcome obstacles, for example, by elimination of fees and introduction of incentives such as links between registration and service delivery. In general, identification of incentives is more straightforward for birth registration than for death registration, especially in communities in which people have little wealth to pass on

to their descendants. Death registration can be increased by links between registration and burial permits and by encouragement of religious authorities to advocate registration. Information and advocacy campaigns are important means to raise awareness and commitment of people working in CRVS systems and to convince families of the importance of registration for identification of interventions designed to prevent premature death in the future.

Experiences of countries show that holistic, systemic approaches involving stakeholders across several sectors—especially health, statistics, registration, justice, home affairs, and civil society organisations—are needed for effective CRVS improvements. Development partners and donors should coordinate their support with country efforts and country-led priorities and plans that are most likely to be sustained over time.

#### Drivers for change

Several drivers of this country momentum exist. Functioning CRVS systems are increasingly seen as fundamental to good governance and sound national administrative systems because they enable greater political participation, underpin accountability, and enable public service delivery by provision of a platform for national population databases, national identity programmes, and e-governance.<sup>51</sup> Universal and responsive CRVS systems have a crucial part to play in achievement of inclusive, equitable, and people-centred development, prevention of statelessness, improvement of humanitarian planning, and aiding of response to disasters. Reliable and timely vital statistics are important for national authorities to plan, and are increasingly seen as investments that yield high-quality data to underpin effective public policy.

Global political commitment to improvement of health of women and children, exemplified by the work of the Commission on Information and Accountability for Women's and Children's Health (COIA) has greatly stimulated interest in CRVS as the most effective way to monitor progress continuously at both national and local levels.<sup>52,53</sup> Countries that have made substantial progress towards universal health coverage have stressed the importance of a functioning CRVS system for definition of the so-called universe of need, which only good CRVS systems can do.<sup>54</sup>

The escalating toll of chronic and non-communicable diseases on human wellbeing and social and economic costs has further highlighted the need to be able to reliably count deaths from leading causes and to measure how rapidly they are changing in low-income and middle-income countries, in which longitudinal data for these dynamics are weakest.<sup>55,56</sup>

#### Harnessing of the potential of innovation

A desire to achieve measurable progress in a short time frame has stimulated growing interest in the potential of information technologies—including internet-enabled

mobile communication devices—to simplify information capture at family or population level, and registration and issuance of certificates at community level, accelerate data compilation and transfer, and enhance capacities for data storage and sharing. In 2010, the Monitoring of Vital Events through Innovation Technology (MoVE-IT) initiative offered some support to various innovative approaches.<sup>57</sup> Kenya, Rwanda, and Tanzania used rapid-short message service (SMS) technology to transmit information about births and deaths to the local civil registration authorities.<sup>58,59</sup> Ghana assessed the feasibility of reinforcement of vital registration in rural communities using volunteer structures and information technologies for data transfer and dissemination.<sup>60</sup>

A review<sup>61</sup> of these and other information technology projects for CRVS concluded that a strong integrated programme logic should drive the system-strengthening efforts, rather than simply the availability of a new technology. An important lesson is that legal processes need to be established so that an SMS can be treated as a formal notification to registration authorities. Successful scaling up of promising information technology projects needs a step-by-step systems-integrative approach, building on what is available, and sustained capacity development, rather than seeking simple quick fixes in new technologies.

Some countries, including Bangladesh, Iran, and Thailand are creating a population register that links population, health, and social security databases by use of unique individual identification numbers. In Bangladesh, interventions to strengthen CRVS are being introduced nationally as part of the national Digital Bangladesh e-governance scheme, which involves several sectors, ministries, and the private sector, with leadership and oversight by the Prime Minister's Office. As part of this scheme, pregnancy outcomes and child survival will be tracked with mobile devices at the community level.<sup>36</sup> This whole-of-government agenda benefits from high-level political commitment and coordination, a national system of unique individual identification, which enables interoperability across several databases, and field-level workers who enter data from digital services directly, many of whom work in the health sector.

A good legal foundation is essential to ensure security and privacy of personal data and to set standards for database interoperability, confidentiality, data protection, and personnel clearance. Such safeguards help to bolster trust that information will be used for public good. When this system is in place, the population register is a valuable method to improve national and local administration. Furthermore, the population database is a source of data for in-depth and long-term cohort studies designed to answer important public policy questions. For example, the Danish population register is the source for research of a wide range of topics,<sup>62</sup> including analysis of twinning rates,<sup>63</sup> effect of smoking

on fetal and neonatal survival,<sup>64</sup> socioeconomic determinants of adult mortality,<sup>65</sup> and risk factors for suicide in young people.<sup>66</sup>

Even without a comprehensive population register, availability of individual identifiers for health care enables record linkage, for example by use of computerised algorithms to link death certificates of reproductive-aged women with maternal identifiers for birth and fetal death certificates,<sup>67</sup> or to compare records between death registry and hospital discharge databases.<sup>68</sup> This development has enabled more complete identification of all maternal deaths, reductions of misreports, and more accurate monitoring of the maternal mortality ratio, and has contributed to improved understanding of causes and circumstances of maternal deaths.

### CRVS and individual identity systems

Many countries are seeking to establish functional systems of identity management. Historically, the CRVS infrastructure, with its protected archival records of vital events, has provided the foundation for individual identity management, and has been of well documented value in the aftermath of catastrophes when people need to be able to establish their identity to reunite with family and to access social services. For example, after Typhoon Haiyan in 2013 in the Philippines, many individuals lost their civil registration documents, which are crucial to obtain government benefits and access basic services. The situation was particularly acute for surviving children and adolescents, who were vulnerable to human trafficking and other related child protection issues. Although many local civil registration offices lost their equipment and records, the well maintained central archives enabled rapid issuance of replacements for damaged or lost birth, marriage, and death certificates.<sup>17</sup>

In the past 10 years, growing demands for improved individual identity management, often driven by security concerns and a desire to reduce duplication and wastage in service delivery and social security disbursements, have led to development of standalone population identification schemes that use electronic individual identification with biometrics.<sup>69</sup> Perhaps the best known, and certainly the largest, example is India's Universal Identification (UID) programme, an electronic database of more than 1 billion residents established to improve delivery of government services, to reduce fraud and corruption, to create robust voting processes, and to improve security.<sup>70</sup> The Indian UID is privately run and not linked to the civil registration system managed by the Registrar General and Census Commissioner, and is thus not part of the national statistical system. This issue has led to some confusion; the UID is essentially an identity infrastructure designed to authenticate individual identity, not to confer rights and privileges such as citizenship and its associated benefits. Enrolment starts at the age of 5 years because biometric identification is rarely feasible in infants. Once issued, the unique identification is fixed for life and is not affected by

For India's Universal Identification programme see <http://uidai.gov.in/>

## Panel 2: Regional civil registration and vital statistics (CRVS) initiatives

### Africa

Substantial mobilisation of countries and political branches of government has already been accomplished in Africa through the Africa Programme on Accelerated Improvement of CRVS (APAI CRVS) led by the UN Economic Commission for Africa (ECA), the African Union Commission (AUC), and the African Development Bank, supported by different UN agencies, and regional and international organisations.<sup>72</sup> The programme has high-level political endorsement, and the Second Conference of Africa Ministers Responsible for Civil Registration, held in Durban, South Africa, on Sept 6–7, 2012, endorsed the recommendation of experts that all African countries should conduct comprehensive country assessments of their CRVS systems and formulate country-owned, concrete, and time-bound national action plans for improvement of CRVS systems.<sup>73</sup> APAI CRVS is supported by a medium-term regional CRVS plan from 2011 to 2015. An updated regional plan for the period 2016–2020 was endorsed at the Third Conference of African Ministers responsible for Civil Registration (Feb 9–13, 2015, Côte d'Ivoire). APAI CRVS is now a permanent ministerial forum under the AUC. High demand is being received from countries for technical support for assessments, derivation of strategic, prioritised, and costed CRVS development plans, and for training in CRVS data collection, analysis, and use.

### The Asia–Pacific region

The Asia–Pacific region, under the auspices of the UN Economic and Social Commission for Asia and the Pacific (ESCAP), with support from UN agencies and regional organisations, has developed a regional programme for CRVS, which was endorsed at a high-level meeting of decision makers from national statistical organisations, civil registration offices, ministries of health, and other relevant stakeholders in December, 2012.<sup>74</sup> A core element of the regional plan is establishment of a regional support mechanism to respond to high demand from countries for technical support for assessments, national CRVS development plans, and training. In 2014, in response to a UN ESCAP Commission Resolution, a Ministerial Conference on Civil Registration and Vital Statistics in Asia and the Pacific took place, attended by 22 ministers and senior representatives from the registration, health and statistics sectors, and civil society.<sup>74</sup> The conference declared 2015–24 to be the CRVS Decade for Asia and the Pacific. Delegations agreed ambitious goals to be achieved by 2024 and the importance of political commitment across sectors, and reaffirmed the need for an all-of-government approach to strengthening of CRVS.

In the Pacific Islands—some of the smallest and most remote countries in the world—registration and counting of each vital event in a timely way can be especially challenging owing to vast distances between islands and the scarcity of reliable and

continuous communications. In response, the Pacific Vital Statistics Action Plan was developed with support from the Brisbane Accord Group (BAG), which brings together agencies, academia, donors, and development partners in the Pacific region.<sup>47</sup> The BAG has supported 15 Pacific countries and territories, of which 90% had undertaken a comprehensive assessment of CRVS, and 39% had developed a national improvement plan by 2015. After the ministerial meeting, a partnership was announced between ESCAP and the Bloomberg Philanthropies to integrate a gender equity component into the regional initiative.

### Eastern Mediterranean

The WHO eastern Mediterranean regional CRVS strategy was endorsed by health ministers at the regional committee meeting in October, 2013. Development of the regional strategy involved country consultation, with representatives from ministries of health, statistics, registration, justice, and the interior. The regional strategy has support from key agencies working in the region, including WHO, UNICEF, UNFPA, and UN ESCAP.<sup>75</sup> The League of Arab States has affirmed its commitment to improvement of CRVS in the region and to development of a regional strategic plan for CRVS. Of the 22 countries in the region, all have completed rapid CRVS assessments and five have gone on to do comprehensive assessments and develop national improvement plans.

### The Americas

The Inter-American Development Bank has worked on civil registration issues for a decade, and finances projects that seek to improve interconnectivity and interoperability between civil registries and vital statistics agencies to ensure timely and complete reporting of vital events as part of the Institutions for Growth and Social Welfare Strategy, approved in 2011. Two of the pillars of the strategy are registry and identity management, and national statistics systems.<sup>76</sup> The Pan American Health Organization developed a Regional Plan of Action for Strengthening Vital and Health Statistics in 2008,<sup>77</sup> and its implementation in countries is well advanced. Each country set a target for improvement of registration coverage depending on the baseline. So far, 11 of 25 countries have reached or surpassed their targets. Key features of CRVS in the region are the important role of the health sector in notification and official certification of vital events, and its strong collaboration with national statistics offices in data compilation, analysis, and dissemination. However, despite regional momentum, for countries with the least developed CRVS systems, to ensure that registration is available to all people is difficult, owing to poverty and remoteness of many communities. Furthermore, although considerable gains have been made in registration of births, incentives and capacities to register and count all deaths and causes of death need to be strengthened.

changes of identity status such as from marriage, divorce, and adoption. The UID system has been outsourced to non-Indian companies, which has raised concerns from security and privacy perspectives. In 2014, an initiative was launched to integrate this identification system with the civil registration system, with the civil registration system as the primary and authentic government source to update the national population register database.<sup>17</sup>

Many other countries with weak or dysfunctional CRVS systems, including some of the poorest in the world, invest in establishment of national identifications, often at high cost. Biometric identity cards are increasingly used for delivery of government services. Expensive biometric voter registration has become much more common. However, use of such systems raises several concerns from legal, privacy, security, and human rights perspectives. Evaluation and documentation of such experiences would help to identify ways to maximise potential benefits of linkages between CRVS, population registers, and systems for individual identification.

We make the case that establishment of systems of unique personal identifiers, including biometrics, should be based on CRVS and start at the birth of each individual rather than being established as separate systems as people become eligible for particular services. The foundational document for all identification systems should be the birth certificate. This position was emphasised in the statement that followed the First International Identity Management Conference that took place in Seoul, South Korea, in September, 2014.<sup>71</sup>

Death registration is equally important because it enables removal of individuals from the population register and identification system, which is important because identification systems are used to update electoral registers and for distribution of goods and services. The population register and individual identification system should be seen as logical extensions of CRVS, which is the only mechanism that provides registration, identification, and statistical functions from start to end of life.

#### Sustained partner engagement for capacity development

Increased country commitment to CRVS has been accompanied by growing engagement of donors, UN agencies, academic partners, and regional initiatives. Initially, several countries benefitted from start-up technical or financial support from the Health Metrics Network at WHO and the Health Information Systems Knowledge Hub at the University of Queensland, but both ceased operations in 2013. Continued support for country assessment and planning has come from regional bodies, including the UN Economic Commission for Africa (ECA), the UN Economic and Social Commission for Asia and the Pacific, the Brisbane Accord Group, the Secretariat of the Pacific Community, and WHO regional offices (panel 2).<sup>47,72-83</sup>

As of November, 2014, 25 countries identified as priorities by the COIA<sup>52</sup> are finalising or have completed national CRVS plans. Capacity development and financial inputs will be needed during the start-up phases of implementation and for documentation, monitoring, and evaluation of progress. Methods have been developed to guide country assessments,<sup>84-87</sup> enable uptake of best practices,<sup>88</sup> estimate costs, formulate investment cases,<sup>89,90</sup> and improve quality of mortality registration, crucial assessment of data quality and plausibility, and cause-of-death ascertainment.<sup>91-96</sup> Of particular value to countries with weak capacities for implementation of ICD are methods designed to improve quality of cause-of-death coding and to enable countries unable to code to ICD 3 or 4 digits to report causes of death according to a simplified ICD structure.<sup>97,98</sup>

Regional initiatives have had an essential advocacy role and helped to generate political commitment at ministerial levels. These initiatives have established mechanisms for exchange of experiences and sharing of technical knowledge and expertise, and have drawn attention to the need to adapt available worldwide CRVS standards to regional challenges. For example, the ECA is developing operational guidance for registration of deaths, with particular reference to Africa. Modernisation of existing guidance and methods is likewise important; UN guidance for computerisation of CRVS dates from 1998, and is seriously outdated in view of fast-moving technical advances.<sup>99</sup> The vast potential of information technologies to accelerate progress of registration, identity management, production, sharing, and use of vital statistics needs to be harnessed. International standards of legislation, unique identifiers, interoperability, data protection, privacy, and confidentiality are likewise urgently needed. The development community has a key part to play.

Taken together, these advocacy, awareness-creation, methods-development, and coalition-building efforts (panel 3)<sup>100-121</sup> suggest an acceleration of momentum for CRVS. Although not yet shown by improved CRVS coverage and quality, these activities should enable measurable progress in the near future. In November, 2014, Asia-Pacific countries began a decade of action to improve CRVS. Countries have set ambitious goals for 2015-24: to achieve universal registration of births, deaths, and other vital events; to provide all individuals with legal documentation of civil registration of vital events; and to generate accurate, complete, and timely vital statistics (including for causes of death), on the basis of registration records.<sup>122</sup> Ability to monitor progress towards goals such as these will be essential, as argued in the paper by Mikkelsen and colleagues<sup>9</sup> in this Series.

#### CRVS and the data revolution

The so-called new data revolution<sup>7</sup> has been described as the following: “a technology revolution”; “open data”; “capacity building in national statistics agencies”; “a big survey push”; and “a focus on data use”.<sup>123-126</sup> To clarify matters, the UN Secretary-General created an Independent

For the Health Metrics Network at WHO see <http://www.who.int/healthmetrics/en/>

For the Health Information Systems Knowledge Hub see <http://www.uq.edu.au/hishub/>

**Panel 3: Major milestones in civil registration and vital statistics (CRVS) progress throughout the past decade****2003**

- WHO Director-General Jong-wook Lee says "To make people count, we first need to be able to count people."<sup>100</sup>

**2004**

- Health Metrics Network (HMN) established to strengthen health information systems

**2005**

- HMN framework for health information systems includes strong focus on CRVS<sup>101</sup>
- *Bulletin of the World Health Organization* paper provides first detailed assessment of quality of mortality and cause-of-death reporting from CRVS systems<sup>102</sup>

**2006**

- First Monitoring of Vital Events (MoVE) initiative established by HMN to produce a series of papers about the importance of CRVS

**2007**

- *The Lancet* "Who counts?" series draws attention to the so-called scandal of invisibility<sup>1</sup>
- WHO Director-General Margaret Chan, in an address to WHO staff (Nov 12, 2007) says "Without these health data (from CRVS) we have no reliable way of knowing whether interventions are working, and whether development aid is producing the desired health outcomes"<sup>103</sup>
- Publication of WHO verbal autopsy standards designed to introduce more consistency and cross-comparability of verbal autopsy-derived mortality data<sup>31</sup>
- Publication of CD-ROM compilation of CRVS-related tools and guidelines<sup>104</sup>

**2008**

- Health Information Systems Knowledge Hub (UQ HISHub) at the University of Queensland School of Population Health established and immediately prioritises CRVS and CRVS tools development

**2009**

- Expert Group workshop on CRVS organised by UN Economic Commission for Africa<sup>105</sup>
- UN Economic and Social Commission for Asia and the Pacific (ESCAP) Committee on Statistics addresses CRVS<sup>106</sup>

**2010**

- HMN MoVE-IT initiative supports country improvement projects in more than 14 country settings<sup>107</sup>
- Sixth Africa Symposium for Statistical Development (Cairo, Egypt; November, 2010) prioritises CRVS<sup>108</sup>
- First Conference of African Ministers Responsible for Civil Registration (Addis Ababa, Ethiopia; Aug 13–14, 2010)<sup>109</sup>
- Secretariat of the Pacific Community University of Queensland

- Brisbane Accord Group (BAG) established to coordinate and lead support for CRVS development in the Pacific
- Publication of UQ HISHub and Australia Bureau of Statistics guide on development of a business case for CRVS
- Publication of WHO/UQ HISHub/HMN CRVS assessment and strategic planning tools

**2011**

- ESCAP high-level meeting passed a resolution on CRVS and endorsed the framework for a regional strategy<sup>110</sup>
- Pacific Vital Statistics Action Plan developed by BAG endorsed by health ministers<sup>47</sup>
- Commission on Information and Accountability for Women's and Children's Health (COIA) prioritises CRVS<sup>52</sup>

**2012**

- Publication of the 2010 Global Burden of Disease Study of global and regional mortality by major causes and age groups, which identifies the need to strengthen country CRVS systems<sup>111</sup>
- Seventh Africa Symposium for Statistical Development (Durban, South Africa) adopts 6-year plan for CRVS<sup>112</sup>
- Second ministerial meeting on CRVS in South Africa addresses the need to improve human resources and infrastructure for CRVS in African countries
- Publication of UQ HISHub handbook for doctors on cause of death ascertainment
- First report of the COIA Independent Expert Review Group (iERG) identifies key actions needed to improve CRVS<sup>52</sup>
- WHO develops simplified verbal autopsy instrument to facilitate routine application, including in CRVS systems

**2013**

- WHO/UQ HISHub/HMN comprehensive CRVS Resource Kit published
- CRVS Global Summit calls for establishment of a global alliance for CRVS
- UN Human Rights Council Resolution on birth registration draws attention to the importance of birth registration and vital statistics for human rights, child protection, and humanitarian planning<sup>113</sup>
- ESCAP Commission Resolution calls for ministerial-level meeting on CRVS in 2014<sup>114</sup>
- Establishment of ESCAP Regional Steering Group to guide development and implementation of the ESCAP regional plan for CRVS<sup>115</sup>
- WHO Eastern Mediterranean Regional Office technical meetings on CRVS and adoption by the EMR Regional Committee of the Regional Strategy for the improvement of CRVS<sup>116</sup>
- First costing study on CRVS developed<sup>117</sup>
- Institute for Health Metrics and Evaluation Global Health Metrics Forum includes a session on CRVS
- Second report of the iERG draws attention to slow progress in improvement of CRVS

(Continues on next page)



(Panel 3 continued from previous page)

- WHO/Government of Canada/World Bank/UNICEF meeting on guiding principles and good practices for health sector contributions to CRVS improvements<sup>34</sup>

#### 2014

- UN Statistics Division issues revised principles and recommendations for CRVS<sup>11</sup>
- World Bank produces CRVS scaling-up investment plan, which is discussed at a meeting of countries and development partners in Addis Ababa<sup>16</sup>
- Establishment of UN interagency coordination group for CRVS
- WHO meeting on mortality statistics in the era of CRVS<sup>56</sup>
- First meeting of civil registrars in the Asia-Pacific region takes place with support from UNICEF, ESCAP, UNHCR, WHO, Plan International, and the EU
- The World Bank Group and Governments of Canada, Norway, and USA announce creation of a Global Financing Facility to mobilise support for developing countries' plans to accelerate progress on the health-related Millennium Development Goals (MDGs); a special focus area is to support countries to expand CRVS efforts towards universal registration of births and deaths by 2030<sup>18</sup>
- UNHCR publishes a Global Plan of Action to end statelessness, calling for inter alia birth registration and issuance of nationality documentation to those entitled to it<sup>19</sup>

- Ministerial Meeting on CRVS in Asia and the Pacific declares the years 2015–24 to be the CRVS decade for Asia and the Pacific, and identifies regional goals and targets<sup>73</sup>
- Civil Society Forum for the Ministerial Conference on CRVS in Asia and the Pacific (Bangkok, Thailand; November, 2014)
- US Secretary Hillary Clinton and Mayor Michael Bloomberg announce a partnership with ESCAP to ensure that regional efforts to improve CRVS focus on challenges faced by women and girls to obtain legal identity and inclusion in official statistics<sup>120</sup>

#### 2015

- 10th African Symposium on Statistical Development reviews progress in CRVS development and maintains CRVS as a key priority
- Third Conference of African Ministers responsible for Civil Registration held Feb 9–13, 2015, Côte d'Ivoire included participation by ministers of health
- UNHRC calls for birth registration as "part of a comprehensive civil registration system that facilitates the development of vital statistics and the effective planning and implementation of programmes and policies intended to promote better governance and to achieve internationally agreed development goals"<sup>121</sup>
- Bloomberg Philanthropies launches \$100 Million Data for Health Program in Developing Countries, which includes strengthening of CRVS as a major priority

Expert Advisory Group on a Data Revolution for Sustainable Development that, in its report—*A World that Counts*—called for investments in innovation, national statistical capacity development, increased political commitment, and effective coordination and partnerships nationally and internationally.<sup>84</sup>

Whatever the eventual scope and content of the data revolution, stronger CRVS systems should clearly be central elements. CRVS systems enable real-time production of statistics for population change, survival, and inequities of mortality risks. CRVS systems generate both the numerators (vital events) and denominators (such as livebirths, population counts, and total deaths) that enable the calculation of indicators such as infant and maternal mortality. These indicators are needed to identify population health and education needs, to better understand mortality and burden of disease, and to accurately measure health trends. Uniquely, CRVS systems not only produce better statistics than other data strategies, but also provide improved individual rights, equity, and accountability in a way that no other data strategy can do. The benefits of investment in CRVS will accrue across many sectors, including health, social protection, governance, and socioeconomic development, and will benefit individuals and families.<sup>85–87</sup> Realisation of these benefits will not be possible without

sustained and substantial support from national policy makers and from regional and global development partners. The final report in this series will consider how such support can be channelled.

#### Contributors

CAZ and ADL conceived the idea for the series and developed the outline for the series, including this paper. CAZ and DdS prepared the first draft of the paper on the basis of initial inputs from the rest of the group. All authors provided feedback, additional and new inputs and suggestions, and reviewed the final manuscript.

#### Declaration of interests

We declare no competing interests.

#### References

- 1 Setel PW, Macfarlane SB, Szreter S, et al, and the Monitoring of Vital Events (MoVE) writing group. A scandal of invisibility: making everyone count by counting everyone. *Lancet* 2007; **370**: 1569–77.
- 2 Hill K, Lopez AD, Shibuya K, Jha P, and the Monitoring of Vital Events (MoVE) writing group. Interim measures for meeting needs for health sector data: births, deaths, and causes of death. *Lancet* 2007; **370**: 1726–35.
- 3 Mahapatra P, Shibuya K, Lopez AD, et al, and the Monitoring of Vital Events writing group. Civil registration systems and vital statistics: successes and missed opportunities. *Lancet* 2007; **370**: 1653–63.
- 4 AbouZahr C, Cleland J, Coullare F, et al, and the Monitoring of Vital Events (MoVE) writing group. The way forward. *Lancet* 2007; **370**: 1791–99.
- 5 Lopez AD, AbouZahr C, Shibuya K, Gollogly L. Keeping count: births, deaths, and causes of death. *Lancet* 2007; **370**: 1744–46.
- 6 Scott JC. Seeing like a state: how certain schemes to improve the human condition have failed. New Haven: Yale University Press, 1998.

- 7 UN. A new global partnership: eradicate poverty and transform economies through sustainable development. The report of the high-level panel of eminent persons on the post-2015 development agenda. May 30, 2013. [http://www.un.org/sg/management/pdf/HLP\\_P2015\\_Report.pdf](http://www.un.org/sg/management/pdf/HLP_P2015_Report.pdf) (accessed Feb 24, 2015).
- 8 Phillips DE, Abouzahr C, Lopez AD, et al. Are well-functioning civil registration and vital statistics systems associated with better health outcomes? *Lancet* 2015; published online May 11. [http://dx.doi.org/10.1016/S0140-6736\(15\)60172-6](http://dx.doi.org/10.1016/S0140-6736(15)60172-6).
- 9 Mikkelsen L, Phillips DE, Abouzahr C, et al. A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. *Lancet* 2015; published online May 11. [http://dx.doi.org/10.1016/S0140-6736\(15\)60171-4](http://dx.doi.org/10.1016/S0140-6736(15)60171-4).
- 10 Abouzahr C, de Savigny D, Mikkelsen L, et al. Towards universal civil registration and vital statistics systems: the time is now. *Lancet* 2015; published online May 11. [http://dx.doi.org/10.1016/S0140-6736\(15\)60170-2](http://dx.doi.org/10.1016/S0140-6736(15)60170-2).
- 11 United Nations Department of Economic and Social Affairs. UN Principles and Recommendations for a Vital Statistics System Revision 3. New York: United Nations International Children's Emergency Fund, 2014. <http://unstats.un.org/unsd/demographic/standmeth/principles/default.htm> (accessed Feb 24, 2015).
- 12 UNICEF. A passport to Protection: a guide to birth registration programming. New York: United Nations International Children's Emergency Fund, 2013. [http://www.unicef.org/media/files/UNICEF\\_BRHandbook\\_Web\\_single\\_pages.pdf](http://www.unicef.org/media/files/UNICEF_BRHandbook_Web_single_pages.pdf) (accessed Feb 24, 2015).
- 13 Harbitz M, Del Carmen Tamargo M. The significance of legal identity in situations of poverty and social exclusion: the link between gender, ethnicity, and legal identity. Technical Note. New York: Inter-American Development Bank, 2009.
- 14 UNICEF. Every Child's Birth Right; inequities and trends in birth registration. New York: United Nations International Children's Emergency Fund, 2013. [http://www.unicef.org/media/files/Embargoed\\_11\\_Dec\\_Birth\\_Registration\\_report\\_low\\_res.pdf](http://www.unicef.org/media/files/Embargoed_11_Dec_Birth_Registration_report_low_res.pdf) (accessed Feb 24, 2015).
- 15 WHO. 2012 World health statistics. Geneva: World Health Organization, 2014. [http://www.who.int/gho/publications/world\\_health\\_statistics/2012/en/](http://www.who.int/gho/publications/world_health_statistics/2012/en/) (accessed Feb 24, 2015).
- 16 World Bank, WHO. Global civil registration and vital statistics: scaling-up investment plan 2014–2025. May 28, 2014. <http://www.worldbank.org/content/dam/Worldbank/document/HDN/Health/CRVS%20Scaling-up%20plan%20final%205-28-14web.pdf> (accessed Feb 24, 2015).
- 17 Abouzahr C, Azimi SY, Bersales LGS, et al. Strengthening civil registration and vital statistics in the Asia–Pacific region: learning from country experiences. *Asia Pac Popul J* 2014; 29: 39–73.
- 18 Office of the Registrar General, India. Vital Statistics of India Based on the Civil Registration System 2011. August, 2013. [http://www.censusindia.gov.in/2011-Documents/CRS\\_Report/CRS\\_Report\\_2010.pdf](http://www.censusindia.gov.in/2011-Documents/CRS_Report/CRS_Report_2010.pdf) (accessed Feb 24, 2015).
- 19 Bah S. Multiple forces working in unison: the case of rapid improvement of vital statistics in South Africa post-1996. *World Health Popul* 2009; 11: 50–59.
- 20 Statistics South Africa. Recorded live births 2011. Aug 16, 2012. <http://www.statssa.gov.za/publications/p0305/p03052011.pdf> (accessed Feb 24, 2015).
- 21 UN Economic and Social Commission for Western Asia. Technical Report of the Status of Civil Registration and Vital Statistics in the ESCWA Region. United Nations, 2009. <http://unstats.un.org/unsd/demographic/CRVS/Technical%20report%20ESCWA%20Final.pdf> (accessed Feb 24, 2015).
- 22 Szwarcwald CL, Neto OLM, Frias PG, de Souza Júnior PRB. Infant mortality rate in Brazil, 2000–10: correction of vital statistics based on a proactive search of deaths and livebirths. *Lancet* 2013; 381: S140.
- 23 Nojilana B, et al. Quality of cause of death certification at an academic hospital in Cape Town, South Africa. *S Afr Med J* 2009; 99: 648–52.
- 24 Rampatige R, Gamage S, Peiris S, Lopez AD. Assessing the reliability of causes of death reported by the Vital Registration System in Sri Lanka: medical records review in Colombo. *HIMJ* 2013; 42: 20–28.
- 25 WHO. International statistical classification of diseases and related health problems, 10th revision. Geneva: World Health Organization, 2010. <http://www.who.int/classifications/icd/en/> (accessed Feb 24, 2015).
- 26 WHO, The University of Queensland, Health Metrics Network. Strengthening civil registration and vital statistics for births, deaths and causes of death: resource kit. Geneva: World Health Organization, 2013. [http://www.who.int/healthinfo/CRVS\\_ResourceKit\\_2012.pdf](http://www.who.int/healthinfo/CRVS_ResourceKit_2012.pdf) (accessed Feb 24, 2015).
- 27 Abouzahr C, Mikkelsen L, Rampatige R, Lopez AD. Mortality statistics: a tool to improve understanding and quality. Working Paper No. 13. Brisbane, Australia: University of Queensland School of Population Health, Health Information Systems Knowledge Hub, 2010. <http://www.uq.edu.au/hishub/docs/WP13/HISHUB-WP13-SUMM-05-WEB%2015%2004%2013.pdf> (accessed Feb 24, 2015).
- 28 Rampatige R, Mikkelsen L, Prado B, Riley I, Lopez AD. Assessing the reliability of hospital-based cause-of-death statistics: evidence-based guidelines for country application. Brisbane, Australia: Capacity Building Tool, University of Queensland School of Population Health, Health Information Systems Knowledge Hub, 2013. [http://www.uq.edu.au/hishub/docs/WP37/MR\\_Review\\_WP37.pdf](http://www.uq.edu.au/hishub/docs/WP37/MR_Review_WP37.pdf) (accessed Feb 24, 2015).
- 29 Murray CJL, Lopez AD, Barofsky JT, Bryson-Cahn C, Lozano R. Estimating population cause-specific mortality fractions from in-hospital mortality: validation of a new method. *PLoS Med* 2007; 4: e326.
- 30 Murray CJL, Rajaratnam JK, Marcus J, Laakso T, Lopez AD. What can we conclude from death registration? Improved methods for evaluating completeness. *PLoS Med* 2010; 7: e1000262.
- 31 WHO. Verbal autopsy standards: ascertaining and attributing causes of death. The 2012 WHO verbal autopsy instrument. Geneva: World Health Organization, 2012. <http://www.who.int/healthinfo/statistics/verbalautopsystandards/en/> (accessed Feb 24, 2015).
- 32 Lopez AD, Lozano R, Murray CJL, Shibuya K, eds. Verbal autopsy: innovations, applications, opportunities—improving cause of death measurement. A thematic series. *Popul Health Metr* 2011; 9: 18–50.
- 33 Lopez A, Thomason J. Civil registration and vital statistics—everybody's business but nobody's business. *Lancet* 2013; 381: 1275–76.
- 34 Skiri H, Kumbaro M T, Abelsaeth A, et al. How to modernise a Civil Registration System: the case of Albania. Oslo: Statistics Norway, 2012. [http://www.ssb.no/english/subjects/00/90/doc\\_201232\\_en/doc\\_201232\\_en.pdf](http://www.ssb.no/english/subjects/00/90/doc_201232_en/doc_201232_en.pdf) (accessed Feb 24, 2015).
- 35 Statistics Norway Department of Social Statistics, Albanian Ministry of Local Government and Decentralisation. Selected Documents on the modernisation of the Civil Registration System in Albania. Oslo: Statistics Norway, 2012. [http://www.ssb.no/english/subjects/02/90/doc\\_200402\\_en/doc\\_200402\\_en.pdf](http://www.ssb.no/english/subjects/02/90/doc_200402_en/doc_200402_en.pdf) (accessed Feb 24, 2015).
- 36 WHO. Investing in the potential of Bangladesh's Civil Registration and Vital Statistics System. A draft investment plan prepared for the CRVS technical consultation meeting. Addis Ababa, 28–29 April 2014. A CRVS project sponsored by Canadian DFATD and WHO. [http://www.who.int/healthinfo/civil\\_registration/TechnicalConsultation\\_April2014/en/](http://www.who.int/healthinfo/civil_registration/TechnicalConsultation_April2014/en/) (accessed April 13, 2015).
- 37 Szwarcwald CL. Strategies for improving the monitoring of vital events in Brazil. *Int J Epidemiol* 2008; 37: 738–44.
- 38 WHO. MOVE-IT: report on monitoring of vital events using information technology. World Health Organization, Health Metrics Network, University of Oslo, and HSP India, 2013. [http://www.who.int/healthinfo/civil\\_registration/crvs\\_report\\_it\\_2013.pdf?ua=1](http://www.who.int/healthinfo/civil_registration/crvs_report_it_2013.pdf?ua=1) (accessed April 1, 2015).
- 39 Naidu S, Buttsworth M, Aumua A. Strengthening civil registration and vital statistics systems in the Pacific: the Fijian experience. Working Paper No. 35. Brisbane: Health Information Systems Knowledge Hub, School of Population Health, The University of Queensland, August, 2013. [http://www.uq.edu.au/hishub/docs/WP35/WP35\\_civil%20reg\\_fiji\\_web.pdf](http://www.uq.edu.au/hishub/docs/WP35/WP35_civil%20reg_fiji_web.pdf) (accessed Feb 24, 2015).
- 40 Dababneh F, Nichols EK, Asad M, Haddad Y, Notzon F, Anderson R. Improving mortality data in Jordan: a 10 year review. *Bull World Health Organ* (in press).
- 41 WHO. CRVS investment planning. Technical Consultation. Addis Ababa, 28–29 April 2014. [http://www.who.int/healthinfo/civil\\_registration/TechnicalConsultation\\_April2014/en/](http://www.who.int/healthinfo/civil_registration/TechnicalConsultation_April2014/en/) (accessed April 1, 2015).
- 42 Hufana L, Cajita J, Morante L et al. Assessing the production, quality and use of national vital statistics: a case study of the Philippines. Brisbane: University of Queensland Health Information Systems Knowledge Hub, November, 2009. <http://www.uq.edu.au/hishub/docs/DN02/HISHUB-DN02-06-WEB-7Mar12.pdf> (accessed Feb 24, 2015).

- 43 The Philippines Civil Registration and Vital Statistics Indicative Investment Plan 2015–2019. Draft for consultation at CRVS technical consultation meeting, Addis Ababa, 28–29 April, 2014. A CRVS project sponsored by Canadian DFATD and World Bank.
- 44 Bradshaw D, Schneider M. Vital registration and statistics in South Africa: case study metropolitan Cape Town. Cape Town: Medical Research Council, 1995.
- 45 Navaratne KV. Improving vital statistics through the Civil Registration System in Sri Lanka. Health Sector Development Project, 2009. <http://siteresources.worldbank.org/INT/HSR/Resources/376278-1114111154043/1011834-1247677403598/060909SriLankaPresentation.pdf> (accessed Feb 24, 2015).
- 46 WHO. Summary report: Civil Registration & Vital Statistics (CRVS) investment planning—technical consultation meeting. Addis Ababa, 28–29 April, 2014 United Nations Conference Center. Geneva: World Health Organization, April, 2014. [http://www.who.int/healthinfo/civil\\_registration/crvs\\_meetingreport\\_april2014.pdf?ua=1](http://www.who.int/healthinfo/civil_registration/crvs_meetingreport_april2014.pdf?ua=1) (accessed Feb 24, 2015).
- 47 The Brisbane Accord Group and the Pacific Vital Statistics Action Plan. Outline document. 2011. <http://www.spc.int/sdd/index.php/en/component/search/vital%2Bstatistics?ordering=newest&searchphrase=all&limit=20> (accessed Feb 24, 2015).
- 48 The Brisbane Accord Group. Progress in the Pacific: CRVS achievements and challenges in the Pacific Islands. Ministerial Conference on Civil Registration and Vital Statistics in Asia and the Pacific. Bangkok, Thailand, 24–28 Nov, 2014.
- 49 Muzzi M. UNICEF good practices in integrating birth registration into health systems (2000–2009): case studies: Bangladesh, Brazil, the Gambia and Delhi, India. Working Paper. New York: United Nations Children's Fund, January, 2010. [http://www.unicef.org/protection/files/Birth\\_Registration\\_Working\\_Paper.pdf](http://www.unicef.org/protection/files/Birth_Registration_Working_Paper.pdf) (accessed Feb 24, 2015).
- 50 US Centers for Disease Control and Prevention. United States National Center for Health Statistics Civil Registration and Vital Statistics (CRVS) Improvement Project. [http://www.cdc.gov/nchs/isp/isp\\_crvs.htm](http://www.cdc.gov/nchs/isp/isp_crvs.htm) (accessed Feb 24, 2015).
- 51 Ngoma C, Marlen SC, Herstad J. e-infrastructure and e-services for developing countries. Cape Town, South Africa: Springer Berlin Heidelberg, 2011. 79.
- 52 WHO. Keeping promises, measuring results. Commission on Information and Accountability for Women's and Children's Health. Geneva: World Health Organization, 2011. [http://www.who.int/topics/millennium\\_development\\_goals/accountability\\_commission/Commission\\_Report\\_advance\\_copy.pdf?ua=1](http://www.who.int/topics/millennium_development_goals/accountability_commission/Commission_Report_advance_copy.pdf?ua=1) (accessed April 1, 2015).
- 53 The Society of Obstetricians and Gynaecologists of Canada. Prime Minister announces details of Global Summit: "Saving Every Woman Every Child: Within Arm's Reach". [http://sogc.org/news\\_items/prime-minister-announces-details-of-global-summit-saving-every-woman-every-child-within-reach/](http://sogc.org/news_items/prime-minister-announces-details-of-global-summit-saving-every-woman-every-child-within-reach/) (accessed April 1, 2015).
- 54 Tangcharoensathien V, Limwattananon S, Patcharanarumol W, Thammatacharee J. Monitoring and evaluating progress towards Universal Health Coverage in Thailand. *PLoS Med* 2014; 11: e1001726.
- 55 United Nations General Assembly. Prevention and control of non-communicable disease. New York: United Nations, 2010. [http://www.who.int/mediacentre/news/notes/2010/noncommunicable\\_diseases\\_20100514/en/index.html](http://www.who.int/mediacentre/news/notes/2010/noncommunicable_diseases_20100514/en/index.html) (accessed Feb 24, 2015).
- 56 WHO. Improving mortality statistics through civil registration and vital statistics systems. Strategies for country and partner support. Geneva: World Health Organization, 2014. [http://www.who.int/healthinfo/civil\\_registration/CRVS\\_MortalityStats\\_Guidance\\_Nov2014.pdf?ua=1](http://www.who.int/healthinfo/civil_registration/CRVS_MortalityStats_Guidance_Nov2014.pdf?ua=1) (accessed Feb 24, 2015).
- 57 Health Metrics Network. Corporate plan. Geneva: World Health Organization, 2011. <http://www.who.int/healthmetrics/news/roadmap.pdf> (accessed Feb 24, 2015).
- 58 HMN. Health Metrics Network MOVE-IT country projects in Africa and Asia. Health Metrics Network, Aug 15, 2012. [http://www.who.int/healthmetrics/move\\_it/move-it\\_projects\\_1582011\\_final.pdf](http://www.who.int/healthmetrics/move_it/move-it_projects_1582011_final.pdf) (accessed April 1, 2015).
- 59 Kabadi G, Mwanyika H, de Savigny D. Innovations in monitoring vital events. Mobile phone SMS support to improve coverage of birth and death registration—a scalable solution. Working Paper No.31. Brisbane, Australia: Health Information Systems Knowledge Hub, University of Queensland, Australia, August, 2013.
- 60 WHO. Volunteers vital for counting births and deaths in Ghana. *Bull World Health Organ* 2011; 89: 322–23.
- 61 University of Oslo, HISP India, Health Metrics Network. Systematic review of eCRVS and mCRVS interventions in low and middle income countries. [http://www.who.int/healthinfo/civil\\_registration/crvs\\_report\\_ecrvs\\_mcrvs\\_2013.pdf?ua=1](http://www.who.int/healthinfo/civil_registration/crvs_report_ecrvs_mcrvs_2013.pdf?ua=1) (accessed April 1, 2015).
- 62 Pedersen CB, Gøtzsche H, Møller JØ, Mortensen PB. The Danish Civil Registration System. A cohort of eight million persons. *Dan Med Bull* 2006; 53: 441–49.
- 63 Kyvik KO, Green A, Beck-Nielsen H. The new Danish Twin Register: establishment and analysis of twinning rates. *Int J Epidemiol* 1995; 24: 589–96.
- 64 Wisborg K, Kesmodel U, Henriksen TB, Olsen SF, Secher NJ. Exposure to tobacco smoke in utero and the risk of stillbirth and death in the first year of life. *Am J Epidemiol* 2001; 154: 322–27.
- 65 Osler M, Andersen AM, Due P, Lund R, Damsgaard MT, Holstein BE. Socioeconomic position in early life, birth weight, childhood cognitive function, and adult mortality. A longitudinal study of Danish men born in 1953. *J Epidemiol Community Health* 2003; 57: 681–86.
- 66 Agerbo E, Nordentoft M, Mortensen PB. Familial, psychiatric, and socioeconomic risk factors for suicide in young people: nested case-control study. *BMJ* 2002; 325: 74.
- 67 Pallin DJ, Sundaram V, Laraque F, Berenson L, Schomberg DR. Active surveillance of maternal mortality in New York City. *Am J Public Health* 2002; 92: 1319–22.
- 68 Donati S, Senatore S, Ronconi A, and the Regional Maternal Mortality working group. Maternal mortality in Italy: a record-linkage study. *BJOG* 2011; 118: 872–79.
- 69 Gelb A, Clark J. Identification for development: the biometrics revolution. CGD Working Paper 315. Washington, DC: Center for Global Development, 2013. <http://www.cgdev.org/content/publications/detail/1426862> (accessed April 20, 2015).
- 70 Zelazny F. The evolution of India's UID program: lessons learned and implications for other developing countries. CGD Policy Paper 008. Washington, DC: Center for Global Development, 2012. <http://www.cgdev.org/content/publications/detail/1426371> (accessed April 20, 2015).
- 71 Government of Korea, African Development Bank, Asian Development Bank, Inter-American Development Bank, International Civil Aviation Authority. International Identity Management Conference, Seoul Statement. Seoul, Republic of Korea, September, 2014.
- 72 Africa Programme on Accelerated Improvement of Civil Registration and Vital Statistics (APAI-CRVS). Second Conference of African Ministers Responsible for Civil Registration. Durban, South Africa: Sept 3–8, 2012. <http://www.uneca.org/crmc2> (accessed Feb 24, 2015).
- 73 Ministerial statement of the civil registration and vital statistics conference. Durban, South Africa: 6–7 Sept, 2012. <http://www.gov.za/ministerial-statement-civil-registration-and-vital-statistics-conference-held-6-7-september-2012-icc> (accessed April 1, 2015).
- 74 Economic and Social Commission for Asia and the Pacific. Make every life count: regional strategic plan for the improvement of civil registration and vital statistics in Asia and the Pacific. Committee on Statistics Third session, Bangkok; Dec 12–14, 2012. <http://www.unescap.org/stat/cst/3/CST3-6EA1.pdf> (accessed Feb 24, 2015).
- 75 Regional Committee For The Eastern Mediterranean. Sixtieth Session Agenda item 5(b) EM/RC60/R.7. Regional strategy for the improvement of civil registration and vital statistics systems 2014–2019. October, 2013.
- 76 Harbitz M, Axt IA. Identification and governance policies: the legal, technical, and institutional foundations that influence the relations and interactions of the citizen with the government and society. Inter-American Development Bank Technical Notes series, No. IBD-TN-196. September, 2011. <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=36400828> (accessed Feb 24, 2015).
- 77 Pan American Health Organization. Regional Plan of Action for Strengthening of Vital and Health Statistics. 48th Directing Council of PAHO, 60th Session of the Regional Committee of WHO for the Americas; Washington DC, USA; Sept 29–Oct 3, 2008. <http://www1.paho.org/english/gov/cd/cd48.r6-e.pdf> (accessed Feb 24, 2015).
- 78 Secretariat of the Pacific Community, University of Queensland Health Information Systems Knowledge Hub. Pacific Vital Statistics Strategy 2011–2014. Information Paper. Ninth Meeting of Ministers of Health for the Pacific Island Countries. Honiara, Solomon Islands; June 28–July 1, 2011.

- 79 Regional Action Framework on Civil Registration and Vital Statistics in Asia and the Pacific. <http://www.getinthepicture.org/docs/Regional.Action.Framework.English.final.pdf> (accessed April 1, 2015).
- 80 The United Nations Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG). A World that Counts. Mobilising the Data Revolution for Sustainable Development. November, 2014. <http://www.undatarevolution.org/wp-content/uploads/2014/12/A-World-That-Counts2.pdf> (accessed Feb 24, 2015).
- 81 Szreter S. The right of registration: development, identity registration, and social security—a historical perspective. *World Development* 2007; 35: 67–86.
- 82 Tyler TR. Trust and democratic governance. In: Braithwaite VA, Levi M, eds. Trust and governance. New York: Russell Sage, 2003: 269–75.
- 83 Breckenridge K, Szreter S, eds. Registration and recognition: documenting the person in world history. Oxford: Oxford University Press/British Academy, 2001.
- 84 WHO, University of Queensland Health Information Systems Knowledge Hub. Rapid assessment of national civil registration and vital statistics systems. Geneva, World Health Organization, 2010. [http://whqlibdoc.who.int/hq/2010/WHO\\_IER\\_HSI\\_STM\\_2010\\_1\\_eng.pdf](http://whqlibdoc.who.int/hq/2010/WHO_IER_HSI_STM_2010_1_eng.pdf) (accessed Feb 24, 2015).
- 85 WHO, University of Queensland Health Information Systems Knowledge Hub. Improving the quality and use of birth, death and cause-of-death information: guidance for a standards-based review of country practices. Geneva: World Health Organization, 2010. <http://www.uq.edu.au/hishub/wp1> (accessed Feb 24, 2015).
- 86 Mikkelsen L. Rapid assessment of vital statistics systems: evaluation of the application of the WHO/HIS Hub tool in 26 countries in the Asia–Pacific region. Working Paper No. 10. Brisbane, Australia: University of Queensland School of Population Health, Health Information Systems Knowledge Hub, 2010. <http://www.uq.edu.au/hishub/all-publications> (accessed Feb 24, 2015).
- 87 Mikkelsen L. Improving civil registration and vital statistics systems: lessons learnt from the application of health information tools in Asia and the Pacific. University of Queensland Health Information Systems Knowledge Hub, Working Paper Series No. 24 2012. [http://www.uq.edu.au/hishub/docs/WP24/HISHUB-WP%2024\\_7%2012%2012.pdf](http://www.uq.edu.au/hishub/docs/WP24/HISHUB-WP%2024_7%2012%2012.pdf) (accessed April 1, 2015).
- 88 WHO, Health Metrics Network, University of Queensland Health Information Systems Knowledge Hub. Strengthening civil registration and vital statistics for births, deaths and causes of death: resource kit. World Health Organization, 2013. <http://www.uq.edu.au/hishub/resource-kit> (accessed Feb 24, 2015).
- 89 Australian Bureau of Statistics. Advocating for civil registration: guide to developing a business case for civil registration systems. Working Paper No. 15. Brisbane, Australia: University of Queensland School of Population Health, Health Information Systems Knowledge Hub, 2010. <http://www.uq.edu.au/hishub/wp15> (accessed Feb 24, 2015).
- 90 Health Metrics Network. The case for investment in civil registration and vital statistics systems. Geneva: World Health Organization, Nov 1, 2012. [http://www.who.int/healthmetrics/resources/CRVS\\_investment\\_case.pdf?ua=1](http://www.who.int/healthmetrics/resources/CRVS_investment_case.pdf?ua=1) (accessed Feb 24, 2015).
- 91 WHO. Analysing mortality levels and causes of death (ANACoD) Electronic Tool. Department of Health Statistics and Information Systems. Geneva: World Health Organization, 2011.
- 92 WHO. ICD-10 interactive self learning tool. <http://apps.who.int/classifications/apps/icd/icd10training/> (accessed Feb 24, 2015).
- 93 WHO. Cause of death on the death certificate in line with ICD-10: quick reference guide. Geneva: World Health Organization, 2010. [http://apps.who.int/classifications/apps/icd/icd10training/ICD-10%20Death%20Certificate/html/ICD-10\\_Resources/causeofdeathflyer.pdf](http://apps.who.int/classifications/apps/icd/icd10training/ICD-10%20Death%20Certificate/html/ICD-10_Resources/causeofdeathflyer.pdf) (accessed Feb 24, 2015).
- 94 Pavillon G, et al. IRIS: a language independent coding system for mortality data. WHO Family of International Classifications Network Meeting. Trieste, Italy; Oct 28–Nov 3, 2007.
- 95 The IRIS Institute. IRIS—Automated coding system for cause of death—version 4.5.0. <https://www.dimdi.de/static/en/klassi/irisinstitute/> (accessed April 1, 2015).
- 96 Rampatige R, et al. Handbook for doctors on cause-of-death certification. Brisbane, Australia: Health Information Systems Knowledge Hub, University of Queensland School of Population Health, 2012.
- 97 WHO. CoDEdit version 1.0. ug basic checks on cause-of-death data. Geneva: World Health Organization, 2014. [http://www.who.int/healthinfo/civil\\_registration/en/](http://www.who.int/healthinfo/civil_registration/en/) (accessed Feb 24, 2015).
- 98 WHO. The Simple Mortality List (ICD-10-SMoL) WHO/HIS/HSI/2014.6. Geneva: World Health Organization, 2014. [http://www.who.int/healthinfo/civil\\_registration/ICD\\_10\\_SMoL.pdf?ua=1](http://www.who.int/healthinfo/civil_registration/ICD_10_SMoL.pdf?ua=1) (accessed Feb 24, 2015).
- 99 UN Statistics Division. Handbook on Civil Registration and Vital Statistics systems—computerization, 1998 98.XVII.10. New York: United Nations Statistics Division, 1998. <http://nstats.un.org/unsd/demographic/standmeth/handbooks/default.htm> (accessed Feb 24, 2015).
- 100 Lee J-W. WHO Director-General, 2003–2006, address to WHO staff. July 21, 2003.
- 101 Health Metrics Network, WHO. Framework and Standards for Country Health Information Systems (2nd ed). Geneva: World Health Organization, June, 2008. [http://who.int/healthmetrics/documents/hmn\\_framework200803.pdf](http://who.int/healthmetrics/documents/hmn_framework200803.pdf) (accessed March 17, 2015).
- 102 Mathers CD, Fat DM, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bull World Health Organ* 2005; 83: 171–77.
- 103 Chan M. WHO Director-General, address to WHO staff. Nov 12, 2007.
- 104 WHO. CD-ROM Health Metrics Network (HMN): Monitoring vital events resource kit. Geneva: World Health Organization, 2007. <http://apps.who.int/bookorders/anglais/detart1.jsp?codlan=1&codcol=99&codch=36> (accessed March 17, 2015).
- 105 UNECA. International experts meet on improving civil registration and vital statistics systems in Africa. July 1, 2009. <http://www1.uneca.org/ArticleDetail/tabid/3018/ArticleId/1777/International-Experts-Meet-on-Improving-Civil-Registration-and-Vital-Statistics-Systems-in-Africa.aspx> (accessed March 17, 2015).
- 106 UNESCAP. Committee on Statistics, First Session. United Nations Economic and Social Commission for Africa and the Pacific, 2009. <http://www.unescap.org/events/committee-statistics-first-session> (accessed March 17, 2015).
- 107 WHO, HMN. MOVE-IT for the MDGs. [http://www.who.int/healthmetrics/MOVEIT\\_final\\_web\\_single\\_page.pdf](http://www.who.int/healthmetrics/MOVEIT_final_web_single_page.pdf) (accessed March 17, 2015).
- 108 UN ECA African Centre for Statistics. African civil registration and vital statistics systems. <http://ecastats.uneca.org/acsweb/FocusAreas/CRVS.aspx> (accessed March 17, 2015).
- 109 First Conference of African Ministers Responsible for Civil Registration: “Toward Improved Civil Status Information for Efficient Public Administration and Generation of Vital Statistics for National Development and MDGs Monitoring in Africa” *Afr Stat J* 2010; 11: 127–142.
- 110 UN ESCAP. ESCAP resolution 67/12 (2011). Improvement of civil registration and vital statistics in Asia and the Pacific. <http://www.unescap.org/resources/escap-resolution-67-12-2011-improvement-civil-registration-and-vital-statistics-asia-and> (accessed April 1, 2015).
- 111 Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380: 2095–128.
- 112 Lehohla PJ. Statement on the Joint 7th Africa Symposium on Statistical Development and Statistics Commission for Africa Conference. Pretoria, South Africa: Statistics South Africa, 2010. [https://www.statssa.gov.za/assd2012/statement\\_7th\\_assd.asp](https://www.statssa.gov.za/assd2012/statement_7th_assd.asp) (accessed March 17, 2015).
- 113 Executive Committee of the High Commissioner's Programme. Conclusion on civil registration. UN High Commissioner for Refugees (UNHCR), Oct 17, 2007. <http://www.refworld.org/docid/525f8ba64.html> (accessed March 17, 2015).
- 114 UN ESCAP. Resolution: implementing the outcome of the High-level Meeting on the Improvement of Civil Registration and Vital Statistics in Asia and the Pacific. Bangkok, 25 April–1 May, 2013. E/ESCAP/69/L.5. <http://www.aehin.org/Portals/0/Docs/CRVS%20Resources/Res-69-15.pdf> (accessed April 1, 2015).
- 115 UN ESCAP First meeting of the Regional Steering Group for Civil Registration and Vital Statistics in Asia and the Pacific, 9–11 December 2013. <http://www.unescap.org/events/first-meeting-regional-steering-group-civil-registration-and-vital-statistics-crvs-asia-and> (April 1, 2015).

- 116 WHO Regional Committee for the Eastern Mediterranean. Regional strategy for the improvement of civil registration and vital statistics systems 2014–2019. Geneva: World Health Organization, October, 2013. [http://applications.emro.who.int/docs/RC60\\_Resolutions\\_2013\\_R7\\_15140\\_EN.pdf](http://applications.emro.who.int/docs/RC60_Resolutions_2013_R7_15140_EN.pdf) (accessed March 17, 2015).
- 117 Cambridge Economic Policy Associates. Country CRVS investment plan costing: advisory note. June, 2014. <http://www.cepa.co.uk/publication-health-metrics-network-crvs?flBack=PB&selYear=2012> (accessed April 7, 2015).
- 118 World Bank. Development partners support the creation of global financing facility to advance women's and children's health. New York, USA: World Bank, Sept 25, 2014. <http://www.worldbank.org/en/news/press-release/2014/09/25/development-partners-support-creation-global-financing-facility-women-children-health> (accessed March 17, 2015).
- 119 UNHCR. Global Plan of Action to End Statelessness, 2014–2024. UN High Commission for Refugees, November, 2014. <http://ibelong.unhcr.org/cms-web/upl/entities/story/FINAL%20Global%20Action%20Plan%20-%20PDF%20Version.pdf> (accessed March 17, 2015).
- 120 UNESCAP. Clinton and Bloomberg announce UN partnership to help every woman and girl in Asia-Pacific realize right to legal identity. Bangkok, Thailand: UNESCAP, Dec 16, 2014. <http://www.unescap.org/news/clinton-and-bloomberg-announce-un-partnership-help-every-woman-and-girl-asia-pacific-realize> (accessed March 17, 2015).
- 121 United Nations General Assembly Human Rights Council 2015, Twenty-eighth session. Agenda item 3. Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development: birth registration and the right of everyone to recognition everywhere as a person before the law A/HRC/28/L.2.
- 122 UN ESCAP. Ministerial Conference on Civil Registration and Vital Statistics in Asia and the Pacific. Ministerial declaration to “Get every one in the picture” in Asia and the Pacific. E/ESCAP/MCCRVS/L.3. <http://www.unescap.org/news/asia-pacific-governments-declare-decade-action-achieve-universal-civil-registration> (accessed Feb 24, 2015).
- 123 Glassman A, Ezeh A. You say you want a (data) revolution? Center for Global Development Blog 7/22/1. <http://international.cgdev.org/blog/you-say-you-want-data-revolution-0> (accessed Feb 24, 2015).
- 124 Kharas H. A data revolution for the post-2015 agenda? World Bank, Future Development blog. Oct 1, 2013. <http://blogs.worldbank.org/futuredevelopment/data-revolution-post-2015-agenda> (accessed Feb 24, 2015).
- 125 Roodman D. Interpreting the data revolution: proceed with caution (Part 1). April 3, 2014. <http://post2015.org/2014/04/03/interpreting-the-data-revolution-proceed-with-caution-part-1/> (accessed Feb 24, 2015).
- 126 PARIS21. Engineering a development data revolution. UN General Assembly, Sept, 2013. <http://paris21.org/sites/default/files/UNGA%202013%20dev%20dataevent%20summary%20note%20for%20WEB%2012.9.13.pdf> (accessed Feb 24, 2015).